

IMPORTANT NOTICE

Attached please find an electronic copy of the offering circular (the “**Offering Circular**”), dated April 24, 2015, relating to the offering of the Class A Principal At-Risk Variable Rate Notes due January 8, 2020 and the Class B Principal At-Risk Variable Rate Notes due January 8, 2020 (together, the “**Notes**”) to be issued by Benu Capital Limited (the “**Issuer**”).

IMPORTANT: You must read the following disclaimer before continuing. The following disclaimer applies to the Offering Circular, and you are therefore advised to read this carefully before reading, accessing or making any other use of the Offering Circular. In accessing the Offering Circular, you agree to be bound by the following terms and conditions, including any modifications to them any time you receive any information from or on behalf of the Issuer, as a result of such access.

The Notes have not been and will not be registered under the U.S. Securities Act of 1933, as amended (the “**Securities Act**”), or any state or foreign securities laws, and are being offered pursuant to an exemption from the registration requirements of the Securities Act, and the Issuer is not and will not be registered under the U.S. Investment Company Act of 1940, as amended (the “**Investment Company Act**”). The Offering Circular does not constitute an offer to any person, other than the recipient, or to the public generally to subscribe for or otherwise acquire any of the securities described therein. The Offering Circular will not constitute an offer to sell or the solicitation of an offer to buy, nor shall there be any sale of the Notes in any jurisdiction where such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any jurisdiction.

Confirmation of your representation: In order to be eligible to view the Offering Circular or make an investment decision with respect to the Notes, investors must be (1) “**qualified institutional buyers**” as defined in Rule 144A under the Securities Act (“**Rule 144A**”) that, with respect to “**U.S. Persons**”, as defined in Rule 902(k) under the Securities Act, are also “**qualified purchasers**”, as defined in Section 2(a)(51) of the Investment Company Act and the rules and regulations thereunder, for purposes of Section 3(c)(7) of the Investment Company Act; (2) “**qualified eligible persons**” as defined in U.S. Commodity Futures Trading Commission Rule 4.7; and (3) residents of and purchasing in, and will hold the Notes in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction. By accepting the e-mail and accessing the Offering Circular, you shall be deemed to have represented to the Issuer that (1) you and any customers you represent are (i) “**qualified institutional buyers**” as defined in Rule 144A that, with respect to “**U.S. Persons**”, as defined in Rule 902(k) under the Securities Act, are also “**qualified purchasers**”, as defined in Section 2(a)(51) of the Investment Company Act and the rules and regulations thereunder, for purposes of Section 3(c)(7) of the Investment Company Act; (ii) “**qualified eligible persons**” as defined in U.S. Commodity Futures Trading Commission Rule 4.7; and (iii) residents of and purchasing in, and will hold the Notes in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction and (2) that you consent to delivery of the Offering Circular by electronic transmission.

Distribution of this electronic transmission of the Offering Circular hereto to any person other than (a) the person receiving this electronic transmission from Swiss Re Capital Markets Corporation (or Swiss Re Capital Markets Limited acting as selling agent on its behalf), Natixis, Aon Benfield Securities, Inc. (or Aon Benfield Securities Limited acting as selling agent on its behalf) and BNP Paribas, as Initial Purchasers, on behalf of the Issuer, and (b) any person retained to advise the person receiving this electronic transmission with respect to the offering contemplated by the Offering Circular (each, an “**Authorized Recipient**”) is unauthorized. Any photocopying, disclosure or alteration of the contents of the Offering Circular, and any forwarding of a copy of the Offering Circular or any portion thereof by electronic mail or any other means to any person other than an Authorized Recipient, is prohibited. By accepting delivery of the Offering Circular, each recipient hereof agrees to the foregoing.

You are reminded that documents transmitted electronically may be altered or changed during the process of electronic transmission, and consequently none of Swiss Re Capital Markets Corporation, Swiss Re Capital Markets Limited, Natixis, Aon Benfield Securities, Inc., Aon Benfield Securities Limited and BNP Paribas, the Issuer or AXA Global Life (nor any person who controls any of these nor any director, officer, employee nor agent of any of these) or any affiliate of any such person accepts any liability or responsibility whatsoever in respect of any such alteration or change. If you are not the intended recipient of this message, please delete and destroy all copies of this disclaimer and the attached Offering Circular along with any e-mail to which either may be attached.

In the United Kingdom, the Offering Circular and any other material in relation to the Notes described therein is only being distributed to, and is only directed at, persons who (i) have professional experience in matters relating to investments falling within Article 19(5) (“**Investment Professionals**”) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended) (the “**Order**”), or (ii) are high net worth entities, or other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (d) (“High net worth companies, unincorporated associations, etc.”) of the Order (all such persons together being referred to as “**Relevant Persons**”). In the United Kingdom, the Notes are offered only to Relevant Persons and no invitation, offer or agreement to subscribe, purchase or otherwise acquire the Notes may be proposed or made to persons other than Relevant Persons. Any person in the United Kingdom that is not a Relevant Person should not act and/or rely on the Offering Circular or any of its contents.

OFFERING CIRCULAR**Benu Capital Limited**

€135,000,000 Class A Principal At-Risk Variable Rate Notes due January 8, 2020
€150,000,000 Class B Principal At-Risk Variable Rate Notes due January 8, 2020

Benu Capital Limited (the “**Issuer**”) is hereby offering the €135,000,000 Class A Principal At-Risk Variable Rate Notes due January 8, 2020 (“**Class A Notes**”) and the €150,000,000 Class B Principal At-Risk Variable Rate Notes due January 8, 2020 (the “**Class B Notes**” and, together with the Class A Notes, the “**Notes**”, and each of the Class A Notes and Class B Notes, a “**Class of Notes**” or “**Class**”) under the specific terms set forth in this Offering Circular (“**Offering Circular**”). Each Class of Notes will be exposed to certain Mortality Events affecting the Covered Area during the related Risk Period as further specified herein. If one or more Mortality Events result in a Loss Payment under the Counterparty Contract applicable to a Class of Notes, all or a portion of the Outstanding Principal Amount payable on the Redemption Date to the holders of such Class of Notes (“**Holders**” or “**Noteholders**”), as well as interest accrued thereon, will be reduced by the corresponding amount payable by the Issuer to the Counterparty pursuant to such Counterparty Contract.

(Continued on the next page)

Investing in the Notes is speculative and involves a high degree of risk including the risk of a total loss of principal amount of the Notes. See “Risk Factors” beginning on page 49 of this Offering Circular for a discussion of certain factors to be considered in connection with an investment in the Notes.

THE NOTES ARE WITH LIMITED RE COURSE TO CERTAIN ASSETS OF THE ISSUER AND WITHOUT RE COURSE TO THE COUNTERPARTY OR ANY OF ITS AFFILIATES.

THE NOTES HAVE NOT BEEN AND WILL NOT BE REGISTERED UNDER THE U.S. SECURITIES ACT OF 1933, AS AMENDED (THE “SECURITIES ACT”), OR ANY STATE OR FOREIGN SECURITIES LAWS AND ARE BEING OFFERED PURSUANT TO AN EXEMPTION FROM THE SECURITIES ACT. THE ISSUER IS NOT AND WILL NOT BE REGISTERED UNDER THE U.S. INVESTMENT COMPANY ACT OF 1940, AS AMENDED (THE “INVESTMENT COMPANY ACT”). THE NOTES WILL BE OFFERED AND SOLD ONLY TO INVESTORS WHO (I) ARE “QUALIFIED INSTITUTIONAL BUYERS” WITHIN THE MEANING OF RULE 144A UNDER THE SECURITIES ACT (“RULE 144A”) THAT, WITH RESPECT TO “U.S. PERSONS”, AS DEFINED IN RULE 902(K) UNDER THE SECURITIES ACT, ARE ALSO “QUALIFIED PURCHASERS”, AS DEFINED IN SECTION 2(A)(51) OF THE INVESTMENT COMPANY ACT AND THE RULES AND REGULATIONS THEREUNDER, FOR PURPOSES OF SECTION 3(c)(7) OF THE INVESTMENT COMPANY ACT, (II) ARE QUALIFIED ELIGIBLE PERSONS (“QUALIFIED ELIGIBLE PERSONS”) AS DEFINED IN U.S. COMMODITY FUTURES TRADING COMMISSION (“CFTC”) RULE 4.7, AND (III) ARE RESIDENTS OF AND PURCHASING IN, AND WILL HOLD THE NOTES IN, A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION (AND MEET THE OTHER REQUIREMENTS SET FORTH UNDER “NOTICE TO INVESTORS” IN THIS OFFERING CIRCULAR). PROSPECTIVE PURCHASERS ARE HEREBY NOTIFIED THAT THE SELLERS OF THE NOTES MAY BE RELYING ON THE EXEMPTION FROM THE PROVISIONS OF SECTION 5 OF THE SECURITIES ACT PROVIDED BY RULE 144A. THE NOTES ARE NOT TRANSFERABLE EXCEPT IN ACCORDANCE WITH THE RESTRICTIONS DESCRIBED UNDER “NOTICE TO INVESTORS” IN THIS OFFERING CIRCULAR. EACH PURCHASER OF THE NOTES IN MAKING ITS PURCHASE WILL BE DEEMED TO HAVE MADE CERTAIN ACKNOWLEDGMENTS, REPRESENTATIONS AND AGREEMENTS AS LISTED UNDER “NOTICE TO INVESTORS” IN THIS OFFERING CIRCULAR.

This Offering Circular constitutes a prospectus for the purpose of Article 5.3 of Directive 2003/71/EC of the European Parliament and of the Council as amended (which includes the amendments made by Directive 2010/73/EU) (collectively, the “**Prospectus Directive**”) in respect of asset-backed securities within the meaning of Article 2 (5) of the Commission Regulation (EC) No. 809/2004 of 29 April 2004 and the relevant implementing provisions in Ireland. This Offering Circular has been approved by the Central Bank of Ireland (the “**Central Bank**”), as competent authority under the Prospectus Directive. The Central Bank only approves this Offering Circular as meeting the requirements imposed under Irish and EU law pursuant to the Prospectus Directive. Such approval relates only to the Notes which are admitted to trading on a regulated market for the purposes of Directive 2004/39/EC and/or which are to be offered to the public in any Member State of the European Economic Area. This Offering Circular will be filed with the Irish Companies Registration Office in accordance with Regulation 38(1)(b) of the Prospectus Directive (2003/71/EC) Regulations 2005, as amended (the “**Prospectus Regulations**”).

Application has been made to the Irish Stock Exchange, plc (the “**Irish Stock Exchange**”) for the Notes to be admitted to the Official List and trading on its regulated market, the Main Securities Market. There can be no assurance that such application will be granted or, if granted, maintained. The issuance and settlement of the Notes is not conditional on the listing of the Notes.

The Notes will be offered by Swiss Re Capital Markets Corporation, Natixis, Aon Benfield Securities, Inc. and BNP Paribas as initial purchasers of the Notes (each, an “**Initial Purchaser**”), subject to receipt and acceptance by each Initial Purchaser and subject to any Initial Purchaser’s rights to reject any order in whole or in part. The Notes will be delivered in book-entry form through the facilities of Euroclear or Clearstream against payment therefor in immediately available funds.

Lead Structuring Agent and Joint Bookrunner

Swiss Re Capital Markets

Co-Structuring Agent and Joint Bookrunner

Natixis

Joint Bookrunners

Aon Benfield Securities, Inc.

BNP Paribas

The date of this Offering Circular is April 24, 2015

(Continued from previous page)

The Issuer is an Irish special purpose company incorporated as a private company with limited liability. The purpose of the offering of the Notes described herein (the “**Offering**”) is to provide the Issuer with funds in order to collateralize its obligations under the Counterparty Contracts and to permit the Issuer to make certain payments to the Counterparty following the occurrence of certain Mortality Events as further specified herein. The business of the Issuer will consist of the issuance of the Notes, the entering into and performance of the Counterparty Contracts and related agreements and activities, including the acquisition and holding of Permitted Investments.

The proceeds of the sale of the Class A Notes will be deposited into a segregated Collateral Account established with respect to the Class A Notes and the proceeds of the sale of the Class B Notes will be deposited into a segregated Collateral Account established with respect to the Class B Notes. All such proceeds will be used one (1) Business Day after the Issuance Date to purchase unsecured notes issued by the European Bank for Reconstruction and Development pursuant to its existing Global Medium Term Note Programme. See “*Use of Proceeds and Permitted Investments*.”

Subject to the occurrence of an Early Redemption Event, Optional Redemption or Extension Event, each Class of Notes is scheduled to mature on the Scheduled Redemption Date at a redemption price equal to the Repayment Amount. See “*Risk Factors—Limited Sources of Funds for Repayment of Principal*.”

Interest on each Class of Notes will accrue from and including the Issuance Date and will be payable periodically in arrears (i) on the eighth (8th) of each January, April, July and October, commencing on the First Payment Date and continuing to, but excluding, the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date of such Class, if any, and the Scheduled Redemption Date of such Class; (ii) on the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date of such Class, if any, and the Scheduled Redemption Date of such Class; and (iii) if there are one or more Extension Events for such Class, on each Extended Redemption Date of such Class (and in each case, if any such day is not a Business Day, on the next succeeding Business Day). See “*Risk Factors—Limited Sources of Funds for Payment of Interest*.”

For each Accrual Period from and including the Issuance Date to, but excluding, the applicable Redemption Date, interest on each Class of Notes will be calculated as the sum of:

- (i) the related Permitted Investment Yield for such Accrual Period, *plus*
- (ii) the amount of interest accrued during such Accrual Period on the Outstanding Principal Amount of such Class of Notes, determined as of the first day of such Accrual Period (after giving effect to any adjustment to the Outstanding Principal Amount on such first day), at a *per annum* rate equal to (a) for Accrual Periods beginning prior to the Scheduled Redemption Date, the Interest Spread for such Class of Notes or (b) for Accrual Periods beginning on or after the Scheduled Redemption Date, the applicable Extension Spread for such Class of Notes; in each case calculated on the basis of the actual number of days elapsed in the related Accrual Period and a 360-day year.

The issuance of the Notes will be authorized by a resolution of the Board of the Issuer prior to the Issuance Date.

It is expected that delivery of the Notes will be made against payment therefor on or about April 24, 2015.

The language of this Offering Circular is English. Certain names, legislative references and technical terms or references have been cited in their original language in order that the correct technical meaning may be ascribed to them under applicable law.

This Offering Circular has been prepared for use in connection with the proposed Offering, which is exempt from registration under the Securities Act, solely for purposes of enabling an investor to consider the purchase of the Notes offered hereby and in connection with the admission to listing of the Notes on the Official List and to trading on the regulated market of the Irish Stock Exchange. Its use for any other purpose is not authorized. Any reproduction or distribution of this Offering Circular, in whole or in part, or any disclosure of its contents, or the use of any information contained herein for any purposes other than considering an investment in the Notes, is prohibited. The information contained in this Offering Circular has been provided by the Issuer, the Counterparty (solely with respect to information regarding itself provided expressly for use herein), the Initial Purchasers, Risk Management Solutions, Inc. (“RMS”) and the other sources identified

herein. No representation or warranty, express or implied, is made by the Counterparty, the Initial Purchasers or RMS as to the accuracy or completeness of such information, and nothing contained in this Offering Circular is, or shall be relied upon as, a promise or representation by any such person, whether as to the past or the future. The Initial Purchasers have not independently verified any of such information and assume no responsibility for its accuracy or completeness. Each offeree of the Notes, by accepting delivery of this Offering Circular, agrees to the foregoing.

Notwithstanding anything to the contrary contained in this Offering Circular, all persons may disclose to any and all persons, without limitation of any kind, the U.S. federal, state and local tax treatment of the Notes and the Issuer, any fact that may be relevant to understanding the U.S. federal, state and local tax treatment of the Notes and the Issuer, and all materials of any kind (including opinions or other tax analyses) relating to such U.S. federal, state and local tax treatment and that may be relevant to understanding such U.S. federal, state and local tax treatment, other than the name of the Issuer or any other parties identified herein, information that would permit identification of the Issuer or any other parties identified herein, any pricing terms or other non-public business or financial information that is unrelated to the U.S. federal, state and local tax treatment of the Notes and the Issuer and is not relevant to understanding the U.S. federal, state and local tax treatment of the Notes and the Issuer and any information to the extent that such disclosure could result in a violation of any U.S. federal or state securities law.

Credit ratings included or referred to in this Offering Circular have been (or are expected to be) issued, with respect to the Notes, by Standard & Poor's Credit Market Services Europe Limited ("S&P") and, with respect to the EBRD, by S&P, Moody's Investors Service Limited ("Moody's") and by Fitch France S.A.S. ("Fitch"). Each of S&P, Moody's and Fitch is established in the European Union and is registered under Regulation (EC) No. 1060/2009, as amended (the "Credit Rating Agency Regulation"), of the European Parliament and of the Council of 16 September 2009 and is included in the list of credit rating agencies published by the European Securities and Markets Authority on its website (at <http://www.esma.europa.eu/page/List-registered-and-certified-CRAs>). In general, European regulated investors are restricted from using a rating for regulatory purposes if such rating is not issued by a credit rating agency established in the European Union and registered under the Credit Rating Agency Regulation (and such registration has not been withdrawn or suspended), subject to transitional provisions that apply in certain circumstances while the registration application is pending. Such general restriction will also apply in the case of ratings issued by non-EU credit rating agencies, unless the relevant ratings are endorsed by an EU-registered credit rating agency or the relevant non-EU rating agency is certified in accordance with the Credit Rating Agency Regulation (and such endorsement action or certification, as the case may be, has not been withdrawn or suspended). Credit ratings are not recommendations to purchase, hold or sell securities, including the Notes. Credit ratings do not comment with respect to securities as to market price, fair market value, or suitability for a particular investor, and they may be changed, suspended or withdrawn.

NOTICE TO RESIDENTS OF NEW HAMPSHIRE

NEITHER THE FACT THAT A REGISTRATION STATEMENT OR AN APPLICATION FOR A LICENSE HAS BEEN FILED UNDER N.H. REV. STAT. ANN. SECTION 421-B WITH THE STATE OF NEW HAMPSHIRE NOR THE FACT THAT A SECURITY IS EFFECTIVELY REGISTERED OR A PERSON IS LICENSED IN THE STATE OF NEW HAMPSHIRE CONSTITUTES A FINDING BY THE SECRETARY OF THE STATE OF NEW HAMPSHIRE THAT ANY DOCUMENT FILED UNDER N.H. REV. STAT. ANN. SECTION 421-B IS TRUE, COMPLETE AND NOT MISLEADING. NEITHER ANY SUCH FACT NOR THE FACT THAT AN EXEMPTION OR EXCEPTION IS AVAILABLE FOR A SECURITY OR A TRANSACTION MEANS THAT THE SECRETARY OF THE STATE OF NEW HAMPSHIRE HAS PASSED IN ANY WAY UPON THE MERITS OR QUALIFICATIONS OF, OR RECOMMENDED OR GIVEN APPROVAL TO, ANY PERSON, SECURITY OR TRANSACTION. IT IS UNLAWFUL TO MAKE, OR CAUSE TO BE MADE, TO ANY INVESTOR, CUSTOMER OR CLIENT ANY REPRESENTATION INCONSISTENT WITH THE PROVISIONS OF THIS PARAGRAPH.

THIS OFFERING CIRCULAR CONTAINS INFORMATION GIVEN IN COMPLIANCE WITH THE LISTING AND ADMISSION TO TRADING GUIDELINES OF THE IRISH STOCK EXCHANGE. THE IRISH STOCK EXCHANGE TAKES NO RESPONSIBILITY FOR THE CONTENTS OF THIS OFFERING CIRCULAR, MAKES NO REPRESENTATIONS AS TO ITS ACCURACY OR COMPLETENESS AND EXPRESSLY DISCLAIMS ANY LIABILITY WHATSOEVER FOR ANY LOSS ARISING FROM OR IN RELIANCE UPON ANY PART OF THIS OFFERING CIRCULAR.

THE ISSUER ACCEPTS RESPONSIBILITY FOR THE INFORMATION CONTAINED IN THIS OFFERING CIRCULAR AND, TO THE BEST KNOWLEDGE AND BELIEF OF THE ISSUER (WHICH HAS TAKEN ALL REASONABLE CARE TO ENSURE THAT SUCH IS THE CASE), SUCH INFORMATION IS IN ACCORDANCE WITH THE FACTS AND DOES NOT OMIT ANYTHING LIKELY TO AFFECT THE IMPORT OF SUCH INFORMATION.

INFORMATION INCLUDED HEREIN (I) WITH RESPECT TO THE SECTION ENTITLED “EBRD NOTES” HAS BEEN EXTRACTED OR OBTAINED, AS THE CASE MAY BE, FROM PUBLICLY AVAILABLE INFORMATION, (II) WITH RESPECT TO THE SECTION ENTITLED “THE COUNTERPARTY”, HAS BEEN PROVIDED BY THE COUNTERPARTY AND (III) WITH RESPECT TO THE SECTIONS ENTITLED “RMS DISCLAIMERS” ON PAGES IX TO XII, “RISK FACTORS—RISKS RELATING TO RMS” ON PAGES 58 TO 64, “RMS EXPERT RISK ANALYSIS METHODOLOGY” ATTACHED HERETO AS APPENDIX B, “RMS EXPERT RISK ANALYSIS RESULTS” ATTACHED HERETO AS APPENDIX C AND “RMS DATA FILE” REFERRED TO IN APPENDIX E HAVE BEEN PROVIDED BY RMS (EACH OF (I) THROUGH (III), “**THIRD PARTY INFORMATION**”).

THE ISSUER CONFIRMS THAT THIRD PARTY INFORMATION HAS BEEN ACCURATELY REPRODUCED AND THAT, SO FAR AS IT IS AWARE, AND IS ABLE TO ASCERTAIN FROM PUBLICLY AVAILABLE INFORMATION, THE COUNTERPARTY AND RMS, NO FACTS HAVE BEEN OMITTED WHICH WOULD RENDER THE REPRODUCED INACCURATE OR MISLEADING.

THE ISSUER HAS ONLY MADE VERY LIMITED ENQUIRIES IN RELATION TO THE THIRD PARTY INFORMATION AND DOES NOT MAKE ANY REPRESENTATION OR WARRANTY, EXPRESSED OR IMPLIED, AS TO THE ACCURACY OR COMPLETENESS OF THE THIRD PARTY INFORMATION AND PROSPECTIVE INVESTORS IN THE NOTES SHOULD NOT RELY UPON, AND SHOULD MAKE THEIR OWN INDEPENDENT INVESTIGATIONS AND ENQUIRIES IN RESPECT OF, THE SAME.

THE COUNTERPARTY ACCEPTS RESPONSIBILITY FOR THE INFORMATION CONTAINED IN THIS OFFERING CIRCULAR UNDER THE HEADING “THE COUNTERPARTY” AND, TO THE BEST KNOWLEDGE AND BELIEF OF THE COUNTERPARTY (WHICH HAS TAKEN ALL REASONABLE CARE TO ENSURE THAT SUCH IS THE CASE), SUCH INFORMATION IS IN ACCORDANCE WITH THE FACTS AND DOES NOT OMIT ANYTHING LIKELY TO AFFECT THE IMPORT OF SUCH INFORMATION.

RMS ACCEPTS RESPONSIBILITY FOR THE INFORMATION CONTAINED IN THE RMS EXPERT RISK ANALYSIS REPORTS (SUBJECT TO THE LIMITATIONS AND DISCLAIMERS IN RESPECT THEREOF SET FORTH IN THIS OFFERING CIRCULAR, INCLUDING, BUT NOT LIMITED TO, THE SECTIONS ENTITLED “RMS DISCLAIMERS” ON PAGES IX to XII AND “RISK FACTORS—RISKS RELATING TO RMS” ON PAGES 58 TO 64 HEREOF) AND, TO THE BEST KNOWLEDGE AND BELIEF OF RMS (WHICH HAS TAKEN ALL REASONABLE CARE TO ENSURE SUCH IS THE CASE), THE RMS EXPERT RISK ANALYSIS REPORTS ARE IN ACCORDANCE WITH THE FACTS AND DO NOT OMIT ANY MAJOR CRITICAL FEATURE LIKELY TO AFFECT THE IMPORT OF SUCH INFORMATION. THE RMS EXPERT RISK ANALYSIS REPORTS ARE INCLUDED IN THIS OFFERING CIRCULAR IN THE FORM AND CONTEXT IN WHICH THEY APPEAR AND RMS HAS CONSENTED TO THE INCLUSION OF THE RMS EXPERT RISK ANALYSIS REPORTS IN THE FORM AND CONTEXT IN WHICH THEY ARE INCLUDED IN THIS OFFERING CIRCULAR. INVESTORS MAY HAVE DIFFERENT VIEWS ON THE RELATIVE IMPORTANCE OF A WIDE RANGE OF FACTORS; CONSEQUENTLY, RMS MAKES NO REPRESENTATIONS ABOUT WHETHER ANY PARTICULAR INFORMATION SHOULD OR SHOULD NOT HAVE BEEN INCLUDED HEREIN.

AS OF THE ISSUANCE OF THE NOTES, EACH MEMBER OF THE BOARD OF DIRECTORS OF THE ISSUER WILL HAVE DELEGATED ITS DUTIES AS A COMMODITY POOL OPERATOR (“CPO”), AS DEFINED IN SECTION 1a(11) OF THE COMMODITY EXCHANGE ACT OF 1936, AS AMENDED (“COMMODITY EXCHANGE ACT”), OF THE ISSUER TO DEUTSCHE INTERNATIONAL CORPORATE SERVICES (IRELAND) LIMITED (THE “MANAGER”), AND THE MANAGER HAS CLAIMED AN EXEMPTION FROM REGISTRATION WITH THE COMMODITY FUTURES TRADING COMMISSION (“CFTC”) WITH RESPECT TO ITS STATUS AS THE ISSUER’S CPO, PURSUANT TO CFTC RULE 4.13(A)(3) AND THE RELIEF PROVIDED IN CFTC LETTER NO. 14-152 (THE “CFTC LETTER”). IN ORDER TO TAKE ADVANTAGE OF SUCH RELIEF, INVESTORS IN THE NOTES ARE LIMITED TO QUALIFIED INSTITUTIONAL BUYERS WHO ARE ALSO QUALIFIED ELIGIBLE PERSONS. RULE 4.13(A)(3) REQUIRES THAT AT ALL TIMES EITHER: (A) THE AGGREGATE INITIAL MARGIN AND PREMIUMS REQUIRED TO ESTABLISH COMMODITY INTEREST POSITIONS DOES NOT EXCEED FIVE PERCENT OF THE LIQUIDATION VALUE OF THE ISSUER’S INVESTMENT PORTFOLIO OR (B) THE AGGREGATE NET NOTIONAL VALUE OF THE ISSUER’S COMMODITY INTEREST POSITIONS DOES NOT EXCEED ONE-HUNDRED PERCENT OF THE LIQUIDATION VALUE OF THE ISSUER’S INVESTMENT PORTFOLIO. IN ADDITION, THE CFTC LETTER CONTAINS CERTAIN ADDITIONAL REQUIREMENTS WITH RESPECT TO THE OPERATION OF THE ISSUER. AS A RESULT OF CLAIMING THE EXEMPTION, THE MANAGER IS NOT REQUIRED TO COMPLY WITH THE DISCLOSURE, REPORTING AND RECORDKEEPING REQUIREMENTS GENERALLY APPLICABLE TO REGISTERED COMMODITY POOL OPERATORS, INCLUDING DELIVERY TO INVESTORS OF A DISCLOSURE DOCUMENT AND A CERTIFIED ANNUAL REPORT DESIGNED TO MEET CFTC REQUIREMENTS.

AN INVESTMENT IN THE NOTES OFFERED HEREBY INVOLVES A HIGH DEGREE OF RISK. SEE “RISK FACTORS” HEREIN. THE NOTES ARE SPECULATIVE AND INVESTORS BEAR THE RISK THAT THEY COULD LOSE ALL OR A PORTION OF THE PRINCIPAL AMOUNT OF, AND INTEREST ON, THE NOTES IF THERE ARE ONE OR MORE MORTALITY EVENTS CAUSING THE ISSUER TO MAKE ONE OR MORE LOSS PAYMENTS UNDER THE RELATED COUNTERPARTY CONTRACT WITH RESPECT TO THE NOTES. ONE OR MORE MORTALITY EVENTS CAUSING THE ISSUER TO MAKE ONE OR MORE LOSS PAYMENTS UNDER THE RELATED COUNTERPARTY CONTRACT COULD OCCUR AT ANY TIME DURING THE RELEVANT RISK PERIOD RESULTING IN A FULL OR PARTIAL LOSS OF AN INVESTMENT IN THE NOTES ISSUED BY THE ISSUER.

THE NOTES ARE COMPLEX INSTRUMENTS AND ARE INTENDED FOR SALE ONLY TO INVESTORS CAPABLE OF UNDERSTANDING THE RISKS ENTAILED IN SUCH INSTRUMENTS. ALL INVESTORS SHOULD HAVE SUFFICIENT KNOWLEDGE AND EXPERIENCE IN FINANCIAL AND BUSINESS MATTERS TO BE CAPABLE OF EVALUATING THE MERITS AND RISKS OF INVESTING IN AND HOLDING THE NOTES. AN INVESTMENT IN THE NOTES SHOULD BE MADE ONLY BY INVESTORS WHO ARE ABLE AND PREPARED TO BEAR THE SUBSTANTIAL RISKS OF INVESTING THEREIN, INCLUDING A COMPLETE LOSS OF PRINCIPAL AMOUNT OF THE NOTES. POTENTIAL INVESTORS IN

THE NOTES ARE STRONGLY ENCOURAGED TO CONSULT WITH THEIR FINANCIAL, LEGAL, TAX AND OTHER ADVISORS BEFORE MAKING ANY INVESTMENT DECISION.

THIS OFFERING CIRCULAR DOES NOT CONSTITUTE AN OFFER TO SELL OR A SOLICITATION OF AN OFFER TO BUY ANY SECURITY OTHER THAN THE NOTES OFFERED HEREBY, NOR DOES IT CONSTITUTE AN OFFER TO SELL OR A SOLICITATION OF AN OFFER TO BUY ANY OF THE NOTES, TO ANY PERSON IN ANY JURISDICTION IN WHICH IT IS UNLAWFUL TO MAKE SUCH AN OFFER OR SOLICITATION TO SUCH PERSON. NEITHER THE DELIVERY OF THIS OFFERING CIRCULAR, NOR ANY SALE MADE HEREUNDER OR THEREUNDER, SHALL UNDER ANY CIRCUMSTANCE CREATE ANY IMPLICATION THAT THE INFORMATION CONTAINED HEREIN IS CORRECT AS OF ANY DATE SUBSEQUENT TO THE DATE HEREOF.

THE NOTES HAVE NOT BEEN AND WILL NOT BE REGISTERED UNDER THE SECURITIES ACT, OR ANY U.S. STATE OR FOREIGN SECURITIES LAWS. THE NOTES ARE SUBJECT TO SUBSTANTIAL RESTRICTIONS ON TRANSFER AS DESCRIBED UNDER “NOTICE TO INVESTORS”.

THE NOTES OFFERED HEREBY HAVE NOT BEEN RECOMMENDED BY ANY UNITED STATES FEDERAL OR STATE OR FOREIGN SECURITIES COMMISSION, INSURANCE OR OTHER REGULATORY AUTHORITY. FURTHERMORE, THE FOREGOING AUTHORITIES HAVE NOT CONFIRMED THE ACCURACY OR DETERMINED THE ADEQUACY OF THIS OFFERING CIRCULAR. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

THE NOTES OFFERED HEREBY MAY NOT BE OFFERED, SOLD, PLEDGED OR OTHERWISE TRANSFERRED TO ANY PERSON (I) IN ANY STATE OR OTHER JURISDICTION IN THE UNITED STATES OTHER THAN THE PERMITTED U.S. JURISDICTIONS OR (II) IN ANY JURISDICTION OUTSIDE OF THE UNITED STATES OTHER THAN THE PERMITTED NON-U.S. JURISDICTIONS, IN EACH CASE, ONLY TO INVESTORS THAT (I) ARE “QUALIFIED INSTITUTIONAL BUYERS” AS DEFINED IN RULE 144A THAT, WITH RESPECT TO “U.S. PERSONS” AS DEFINED IN RULE 902(K) UNDER THE SECURITIES ACT, ARE ALSO “QUALIFIED PURCHASERS”, AS DEFINED IN SECTION 2(A)(51) OF THE INVESTMENT COMPANY ACT AND THE RULES AND REGULATIONS THEREUNDER, FOR PURPOSES OF SECTION 3(c)(7) OF THE INVESTMENT COMPANY ACT AND (II) ARE “QUALIFIED ELIGIBLE PERSONS” AS DEFINED IN CFTC RULE 4.7 (AND MEET THE OTHER REQUIREMENTS SET FORTH UNDER THE “NOTICE TO INVESTORS” SECTION HEREIN), AND IN ACCORDANCE WITH ALL APPLICABLE SECURITIES LAWS OF THE PERMITTED U.S. JURISDICTIONS AND ALL APPLICABLE SECURITIES LAWS OF THE PERMITTED NON-U.S. JURISDICTIONS. EXCEPT AS OTHERWISE NOTED HEREIN, IF ANY PERSON ACQUIRING AN INTEREST IN A NOTE IS NOT A “QUALIFIED INSTITUTIONAL BUYER” AND, IN THE CASE OF A U.S. PERSON, IS NOT A “QUALIFIED PURCHASER” (OR FAILS TO MEET THE OTHER REQUIREMENTS SET FORTH HEREIN IN “NOTICE TO INVESTORS”), OR IS NOT A “QUALIFIED ELIGIBLE PERSON”, THE ISSUER MAY REGARD SUCH ACQUISITION AS NULL AND VOID AND OF NO EFFECT. ANY PERSON WHO HOLDS ANY INTEREST IN THE NOTES, WHO DOES NOT RESIDE AND HOLD SUCH INTEREST IN A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION, OR IN THE CASE OF A PERSON THAT IS NOT A “QUALIFIED INSTITUTIONAL BUYER” AND, IN THE CASE OF A U.S. PERSON, IS NOT A “QUALIFIED PURCHASER”, OR IS NOT A “QUALIFIED ELIGIBLE PERSON”, MAY BE FORCED TO TRANSFER SUCH INTEREST TO A PERSON IN A PERMITTED U.S. JURISDICTION OR PERMITTED NON-U.S. JURISDICTION WHO MEETS THE REQUIREMENTS SET FORTH HEREIN IN “NOTICE TO INVESTORS”. NONE OF THE ISSUER, THE COUNTERPARTY, ANY INITIAL PURCHASER OR ANY OF THEIR RESPECTIVE AFFILIATES MAKES ANY REPRESENTATION THAT THE OFFER, SALE, PLEDGE OR TRANSFER OF THE NOTES IS PERMITTED UNDER THE SECURITIES LAW OF ANY PERMITTED U.S. JURISDICTION OR ANY PERMITTED NON-U.S. JURISDICTION.

THIS OFFERING CIRCULAR CONTAINS DESCRIPTIONS BELIEVED TO BE ACCURATE WITH RESPECT TO THE MATERIAL TERMS OF CERTAIN DOCUMENTS, BUT REFERENCE IS MADE TO THE

ACTUAL DOCUMENTS, INCLUDING WITHOUT LIMITATION THE INDENTURE (AND ANY SUPPLEMENT THERETO), THE COUNTERPARTY CONTRACTS, THE DEEDS OF CHARGE, THE COUNTERPARTY DEEDS OF CHARGE, THE MANAGEMENT AGREEMENT, THE REIMBURSEMENT AGREEMENT, THE CALCULATION AGENT AGREEMENT, THE MEMORANDUM AND ARTICLES OF ASSOCIATION OF THE ISSUER AND THE FORMS OF THE NOTES FOR COMPLETE INFORMATION WITH RESPECT THERETO, AND SUCH DESCRIPTIONS ARE QUALIFIED IN THEIR ENTIRETY BY SUCH REFERENCE. COPIES OF SUCH DOCUMENTS MAY BE OBTAINED AS PER THE INSTRUCTIONS SET FORTH IN THE SECTION “*AVAILABLE INFORMATION*” HEREIN BY A NOTEHOLDER OR A PROSPECTIVE NOTEHOLDER (WHO IS A PERMITTED TRANSFeree).

THERE IS NO MARKET FOR THE NOTES AND THERE IS NO ASSURANCE THAT A MARKET WILL DEVELOP. NO INITIAL PURCHASER IS UNDER ANY OBLIGATION TO MAKE A MARKET IN THE NOTES AND, TO THE EXTENT THAT SUCH MARKET MAKING IS COMMENCED BY ANY INITIAL PURCHASER, IT MAY BE DISCONTINUED AT ANY TIME. GIVEN THE RISKS ASSOCIATED WITH AN INVESTMENT IN THE NOTES, THE HIGH MINIMUM DENOMINATIONS AND THE RESTRICTIONS ON TRANSFER, THERE IS NO ASSURANCE THAT A SECONDARY TRADING MARKET FOR THE NOTES WILL DEVELOP AND INVESTORS MUST BE ABLE TO BEAR THE RISKS OF HOLDING THE NOTES UNTIL THEIR REDEMPTION DATE.

IN MAKING AN INVESTMENT DECISION, INVESTORS MUST RELY ON THEIR OWN EXAMINATION OF THE ISSUER AND THE TERMS OF THE NOTES AND THE PARTICULAR OFFERING THEREOF, INCLUDING THE MERITS AND RISKS INVOLVED. BY ACCEPTING DELIVERY OF THIS OFFERING CIRCULAR, INVESTORS WILL BE DEEMED TO HAVE ACKNOWLEDGED THE NEED TO CONDUCT THEIR OWN THOROUGH INVESTIGATION AND EXERCISE THEIR OWN DUE DILIGENCE BEFORE MAKING AN INVESTMENT IN THE NOTES. INVESTORS AND THEIR ADVISORS, IF ANY, ARE INVITED TO ASK QUESTIONS OF, AND OBTAIN ADDITIONAL INFORMATION CONCERNING, THE ISSUER AND THE TERMS AND CONDITIONS OF THE INVESTMENT CONTEMPLATED BY THIS OFFERING CIRCULAR, AND ANY ADDITIONAL INFORMATION THAT IS NECESSARY TO VERIFY THE ACCURACY OF THE INFORMATION PROVIDED TO SUCH INVESTORS. BY PURCHASING NOTES EACH INVESTOR SHALL BE DEEMED TO ACKNOWLEDGE THAT IT HAS HAD A FULL OPPORTUNITY TO ASK SUCH QUESTIONS OF, AND OBTAIN SUCH INFORMATION FROM, THE ISSUER.

THE NOTES ARE NOT OBLIGATIONS OF, AND ARE NOT GUARANTEED BY, THE COUNTERPARTY OR ANY OF ITS AFFILIATES OR ANY OTHER PARTY. THE OUTSTANDING PRINCIPAL AMOUNT AND INTEREST RELATING THERETO ARE PAYABLE ONLY BY THE ISSUER. THE NOTES ARE WITHOUT RECOURSE TO ANY ASSETS OF THE ISSUER, EXCEPT AS DESCRIBED HEREIN, AND WITHOUT RECOURSE TO ANY ASSETS OF THE COUNTERPARTY OR ITS AFFILIATES OR ANY OTHER PARTY.

NONE OF THE ISSUER, THE COUNTERPARTY, THE INDENTURE TRUSTEE, THE PAYING AGENT, THE NOTE REGISTRAR, ANY INITIAL PURCHASER, THE CALCULATION AGENT, THE IRISH LISTING AGENT, NOR ANY OF THEIR RESPECTIVE AFFILIATES NOR ANY OF THEIR RESPECTIVE REPRESENTATIVES MAKES ANY REPRESENTATION TO ANY INVESTOR IN THE NOTES REGARDING THE LEGALITY OF AN INVESTMENT UNDER APPROPRIATE LEGAL INVESTMENT OR SIMILAR LAWS. INVESTORS ARE NOT TO CONSTRUE THE CONTENTS OF THIS OFFERING CIRCULAR AS INVESTMENT, TAX, ACCOUNTING OR LEGAL ADVICE. THIS OFFERING CIRCULAR, AS WELL AS THE NATURE OF AN INVESTMENT IN THE NOTES, SHOULD BE REVIEWED BY EACH INVESTOR AND ITS INVESTMENT, TAX OR OTHER ADVISERS, AND ITS ACCOUNTANTS AND LEGAL COUNSEL. INVESTORS SHOULD SATISFY THEMSELVES THAT AN INVESTMENT IN THE NOTES IS NOT IN VIOLATION OF THE LAWS OF ANY JURISDICTION RELEVANT TO THEM, INCLUDING APPLICABLE INSURANCE LAWS.

THE ISSUER IS AN IRISH PRIVATE LIMITED COMPANY AND ALL OF ITS DIRECTORS ARE CURRENTLY RESIDENTS OF IRELAND. ALL OR A SUBSTANTIAL PORTION OF THE ASSETS OF SUCH DIRECTORS AND OF THE ISSUER ARE OR MAY BE LOCATED IN JURISDICTIONS OUTSIDE THE UNITED STATES. ALTHOUGH THE ISSUER HAS IRREVOCABLY AGREED THAT IT MAY BE SERVED WITH PROCESS IN NEW YORK, NEW YORK, WITH RESPECT TO ANY ACTION ARISING OUT OF, OR RELATING TO, THE INDENTURE OR THE NOTES, IT COULD BE DIFFICULT FOR INVESTORS TO EFFECT SERVICE OF PROCESS WITHIN THE UNITED STATES ON ANY DIRECTOR OF THE ISSUER OR TO RECOVER AGAINST THE ISSUER OR ITS DIRECTORS, INDIVIDUALLY OR IN ANY COMBINATION THEREOF, ON JUDGMENTS OF UNITED STATES COURTS PREDICATED UPON CIVIL LIABILITIES UNDER THE UNITED STATES FEDERAL SECURITIES LAWS.

THERE IS DOUBT AS TO WHETHER THE COURTS OF IRELAND WOULD (I) ENFORCE JUDGMENTS OF UNITED STATES COURTS OBTAINED IN ACTIONS AGAINST THE ISSUER OR ITS DIRECTORS PREDICATED UPON THE CIVIL LIABILITY PROVISIONS OF THE SECURITIES LAWS OF THE UNITED STATES OR ANY STATE OF THE UNITED STATES OR (II) ENTERTAIN ORIGINAL ACTIONS BROUGHT IN IRELAND AGAINST SUCH PERSONS OR THE ISSUER PREDICATED SOLELY UPON UNITED STATES FEDERAL SECURITIES LAWS. THERE IS NO TREATY IN EFFECT BETWEEN THE UNITED STATES AND IRELAND PROVIDING FOR SUCH ENFORCEMENT, AND THERE ARE GROUNDS UPON WHICH IRISH COURTS MAY NOT ENFORCE JUDGMENTS OF UNITED STATES COURTS. CERTAIN REMEDIES AVAILABLE UNDER THE LAWS OF UNITED STATES JURISDICTIONS, INCLUDING CERTAIN REMEDIES UNDER THE UNITED STATES FEDERAL SECURITIES LAWS, MAY NOT BE ALLOWED IN IRISH COURTS AS CONTRARY TO PUBLIC POLICY.

THE RATINGS OF THE NOTES REFERRED TO IN THIS OFFERING CIRCULAR, IF OBTAINED, WILL NOT BE RECOMMENDATIONS TO PURCHASE, HOLD OR SELL THE NOTES. SUCH RATINGS WILL NOT COMMENT AS TO THE MARKET PRICE, FAIR MARKET VALUE OR SUITABILITY FOR A PARTICULAR INVESTOR, NOR WILL SUCH RATINGS ADDRESS THE LIKELIHOOD THAT A NOTEHOLDER WILL BE ABLE TO SELL THE NOTES. THE RATINGS OF THE NOTES WILL BE BASED ON THE THEN CURRENT INFORMATION FURNISHED TO THE RATING AGENCY BY THE ISSUER, THE COUNTERPARTY AND THE INITIAL PURCHASERS AND INFORMATION OBTAINED FROM OTHER SOURCES, INCLUDING, BUT NOT LIMITED TO, RMS. THE RATINGS OF THE NOTES, IF OBTAINED, MAY BE CHANGED, SUSPENDED OR WITHDRAWN AS A RESULT OF CHANGES IN, OR THE UNAVAILABILITY OF, SUCH INFORMATION.

SINCE THE DATE OF INCORPORATION OF THE ISSUER, THERE HAVE BEEN NO GOVERNMENTAL, LEGAL OR ARBITRATION PROCEEDINGS (INCLUDING ANY SUCH PROCEEDINGS WHICH ARE PENDING OR THREATENED OF WHICH THE ISSUER IS AWARE) WHICH MAY HAVE OR HAVE HAD IN THE RECENT PAST A SIGNIFICANT EFFECT ON THE ISSUER'S FINANCIAL POSITION OR PROFITABILITY.

SAVE AS DISCLOSED IN THIS OFFERING CIRCULAR, THERE HAS BEEN NO SIGNIFICANT CHANGE IN THE FINANCIAL OR TRADING POSITION OF THE ISSUER SINCE THE DATE OF THE ISSUER'S INCORPORATION AND THERE HAS BEEN NO MATERIAL ADVERSE CHANGE IN THE FINANCIAL CONDITION OR PROSPECTS OF THE ISSUER SINCE THE DATE OF THE ISSUER'S INCORPORATION.

NO DEALER, SALESPERSON OR OTHER PERSON IS AUTHORIZED TO GIVE ANY INFORMATION OR TO REPRESENT ANYTHING NOT CONTAINED IN THIS OFFERING CIRCULAR. YOU MUST NOT RELY ON ANY UNAUTHORIZED INFORMATION OR REPRESENTATIONS. THIS OFFERING CIRCULAR IS AN OFFER TO SELL ONLY THE NOTES OFFERED HEREBY, BUT ONLY UNDER CIRCUMSTANCES AND IN JURISDICTIONS WHERE IT IS LAWFUL TO DO SO. THE INFORMATION CONTAINED IN THIS OFFERING CIRCULAR IS CURRENT ONLY AS OF ITS DATE.

RMS DISCLAIMERS

THE STATISTICAL DATA, MODELING AND EXPLANATIONS INCLUDED IN THE “RMS EXPERT RISK ANALYSIS METHODOLOGY” ATTACHED HERETO AS APPENDIX B, THE “RMS EXPERT RISK ANALYSIS RESULTS” ATTACHED HERETO AS APPENDIX C AND THE “RMS DATA FILE” REFERRED TO IN APPENDIX E, AND ANY ANALYSIS OR INFORMATION PROVIDED BY RMS IN ITS CAPACITY AS CALCULATION AGENT FOR THE NOTES (COLLECTIVELY, THE “**RMS EXPERT RISK ANALYSIS REPORTS**”), HAVE BEEN PREPARED BY RMS AS EXPERTS IN STATISTICAL MODELING AND THE ANALYSIS OF RISKS ASSOCIATED WITH MORTALITY EVENTS AND AS CALCULATION AGENT. INVESTORS ARE ADVISED THAT THE LOSS CALCULATIONS REPORTED IN THE RMS EXPERT RISK ANALYSIS REPORTS ARE BASED ON THE FOLLOWING RMS MODELS (THE “**RMS MODELS**”):

- RMS LONGEVITY MODEL, FIRST RELEASED IN 2010, LAST UPDATED IN 2013 (“**RMS LONGEVITY MODEL**” OR “**BASELINE MODEL**”);
- RMS INFECTIOUS DISEASE MODEL, FIRST RELEASED IN 2007, LAST UPDATED IN 2011 (“**RMS INFECTIOUS DISEASE MODEL**”);
- RMS UNITED STATES EARTHQUAKE CASUALTY MODEL VERSION 13.1, UPGRADED IN 2014 (“**RMS U.S. EARTHQUAKE CASUALTY MODEL**”) AND RMS JAPAN EARTHQUAKE CASUALTY MODEL VERSION 11.0, UPGRADED IN 2012, (“**RMS JAPAN EARTHQUAKE CASUALTY MODEL**” AND, COLLECTIVELY, THE “**RMS EARTHQUAKE CASUALTY MODELS**”);
- RMS UNITED STATES PROBABILISTIC TERRORISM MODEL VERSION 3.1.4, UPGRADED IN 2012 AND RMS FRANCE LIFERISKS TERRORISM MODEL VERSION 2.0, CREATED IN 2012, (COLLECTIVELY, THE “**RMS PROBABILISTIC TERRORISM MODELS**”);
- RMS RESIDUAL RISK MODEL 2.0, FIRST RELEASED IN 2012 (“**RMS RESIDUAL RISK MODEL**”); AND
- RMS GLOBAL TSUNAMI SCENARIO MODEL, FIRST RELEASED IN 2014 (“**RMS TSUNAMI SCENARIO MODEL**”).

RMS HAS USED THE RMS MODELS TO PERFORM RISK ANALYSES IN CONNECTION WITH THE ISSUANCE OF THE NOTES AND TO DETERMINE THE APPLICABLE ANNUALIZED MODELED EXPECTED LOSS AND ANNUALIZED MODELED ATTACHMENT PROBABILITY FOR EACH CLASS OF NOTES. THE RMS MODELS ARE SUBJECT TO NUMEROUS ASSUMPTIONS, UNCERTAINTIES AND THE INHERENT LIMITATIONS OF ANY STATISTICAL ANALYSIS. ACTUAL LOSS EXPERIENCE IS INHERENTLY UNPREDICTABLE. INVESTORS ARE URGED TO READ CAREFULLY THE MATERIAL CONTAINED HEREIN UNDER “*RISK FACTORS*” AND IN THE RMS EXPERT RISK ANALYSIS REPORTS FOR A DESCRIPTION OF SUCH ASSUMPTIONS, UNCERTAINTIES AND LIMITATIONS.

THE DATA AND METHODOLOGY DESCRIBED IN THE RMS EXPERT RISK ANALYSIS REPORTS AND THE ANALYSES, ESTIMATES AND SERVICES INTENDED TO BE PROVIDED ARE PROVIDED “AS IS,” WITHOUT WARRANTY OR GUARANTY OF ANY KIND TO THE NOTEHOLDERS. THESE ANALYSES AND ESTIMATES ARE PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY AND ARE NOT INTENDED TO PROVIDE, NOR SHOULD THEY BE INTERPRETED AS PROVIDING, ANY FACTS REGARDING, OR ANY GUARANTY OR PREDICTION OR FORECAST OF, THE LIKELIHOOD THAT INVESTORS IN THE NOTES WILL RECEIVE PAYMENT THEREON. NOTWITHSTANDING THE ANALYSES, ESTIMATES AND ASSUMPTIONS SET FORTH HEREIN, ONE OR MORE MORTALITY EVENTS COULD OCCUR IN ANY GIVEN CALENDAR YEAR DURING THE RISK PERIOD APPLICABLE TO A CLASS OF NOTES, RESULTING IN A FULL OR PARTIAL LOSS OF THE PRINCIPAL AMOUNT OF, AND INTEREST ACCRUED ON, SUCH CLASS.

RMS DOES NOT REPRESENT INVESTORS OR THE INVESTORS’ INTERESTS IN ANY WAY. RMS DOES NOT SPONSOR, ENDORSE, OFFER, SELL OR PROMOTE THE NOTES BEING OFFERED, NOR DOES IT MAKE ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, TO THE OFFEREES, PURCHASERS OR HOLDERS OF THE NOTES REGARDING THE ADVISABILITY OF INVESTING IN THE NOTES OR THE LEGALITY OF INVESTMENT IN THE NOTES. RMS IS NOT RESPONSIBLE FOR AND HAS NOT PARTICIPATED IN THE DETERMINATION AND DEVELOPMENT OF THE STRUCTURE OR PRICING

OF THE NOTES, THE INTEREST SPREAD APPLICABLE TO EACH CLASS OF NOTES OR THE INTEREST CALCULATION APPLICABLE TO EACH CLASS OF NOTES. FURTHERMORE, RMS HAS NO OBLIGATION OR LIABILITY IN CONNECTION WITH THE NOTES OR TRADING THEREOF, OR LIABILITY FOR ANY ADVERSE FINANCIAL RESULT OR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, WHATSOEVER. RMS MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED TO THE NOTEHOLDERS, AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION SET FORTH HEREIN, INCLUDING INFORMATION PROVIDED IN THE RMS EXPERT RISK ANALYSIS REPORTS.

RMS HAS RELIED ON A NUMBER OF SOURCES FOR HISTORICAL POPULATION AND MORTALITY DATA. THESE SOURCES INCLUDED, BUT MAY NOT BE LIMITED TO, THE FOLLOWING: (I) THE U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC), (II) THE U.S. CENSUS BUREAU, (III) EUROSTAT, (IV) INSTITUT NATIONAL DE LA STATISTIQUE ET DES ÉTUDES ÉCONOMIQUES (INSEE), (V) JAPAN STATISTICS BUREAU (JSB), (VI) JAPAN MINISTRY OF HEALTH, LABOR AND WELFARE AND (VII) THE HUMAN MORTALITY DATABASE. RMS HAD NO CONTROL OVER OR INVOLVEMENT IN THE COLLECTION AND COMPILATION OF THIS DATA BY THESE SOURCES. FUTURE UPDATES BY THESE SOURCES OF PUBLISHED MORTALITY AND POPULATION DATA MAY MATERIALLY ALTER THE LOSS ESTIMATES GENERATED BY THE RMS MODELS IN THE RMS EXPERT RISK ANALYSIS REPORTS. ADDITIONALLY, RMS HAS NOT REVIEWED THIS DATA FOR REASONABLENESS AND CONSISTENCY AND PERFORMED NO AUDITS OR INDEPENDENT VERIFICATION OF THE INFORMATION RECEIVED FROM THESE SOURCES. TO THE EXTENT THERE ARE MATERIAL ERRORS IN THE INFORMATION PROVIDED, THE RESULTS OF THE RMS EXPERT RISK ANALYSIS REPORTS WILL BE AFFECTED AND IS A RISK BORNE SOLELY BY INVESTORS IN THE NOTES. THE DATA USED IN CALIBRATION OF THE RMS MODELS MAY NOT CONSTITUTE THE MOST RECENT DATA PUBLISHED BY THE RELEVANT SOURCE.

IN THE DEVELOPMENT OF THE RMS MODELS, AND THE APPLICABLE RISK PARAMETERS THEREOF, RMS HAS RELIED ON PUBLISHED TECHNICAL PAPERS AND CATALOGS OF PAST MORTALITY RATE STUDIES, MEDICAL AND PHARMACEUTICAL, INFECTIOUS DISEASES, TERRORIST ATTACKS AND SEISMIC AND TSUNAMI ACTIVITY, AND HAS SELECTED THOSE WHICH IT BELIEVES REPRESENT CREDIBLE SCIENTIFIC DATA AND JUDGMENT. HOWEVER, SINCE NO SCIENTIFIC CONSENSUS ON MODELS OR RISK PARAMETERS EXISTS, RMS ACKNOWLEDGES THAT OTHER CREDIBLE, PUBLISHED MODELS AND/OR RISK PARAMETERS MAY EXIST WHICH, IF USED, COULD PRODUCE MATERIALLY DIFFERENT RESULTS. RMS ALSO HAS NOT VERIFIED THE AUTHENTICITY, ACCURACY OR COMPLETENESS OF ALL THE ORIGINAL DATA IN THE HISTORICAL CATALOGS OR OTHER DATA SOURCES USED TO DEVELOP THE RMS MODELS. THE RMS MODELS DO NOT PREDICT FUTURE MORTALITY OR ANY MORTALITY EVENTS. INVESTORS SHOULD CONSULT THEIR OWN EXPERT ADVISORS WHOSE CONCLUSIONS MAY DIFFER FROM THOSE OF RMS.

NO MODEL IS, OR COULD BE, AN EXACT REPRESENTATION OF REALITY. THE RMS MODELS RELY ON VARIOUS METHODOLOGIES AND ASSUMPTIONS, INCLUDING ASSUMPTIONS ABOUT THE AUTHENTICITY, ACCURACY AND COMPLETENESS OF HISTORICAL DATA, SOME OF WHICH ARE SUBJECT TO UNCERTAINTY, AND WHICH MIGHT NOT BE USED IN MODELS PROVIDED BY OTHER MODELING FIRMS. FURTHERMORE, THERE MAY BE MATERIAL DIFFERENCES IN THE WAY IN WHICH THESE ASSUMPTIONS ARE CONSIDERED BY OTHER MODELING FIRMS. THERE CAN BE NO ASSURANCE THAT THE RMS MODELS WILL PROVE TO BE ACCURATE ESTIMATIONS OF THE RISK OF A REDUCTION OF THE PRINCIPAL OF OR INTEREST ON EACH CLASS OF NOTES. ACCORDINGLY, THE EXPECTED LOSS ESTIMATES AND RELATED PROBABILITIES PRODUCED BY THE RMS MODELS ARE THEMSELVES SUBJECT TO UNCERTAINTY.

RMS REVIEWS MODEL ASSUMPTIONS FROM TIME TO TIME IN LIGHT OF NEW DATA AND OTHER INFORMATION TO REFINE THE LOSS ESTIMATES AND MODIFY ITS MODELS AS SUCH INFORMATION BECOMES AVAILABLE. AS SUCH, THE RMS MODELS MAY NOT NECESSARILY REFLECT THE MOST CURRENT MODELS OF RMS AT ANY TIME. ESTIMATES GENERATED BY SUCH REFINED OR MODIFIED MODELS MAY MATERIALLY DIFFER FROM THE ESTIMATES GENERATED BY THE RMS MODELS. SIMILARLY, THE USE OF SUCH MODELS IN LIEU OF THE RMS MODELS MIGHT SIMILARLY MATERIALLY ALTER THE INFORMATION PROVIDED IN THE RMS EXPERT RISK ANALYSIS REPORTS. HOWEVER, WHILE RMS MAY UPDATE THE RMS MODELS IN THE FUTURE TO REFLECT CHANGES IN ASSUMPTIONS, DATA INPUTS, FORMATS, COMPUTER AND OPERATING SYSTEMS, NO

CHANGES OR UPDATES TO THE RMS EXPERT RISK ANALYSIS RESULTS WILL BE PERMITTED SUBSEQUENT TO THE DATE OF THIS OFFERING CIRCULAR.

A SIGNIFICANT AMOUNT OF VARIABILITY EXISTS IN THE EVENTS BEING ANALYZED, AS WELL AS UNCERTAINTY IN THE ASSUMPTIONS AND PARAMETERS USED IN THE RMS EXPERT RISK ANALYSIS REPORTS, ANY ONE OF WHICH ALONE CAN CAUSE THE MODELED LOSS TO BE SIGNIFICANTLY DIFFERENT FROM THE LOSSES ULTIMATELY SUSTAINED DURING THE RISK PERIOD APPLICABLE TO EACH CLASS OF NOTES, RESULTING IN SIGNIFICANTLY DIFFERENT LOSSES SUSTAINED BY SUCH CLASS. CONSIDERABLE UNCERTAINTY ALSO EXISTS IN THE PARAMETERS USED IN THE RMS EXPERT RISK ANALYSIS REPORTS ARISING FROM INSUFFICIENT DATA, LIMITED SCIENTIFIC KNOWLEDGE AND ALTERNATIVE ASSUMPTIONS AS TO EMPIRICAL RELATIONSHIPS AS WELL AS FROM THE RANDOM NATURE OF THE VARIOUS EVENTS. SUCH UNCERTAINTIES EXIST IN, BUT ARE NOT LIMITED TO, ESTIMATES OF INITIAL MORTALITY RATES, MODELED IMPROVEMENTS IN MORTALITY RATES, ESTIMATES OF EARTHQUAKE SEVERITY, RECURRENCE AND GROUND SHAKING, TERRORIST TARGET LOCATIONS, METHODS OF TERRORIST ATTACKS, INFECTIOUS DISEASE TRANSMISSIBILITY, VIRULENCE AND THE IMPACT OF COUNTERMEASURES. FURTHERMORE, THE ASSUMPTIONS AND METHODOLOGIES USED BY RMS MAY NOT CONSTITUTE AN EXCLUSIVE SET OF REASONABLE ASSUMPTIONS AND MAY NOT BE CORRECT. USE OF ALTERNATIVE ASSUMPTIONS AND/OR MODELS COULD YIELD RESULTS MATERIALLY DIFFERENT THAN THOSE PRODUCED BY RMS. RMS ALSO DID NOT ELICIT FROM OTHER EXPERTS ALTERNATIVE INTERPRETATIONS OF ITS DATA OR METHODS, NOR DID RMS RESEARCH ALL POTENTIALLY AVAILABLE INTERPRETATIONS OF SUCH DATA AND METHODS ON THE BASIS THAT RMS CONSIDERED ITS OWN INTERPRETATIONS TO BE MORE RELIABLE. INVESTORS ARE URGED TO READ CAREFULLY THE MATERIAL CONTAINED IN THIS OFFERING CIRCULAR UNDER “*RMS EXPERT RISK ANALYSIS METHODOLOGY*”, “*RMS EXPERT RISK ANALYSIS RESULTS*”, “*RISK FACTORS*” AND ANY RELATED DISCLOSURE IN ANY SUPPLEMENT HERETO FOR A DESCRIPTION OF SUCH ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES.

THE MODELED LOSS ESTIMATES PRODUCED IN THE RMS EXPERT RISK ANALYSIS REPORTS ARE NOT NECESSARILY PREDICTIVE OF FUTURE EVENTS AND ARE NOT TO BE CONSIDERED AS FACTS, PROJECTIONS, OR PREDICTIONS OF THE FREQUENCY, SEVERITY OR MONETARY LOSSES FROM FUTURE CHANGES IN MORTALITY RATES. INVESTORS IN THE NOTES SHOULD NOT VIEW THE EXPECTED LOSS ESTIMATES AND RELATED PROBABILITIES GENERATED BY THE RMS MODELS AS NECESSARILY PREDICTING THE LIKELIHOOD OF THE OCCURRENCE DURING THE RISK PERIOD APPLICABLE TO EACH CLASS OF NOTES OF ONE OR MORE MORTALITY EVENTS RESULTING IN A REDUCTION OF THE PRINCIPAL OF, OR INTEREST ON, SUCH CLASS OF NOTES. RMS HAS NOT MADE ANY EFFORT, NOR DOES IT HAVE THE ABILITY TO PREDICT, THE OCCURRENCE OF FUTURE EVENTS RESULTING IN A LOSS TO THE NOTES. THERE CAN BE NO ASSURANCE THAT THE RMS EXPERT RISK ANALYSIS REPORTS INCORPORATE ALL FACTORS, WHICH MAY CONTRIBUTE TO LOSSES TO THE NOTES. ACCORDINGLY, THE ACTUAL FREQUENCY AND AMOUNT OF LOSSES TO THE NOTES COULD DIFFER MATERIALLY FROM THE FREQUENCY AND SEVERITY ESTIMATED BY RMS.

RMS HAS PROVIDED ITS ANALYSES, EXPECTED LOSS ESTIMATES AND RELATED PROBABILITIES CONTAINED WITHIN THE RMS EXPERT RISK ANALYSIS REPORTS HEREIN. NOTEHOLDERS WILL HAVE NO RIGHT TO ENFORCE OR TAKE ACTIONS AGAINST RMS OR ANY OTHER RIGHT THEREUNDER OR IN CONNECTION THEREWITH. THE ISSUER’S USE OF THE INFORMATION PROVIDED BY RMS, PARTICULARLY WITH REGARD TO ANY DISCLOSURE MADE OR OMITTED IN THIS OFFERING CIRCULAR OR ANY OFFERING CIRCULAR SUPPLEMENT, IS COMPLETELY WITHIN THE ISSUER’S SOLE DISCRETION, AND NOT THE RESPONSIBILITY OF RMS.

RMS PROVIDES CONSULTING SERVICES TO THE COUNTERPARTY AND ITS AFFILIATES (INCLUDING IN RESPECT OF THE PROPOSED OFFERING OF NOTES), EXPECTS TO PROVIDE SUCH SERVICES, AND MAY ENGAGE IN OTHER TYPES OF BUSINESS WITH THE COUNTERPARTY AND ITS AFFILIATES IN THE FUTURE. THE ISSUER HAS AGREED TO PAY THE FEES AND EXPENSES OF RMS IN ITS CAPACITY AS CALCULATION AGENT. IN ADDITION, THE ISSUER HAS AGREED UNDER THE CALCULATION AGENT AGREEMENT TO INDEMNIFY RMS IN RESPECT OF CERTAIN CLAIMS, LOSSES AND EXPENSES.

THE “*RMS EXPERT RISK ANALYSIS METHODOLOGY*,” “*RMS EXPERT RISK ANALYSIS RESULTS*” AND THE “*RMS DATA FILE*” ATTACHED TO THIS OFFERING CIRCULAR ARE INCLUDED HEREIN IN

RELIANCE UPON RMS AS AN EXPERT IN SUCH MATTERS. NONE OF THE ISSUER, THE COUNTERPARTY, THE INDENTURE TRUSTEE, THE PAYING AGENT, THE NOTE REGISTRAR OR THE INITIAL PURCHASERS, OR ANY OF THEIR RESPECTIVE AFFILIATES OR REPRESENTATIVES, OR ANY OF THEIR RESPECTIVE DIRECTORS OR OFFICERS, OR ANY PARTY WHO “CONTROLS” ANY OF THE FOREGOING WITHIN THE MEANING OF SECTION 15 OF THE SECURITIES ACT OR SECTION 20 OF THE U.S. SECURITIES EXCHANGE ACT OF 1934, AS AMENDED (THE “EXCHANGE ACT”) HAS REVIEWED, OR MAKES, OR SHALL BE DEEMED TO MAKE, ANY REPRESENTATION WITH RESPECT TO THE ANALYSIS PROVIDED BY RMS IN THE RMS EXPERT RISK ANALYSIS REPORTS, INCLUDING, WITHOUT LIMITATION, THE ADEQUACY, COMPLETENESS OR APPROPRIATENESS OF THE RMS EXPERT RISK ANALYSIS REPORTS. THE RMS EXPERT RISK ANALYSIS REPORTS ARE, AS NOTED ABOVE, BASED ON CERTAIN ASSUMPTIONS, JUDGMENTS AND METHODOLOGIES OF RMS, A NUMBER OF WHICH ARE CONFIDENTIAL AND PROPRIETARY TO RMS. WITHOUT INTENDING TO LIMIT THE FOREGOING, NONE OF THE ISSUER, THE COUNTERPARTY OR THE INITIAL PURCHASERS OR THEIR RESPECTIVE DIRECTORS OR OFFICERS HAS REVIEWED THE RMS EXPERT RISK ANALYSIS REPORTS TO DETERMINE (I) THE REASONABLENESS OF THE ASSUMPTIONS, JUDGMENTS AND METHODOLOGIES UTILIZED BY RMS, (II) WHETHER SUCH ASSUMPTIONS, JUDGMENTS OR METHODOLOGIES SHOULD BE SUPPLEMENTED IN ANY WAY THROUGH THE USE OF ALTERNATIVE ASSUMPTIONS, JUDGMENTS OR METHODOLOGIES, (III) WHETHER THE ASSUMPTIONS, JUDGMENTS AND METHODOLOGIES EMPLOYED BY RMS INCLUDE THE APPROPRIATE FACTORS THAT COULD CONTRIBUTE TO A LOSS PAYMENT AND (IV) WHETHER THE USE OF ALTERNATIVE ASSUMPTIONS, JUDGMENTS AND METHODOLOGIES, OR THE USE OF A DIFFERENT CATASTROPHE SIMULATION MODEL, COULD YIELD RESULTS MATERIALLY DIFFERENT FROM THOSE GENERATED BY THE RMS MODELS.

BECAUSE OF THE INHERENT LIMITATION OF RELYING ON THE RMS EXPERT RISK ANALYSIS REPORTS, AND BECAUSE OF THE SUBJECTIVE NATURE OF MANY OF RMS’ ASSUMPTIONS, JUDGMENTS AND METHODOLOGIES IN PREPARING THE RMS EXPERT RISK ANALYSIS REPORTS, EACH OF THE ISSUER, THE COUNTERPARTY, THE INDENTURE TRUSTEE, THE PAYING AGENT, THE NOTE REGISTRAR, THE INITIAL PURCHASERS AND THEIR RESPECTIVE AFFILIATES AND REPRESENTATIVES, AND ANY PARTY WHO “CONTROLS” ANY OF THE FOREGOING WITHIN THE MEANING OF SECTION 15 OF THE SECURITIES ACT OR SECTION 20 OF THE EXCHANGE ACT, EXPRESSLY DISCLAIMS ANY RESPONSIBILITY FOR, OR LIABILITY BASED UPON, A FINDING THAT THE RMS EXPERT RISK ANALYSIS REPORTS INCLUDES ANY UNTRUE STATEMENT OF A MATERIAL FACT OR THAT THE RMS EXPERT RISK ANALYSIS REPORTS OMIT TO STATE A MATERIAL FACT NECESSARY IN ORDER TO MAKE THE STATEMENTS, IN LIGHT OF THE CIRCUMSTANCES UNDER WHICH THEY WERE MADE, NOT MISLEADING.

THE CALCULATION OF AN EVENT PAYMENT AND RELATED PRINCIPAL REDUCTION OR PRINCIPAL INCREASE WITH RESPECT TO THE NOTES TO BE PERFORMED BY RMS IN ITS CAPACITY AS CALCULATION AGENT WILL RESULT FROM A FACTUAL DETERMINATION BASED ON DATA PROVIDED BY THE REPORTING SOURCES. THE DETERMINATION WILL BE PERFORMED IN ACCORDANCE WITH THE METHODOLOGIES DESCRIBED IN THIS OFFERING CIRCULAR AND AS SPECIFIED IN THE CALCULATION AGENT AGREEMENT. THE TERMS OF THE NOTES PROVIDE THAT ALL FACTUAL DETERMINATIONS MADE BY RMS AS CALCULATION AGENT ARE FINAL AND BINDING, ABSENT MANIFEST ERROR. NO SEPARATE REVIEW OR APPRAISAL OF THE ACCURACY OF THE DEFINED METHODOLOGIES OR DATA USED WILL BE PERFORMED. INVESTORS ARE ADVISED THAT THE CALCULATION OF AN EVENT PAYMENT AND RELATED PRINCIPAL REDUCTION OR PRINCIPAL INCREASE IS FINAL, REGARDLESS OF ANY ACTUAL, POTENTIAL OR THEORETICAL DISCREPANCIES BETWEEN THE METHODOLOGIES USED BY THE CALCULATION AGENT AND ANY OTHER POSSIBLE METHODOLOGIES FOR ASSESSING THE SAME FACTS OR ANY LOSSES WHICH ARE ACTUALLY EXPERIENCED IN REALITY AS A RESULT OF THE ASSOCIATED MORTALITY EVENT. THESE INHERENT LIMITATIONS ARE POTENTIALLY EXACERBATED BY THE POTENTIAL FOR UNRELIABLE DATA, OR THE UNAVAILABILITY OF DATA FROM THE REPORTING SOURCES USED BY THE CALCULATION AGENT.

NOTICE TO RESIDENTS OF AUSTRALIA

THIS OFFERING CIRCULAR IS NOT A “PRODUCT DISCLOSURE STATEMENT” FOR THE PURPOSES OF CHAPTER 7 OF THE AUSTRALIAN CORPORATIONS ACT 2001 (CTH) (THE “**CORPORATIONS ACT**”) AND IS NOT REQUIRED TO BE LODGED WITH THE AUSTRALIAN SECURITIES AND INVESTMENTS COMMISSION UNDER THE CORPORATIONS ACT AS EACH OFFER FOR THE ISSUE, ANY INVITATION TO APPLY FOR THE ISSUE AND ANY OFFER FOR SALE OF, AND ANY INVITATION FOR OFFERS TO PURCHASE, THE NOTES TO A PERSON UNDER THIS OFFERING CIRCULAR:

- (I) WILL BE FOR A MINIMUM AMOUNT PAYABLE (AFTER DISREGARDING ANY AMOUNT LENT BY THE PERSON OFFERING THE NOTES (AS DETERMINED UNDER SECTION 700(3) OF THE CORPORATIONS ACT) OR ANY OF THEIR ASSOCIATES (AS DETERMINED UNDER SECTIONS 10 TO 17 OF THE CORPORATIONS ACT)) ON ACCEPTANCE OF THE OFFER OR APPLICATION (AS THE CASE MAY BE) WHICH IS AT LEAST A\$500,000 (CALCULATED IN ACCORDANCE WITH BOTH SECTION 708(9) OF THE CORPORATIONS ACT AND REGULATION 7.1.18 OF THE AUSTRALIAN CORPORATIONS REGULATIONS 2001 (CTH)); OR
- (II) DOES NOT OTHERWISE REQUIRE DISCLOSURE TO INVESTORS UNDER PART 6D.2 OF THE CORPORATIONS ACT AND IS NOT MADE TO A PERSON WHO IS A RETAIL CLIENT (AS DEFINED IN SECTION 761G OF THE CORPORATIONS ACT).

A PERSON MAY NOT (DIRECTLY OR INDIRECTLY) OFFER FOR ISSUE OR SALE, OR MAKE ANY INVITATION TO APPLY FOR THE ISSUE OR TO PURCHASE, THE NOTES OR DISTRIBUTE THIS OFFERING CIRCULAR EXCEPT IF THE OFFER OR INVITATION:

- (I) DOES NOT NEED DISCLOSURE TO INVESTORS UNDER PART 6D.2 OF THE CORPORATIONS ACT;
- (II) IS NOT MADE TO A RETAIL CLIENT (AS DEFINED IN SECTION 761G OF THE CORPORATIONS ACT); AND
- (III) COMPLIES WITH ANY OTHER APPLICABLE LAWS IN ALL JURISDICTIONS IN WHICH THE OFFER OR INVITATION IS MADE.

NOTICE TO RESIDENTS OF AUSTRIA

THIS OFFERING CIRCULAR DOES NOT CONSTITUTE AN OFFERING PROSPECTUS PURSUANT TO EITHER THE AUSTRIAN CAPITAL MARKET ACT (*KAPITALMARKTGESETZ*) OR THE AUSTRIAN STOCK EXCHANGE ACT (*BOERSENGESETZ*). FURTHERMORE, THIS OFFERING CIRCULAR HAS NOT BEEN AUDITED BY A QUALIFIED BANK OR A CERTIFIED PUBLIC ACCOUNTANT. THE FORM AND CONTENT OF THIS OFFERING CIRCULAR DO NOT COMPLY WITH THE AUSTRIAN LAW FOR PUBLIC OFFERING OF SECURITIES IN FOREIGN FUNDS. THUS, THIS OFFERING CIRCULAR IS NEITHER INTENDED TO SERVE AS A MEANS OF OFFERING SECURITIES TO THE PUBLIC NOR DOES IT CONSTITUTE AN OFFER OF SUCH SECURITIES TO THE PUBLIC. THE NOTES ARE OFFERED OR SOLD ON A PRIVATE PLACEMENT BASIS. THIS OFFERING CIRCULAR HAS BEEN PRODUCED FOR THE SOLE PURPOSE OF PROVIDING INFORMATION ABOUT CERTAIN SECURITIES TO A LIMITED NUMBER OF QUALIFIED INVESTORS IN AUSTRIA.

NOTICE TO RESIDENTS OF BARBADOS

THIS OFFERING CIRCULAR IS ISSUED IN CONNECTION WITH THE DISTRIBUTION BY THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OF THE NOTES (A) TO PERSONS IN BARBADOS WHO ARE EITHER EXEMPT FROM CURRENCY CONTROLS IN RESPECT OF THE PURCHASE, ACQUISITION AND OWNERSHIP OF THE NOTES, OR HAVE OBTAINED THE NECESSARY PERMISSION UNDER THE EXCHANGE CONTROL ACT OF BARBADOS, AND (B) TO FEWER THAN FIFTY (50) PERSONS IN THE AGGREGATE EACH OF WHOM IS A “SOPHISTICATED PURCHASER” WITHIN THE MEANING OF SECTION 61(1) OF THE BARBADOS SECURITIES ACT (BARBADOS EXEMPT PURCHASERS).

AS SUCH THE DISTRIBUTION OF THE NOTES IN BARBADOS IS EXEMPT FROM THE PROSPECTUS REQUIREMENTS OF THE BARBADOS SECURITIES ACT, BUT IS SUBJECT TO ANY CONDITIONS PRESCRIBED BY THE FINANCIAL SERVICES COMMISSION (OF BARBADOS). THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF HAVE GIVEN PRIOR WRITTEN NOTIFICATION OF THE DISTRIBUTION OF THE NOTES TO THE FINANCIAL SERVICES COMMISSION (OF BARBADOS) IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 69(2)(A) OF THE BARBADOS SECURITIES ACT. THE ISSUER MAY SEEK WRITTEN CONFIRMATION OF THE EXEMPTION FROM THE FINANCIAL SERVICES COMMISSION (OF BARBADOS).

BY PURCHASING NOTES IN BARBADOS, A PURCHASER WILL BE REPRESENTING TO THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF THAT:

- (I) THE PURCHASER IS A SOPHISTICATED PURCHASER WITHIN THE MEANING OF SECTION 61(1) OF THE BARBADOS SECURITIES ACT;
- (II) THE PURCHASER IS EXEMPT FROM CURRENCY CONTROLS IN RESPECT OF THE PURCHASE, ACQUISITION AND OWNERSHIP OF THE NOTES, OR HAS OBTAINED THE NECESSARY PERMISSION UNDER THE EXCHANGE CONTROL ACT OF BARBADOS, AND THAT EVIDENCE OF SUCH EXEMPTION SHALL BE FORWARDED TO THE ISSUER;
- (III) THE PURCHASER IS ABLE TO EVALUATE THE NOTES AS AN INVESTMENT ON THE BASIS OF THE INFORMATION PROVIDED IN THIS OFFERING CIRCULAR, BY VIRTUE OF HIS NET WORTH AND ADVICE INDEPENDENTLY AVAILABLE TO HIM FROM AN INVESTMENT ADVISOR; AND
- (IV) THE PURCHASER HAS REVIEWED THE FOREGOING PARAGRAPH.

THIS OFFERING CIRCULAR IS NOT ISSUED IN CONNECTION WITH ANY INVITATION TO THE PUBLIC TO SUBSCRIBE FOR ANY DEBENTURES OR AS PART OF ANY DISTRIBUTION OF DEBENTURES TO THE PUBLIC. AS A CONSEQUENCE, THE SALE AND DISTRIBUTION OF THE NOTES IS EXEMPTED FROM HAVING TO COMPLY WITH THE PROSPECTUS REQUIREMENTS OF THE BARBADOS COMPANIES ACT, AND THERE IS NO REQUIREMENT FOR THE REGISTRATION OF THE NOTES IN ACCORDANCE WITH THE BARBADOS SECURITIES ACT.

NOTICE TO RESIDENTS OF BELGIUM

THE ISSUER HAS NOT BEEN AND WILL NOT BE REGISTERED WITH THE BELGIAN BANKING, FINANCE AND INSURANCE COMMISSION (*COMMISSIE VOOR HET BANK-, FINANCIËLE- EN ASSURANTIEWEZEN/COMMISSION BANCAIRE, FINANCIÈRE ET DES ASSURANCES*) AS A FOREIGN COLLECTIVE INVESTMENT INSTITUTION UNDER ARTICLE 127 OF THE BELGIAN LAW OF 20 JULY 2004 ON CERTAIN FORMS OF COLLECTIVE MANAGEMENT OF INVESTMENT PORTFOLIOS. THE OFFERING IN BELGIUM HAS NOT BEEN AND WILL NOT BE NOTIFIED TO THE BELGIAN BANKING, FINANCE AND INSURANCE COMMISSION, NOR HAS THIS DOCUMENT NOR ANY SUPPLEMENT THERETO BEEN NOR WILL IT BE APPROVED BY THE BELGIAN BANKING, FINANCE AND INSURANCE COMMISSION.

ACCORDINGLY, THE NOTES SHALL, WHETHER DIRECTLY OR INDIRECTLY, ONLY BE OFFERED, SOLD, TRANSFERRED OR DELIVERED IN BELGIUM TO INDIVIDUALS OR LEGAL ENTITIES (I) WHO ARE BOTH “QUALIFIED INVESTORS” IN THE SENSE OF ARTICLE 10 OF THE BELGIAN LAW OF 16 JUNE 2006 ON THE PUBLIC OFFER OF PLACEMENT INSTRUMENTS AND THE ADMISSION TO TRADING OF PLACEMENT INSTRUMENTS ON REGULATED MARKETS (AS AMENDED FROM TIME TO TIME) AND “PROFESSIONAL OR INSTITUTIONAL INVESTORS” IN THE SENSE OF ARTICLE 5 § 3 OF THE BELGIAN LAW OF 20 JULY 2004 ON CERTAIN FORMS OF COLLECTIVE MANAGEMENT OF INVESTMENT PORTFOLIOS (AS AMENDED FROM TIME TO TIME), ACTING ON THEIR OWN BEHALF, OR (II) INVESTING AT LEAST EUR50,000 (OR ITS EQUIVALENT IN OTHER CURRENCIES) PER TRANSACTION.

THIS OFFERING CIRCULAR HAS BEEN ISSUED TO YOU FOR YOUR PERSONAL USE ONLY AND EXCLUSIVELY FOR THE PURPOSES OF THE OFFERING. ACCORDINGLY, THIS OFFERING CIRCULAR MAY NOT BE USED FOR ANY OTHER PURPOSE NOR PASSED ON TO ANY OTHER PERSON IN BELGIUM.

NOTICE TO RESIDENTS OF BERMUDA

TO THE EXTENT THAT ANY NOTES ARE OFFERED OR SOLD IN OR FROM BERMUDA SUCH OFFER OR SALE WILL BE MADE IN ACCORDANCE WITH THE INVESTMENT BUSINESS ACT 2003 OF BERMUDA.

NOTICE TO RESIDENTS OF THE BRITISH VIRGIN ISLANDS

THE NOTES MAY NOT BE OFFERED IN THE BRITISH VIRGIN ISLANDS (“**BVI**”) UNLESS THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF IS LICENSED TO CARRY ON BUSINESS IN THE BVI. NONE OF THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF IS LICENSED TO CARRY ON BUSINESS IN THE BVI. THE NOTES MAY BE OFFERED TO BVI BUSINESS COMPANIES (FROM OUTSIDE THE BRITISH VIRGIN ISLANDS) WITHOUT RESTRICTIONS. A BVI BUSINESS COMPANY IS A COMPANY FORMED UNDER OR OTHERWISE GOVERNED BY THE BVI BUSINESS COMPANIES ACT 2004 (AS AMENDED).

IT IS EXPECTED THAT PART II OF THE SECURITIES AND INVESTMENT BUSINESS ACT 2010 (“**SIBA**”) WILL BE BROUGHT INTO FORCE AND BECOME LAW IN THE BVI IN THE NEAR FUTURE. UPON PART II OF SIBA COMING INTO FORCE, THE NOTES MAY NOT BE, AND WILL NOT BE, OFFERED TO THE PUBLIC OR TO ANY PERSON IN THE BVI FOR PURCHASE OR SUBSCRIPTION BY OR ON BEHALF OF THE ISSUER. THE NOTES MAY CONTINUE TO BE OFFERED TO BVI BUSINESS COMPANIES, BUT ONLY WHERE THE OFFER WILL BE MADE TO, AND RECEIVED BY, THE RELEVANT BVI COMPANY ENTIRELY OUTSIDE OF THE BVI. THE NOTES MAY ALSO BE OFFERED TO PERSONS LOCATED IN THE BVI WHO ARE “QUALIFIED INVESTORS” FOR THE PURPOSES OF SIBA.

THIS OFFERING CIRCULAR HAS NOT BEEN REGISTERED WITH THE FINANCIAL SERVICES COMMISSION OF THE BVI AND WILL NOT BE SO REGISTERED UPON PART II OF SIBA COMING INTO FORCE. NO REGISTERED PROSPECTUS HAS BEEN OR WILL BE PREPARED IN RESPECT OF THE NOTES FOR THE PURPOSES OF SIBA.

NOTICE TO RESIDENTS OF CANADA (ONTARIO AND QUÉBEC)

THIS OFFERING CIRCULAR CONSTITUTES AN OFFERING OF NOTES ONLY IN ONTARIO AND QUÉBEC AND ONLY TO THOSE PERSONS WHERE AND TO WHOM THEY MAY BE LAWFULLY OFFERED FOR SALE, AND THEREIN ONLY BY PERSONS PERMITTED TO SELL SUCH NOTES.

THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF HAVE NOT FILED A PROSPECTUS WITH ANY SECURITIES COMMISSION OR SIMILAR AUTHORITY IN CANADA IN RESPECT OF THE NOTES AND ACCORDINGLY, THE NOTES ARE NOT QUALIFIED FOR SALE IN CANADA AND MAY NOT BE OFFERED OR SOLD DIRECTLY OR INDIRECTLY IN CANADA EXCEPT PURSUANT TO AN EXEMPTION FROM THE PROSPECTUS AND REGISTRATION REQUIREMENTS OF CANADIAN SECURITIES LAWS. THE OFFERING OF NOTES IN CANADA IS BEING MADE SOLELY BY THIS OFFERING CIRCULAR AND NO PERSON HAS BEEN AUTHORIZED TO GIVE ANY INFORMATION OR TO MAKE ANY REPRESENTATION OTHER THAN THOSE CONTAINED IN THIS OFFERING CIRCULAR. NO SECURITIES COMMISSION OR SIMILAR REGULATORY AUTHORITY IN CANADA HAS REVIEWED OR IN ANY WAY PASSED UPON THIS OFFERING CIRCULAR OR THE MERITS OF THE NOTES, AND ANY REPRESENTATION TO THE CONTRARY IS AN OFFENCE.

THIS OFFERING CIRCULAR IS NOT, AND UNDER NO CIRCUMSTANCES IS TO BE CONSTRUED AS, A PROSPECTUS, AN ADVERTISEMENT OR A PUBLIC OFFERING OF THE NOTES IN CANADA.

CURRENCY

ALL DOLLAR AMOUNTS IN THIS OFFERING CIRCULAR ARE EXPRESSED IN A CURRENCY OTHER THAN CANADIAN DOLLARS, SAVE WHERE OTHERWISE INDICATED. FLUCTUATIONS IN THE EXCHANGE RATE BETWEEN SUCH CURRENCY AND THE CANADIAN DOLLAR WILL AFFECT THE CANADIAN DOLLAR EQUIVALENT OF THE OFFERING PRICE OF THE NOTES AND THE FINANCIAL INFORMATION CONTAINED HEREIN. IN ADDITION, THE FINANCIAL INFORMATION CONTAINED HEREIN HAS NOT BEEN PREPARED IN ACCORDANCE WITH INTERNATIONAL FINANCIAL REPORTING STANDARDS.

RESALE RESTRICTIONS

THE DISTRIBUTION OF THE NOTES IN ONTARIO AND QUÉBEC IS BEING MADE ON A PRIVATE PLACEMENT BASIS AND EXEMPT FROM THE REQUIREMENT THAT THE ISSUER PREPARE AND FILE A PROSPECTUS WITH APPLICABLE SECURITIES REGULATORY AUTHORITIES. ACCORDINGLY, ANY RESALE OF THE NOTES MUST BE MADE IN ACCORDANCE WITH, OR PURSUANT TO AN EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE PROSPECTUS REQUIREMENTS OF APPLICABLE PROVINCIAL SECURITIES LAWS. THESE CANADIAN RESALE RESTRICTIONS MAY IN SOME CIRCUMSTANCES APPLY TO RESALES MADE OUTSIDE OF CANADA. CANADIAN PURCHASERS OF NOTES ARE ADVISED TO SEEK CANADIAN LEGAL ADVICE PRIOR TO ANY RESALE OF THE NOTES, BOTH WITHIN AND OUTSIDE OF CANADA.

ACKNOWLEDGMENTS

BY PURCHASING THE NOTES, AMONG OTHER THINGS, EACH PURCHASER IN ONTARIO AND QUÉBEC WILL BE DEEMED TO HAVE CONFIRMED, CERTIFIED, REPRESENTED, WARRANTED TO AND AGREED FOR THE BENEFIT OF THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF AS FOLLOWS:

- (A) IT IS AUTHORIZED TO CONSUMMATE THE PURCHASE OF THE NOTES;
- (B) IT IS A RESIDENT OF ONTARIO OR QUÉBEC, AS APPLICABLE;
- (C) IT IS BASING ITS INVESTMENT DECISION SOLELY ON THE FINAL VERSION OF THIS OFFERING CIRCULAR AND NOT ON ANY OTHER INFORMATION CONCERNING THE ISSUER OR THE OFFERING;
- (D) IT IS AN “ACCREDITED INVESTOR” WITHIN THE MEANING OF SECTION 1.1 OF NATIONAL INSTRUMENT 45-106, *PROSPECTUS AND REGISTRATION EXEMPTIONS* (“NI 45-106”);
- (E) IF THE PURCHASER IS AN “ACCREDITED INVESTOR” IN RELIANCE ON PARAGRAPH (M) OF THE DEFINITION OF “ACCREDITED INVESTOR” IN SECTION 1.1 OF NI 45-106, THE PURCHASER WAS NOT CREATED OR USED SOLELY TO PURCHASE OR HOLD SECURITIES AS AN ACCREDITED INVESTOR UNDER THAT PARAGRAPH (M);
- (F) IT IS PURCHASING THE NOTES AS PRINCIPAL, OR IS DEEMED TO BE PURCHASING THE NOTES AS PRINCIPAL UNDER APPLICABLE LAW, NOT AS AGENT, WITHIN THE MEANING OF NI 45-106 FOR INVESTMENT ONLY AND NOT WITH A VIEW TO RESALE OR DISTRIBUTION;
- (G) IT IS ENTITLED UNDER APPLICABLE SECURITIES LAWS IN ONTARIO OR QUÉBEC, AS APPLICABLE, TO PURCHASE THE NOTES WITHOUT THE BENEFIT OF A PROSPECTUS QUALIFIED UNDER SUCH SECURITIES LAWS;
- (H) IT IS A “PERMITTED CLIENT” WITHIN THE MEANING OF SECTION 1.1 OF NATIONAL INSTRUMENT 31-103 – *REGISTRATION REQUIREMENTS, EXEMPTIONS AND ONGOING REGISTRATION OBLIGATIONS*;
- (I) IT HAS REVIEWED THE TERMS UNDER THE HEADING “*RESALE RESTRICTIONS*” ABOVE, AND IT ACKNOWLEDGES AND UNDERSTANDS THAT THE NOTES MAY NOT BE RESOLD WITHOUT AN EXEMPTION FROM THE REGISTRATION AND PROSPECTUS REQUIREMENTS OF APPLICABLE SECURITIES LAWS;
- (J) IT UNDERSTANDS AND ACKNOWLEDGES THAT THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF ARE UNDER NO OBLIGATION TO FILE AND HAVE NO PRESENT INTENTION OF FILING WITH ANY SECURITIES REGULATORY AUTHORITY IN CANADA ANY PROSPECTUS IN RESPECT OF THE SALE OR RESALE OF THE NOTES; AND
- (K) IT UNDERSTANDS AND ACKNOWLEDGES THAT IF, AS A RESULT OF ANY INFORMATION OR OTHER MATTER WHICH COMES TO THE ATTENTION OF THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR ANY DIRECTOR,

OFFICER OR EMPLOYEE OF THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF, OR ITS PROFESSIONAL ADVISORS OR SUCH PERSONS KNOW OR SUSPECT THAT AN INVESTOR IS ENGAGED IN MONEY LAUNDERING, THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR SUCH PERSONS ARE REQUIRED TO REPORT SUCH INFORMATION OR OTHER MATTER TO THE FINANCIAL TRANSACTIONS AND REPORTS ANALYSIS CENTRE OF CANADA (FINTRAC) AND SUCH REPORT SHALL NOT BE TREATED AS A BREACH OF ANY RESTRICTION UPON THE DISCLOSURE OF INFORMATION IMPOSED BY CANADIAN LAW OR OTHERWISE.

COLLECTION OF PERSONAL INFORMATION

EACH INVESTOR IN CANADA ACKNOWLEDGES THAT ITS NAME AND OTHER SPECIFIED INFORMATION, INCLUDING INFORMATION PERTAINING TO THE NOTES ACQUIRED BY SUCH INVESTOR, MAY BE DISCLOSED TO SECURITIES REGULATORY AUTHORITIES OF CANADA AND MAY BECOME AVAILABLE TO THE PUBLIC IN ACCORDANCE WITH THE REQUIREMENTS OF APPLICABLE SECURITIES LAWS OF CANADA. THE INVESTOR CONSENTS TO THE COLLECTION, USE AND DISCLOSURE OF THIS INFORMATION. BY PURCHASING THE NOTES, THE INVESTOR ACKNOWLEDGES THAT HIS, HER OR ITS PERSONAL INFORMATION SUCH AS THE INVESTOR'S NAME, ADDRESS AND TELEPHONE NUMBER WILL BE DELIVERED TO THE ONTARIO SECURITIES COMMISSION (THE "OSC") AND THAT SUCH PERSONAL INFORMATION IS BEING COLLECTED INDIRECTLY BY THE OSC UNDER THE AUTHORITY GRANTED TO IT IN SECURITIES LEGISLATION FOR THE PURPOSES OF THE ADMINISTRATION AND ENFORCEMENT OF THE SECURITIES LEGISLATION OF ONTARIO. BY PURCHASING THE NOTES, THE INVESTOR SHALL BE DEEMED TO HAVE AUTHORIZED SUCH INDIRECT COLLECTION OF PERSONAL INFORMATION BY THE OSC. QUESTIONS ABOUT SUCH INDIRECT COLLECTION OF PERSONAL INFORMATION SHOULD BE DIRECTED TO THE OSC'S ADMINISTRATIVE SUPPORT CLERK, SUITE 1903, BOX 55, 20 QUEEN STREET WEST, TORONTO, ONTARIO M5H 3S8 OR TO THE FOLLOWING TELEPHONE NUMBER: (416) 593-3684.

CANADIAN INCOME TAX CONSIDERATIONS

NO REPRESENTATION OR WARRANTY IS MADE AS TO THE TAX CONSEQUENCES TO A CANADIAN RESIDENT OF AN INVESTMENT IN THE NOTES. PROSPECTIVE PURCHASERS OF THE NOTES SHOULD CONSULT THEIR OWN TAX ADVISERS WITH RESPECT TO ANY TAXES PAYABLE IN CONNECTION WITH THE ACQUISITION, HOLDING OR DISPOSITION OF THE NOTES. IT IS RECOMMENDED THAT TAX ADVISERS BE EMPLOYED IN CANADA, AS THERE ARE A NUMBER OF SUBSTANTIVE CANADIAN TAX COMPLIANCE REQUIREMENTS FOR CANADIAN INVESTORS.

ENFORCEMENT OF LEGAL RIGHTS

THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF WERE ESTABLISHED UNDER THE LAWS OF A JURISDICTION OUTSIDE CANADA. THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF AND ITS DIRECTORS AND OFFICERS ARE RESIDENTS OUTSIDE CANADA. ALL OR A SUBSTANTIAL PORTION OF THE ASSETS OF THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF AND ITS DIRECTORS AND OFFICERS ARE SITUATED OUTSIDE CANADA. AS A RESULT, THERE MAY BE DIFFICULTY IN ENFORCING ANY LEGAL RIGHTS AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR ITS DIRECTORS AND OFFICERS. IN PARTICULAR, IT MAY NOT BE POSSIBLE FOR INVESTORS TO EFFECT SERVICE OF PROCESS WITHIN CANADA UPON THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR ITS DIRECTORS AND OFFICERS, TO SATISFY A JUDGMENT AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR ITS DIRECTORS AND OFFICERS IN CANADA OR TO ENFORCE A JUDGMENT OBTAINED IN CANADIAN COURTS AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF OR ITS DIRECTORS AND OFFICERS OUTSIDE CANADA.

RIGHTS OF ACTION FOR DAMAGES AND RESCISSION

AS USED HEREIN, "**MISREPRESENTATION**" MEANS AN UNTRUE STATEMENT OF A MATERIAL FACT OR AN OMISSION TO STATE A MATERIAL FACT THAT IS REQUIRED TO BE STATED OR THAT IS NECESSARY TO MAKE A STATEMENT IN THIS OFFERING CIRCULAR NOT MISLEADING IN LIGHT OF

THE CIRCUMSTANCES IN WHICH IT WAS MADE, AND “**MATERIAL FACT**” MEANS A FACT THAT WOULD REASONABLY BE EXPECTED TO HAVE A SIGNIFICANT EFFECT ON THE MARKET PRICE OR VALUE OF THE NOTES. SECURITIES LEGISLATION IN ONTARIO PROVIDES THAT IF THIS OFFERING CIRCULAR, TOGETHER WITH ANY AMENDMENT HERETO, DELIVERED TO AN INVESTOR RESIDENT IN ONTARIO BEFORE THE ISSUANCE OF THE NOTES TO SUCH INVESTOR, CONTAINS A MISREPRESENTATION, AND IT WAS A MISREPRESENTATION AT THE TIME OF PURCHASE OF THE NOTES BY SUCH INVESTOR, SUCH INVESTOR WHO PURCHASES THE NOTES DURING THE PERIOD OF DISTRIBUTION WILL HAVE, WITHOUT REGARD TO WHETHER THE INVESTOR RELIED UPON THE MISREPRESENTATION, A RIGHT OF ACTION AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF FOR DAMAGES OR, WHILE STILL THE OWNER OF THE NOTES PURCHASED BY THAT INVESTOR, FOR RESCISSION, IN WHICH CASE, IF THE INVESTOR ELECTS TO EXERCISE THE RIGHT OF RESCISSION, THE INVESTOR WILL HAVE NO RIGHT OF ACTION FOR DAMAGES AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF. THE INVESTOR MAY EXERCISE THESE RIGHTS AGAINST THE ISSUER, ANY INITIAL PURCHASER OR ANY OTHER PERSON ACTING ON THEIR BEHALF PROVIDED, THAT THE RIGHT OF ACTION FOR RESCISSION OR DAMAGES WILL BE EXERCISABLE BY AN INVESTOR ONLY IF THE INVESTOR COMMENCES AN ACTION TO ENFORCE SUCH RIGHT NOT LATER THAN:

- (A) IN THE CASE OF AN ACTION FOR RESCISSION, 180 DAYS AFTER THE DATE OF THE TRANSACTION THAT GAVE RISE TO THE CAUSE OF ACTION; OR
- (B) IN THE CASE OF ANY ACTION OTHER THAN AN ACTION FOR RESCISSION, THE EARLIER OF (1) 180 DAYS AFTER THE INVESTOR FIRST HAD KNOWLEDGE OF THE FACTS GIVING RISE TO THE CAUSE OF ACTION, OR (2) THREE YEARS AFTER THE DATE OF THE TRANSACTION THAT GAVE RISE TO THE CAUSE OF ACTION.

NONE OF THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF WILL BE LIABLE IF THEY PROVE THAT THE INVESTOR PURCHASED THE NOTES WITH KNOWLEDGE OF THE MISREPRESENTATION. IN THE CASE OF AN ACTION FOR DAMAGES, NONE OF THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF WILL BE LIABLE FOR ALL OR ANY PORTION OF THE DAMAGES THAT THEY PROVE DOES NOT REPRESENT THE DEPRECIATION IN VALUE OF THE NOTES AS A RESULT OF THE MISREPRESENTATION RELIED UPON. IN NO CASE WILL THE AMOUNT RECOVERABLE IN ANY ACTION EXCEED THE PRICE AT WHICH THE NOTES WERE SOLD TO THE INVESTOR.

THE FOREGOING RIGHTS DO NOT APPLY IF THE INVESTOR IS:

- (A) A CANADIAN FINANCIAL INSTITUTION, MEANING EITHER:
 - (I) AN ASSOCIATION GOVERNED BY THE COOPERATIVE CREDIT ASSOCIATIONS ACT (CANADA) OR A CENTRAL COOPERATIVE CREDIT SOCIETY FOR WHICH AN ORDER HAS BEEN MADE UNDER SECTION 473(1) OF THAT ACT; OR
 - (II) A BANK, LOAN CORPORATION, TRUST COMPANY, TRUST CORPORATION, INSURANCE COMPANY, TREASURY BRANCH, CREDIT UNION, CAISSE POPULAIRE, FINANCIAL SERVICES COOPERATIVE, OR LEAGUE THAT, IN EACH CASE, IS AUTHORIZED BY AN ENACTMENT OF CANADA OR JURISDICTION OF CANADA TO CARRY ON BUSINESS IN CANADA OR A JURISDICTION IN CANADA;
- (B) A SCHEDULE III BANK, MEANING AN AUTHORIZED FOREIGN BANK NAMED IN SCHEDULE III OF THE BANK ACT (CANADA);
- (C) THE BUSINESS DEVELOPMENT BANK OF CANADA INCORPORATED UNDER THE BUSINESS DEVELOPMENT BANK OF CANADA ACT (CANADA); OR

- (D) A SUBSIDIARY OF ANY PERSON REFERRED TO IN PARAGRAPHS (A), (B) OR (C) IMMEDIATELY ABOVE, IF THE PERSON OWNS ALL OF THE VOTING SECURITIES OF THE SUBSIDIARY, EXCEPT THE VOTING NOTES REQUIRED BY LAW TO BE OWNED BY DIRECTORS OF THAT SUBSIDIARY.

THE FOREGOING SUMMARY IS SUBJECT TO THE EXPRESS PROVISIONS OF THE RESPECTIVE SECURITIES LEGISLATION OF ONTARIO AND QUÉBEC, AS AMENDED, AND THE RULES, REGULATIONS AND OTHER INSTRUMENTS THEREUNDER, AND REFERENCE IS MADE TO THE COMPLETE TEXT OF SUCH PROVISIONS CONTAINED THEREIN. EACH PURCHASER SHOULD REFER TO PROVISIONS OF THE APPLICABLE SECURITIES LEGISLATION FOR THE PARTICULARS OF THESE RIGHTS OR CONSULT WITH A LEGAL ADVISER. THE RIGHTS OF ACTION DESCRIBED HEREIN ARE IN ADDITION TO AND WITHOUT DEROGATION FROM ANY OTHER RIGHT OR REMEDY THAT THE INVESTOR MAY HAVE AT LAW.

LANGUAGE OF DOCUMENTS

UPON RECEIPT OF THIS OFFERING CIRCULAR, EACH CANADIAN INVESTOR HEREBY CONFIRMS THAT IT HAS EXPRESSLY REQUESTED THAT ALL DOCUMENTS EVIDENCING OR RELATING IN ANY WAY TO THE SALE OF THE SECURITIES DESCRIBED HEREIN (INCLUDING FOR GREATER CERTAINTY ANY INVESTOR CONFIRMATION OR ANY NOTICE) BE DRAWN UP IN THE ENGLISH LANGUAGE ONLY.

PAR LA RÉCEPTION DE CE DOCUMENT, CHAQUE INVESTISSEUR CANADIEN CONFIRME PAR LES PRÉSENTES QU'IL A EXPRESSÉMENT EXIGÉ QUE TOUS LES DOCUMENTS FAISANT FOI OU SE RAPPORTANT DE QUELQUE MANIÈRE QUE CE SOIT À LA VENTE DES VALEURS MOBILIÈRES DÉCRITES AUX PRÉSENTES (INCLUANT, POUR PLUS DE CERTITUDE, TOUTE CONFIRMATION D'ACHAT OU TOUT AVIS) SOIENT RÉDIGÉS EN ANGLAIS SEULEMENT.

NOTICE TO RESIDENTS OF THE CAYMAN ISLANDS

UNLESS THE NOTES ARE LISTED ON THE CAYMAN ISLANDS STOCK EXCHANGE, NO INVITATION, WHETHER DIRECTLY OR INDIRECTLY, MAY BE MADE TO THE PUBLIC IN THE CAYMAN ISLANDS TO SUBSCRIBE FOR THE NOTES. THE TERM “PUBLIC IN THE CAYMAN ISLANDS” DOES NOT INCLUDE (A) A SOPHISTICATED PERSON; (B) A HIGH NET WORTH PERSON; (C) A PERSON SPECIFIED IN PARAGRAPH 3 OR 4 OF THE FOURTH SCHEDULE TO THE SECURITIES INVESTMENT BUSINESS LAW (REVISED); (D) AN EXEMPTED OR ORDINARY NON-RESIDENT COMPANY REGISTERED UNDER THE COMPANIES LAW (REVISED), OR A FOREIGN COMPANY REGISTERED UNDER PART IX OF THAT LAW, OR ANY SUCH COMPANY ACTING AS GENERAL PARTNER OF A PARTNERSHIP REGISTERED UNDER SECTION 9(1) OF THE EXEMPTED LIMITED PARTNERSHIP LAW (REVISED), OR ANY DIRECTOR OR OFFICER OF THE SAME ACTING IN SUCH CAPACITY; OR (E) THE TRUSTEE OF ANY TRUST REGISTERED OR CAPABLE OF REGISTRATION UNDER SECTION 74 OF THE TRUST LAW (REVISED) ACTING IN SUCH CAPACITY.

NOTICE TO RESIDENTS OF DENMARK

THIS OFFERING CIRCULAR AND THE NOTES OFFERED HEREIN HAVE NOT BEEN FILED WITH OR APPROVED BY THE DANISH FINANCIAL SUPERVISORY AUTHORITY OR ANY OTHER REGULATORY AUTHORITY IN THE KINGDOM OF DENMARK NOR DOES THIS DOCUMENT OR ANY SUPPLEMENT THERETO CONSTITUTE A PROSPECTUS OR OTHER PROMOTIONAL MATERIAL FOR THE PUBLIC OFFERING OF SECURITIES IN ACCORDANCE WITH DANISH LAW. ACCORDINGLY, THE NOTES OFFERED HEREIN MAY NOT BE OFFERED OR SOLD, DIRECTLY OR INDIRECTLY, IN DENMARK, NOR MAY THIS DOCUMENT BE MARKETED OR DISTRIBUTED IN DENMARK EXCEPT IF SUCH MARKETING OR DISTRIBUTION IS IN COMPLIANCE WITH THE DANISH SECURITIES TRADING ACT AND ANY EXECUTIVE ORDERS ISSUED THEREUNDER, INCLUDING EXECUTIVE ORDER NO. 885 OF 14 SEPTEMBER 2009 ON THE FIRST PUBLIC OFFER OF CERTAIN SECURITIES, AS AMENDED OR REPLACED FROM TIME TO TIME.

NOTICE TO RESIDENTS OF EUROPEAN ECONOMIC AREA MEMBER STATES

IN RELATION TO EACH MEMBER STATE OF THE EUROPEAN ECONOMIC AREA WHICH HAS IMPLEMENTED THE PROSPECTUS DIRECTIVE (EACH, A “**RELEVANT MEMBER STATE**”), EACH INITIAL PURCHASER HAS REPRESENTED AND AGREED, AND EACH FURTHER NOTEHOLDER WILL BE REQUIRED AND DEEMED TO REPRESENT AND AGREE, THAT WITH EFFECT FROM AND INCLUDING THE DATE ON WHICH THE PROSPECTUS DIRECTIVE IS IMPLEMENTED IN THAT RELEVANT MEMBER STATE (THE “**RELEVANT IMPLEMENTATION DATE**”), IT HAS NOT MADE AND WILL NOT MAKE AN OFFER OF THE NOTES WHICH ARE THE SUBJECT OF THE OFFERING CONTEMPLATED BY THIS OFFERING CIRCULAR TO THE PUBLIC IN THAT RELEVANT MEMBER STATE EXCEPT THAT IT MAY, WITH EFFECT FROM AND INCLUDING THE RELEVANT IMPLEMENTATION DATE, MAKE AN OFFER OF SUCH NOTES TO THE PUBLIC IN THAT RELEVANT MEMBER STATE:

- (A) AT ANY TIME TO ANY LEGAL ENTITY WHICH IS A QUALIFIED INVESTOR AS DEFINED IN THE PROSPECTUS DIRECTIVE;
- (B) AT ANY TIME TO FEWER THAN 150 NATURAL OR LEGAL PERSONS (OTHER THAN QUALIFIED INVESTORS AS DEFINED IN THE PROSPECTUS DIRECTIVE) SUBJECT TO OBTAINING THE PRIOR CONSENT OF THE ISSUER FOR ANY SUCH OFFER; OR
- (C) AT ANY TIME IN ANY OTHER CIRCUMSTANCES FALLING WITHIN ARTICLE 3(2) OF THE PROSPECTUS DIRECTIVE;

PROVIDED, THAT NO SUCH OFFER OF THE NOTES REFERRED TO IN (A) TO (C) ABOVE SHALL REQUIRE THE ISSUER TO PUBLISH A PROSPECTUS PURSUANT TO ARTICLE 3 OF THE PROSPECTUS DIRECTIVE OR SUPPLEMENT A PROSPECTUS PURSUANT TO ARTICLE 16 OF THE PROSPECTUS DIRECTIVE.

FOR THE PURPOSES OF THIS PROVISION, THE EXPRESSION AN “**OFFER OF NOTES TO THE PUBLIC**” IN RELATION TO ANY NOTES IN ANY RELEVANT MEMBER STATE MEANS THE COMMUNICATION IN ANY FORM AND BY ANY MEANS OF SUFFICIENT INFORMATION ON THE TERMS

OF THE OFFER AND THE NOTES TO BE OFFERED SO AS TO ENABLE AN INVESTOR TO DECIDE TO PURCHASE OR SUBSCRIBE FOR THE NOTES, AS THE SAME MAY BE VARIED IN THAT MEMBER STATE BY ANY MEASURE IMPLEMENTING THE PROSPECTUS DIRECTIVE IN THAT MEMBER STATE, AND THE EXPRESSION "**PROSPECTUS DIRECTIVE**", IN THIS CONTEXT, MEANS DIRECTIVE 2003/71/EC (AS AMENDED, INCLUDING BY DIRECTIVE 2010/73/EU), AND INCLUDES ANY RELEVANT IMPLEMENTING MEASURE IN THE RELEVANT MEMBER STATE.

NOTICE TO RESIDENTS OF FRANCE

THE NOTES DESCRIBED HEREIN WILL BE ISSUED OUTSIDE OF FRANCE AND MAY NOT BE, DIRECTLY OR INDIRECTLY, OFFERED OR SOLD TO THE PUBLIC IN FRANCE ("*OFFRE AU PUBLIC DE TITRES FINANCIERS*"). THE OFFER OF THE NOTES IS NOT SUBJECT TO THE REQUIREMENT OF A PROSPECTUS TO BE SUBMITTED TO THE FRENCH AUTORITÉ DES MARCHÉS FINANCIERS (AMF) FOR ITS APPROVAL (VISA) AND THIS OFFERING CIRCULAR AND ANY OTHER OFFERING OR MARKETING MATERIAL RELATING TO THE NOTES HAVE BEEN SUBMITTED NEITHER PURSUANT TO THE CLEARANCE PROCEDURE OF THE FRENCH AMF NOR TO A COMPETENT AUTHORITY OF ANOTHER MEMBER STATE OF THE EUROPEAN ECONOMIC AREA THAT WOULD HAVE NOTIFIED ITS APPROVAL TO THE AMF UNDER THE EU PROSPECTUS DIRECTIVE AS IMPLEMENTED IN FRANCE AND IN ANY RELEVANT MEMBER STATE. THE NOTES WILL NOT BE OFFERED OR SOLD, DIRECTLY OR INDIRECTLY, IN FRANCE, AND THIS OFFERING CIRCULAR AND ANY OTHER OFFERING OR MARKETING MATERIAL RELATING TO THE NOTES WILL NOT BE RELEASED, ISSUED OR DISTRIBUTED TO THE PUBLIC IN FRANCE OR USED IN CONNECTION WITH ANY OFFER FOR SUBSCRIPTION, EXCHANGE OR SALE OF THE NOTES TO THE PUBLIC IN FRANCE. ANY SUCH OFFERS, SALES AND DISTRIBUTIONS MAY BE MADE IN FRANCE ONLY TO QUALIFIED INVESTORS ("*INVESTISSEURS QUALIFIÉS*"), AND/OR TO A LIMITED GROUP OF INVESTORS ("*CERCLE RESTREINT D'INVESTISSEURS*"), ACTING FOR THEIR OWN ACCOUNT AND/OR TO PROVIDERS OF INVESTMENT SERVICES RELATING TO PORTFOLIO MANAGEMENT FOR THE ACCOUNT OF THIRD PARTIES ("*PERSONNES FOURNISSANT LE SERVICE D'INVESTISSEMENT DE GESTION DE PORTEFEUILLE POUR LE COMPTE DE TIERS*"), AS DEFINED IN, AND IN ACCORDANCE WITH, ARTICLES L.411-2, D.411-1 AND D.411-4, D.744-1, D.754-1 AND D.764-1 OF THE FRENCH *CODE MONÉTAIRE ET FINANCIER*. IN COMPLIANCE WITH ARTICLES L.411-2 AND D.411-1 AND D.411-4, D.744-1, D.754-1 AND D.764-1 OF THE FRENCH *CODE MONÉTAIRE ET FINANCIER*, ANY INVESTORS SUBSCRIBING FOR THE NOTES SHOULD BE ACTING FOR THEIR OWN ACCOUNT. IF ANY NOTES SUBSCRIBED FOR OR ACQUIRED BY SUCH INVESTORS ARE SUBSEQUENTLY OFFERED OR SOLD, DIRECTLY OR INDIRECTLY, TO THE PUBLIC IN FRANCE, ANY SUCH OFFER SHALL COMPLY WITH ARTICLES L. 411-1, L.411-2, L.412- 1 AS WELL AS L.621-8 TO L.621-8-3 OF THE FRENCH *CODE MONÉTAIRE ET FINANCIER*.

NOTICE TO RESIDENTS OF GERMANY

THIS OFFERING CIRCULAR IS ONLY DIRECTED AT PERSONS IN GERMANY WHO ARE “QUALIFIED INVESTORS” (*QUALIFIZIERTE ANLEGER*) WITHIN THE MEANING OF SECTION 2 SUBSECTION 6 OF THE GERMAN SECURITIES PROSPECTUS ACT (*WERTPAPIERPROSPEKTGESETZ*) OR ARE PERSONS TO WHOM AN OFFER OF SECURITIES MAY OTHERWISE BE MADE WITHOUT THE REQUIREMENT FOR AN APPROVED PROSPECTUS PURSUANT TO SECTION 3 SUBSECTION 2 OF THE GERMAN SECURITIES PROSPECTUS ACT (ALL SUCH PERSONS TOGETHER REFERRED TO AS “**RELEVANT PERSONS**”). THIS OFFERING CIRCULAR HAS NOT BEEN AND WILL NOT BE SUBMITTED TO, NOR HAS IT BEEN APPROVED BY, THE GERMAN FINANCIAL SERVICES SUPERVISORY AUTHORITY (*BUNDESANSTALT FÜR FINANZDIENSTLEISTUNGSAUFSICHT, BAFIN*) OR ANY OTHER REGULATORY AUTHORITY IN GERMANY. THE NOTES HAVE NOT BEEN AND WILL NOT BE ADMITTED FOR PUBLIC OFFERING IN GERMANY AND MUST NOT BE DISTRIBUTED WITHIN GERMANY BY WAY OF A PUBLIC OFFER, PUBLIC ADVERTISEMENT OR IN ANY SIMILAR MANNER. ANY RESALE OF THE NOTES IN GERMANY MAY ONLY BE MADE IN ACCORDANCE WITH THE SECURITIES PROSPECTUS ACT AND OTHER APPLICABLE GERMAN LAWS. THIS OFFERING CIRCULAR AND ANY OTHER DOCUMENT RELATING TO THE NOTES, AS WELL AS INFORMATION CONTAINED THEREIN, MAY NOT BE SUPPLIED TO THE PUBLIC IN GERMANY OR USED IN CONNECTION WITH ANY OFFER FOR SUBSCRIPTION OF NOTES TO THE PUBLIC IN GERMANY. THIS OFFERING CIRCULAR MUST NOT BE RELIED ON OR ACTED UPON BY PERSONS WHO ARE NOT RELEVANT PERSONS. ANY INVESTMENT OR INVESTMENT ACTIVITY TO WHICH THIS COMMUNICATION RELATES IS AVAILABLE ONLY TO RELEVANT PERSONS AND WILL BE ENGAGED IN ONLY WITH RELEVANT PERSONS.

NOTICE TO RESIDENTS OF GUERNSEY

THIS OFFERING CIRCULAR SHALL NOT BE CIRCULATED TO THE PUBLIC IN THE BAILIWICK OF GUERNSEY, CHANNEL ISLANDS.

THIS OFFERING CIRCULAR IS ONLY BEING PROMOTED IN OR FROM WITHIN THE BAILIWICK OF GUERNSEY EITHER (I) BY PERSONS LICENSED TO DO SO UNDER THE PROTECTION OF INVESTORS (BAILIWICK OF GUERNSEY) LAW, 1987 (AS AMENDED) OR (II) TO PERSONS LICENSED UNDER THE PROTECTION OF INVESTORS (BAILIWICK OF GUERNSEY) LAW, 1987 (AS AMENDED), THE INSURANCE BUSINESS (BAILIWICK OF GUERNSEY) LAW, 2002 (AS AMENDED), THE BANKING SUPERVISION (BAILIWICK OF GUERNSEY) LAW, 1994 (AS AMENDED) OR THE REGULATION OF FIDUCIARIES, ADMINISTRATION BUSINESSES AND COMPANY DIRECTORS, ETC. (BAILIWICK OF GUERNSEY) LAW, 2000 (AS AMENDED).

PROMOTION IS NOT BEING MADE IN ANY OTHER WAY.

NOTICE TO RESIDENTS OF HONG KONG

THE ISSUER AND THE INITIAL PURCHASERS HAVE REPRESENTED, WARRANTED AND AGREED THAT, WITH EFFECT FROM AND INCLUDING THE DATE OF THIS OFFERING CIRCULAR, IT HAS NOT ISSUED AND WILL NOT ISSUE, AND WILL NOT HAVE IN ITS POSSESSION FOR THE PURPOSES OF ISSUE, AN ADVERTISEMENT, INVITATION OR DOCUMENT WHICH IS OR CONTAINS AN INVITATION TO THE PUBLIC TO ENTER INTO OR OFFER TO ENTER INTO AN AGREEMENT TO ACQUIRE, DISPOSE OF, SUBSCRIBE FOR OR UNDERWRITE THE NOTES WHICH ARE THE SUBJECT OF THE OFFERING CONTEMPLATED BY THIS OFFERING CIRCULAR IN THE HONG KONG SPECIAL ADMINISTRATIVE REGION OF THE PEOPLE'S REPUBLIC OF CHINA ("HONG KONG"), OTHER THAN THE ISSUE OF THIS OFFERING CIRCULAR. THE ISSUER AND THE INITIAL PURCHASERS MAY ISSUE THIS OFFERING CIRCULAR:

- (I) TO ANY CORPORATION LICENSED TO DEAL IN OR ADVISE ON SECURITIES, OR TO ANY OTHER PERSON CARRYING ON THE BUSINESS OF INVESTMENT SERVICES AND REGULATED UNDER THE LAW OF ANY PLACE OUTSIDE HONG KONG ("REGULATED");
- (II) TO ANY AUTHORIZED INSTITUTION (BEING A BANK, A RESTRICTED LICENSE BANK OR DEPOSIT-TAKING COMPANY) AS DEFINED IN THE BANKING ORDINANCE (CHAPTER 155 OF THE LAWS OF HONG KONG), OR ANY BANK WHICH IS NOT AN AUTHORIZED INSTITUTION BUT IS REGULATED;
- (III) TO A WHOLLY OWNED SUBSIDIARY OR A HOLDING COMPANY HOLDING ALL THE ISSUED SHARE CAPITAL OF A PERSON DESCRIBED IN (I) OR (II) AND ANY OTHER WHOLLY OWNED SUBSIDIARY OF SUCH A HOLDING COMPANY;
- (IV) TO ANY INSURER AUTHORIZED UNDER THE INSURANCE COMPANIES ORDINANCE (CHAPTER 41 OF THE LAWS OF HONG KONG), OR ANY OTHER PERSON CARRYING ON INSURANCE BUSINESS AND REGULATED;
- (V) TO ANY GOVERNMENT (OTHER THAN A MUNICIPAL GOVERNMENT AUTHORITY), CENTRAL BANK OR MULTILATERAL AGENCY;
- (VI) TO A TRUST COMPANY REGISTERED UNDER PART VIII OF THE TRUSTEE ORDINANCE (CHAPTER 29 OF THE LAWS OF HONG KONG) OR ANY OTHER CORPORATION WHICH CARRIES ON A BUSINESS OF A SIMILAR NATURE TO THAT OF A REGISTERED TRUST COMPANY AND IS REGULATED AND WHICH ACTS AS TRUSTEE OF A TRUST OR TRUSTS WITH TOTAL ASSETS OF NOT LESS THAN HK\$40 MILLION OR ITS EQUIVALENT IN ANY FOREIGN CURRENCY AS STATED OR ASCERTAINED IN PRESCRIBED AUDITED FINANCIAL STATEMENTS PREPARED WITHIN SIXTEEN (16) MONTHS OF THE RELEVANT DATE OR CUSTODIAN STATEMENTS ISSUED WITHIN TWELVE (12) MONTHS OF THE RELEVANT DATE;
- (VII) TO ANY INDIVIDUAL, EITHER ALONE OR WITH ANY OF HIS ASSOCIATES ON A JOINT ACCOUNT, HAVING A PORTFOLIO OF NOT LESS THAN HK\$8 MILLION OR ITS EQUIVALENT IN ANY FOREIGN CURRENCY AS STATED OR ASCERTAINED IN AN AUDITOR'S CERTIFICATE OR CUSTODIAN'S STATEMENT ISSUED WITHIN TWELVE (12) MONTHS OF THE RELEVANT DATE;
- (VIII) TO ANY CORPORATION OR PARTNERSHIP HAVING A PORTFOLIO OF SECURITIES, CERTIFICATES OF DEPOSIT AND MONEY OF NOT LESS THAN HK\$8 MILLION OR ITS EQUIVALENT IN ANY FOREIGN CURRENCY OR TOTAL ASSETS OF NOT LESS THAN HK\$40 MILLION OR ITS EQUIVALENT IN ANY FOREIGN CURRENCY AS ASCERTAINED BY REFERENCE TO THE MOST RECENT AUDITED FINANCIAL STATEMENT PREPARED WITHIN SIXTEEN (16) MONTHS OF THE RELEVANT DATE OR CUSTODIAN STATEMENT ISSUED WITHIN TWELVE (12) MONTHS OF THE RELEVANT DATE;

- (IX) TO ANY CORPORATION THE SOLE BUSINESS OF WHICH IS TO HOLD INVESTMENTS AND WHICH IS WHOLLY OWNED BY A TRUST COMPANY OR CORPORATION AS DESCRIBED IN (VI) OR BY AN INDIVIDUAL WHO, EITHER ALONE OR WITH ANY OF HIS/HER ASSOCIATES ON A JOINT ACCOUNT, IS DESCRIBED IN (VII) OR BY A CORPORATION OR PARTNERSHIP AS DESCRIBED IN (VIII);
- (X) TO ANY PERSON OUTSIDE HONG KONG; OR
- (XI) IN ANY OTHER CIRCUMSTANCES FALLING WITHIN SECTION 103(3) OF THE SECURITIES AND FUTURES ORDINANCE (CHAPTER 571 OF THE LAWS OF HONG KONG);

PROVIDED, THAT NO SUCH OFFERING OF THE NOTES CONTEMPLATED BY THIS OFFERING CIRCULAR SHALL REQUIRE THE ISSUER OR THE INITIAL PURCHASER TO REGISTER OR HAVE AUTHORIZED THIS OFFERING CIRCULAR UNDER THE LAWS OF HONG KONG.

THE CONTENTS OF THIS DOCUMENT HAVE NOT BEEN REVIEWED BY ANY REGULATORY AUTHORITY IN HONG KONG. YOU ARE ADVISED TO EXERCISE CAUTION IN RELATION TO THE OFFER. IF YOU ARE IN ANY DOUBT ABOUT ANY OF THE CONTENTS OF THIS DOCUMENT, YOU SHOULD OBTAIN PROFESSIONAL ADVICE.

NOTICE TO RESIDENTS OF IRELAND

EACH INITIAL PURCHASER HAS REPRESENTED AND AGREED IN THE RELEVANT PURCHASE AGREEMENT, AND EACH NOTEHOLDER WILL BE REQUIRED AND DEEMED TO REPRESENT AND AGREE, THAT, TO THE EXTENT APPLICABLE:

- (I) IT HAS NOT AND WILL NOT UNDERWRITE THE ISSUE OF, OR PLACE, ANY NOTES, OTHERWISE THAN IN CONFORMITY WITH THE PROVISIONS OF (I) THE EUROPEAN COMMUNITIES (MARKETS IN FINANCIAL INSTRUMENTS) REGULATIONS 2007 (AS AMENDED), INCLUDING, WITHOUT LIMITATION, PARTS 6, 7 AND 12 THEREOF AND ANY CODES OF CONDUCT, GUIDANCE AND OTHER REQUIREMENTS ISSUED IN CONNECTION THEREWITH AND (II) THE INVESTOR COMPENSATION ACT, 1998;
- (II) IT HAS NOT AND WILL NOT UNDERWRITE THE ISSUE OF, OR PLACE, ANY NOTES, OTHERWISE THAN IN CONFORMITY WITH THE PROVISIONS OF THE CENTRAL BANK ACTS 1942 TO 2014 AND ANY CODES OF CONDUCT OR RULES MADE UNDER SECTION 117(1) OF THE CENTRAL BANK ACT 1989;
- (III) IT HAS NOT AND WILL NOT UNDERWRITE THE ISSUE OF, OR DO ANYTHING IN IRELAND IN RESPECT OF, ANY NOTES OTHERWISE THAN IN CONFORMITY WITH THE PROVISIONS OF THE PROSPECTUS REGULATIONS AND ANY RULES ISSUED UNDER SECTION 51 OF THE INVESTMENT FUNDS, COMPANIES AND MISCELLANEOUS PROVISIONS ACT 2005 BY THE CENTRAL BANK;
- (IV) IT HAS NOT AND WILL NOT UNDERWRITE THE ISSUE OF, PLACE OR OTHERWISE ACT IN IRELAND IN RESPECT OF ANY NOTES, OTHERWISE THAN IN CONFORMITY WITH THE PROVISIONS OF THE EU DIRECTIVE 2003/6/EC ON INSIDER DEALING AND MARKET MANIPULATION AND IRISH MARKET ABUSE LAW (AS SUCH TERM IS DEFINED IN THE IRISH INVESTMENT FUNDS, COMPANIES AND MISCELLANEOUS PROVISIONS ACT, 2005 (THE “**2005 ACT**”) AND THE MARKET ABUSE (DIRECTIVE 2003/6/EC) REGULATIONS 2005 (AS AMENDED) AND ANY RULES ISSUED UNDER SECTION 34 OF THE INVESTMENT FUNDS, COMPANIES AND MISCELLANEOUS PROVISIONS ACT 2005 BY THE CENTRAL BANK; AND
- (V) IT HAS COMPLIED WITH AND WILL COMPLY WITH ALL APPLICABLE PROVISIONS OF THE IRISH COMPANIES ACTS 1963-2013.

(AS EACH OF THE FOREGOING MAY BE AMENDED, VARIED OR SUPPLEMENTED FROM TIME TO TIME).

THE ISSUER WILL NOT BE REGULATED BY THE CENTRAL BANK BY VIRTUE OF ISSUING THE NOTES. ANY INVESTMENT IN THE NOTES DOES NOT HAVE THE STATUS OF A BANK DEPOSIT AND IS

NOT SUBJECT TO THE DEPOSIT PROTECTION SCHEME OPERATED BY THE CENTRAL BANK OR ANY OTHER GOVERNMENT GUARANTEE SCHEME.

NOTICE TO RESIDENTS OF ITALY

THIS OFFERING CIRCULAR IS ONLY DIRECTED AT PERSONS IN ITALY WHO ARE QUALIFIED INVESTORS PURSUANT TO ART. 100 OF THE ITALIAN FINANCIAL LAW AND ART. 34 TER OF CONSOB REGULATION NO. 11971/99, AS AMENDED, IMPLEMENTING THE ITALIAN FINANCIAL LAW (THE “**ISSUERS REGULATION**”). PURSUANT TO THE ISSUERS REGULATION, WHICH REFERS TO ART. 26 OF CONSOB REGULATION NO. 16190/2007 (THE “**INTERMEDIARIES REGULATION**”), “**QUALIFIED INVESTORS**” ARE:

- (I) ENTITIES REQUIRED TO BE AUTHORIZED OR REGULATED TO OPERATE IN THE FINANCIAL MARKETS, BOTH ITALIAN AND FOREIGN, INCLUDING BANKS, INVESTMENT FIRMS, OTHER AUTHORIZED OR REGULATED FINANCIAL INSTITUTIONS, INSURANCE COMPANIES, COLLECTIVE INVESTMENT SCHEMES AND MANAGEMENT COMPANIES OF SUCH SCHEMES, PENSION FUNDS AND MANAGEMENT COMPANIES OF SUCH FUNDS, DEALERS ACTING ON THEIR OWN ACCOUNT ON COMMODITIES AND COMMODITY DERIVATIVES, PERSONS DEALING EXCLUSIVELY ON THEIR OWN ACCOUNT ON FINANCIAL INSTRUMENTS MARKETS WITH INDIRECT MEMBERSHIP OF CLEARING AND SETTLEMENT SERVICES AND THE LOCAL COMPENSATORY AND GUARANTEE SYSTEM (LOCALS), OTHER INSTITUTIONAL INVESTORS, STOCKBROKERS;
- (II) LARGE UNDERTAKINGS MEETING TWO OF THE FOLLOWING SIZE REQUIREMENTS ON A COMPANY BASIS: 1) BALANCE SHEET TOTAL 20.000.000 EUROS; 2) NET REVENUES 40.000.000 EUROS; 3) OWN FUNDS 2.000.000 EUROS;
- (III) INSTITUTIONAL INVESTORS WHOSE MAIN ACTIVITY IS TO INVEST IN FINANCIAL INSTRUMENTS, INCLUDING ENTITIES DEDICATED TO THE SECURITIZATION OF ASSETS OR OTHER FINANCIAL TRANSACTIONS;
- (IV) UPON REQUEST, THE INDIVIDUALS WHO MEET AT LEAST TWO OF THE FOLLOWING CONDITIONS: 1) THEY HAVE PERFORMED SIGNIFICANT TRANSACTIONS ON STOCK MARKETS WITH AN AVERAGE FREQUENCY OF AT LEAST TEN TRANSACTIONS PER QUARTER IN THE LAST FOUR QUARTERS; 2) THE SIZE OF THEIR FINANCIAL INSTRUMENT PORTFOLIO, DEFINED AS INCLUDING CASH DEPOSITS, EXCEEDS 500.000 EUROS; 3) THEY WORK OR HAVE WORKED FOR AT LEAST ONE YEAR IN THE FINANCIAL SECTOR CARRYING OUT FUNCTIONS WHICH REQUIRE KNOWLEDGE OF INVESTMENTS IN FINANCIAL INSTRUMENTS;
- (V) THE ITALIAN NATIONAL GOVERNMENT AND THE BANK OF ITALY; OR
- (VI) UPON REQUEST, ITALIAN REGIONS, THE AUTONOMOUS PROVINCES OF TRENTO AND BOLZANO, ENTITIES REFERRED TO IN ART. 2 OF LEGISLATIVE DECREE NO. 267/2000, AS WELL AS NATIONAL AND REGIONAL PUBLIC ENTITIES, PROVIDED THAT THE FOLLOWING CONDITIONS ARE ALL MET: 1) FINAL REVENUES ASCERTAINED IN LAST APPROVED MANAGEMENT REPORT EXCEEDING 40.000.000 EUROS; 2) TRANSACTIONS FOR A TOTAL VALUE EXCEEDING 100.000.000 EUROS, PERFORMED ON STOCK MARKETS DURING THE LAST THREE YEARS BEFORE THE RELEVANT CONTRACT IS SIGNED; 3) STAFF MEMBERS ENTRUSTED WITH THE FINANCIAL MANAGEMENT HAVING APPROPRIATE COMPETENCIES, KNOWLEDGE AND EXPERIENCE IN CONNECTION WITH INVESTMENT SERVICES, ASSET MANAGEMENT SERVICES AND FINANCIAL INSTRUMENTS.

NOTICE TO RESIDENTS OF JAPAN

NO REGISTRATION PURSUANT TO ARTICLE 4, PARAGRAPH 1 OF THE FINANCIAL INSTRUMENTS AND EXCHANGE LAW OF JAPAN (THE “**FIEL**”) HAS BEEN MADE OR WILL BE MADE WITH RESPECT TO THE SOLICITATION OF THE ACQUISITION OF THE NOTES ON THE GROUND THAT ARTICLE 2, PARAGRAPH 3, ITEM 2-(I) OF THE FIEL IS APPLIED TO SUCH SOLICITATION. AS DESCRIBED IN THIS DOCUMENT, THE OFFERING OF THE NOTES IS LIMITED TO AND MADE ONLY TO THE QUALIFIED INSTITUTIONAL INVESTORS (“**QIIS**”) AS DEFINED IN ARTICLE 2, PARAGRAPH 3, ITEM 1 OF THE FIEL AND ARTICLE 10 OF THE CABINET ORDER REGARDING THE DEFINITIONS UNDER ARTICLE 2 OF THE FIEL. NO TRANSFER OF THE NOTES MAY BE MADE TO PERSONS OTHER THAN QIIS, AS DESCRIBED IN THIS DOCUMENT.

THE ISSUER HAS NOT ISSUED (I) ANY OTHER DEBT SECURITIES LISTED AT A SECURITIES EXCHANGE IN JAPAN OR OTHERWISE SUBJECT TO THE CONTINUOUS DISCLOSURE OBLIGATIONS UNDER THE FIEL, WHICH HAVE THE SAME MATURITY, INTEREST RATE AND DENOMINATION CURRENCY AS THOSE OF THE NOTES, OR (II) ANY OTHER DEBT SECURITIES OFFERED OR SOLD UPON PRIVATE PLACEMENT EXEMPTION FOR SPECIFIED INVESTORS IN JAPAN UNDER THE FIEL, WHICH HAVE THE SAME MATURITY, INTEREST RATE AND DENOMINATION CURRENCY AS THOSE OF THE NOTES.

NOTICE TO RESIDENTS OF THE REPUBLIC OF KOREA

THIS OFFERING CIRCULAR IS NOT, AND UNDER NO CIRCUMSTANCES IS TO BE CONSTRUED AS, A PUBLIC OFFERING OF SECURITIES IN KOREA. NEITHER THE ISSUER NOR ANY OF ITS AGENTS MAKE ANY REPRESENTATION WITH RESPECT TO THE ELIGIBILITY OF ANY RECIPIENTS OF THIS DOCUMENT TO ACQUIRE THE NOTES UNDER THE LAWS OF KOREA, INCLUDING, BUT WITHOUT LIMITATION, THE FOREIGN EXCHANGE TRANSACTION LAW AND REGULATIONS THEREUNDER (THE “**FETL**”). THE NOTES HAVE NOT BEEN REGISTERED WITH THE FINANCIAL SERVICES COMMISSION OF KOREA FOR PUBLIC OFFERING IN KOREA, AND NONE OF THE NOTES MAY BE OFFERED, SOLD OR DELIVERED, DIRECTLY OR INDIRECTLY, OR OFFERED OR SOLD TO ANY PERSON FOR RE-OFFERING OR RESALE, DIRECTLY OR INDIRECTLY, IN KOREA OR TO ANY RESIDENT OF KOREA EXCEPT PURSUANT TO THE FINANCIAL INVESTMENT SERVICES AND CAPITAL MARKETS ACT AND THE DECREES AND REGULATIONS THEREUNDER (THE “**FSCMA**”), THE FETL AND ANY OTHER APPLICABLE LAWS, REGULATIONS AND MINISTERIAL GUIDELINES IN KOREA. WITHOUT PREJUDICE TO THE FOREGOING, THE NUMBER OF NOTES OFFERED IN KOREA OR TO A RESIDENT OF KOREA SHALL BE LESS THAN FIFTY AND FOR A PERIOD OF ONE YEAR FROM THE ISSUE DATE OF THE NOTES, NONE OF THE NOTES MAY BE DIVIDED RESULTING IN AN INCREASED NUMBER OF NOTES. FURTHERMORE, THE NOTES MAY NOT BE RESOLD TO KOREAN RESIDENTS UNLESS THE PURCHASER OF THE NOTES COMPLIES WITH ALL APPLICABLE REGULATORY REQUIREMENTS (INCLUDING, BUT NOT LIMITED TO, GOVERNMENT REPORTING APPROVAL REQUIREMENTS UNDER THE FETL AND ITS SUBORDINATE DECREES AND REGULATIONS) IN CONNECTION WITH THE PURCHASE OF THE NOTES.

NOTICE TO RESIDENTS OF LUXEMBOURG

THE NOTES MAY NOT BE OFFERED OR SOLD IN THE GRAND DUCHY OF LUXEMBOURG, EXCEPT FOR NOTES WHICH ARE OFFERED IN CIRCUMSTANCES THAT DO NOT REQUIRE THE APPROVAL OF A PROSPECTUS BY THE LUXEMBOURG FINANCIAL REGULATORY AUTHORITY AND THE PUBLICATION OF SUCH PROSPECTUS IN ACCORDANCE WITH THE LAW OF JULY 10, 2005 ON PROSPECTUSES FOR SECURITIES. THE NOTES ARE OFFERED TO A LIMITED NUMBER OF INVESTORS OR TO INSTITUTIONAL INVESTORS, IN ALL CASES UNDER CIRCUMSTANCES DESIGNED TO PRECLUDE A DISTRIBUTION THAT WOULD BE OTHER THAN A PRIVATE PLACEMENT. THIS OFFERING CIRCULAR MAY NOT BE REPRODUCED OR USED FOR ANY PURPOSE, OR FURNISHED TO ANY PERSON OTHER THAN THOSE TO WHOM COPIES HAVE BEEN SENT.

NOTICE TO RESIDENTS OF MEXICO

NO ACTIONS, APPLICATIONS OR FILINGS HAVE BEEN UNDERTAKEN IN MEXICO, WHETHER BEFORE THE NATIONAL BANKING AND SECURITIES COMMISSION (*COMISIÓN NACIONAL BANCARIA Y DE VALORES*, OR *CNBV*) OR THE MEXICAN STOCK EXCHANGE (*BOLSA MEXICANA DE VALORES*, OR *BMV*), IN ORDER TO REGISTER OR MAKE A PUBLIC OFFERING IN MEXICO, WITH OR WITHOUT PRICE, THROUGH MASS MEDIA AND TO INDETERMINATE SUBJECTS TO SUBSCRIBE, ACQUIRE, SELL OR OTHERWISE ASSIGN THE NOTES, IN ANY FORM OR MANNER.

THIS DOCUMENT IS NOT INTENDED TO BE DISTRIBUTED THROUGH MASS MEDIA TO INDETERMINATE SUBJECTS, NOR TO SERVE AS AN APPLICATION FOR THE REGISTRATION OF THE NOTES BEFORE ANY SECURITIES REGISTRY OR EXCHANGE IN MEXICO, NOR AS A PROSPECTUS FOR THE NOTES' PUBLIC OFFERING IN MEXICO. NO FINANCIAL AUTHORITY OR SECURITIES EXCHANGE IN MEXICO HAS REVIEWED OR ASSESSED THE PARTICULARS OF THE NOTES OR THEIR OFFERING, AND IN NO CASE WILL THEY CERTIFY THE SUITABILITY OF THE NOTES, THE SOLVENCY OF THE ISSUER, OR THE EXACTITUDE OR VERACITY OF THE INFORMATION CONTAINED HEREIN, NOR WILL THEY VALIDATE ANY ACTION IN RELATION TO THE NOTES. HENCE, THE INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE RESPONSIBILITY OF THE ISSUER AND HAS NOT BEEN REVIEWED BY THE CNBV.

YOU ARE SOLELY RESPONSIBLE FOR ANY DECISION YOU MAKE IN RELATION TO THE NOTES IF YOU HAVE PROCURED THIS DOCUMENT YOURSELF OR CAME BY IT THROUGH YOUR OWN MEANS OUT OF YOUR OWN ACCORD, REGARDLESS OF THE SOURCE. IF YOU HAVE RECEIVED THIS DOCUMENT FROM EITHER THE ISSUER OR ANY INITIAL PURCHASER, THE NOTES ARE BEING OFFERED TO YOU UNDER THE PRIVATE OFFERING EXCEPTIONS IN THE MEXICAN SECURITIES MARKET LAW (*LEY DEL MERCADO DE VALORES*, OR THE "SML", ITS ENGLISH LANGUAGE ACRONYM) FOR WHICH YOU MUST BE IN ONE OF THE FOLLOWING SITUATIONS:

- (A) YOU ARE EITHER AN INSTITUTIONAL INVESTOR (*INVERSIONISTA INSTITUCIONAL*) WITHIN THE MEANING OF ARTICLE 2, ROMAN NUMERAL XVII, OF THE SML AND REGARDED AS SUCH PURSUANT TO THE LAWS OF MEXICO, OR A QUALIFIED INVESTOR (*INVERSIONISTA CALIFICADO*) PURSUANT TO THE DEFINITION OF ARTICLE 2, ROMAN NUMERAL XVI, OF THE SML AND YOU HAVE THE INCOME, ASSETS OR QUALITATIVE CHARACTERISTICS PROVIDED FOR UNDER ARTICLE 1, ROMAN NUMERAL XIII OF THE GENERAL PROVISIONS APPLICABLE TO ISSUERS OF SECURITIES AND OTHER PARTICIPANTS IN THE SECURITIES MARKET, WHICH REQUIRE THAT YOU HAVE MAINTAINED, ON AVERAGE OVER THE PAST YEAR, INVESTMENTS IN SECURITIES (WITHIN THE MEANING OF THE SML) FOR AN AMOUNT EQUAL TO OR GREATER THAN 1,500,000 INVESTMENT UNITS (*UNIDADES DE INVERSIÓN, UDIS*), OR IN EACH OF THE LAST 2 YEARS HAD A GROSS ANNUAL INCOME EQUAL TO OR GREATER THAN 500,000 SUCH INVESTMENT UNITS; OR
- (B) YOU ARE A MEMBER OF A GROUP OF LESS THAN 100 INDIVIDUALLY IDENTIFIED PEOPLE TO WHOM THE NOTES ARE BEING OFFERED DIRECTLY AND PERSONALLY.

YOU MAY BE REQUIRED TO EXPRESSLY CONFIRM THAT YOU FALL INTO EITHER OF THE FOREGOING EXCEPTIONS, THAT YOU FURTHER UNDERSTAND THAT THE PRIVATE OFFERING OF NOTES HAS LESS DOCUMENTARY AND INFORMATION REQUIREMENTS THAN PUBLIC OFFERINGS DO, AND THAT YOU WAIVE THE RIGHT TO CLAIM BASED ON THE LACK OF ANY DOCUMENT OR INFORMATION.

ANY INVESTOR ACQUIRING THE NOTES ACCEPTS RESPONSIBILITY FOR ITS DECISION TO ACQUIRE THE NOTES. ANY AND ALL ACQUISITIONS OF NOTES SHALL BE MADE THROUGH A U.S. FINANCIAL INTERMEDIARY PURSUANT TO APPLICABLE U.S. LAWS. NO MEXICAN FINANCIAL INTERMEDIARY MAY TRADE THESE NOTES.

NOTICE TO RESIDENTS OF THE NETHERLANDS

THIS OFFERING CIRCULAR HAS NOT BEEN APPROVED BY AND FILED WITH THE DUTCH AUTHORITY FOR THE FINANCIAL MARKETS (*AUTHORITY FINANCIËLE MARKTEN*, THE “**AFM**”). THE NOTES ARE NOT, WILL NOT AND MAY NOT, DIRECTLY OR INDIRECTLY, BE OFFERED IN THE NETHERLANDS, UNLESS (I) A PROSPECTUS, WHICH HAS BEEN APPROVED BY THE RELEVANT COMPETENT AUTHORITY, IS PUBLISHED OR AN EXCEPTION TO THE REQUIREMENT TO PUBLISH A PROSPECTUS PURSUANT TO THE DUTCH FINANCIAL SUPERVISION ACT (*WET OP HET FINANCIËEL TOEZICHT*, “**FSA**”) APPLIES, AND (II) TO OR BY INDIVIDUALS OR ENTITIES THAT ARE QUALIFIED INVESTORS WITHIN THE MEANING OF ARTICLE 1:1 FSA AND/OR TO FEWER THAN 100 PERSONS NOT BEING QUALIFIED INVESTORS WITHIN THE MEANING OF THE FSA.

NOTICE TO RESIDENTS OF NEW ZEALAND

THIS OFFERING CIRCULAR AND THE INFORMATION CONTAINED IN OR ACCOMPANYING THIS OFFERING CIRCULAR ARE NOT, AND ARE UNDER NO CIRCUMSTANCES TO BE CONSTRUED AS, AN OFFER OF SECURITIES TO ANY PERSON WHO IS A MEMBER OF THE PUBLIC IN NEW ZEALAND FOR SUBSCRIPTION IN TERMS OF THE SECURITIES ACT 1978 (NEW ZEALAND) (THE “**SECURITIES ACT 1978**”). THIS OFFERING CIRCULAR AND THE INFORMATION CONTAINED IN OR ACCOMPANYING THIS OFFERING CIRCULAR HAVE NOT BEEN REGISTERED, FILED WITH OR APPROVED BY ANY NEW ZEALAND REGULATORY AUTHORITY OR UNDER OR IN ACCORDANCE WITH THE SECURITIES ACT 1978. THIS OFFERING CIRCULAR AND THE INFORMATION CONTAINED IN OR ACCOMPANYING THIS OFFERING CIRCULAR ARE NOT A PROSPECTUS OR AN INVESTMENT STATEMENT UNDER NEW ZEALAND LAW AND DO NOT CONTAIN ALL THE INFORMATION THAT A PROSPECTUS OR INVESTMENT STATEMENT IS REQUIRED TO CONTAIN UNDER NEW ZEALAND LAW. ANY OFFER OR SALE OF ANY SECURITIES DESCRIBED IN THESE MATERIALS IN NEW ZEALAND WILL BE MADE ONLY:

- (A) TO PERSONS WHOSE PRINCIPAL BUSINESS IS THE INVESTMENT OF MONEY OR WHO, IN THE COURSE OF AND FOR THE PURPOSES OF THEIR BUSINESS, HABITUALLY INVEST MONEY, FOR THE PURPOSES OF SECTION 3(2)(A)(II) OF THE SECURITIES ACT 1978; OR
- (B) TO PERSONS WHO ARE EACH REQUIRED TO PAY A MINIMUM SUBSCRIPTION PRICE OF AT LEAST NZ\$500,000 FOR THE NOTES BEFORE THE ALLOTMENT OF THOSE NOTES (DISREGARDING ANY AMOUNTS PAYABLE, OR PAID, OUT OF MONEY LENT BY THE ISSUER OR ANY ASSOCIATED PERSON OF THE ISSUER); OR
- (C) TO PERSONS WHO ARE ELIGIBLE PERSONS WITHIN THE MEANING OF SECTION 5(2CC) OF THE SECURITIES ACT 1978; OR
- (D) IN OTHER CIRCUMSTANCES WHERE THERE IS NO CONTRAVENTION OF THE SECURITIES ACT 1978 (OR ANY STATUTORY MODIFICATION OR RE-ENACTMENT OF, OR STATUTORY SUBSTITUTION FOR, THE SECURITIES ACT 1978).

IN SUBSCRIBING FOR NOTES EACH INVESTOR REPRESENTS AND AGREES THAT IT IS NOT ACQUIRING THOSE NOTES WITH A VIEW TO OFFERING THEM (OR ANY OF THEM) FOR SALE TO MEMBERS OF THE PUBLIC (AS THAT EXPRESSION IS DEFINED IN THE SECURITIES ACT 1978) AND, ACCORDINGLY:

- (A) IT HAS NOT OFFERED OR SOLD, AND WILL NOT OFFER OR SELL, DIRECTLY OR INDIRECTLY, ANY NOTES; AND
- (B) IT HAS NOT DISTRIBUTED AND WILL NOT DISTRIBUTE, DIRECTLY OR INDIRECTLY, ANY OFFERING MATERIALS OR ADVERTISEMENT IN RELATION TO ANY OFFER OF NOTES,

IN EACH CASE IN NEW ZEALAND OTHER THAN TO PERSONS THAT MEET THE CRITERIA SET OUT IN (A) TO (D) ABOVE.

NOTICE TO RESIDENTS OF NORWAY

THE OFFERING OF THE NOTES IS NOT SUBJECT TO THE PUBLIC OFFERING RULES OF THE SECURITIES TRADING ACT. NO ACTION HAS OR WILL BE TAKEN FOR THE OFFERING OF THE NOTES TO BE REGISTERED UNDER THE PUBLIC OFFERING RULES OF THE SECURITIES TRADING ACT, AS THE MINIMUM SUBSCRIPTION OF THE NOTES OFFERED IS ABOVE THE EQUIVALENT OF EUR50,000. THE NOTES HAVE NOT BEEN NOR WILL BE REGISTERED OR APPROVED BY THE FINANCIAL SUPERVISORY AUTHORITY OF NORWAY (*KREDITTILSYNET*) OR THE OSLO STOCK EXCHANGE AND, THUS, ARE NOT UNDER PUBLIC SUPERVISION IN NORWAY. THE ISSUER IS NOT UNDER PUBLIC SUPERVISION IN NORWAY. THIS OFFERING CIRCULAR MUST NOT BE COPIED OR OTHERWISE DISTRIBUTED BY THE ADDRESSEE.

NOTICE TO RESIDENTS OF PORTUGAL

THE ISSUER HAS REPRESENTED AND AGREED THAT THE NOTES HAVE NOT AND WILL NOT BE OFFERED, SOLD OR DISTRIBUTED, DIRECTLY OR INDIRECTLY, TO THE PUBLIC IN PORTUGAL AND THAT IT HAS NOT DISTRIBUTED OR CAUSED TO BE DISTRIBUTED AND SHALL NOT DISTRIBUTE OR CAUSE TO BE DISTRIBUTED TO THE PUBLIC IN PORTUGAL OR IN CIRCUMSTANCES WHICH CONSTITUTE AN OFFER TO THE PUBLIC ACCORDING TO ARTICLE 109 OF THE PORTUGUESE SECURITIES CODE, THIS OFFERING CIRCULAR OR ANY OTHER OFFERING MATERIAL RELATING TO THE NOTES, AND THAT SUCH OFFERS, SALES AND DISTRIBUTIONS HAVE BEEN AND SHALL ONLY BE MADE IN PORTUGAL, IN A PRIVATE PLACEMENT, TO QUALIFIED INVESTORS, ALL AS DEFINED IN THE PORTUGUESE SECURITIES CODE.

THIS OFFERING CIRCULAR IS PERSONAL TO EACH PROSPECTIVE INVESTOR AND DOES NOT CONSTITUTE AN OFFER TO ANY OTHER PERSON. IT MAY ONLY BE USED BY THOSE PERSONS TO WHOM IT HAS BEEN HANDED OUT IN CONNECTION WITH THE ISSUE OF NOTES DESCRIBED HEREIN AND MAY NEITHER DIRECTLY NOR INDIRECTLY BE DISTRIBUTED OR MADE AVAILABLE TO OTHER PERSONS WITHOUT THE EXPRESS CONSENT OF THE ISSUER.

NOTICE TO RESIDENTS OF SINGAPORE

THIS OFFERING CIRCULAR HAS NOT BEEN REGISTERED AS A PROSPECTUS WITH THE MONETARY AUTHORITY OF SINGAPORE. ACCORDINGLY, THIS OFFERING CIRCULAR AND ANY OTHER DOCUMENT OR MATERIAL IN CONNECTION WITH THE OFFER OR SALE, OR INVITATION FOR SUBSCRIPTION OR PURCHASE, OF THE NOTES MAY NOT BE CIRCULATED OR DISTRIBUTED, NOR MAY THE NOTES BE OFFERED OR SOLD, OR BE MADE THE SUBJECT OF AN INVITATION FOR SUBSCRIPTION OR PURCHASE, WHETHER DIRECTLY OR INDIRECTLY, TO PERSONS IN SINGAPORE OTHER THAN (I) TO AN INSTITUTIONAL INVESTOR UNDER SECTION 274 OF THE SECURITIES AND FUTURES ACT, CHAPTER 289 OF SINGAPORE (THE “SFA”), (II) TO A RELEVANT PERSON PURSUANT TO SECTION 275(1), OR ANY PERSON PURSUANT TO SECTION 275(1A), AND IN ACCORDANCE WITH THE CONDITIONS SPECIFIED IN SECTION 275, OF THE SFA, OR (III) OTHERWISE PURSUANT TO, AND IN ACCORDANCE WITH THE CONDITIONS OF, ANY OTHER APPLICABLE PROVISION OF THE SFA.

WHERE THE NOTES ARE SUBSCRIBED OR PURCHASED UNDER SECTION 275 BY A RELEVANT PERSON WHICH IS:

- (I) A CORPORATION (WHICH IS NOT AN ACCREDITED INVESTOR (AS DEFINED IN SECTION 4A OF THE SFA)) THE SOLE BUSINESS OF WHICH IS TO HOLD INVESTMENTS AND THE ENTIRE SHARE CAPITAL OF WHICH IS OWNED BY ONE OR MORE INDIVIDUALS, EACH OF WHOM IS AN ACCREDITED INVESTOR; OR
- (II) A TRUST (WHERE THE TRUSTEE IS NOT AN ACCREDITED INVESTOR) WHOSE SOLE PURPOSE IS TO HOLD INVESTMENTS AND EACH BENEFICIARY OF THE TRUST IS AN INDIVIDUAL WHO IS AN ACCREDITED INVESTOR,

SECURITIES (AS DEFINED IN SECTION 239(1) OF THE SFA) OF THAT CORPORATION OR THE BENEFICIARIES' RIGHTS AND INTEREST (HOWSOEVER DESCRIBED) IN THAT TRUST SHALL NOT BE TRANSFERRED WITHIN 6 MONTHS AFTER THAT CORPORATION OR THAT TRUST HAS ACQUIRED THE ABS/ILS STRUCTURES PURSUANT TO AN OFFER MADE UNDER SECTION 275 EXCEPT:

- (I) TO AN INSTITUTIONAL INVESTOR OR TO A RELEVANT PERSON DEFINED IN SECTION 275(2) OF THE SFA, OR TO ANY PERSON ARISING FROM AN OFFER REFERRED TO IN SECTION 275(1A) OR SECTION 276(4)(I)(B) OF THE SFA;
- (II) WHERE NO CONSIDERATION IS OR WILL BE GIVEN FOR THE TRANSFER;
- (III) WHERE THE TRANSFER IS BY OPERATION OF LAW; OR
- (IV) AS SPECIFIED IN SECTION 276(7) OF THE SFA.

NOTICE TO RESIDENTS OF SPAIN

THE SALE OF THE NOTES TO WHICH THIS OFFERING CIRCULAR REFERS HAS NOT BEEN REGISTERED WITH THE SPANISH NATIONAL SECURITIES MARKET COMMISSION ("COMISIÓN NACIONAL DEL MERCADO DE VALORES") PURSUANT TO SPANISH LAWS AND REGULATIONS AND DOES NOT FORM PART OF ANY PUBLIC OFFER OF SUCH SECURITIES IN SPAIN. ACCORDINGLY, THE NOTES MAY NOT BE, AND/OR ARE NOT INTENDED TO BE, PUBLICLY OFFERED, MARKETED OR PROMOTED, NOR ANY PUBLIC OFFER IN RESPECT THEREOF MADE, IN SPAIN, NOR MAY THIS OFFERING CIRCULAR OR ANY OTHER OFFERING MATERIALS RELATING TO THE OFFER OF THE NOTES BE DISTRIBUTED, IN THE KINGDOM OF SPAIN, BY THE ISSUER, THE INITIAL PURCHASERS OR ANY OTHER PERSON ON THEIR BEHALF, EXCEPT IN CIRCUMSTANCES WHICH DO NOT CONSTITUTE A PUBLIC OFFERING AND MARKETING IN SPAIN WITHIN THE MEANING OF SPANISH LAWS OR WITHOUT COMPLYING WITH ALL LEGAL AND REGULATORY REQUIREMENTS IN RELATION THERETO. THIS OFFERING CIRCULAR AND ANY OTHER MATERIAL RELATING TO THE NOTES MAY NOT BE DISTRIBUTED TO ANY PERSON OR ENTITY OTHER THAN ITS RECIPIENTS, EXCEPT IN COMPLIANCE WITH SPANISH LAW AND REGULATIONS.

NOTICE TO RESIDENTS OF SWEDEN

THIS DOCUMENT HAS NOT BEEN NOR WILL IT BE REGISTERED WITH OR APPROVED BY FINANSINSPEKTIONEN (THE SWEDISH FINANCIAL SUPERVISORY AUTHORITY) UNDER THE SWEDISH FINANCIAL INSTRUMENTS TRADING ACT (1991:980). FURTHER, NO SINGLE INVESTOR MAY INVEST AN AMOUNT LESS THAN EUR100,000 PER OFFERING AND THE OFFER IS ONLY DIRECTED TO "QUALIFIED INVESTORS" AS DEFINED BY THE SWEDISH FINANCIAL INSTRUMENTS TRADING ACT. ACCORDINGLY, THIS DOCUMENT MAY NOT BE MADE AVAILABLE, NOR MAY THE NOTES OFFERED HEREUNDER BE MARKETED AND OFFERED FOR SALE, IN SWEDEN, OTHER THAN UNDER CIRCUMSTANCES WHICH ARE DEEMED NOT TO BE AN OFFER TO THE PUBLIC IN SWEDEN UNDER THE SWEDISH FINANCIAL INSTRUMENTS TRADING ACT.

PROSPECTIVE INVESTORS SHOULD NOT CONSTRUE THE CONTENTS OF THIS DOCUMENT AS LEGAL OR TAX ADVICE. THIS DOCUMENT HAS BEEN PREPARED FOR MARKETING PURPOSES ONLY AND DOES NOT CONSTITUTE INVESTMENT ADVICE.

NOTICE TO RESIDENTS OF SWITZERLAND

THIS OFFERING CIRCULAR AND ANY OTHER MATERIAL RELATING TO THE NOTES WHICH ARE THE SUBJECT OF THE OFFERING CONTEMPLATED BY THIS OFFERING CIRCULAR, DO NOT CONSTITUTE A PROSPECTUS WITHIN THE MEANING OF ARTICLES 652A AND 1156D OF THE SWISS CODE OF OBLIGATIONS. THE NOTES REFERRED TO IN THIS OFFERING CIRCULAR DO NOT QUALIFY AS INVESTMENT FUND INTERESTS AND CONSEQUENTLY ARE NOT SUBJECT TO ANY INVESTMENT FUND SUPERVISION IN SWITZERLAND. AS A RESULT, INVESTORS CANNOT CLAIM ANY PROTECTION UNDER THE SWISS FEDERAL ACT ON COLLECTIVE INVESTMENT SCHEMES OF JUNE 23, 2006 ("CISA") AND THE CORRESPONDING COLLECTIVE INVESTMENT SCHEMES ORDINANCE ("CISO"). WHILE INVESTING IN THE NOTES, INVESTORS ARE EXPOSED TO THE CREDIT RISK OF THE ISSUER. AS A

RESULT, THE VALUE OF THE NOTES IS NOT ONLY SUBJECT TO THE MARKET RISK OF THEIR UNDERLYING ASSETS BUT ALSO TO THE SOLVENCY RISK OF THE ISSUER.

THIS OFFERING CIRCULAR IS BEING COMMUNICATED IN SWITZERLAND TO A LIMITED NUMBER OF SELECTED INVESTORS ONLY. THE ISSUER, ANY INITIAL PURCHASER AND ANY OTHER PERSON ACTING ON THEIR BEHALF HAVE NOT BEEN AUTHORIZED BY THE SWISS FINANCIAL MARKET SUPERVISORY AUTHORITY (FINMA) FOR PUBLIC OFFERING IN OR FROM SWITZERLAND. ACCORDINGLY, THE NOTES MAY NOT BE OFFERED TO THE PUBLIC IN OR FROM SWITZERLAND, AND NEITHER THIS OFFERING CIRCULAR NOR ANY OTHER OFFERING MATERIALS RELATING TO THE NOTES MAY BE DISTRIBUTED IN CONNECTION WITH ANY SUCH PUBLIC OFFERING. THE NOTES MAY ONLY BE OFFERED IN OR FROM SWITZERLAND TO QUALIFIED INVESTORS AS DEFINED IN ARTICLES 3 AND 10 PARAGRAPHS 3 AND 4 CISA AND 6 PARAGRAPH 2 CISO, WITHOUT ANY PUBLIC OFFERING.

THIS OFFERING CIRCULAR MAY NOT BE COPIED, REPRODUCED, DISTRIBUTED OR PASSED ON TO OTHERS WITHOUT THE PRIOR WRITTEN CONSENT OF THE ISSUER. THE NOTES WILL NOT BE LISTED ON THE SIX SWISS EXCHANGE AND, THEREFORE, THE DOCUMENTS RELATING TO THE NOTES, INCLUDING, BUT NOT LIMITED TO, THIS CIRCULAR, DO NOT CLAIM TO COMPLY WITH THE DISCLOSURE STANDARDS OF THE SWISS CODE OF OBLIGATIONS AND THE LISTING RULES OF THE SIX SWISS EXCHANGE.

NOTICE TO RESIDENTS OF THE UNITED KINGDOM

IN THE UNITED KINGDOM, THIS OFFERING CIRCULAR AND ANY OTHER MATERIAL IN RELATION TO THE NOTES DESCRIBED HEREIN IS ONLY BEING DISTRIBUTED TO, AND IS ONLY DIRECTED AT, PERSONS WHO (I) HAVE PROFESSIONAL EXPERIENCE IN MATTERS RELATING TO INVESTMENTS FALLING WITHIN ARTICLE 19(5) (“**INVESTMENT PROFESSIONALS**”) OF THE FINANCIAL SERVICES AND MARKETS ACT 2000 (FINANCIAL PROMOTIONS) ORDER 2005 (AS AMENDED) (THE “**ORDER**”), OR (II) ARE HIGH NET WORTH ENTITIES, OR OTHER PERSONS TO WHOM IT MAY LAWFULLY BE COMMUNICATED, FALLING WITHIN ARTICLE 49(2)(A) TO (D) (“HIGH NET WORTH COMPANIES, UNINCORPORATED ASSOCIATIONS, ETC.”) OF THE ORDER; (ALL SUCH PERSONS TOGETHER BEING REFERRED TO AS “**RELEVANT PERSONS**”). IN THE UNITED KINGDOM, THE NOTES ARE OFFERED ONLY TO RELEVANT PERSONS AND NO INVITATION, OFFER OR AGREEMENT TO SUBSCRIBE, PURCHASE OR OTHERWISE ACQUIRE THE NOTES MAY BE PROPOSED OR MADE TO PERSONS OTHER THAN RELEVANT PERSONS. ANY PERSON IN THE UNITED KINGDOM THAT IS NOT A RELEVANT PERSON SHOULD NOT ACT ON OR RELY ON THIS OFFERING CIRCULAR OR ANY OF ITS CONTENTS.

No person has been authorized to give any information or make any representations other than those contained in this Offering Circular and, if given or made, such information or representations must not be relied upon as having been authorized. This Offering Circular does not constitute an offer to sell or the solicitation of an offer to buy any securities other than the Notes to which such documents relate or an offer to sell or the solicitation of an offer to buy such securities by any person in any circumstances in which such offer or solicitation is unlawful. Neither the delivery of this Offering Circular nor any offer or sale made hereunder or thereunder shall, under any circumstances, create any implication that there has been no change in the affairs of the Issuer, the Counterparty, the Initial Purchasers or any of their respective affiliates, or any of their respective directors, officers or agents since the date hereof or that the information herein is correct as of any time subsequent to its date.

SEE ALSO “NOTICE TO INVESTORS” BEGINNING ON PAGE 129.

AVAILABLE INFORMATION

The Issuer extends to each potential investor meeting the investment criteria set forth in “*Notice to Investors*” the opportunity, prior to the consummation of the sale of the Notes, to ask questions of, and receive answers from, the Issuer concerning the Notes, the Issuer and the terms and conditions of the Offering in order to verify information set forth herein, to the extent the Issuer possesses the same or can acquire such information without unreasonable effort or expense.

Prior to the consummation of sales of the Notes, the Issuer will make the following transaction documents available in draft form to potential investors meeting the investment criteria set forth in “*Notice to Investors*” for review: (i) the base indenture, to be entered into between the Issuer and the Indenture Trustee as of the Issuance Date (the “**Base Indenture**”) as supplemented and amended by the class supplement to be entered into between the Issuer and the Indenture Trustee as of the Issuance Date (the “**Class Supplement**”, and the Base Indenture as so supplemented and amended, the “**Indenture**”); (ii) the Counterparty Contracts; (iii) the Deeds of Charge; (iv) the Counterparty Deeds of Charge; (v) the Management Agreement; (vi) the Reimbursement Agreement; (vii) the Calculation Agent Agreement (including the related procedures to be followed by the Calculation Agent); (viii) the memorandum and articles of association of the Issuer; and (ix) the form of the Notes (collectively, the “**Selected Transaction Documents**”).

After the Issuance Date and while the Notes are outstanding, the Issuer will make available, or cause to be made available to Noteholders and prospective purchasers designated by such Noteholders (provided, that such prospective purchasers are permitted transferees), final execution versions of the Selected Transaction Documents and, within two (2) Business Days from when the following information becomes available to the Issuer: (i) any Event Notice; (ii) any Event Report; (iii) notice of any Early Redemption Event or Optional Redemption; (iv) any Extension Notice; (v) any Partial Extension Notice; (vi) notice of any Event of Default; (vii) any EBRD Put Notice, (viii) any information relating to a downgrade of the EBRD (if any) that is made available to the Issuer; (ix) the nominal amount of the EBRD Notes held by the Issuer, the applicable securities identification number (i.e., “**ISIN**” and/or “**Common Code**”) for the EBRD Notes and the then-current issuer rating of the EBRD by S&P which will be made available to the Issuer on a monthly basis by the Indenture Trustee, (x) in relation to each of the Money Market Funds Permitted Investments held by the Issuer, if applicable, the name of the fund (including the relevant ISIN number), the market value of the fund, the ratings of the fund and the most recent accrued dividend, all of which will be made available on a weekly basis to the extent such information is available to the Issuer; (xi) in relation to each of the Interest Deposit Investments, if applicable, the name of the fund (including the relevant ISIN number), the market value of the fund, the ratings of the fund and the most recent accrued dividend, all of which will be made available on a monthly basis to the extent such information is available to the Issuer; (xii) the amount of interest accrued at the Interest Spread or Extension Spread, as applicable, for each Accrual Period; and (xiii) any supplemental information the Counterparty may, in its discretion, furnish to the Issuer for distribution to the Noteholders (“**Available Information**”).

The Issuer is not subject to the informational requirements of the United States Securities Exchange Act of 1934, as amended (“**Exchange Act**”). The Issuer agrees that at any time while the Notes are outstanding, it will furnish to Noteholders or prospective purchasers designated by such Noteholders (provided, that such prospective purchasers are permitted transferees) the information required to be delivered pursuant to Rule 144A(d)(4) under the Securities Act to permit compliance with Rule 144A in connection with resales of the Notes (“**Rule 144A Information**”) and the Available Information.

The Issuer will also furnish all information that it is required to furnish to the Irish Stock Exchange and the Central Bank for so long as the Notes are listed on the Official List and admitted to trading on the Main Securities Market of the Irish Stock Exchange.

Requests for Rule 144A Information and Available Information may be made by contacting the Issuer at 6th Floor, Pinnacle 2, Eastpoint Business Park, Dublin 3, Ireland, Ireland, telephone: +353(1)680-6000, facsimile: +353(1)680-6050 and email: corporate.services@db.com.

While the Notes are outstanding, the Issuer will furnish to the Indenture Trustee and make available, or cause to be made available, to any Noteholder or prospective purchasers of the Notes (provided, that such prospective purchasers are permitted transferees) the Available Information and Rule 144A Information (to the extent such information is available to the Issuer), via a secured password protected internet site online workspace maintained by the Manager (as such term is defined herein and in such role, the “**Workspace Administrator**”) on behalf of the Issuer initially with IntraLinks®, Inc. (“**IntraLinks**”). A Noteholder or prospective purchaser of the Notes (provided, that such prospective purchaser is a permitted transferee) may submit a request for access to such workspace in writing by submitting a Request for Information Form to the Issuer, substantially in the form attached hereto as Appendix D.

Noteholders or prospective purchasers of the Notes (provided, that such prospective purchasers are permitted transferees) submitting a valid Request for Information Form shall receive a password and instructions for accessing such workspace following receipt by the Issuer of such request.

As a condition to access any such information, Noteholders or prospective purchasers of the Notes will agree not to disclose any such information to third parties other than as required by applicable law, including federal and state securities laws, or after the Issuance Date in connection with the potential resale of the Notes to a prospective purchaser that meets the investor criteria set forth herein, nor use any such information for any purpose other than an analysis of an investment in the Notes by itself.

The information on any website referred to herein (or any website directly or indirectly related to any such website) is not a part of, or incorporated by reference into, this Offering Circular.

TABLE OF CONTENTS

	<u>Page</u>
OVERVIEW	1
RISK FACTORS	49
THE ISSUER	81
PURPOSE OF THE OFFERING	84
USE OF PROCEEDS AND PERMITTED INVESTMENTS	84
RATINGS	86
THE COUNTERPARTY	86
SUMMARY OF CERTAIN DOCUMENTS	87
DESCRIPTION OF THE NOTES	94
EBRD NOTES	103
CERTAIN U.S. FEDERAL INCOME TAX CONSIDERATIONS	105
CERTAIN IRISH INCOME TAX CONSIDERATIONS	117
THE SAVINGS DIRECTIVE (COUNCIL DIRECTIVE) 2003/48/EC	122
CERTAIN BENEFIT PLAN CONSIDERATIONS	123
PLAN OF DISTRIBUTION	126
NOTICE TO INVESTORS	129
LISTING AND GENERAL INFORMATION	140
RELATED PARTIES	142
EXPERTS	142
VALIDITY OF THE NOTES	142
APPENDIX A INDEX OF DEFINED TERMS	A-1
APPENDIX B RMS EXPERT RISK ANALYSIS METHODOLOGY	B-1
APPENDIX C RMS EXPERT RISK ANALYSIS RESULTS	C-1
APPENDIX D REQUEST FOR INFORMATION FORM	D-1
APPENDIX E RMS DATA FILE	E-1

OVERVIEW

The following description of the Notes is qualified in its entirety by, and should be read in conjunction with, the more detailed information appearing elsewhere in this Offering Circular forming part of this Offering. When a term is defined in this Offering Circular, it is printed in bold-faced type. Certain capitalized terms used but not defined in this summary are used herein as defined elsewhere in this Offering Circular. Appendix A to this Offering Circular includes an “Index of Defined Terms” that lists defined terms used herein and the page on which each term is first defined in this Offering Circular.

This description is subject to, and is qualified in its entirety by reference to, all the provisions of the Indenture, the relevant Counterparty Contract, the Calculation Agent Agreement and the other transaction documents described herein.

Prospective investors should consider carefully the information set forth under the caption “Risk Factors” and all other information set forth in this Offering Circular prior to making an investment in the Notes.

Offering of Notes

Issuer..... Benu Capital Limited, an Irish special purpose company incorporated as a private company with limited liability (the “**Issuer**”). The Issuer was incorporated under the laws of Ireland on August 7, 2014, under company number 547693. All of its issued shares are held in trust for charitable purposes by or on behalf of Deutsche International Finance (Ireland) Limited.

The Issuer’s business consists solely of the issuance of the Notes, the entering into and performance of the Counterparty Contracts and related agreements and activities, including the acquisition and holding of Permitted Investments.

The Issuer does not, and does not intend to, engage in any other business, incur indebtedness for money borrowed (other than the Notes), pay dividends or make other distributions on its capital (other than a distribution upon liquidation of the Issuer) or enter into any derivative contract or any other risk transfer contract other than the Counterparty Contracts.

Purpose of Offering..... The Issuer is issuing each Class of Notes and entering into the respective Counterparty Contracts to provide the Counterparty with protection against Mortality Events as further described in this Offering Circular. For the avoidance of doubt, the Issuer shall not provide, nor shall it be deemed to be providing, any insurance or reinsurance to the Counterparty.

Counterparty..... AXA Global Life (the “**Counterparty**”) is a wholly owned subsidiary of AXA and an internal AXA Group reinsurance company that oversees AXA Group’s global life operations.

Notes Offered €135,000,000 Class A Principal At-Risk Variable Rate Notes due January 8, 2020 (“**Class A Notes**”) and €150,000,000 Class B Principal At-Risk Variable Rate Notes due January 8, 2020 (“**Class B Notes**” and, together with the Class A Notes, the “**Notes**”, and each of the Class A Notes and Class B Notes, a “**Class of Notes**” or “**Class**”).

Issuance Currency The issuance currency for the Notes will be euro. References to “euro” or “EUR” or “€” are to the single currency of the participating member states of the European and Monetary

	Union of the Treaty Establishing the European Community, as amended from time to time.
Offering Price	The “ Offering Price ” for the Notes will be as follows:
	Class A Notes: 100% of the Original Principal Amount
	Class B Notes: 100% of the Original Principal Amount
Issuance Date.....	The date on which the Notes are issued, which is expected to be on or about April 24, 2015 (“ Issuance Date ”).
Use of Proceeds; EBRD Notes.....	<p>On the Issuance Date, all proceeds paid to the Issuer from the sale of each Class of Notes will be deposited into a segregated Collateral Account established for such Class and will be available to satisfy the obligations of the Issuer to the Counterparty under the related Counterparty Contract, and only after the termination of such Counterparty Contract in accordance with its terms and payment of all amounts due and owing thereunder, to make payments under the Indenture in respect of the Outstanding Principal Amount of such Class of Notes.</p> <p>For each Class of Notes, beginning on the Business Day immediately following the Issuance Date up to and including the Business Day immediately prior to the applicable Redemption Date, the collateral of such Class will consist only of unsecured notes issued by the EBRD pursuant to its existing Global Medium Term Note Programme, other than in certain situations where all or part of such collateral may consist of Money Market Funds Permitted Investments or cash deposits. For more information, see “—<i>Permitted Investments</i>” and “<i>Use of Proceeds and Permitted Investments</i>”. The scheduled maturity of the EBRD Notes for each Class of Notes is January 6, 2023. The EBRD Notes for each Class may be subject to early redemption as described further herein (for more information, see “<i>Use of Proceeds and Permitted Investments</i>” and “<i>EBRD Notes—EBRD Global Medium Term Note Programme</i>”).</p>
	As of the date of this Offering Circular, the EBRD has been assigned a credit rating of “AAA (stable outlook)” by S&P, an “Aaa (stable outlook)” credit rating by Moody’s and an “AAA (stable outlook)” credit rating by Fitch, each of which is established in the European Union and registered under the Credit Rating Agency Regulation.
	Prospective investors should consider carefully the information set forth in this Offering Circular under the caption “ <i>Risk Factors—Risks Relating to Ratings and Rating Agencies</i> ” prior to making an investment in the Notes.
	For more information about the EBRD, see “ <i>EBRD Notes—Overview of EBRD</i> ”.
Recourse	Noteholders of each Class of Notes will have recourse only to the Collateral for such Class of Notes (subject to the prior interest of the Counterparty in such Collateral) and to the Periodic Payments payable under the related Counterparty Contract, and will have no recourse to any other Collateral

nor to any Periodic Payments payable under the Counterparty Contract related to any other Class of Notes. Noteholders of each Class of Notes will rank *pari passu* with all other Noteholders of such Class.

The Notes are without recourse to the Counterparty or any of its affiliates.

Listing.....

Application will be made to the Irish Stock Exchange for each Class of Notes to be admitted to the Official List and trading on its regulated market, the Main Securities Market. There can be no assurance that such application will be granted or, if granted, maintained. The issuance and settlement of the Notes is not conditional on the listing of the Notes.

The expenses related to the admission to listing and trading of the Notes will be approximately €5,300.

The Notes

I. Principal Amounts

Original Principal Amount.....

The “**Original Principal Amount**” for the Notes will be as follows:

Class A Notes: €135,000,000; and

Class B Notes: €150,000,000.

Outstanding Principal Amount.....

As of any date of determination, the “**Outstanding Principal Amount**” of each Class of Notes will be an amount equal to the Original Principal Amount of such Class (i) as reduced by the sum of all Principal Reductions applicable to such Class, if any (calculated for all Payment Dates on or prior to such date of determination), and (ii) as increased by the sum of all Principal Increases applicable to such Class, if any (calculated for all Payment Dates on or prior to such date of determination). The Outstanding Principal Amount of each Class of Notes will be neither less than zero nor greater than the Original Principal Amount of such Class. Any such adjustment to the Outstanding Principal Amount will be allocated *pro rata* among the Noteholders of such Class.

Principal Reduction.....

For each Class of Notes and on each Payment Date, an amount equal to the sum of (i) all Loss Payments, if any, required to be paid in connection with such Class and Payment Date and (ii) all Partial Repayment Amounts, if any, related to such Class and Payment Date (“**Principal Reduction**”). The aggregate of all Principal Reductions (net of all Principal Increases) for a Class of Notes shall not exceed the Original Principal Amount of such Class.

Principal Increase

For each Class of Notes and on each Payment Date, an amount equal to the sum of all Counterparty Payments, if any, required to be paid in connection with such Class and Payment Date (“**Principal Increase**”).

Repayment Amount.....

For each Class of Notes, the repayment amount of such Class (“**Repayment Amount**”) will be equal to the sum of (i) 100% of the Outstanding Principal Amount of such Class, determined

as of the Redemption Date of such Class, *plus* (ii) if applicable, the Early Redemption Event Premium or Optional Redemption Event Premium of such Class; *provided*, that the Repayment Amount of such Class will not be greater than the sum of (a) the proceeds of the liquidation of any Permitted Investments (*less* applicable taxes and fees, if any) held in the Collateral Account of such Class, *plus* (b) if applicable, the Early Redemption Event Premium or Optional Redemption Event Premium of such Class.

Notional Amount.....

For each Class of Notes, any payments due and payable by the Issuer to the Counterparty under the respective Counterparty Contract will be limited to the notional amount of such Counterparty Contract (“**Notional Amount**”). On the Issuance Date, the Notional Amount of each Counterparty Contract will be equal to the Original Principal Amount of the respective Class of Notes and, on each subsequent Payment Date, the Notional Amount will be equal to the Outstanding Principal Amount of the respective Class of Notes before giving effect to any Principal Reduction or Principal Increase applicable to such Class on such Payment Date.

II. Redemption Date

Redemption Date

For each Class of Notes, (i) the earliest to occur of the Early Redemption Date for such Class, if any, the Optional Redemption Date for such Class, if any, and the Scheduled Redemption Date for such Class, or (ii) following an Extension Event with respect to such Class, the relevant Extended Redemption Date for such Class (which, for the avoidance of doubt, may not occur later than the Early Redemption Date or the Final Extended Redemption Date for such Class, as applicable) (“**Redemption Date**”).

Scheduled Redemption Date

Each of the Class A Notes and Class B Notes are scheduled to mature on January 8, 2020 (or if such day is not a Business Day, on the next succeeding Business Day) (“**Scheduled Redemption Date**”).

Extended Redemption Date.....

For each Class of Notes, each date to which the maturity of such Class may be extended following one or more Extension Events (each, an “**Extended Redemption Date**”). The Extended Redemption Dates, if any, will be on each eighth (8th) of January, April, July and October following the Scheduled Redemption Date for such Class (and in each case, if such day is not a Business Day, on the next succeeding Business Day); *provided*, that in no event, will the maturity of such Class be extended beyond the Early Redemption Date or the Final Extended Redemption Date for such Class, as applicable.

Final Extended Redemption Date

For each Class of Notes, the Payment Date that occurs on or immediately after the earliest of the following, as applicable:

- (i) January 9, 2023 (or if such day is not a Business Day, on the next succeeding Business Day);
- (ii) the first Event Reporting Date on which all of the relevant Reporting Sources have released Final Data for each

Country and Calendar Year for which a Mortality Event has occurred; and

(iii) the Payment Date on which the sum of all Principal Reductions (net of Principal Increases) for such Class of Notes relating to all Countries and Calendar Years for which Final Data has been released equals the Original Principal Amount ("**Final Extended Redemption Date**");

provided, that for clauses (ii) and (iii) above, if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Payment Date, the next succeeding Payment Date. With respect to clauses (ii) and (iii) above, the Counterparty shall, within two (2) Business Days after having received the relevant Event Report containing such Final Data, send a notice to the Issuer and the Indenture Trustee (with a copy to the Paying Agent, the Note Registrar and the Calculation Agent) to terminate the relevant Extension Event for such Class.

Minimum Development Period.....

For each Class of Notes, if a Loss Payment has been made (or will be made on the immediately succeeding Payment Date) by the Issuer to the Counterparty under the corresponding Counterparty Contract in respect of a Calendar Year, the "**Minimum Development Period**" for such Calendar Year will be deemed to have commenced as of the end of such Calendar Year and will continue until the earliest of:

- (i) the date that is thirty-six (36) months following the end of such Calendar Year;
- (ii) the first Event Reporting Date on which each relevant Reporting Source has released Final Data for each Country for which a Mortality Event has occurred in respect of such Calendar Year;
- (iii) the date on which each relevant Reporting Source ceases to exist for each Country for which a Mortality Event has occurred in respect of such Calendar Year; and
- (iv) the Payment Date on which the sum of all Principal Reductions (net of Principal Increases) for such Class of Notes relating to all Countries and Calendar Years for which Final Data has been released equals the Original Principal Amount.

III. Extension

Extension Period.....

For each Class of Notes, the period from and including the Scheduled Redemption Date for such Class to and including the last Extended Redemption Date for such Class (the "**Extension Period**"), if the requirements for an Extension Event are satisfied and the Counterparty elects, or is required, to extend the maturity of such Class beyond the Scheduled Redemption Date to one or more Extended Redemption Dates.

Extension Event.....

For each Class of Notes, any Optional Extension Event or Mandatory Extension Event, as the case may be (each, an "**Extension Event**").

An Optional Extension Event or Mandatory Extension Event may occur independently of each other or may occur together. An Extension Event of one type may be followed by an Extension Event of another type for a subsequent Accrual Period during the Extension Period if the conditions for such other type of Extension Event have been satisfied, *provided, however*, that in no event, will the maturity of such Class be extended beyond the Early Redemption Date or the Final Extended Redemption Date for such Class, as applicable. The occurrence of an Extension Event will not have the effect of extending the Risk Period.

Extension Notice

For each Class of Notes, the written notice of an Extension Event from the Counterparty to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) delivered on or prior to an Extension Determination Date (each, an “**Extension Notice**”). Each Extension Notice must specify the type of Extension Event elected or required and each Class of Notes subject to extension.

Extension Determination Date

For each Class of Notes, the date that is eight (8) Business Days prior to the Scheduled Redemption Date or any Extended Redemption Date of such Class, as the case may be (“**Extension Determination Date**”); *provided*, that if an Event Notice is issued for such Class less than thirty (30) Business Days prior to the Scheduled Redemption Date, then in such case three (3) Business Days prior to the Scheduled Redemption Date.

Optional Extension Event

For each Class of Notes, the Counterparty may at its option elect to require the Issuer to extend the maturity of such Class of Notes beyond the Scheduled Redemption Date of such Class, by providing an Extension Notice on or prior to the Extension Determination Date immediately preceding the Scheduled Redemption Date or an Extended Redemption Date of such Class, as applicable. An “**Optional Extension Event**” for a Class of Notes will occur on the date when the Issuer receives the related Extension Notice for such Class from the Counterparty (*provided*, that such date is on or prior to the relevant Extension Determination Date), and the Optional Extension Spread will be used to determine the interest rate for such Class in respect of each Accrual Period in which such Optional Extension Event is in effect, starting with the first full Accrual Period following the occurrence of such Optional Extension Event (*provided*, that a Mandatory Extension Event has not occurred with respect to such Accrual Period, in which case the Mandatory Extension Spread will apply).

If the maturity of a Class of Notes has been extended to an Extended Redemption Date due to the occurrence of an Optional Extension Event, the maturity of such Class will automatically be further extended to each subsequent Extended Redemption Date unless and until (i) the Counterparty elects to send a written notice to the Issuer and the Indenture Trustee, on or prior to the relevant Extension Determination Date, to terminate such Optional Extension Event, in which case such Class will be redeemed on the immediately succeeding Extended Redemption Date or (ii) the Indenture Trustee has received an Extension Notice on or prior to the relevant

Extension Determination Date to convert such Optional Extension Event into a Mandatory Extension Event.

Following the receipt of such notice terminating an Optional Extension Event for such Class under (i) above, if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Extended Redemption Date, the redemption of such Class will occur on the next succeeding Extended Redemption Date and the Optional Extension Spread will be used to determine the interest rate for such Class in respect of such Accrual Period.

Mandatory Extension Event.....

For each Class of Notes, if a Minimum Development Period is or will be in effect for such Class of Notes as of the Payment Date immediately following an Extension Determination Date, the Counterparty will be obligated to require the Issuer to extend the maturity of such Class until no Minimum Development Periods remain in effect, at which time the Counterparty will be required to send a notice to the Issuer and the Indenture Trustee (with a copy to the Paying Agent, the Note Registrar and the Calculation Agent) on or prior to the relevant Extension Determination Date to terminate such Mandatory Extension Event for such Class. Following the receipt of such notice terminating a Mandatory Extension Event for such Class, if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Extended Redemption Date, the redemption of such Class will occur on the next succeeding Extended Redemption Date and the Mandatory Extension Spread will be used to determine the interest rate for such Class in respect of the Accrual Period ending on such next succeeding Extended Redemption Date.

A “**Mandatory Extension Event**” for a Class of Notes will occur on the date when the Issuer receives the related Extension Notice (*provided*, that such date is on or prior to the relevant Extension Determination Date and the conditions for a Mandatory Extension Event for such Class are satisfied), and the Mandatory Extension Spread will be used to determine the interest rate for such Class in respect of each Accrual Period in which such Mandatory Extension Event is in effect, starting with the first full Accrual Period following the occurrence of such Mandatory Extension Event.

Partial Extension Notice; Partial Extension; Partial Repayment Amount; Partial Extension Date.....

For each Class of Notes, with respect to the related Scheduled Redemption Date or any Extended Redemption Date, the Counterparty may, at any time prior to the relevant Extension Determination Date, elect to give written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) under the related Counterparty Contract (each, a “**Partial Extension Notice**”) to reduce the Notional Amount (such election, a “**Partial Extension**”), requiring the Issuer to repay to the Noteholders of such Class a portion of the Outstanding Principal Amount of such Class in an amount equal to such reduction of the Notional Amount (“**Partial Repayment Amount**”).

The Partial Repayment Amount for such Class will be payable on the first Payment Date that (i) occurs on or after the

Scheduled Redemption Date and (ii) is at least ten (10) Business Days after the date on which the Partial Extension Notice is submitted (“**Partial Extension Date**”); *provided*, that if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Payment Date, the Partial Extension Date will occur on the next succeeding Payment Date, but not later than the Final Extended Redemption Date. Such payment will be allocated pro rata among the Noteholders of such Class. The Outstanding Principal Amount of such Class will be reduced by the Partial Repayment Amount for such Class on the applicable Partial Extension Date.

IV. Early Redemption Events

Early Redemption Date

If an Early Redemption Event has occurred with respect to a Class of Notes, such Class will be redeemed in whole earlier than the Scheduled Redemption Date of such Class or, if applicable, on the immediately succeeding Extended Redemption Date following such Early Redemption Event, as the case may be. The “**Early Redemption Date**” will be the earliest eighth (8th) of January, April, July and October that occurs at least ten (10) Business Days after the date on which an Early Redemption Event has occurred (and in each case, if such day is not a Business Day, on the next succeeding Business Day); *provided, that* if an Early Redemption Event occurs less than ten (10) Business Days prior to the Scheduled Redemption Date or Extended Redemption Date of such Class, if applicable, then such Class will be redeemed on such Scheduled Redemption Date or such relevant Extended Redemption Date, as the case may be; *further, that* if the EBRD Notes for such Class have not been fully redeemed as of an intended Early Redemption Date, the Early Redemption Date will be on the Payment Date immediately succeeding such intended Early Redemption Date.

Early Redemption Events

For each Class of Notes, each of the following will constitute an “**Early Redemption Event**” and will occur on the date:

- (i) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract if the Outstanding Principal Amount of such Class is or will be on the next Payment Date equal to or less than 10% of the Original Principal Amount of such Class (“**Clean-Up Termination Event**”); *provided, that* such Class may not be redeemed pursuant to a Clean-Up Termination Event prior to the completion of the last Minimum Development Period for such Class;
- (ii) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract following the certification by the Calculation Agent in writing that, in the opinion of the Calculation Agent, all future Event Reports would

register any Country within the Covered Area as Unreported (“**Reporting Source Failure Event**”); *provided, that* such Class may not be redeemed pursuant to a Reporting Source Failure Event prior to the completion of the last Minimum Development Period for such Class;

- (iii) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) that it elects to trigger a termination of the related Counterparty Contract if (a) either the Calculation Agent or the Manager has become incapable of performing, or has failed to perform, its respective duties and obligations under the Calculation Agent Agreement or the Management Agreement, respectively (a “**Service Provider Failure**”), and (b) the Issuer, after using its commercially reasonable efforts, in cooperation with the Counterparty, has been unable, within forty-five (45) calendar days following such Service Provider Failure, to engage a suitable replacement calculation agent or manager to perform such duties and obligations that is reasonably satisfactory to and unaffiliated with the Counterparty and the Issuer and, with respect to the replacement calculation agent, has experience in the analysis and modeling of excess mortality risk (“**Service Provider Failure Event**”);
- (iv) that is designated as an “Early Termination Date” pursuant to the related Counterparty Contract following an “Event of Default” or “Termination Event” (as each term is defined in such Counterparty Contract; for more information, see “*Summary of Certain Documents—Counterparty Contract—Early Termination*”) under such Counterparty Contract (“**Counterparty Contract Termination Event**”);
- (v) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract, if, in the Counterparty’s sole judgment (following written advice of counsel with a copy provided to the Indenture Trustee and the Issuer), there is any amendment to, implementation of, the effectiveness of, change in, or issuance of, laws of any relevant jurisdiction (or any official interpretation, guidance or application thereof) that would (x) materially and adversely impair the Counterparty’s ability to perform, or would result in material adverse consequences or materially increase the regulatory burden for the Counterparty if it continued to perform, its obligations under the related Counterparty Contract or (y) materially and adversely impair the Issuer’s ability to perform, or would result in material adverse consequences or materially increase the regulatory burden for the Issuer if it continued to perform, its obligations under a Class of Notes, the Indenture or the related Counterparty Contract, in each case as determined by the Counterparty; *provided, that* the Dodd-Frank Wall Street Reform and Consumer

Protection Act (“**Dodd-Frank**”) and all rules, guidelines or directions thereunder or issued in connection therewith will in each case be deemed to be a “change in law” regardless of the date enacted, adopted or implemented (“**Change in Law Event**”);

- (vi) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract if, in the Counterparty’s sole judgment (following written advice of counsel with a copy provided to the Issuer and the Indenture Trustee), as a result of any amendment to, or change in, the laws or regulations of any jurisdiction affecting taxation, or any amendment to, or change in, an official interpretation or application of such laws or regulations, or any action taken by a taxing authority or brought in a court of competent jurisdiction (regardless of whether such action is taken or brought with respect to a party which is not a party to such Counterparty Contract), on or after the Issuance Date, the Counterparty is required, with respect to any payment payable by the Counterparty to the Issuer under such Counterparty Contract, to (1) materially increase the amount of such payment or (2) pay any material tax in excess of such payment as a result of the Counterparty or such payment becoming subject to taxation in any jurisdiction (“**Counterparty Tax Event**”);
- (vii) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract (a) if the aggregate amount of Supplemental Payments for both Classes of Notes made by the Counterparty, other than in respect of any Negative Yield Expense Fees, equals or exceeds €350,000 in any calendar year or (b) if the aggregate amount of any Negative Yield Expense Fees for both Classes of Notes equals or exceeds €700,000 (“**Supplemental Expenses Termination Event**”); or
- (viii) on which the Counterparty gives written notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent, the Note Registrar and the Calculation Agent) that it elects to trigger a termination of the related Counterparty Contract following the occurrence of an EBRD Put Event, other than with respect to the occurrence of an EBRD Put Event described in subsection (i), (ii), (iii), (iv) or (vii) in the definition of EBRD Put Event (“**EBRD Termination Event**”).

Early Redemption Event Premium

For each Class of Notes, an additional repayment amount (“**Early Redemption Event Premium**”) will be payable on such Class of Notes in an amount described below upon the occurrence, prior to the Scheduled Redemption Date of such Class, of a Counterparty Contract Termination Event as a result of a payment default of the Counterparty under the

related Counterparty Contract.

The Early Redemption Event Premium for such Class will be equal to the sum of the present values, discounted at the Discounting Rate (determined as of the first day of the Accrual Period in which such Early Redemption Event occurred), of each of the unpaid scheduled payments of interest calculated on the Outstanding Principal Amount of such Class, determined as of the Early Redemption Date of such Class, for each Accrual Period from such Early Redemption Date to the earlier of (i) the first anniversary of such Early Redemption Date and (ii) the Scheduled Redemption Date of such Class.

Discounting Rate

3-month EURIBOR, as determined by the Indenture Trustee pursuant to the terms of the Indenture (“**Discounting Rate**”), but in no event less than zero.

V. Optional Redemption

Optional Redemption

For each Class of Notes, the Counterparty may direct the Issuer to redeem all, but not less than all, of the Notes of such Class on an Optional Redemption Date (an “**Optional Redemption**”), at a redemption price equal to the Repayment Amount, which will include the Optional Redemption Event Premium, by providing written notice of such election to the Issuer and the Indenture Trustee at least ten (10) Business Days prior to the applicable Optional Redemption Date.

Optional Redemption Date.....

For each Class of Notes, any of January 8, 2019, April 8, 2019 and July 8, 2019, as applicable (or, in each case, if such day is not a Business Day, the next succeeding Business Day) (each, an “**Optional Redemption Date**”).

Optional Redemption Event Premium.....

In the event of an Optional Redemption with respect to a Class of Notes, an additional amount will be payable on such Class of Notes (and included in the Repayment Amount) equal to:

- (a) if the applicable Optional Redemption Date is January 8, 2019, 1.00% of the Outstanding Principal Amount of such Class of Notes;
- (b) if the applicable Optional Redemption Date is April 8, 2019, 0.85% of the Outstanding Principal Amount of such Class of Notes; and
- (c) if the applicable Optional Redemption Date is July 8, 2019, 0.70% of the Outstanding Principal Amount of such Class of Notes (the “**Optional Redemption Event Premium**”).

VI. Interest

Interest Spread Amount; Extension Spread Amount;
Interest Calculation Convention.....

For each Accrual Period from and including the Issuance Date to, but excluding, the applicable Redemption Date, interest on each Class of Notes will be calculated as the sum of:

- (i) the related Permitted Investment Yield for such Accrual Period, *plus*

- (ii) the amount of interest accrued during such Accrual Period on the Outstanding Principal Amount of such Class of Notes, determined as of the first day of such Accrual Period (after giving effect to any adjustment to the Outstanding Principal Amount on such first day), at a *per annum* rate equal to (a) for Accrual Periods beginning prior to the Scheduled Redemption Date, the Interest Spread for such Class of Notes (the “**Interest Spread Amount**”) or (b) for Accrual Periods beginning on or after the Scheduled Redemption Date, the applicable Extension Spread for such Class of Notes (the “**Extension Spread Amount**”); in each case calculated on the basis of the actual number of days elapsed in the related Accrual Period and a 360-day year (the “**Interest Calculation Convention**”).

Accrual Period.....

For each Class of Notes, interest in respect of each Payment Date will accrue on such Class of Notes from and including the immediately preceding Payment Date (or the Issuance Date in the case of the First Payment Date) to, but excluding, such Payment Date (each, an “**Accrual Period**”); *provided*, that with respect to any Accrual Period for which the full or partial redemption of the EBRD Notes has occurred, such Accrual Period will extend to, but exclude, one (1) Business Day prior to the applicable Payment Date for the purposes of calculating the EBRD Notes Coupon Payment in respect of amounts being so redeemed under the EBRD Notes.

Interest Spread.....

The “**Interest Spread**” for each Class of Notes will be a *per annum* interest rate as follows:

Class A Notes: 2.55%; and

Class B Notes: 3.35%.

Extension Spread.....

The “**Extension Spread**” for each Class of Notes will be a *per annum* interest rate as follows:

relating to an Optional Extension Event only, 1.50% (“**Optional Extension Spread**”); and

relating to a Mandatory Extension Event (whether or not in combination with an Optional Extension Event), 0.10% (“**Mandatory Extension Spread**”).

Payment Dates.....

Interest on each Class of Notes will be payable periodically in arrears on the following days (each, a “**Payment Date**”):

- (i) on the eighth (8th) of each January, April, July and October, commencing on the First Payment Date and continuing to, but excluding, the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date of such Class, if any, and the Scheduled Redemption Date of such Class (and in each case, if any such day is not a Business Day, on the next succeeding Business Day);
- (ii) on the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date

of such Class, if any, and the Scheduled Redemption Date of such Class; and

- (iii) if there is one or more Extension Events for such Class, on each Extended Redemption Date of such Class.

See “*Risk Factors—Limited Sources of Funds for Payment of Interest.*”

First Payment Date

For each Class of Notes, July 8, 2015 (or if such day is not a Business Day, on the next succeeding Business Day) (“**First Payment Date**”).

Loss Determination

I. Mortality Index Value

Risk Period

For each Class of Notes, the “**Risk Period**” is the period commencing on and including January 1, 2015 up to and including the earlier of (i) December 31, 2019 and (ii) in the event of an Early Redemption Event or an Optional Redemption for such Class, December 31 of the Calendar Year immediately preceding such Early Redemption Event or Optional Redemption.

Calendar Year

A “**Calendar Year**” is any calendar year within the Risk Period and is referenced by t according to the following:

- $t = 1:$ 2015
 $t = 2:$ 2016
 $t = 3:$ 2017
 $t = 4:$ 2018
 $t = 5:$ 2019

Country; Covered Area

France, Japan and the United States (each, a “**Country**” and, collectively, the “**Covered Area**”).

United States.....

The fifty states of the United States of America and the District of Columbia (the “**United States**”).

France

Mainland metropolitan France and Corsica excluding Departments d’Outre Mer (DOM) and Territories d’Outre Mer (TOM) (“**France**”).

Japan

The territory of the country of Japan (“**Japan**”).

Reporting Source; Eurostat; SBJ; CDC;
U.S. Census Bureau.....

Each of the following entities is a “**Reporting Source**”:

- (i) with respect to Data for France, Eurostat or its successor (“**Eurostat**”);
- (ii) with respect to Data for Japan, the Statistics Bureau of Japan, Ministry of Internal Affairs and Communications or its successor (the “**SBJ**”); and
- (iii) with respect to Data for the United States, the U.S. Centers for Disease Control and

Prevention or its successor (the “**CDCU.S. Census Bureau**

in each case, including any successor reporting source publishing substantially similar data. See also “*Calculation of Aggregate Percentage*” in the RMS Expert Risk Analysis Results attached hereto as Appendix C.

Mortality Index

For each Country C and Calendar Year t , the “**Mortality Index**” is given by the following formula:

$$Index_t^C = \sum_{All\ x} (\beta_{m,x}^C q_{m,x,t}^C + \beta_{f,x}^C q_{f,x,t}^C)$$

where:

$\beta_{m,x}^C$ is the Index Weight applied to the Mortality Rate for males of age group x in Country C as specified in the RMS Expert Risk Analysis Results attached hereto as Appendix C;

$\beta_{f,x}^C$ is the Index Weight applied to the Mortality Rate for females of age group x in Country C in the RMS Expert Risk Analysis Results attached hereto as Appendix C;

$q_{m,x,t}^C$ is the Mortality Rate for males of age group x for Country C in Calendar Year t ; and

$q_{f,x,t}^C$ is the Mortality Rate for females of age group x for Country C in Calendar Year t .

Reference Index Value, Index Reference Year

For each Country C and Calendar Year t , the “**Reference Index Value**” is given by the following formula:

$$RIV_t^C = Index_{Index\ Reference\ Year+t-1}^C$$

provided that (for $t \geq 2$) the foregoing result is subject to a cap of $RIV_{t-1}^C \times 101.9\%$ and a floor of $RIV_{t-1}^C \times 98.1\%$;

where the “**Index Reference Year**” is the Calendar Year 2014.

Mortality Index Value

For each Country C and Calendar Year t , the “**Mortality Index Value**” is calculated by the Calculation Agent using Sufficient Data and the following formula:

$$MIV_t^C = \begin{cases} \text{for } t = 1: & \frac{Index_t^C}{RIV_t^C} \\ \text{for } t \geq 2: & \frac{Index_t^C}{\min(RIV_t^C, RIV_{t-1}^C)} \end{cases}$$

where:

$Index_t^C$ is the Mortality Index for Country C and Calendar Year t ; and

RIV_t^C is the Reference Index Value for Country C and Calendar Year t .

II. Loss Determination

Mortality Event.....

For each Class of Notes, a “**Mortality Event**” will have occurred in respect of a particular Country and Calendar Year if the Annual Country Percentage for such Class, Country and Calendar Year is greater than zero.

Initial Trigger Level

For each Calendar Year t , the “**Initial Trigger Level**” is given by the following:

For the Class A Notes:

France:	116.0%
Japan:	116.0%
United States:	108.0%

For the Class B Notes:

France:	108.1%
Japan:	108.2%
United States:	104.1%

For the avoidance of doubt, the Trigger Level for a Country, Class of Notes and Calendar Year t (where $t \geq 2$) may be reduced to a level below the Initial Trigger Level if the Mortality Index Value for such Country for Calendar Year $t - 1$ exceeds 100% or, in the case of the Class A Notes, due to the application of the Class A Dropdown Level.

Trigger Reduction Amount

For each Country C , Calendar Year t , and Class of Notes N , the “**Trigger Reduction Amount**” is the amount by which the Trigger Level for such Class for Calendar Year t is reduced, equal to the portion of the Mortality Index Value for such Country in the Calendar Year $t - 1$ that exceeds 100%, up to the Trigger Level for such Country for Calendar Year $t - 1$, and is given by the following formula:

$$TRA_{t,N}^C = \begin{cases} \text{for } t = 1: & 0\% \\ \text{for } t \geq 2: & \min(MIV_{t-1}^C, TL_{t-1,N}^C) - 100\% \end{cases}$$

provided that the foregoing result is subject to a floor of 0%; where:

MIV_t^C is the Mortality Index Value for Country C and Calendar Year t ; and

$TL_{t,N}^C$ is the Trigger Level for Country C , Calendar Year t , and Class of Notes N .

Class A Dropdown Level

The “**Class A Dropdown Level**” is the level to which the Trigger Level for the Class A Notes for Calendar Year 5 shall be set if such level is lower than the Trigger Level after the application of the relevant Trigger Reduction Amount, and is given by the following:

France:	110.0%
Japan:	110.0%

United States: 106.0%

Trigger Level

For each Country C and a Calendar Year t , the “**Trigger Level**” is given by the following formula:

For $1 \leq t \leq 4$:

For each Class of Notes N :

$$TL_{t,N}^C = ITL_N^C - TRA_{t,N}^C$$

For $t = 5$:

For the Class A Notes:

$$TL_{5,A}^C = \min (ITL_A^C - TRA_{5,A}^C, DL_A^C)$$

For the Class B Notes:

$$TL_{5,B}^C = ITL_B^C - TRA_{5,B}^C$$

provided, in each case, that the foregoing result is subject to a floor of 100%;

where:

ITL_N^C is the Initial Trigger Level for Country C , and Class of Notes N ;

$TRA_{t,N}^C$ is the Trigger Reduction Amount for Country C , Calendar Year t , and Class of Notes N ; and

DL_A^C is the Class A Dropdown Level for Country C .

Exhaustion Level

For a Calendar Year t , the “**Exhaustion Level**” is given as follows:

For $t = 1$:

For the Class A Notes:

France:	152.7%
Japan:	140.8%
United States:	120.4%

For the Class B Notes:

France:	116.0%
Japan:	116.0%
United States:	108.0%

For $2 \leq t \leq 5$:

For each Country C and Class of Notes N , as given by the following formula:

$$\text{Exhaustion Level}_{t,N}^C = TL_{t,N}^C + \text{Exhaustion Level}_{1,N}^C - ITL_N^C$$

where:

$TL_{t,N}^C$ is the Trigger Level for Country C , Calendar Year t ,

and Class of Notes N ;

ITL_N^C is the Initial Trigger Level for Country C , and Class of Notes N ; and

$Exhaustion\ Level_{t,N}^C$ is the Exhaustion Level for Country C and Calendar Year t , and Class of Notes N .

Annual Country Percentage

For any given Calendar Year t and Class of Notes N , the “**Annual Country Percentage**” for each Country C is the result of the following formula, expressed as a percentage:

$$\text{Annual Country Percentage}_{t,N}^C = \left(\frac{MIV_t^C - TL_{t,N}^C}{Exhaustion\ Level_{t,N}^C - TL_{t,N}^C} \right)$$

where

MIV_t^C is the Mortality Index Value for Country C and Calendar Year t ;

$TL_{t,N}^C$ is the Trigger Level for Country C , Calendar Year t , and Class of Notes N ; and

$Exhaustion\ Level_{t,N}^C$ is the Exhaustion Level for Country C , Calendar Year t , and Class of Notes N .

If the foregoing result is greater than 100%, the Annual Country Percentage will be deemed equal to 100%; if the foregoing result is less than 0% or if such Country is deemed Unreported by the Calculation Agent in an Event Report, the Annual Country Percentage will be deemed equal to 0%.

The Annual Country Percentage for any given Calendar Year, Class and Country will be calculated using the latest Data available as of the date such calculation is performed.

Aggregate Percentage.....

For each Class of Notes and as of any date of determination, the lesser of (i) the sum of the Annual Country Percentages across all Countries for all Calendar Years in respect of such Class and (ii) 100% (“**Aggregate Percentage**”).

Event Payment.....

For each Class of Notes and as of any Payment Date, an amount equal to (i) the Original Principal Amount of such Class *multiplied by* (ii) a percentage equal to (a) the Aggregate Percentage as of such Payment Date *minus* (b) the Aggregate Percentage as of the immediately preceding Payment Date (“**Event Payment**”). For the avoidance of doubt, an Event Payment may be positive or negative.

For each Class of Notes, the Mortality Index Value, Trigger Level, Exhaustion Level, Annual Country Percentage for each Country for the relevant Calendar Year, Aggregate Percentage, the related Event Payment, if any, and the related Principal Reduction or Principal Increase, if any, and the related calculations, will be set forth in the relevant Event Report from the Calculation Agent.

III. Data Reporting

Reported; Unreported.....

For each Class of Notes, as of the Issuance Date, each Country within the Covered Area will be deemed

“Unreported” for all Calendar Years. For each Calendar Year, Unreported status with respect to a given Country will remain until the following conditions are met: (i) the Counterparty delivers an Event Notice to the Calculation Agent; and (ii) Sufficient Data is obtained by the Calculation Agent at least ten (10) Business Days prior to the applicable Event Reporting Date for such Country.

With respect to each Country within the Covered Area for a given Calendar Year, following the delivery of an Event Notice to the Calculation Agent, if Sufficient Data as of the tenth (10th) Business Day prior to the applicable Event Reporting Date has been obtained for such Country and Calendar Year, such Country will be deemed **“Reported”** with respect to such Calendar Year. Reported results will be published by the Calculation Agent in the subsequent Event Report.

Sufficient Data; Data; Final Data Preliminary Data, Alternative Data

With respect to each Country within the Covered Area for a given Calendar Year, once the Calculation Agent has been able to obtain data for such Calendar Year by the applicable Reporting Source necessary to calculate a Mortality Index Value for such Country, the data will be considered sufficient data (**“Sufficient Data”**). For any given Country in a given Calendar Year, the data to be considered as Sufficient Data will be as set out below:

- (i) From, but excluding, the last day of a Calendar Year to and including the last day of the 24-month period following the end of such Calendar Year:
 - (x) Data for each Calendar Year (**“Data”**) and not indicated by the applicable Reporting Source as preliminary or equivalently labeled preliminary Data (such Data being referred to as **“Final Data”**); or
 - (y) Data available and indicated by the applicable Reporting Source as preliminary or equivalently labeled preliminary Data (such Data being referred to as **“Preliminary Data”**); and
- (ii) From, but excluding, the last day of the 24-month period following the end of a Calendar Year to and including the Final Extended Redemption Date: Final Data, Preliminary Data or Alternative Data.

For these purposes, where Final Data or Preliminary Data is not available from the applicable Reporting Source and the Calculation Agent can identify equivalent Data from a publicly available alternative source using substantially similar data collection, review, calculation and reporting procedures, if any, in accordance with the procedures specified in the

Calculation Agent Agreement, such Data will be “**Alternative Data**”.

For purposes of calculating any Mortality Index Value in respect of any Accrual Period, Data will be used to the extent available and in the following priority, where applicable: *first*, Final Data; *second*, Preliminary Data; and *third*, Alternative Data.

Mortality Rates

With respect to each Country within the Covered Area for a given Calendar Year, the population death rate per 100,000, for all causes, for the relevant age/gender cohort, as published by the applicable Reporting Source, or in the absence of such publication, Deaths divided by Population (“**Mortality Rates**”).

Deaths

With respect to each Country within the Covered Area for a given Calendar Year, the actual reported number of deaths in each age/gender cohort, for all causes as published by the applicable Reporting Source (“**Deaths**”).

Population; Population Data

For each Country within the Covered Area, the population count for each age/gender cohort, as published by the applicable Reporting Source (“**Population**”). In a given Calendar Year, if such Reporting Source publishes the Population as of different points in time, the following priority is to be used:

- (i) Population as of the middle of the year; and
- (ii) Population as of a time of year other than the middle of the year shall be linearly interpolated to provide an estimate of the Population as of the middle of the year by additionally using the Population for the immediately preceding or immediately following Calendar Year, as applicable.

“**Population Data**” with respect to a given Country is Data that is Reported by the applicable Reporting Source with respect to a Population. If Population Data for one or more age groups in a particular Calendar Year are Incomplete Data but such Population Data for the immediately preceding Calendar Year are available, then such Population Data will be used instead of such Incomplete Data.

Incomplete Data

Data that is Reported and is considered to have unavailable Population figures for one or more age/gender groups that are not available elsewhere in other data published by the applicable Reporting Source (“**Incomplete Data**”).

Basis Changes.....

From time to time, due to changes in reporting or in the case where Preliminary Data is used, a Reporting Source may report Mortality Rates, Deaths, or Population on a different basis from that used for the RMS Expert Risk Analysis Report attached hereto. Below are guidelines for the Calculation Agent for possible basis changes (“**Basis Changes**”):

- (i) *Different Grouping Method:* If data is grouped in more age or gender categories than what was used

for the purposes of the RMS Expert Risk Analysis Report, Deaths and Population figures for such year(s) will be combined to match earlier categories used for the RMS Expert Risk Analysis Report. If data is grouped in fewer age or gender categories than what was used for the purposes of the RMS Expert Risk Analysis Report, such specified Index Weights (as defined in Appendix B) for the calculation of the Mortality Index from the earlier categorizations will be combined to allow a consistent comparison basis for the Reporting Source.

- (ii) *Regions:* Except as set forth in this subsection (ii), no adjustment will be made to the definitions of France, Japan or the United States regardless of any annexation or cession of territory.

If any annexation of territory occurs with respect to any Country, the Calculation Agent will, to the extent possible, exclude the Data for such annexed territory in calculating a Mortality Index Value for such Country.

If a region is not reported due to a failure by the Reporting Source to obtain necessary data, then that Country will be considered Unreported unless reported regions comprise at least 95% of such Country's Population based on the most recent one-year period of full reporting. However, from, but not including, twenty-four (24) months following the end of a Calendar Year, if such failure to obtain necessary Data with respect to such Calendar Year arises due to a cession of territory from a Country, and no Alternative Data is available, the Calculation Agent will exclude such ceded territory from the applicable Country when calculating the applicable Mortality Index Value and the exclusion of such territory will not prevent such Country from becoming Reported.

Should the reporting basis for any region in any Country change (other than with respect to an annexation or cession), the Calculation Agent, to the extent possible, shall exclude Data with respect to such change of basis when calculating the Mortality Index Value to allow for a reasonably consistent comparison basis. Only if excluding such Data for any region in such Country is not possible shall the Calculation Agent include them in such Country.

- (iii) *Reporting Period for Data relating to Deaths:* If the Reporting Source changes the annual reporting period of Data relating to Deaths in a Calendar Year, the Calculation Agent will use Data relating to Deaths in the following order of priority:

- (A) Deaths reported on a monthly basis such that the Calculation Agent will

aggregate Deaths for each monthly period across a Calendar Year.

- (B) Deaths reported on an annual basis which does not correspond to a Calendar Year basis such that if (a) the annual reporting period begins on or before June 30 of a Calendar Year, the Calculation Agent will use Deaths for such annual reporting period as the Deaths for such Calendar Year, and (b) if the annual reporting period begins on or after July 1 of a Calendar Year, the Calculation Agent will use Deaths for such annual reporting period as the Deaths for the Calendar Year immediately following such Calendar Year; *provided*, that Data relating to Deaths for an annual reporting period where part of such annual reporting period is not within the Risk Period shall not be used in the calculation of an Annual Country Percentage for the related Country and Calendar Year and such Annual Country Percentage shall be deemed to be equal to zero.

Notwithstanding clauses (i) – (iii) above, where Basis Changes have occurred with respect to any year and it is not reasonably possible to disregard such changes, the Calculation Agent will attempt to adjust any Mortality Index Value and the related Reference Index Value as necessary to achieve a reasonably consistent comparison basis between each applicable Calendar Year and the Index Reference Year, where the available Data would permit this. Any adjustment by the Calculation Agent pursuant to the foregoing will be binding on the Counterparty and the Issuer, absent manifest error.

IV. Event Reporting

Calculation Agent Agreement;
Calculation Agent.....

On the Issuance Date, the Issuer will enter into a Calculation Agent Agreement (“**Calculation Agent Agreement**”) with Risk Management Solutions, Inc., as the calculation agent (“**Calculation Agent**”) to perform the services described below among other activities. See also “*Summary of Certain Documents—Calculation Agent Agreement*”.

Event Notice.....

For each Class of Notes, the Counterparty may at any time give written notice to the Issuer and the Calculation Agent (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) requesting that the Calculation Agent provide an Event Report with respect to one or more Countries and Calendar Years for such Class (“**Event Notice**”).

Event Report; Initial Event Report; Event Reporting Date; Initial Event Reporting Date; Subsequent Event

Following the receipt of an Event Notice in respect of a Class of Notes, the Calculation Agent will issue a report to the Issuer and the Counterparty (with a copy to the Indenture

Reporting Date.....

Trustee, the Paying Agent and the Note Registrar) stating the results of the procedures carried out by the Calculation Agent in determining for each Country and Calendar Year specified in such Event Notice, the relevant Mortality Index Value and Annual Country Percentage, as well as the Aggregate Percentage and Event Payment in respect of such Class (“**Event Report**”).

Each Event Report will include a reasonably detailed description of any Basis Changes applicable to such Event Report.

All factual determinations made by the Calculation Agent in an Event Report prepared and delivered shall be final and binding on the Issuer and the Counterparty, absent manifest error or manifest breach by the Calculation Agent of the Calculation Agent Agreement. In the event of manifest error in any Event Report for any Class of Notes or manifest breach by the Calculation Agent in the performance of its duties under the Calculation Agent Agreement, such Event Report shall not be effective and no Loss Payment or Counterparty Payment shall occur as a result thereof. For the avoidance of doubt, the relevant Loss Payment or Counterparty Payment shall occur in accordance with the terms of the related Counterparty Contract when such manifest error or breach has been cured by the Calculation Agent in accordance with the Calculation Agent Agreement.

The Calculation Agent will be required to submit an Event Report (the “**Initial Event Report**”) to the Issuer and the Counterparty (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) no later than the fifteenth (15th) Business Day prior to the first Payment Date after the date the applicable Event Notice is issued or, if such Initial Event Report is available sooner for submission, promptly following such earlier date (the “**Initial Event Reporting Date**”), using the most recent available Sufficient Data available during the preparation of such Initial Event Report; *provided*, that, if such Event Notice is issued less than thirty (30) Business Days prior to a Payment Date, the Initial Event Reporting Date will be the fifteenth (15th) Business Day prior to the Payment Date immediately succeeding such Payment Date; *provided, further*, that if such Event Notice is issued less than thirty (30) Business Days but more than twenty-two (22) Business Days prior to the applicable Redemption Date, the Calculation Agent will be required to submit the Initial Event Report no later than three (3) Business Days prior to such Redemption Date.

Thereafter, the Calculation Agent shall continue to issue an Event Report for each applicable Country and Calendar Year specified in an Event Notice at least fifteen (15) Business Days prior to each subsequent Payment Date or, if such Event Report is available sooner for submission, promptly following such earlier date (each a “**Subsequent Event Reporting Date**” and, together with the Initial Event Reporting Date, an “**Event Reporting Date**”), until and including the earlier of (i) the first Payment Date on which the Final Data for all applicable Countries and Calendar Years specified in an Event Notice is included in an Event

Report and (ii) the last Event Reporting Date prior to the Redemption Date, in each case using the most recent Sufficient Data available during the preparation of such Event Report; *provided*, that the Calculation Agent shall not be required to provide an Event Report with respect to a subsequent Payment Date unless on or before the thirtieth (30th) Business Day prior to the applicable subsequent Payment Date, new or revised Sufficient Data has been reported by the Reporting Source in addition to the Data on which the most recent prior Event Report was based; *provided, further*, in the case of the Final Extended Redemption Date, the applicable Subsequent Event Reporting Date will be three (3) Business Days prior to the Final Extended Redemption Date.

Counterparty Contract

Counterparty Contract; Loss Payment;
Counterparty Payment.....

On the Issuance Date, the Issuer will enter into a separate financial contract with the Counterparty for each Class of Notes (each, a “**Counterparty Contract**”) providing for payments following the occurrence of Mortality Events as described in this Offering Circular. Each Counterparty Contract (i) will require the Issuer to make payments to the Counterparty equal to any Event Payment greater than zero (each, a “**Loss Payment**”) and (ii) will require the Counterparty to make payments to the Issuer equal to the absolute value of any Event Payment less than zero (each, a “**Counterparty Payment**”). Any Loss Payment or Counterparty Payment will be made on the date or dates specified in the applicable Counterparty Contract.

The aggregate of all Loss Payments to be made by the Issuer to the Counterparty under a Counterparty Contract (net of aggregate Counterparty Payments, if any) may not exceed the Original Principal Amount of the related Class of Notes, as reduced by any Partial Repayment Amounts. The Counterparty Contracts will be documented on the basis of an ISDA Master Agreement, and a schedule and confirmation thereunder, to be entered into between the Counterparty and the Issuer and will be governed by New York law.

The Counterparty Contracts will provide for termination thereof (a) at the option of the Counterparty upon the occurrence of a Clean-Up Termination Event, Reporting Source Failure Event, Service Provider Failure Event, Change in Law Event, Counterparty Tax Event, Supplement Expense Termination Event or EBRD Termination Event, (b) at the option of the affected party only in certain limited circumstances which include payment default of a party, insolvency, illegality, tax and certain other events (for more information, see “*Summary of Certain Documents—Counterparty Contract—Early Termination*”) and (c) at the election of the Counterparty upon the occurrence of an Optional Redemption and payment of the applicable Optional Redemption Event Premium (for more information see “*Summary of Certain Documents – Counterparty Contract – Optional Termination*”).

The Counterparty may at its option, by issuing an Extension

Notice, require the Issuer to extend the term of a Counterparty Contract (and also the maturity of the corresponding Class of Notes) beyond the applicable Scheduled Redemption Date to one or more Extended Redemption Dates, but no later than the Final Extended Redemption Date. In addition, the Counterparty will be obligated to require the Issuer to extend the term of a Counterparty Contract (and also the maturity of the corresponding Class of Notes) beyond the applicable Scheduled Redemption Date to a date that is no later than the Final Extended Redemption Date in certain circumstances if a Minimum Development Period remains in effect. Any extension of the term of a Counterparty Contract (and the maturity of a Class of Notes) will not have the effect of extending the relevant Risk Period.

Interest Deposit Account;
Interest Deposit Account Amount;
Interest Deposit Investments.....

Under the Counterparty Contract corresponding to each Class of Notes, the Counterparty will be required to make payments (each, an “**Interest Deposit Account Amount**”) into a distinct, segregated, interest-bearing account, which will be established by the Counterparty in its own name, charged by way of security interest in the manner described under “—*Assignment of Interest Deposit Account; Counterparty Deed of Charge*” and maintained with The Bank of New York Mellon, London branch outside of the United States (each, an “**Interest Deposit Account**”).

On the Issuance Date, the Counterparty will deposit for each Class of Notes an initial payment of an amount equal to the Interest Periodic Payment that will become due for such Class on the First Payment Date.

Thereafter, on or prior to the fourteenth (14th) Business Day preceding each Payment Date other than the Final Extended Redemption Date (including, for the avoidance of doubt, the First Payment Date), the Counterparty will be required under each Counterparty Contract to deposit an amount equal to the Interest Periodic Payment due for the applicable Class of Notes on the second Payment Date following such date of deposit, determined, as applicable, on the Outstanding Principal Amount, as reduced by the amount of any Principal Reduction or increased by the amount of any Principal Increase which is to be made on the Payment Date immediately following such date of deposit; *provided*, that in respect of the Interest Periodic Payments due on each Payment Date during the Extension Period, if any, and up to and including the Redemption Date of such Class, such deposit amounts will be calculated using the Optional Extension Spread.

Additionally, on each Payment Date, in respect of each Class, the Counterparty will be required to deposit, to the extent that the result of such calculation is positive, an amount equal to (i) the Interest Periodic Payment due for such Class on the Payment Date following such date of deposit determined, as applicable, on the Outstanding Principal Amount, as reduced by the amount of any Principal Reduction or increased by the amount of any Principal Increase made on such Payment

Date, *minus* (ii) the principal amount on deposit in, or otherwise to the credit of, the related Interest Deposit Account. To the extent that (ii) exceeds (i), the Counterparty may withdraw such excess amount from the related Interest Deposit Account. The Counterparty may withdraw any amounts on deposit in an Interest Deposit Account on the related Redemption Date for such Class.

Amounts on deposit in the Interest Deposit Account for a Class, other than interest and yield on Interest Deposit Investments, will be invested in Interest Deposit Investments or remain uninvested in cash, at the direction of the Counterparty in its sole discretion, up to but excluding the third (3rd) Business Day preceding the Payment Date (if any) for such Class on which such amounts are to be withdrawn from or transferred out of such Interest Deposit Account.

Any amounts standing to the credit of the Interest Deposit Account for a Class of Notes in excess of those necessary to secure the Interest Spread Amount or Extension Spread Amount, as the case may be, for each Class of Notes will be paid over to the Counterparty.

“Interest Deposit Investments” will consist of one or more euro-denominated money market funds selected by the Counterparty in its sole discretion that are available for investment on the money market fund platform of The Bank of New York Mellon, London branch, and:

- (a) invest in (1) local and national government, and supranational organization obligations, (2) repurchase and reverse repurchase agreements fully backed by local and national government, and supranational debt and/or (3) other short-term obligations issued by financial institutions and corporates; and
- (b) has a principal stability rating at the time of deposit into the Interest Deposit Account of at least “AA-m” by S&P and thereafter is rated by S&P (or an affiliate, where such affiliate may not be established in the European Union or registered under the Credit Rating Agency Regulation).

The Counterparty will be entitled to and may withdraw, during normal business hours, all available yield on Interest Deposit Investments and available interest in each Interest Deposit Account after the deduction of any applicable taxes.

The principal amounts on deposit in, or otherwise to the credit of, any Interest Deposit Account will be secured in favor of the Issuer.

Periodic Payment; Interest Periodic Payment.....

The Counterparty will be obligated to make or cause to be made the following payments to the Issuer under the Counterparty Contract for each Class of Notes, calculated with respect to each Accrual Period (each a “**Periodic Payment**” and, collectively, the “**Periodic Payments**”):

- (i) from, and including, the Issuance Date up to and including the earliest of the Early Redemption Date, the Optional Redemption Date and the Scheduled Redemption Date of such Class of Notes, as the case may be, an amount equal to the Interest Spread Amount for such Class and for such Accrual Period;
- (ii) during the Extension Period, if any, up to and including the Extended Redemption Date of such Class, an amount equal to the applicable Extension Spread Amount for such Class and for such Accrual Period (each payment referred to in (i) and (ii), an “**Interest Periodic Payment**” and collectively, the “**Interest Periodic Payments**”);
- (iii) the Early Redemption Event Premium due for such Class of Notes, if applicable;
- (iv) the Optional Redemption Event Premium due for such Class of Notes, if applicable.

Each Interest Periodic Payment will be deposited by the Counterparty into the Interest Deposit Account and will be transferred by the Indenture Trustee into the Interest Payment Account on the third (3rd) Business Day preceding such Payment Date. See “—*Interest Deposit Account; Interest Deposit Account Amount; Interest Deposit Investments*”.

Each payment referred to in (iii) and (iv) above, if applicable, will be deposited by the Counterparty into the Interest Payment Account on the third (3rd) Business Day preceding such Payment Date.

Reimbursement Agreement; Closing Payment;
Supplemental Payment.....

The Issuer and the Counterparty will enter into a “**Reimbursement Agreement**” on the Issuance Date. Pursuant to the Reimbursement Agreement, the Counterparty will make payments to the Issuer (i) on or about the Issuance Date, in an amount equal to expenses incurred by the Issuer in connection with the establishment of the Issuer, the issuance of the Notes and certain operating expenses payable to third parties by the Issuer in connection therewith (the “**Closing Payment**”) and (ii) from time to time, if required and applicable, in an amount equal to certain operating expenses, fees and other obligations (including, without limitations, contractual indemnity payments) incurred by the Issuer relating to, among other things, the Manager, Indenture Trustee, any Calculation Agent and certain other service providers, the winding-up costs of the Issuer and any Negative Yield Expense Fees (each, a “**Supplemental Payment**”), subject to an aggregate maximum amount in any calendar year of €350,000 for both Classes of Notes (or such other amounts in excess of such aggregate maximum amount as may otherwise be approved by the Counterparty at its sole discretion); *provided*, that any Negative Yield Expense Fees shall not be counted toward such maximum amount. Such maximum amount will be calculated net of any interest earned on amounts standing to the credit of the Expense Account. Such payments will be deposited in the Expense Account and paid on the tenth (10th) Business Day following receipt by the Counterparty of

certification from the Issuer regarding the applicable expenses. Any amounts remaining in the Expense Account immediately prior to the winding-up of the Issuer will revert to the Counterparty, for the avoidance of doubt, following the payment of all winding-up costs of the Issuer including the costs of the liquidator.

Permitted Investments

I. General

Permitted Investments

The Issuer will irrevocably deposit an amount equal to the proceeds from the sale of each Class of Notes into the Collateral Account for such Class. The principal portion of the assets held in each such Collateral Account will be invested in Permitted Investments.

The “**Permitted Investments**” will consist of (i) the EBRD Notes; (ii) Money Market Funds Permitted Investments if the proceeds of a Class of Notes or Counterparty Payments have been used to purchase such Money Market Funds Permitted Investments; or (iii) cash deposits.

Any reference in this Offering Circular to “cash” or “cash deposits” will be denominated in euro. Amounts held in cash in the Collateral Account or Interest Payment Account will not accrue any interest.

Permitted Investment Yield; Top-Up Amount;
MMF Negative Yield Event; Total Permitted
Investment Amount; MMF Negative
Yield Deficit

For each Class of Notes, the yield on the Permitted Investments in the Collateral Account for such Class (the “**Permitted Investment Yield**”) will be an amount equal to the actual investment earnings received in such Collateral Account on the Permitted Investments prior to and including one (1) Business Day prior to the applicable Payment Date, which have not been previously distributed to the Issuer, net of applicable withholding taxes and fees imposed on such earnings, if any; *provided*, to the extent that an MMF Negative Yield Event has occurred as of any Payment Date, (i) the Indenture Trustee will be directed not to distribute to the Paying Agent such net investment earnings actually received by the Issuer from the Collateral Account from and including such Payment Date until such time as the MMF Negative Yield Deficit has been reduced to zero and (ii) until such time as the MMF Negative Yield Deficit has been reduced to zero, such net investment earnings will be reinvested in Permitted Investments and excluded from the definition of Permitted Investment Yield payable to Noteholders (“**Top-Up Amount**”).

For the purposes of the foregoing:

- (i) A “**MMF Negative Yield Event**” will occur as of any Payment Date if (a) all or a portion of the Permitted Investments consist of Money Market Funds Permitted Investments and (b) the Outstanding Principal Amount exceeds the Total Permitted Investment Amount, after giving effect to any Principal Reduction or Principal Increase on

such Payment Date;

- (ii) As of any date of determination, the “**Total Permitted Investment Amount**” will be an amount equal to (a) the product of (1) the number of shares of Money Market Funds Permitted Investments, if any, in the Collateral Account and (2) the corresponding net asset value of each such share, plus (b) the principal amount of Permitted Investments consisting of EBRD Notes, if any, plus (c) the amount of any cash in the Collateral Account, in each case as of such date of determination; and
- (iii) As of any date of determination, the “**MMF Negative Yield Deficit**” will be equal to the amount, if any, by which the Outstanding Principal Amount (after giving effect to any Principal Reduction or Principal Increase on such date of determination) exceeds the Total Permitted Investment Amount.

Negative Yield Expense Fee

The Indenture Trustee has agreed in the Indenture not to apply a “negative yield” or similar fee directly against amounts held in cash in the applicable Collateral Account, Interest Payment Account or Interest Deposit Account. Instead, to the extent that any amounts held in cash in such Collateral Account would otherwise be subject to a negative yield or similar fee, the Indenture Trustee will provide the Issuer an invoice for payment, and the Issuer has agreed to pay from the Expense Account, such negative yield or similar fee (a “**Negative Yield Expense Fee**”). Any Negative Yield Expense Fee will be included as a Supplemental Payment under the Reimbursement Agreement with the Counterparty.

II. EBRD Notes

EBRD Notes

The Issuer will use the proceeds from the sale of each Class of Notes to purchase EBRD Notes, which will be deposited in the Collateral Account for such Class. To and including the date that is one (1) Business Day prior to the Redemption Date of such Class, the collateral for such Class will consist only of the EBRD Notes unless (i) such EBRD Notes are not successfully delivered to such Collateral Account for any reason within six (6) Business Days following the Issuance Date, (ii) an EBRD Put Event occurs with respect to such Class which results in a full redemption of the EBRD Notes being held as collateral for such Class, (iii) a Counterparty Payment is received by the Issuer pursuant to the Counterparty Contract for such Class or (iv) the EBRD Notes being held as collateral for such Class are wholly or partially redeemed in order to make a Loss Payment for such Class or to be used as a Partial Repayment Amount for such Class.

When EBRD Notes that are being held as collateral for a Class are wholly or partially redeemed, the cash proceeds of such redemption will be deposited in the Collateral Account for such Class and may be invested in Money Market Funds Permitted Investments, if applicable, or used for a Loss Payment or payment of a Partial Repayment Amount, if applicable. See “—*Money Market Funds Permitted Investments—Money Market Funds Permitted Investments*”.

For the avoidance of doubt, any funds on deposit in a Collateral Account as a result of a Counterparty Payment received by the Issuer will not be invested in EBRD Notes.

Any EBRD Notes that are outstanding prior to the Redemption Date of the related Class of Notes will be redeemed and the proceeds thereof will be used to pay the Repayment Amount for such Class on such Redemption Date.

EBRD Notes Issuance Date; EBRD; EBRD Notes; EBRD Notes Scheduled Maturity Date

In respect of each Class of Notes, on or about the Business Day immediately following the Issuance Date (the “**EBRD Notes Issuance Date**”), the European Bank for Reconstruction and Development (the “**EBRD**”) will issue, and the Issuer will purchase, a distinct class of unsecured notes pursuant to the EBRD’s existing Global Medium Term Note Programme (each such class, the “**EBRD Notes**”) in an amount equal to the Original Principal Amount of the applicable Class of Notes and with a scheduled maturity date of January 6, 2023 (the “**EBRD Notes Scheduled Maturity Date**”).

The EBRD Notes purchased in connection with each Class of Notes will be denominated in euro and will bear an interest rate equal to the EBRD Interest Rate.

As of the Issuance Date and for the duration of the Notes, the EBRD must have an issuer rating of at least “AA-” by S&P. In the event that the EBRD ceases to be rated at least “AA-” by S&P, an EBRD Put Event may occur and the proceeds therefrom will be invested in Money Market Funds Permitted Investments, if available, or cash. For more information regarding the EBRD and EBRD Notes, see “*EBRD Notes*” and “*Use of Proceeds and Permitted Investments*”.

EBRD Interest Rate; EURIBOR Calculation Agent

The “**EBRD Interest Rate**” will be equal to EURIBOR determined by the EURIBOR Calculation Agent in accordance with the terms and conditions of the EBRD Notes using a designated maturity of three (3) months, minus (i) with respect to the EBRD Notes purchased with the proceeds of the Class A Notes, 43.5 basis points and (ii) with respect to the EBRD Notes purchased with the proceeds of the Class B Notes, 44.5 basis points (but in no event shall the EBRD Interest Rate with respect to either Class of Notes be less than zero); *provided*, that for the Accrual Period immediately preceding the First Payment Date and the Final Extended Redemption Date (if applicable), EURIBOR will be determined by the EURIBOR Calculation Agent using straight-line linear interpolation.

“**EURIBOR Calculation Agent**” means Citibank, N.A., as agent under the EBRD’s Global Medium Term Note Programme, or any successor agent thereunder, for EBRD Notes.

EBRD Notes Coupon Payment; EBRD Coupon Payment Date.....

Interest payments under the EBRD Notes (each, an “**EBRD Notes Coupon Payment**”) will be made by the EBRD one (1) Business Day prior to each Payment Date (each such date, an “**EBRD Coupon Payment Date**”).

For each Class of Notes, interest on EBRD Notes in respect of each Payment Date will accrue from, and including, the immediately preceding Payment Date (or the EBRD Notes Issuance Date in the case of the First Payment Date) to, but excluding, such Payment Date, except that in connection with the redemption or partial redemption of the EBRD Notes, interest from the EBRD to the Issuer with respect to the EBRD Notes will be paid on such redemption date and will accrue up to, but excluding, such redemption date.

EBRD Put Notice

For each Class of Notes, the Indenture Trustee, on behalf of the Issuer, will deliver a notice effecting a redemption of EBRD Notes in the related Collateral Account to the EBRD (with a copy to Citibank, N.A., the Issuer and the Counterparty) (each, an “**EBRD Put Notice**”) (i) to fund a Loss Payment under the related Counterparty Contract, (ii) to fund a Partial Repayment Amount for such Class or (iii) upon the occurrence of an EBRD Put Event for such Class.

EBRD Put Date

For each Class of Notes, the EBRD Notes may be wholly or partially redeemed at par (in minimum denominations of €1,000 per note, as applicable) on any EBRD Coupon Payment Date prior to the EBRD Notes Scheduled Maturity Date for such Class, upon not less than five (5) Business Days following the delivery of an EBRD Put Notice to the EBRD (each, an “**EBRD Put Date**”).

Upon the redemption of the EBRD Notes following an EBRD Put Event for such Class, unless the proceeds of such redemption are scheduled to be paid out within three (3) Business Days of being deposited in the related Collateral Account, the Indenture Trustee will use the proceeds of the redemption of EBRD Notes in the related Collateral Account to invest in Money Market Funds Permitted Investments, in the manner described under the heading “—*Money Market Funds Permitted Investments*”.

EBRD Put Event; Non-Payment Put Event; Non-Payment Notice

For each Class of Notes, an “**EBRD Put Event**” under the EBRD Notes will occur in the following instances:

(i) if on or prior to the date that is eight (8) Business Days prior to the Scheduled Redemption Date of such Class, the Indenture Trustee receives a written notice from the Issuer stating that the Issuer has not received an Extension Notice from the Counterparty, and instructing the Indenture Trustee to deliver an EBRD Put Notice to the EBRD no later than six (6) Business Days prior to such Scheduled Redemption Date;

(ii) in the case where there has been a prior extension as a result of (a) an Optional Extension Event, the Indenture Trustee receives a written notice from the Issuer stating that the Issuer has received a notice from the Counterparty to terminate the Optional Extension Event, or (b) a Mandatory Extension Event, the Indenture Trustee receives a written notice from the Issuer to terminate such Mandatory Extension Event stating that the conditions for a Mandatory Extension Event are no longer satisfied and the Counterparty has not elected an Optional Extension Event, and, in each case of (a) and (b), instructing the Indenture Trustee to deliver an EBRD

Put Notice for such Class to the EBRD no later than six (6) Business Days prior to the relevant Extended Redemption Date;

(iii) the Indenture Trustee receives written notice from the Issuer or the Counterparty of an Early Redemption Event for such Class, other than an EBRD Termination Event;

(iv) the Indenture Trustee receives written notice from the Issuer or the Counterparty of an Optional Redemption for such Class;

(v) following a Non-Payment Put Event, if the EBRD continues to not make such payment that is due for a period of ten (10) Business Days following the delivery by the Indenture Trustee of a Non-Payment Notice;

(vi) the Indenture Trustee receives written notice from the Issuer or the Counterparty that there has been a default by the EBRD in the performance of any other covenant or agreement contained in the EBRD Notes and any such default continues for a period of ninety (90) calendar days after written notice thereof is given to the EBRD by a holder of EBRD Notes;

(vii) the Indenture Trustee receives written notice that there has been a default by the EBRD in the payment of the principal of, or interest on, any bonds, notes or similar obligations which have been issued, assumed or guaranteed by the EBRD and such default continues for a period of ninety (90) calendar days; or

(viii) a responsible officer of the Indenture Trustee has actual knowledge that there has been a reduction of the credit rating assigned to the EBRD by S&P to below “AA-”.

The Indenture Trustee will monitor and provide to the Issuer the credit rating assigned by S&P to the EBRD on the fifteenth (15th) of each month while any of the EBRD Notes are outstanding.

A “**Non-Payment Put Event**” will occur if the EBRD has not made a payment of principal of, or interest on, any of the EBRD Notes on the date that such payment is due and continues to not make such payment for a period of five (5) Business Days.

Following the occurrence of a Non-Payment Put Event, the Indenture Trustee will deliver written notice to the EBRD as promptly as practicable (and no later than two (2) Business Days after such Non-Payment Put Event has occurred) notifying it of its failure to make a payment (“**Non-Payment Notice**”).

If the EBRD fails to make such payment for a period of ten (10) Business Days following the delivery of the Non-Payment Notice, the Indenture Trustee, on behalf of the Issuer, will deliver an EBRD Put Notice providing for the redemption of the entire outstanding principal amount of the EBRD Notes relating to each Class of Notes, to be effective

at the earliest EBRD Put Date thereafter.

EBRD Credit Rating.....

“AAA (stable outlook)” by S&P as of the date hereof.

III. Money Market Funds Permitted Investments

Money Market Fund

“**Money Market Fund**” means each of the euro-denominated money market funds in the order of priority set forth below:

	<u>Name of Fund</u>	<u>ISIN</u>
Euro Government Money Market Funds		
1.	BlackRock ICS-Inst Euro Gv/Core (Dis)	IE00B39VC974
Euro Prime Money Market Funds		
2.	BNP Paribas InstiCash EUR/I Dist	LU0212992274
3.	Deutsche Global Liq Managed Euro/Advisory	IE0008643250
4.	Morgan Stanley-Euro Liq/Institut	LU0875333444

Money Market Funds Permitted Investments.....

“**Money Market Funds Permitted Investments**” means one or more Money Market Funds held in the Collateral Account in accordance with the order of priority and procedures set forth in the Indenture as follows:

- (i) (a) invests solely in (1) local and national government, and supranational organization obligations, and/or (2) repurchase and reverse repurchase agreements fully backed by local and national government, and supranational debt (each such Money Market Fund, a “**Euro Government Money Market Fund**”);
 - (b) has a principal stability rating at the time of deposit into the Collateral Account of at least “AA-m” by S&P (or an affiliate, where such affiliate may not be established in the European Union or registered under the Credit Rating Agency Regulation), and thereafter is rated by S&P;
 - (c) the most recent monthly yield as reported by the relevant Money Market Fund is greater than or equal to zero;
 - (d) gives rise only to payments that are not subject to U.S. or non-U.S. withholding tax; and
 - (e) is not subject to any financial transaction tax by an EU member state; or
- (ii) to the extent that the Money Market Funds referred

to in clause (i) above are not available or are unable to accept the full amount of funds in the Collateral Account, then one or more Money Market Funds that:

- (a) invests in (1) local and national government, and supranational organization obligations, (2) repurchase and reverse repurchase agreements fully backed by local and national government, and supranational debt and/or (3) other short-term obligations issued by financial institutions and corporations (each such Money Market Fund, a “**Euro Prime Money Market Fund**”);
 - (b) has a principal stability rating at the time of deposit into the Collateral Account and any time thereafter of at least “AA-m” by S&P (or an affiliate, where such affiliate may not be established in the European Union or registered under the Credit Rating Agency Regulation);
 - (c) the most recent monthly yield as reported by the relevant Money Market Fund is greater than or equal to zero;
 - (d) gives rise only to payments that are not subject to U.S. or non-U.S. withholding tax; and
 - (e) is not subject to any financial transaction tax by an EU member state; or
- (iii) to the extent that the Money Market Funds referred to in clauses (i) and (ii) above are not available or are unable to accept the full amount of funds available for investment in the Collateral Account, then one or more Money Market Funds that satisfy the criteria in clause (i) and (ii) above (in that order of priority), but may give rise to payments that are subject to U.S. or non-U.S. withholding tax (other than on invested capital) or are subject to a financial transaction tax by an EU member state.

To the extent that such Money Market Funds specified in clauses (i), (ii) or (iii) above are not available or are unable to accept the full amount of funds in the Collateral Account or during any period between the liquidation and the reinvestment of any of the foregoing, such funds will be uninvested and held in cash pursuant to the terms of the Indenture; *provided*, that on the third (3rd) Business Day of each month while a Class of Notes is outstanding, the Indenture Trustee will seek to transfer any cash on deposit in the applicable Collateral Account (other than Permitted Investments Yield) into Money Market Funds Permitted Investments to the extent available and in the order of priority set forth above.

All or a portion of the cash on deposit standing to the credit of the Collateral Account for a Class of Notes may be

invested in one or more Money Market Funds Permitted Investments including as a result of (i) the failure of such EBRD Notes to be successfully delivered for any reason to such Collateral Account within six (6) Business Days following the Issuance Date, (ii) the occurrence of an EBRD Put Event with respect to such Class which results in a redemption of the EBRD Notes being held as collateral for such Class, (iii) the receipt of a Counterparty Payment by the Issuer pursuant to the Counterparty Contract for such Class or (iv) the whole or partial redemption of the EBRD Notes being held as collateral for such Class in order to make a Loss Payment for such Class or to be used as a Partial Repayment Amount for such Class, and in each case *provided*, that any such cash on deposit in the applicable Collateral Account is not scheduled to be paid out within three (3) Business Days of being deposited in such Collateral Account.

If funds on deposit in the Collateral Account for a Class of Notes are invested in one or more Money Market Funds Permitted Investments, such Money Market Funds Permitted Investment will be liquidated prior to the Redemption Date of such Class or the Payment Date of a Principal Reduction for which such funds are scheduled to be paid, as applicable.

Once the Issuer's obligations to the Counterparty under the Counterparty Contract for a Class of Notes have been fully discharged in accordance with the terms of such Counterparty Contract, any remaining amounts in the Collateral Account for such Class will be used to pay the Repayment Amount for such Class on the related Redemption Date.

Failure to Meet Money Market Fund Criteria; Higher Level of Money Market Fund Criteria.....

If a responsible officer of the Indenture Trustee has actual knowledge (without independent investigation other than in connection with the delivery of a weekly report as set out in the Indenture and based solely upon information provided by S&P or the respective Money Market Fund providers to such responsible officer) that a Money Market Fund held in the Collateral Account no longer satisfies the criteria in clauses (i), (ii) or (iii) in the definition of Money Market Funds Permitted Investments, then shares of such Money Market Fund will be liquidated as promptly as practicable and the proceeds will be invested in an alternative Money Market Funds Permitted Investment (or if no such Money Market Fund is available, then cash) in accordance with the procedures specified in the Indenture.

In addition, if Permitted Investments consist of Money Market Funds and a responsible officer of the Indenture Trustee has actual knowledge (without independent investigation other than in connection with the delivery of a weekly report as set out in the Indenture and based solely upon information provided by S&P or the respective Money Market Fund providers to such responsible officer) that one or more of the other Money Market Funds (i) is available to accept the funds in the Collateral Account and (ii) satisfies a higher MMF Criteria Level, then on the third (3rd) Business Day of the next succeeding month, the shares of such Money Market Fund will be liquidated and transferred into such Money Market Fund meeting the higher MMF Criteria Level

as promptly as is practicable.

For purposes of the foregoing, each of the following will be an “**MMF Criteria Level**” in order of priority: (i) a Euro Government Money Market Fund that satisfies the criteria under clause (i) of the definition of Money Market Funds Permitted Investment; (ii) a Euro Prime Money Market Fund that satisfies the criteria under clause (ii) of the definition of Money Market Funds Permitted Investment; (iii) a Euro Government Money Market Fund that satisfies the criteria under clause (iii) of the definition of Money Market Funds Permitted Investment; (iv) a Euro Prime Money Market Fund that satisfies the criteria under clause (iii) of the definition of Money Market Funds Permitted Investment; and (v) cash.

Money Market Fund Yield.....

For each Class of Notes and each Accrual Period, an amount equal to the actual investment earnings received by the Issuer through and including, but not later than, one (1) Business Day prior to the applicable Payment Date, which have not been previously distributed to the Issuer, net of applicable withholding taxes and fees imposed on such earnings, if any, on the amounts in the Collateral Account of such Class invested in one or more Money Market Funds Permitted Investments (“**Money Market Fund Yield**”). Neither the Issuer, nor the Counterparty, nor any other party, is under any obligation to pay any additional amounts in respect of any taxes or fees applicable to the Money Market Fund Yield.

Non-QEF Investment Funds

Pursuant to the terms of the Indenture, on the first Business Day of each calendar year, the shares of any non-U.S. Money Market Funds Permitted Investment held by the Issuer that does not provide upon request the information necessary for a U.S. Holder to make a QEF election (a “**Non-QEF Investment Fund**”) with respect to such Money Market Funds Permitted Investment will be liquidated, and as promptly as practicable thereafter, the proceeds from such liquidation will be used to purchase shares in a Money Market Funds Permitted Investment other than a Non-QEF Investment Fund with respect to which shares were held in the immediately preceding year. To the extent no other Money Market Funds Permitted Investment is available other than a Non-QEF Investment Fund with respect to which shares were held in the immediately preceding calendar year, or the available Money Market Funds Permitted Investments are not able to accept the full amount of funds in the Collateral Account, the proceeds of such liquidation held in the Collateral Account will be transferred pursuant to the terms of the Indenture and for the periods specified in the Indenture. To the extent no Money Market Funds Permitted Investment is available, the funds will remain uninvested in the Collateral Account pursuant to the terms of the Indenture.

FATCA

If a responsible officer of the Indenture Trustee receives written notice from an authorized person of the Issuer or the Counterparty that gross proceeds from the disposition or redemption of a Money Market Funds Permitted Investment will become subject to withholding tax, then shares of such Money Market Funds Permitted Investment will be liquidated prior to the time that gross proceeds from the disposition or redemption of such Money Market Funds Permitted

Investment become subject to withholding tax as specified in such written notice and the proceeds of such liquidation will be invested in an alternative Permitted Investment in accordance with the procedures specified in the Class Supplement.

IV. Indenture; Collateral

Indenture.....

The Issuer will enter into an indenture, dated as of the Issuance Date (“**Indenture**”), with The Bank of New York Mellon, London Branch, as trustee which will set forth the specific terms with respect to each Class of Notes.

The Indenture and each Class of Notes will be construed and enforced in accordance with and governed by the laws of the State of New York.

Collateral Account; Interest Payment Account

The Issuer will deposit an amount equal to the proceeds from the sale of each Class of Notes into a segregated collateral account established with respect to such Class with the Indenture Trustee in the name of the Issuer which will be secured in favor of the Indenture Trustee pursuant to the Deed of Charge for the benefit of the Counterparty, the Noteholders and the Indenture Trustee (each, a “**Collateral Account**”). Amounts credited to each Collateral Account will be invested in Permitted Investments.

On each Payment Date, amounts standing to the credit of a Collateral Account in respect of a Class of Notes, other than Permitted Investment Yield, which will be transferred to the Interest Payment Account of such Class in respect of that Payment Date, will be available to satisfy (in order of priority) (except that any Partial Repayment Amount for such Class will not be subject to the prior interest of the Counterparty):

- (i) any obligations of the Issuer to the Counterparty under the related Counterparty Contract;
- (ii) any obligations of the Issuer to the Noteholders under the Indenture in respect of the Repayment Amount for such Class; and
- (iii) only following the Redemption Date of such Class to the extent of any amounts remaining after payment in full of the obligations described in (i) and (ii) above, any expenses due and unpaid from the Expense Account, including any amounts due and payable by the Issuer in respect of indemnification obligations under any agreement relating to the Notes with a third party.

For each Class of Notes, the Permitted Investment Yield received in respect of the Permitted Investments will be transferred to a cash account established in the name of the Issuer with the London branch of the Indenture Trustee (each, an “**Interest Payment Account**”).

In addition, the relevant Periodic Payments for such Class under the related Counterparty Contract which had been previously deposited in the related Interest Deposit Account

by the Counterparty will be transferred into the Interest Payment Account by the Indenture Trustee and, if applicable, the Counterparty will directly make payment of the Periodic Payments other than Interest Periodic Payments into the related Interest Deposit Account.

For each Class of Notes, on each Payment Date, an amount equal to the applicable Permitted Investment Yield *plus* the (i) Interest Spread Amount for such Class or (ii) Extension Spread Amount for such Class, as the case may be, for the related Accrual Period will be withdrawn (to the extent available) by the Indenture Trustee from the Interest Payment Account for payment, on a *pari passu* basis, to Noteholders of such Class from a location outside the United States.

Deed of Charge; Collateral; Limitation as to Enforcement

For each Class of Notes, the Issuer will, pursuant to a deed of charge and assignment dated as of the Issuance Date (a "**Deed of Charge**"), among the Issuer, the Indenture Trustee, the Custodian, The Bank of New York Mellon, London branch, as account bank, and the Counterparty, mortgage, charge and/or assign by way of security to the Indenture Trustee, for the benefit of itself, the Counterparty and the Noteholders of such Class, as security for the payment of certain of the Issuer's obligations to such parties, all the Issuer's right, title and interest in, to and under the following (the "**Collateral**"):

- (i) the related Counterparty Contract, including the right to receive all payments due and payable from the Counterparty thereunder;
- (ii) the Collateral Account of such Class and the proceeds of the issuance of such Class deposited therein and any amount standing to the credit of such Collateral Account, and all proceeds thereof;
- (iii) the related Counterparty Deed of Charge;
- (iv) the Interest Payment Account of such Class established pursuant to the Indenture; and
- (v) the Custody Agreement.

Each Deed of Charge will be governed by the laws of England and Wales.

The Collateral does not include any interest of the Issuer in (i) the Expense Account, any assets therein and any proceeds earned thereon, (ii) the Reimbursement Agreement (including, for the avoidance of doubt, the Closing Payment and any Supplemental Payment), (iii) amounts representing the Issuer's ordinary share capital and any proceeds earned thereon and (iv) the Issuer's annual profit of €1,000 per annum and any proceeds earned thereunder.

Neither the Indenture Trustee nor any Noteholder will have the right to enforce or otherwise realize upon the Indenture Trustee's security interest in the Collateral Account and any Permitted Investments held therein until all of the Issuer's

obligations under the related Counterparty Contract (including the potential liability for any claim under such Counterparty Contract) have been satisfied or terminated in accordance with the terms thereof.

Under each Deed of Charge, the proceeds of enforcement of the security over investment earnings on the assets standing to the credit of the applicable Collateral Account, the security over the applicable Interest Payment Account, the security over the applicable Counterparty Contract will be applied toward the payment of the interest on, and then, the Outstanding Principal Amount of, the applicable Class of Notes, subject to first discharging the fees, costs and expenses of the Indenture Trustee and Paying Agent. The proceeds of enforcement of the security over the remainder of the Collateral with respect to such Class of Notes will be applied first to discharge the obligations of the Issuer to the Counterparty pursuant to the Counterparty Contract and then toward the payment of interest on, and then, the Outstanding Principal Amount of, such Class of Notes, subject to first discharging the fees, costs and expenses of the Indenture Trustee and Paying Agent.

In certain circumstances, any first fixed charge and assignment by way of security described above may be held by the English courts to take effect as a floating charge (for more information, see *"Risk Factors—Risks Relating to English Law Security Interests and Assignment by way of Security under the Deed of Charge and the Counterparty Deed of Charge"*).

Assignment of Interest Deposit Account; Counterparty
Deed of Charge.....

For each Class of Notes, the Counterparty will secure by way of a mortgage and/or charge in favor of the Issuer, pursuant to a deed of charge among the Indenture Trustee, the Issuer and the Counterparty, dated as of the Issuance Date (each, a "**Counterparty Deed of Charge**"), the related Interest Deposit Account to secure its obligations to make payments of the applicable (i) Interest Spread Amount or (ii) Extension Spread Amount, as the case may be, for such Class of Notes for the relevant Accrual Period, in the event that an Event of Default under the Indenture has occurred as a result of the default of the Counterparty under the related Counterparty Contract. In certain circumstances, any first fixed charge created under the Counterparty Deed of Charge may be held by the English courts to take effect as a floating charge (for more information, see *"Risk Factors—Risks Relating to English Law Security Interests and Assignment by way of Security under the Deed of Charge and the Counterparty Deed of Charge"*).

In the event that an Event of Default under the Indenture has occurred in respect of a Class of Notes as a result of the default of the Counterparty under the related Counterparty Contract, the Indenture Trustee will be permitted to realize upon the security interest of the Issuer and acquire the rights to all assets standing to the credit of the Interest Deposit Account, provided that any investment earnings in the

Interest Deposit Account will be paid directly to the Counterparty. As a result, the Indenture Trustee, as the Issuer's mortgagee or chargee of such Interest Deposit Account, may apply amounts standing to the credit of such Interest Deposit Account (other than investment earnings) to pay the Interest Spread Amount or Extension Spread Amount to Noteholders of such Class.

On each Payment Date for a Class of Notes, the Counterparty may withdraw any amounts in the related Interest Deposit Account in excess of the Interest Periodic Payment due for such Class on the following Payment Date. For more information, see “—*Counterparty Contract—Interest Deposit Account; Interest Deposit Account Amount; Interest Deposit Investments*”. In addition, any amounts remaining in such Interest Deposit Account following the redemption of such Class will be paid over to the Counterparty.

Custodian; Custody Agreement

As of the Issuance Date, the Issuer and The Bank of New York Mellon, London branch (the “**Custodian**”) will enter into a Custody Agreement (a “**Custody Agreement**”) for each Class of Notes under which, among other things, the Custodian establishes a Collateral Account for such Class for the custody and safekeeping of the related Permitted Investments. Each Custody Agreement will be governed by the laws of England and Wales.

Assigned Agreements.....

Under the Indenture, the Issuer will assign and pledge to the Indenture Trustee for the benefit of all Noteholders, all of the Issuer's right, title, benefit and interest in, to and under the Management Agreement and the Calculation Agent Agreement (the “**Assigned Agreements**”).

Sources of Funds for Repayment of Principal.....

The Issuer's sources of funds for repayment of the Outstanding Principal Amount of a Class of Notes will be: (a) the principal amount of EBRD Notes held in the related Collateral Account; and/or (b) the net proceeds of the liquidation of any Money Market Funds Permitted Investments (net of any applicable withholding taxes and fees); and/or (c) cash on deposit in such Collateral Account.

Payment of the Outstanding Principal Amount of each such Class is effectively subordinated to the obligations of the Issuer to the Counterparty under the related Counterparty Contract.

If funds or Permitted Investments held in the Collateral Account for a Class of Notes are required to be paid to the Counterparty or redeemed, as applicable, in connection with a Principal Reduction for such Class, the Indenture Trustee will (i) first, use any cash on deposit in such account to pay for such Principal Reduction, (ii) second, if the amount referred to in clause (i) is not sufficient for the Issuer to fully pay for such Principal Reduction, redeem any Money Market Funds Permitted Investments held in such Collateral Account and use the net proceeds thereof to pay for such Principal Reduction and (iii) third, if the amounts referred to in clauses (i) and (ii) are not sufficient to fully pay for such Principal Reduction, redeem a sufficient amount of related EBRD Notes and use the net proceeds thereof to pay for such

Principal Reduction.

Sources of Funds for Payment of Interest.....

The Issuer's sole sources of funds for payments of interest on a Class of Notes will be (i) the Periodic Payments received from the Counterparty under the related Counterparty Contract relating to payment of interest to the Noteholders of such Class (including amounts standing to the credit of the Interest Deposit Account), and (ii) the applicable Permitted Investment Yield.

It is anticipated that the net investment earnings on the Permitted Investments will be less than the amounts payable by the Issuer in respect of interest on the Outstanding Principal Amount for each Class of Notes. Accordingly, in the event of the failure of (i) the Counterparty to make Periodic Payments when due under the related Counterparty Contract or (ii) the payment of any Permitted Investment Yield by any Permitted Investments (including the failure of the EBRD to pay any related interest payments on an EBRD Coupon Payment Date), the Issuer, subject to the amount available in the Interest Deposit Account for such Class, may be unable to make full payment of interest when due on the Outstanding Principal Amount of such Class.

Events of Defaults; Acceleration; Covenants; No Petition; Extinguishment of Obligations

Defaults and Remedies; Events of Default.....

The Indenture specifies certain events of default in respect of each Class of Notes (each, an "**Event of Default**") including:

- (i) a failure of the Issuer to pay interest on such Class when due which is not cured within five (5) Business Days;
- (ii) a default of the Issuer in the repayment of the Repayment Amount or Partial Repayment Amount of such Class when due which, solely in the case of the Partial Repayment Amount, is not cured within five (5) Business Days;
- (iii) a default in the observance of any covenant or agreement of the Issuer made in the Indenture which has a material adverse effect on the Noteholders of such Class and any such default continues or is not cured for a period of forty-five (45) calendar days after written notice thereof is given to the Issuer by the Indenture Trustee or otherwise Noteholders representing at least twenty-five percent (25%) of the Outstanding Principal Amount of such Class;
- (iv) any representation or warranty made by the Issuer in the Indenture or in any certificate or other writing delivered pursuant thereto or in connection therewith having been incorrect as of the time made, *provided, that* such misrepresentation has a material adverse effect on the Noteholders of such Class and is not cured or eliminated within forty-five (45) calendar days after written notice thereof is given to the Issuer by the Indenture Trustee or otherwise Noteholders representing at least twenty-five percent (25%) of the Outstanding Principal Amount of such Class (such notice specifying such incorrect

representation or warranty and requiring it to be remedied and stating that such notice is a notice of default under the Indenture);

- (v) the filing of a decree or order for relief by a court having jurisdiction in the premises in respect of the Issuer or any substantial part of the Collateral in an involuntary case under any applicable federal, state or non-U.S. bankruptcy, insolvency or other similar law now or hereafter in effect, or appointing a receiver, liquidator, assignee, custodian, trustee, sequestrator, examiner or similar official of the Issuer or for any substantial part of the Collateral, or ordering the winding-up, liquidation or examinership of the Issuer's affairs, and such decree or order shall remain unstayed and in effect, for a period of sixty (60) calendar days; or
- (vi) the commencement by the Issuer of any voluntary case under any applicable federal, state or non-U.S. bankruptcy, insolvency or other similar law now or hereafter in effect, or the consent by the Issuer to the entry of an order for relief in an involuntary case under any such law, or the consent by the Issuer to the appointment or taking possession by a receiver, liquidator, assignee, custodian, trustee, sequestrator, examiner or similar official of the Issuer or for any substantial part of the Collateral, or the making by the Issuer of any general assignment for the benefit of creditors, or the failure by the Issuer generally to pay its debts as such debts become due, or the taking of any action by the Issuer in furtherance of any of the foregoing.

If an Event of Default specified in clause (v) or (vi) above should occur with respect to a Class of Notes, all Classes of Notes will be immediately due and payable.

If an Event of Default (other than as specified under (v) or (vi)) should occur and be continuing with respect to a Class of Notes, either the Indenture Trustee or the Noteholders representing at least twenty-five percent (25%) of the Outstanding Principal Amount of any such Class adversely affected by such Event of Default may accelerate such Class and declare such Class to be immediately due and payable. The Indenture Trustee will provide five (5) Business Days prior notice to the Issuer and the Counterparty of such declaration. Such declaration by the Indenture Trustee may, under certain circumstances, be rescinded by the holders of a majority of the Outstanding Principal Amount of the applicable Class.

In the event of such acceleration, the amount immediately due and payable in full satisfaction of the Issuer's obligations under the Class of Notes will be 100% of the Repayment Amount of such Class, *plus* any accrued and unpaid interest. **If a Class has been accelerated, the Indenture Trustee is required to maintain possession of the respective Collateral and apply any proceeds thereof as if there had been no declaration of acceleration until the obligations of the Issuer under the related Counterparty Contract have**

been satisfied or terminated in accordance with their terms.

Subject to the provisions for indemnification and certain limitations contained in the Indenture (including those described in the following paragraph), the affected Noteholders will have the right to direct the time, method and place of conducting any proceeding or any remedy available to the Indenture Trustee, and the Noteholders may, in certain cases, waive any default with respect thereto, except a default in the payment of any amounts required to be paid under the applicable Class of Notes.

No Noteholder will have the right to institute any proceeding with respect to a Class of Notes unless (i) such Noteholder previously has given to the Indenture Trustee written notice of a continuing Event of Default with respect to that Class, (ii) Noteholders holding at least 25% of the Outstanding Principal Amount of such Class have made a written request to the Indenture Trustee to institute such proceeding in its own name as Indenture Trustee, (iii) such Noteholder or Noteholders has or have offered the Indenture Trustee indemnity, security and/or pre-funding reasonably satisfactory to the Indenture Trustee against the costs, expenses and liabilities to be incurred or in respect of which it may become liable in complying with such request, (iv) the Indenture Trustee has for thirty (30) calendar days after its receipt of such written request and offer of indemnity, security or pre-funding failed to institute such proceeding without cause and (v) no written direction inconsistent with such Noteholders' written request has been given to the Indenture Trustee during such thirty (30) calendar day period by Noteholders representing at least a majority of the Outstanding Principal Amount of such Class; *provided*, that no Noteholder shall be entitled to take, or join any other person in taking, any steps or proceedings to seek or procure the winding-up, examinership, liquidation, dissolution, reorganization or similar insolvency proceedings with respect to the Issuer or for the appointment of an administrator, manager, administrative receiver, trustee, liquidator, examiner, sequestrator or similar officer with respect to the Issuer or any of its revenues or assets. The Noteholders will only have recourse to the relevant Collateral, as specified herein, in such circumstances.

If a Class of Notes becomes immediately due and payable following an Event of Default, the Indenture Trustee may, subject to the rights of the Counterparty, with respect to such Class of Notes, institute proceedings to collect amounts due or foreclose on the Collateral securing that Class of Notes or otherwise exercise remedies as a secured party with respect to such Collateral and take any other appropriate action to protect and enforce the rights and remedies of the Indenture Trustee and the Noteholders.

No recourse may, to the full extent permitted by applicable law, be taken, directly or indirectly, with respect to the obligations of the Issuer relating to a Class of Notes or under the Indenture or any related documents, any certificate or other writing delivered in connection therewith, against

(i) the Indenture Trustee in its individual capacity, or (ii) any partner, owner, beneficiary, agent, officer, director, employee, successor or assign of the Indenture Trustee, each in its individual capacity, (iii) any holder of equity in the Issuer or the Indenture Trustee or (iv) any director or officer of the Issuer.

Notwithstanding the foregoing, neither the Indenture Trustee nor any Noteholder will have the right to enforce or otherwise realize upon the Indenture Trustee's security interest in the Collateral Account and Permitted Investments held therein until all of the Issuer's obligations under the related Counterparty Contract (including the potential liability for any claim under such Counterparty Contract) have been satisfied or terminated in accordance with the terms thereof.

Covenants

The Indenture contains certain covenants that, as long as any of the Notes remain outstanding, among other things:

- (i) prevent the Issuer from substituting any financial contract or policy of insurance or reinsurance for the Counterparty Contracts;
- (ii) require the Issuer to maintain records to the extent required under applicable Irish law;
- (iii) require the Issuer to maintain the Collateral and the Indenture Trustee's security interest in the Collateral;
- (iv) require the Issuer to maintain its existence;
- (v) require the Issuer to provide to the registered Noteholders the information required to be furnished to the relevant Noteholders or prospective purchasers of Notes in order to permit compliance with Rule 144A under the Securities Act as well as the Available Information;
- (vi) require the Issuer to deliver to the Indenture Trustee notice of any Event of Default or default under the Counterparty Contracts or any other applicable document described herein;
- (vii) prevent the Issuer from engaging in any business other than as contemplated herein or incidental or ancillary thereto;
- (viii) prevent the Issuer from incurring any indebtedness for borrowed money (other than as contemplated herein);
- (ix) prevent the Issuer from merging or consolidating with or into any other person or disposing of all or substantially all of its assets; and
- (x) prevent the Issuer from amending the terms of the Counterparty Contracts and certain other documents without the requisite consent of Noteholders except as set forth in the Indenture.

No Petition

By its acquisition of a Note, each Noteholder agrees that neither it nor the Indenture Trustee on its behalf or for its

benefit may commence, or join in against the Issuer or institute against the Issuer any bankruptcy, reorganization, arrangement, insolvency, examinership or liquidation proceedings, or other proceedings under any federal, state or foreign bankruptcy law (including the laws of Ireland) until the expiration of two (2) years (or, if longer, the applicable preference period under any applicable law including the laws of Ireland) and one (1) calendar day from the day when (a) no Notes remain outstanding and (b) all of the Counterparty Contracts have been terminated in accordance with their respective terms and any amounts due and owing thereunder have been satisfied.

Extinguishment of Obligations

All obligations of the Issuer under the Indenture with respect to the Classes of Notes will be limited recourse obligations of the Issuer payable solely from the related Collateral (subject to the prior interest of the Counterparty) and will be deemed to be extinguished if, at any time, the Issuer has no assets (which will include claims that may be asserted by the Issuer with respect to contractual obligations of third parties to the Issuer) or such Collateral has been depleted.

Collections during an Event of Default

If, following the occurrence and continuation of an Event of Default in connection with a Class of Notes, the Indenture Trustee collects any money or property from the Counterparty pursuant to the respective Counterparty Contract for such Class or collects any money or property in respect of Permitted Investment Yield, the Interest Payment Account or the Interest Deposit Account for such Class, the Indenture Trustee will pay out such money or property in the following order:

- (i) *first*, to The Bank of New York Mellon in each of its capacities (individual or otherwise) in respect of any fees, expenses and indemnification amounts relating to the Notes payable to it, and unpaid, pursuant to the Indenture (but only to the extent there are no available funds in the Expense Account);
- (ii) *second*, to the Noteholders of such Class for, and in proportion to, amounts payable and unpaid on such Class in respect of interest (including for the avoidance of doubt any Early Redemption Event Premium and any Optional Redemption Event Premium, if applicable); and
- (iii) *third*, to the Noteholders of such Class for, and in proportion to, amounts payable and unpaid on such Class in respect of the Outstanding Principal Amount.

If, following the occurrence and continuation of an Event of Default in connection with a Class of Notes, the Indenture Trustee collects any money or property with respect to such Class, other than as set forth above, the Indenture Trustee will pay out such money or property, in the following order:

- (i) *first*, to The Bank of New York Mellon in each of its capacities (individual or otherwise) in respect of any fees, expenses and indemnification amounts relating to the Notes payable to it, and unpaid, pursuant to the Indenture (but only to the extent there are no available

funds in the Expense Account);

- (ii) *second*, to the Counterparty in respect of any amounts payable and unpaid under the related Counterparty Contract;
- (iii) *third*, to the Noteholders of such Class for, and in proportion to, amounts payable and unpaid on such Class in respect of interest (including for the avoidance of doubt any Early Redemption Event Premium and Optional Redemption Event Premium, if applicable); and
- (iv) *fourth*, to the Noteholders of such Class for, and in proportion to, amounts payable and unpaid on such Class in respect of the Outstanding Principal Amount.

Manner of Offering; Transfer Restrictions

Manner of Offering

The offering of the Notes will be made pursuant to Rule 144A to investors who (i) are Qualified Institutional Buyers that, with respect to U.S. persons, are also Qualified Purchasers, (ii) are Qualified Eligible Persons, (iii) are residents of and purchasing in, and will hold the Notes in, a Permitted U.S. or Permitted Non-U.S. Jurisdiction, and (iv) will be deemed to make the representations, warranties and agreements specified in the “Notice to Investors—Representations of Purchasers”. Transfers of the Notes (or beneficial interests therein) that do not meet these requirements may be deemed void and of no effect. Any person who holds any interest in the Notes (or beneficial interests therein) who does not reside and hold such interest in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, or, at the time of the acquisition of an interest in the Notes, is not a Qualified Institutional Buyer, a Qualified Eligible Person and, in the case of a U.S. Person, a Qualified Purchaser, may be forced to sell or transfer such interest in the Notes to a purchaser who meets the requirements set forth in “*Notice to Investors*” in this Offering Circular. The Notes are not being offered to the public in any jurisdiction.

The Offering, sale and delivery of the Notes and this Offering Circular are restricted by law in certain jurisdictions. Persons who receive this Offering Circular or other materials relating to the Notes are required by the Issuer to inform themselves about and observe such restrictions on offers, sales and deliveries of the Notes and distribution of this Offering Circular (including any other offering materials or presentations relating to the Notes). See “*Notice to Investors*”.

The Notes will bear a legend and may not be transferred except in compliance with the transfer restrictions described in the Notes in such legend and in the Indenture.

Transfer Restrictions

The Notes have not been and will not be registered under the Securities Act or any United States state or foreign securities laws and are subject to restrictions on transfer. See “*Notice to Investors*”.

Denominations.....

The Notes will be issued in minimum denominations of €250,000 and integral multiples of €1,000 in excess thereof.

Form of Notes.....	Each Class of Notes will be issued in fully registered global form and will be available for purchase through the book-entry systems of Euroclear Bank S.A./N.V. (“ Euroclear ”) or Clearstream Banking, <i>société anonyme</i> , Luxembourg (“ Clearstream ”).
ISIN.....	For the Class A Notes: XS1219733083 For the Class B Notes: XS1219733240
Permitted U.S. Jurisdictions	The District of Columbia and all states of the United States, except for the states of Hawaii, Montana and Nevada (“ Permitted U.S. Jurisdictions ”). No U.S. territory will be a Permitted U.S. Jurisdiction.
Permitted Non-U.S. Jurisdictions	Argentina, Australia, Austria, Bahrain, Barbados, Belgium, Bermuda, British Virgin Islands, Canada (the provinces of British Columbia, Ontario and Quebec only), Cayman Islands, China, Denmark, Dubai International Finance Center, France, Germany, Guernsey, Hong Kong, Ireland, Israel, Italy, Japan, Jersey, Kuwait, Liechtenstein, Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Portugal, Republic of Korea, Singapore, Spain, Sweden, Switzerland and the United Kingdom (“ Permitted Non-U.S. Jurisdictions ”).
	The designation of a jurisdiction as a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction relates solely to the characterization of the Notes for certain insurance law purposes.
	Any person who holds any interest in a Class of Notes, who does not reside and hold such interest in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, may be forced to transfer such interest to a person in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction. See “ <i>Description of the Notes — Permitted Jurisdictions</i> ”.
Other Provisions	
Tax Consequences.....	As specified herein under “ <i>Certain U.S. Federal Income Tax Considerations</i> ” and “ <i>Certain Irish Income Tax Considerations</i> ”.
Benefit Plan Considerations.....	As specified herein under “ <i>Certain Benefit Plan Considerations</i> ”.
Record Date	The “ Record Date ”, with respect to a Payment Date or Redemption Date for each Class of Notes will be the close of business on the fifteenth (15 th) Business Day immediately preceding such day.
Indenture Trustee.....	The Bank of New York Mellon, acting through its London branch, or its successors or assigns, will act as indenture trustee (the “ Indenture Trustee ”) pursuant to the Indenture. The address of the Indenture Trustee is One Canada Square, London E14 5AL, United Kingdom.
Note Registrar.....	The Bank of New York Mellon (Luxembourg) S.A., or its successors or assigns, having its address at Vertigo Building – Polaris, 2-4 rue Eugène Ruppert, L-2453 Luxembourg, or

	any successor Note Registrar (“ Note Registrar ”).
Paying Agent	The Bank of New York Mellon, acting through its London branch, or its successors or assigns, having its address at One Canada Square, London E14 5AL, United Kingdom, or any successor Paying Agent (“ Paying Agent ”).
Irish Listing Agent.....	Walkers Listing & Support Services Limited, or its successor will act as the Irish Listing Agent of the Issuer (“ Irish Listing Agent ”).
Manager	Deutsche International Corporate Services (Ireland) Limited or its successor (“ Manager ”).
Auditor.....	Mazars Dublin, or its successor, will act as the independent auditor of the Issuer (“ Auditor ”).
Calculation Agent.....	Risk Management Solutions, Inc. (“ RMS ”) or its successor (“ Calculation Agent ”).
Business Day; TARGET Settlement date	A day (other than a Saturday or a Sunday) on which Clearstream and Euroclear are open and commercial banks and foreign exchange markets settle payments and are open for general business in Paris, France; the City of London, England; Dublin, Ireland; and New York City, United States, and which is also a TARGET Settlement Date (“ Business Day ”). A “ TARGET Settlement Date ” is a day on which the Trans-European Automated Real-time Gross Settlement Express Transfer payment system (or any successor system) is open for business.
Rating Agency	Standard & Poor’s Credit Market Services Europe Limited or any successor thereof (the “ Rating Agency ”).
Expected Ratings of the Notes	The Rating Agency is established in the European Union and is registered under the Credit Rating Agency Regulation.
	It is expected that, on the Issuance Date, the Class A Notes will have a rating of BB+ (sf) and the Class B Notes will have a rating of BB (sf) by the Rating Agency (each, a “ Rating ”).
	Each Rating, if obtained, will address the likelihood that the Noteholders of the related Class of Notes will receive timely payment of interest and ultimate payment of the principal amount of such Class on the related Redemption Date. However, the Rating Agency will not evaluate, and each Rating will not address, the likelihood of payment of the principal amount of any Class by the Scheduled Redemption Date of such Class. The Ratings will not be recommendations to purchase, hold or sell any Notes of any Class. The Ratings will not comment as to the market price, fair market value, or suitability for a particular investor of any Notes of any Class, nor do they address the likelihood that a Noteholder will be able to sell such Notes. Each Rating will be based on the then-current information furnished to the Rating Agency by the Issuer and/or the Counterparty, and such other information, if any, that the Rating Agency may obtain from other sources, including, but not limited to, RMS. The Ratings, if obtained, may be changed, suspended or withdrawn at any time as a result of

changes in, or the unavailability of, certain information, including information that is outside the control of, and unknown to, the Issuer or the Counterparty.

Prospective investors should consider carefully the information set forth in this Offering Circular under the caption “*Risk Factors—Risks Relating to Ratings and Rating Agencies*” prior to making an investment in the Notes.

Risk Factors.....

Prospective investors should consider carefully the information set forth under the caption “*Risk Factors*” herein and all other information set forth in this Offering Circular before making any investment in the Notes.

RISK FACTORS

Investment in the Notes is speculative and involves a high degree of risk including, but not limited to, the following factors and the factors described in the legends included in the forward part of this Offering Circular. The Issuer believes that the following factors may be relevant to it and its business. All of these factors are contingencies which may or may not occur, and the Issuer is not in a position to express a view on the likelihood of any such contingency occurring. The Issuer believes that the factors described below represent the principal risks inherent in investing in Notes, but the inability of the Issuer to pay interest, principal or other amounts on or in connection with any Notes may occur for other reasons which may not be considered significant risks by the Issuer based on information currently available to it or which it may not currently be able to anticipate. Prospective investors should also read the detailed information set out elsewhere in this Offering Circular and should carefully consider the suitability of an investment in the Notes in the light of their own financial circumstances and investment objectives prior to making any investment decision.

General Investment Risks

The Notes are complex speculative instruments and are intended for sale only to investors capable of understanding and assuming the high risks entailed in such instruments. Potential investors are strongly encouraged to consult with their financial, accounting, legal, actuarial and tax advisors before making any investment decision in respect of the Notes.

Loss of Principal and Interest

If during the Risk Period applicable to a Class of Notes there are one or more Mortality Events resulting in a Principal Reduction with respect to such Class, investors could lose all or a portion of their investment. The occurrence of one or more Mortality Events resulting in a Principal Reduction is inherently unpredictable. Therefore, the risk of loss to Noteholders cannot be predicted. In addition, if the Counterparty fails to pay any Counterparty Payment or other payments due under the applicable Counterparty Contract, or the Permitted Investments cannot be liquidated for an amount equal to their cost, the Issuer could be unable to make full payments of principal and interest on the related Class of Notes.

Maturity

The maturity date of any Class of Notes may be extended beyond the Scheduled Redemption Date for such Class upon the occurrence of an Extension Event. An Extension Event may be effected with respect to the full Outstanding Principal Amount of any Class of Notes or a portion thereof pursuant to a Partial Extension Event. Whether an Extension Event will occur is unpredictable and may be determined in the sole discretion of the Counterparty. During any Extension Period, interest payable on the applicable Class of Notes will no longer be based on the Interest Spread, but a reduced Extension Spread.

Early Redemption / Optional Redemption

If an Early Redemption Event or Optional Redemption occurs with respect to a Class of Notes, such Class will be redeemed in whole prior to the applicable Scheduled Redemption Date for cash for their respective Repayment Amount (and a premium may not be payable as a result thereof). If a Class is redeemed prior to its Scheduled Redemption Date, the Noteholders of such Class may be unable to reinvest amounts received as a result of such redemption in investments with a yield equal to or greater than the yield of such Class.

Volatility

The fair market value of the Notes can be expected to exhibit substantial volatility to the extent there occurs, or there are market expectations of, one or more extreme mortality events, whether or not constituting a Mortality Event. The market value of any Class of Notes may be affected if such Class of Notes is downgraded by the Rating Agency or if any market condition reduces liquidity of the Notes. The market value of any Class of Notes may also be expected to exhibit substantial volatility if a sizeable other material catastrophic event occurs that affects the insurance or reinsurance industry.

Further, the market value of any Class of Notes may exhibit volatility based on changes in the market value of the Permitted Investments.

Limited Recourse to the Issuer; Non-recourse to the Counterparty

The Notes are with limited recourse to certain assets of the Issuer, as more fully described herein, and are without recourse to the Counterparty or any of its affiliates or, other than to the Collateral and, to the extent described herein, the assets of the Issuer. With respect to each Class of Notes, the Noteholders of such Class and the Indenture Trustee will (i) not have any right to enforce or realize against the related Collateral until all of the Issuer's obligations under the respective Counterparty Contract have been satisfied or terminated, and (ii) will have recourse only to the Collateral for such Class (subject to the prior interest of the Counterparty) and will have no recourse to any Collateral for any other Class.

Insolvency

Expenses of the Issuer are payable from the Expense Account, which will principally consist of the Closing Payment and any Supplemental Payment(s), if any, by the Counterparty under the Reimbursement Agreement. While the Issuer believes that its intended business operations will permit it to pay its debts as they fall due, if any unsatisfied liabilities arise, there is a risk of insolvency of the Issuer.

Consolidation

Under generally accepted accounting principles and financial reporting standards, including U.S. GAAP and International Financial Reporting Standards ("IFRS"), the Issuer may be considered a variable interest entity or investee, as applicable. A purchaser of the Notes may be considered to hold a variable interest in a variable interest entity or investee, as applicable. Under certain circumstances, generally accepted accounting principles and financial reporting standards require a holder of a variable interest in a variable interest entity or investee, as applicable, to consolidate the variable interest entity or investee, as applicable. Additionally, generally accepted accounting principles and financial reporting standards regarding variable interest entities or investees are subject to change at any time and may apply retroactively. In addition, under generally accepted accounting principles, including U.S. GAAP and IFRS, Noteholders may be required to account for their beneficial ownership of the Notes as insurance contracts under certain circumstances. Noteholders are urged to consult their accounting advisors with respect to the accounting treatment of the Notes including the potential consolidation of the Issuer and any related accounting implications.

Limited Liquidity of the Notes

There is currently no secondary market for the Notes. No Initial Purchaser is under any obligation to make a market in the Notes, and to the extent that such market making is commenced, it may be discontinued at any time. There is no assurance that a secondary market will develop or, if it does develop, that it will provide Noteholders with liquidity in regard to their investment in the Notes or that it will continue until the Outstanding Principal Amount of the Notes is paid. In addition, if a Mortality Event occurs, the liquidity of the Notes may be materially impaired.

Even if a secondary market develops, the fair market value of each Class of Notes can be expected to exhibit substantial volatility to the extent there are market expectations of one or more Mortality Events to which the principal and interest of such Class of Notes is exposed. The fair market value of any Class of Notes may also be affected if such Notes are downgraded by any Rating Agency or if the market experiences limited liquidity at such times.

The Notes will be issued in minimum denominations of €250,000 and integral multiples of €1,000 in excess thereof. The Notes may be reoffered and sold only to investors who (i) are Qualified Institutional Buyers that, with respect to U.S. Persons, are also Qualified Purchasers, (ii) are Qualified Eligible Persons as defined in CFTC Rule 4.7, and (iii) are residents of, and purchasing in, holding in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, and otherwise agree to be bound by the transfer restrictions described under "*Notice to Investors*". The Notes will not be registered under the Securities Act or any state or foreign securities laws and transfers of Notes are subject to substantial contractual and legal restrictions. In particular, a Noteholder may not sell or offer to sell the Notes in or into any state or jurisdiction of the United States other than the Permitted U.S. Jurisdictions or in or into any jurisdiction outside of the United States other than the Permitted Non-U.S. Jurisdictions, unless the proposed transferee delivers certain legal opinions or other evidence of compliance with applicable insurance laws. See "*—Permitted U.S. Jurisdictions and Permitted Non-U.S. Jurisdictions*" below. Given the risks associated with an investment in the Notes, the high minimum denominations and the restrictions on transfer, investors may have difficulty locating Qualified Institutional Buyers that are Qualified Eligible Persons and that, with respect to U.S. Persons, are also Qualified Purchasers, willing to purchase Notes from them. Consequently, a Noteholder may not be able to liquidate its investment readily, and the Notes may not be readily accepted as collateral for loans. Prospective investors should

proceed on the assumption that they may have to bear the economic risk of an investment in the Notes until their maturity.

The Indenture Trustee or Custodian May Be Unable to Liquidate Investments in a Timely Manner

The Repayment Amount of any Class of Notes is limited to the proceeds of the liquidation of the applicable Permitted Investments. There can be no assurances that there will not be a delay in the ability of the Indenture Trustee or Custodian to liquidate the applicable Permitted Investments or, upon such liquidation, that the amounts realized from the liquidation of the applicable Permitted Investments will not be less than the Outstanding Principal Amount of the relevant Class of Notes.

Risks Relating to the Counterparty

Counterparty Contracts

As the frequency and severity of extreme mortality events are inherently unpredictable, Noteholders are exposed to the unpredictability of the risk that a Mortality Event may or may not occur. When and if one or more Mortality Events occur, the Issuer may, as required under the relevant Counterparty Contract, pay a Loss Payment to the Counterparty and a related Principal Reduction under the related Class of Notes will occur. The Principal Reduction with respect to each Class will not necessarily bear any direct or indirect correlation to losses actually incurred by the Counterparty as a result of the occurrence of a Mortality Event. Payment of Principal Reductions with respect to each Class will cause a reduction in all or a portion of the Outstanding Principal Amount of, and interest on, each Class of Notes exposed to such Mortality Event. If a Principal Increase occurs following one or more Principal Reductions, interest on the Notes will not be adjusted retroactively for the period prior to such Principal Increase.

Reliance on the Counterparty

The Permitted Investment Yield will be less than the full amount of interest due on the respective Class of Notes. If the Counterparty fails to make any Periodic Payment when due under the relevant Counterparty Contract, whether due to the creditworthiness of the Counterparty or for any other reason, the Issuer may be unable to pay the Interest Spread or Extension Spread component, as applicable, of interest due and payable on the corresponding Class of Notes, as well as any Early Redemption Event Premium or Optional Redemption Event Premium. The Discounting Rate used to calculate the Early Redemption Event Premium may not be less than zero.

In addition, any failure of the Counterparty to make a Counterparty Payment to the Issuer when due under a Counterparty Contract, whether due to the creditworthiness of the Counterparty or for any other reason, may result in the Issuer, subject to the amount available in the Interest Deposit Account for each Class, not having sufficient funds on the Redemption Date to pay the Outstanding Principal Amount to Noteholders of the corresponding Class of Notes.

Risks Relating to Ratings and Rating Agencies

In general, European regulated investors are restricted under the Credit Rating Agency Regulation from using ratings for regulatory purposes, unless such ratings are issued by a credit rating agency established in the EU and registered under the Credit Rating Agency Regulation (and such registration has not been withdrawn or suspended), subject to transitional provisions that apply in certain circumstances while the registration application is pending. Such general restriction will also apply in the case of ratings issued by non-EU credit rating agencies, unless the relevant ratings are endorsed by an EU-registered credit rating agency or the relevant non-EU rating agency is certified in accordance with the Credit Rating Agency Regulation (and such endorsement action or certification, as the case may be, has not been withdrawn or suspended).

The assignment of a rating to a Class of Notes should not be treated by a prospective investor as meaning that such investor does not need to make its own thorough investigations into, and determinations of, the risks and merits of an investment in the Notes. Each Noteholder should take such steps as it considers appropriate to evaluate the on-going risks and merits of a continued investment in the relevant Class of Classes of Notes, regardless of any rating assigned to such Notes. Prospective investors should not necessarily rely on downgrades of ratings as indicators of deteriorating credit or collateral, or of changes in the risks related to Mortality Events. During the global financial crisis, rating agencies were the subject of criticism from a number of global governmental bodies that they did not downgrade entities on a sufficiently quick basis.

In particular, the Ratings of the Notes, if obtained, will not be recommendations to purchase, hold or sell the Notes. The Ratings will address the likelihood that the Holders of the relevant Class of Notes will receive timely payment of interest and ultimate payment of principal on such Class of Notes on the Redemption Date. The Ratings will not comment as to the market price, fair market value, suitability for a particular investor of any Notes of any Class, nor will such Ratings address the likelihood that a Noteholder will be able to sell such Notes. The Ratings of the Notes will be based on the then current information furnished to the Rating Agency by the Issuer, the Counterparty and the Initial Purchasers and information obtained from other sources, including, but not limited to, RMS. The Ratings of the Notes, if obtained, may be changed, suspended or withdrawn for any reason, including as a result of changes in, or the unavailability of, certain information. Further, rating agencies typically rely on information generated by their proprietary models in the rating process, the underlying assumptions of which models are generally not known to outside parties and are subject to changes which could have significant impact on the Ratings. Different rating agencies may have different models and assumptions. Accordingly, there can be no assurance that the Ratings of the Notes, if obtained, will be maintained. The Rating of any Class of Notes may be reassessed by the Rating Agency at any time. As a result of such reassessment, the Rating of such Class may be lowered, suspended or withdrawn.

Rating Agencies May Have Certain Conflicts of Interest; and the Notes May Receive an Unsolicited Rating, Which May Have an Adverse Effect on the Liquidity or the Market Price of the Notes.

Standard & Poor's Credit Market Services Europe Limited has been hired by the Issuer to provide its ratings on the Notes. A rating agency may have a conflict of interest where, as is the case with the Ratings of the Notes (with the exception of unsolicited ratings), an issuer, underwriter or sponsor of a security pays the fee charged by the rating agency for its rating services.

Under Rule 17g-5 of the Exchange Act ("Rule 17g-5"), nationally recognized statistical rating organizations ("NRSROs") providing the requisite certification will have access to all information posted on a website established for the purpose of initially determining the Ratings of the Notes and monitoring such Ratings after the Issuance Date. As a result, an NRSRO other than the Rating Agency may issue ratings on the Notes (the "Unsolicited Ratings"), which may be lower, and could be significantly lower, than the Ratings assigned by the Rating Agency. An Unsolicited Rating may be issued prior to, or after, the Issuance Date and will not be reflected in the final offering circular for the Notes. Issuance of any Unsolicited Rating will not affect the issuance of the Notes. Issuance of an Unsolicited Rating lower than the Ratings assigned by the Rating Agency on the Notes might adversely affect the value of the Notes and, for regulated entities, could affect the status of the Notes as a legal investment or the capital treatment of the Notes. Investors in the Notes should monitor whether an Unsolicited Rating of the Notes has been issued by a non-hired NRSRO and should consult with their legal counsel regarding the effect of the issuance of an Unsolicited Rating that is lower than the Ratings set forth herein. In addition, if any information provided to any hired NRSRO for the purpose of assigning or monitoring the Ratings on the Notes is not made available to a non-hired NRSRO, as a result of the failure to comply with the website requirements of Rule 17g-5, or any other reason, a hired NRSRO could withdraw its ratings on the Notes, which could adversely affect the market value of the Notes and/or limit the ability of a Holder to sell its Notes.

Furthermore, the Securities and Exchange Commission may determine that the Rating Agency no longer qualifies as an NRSRO for the purposes of federal securities law or the Rating Agency may otherwise not qualify to monitor or continue to rate the Notes. Any such circumstances could adversely affect the market value of each Class of Notes and/or limit the ability of a Noteholder to sell its Notes.

Permitted U.S. Jurisdictions and Permitted Non-U.S. Jurisdictions

The laws and regulations of the Permitted U.S. Jurisdictions and the Permitted Non-U.S. Jurisdictions contain broad definitions of the activities that may constitute the conduct of the business of insurance or reinsurance in such states or jurisdictions. The terms of the Notes are such that they could be construed to constitute insurance or reinsurance contracts in these jurisdictions, insofar as they expose the holders to certain insurance or reinsurance related risks, and accordingly subject the investor and/or the Issuer to regulation as a provider of insurance or reinsurance coverage. In addition, because the Issuer is required under the Counterparty Contracts to make payments to the Counterparty, in the event of Principal Reductions, the activities of the Issuer in this regard could be characterized as insurance or reinsurance, insofar as the Issuer bears certain insurance or reinsurance related risk as against the Counterparty.

The Issuer has been advised by its counsel that, in each of the Permitted U.S. Jurisdictions and Permitted Non-U.S. Jurisdictions, investors in the Notes should not be required solely by reason of such investment to be licensed as an insurer or reinsurer in such state or jurisdiction and that the Issuer should not be required solely by reason of the

Counterparty Contracts to be licensed as an insurer or reinsurer in Ireland or France. This advice is based upon interpretations (either written or oral) received from the staff of the insurance regulatory body or in certain cases local counsel in such states and jurisdictions with respect to securities having similar characteristics to the Notes. Such interpretations were issued years ago and have not been and will not be updated in connection with the Offering. In the event similar interpretations or advice (in the judgment of the Issuer, based on the written advice of its counsel) are obtained from additional states or foreign jurisdictions, the Issuer may so notify the Indenture Trustee in writing, and thereafter transfers of the Notes to Qualified Institutional Buyers that are Qualified Eligible Persons (and that, with respect to U.S. Persons, are also Qualified Purchasers) in any such additional states or foreign jurisdictions will be permitted, subject to any transfer restrictions otherwise applicable as described herein. Insurance regulatory authorities have broad discretionary powers to modify or withdraw regulatory interpretations, and such interpretations and the written advice of counsel received with respect to the laws of the Permitted U.S. Jurisdictions and the Permitted Non-U.S. Jurisdictions are not binding on a court or any third party and may be subject to challenge in administrative or judicial proceedings. There can be no assurance that such interpretations and advice will remain in effect or as to the outcome of any such third party challenge. In the event that a Noteholder wishes to transfer the Notes into a jurisdiction that is not a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, such Noteholder will be required to provide the Issuer and the Indenture Trustee with a written regulatory interpretation or opinion of counsel, in each case satisfactory in form and substance to the Issuer, the Indenture Trustee and its counsel, that the Notes would not subject such Noteholder, such Noteholder's transferee or the Issuer to the insurance laws and regulations of such jurisdiction.

Any person who holds any interest in the Notes, who does not reside and hold such interest in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, may be forced to transfer such interest to a person in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction. See "*Description of the Notes—Permitted Jurisdictions*".

Legal and Regulatory Provisions Affecting Investors

The investment activities of certain investors are subject to legal investment laws and regulations, or review or regulation by certain authorities. Each potential investor in the Notes should consult its legal advisers to determine whether and to what extent (1) it has the legal power, authority and right to purchase such Notes, (2) the Notes can be used as collateral for various types of borrowing and (3) other restrictions apply to its purchase or pledge of any Notes. Financial institutions should consult their legal advisers or the appropriate regulators to determine the appropriate treatment of the Notes under any applicable risk based capital or similar rules. None of the Issuer, the Counterparty or any Initial Purchaser, or any of their respective affiliates, expresses any view as to any of the foregoing matters. Each Initial Purchaser and any other purchaser of the Notes must be able to make (and will be deemed to have made) the representations and warranties in the "*Notice to Investors*" section of this Offering Circular including, but not limited to, representing that it has the legal power, authority and right to purchase such Notes.

Risks Relating to the Issuer

Limited Resources of the Issuer; Capitalization of the Issuer

The Issuer is thinly capitalized. The authorized share capital of the Issuer is, and at the date of the issuance of the Notes will be, €1,000, and the issued ordinary share capital of the Issuer is, and at the date of the issuance of the Notes will be, €1.00. Such authorized and issued share capital is not expected to increase materially. The income expected to be received by the Issuer from the investment of the proceeds of the sale of the Notes, the payment of the Periodic Payments, the Closing Payment and any Supplemental Payment is expected to be sufficient to make payment of the projected expenses and liabilities of the Issuer. There can be no assurance that the Issuer will not incur expenses or liabilities other than as projected or that payments to the Issuer will be made, or if made, will be made in a sufficient amount or in a timely manner. In the event of the occurrence of unanticipated expenses or liabilities not otherwise paid or provided for (through indemnification or otherwise by the Counterparty), the Issuer might incur otherwise unfunded expenses. In the event that unfunded expenses or liabilities exceed the available funds of the Issuer at that time, the Issuer could be forced to seek the protection of insolvency proceedings.

All of the issued and outstanding ordinary shares of the Issuer will be held by or on behalf of Deutsche International Finance (Ireland) Limited, as share trustee under a declaration of trust for charitable and similar purposes. The share trustee will be under no obligation to, and is not expected to, subscribe for additional shares of the Issuer or otherwise to provide funds or capital to the Issuer.

The Notes are not obligations of, and are not guaranteed by, the Counterparty or any of its affiliates, and investors will not have recourse to any of the assets of the Counterparty or any of its affiliates.

Center of Main Interest

The Issuer has its registered office in Ireland. As a result there is a rebuttable presumption that its center of main interest (“**COMI**”) is in Ireland and consequently that any main insolvency proceedings applicable to it would be governed by Irish law. In the decision by the European Court of Justice (“**ECJ**”) in relation to Eurofood IFSC Limited, the ECJ restated the presumption in Council Regulation (EC) No. 1346/2000 of May 29, 2000 on insolvency proceedings, that the place of a company’s registered office is presumed to be the company’s COMI and stated that the presumption can only be rebutted if “factors which are both objective and ascertainable by third parties enable it to be established that an actual situation exists which is different from that which locating it at the registered office is deemed to reflect”. As the Issuer has its registered office in Ireland, has Irish resident directors, is registered for tax in Ireland and has an Irish corporate services provider, the Issuer does not believe that factors exist that would rebut this presumption, although this would ultimately be a matter for the relevant court to decide, based on the circumstances existing at the time when it was asked to make that decision. If the Issuer’s COMI is not located in Ireland, and is held to be in a different jurisdiction within the European Union, main insolvency proceedings may not be opened in Ireland.

Insolvency

Operating expenses of the Issuer are payable principally out of the Closing Payment and any Supplemental Payment received by the Issuer under the Reimbursement Agreement. While the Issuer believes that its intended business operations will permit it to pay its debts as they fall due, if any unsatisfied liabilities arise, there is a risk of insolvency of the Issuer.

Limited Sources of Funds for Payment of Principal

The Issuer’s only sources of funds for repayment of the Outstanding Principal Amount will be: (i) the outstanding principal amount of EBRD Notes in the Collateral Account for each Class of Notes, if any; (ii) the net proceeds of the liquidation of any Money Market Funds Permitted Investments (net of any applicable withholding taxes and fees); and/or (iii) cash held in the applicable Collateral Account.

Payment of the Outstanding Principal Amount is effectively subordinated to the obligations of the Issuer to the Counterparty under the applicable Counterparty Contract.

Any failure of the EBRD to redeem EBRD Notes upon the delivery of an EBRD Put Notice prior to the Redemption Date of the related Class of Notes could result in the Issuer not having sufficient funds on such Redemption Date to repay the Outstanding Principal Amount to Noteholders.

In the event that the investments of the proceeds with respect to each Class of Notes consist of one or more Money Market Funds Permitted Investments, Noteholders of such Class will be exposed to the market value of such Money Market Funds Permitted Investments, which would reflect the value of the underlying assets of the relevant funds, which could materially adversely affect the ability of the Issuer to make payments of principal in full on the Redemption Date for such Class. In addition, in the event of the occurrence of any insolvency or similar proceedings involving the Indenture Trustee (in such capacity or in its capacity as Paying Agent), the Issuer may be unable to make payments of interest on, or repay the Outstanding Principal Amount of, such Class of Notes when due.

Limited Sources of Funds for Payment of Interest

The Issuer’s sole sources of funds for payments of interest with respect to each Class of Notes will be (i) the Periodic Payments received from the Counterparty under the relevant Counterparty Contract relating to payment of interest to the Noteholders of such Class (including amounts standing to the credit of the Interest Deposit Account), and (ii) the applicable Permitted Investment Yield, if applicable.

It is anticipated that the net earnings on the investments of the proceeds of each Class of Notes will be less than the amounts payable by the Issuer in respect of interest on the Outstanding Principal Amount. Accordingly, in the event of the failure of (i) the Counterparty to make Periodic Payments when due under the relevant Counterparty Contract (ii) the payment of any Permitted Investment Yield from any Permitted Investments (including the failure of the EBRD to make payments of interest on an EBRD Coupon Payment Date), the Issuer, subject to the amount available in the Interest Deposit Account for such Class, may be unable to make full payment of interest on the Outstanding Principal Amount.

Absence of Operating History of Issuer; Reliance on Independent Contractors

The Issuer is a recently formed special purpose company domiciled in Ireland with no operating history. The Issuer's sole business purpose is to issue the Notes and to enter into and perform the Counterparty Contracts with the Counterparty and related agreements and activities including the acquisition and holding of the Permitted Investments.

Certain of the business activities of the Issuer are to be carried out on behalf of the Issuer by independent contractors appointed by the Issuer for such purpose. For example, the data reported by any Reporting Source will be obtained by the Calculation Agent, which will be under no obligation to undertake any independent assessment of the accuracy of the data so reported. The certification of the Calculation Agent will be binding on the Issuer and the Counterparty for purposes of determining any liability of the Issuer under the Counterparty Contracts. Accordingly, the analysis performed by the Calculation Agent will, in part, determine whether the Notes will be subject to a Principal Reduction or Principal Increase. Management of the Issuer will not have any role in determining or verifying such data or calculations. The Issuer (and thus the Noteholders) will be relying on such independent contractors to perform their duties properly and in good faith. The Issuer is not expected to independently review any business activities carried out on its behalf by such independent contractors.

Limited Ability to Serve Process On, or Enforce Judgments Against, the Issuer and its Directors and Officers

The Issuer is an Irish private limited company and all of its directors are currently residents of Ireland. Certain of the assets of the Issuer and all or a substantial portion of the assets of such directors and of the Issuer are or may be located in jurisdictions outside the United States. Although the Issuer has irrevocably agreed that it may be served with process in New York, New York, with respect to any action arising out of, or relating to it with respect to the Indenture or the Notes, it could be difficult for investors to effect service of process within the United States on any director of the Issuer or to recover against the Issuer or its directors, individually or any combination thereof, on judgments of United States courts predicated upon civil liabilities under the United States federal securities laws.

There is doubt as to whether the courts of Ireland would (i) enforce judgments of United States courts obtained in actions against the Issuer or its directors predicated upon the civil liability provisions of the securities laws of the United States or any state of the United States or (ii) entertain original actions brought in Ireland against such persons or the Issuer predicated solely upon United States federal securities laws. There is no treaty in effect between the United States and Ireland providing for such enforcement, and there are grounds upon which Irish courts may not enforce judgments of United States courts. Certain remedies available under the laws of United States jurisdictions, including certain remedies under the United States federal securities laws, may not be allowed in Irish courts as contrary to public policy.

Change of Law

The structure of the issue of Notes is based on the legal systems and administrative practice in each relevant jurisdiction in effect as at the date of this Offering Circular. No assurance can be given as to the impact of any possible change in law or to administrative practice in any of the relevant jurisdictions after the date of this Offering Circular, nor can any assurance be given as to whether any such change could adversely affect the ability of the Issuer to make payments under the Notes.

Irish Law Considerations

The Issuer is subject to Irish Regulatory Risks

Because the Issuer is organized in Ireland, it will be subject to changes of law or regulations in Ireland that may have an adverse impact on its business, results of operations and/or financial condition, including imposition of tax liability or the imposition of regulatory supervision. The structure of the issue of the Notes is based on Irish law, and various regulatory, accounting and administrative practices in effect as at the date of this Offering Circular, and also, having due regard to the expected tax treatment of all relevant entities under the tax law and the published practice of the Irish Revenue Commissioners in force or applied in Ireland, as at the date of this Offering Circular. No assurance can be given as to the impact of any possible change to Irish law or any other relevant law or the regulatory, accounting or administrative practice in any relevant jurisdiction, or the interpretation or administration thereof, or to the published practices of the Irish Revenue Commissioners in Ireland or the tax authorities of any other relevant taxing jurisdiction, after the date of this Offering Circular.

Any investment in the Notes does not have the status of a bank deposit in Ireland and is not within the scope of the deposit protection scheme or any other guarantee scheme operated by the Central Bank or by the Irish Government.

The Issuer is not regulated by the Central Bank and is not required to obtain any license or any authorization under Irish law in order to issue the Notes or to carry on any of its business activities as described herein.

Preferred Creditors under Irish Law and Floating Charges

The Issuer is a company incorporated in Ireland under Irish law. Upon an insolvency of an Irish company, when applying the proceeds of assets subject to fixed security which may have been realized in the course of a liquidation or receivership, the claims of a limited category of preferential creditors will take priority over the claims of creditors holding the relevant fixed security. Such preferred claims include the remunerations, costs and expenses properly incurred by any examiner of the company (which may include any borrowings made by an examiner to fund the company's requirements for the duration of its appointment) which have been approved by the Irish courts (see “—*Examinership*” below).

The holder of a fixed security over the book debts of an Irish tax resident company (which would include the Issuer) may be required by the Irish Revenue Commissioners, by notice in writing from the Irish Revenue Commissioners, to pay to it sums equivalent to those which the holder received in payment of debts due to it by the company. Where the holder of the security has given notice to the Irish Revenue Commissioners of the creation of the security within twenty-one (21) days of its creation, such holder's liability is limited to the amount of certain outstanding Irish tax liabilities of the company (including liabilities in respect of value added tax) arising after the issuance of the Irish Revenue Commissioners' notice to the holder of fixed security.

The Irish Revenue Commissioners may also attach any debt due to an Irish tax resident company (which would include the Issuer) by another person in order to discharge any liabilities of the company in respect of outstanding tax whether the liabilities are due on its own account or as an agent or trustee. As of the date of this Offering Circular, the scope of this right of the Irish Revenue Commissioners has not been considered by the Irish courts and it may override the rights of holders of security (whether fixed or floating) over the debt in question.

In relation to the disposal of assets of any Irish tax resident company (which would include the Issuer) which are subject to security, a person entitled to the benefit of the security may be liable for tax in relation to any capital gains made by the company on a disposal of those assets on exercise of the security.

The meaning of a fixed charge is that the person creating the charge does not have liberty to deal with the assets which are the subject matter of the security in the sense of disposing of such assets or expending or appropriating the moneys or claims constituting such assets and accordingly, if and to the extent that such liberty is given to the Issuer, any charge constituted by a deed of charge may operate as a floating, rather than a fixed charge.

In particular, the Irish courts have held that in order to create a fixed charge on receivables it is necessary to oblige the chargor to pay the proceeds of collection of the receivables into a designated bank account and to prohibit the chargor from withdrawing or otherwise dealing with monies standing to the credit of such account without the consent of the chargee.

Depending upon the level of control actually exercised by the chargor, there is therefore a possibility that the fixed security over the book debts of the Issuer's account would be regarded by the Irish courts as a floating charge.

Under Irish law, floating charges have certain weaknesses, including the following: (i) they have weak priority against purchasers (who are not on notice of any negative pledge contained in the floating charge) and the chargees of the assets concerned and against lien holders, execution creditors and creditors with rights of set-off; (ii) as discussed above, they rank after certain preferential creditors, such as claims of employees and certain taxes on winding-up; (iii) they rank after certain insolvency remuneration expenses and liabilities; (iv) the examiner of a company has certain rights to deal with the property covered by the floating charge; and (v) they rank after fixed charges.

Examinership

Examinership may be applied to the Issuer. Examinership is a court procedure available under the Irish Companies (Amendment) Act, 1990, as amended (the “**1990 Act**”), to facilitate the survival of Irish companies in financial difficulties.

The company, the directors of the company, a contingent, prospective or actual creditor of the company, or shareholders of the company holding, at the date of presentation of the petition, not less than 1/10th of the voting share capital of the company are each entitled to petition the court for the appointment of an examiner. The examiner, once appointed, has the power to set aside contracts and arrangements entered into by the company after this appointment and, in certain circumstances, can avoid a negative pledge given by the company prior to its appointment. Furthermore, it may sell assets that are the subject of a fixed charge. However, if such power is exercised the examiner must account to the holders of the fixed charge for the amount realized and discharge the amount due to them out of the proceeds of sale.

During the period of protection, the examiner will compile proposals for a compromise or scheme of arrangement to assist the survival of the company or the whole or any part of its undertaking as a going concern.

A scheme of arrangement may be approved by the Irish High Court or Circuit Court, as applicable (the “**Relevant Court**”) when at least one class of creditors has voted in favor of the proposals and the Relevant Court is satisfied that such proposals are fair and equitable in relation to any class of members or creditors who have not accepted the proposals and whose interests would be impaired by implementation of the scheme of arrangement. In considering proposals by the examiner, it is likely that secured and unsecured creditors would form separate classes of creditors.

In the case of the Issuer, if the Indenture Trustee represented the majority in number and value of claims within the secured creditor class (which would be likely given the restrictions agreed to by the Issuer), the Indenture Trustee would be in a position to reject any proposal not in favor of the Noteholders. The Indenture Trustee would also be entitled to argue at the Relevant Court hearing at which the proposed scheme of arrangement is considered that the proposals are unfair and inequitable in relation to the Noteholders, especially if such proposals included a writing down to the value of amounts due by the Issuer to the Noteholders or resulted in Noteholders receiving less than they would have if the Issuer was wound up. The primary risks to the Noteholders if an examiner were to be appointed to the Issuer are as follows:

- (i) the potential for a scheme of arrangement being approved involving the writing down of the debt due by the Issuer to the Noteholders as secured by the Indenture or the applicable Deed of Charge, as applicable;
- (ii) the potential for the examiner to seek to set aside any negative covenants in the Indenture prohibiting the creation of security or the incurrence of borrowings by the Issuer to enable the examiner to borrow to fund the Issuer during the protection period; and
- (iii) in the event that a scheme of arrangement is not approved and the Issuer subsequently goes into liquidation, the examiner’s remuneration and expenses (including certain borrowings incurred by the examiner on behalf of the Issuer and approved by the Relevant Court) will take priority over any amounts owed to the Noteholders under the terms of the Notes.

Irish Taxation Risks

To the extent that changes in Irish tax law or current interest withholding tax exemption conditions no longer being fulfilled result in imposition of a withholding tax, interest payments to Noteholders may be reduced by the amount of tax required to be withheld by the Issuer.

Interest payments on the Notes may be subject to Irish withholding tax if there is a change in Irish tax law or if the various exemption conditions set forth under “*Certain Irish Income Tax Considerations—Irish Taxation—Taxation of Noteholders—Withholding Tax*” are not fulfilled. The Issuer is not obligated to gross up or otherwise compensate Noteholders for withholding taxes incurred. This may, therefore, affect the return which Noteholders received on the Notes.

Changes in Irish tax laws may adversely impact the Issuer’s business and the value of the Noteholders’ investment.

The Issuer is treated as a securitization vehicle which is taxed pursuant to Section 110 of the Taxes Consolidation Act 1997 (the “**TCA 1997**”). There is no guarantee that the tax treatment of an Irish securitization company will not change in the future. The tax deductibility of the Issuer’s interest costs will depend on the applicability of Section 110 TCA 1997 and the current revenue practice in relation to that matter. If these rules change this may have an impact on the return for Noteholders.

The Issuer is incorporated, and resident for tax purposes, in Ireland. Accordingly, it is subject to Irish corporation tax on its worldwide income and gains. The current rates of Irish corporation tax are 12.5% for certain trading income, 25% for all other income and 33% for capital gains. If the Issuer satisfies the requirements to be considered a qualifying company for the purposes of section 110 of the Irish Taxes Consolidation Act, the Issuer will be subject to the higher rate of Irish corporation tax on its profits (currently 25%) and will compute its profits for Irish corporation tax purposes in accordance with that provision. The rate of tax and the methods of computing the tax base in respect of the Issuer's business in Ireland can change depending on changes in Irish law. If the effective tax burden the Issuer suffers in Ireland increases above its anticipated level, returns to Noteholders will decrease. There can be no guarantee that no such changes will be introduced.

Risks Relating to RMS

Risks Relating to the RMS Expert Risk Analysis Reports

Limitations of the RMS Expert Risk Analysis Reports

The data and methodologies described in the RMS Expert Risk Analysis Reports, and the analyses, estimates and services intended to be provided are provided "as is" without warranty or any guaranty of any kind to the Noteholders. These analyses and estimates are provided for illustrative purposes only and are not intended to provide, nor should they be interpreted as providing, any facts regarding, or any guaranty or prediction or forecast of, the likelihood that investors in the Notes will receive payment thereon. No changes or updates to the estimates or information provided in the "*RMS Expert Risk Analysis Methodology*" or "*RMS Expert Risk Analysis Results*" attached to this Offering Circular will be made subsequent to the date of this Offering Circular. Notwithstanding the analyses, estimates and assumptions set forth herein, one or more events could occur in any given year during the Risk Period applicable to a Class of Notes, resulting in a full or partial loss of the principal amount of, and interest accrued on, such Class.

Investors are advised that the loss calculations reported in the RMS Expert Risk Analysis Reports are based on the following models ("**RMS Models**"):

- RMS Longevity Model, first released in 2010, last updated in 2013 ("**RMS Longevity Model**" or "**Baseline Model**");
- RMS Infectious Disease Model, first released in 2007, last updated in 2011 ("**RMS Infectious Disease Model**");
- RMS United States Earthquake Casualty Model Version 13.1, upgraded in 2014 ("**RMS U.S. Earthquake Casualty Model**") and RMS Japan Earthquake Casualty Model Version 11.0, upgraded in 2012, ("**RMS Japan Earthquake Casualty Model**" and, collectively the "**RMS Earthquake Casualty Models**");
- RMS United States Probabilistic Terrorism Model Version 3.1.4, upgraded in 2012 and RMS France LifeRisks Terrorism Model Version 2.0, created in 2012, (collectively the "**RMS Probabilistic Terrorism Models**");
- RMS Residual Risk Model 2.0, first released in 2012 ("**RMS Residual Risk Model**"); and
- RMS Global Tsunami Scenario Model, first released in 2014 ("**RMS Tsunami Scenario Model**").

RMS does not represent investors in the Notes or their interests in any way. RMS does not sponsor, endorse, offer or promote the Notes, nor does it make any representation or warranty, express or implied, regarding the advisability of investing in the Notes or the legality of an investment in the Notes. RMS is not responsible for and has not participated in the determination of the structure or pricing of the Notes. Furthermore, RMS has no obligation or liability in connection with the trading, if any, of the Notes or liability for any adverse financial result or any direct, indirect, special, punitive or consequential damages whatsoever. RMS makes no representation or warranty, express or implied, to the Noteholders, as to the accuracy or completeness of the information set forth herein, including information provided in the RMS Expert Risk Analysis Reports.

The RMS Expert Risk Analysis Reports does not provide any opinions or analysis with respect to the tax treatment of the Notes

In the development of the RMS Models, and the applicable risk parameters thereof, RMS has relied on published technical papers and catalogs of past mortality rate studies, medical and pharmaceutical research, infectious diseases, terrorist attacks, seismic and tsunami activity, and has selected those which it believes represent credible scientific data and judgment. However, since no scientific consensus on models or risk parameters exists, RMS acknowledges that other credible, published models and/or risk parameters may exist that, if used, could produce materially different results. RMS also has not verified the authenticity or accuracy of all the original data in the historical catalogs or other data sources used to develop the RMS Models. The RMS Models do not predict the probabilistic occurrence of any catastrophic events. Prior to investing in the Notes, investors should consult their own expert advisors whose conclusions may differ from those of RMS.

To the extent that actual experience differs from that assumed in the RMS Models, actual results will differ from the results presented in the RMS Expert Risk Analysis Reports, a risk borne solely by investors in the Notes.

RMS has relied on a number of sources for historical population and mortality data. These sources included, but may not be limited to, the following:

- The U.S. Centers for Disease Control and Prevention (CDC);
- The U.S. Census Bureau;
- Eurostat;
- Institut national de la statistique et des études économiques (INSEE);
- Japan Statistics Bureau (JSB);
- Japan Ministry of Health, Labor and Welfare; and
- The Human Mortality Database.

RMS had no control over or involvement in the collection and compilation of this data by these sources. Future updates by these sources of published mortality and population data may materially alter the loss estimates generated by the RMS Models in the RMS Expert Risk Analysis Reports. Additionally, RMS has not reviewed this data for reasonableness and consistency and performed no audits or independent verification of the information received from these sources. To the extent there are material errors in the information provided, the results of the RMS Expert Risk Analysis Reports will be affected, a risk borne solely by investors in the Notes. The data used in calibration of the RMS Models may not constitute the most recent data published by the relevant source.

No model is, or could be, an exact representation of reality. The RMS Models rely on various methodologies and assumptions, some of which are subject to uncertainty, and which might not be used in models provided by other modeling firms. Furthermore, there may be differences in the way in which these assumptions are considered by other firms. There can be no assurance that the RMS Models will prove to be an accurate estimation of the risk of a reduction of the principal of or interest on the Notes. Accordingly, the expected loss estimates and related probabilities produced by the RMS Models are themselves subject to uncertainty. RMS reviews model assumptions in view of new data and other information to refine and modify its models as such information becomes available. As such, the RMS Models may not necessarily reflect the most current models of RMS at any time. Estimates generated by such refined or modified models may materially differ from the estimates generated by the RMS Models in connection with this Offering, and the use of such models in lieu of the RMS Models might similarly materially alter the information provided in the RMS Expert Risk Analysis Reports.

A significant amount of variability exists in the events being analyzed, as well as uncertainty in the assumptions and parameters used in the RMS Models and RMS Expert Risk Analysis Reports presented in this Offering Circular and in any other supplement hereto. Any one of which alone can cause the modeled principal reduction to be significantly different from the loss ultimately sustained from a Mortality Event. Such uncertainties exist in, but are not limited to, estimates of infectious disease, earthquake and terrorism event frequency and severity. Considerable uncertainty also exists in the parameters used in the RMS Expert Risk Analysis Reports arising from insufficient available data, limited scientific knowledge and alternative assumptions as to empirical relationships as well as from the random nature of the various events. The RMS Models cannot include all sources of uncertainty. Furthermore, the assumptions and methodologies used by RMS may not constitute an exclusive set of reasonable assumptions and may not be correct. Use of alternative assumptions and/or models could yield results materially different than those produced

by RMS. RMS also did not elicit from other experts alternative interpretations of its data or methods, nor did RMS research all potentially available interpretations of such data and methods on the basis that RMS considered its own interpretations to be more reliable.

Risk estimates produced in the RMS Expert Risk Analysis Reports are not to be considered as facts, projections, or predictions of the frequency, severity or monetary losses from future changes in mortality rates. RMS has not made any effort, nor does it have the ability, to predict the occurrence of future events resulting in a loss to the Notes. There can be no assurance that the RMS Expert Risk Analysis Reports incorporate all factors, which may contribute to losses to the Notes. Therefore, the actual frequency and amount of losses to the Notes could differ materially from the frequency and severity estimated by RMS.

As a result of its ongoing process of internal review, RMS may refine its model assumptions from time to time in light of new scientific and other information as such information becomes available. Such refinements may materially alter, and have in the past materially altered, the loss estimates generated by the RMS Models. As such, the RMS Models may not necessarily reflect the most current models of RMS at any time. Estimates generated by such refined or modified models may materially differ from the estimates generated by the RMS Models in connection with the Offering of the Notes. Similarly, the use of the RMS Models in lieu of the most current models available might similarly materially alter the information provided in the RMS Expert Risk Analysis Reports.

No Representation or Liability as to RMS Expert Risk Analysis Reports

None of the Issuer, the Counterparty, the Initial Purchasers, the Indenture Trustee or any of their respective affiliates and representatives, or any of their respective directors or officers or any party who “controls” any of the foregoing within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, has reviewed, or makes, or shall be deemed to make, any representations with respect to the analysis provided by RMS in the RMS Expert Risk Analysis Reports, including, without limitation, the adequacy, completeness, appropriateness or otherwise of the RMS Expert Risk Analysis Reports. The RMS Expert Risk Analysis Reports are, as noted above, based on certain assumptions, judgments and the methodologies of RMS, a number of which are confidential and proprietary to RMS. Without intending to limit the foregoing, in particular, none of the Issuer, the Counterparty, the Initial Purchasers, the Indenture Trustee or any of their respective affiliates or representatives or any of their respective directors or officers or any party who “controls” any of the foregoing within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, has reviewed or will review the RMS Expert Risk Analysis Reports to determine (i) the reasonableness of the assumptions, judgments and methodologies utilized by RMS, (ii) whether such assumptions, judgments and methodologies should be supplemented in any way through the use of alternative assumptions, judgments or methodologies, (iii) whether the assumptions, judgments and methodologies employed by RMS include the appropriate factors that could contribute to an event which would cause a reduction in principal to the Notes and (iv) whether the use of alternative assumptions, judgments and methodologies, or the use of a different simulation model, could yield results materially different from those generated by the RMS Model.

Because of the inherent limitation of relying on the RMS Expert Risk Analysis Reports for loss estimation, and because of the subjective nature of many of RMS’s assumptions, judgments and methodologies in preparing the RMS Expert Risk Analysis Reports, each of the Issuer, the Counterparty, the Initial Purchasers, the Indenture Trustee and their respective affiliates and representatives expressly disclaims any responsibility for, or any liability based upon, a finding that the RMS Expert Risk Analysis Reports included in this Offering Circular includes any untrue statement of a material fact or that the RMS Expert Risk Analysis Reports omit to state a material fact necessary in order to make the statements, in light of the circumstances under which they were made, not misleading.

RMS has Excluded Certain Kinds of Events From its Analysis

RMS has projected future levels of mortality and the volatility of future mortality based on the RMS Models. Certain considerations have been given to the impact of major disease epidemics, acts of aggression such as terrorist activity, earthquakes and other residual risks. Mortality could result from earthquakes occurring outside the modeled regions covered by the RMS Earthquake Casualty models and cause a Principal Reduction to the Notes. However, RMS has not modeled separately the mortality of certain catastrophic events, not included within the Residual Risk Model. Some such events form part of the Residual Risk Model, including other natural disasters (*e.g.* tsunamis affecting Japan and heatwaves), and some are included in the RMS Longevity Model, to the extent that deaths from those causes are captured in the historical mortality record over which the model was calibrated. RMS has not modeled such events separately, but rather included them in the Residual Risk Model and the RMS Longevity Model. Other potential sources of excess mortality, (*e.g.* nuclear war and other risks such as meteors) are neither included in the RMS Longevity Model nor the RMS Residual Risk Model, since such events do not fall within the historical period over which these models

were parameterized. Any such events may occur and cause a reduction in principal despite RMS's assessment and analysis.

Incidents of Infectious Diseases, Terrorism, Earthquakes and Mortality Owing to Residual Risks Could Exceed Projected Mortality Rates

Three of the types of events modeled by RMS and discussed in the RMS Expert Risk Analysis Reports are events of infectious disease, terrorism and earthquake. The RMS Expert Risk Analysis Reports describe the RMS Longevity Model, the RMS Infectious Disease Model, the RMS Probabilistic Terrorism Model, the RMS U.S. Earthquake Model, the RMS Residual Risk Model, and the data and assumptions applied therein, and should be read in conjunction with the RMS Disclaimers and the Risk Factors contained in this Offering Circular.

The RMS Probabilistic Terrorism Model contains assumptions with respect to the desirability of terrorist targets, the difficulty of attacks within the prevailing counter-terrorism environment, the probability of success and the resulting number of deaths. There can be no assurance that a terrorist attack or attacks of the type that could cause a Principal Reduction will be limited to the targets and attack types contained in the RMS Probabilistic Terrorism Model or that the level of difficulty, success rate, or resulting deaths will comport with those modeled. Terrorism activity is inherently impossible to predict.

If ordinary mortality experience for a given period exceeds that indicated in the "RMS Expert Risk Analysis Methodology" attached hereto as appendix B, an extreme event such as a pandemic, terrorist attack, earthquake or other causes of excess mortality would not necessarily need to be severe to cause a Principal Reduction to the Notes.

Incidents of Tsunami Could Exceed Projected Mortality Rates from the RMS Residual Risk Model

The RMS Residual Risk Model in Japan captures certain historical tsunami events to the extent that those occurred within the historical record over which it was parameterized. Future tsunamis that may impact Japan are extremely likely to have some different characteristics to tsunamis observed historically. Differences in location, how the tsunami was generated, wave height, speed, tides, land topography, buildings, countermeasures, time of day, evacuation efficacy and many other factors will result in different numbers of people exposed and different consequent mortality. Furthermore, changes in the location of the population over time will result in different exposure and different mortality. Any such event may occur and could cause a loss of principal to the Notes, despite RMS's analysis.

The RMS Residual Risk Model does not include such treatment of tsunamis in other Countries in the Covered Area. Any such event may occur and could cause a loss of principal to the Notes.

Results from the RMS Tsunami Scenario Model Are Not Included in the Probabilistic Risk Estimates in the RMS Expert Risk Analysis Reports or RMS Expert Risk Analysis Results

The "RMS Expert Risk Analysis Methodology" and "RMS Expert Risk Analysis Results" attached to this Offering Circular contain estimates of modelled mortality rates and associated estimated principal reductions for a set of modelled tsunami scenarios derived from the RMS Tsunami Scenario Model. These scenarios provide an estimate of the number of deaths that might occur if such an event were to happen. However, no effort has been made to estimate of the likelihood of these events occurring during the Risk Period or the probability of these events causing a loss of principal to the Notes. As such, these scenarios are included as an illustration only and are not included in any of the modeled Attachment Probability, Exhaustion Probability, Expected Loss, or any other probabilistic measure included in the "RMS Expert Risk Analysis Methodology" or "RMS Expert Risk Analysis Results". The set of scenarios does not include all sources of tsunami, and does not include many of the mechanisms by which a tsunami could form. Furthermore RMS has made assumptions regarding the distribution of the population, potential for evacuation, vulnerability to different inundation depths, and many other factors in estimating these modelled mortality rates. These assumptions are based on small amounts of data, where available, and on judgment where no data was available. Since these assumptions are not true representations of reality, it is possible that a tsunami event could occur that causes a loss of principal to the Notes beyond what is covered in the "RMS Expert Risk Analysis Methodology" and "RMS Expert Risk Analysis Results" sections attached to this Offering Circular.

Ongoing Events May Cause Elevated Mortality Rates in the Covered Area

Ongoing infectious disease epidemics including, but not limited to, the outbreak of Ebola virus in West Africa, if not contained, may cause a loss of principal to the Notes. The "RMS Expert Risk Analysis Methodology" and "RMS

Expert Risk Analysis Results" do not incorporate any additional risk of loss to principal to the Notes that such ongoing epidemics may pose.

RMS Has No Direct Contractual Liability to Noteholders

RMS has provided its analyses, expected loss estimates and related probabilities as described under the "RMS Expert Risk Analysis Methodology" and "RMS Expert Risk Analysis Results" sections attached to this Offering Circular. Noteholders will have no right to enforce or take actions against RMS or any other right thereunder or in connection therewith.

RMS Has No Obligation to Update the RMS Expert Risk Analysis Reports

The analysis provided by RMS in the "RMS Expert Risk Analysis Methodology," "RMS Expert Risk Analysis Results" and "RMS Data File" attached to this Offering Circular or any related disclosure in any other supplement hereto is not required to be updated in connection with the issuance of any Class of Notes subsequent to the Issuance Date or at any other time.

Risks Associated with RMS as Calculation Agent

Binding Nature of Parameters Provided by Reporting Sources

The calculation of a Mortality Index Value to be performed by RMS in its capacity as Calculation Agent will result in a factual determination as to whether a Mortality Event has occurred. Under certain circumstances, an occurrence outside the Covered Area may cause effects within the Covered Area resulting in a Mortality Event. The determination will be performed in accordance with the methodology described herein under "Summary of Certain Documents – Calculation Agent Agreement" and set forth in the Calculation Agent Agreement. The terms of the Notes provide that all factual determinations made by the Calculation Agent are final and binding, absent manifest error. No separate review or appraisal of the accuracy of the defined methodologies or data used will be performed. Investors are advised that the calculation of an Event Payment is final, regardless of any actual, potential or theoretical discrepancies between the methodology used by the Calculation Agent and any other possible methodology for assessing the same underlying facts. These inherent limitations may be exacerbated by the potential for unreliable data, or the unavailability of data, from the Reporting Sources. Any Basis Change or change in the applicable Reporting Source's reporting of Mortality Rates, Deaths, or Population may lead to a different result with respect to a Mortality Index Value than had such change not occurred.

The data used to determine an Event Payment for the Notes may not be the final data with regard to any Mortality Event. Consequently, investors may suffer a Principal Reduction with respect to one or more Mortality Events for which a Loss Payment might not have been payable if Final Data from the Reporting Sources had been published at the time of the determination of the Principal Reduction. In addition, the Issuer will not be required to extend the maturity of a Class of Notes pursuant to a Mandatory Extension Event if the Minimum Development Period has expired.

Use of Preliminary or Alternative Data rather than Final Data with respect to Deaths and Mortality Rates

Under certain circumstances, as described herein under "Overview—Loss Determination" and "Overview—Data Reporting", the Notes permit the use of Preliminary Data or equivalently labeled data or, in its absence, Alternative Data acquired from publicly available alternative sources in accordance with the procedures specified in the Calculation Agent Agreement, rather than the Final Data in respect of Deaths for the Calendar Year and Country, to be used in determining whether a Mortality Event has occurred and, therefore, whether the Notes will be subject to a Principal Reduction on their Redemption Date and a resulting Loss Payment will be made to the Counterparty. To the extent that such data may differ from Final Data from a Reporting Source, this may cause a Principal Reduction to the Notes that would not have occurred (or would have been smaller) had Final Data been available at the time of determination of the Principal Reduction (and related Loss Payment).

Preliminary Data in the United States has historically been reported by the Reporting Source by ten-year age band, whereas Final Data has been reported by five-year age band. If Preliminary Data is used in the determination of a Principal Reduction to the Notes, this different method of grouping would result in a Basis Change, and the Principal Reduction calculated in accordance with the procedures described herein under "Summary of Certain Documents – Calculation Agent Agreement" and set forth in the Calculation Agent Agreement, may cause a different Principal Reduction than if that Basis Change had not occurred.

Agencies reporting Mortality Rates in various countries have made errors in reporting Preliminary Data that have subsequently been revised in Final Data. Such errors include, but are not limited to, inaccurate reporting of the total number of Deaths and inaccurate grouping of those Deaths by age and gender. Such errors or omissions may cause a different Principal Reduction to and loss of Interest on the Notes than what would be reported if Final Data were used.

Once data has been marked as final by the Reporting Source, even if the entity providing such data to the Reporting Source views it as preliminary and hence subject to change, the Calculation Agent shall treat the data as Final Data. Any updates by entities providing such data to the Reporting Source after the Reporting Source has marked the data as final will not be used in any subsequent calculations and the use of such data may result in a different Principal Reduction than reported by the Calculation Agent.

Use of Population Data

The calculation of a Mortality Index Value relies on population estimates published by Reporting Sources in each Country within the Covered Area, which may be revised at any time. Such revisions include, but are not limited to, updates of past population estimates following a census, which may result in different Mortality Rates and a different Mortality Index Value. In this regard, the most recent census was conducted in the U.S. in 2010, the results of which are largely available as of the date of this Offering Circular. The most recent census including Population Data for France was conducted in 2012 and its results were made available in December 2014. The most recent census for Japan was conducted in 2010 and its results were made fully available in October 2011. Population estimates are calculated incorporating census data. To the extent that revised population estimates differ from prior population estimates from a Reporting Source, this may cause a Principal Reduction to the Notes that would not have occurred (or would have been smaller) had the prior population estimates applied. Furthermore, Population Data may not reflect the actual populations of the countries in the Covered Area as a result of factors including, but not limited to, uncertainty in the Reporting Sources' calculations of population estimates, deaths, emigration and immigration. Investors may suffer a Principal Reduction as a result of the uncertainties associated with population estimates that would not have occurred if such uncertainties did not apply.

Basis Changes

Any Basis Change or change in the applicable Reporting Source's reporting of Deaths, Populations or Mortality Rates may result in a Mortality Index Value that differs from that which may have resulted had such change not occurred. For example, a Reporting Source could change the basis upon which it makes its determinations, including, without limitation: (i) the territory with respect to which it reports; (ii) the age bands with respect to which it reports; or (iii) the meaning of "residence" for the purposes of its reports. Where possible the Calculation Agent will attempt to calculate the relevant Mortality Index Values in a manner that would disregard such Basis Change. However in certain circumstances the Calculation Agent may not be able to disregard such Basis Change, which could result in Mortality Index Values that differ from the values that would have been calculated had there been no such Basis Change. Accordingly, such Basis Change may cause a Principal Reduction to the Notes that would not have occurred (or would have been smaller) had such Basis Change not been made.

RMS' Relationship with the Issuer and the Counterparty

RMS provides consulting services and other services to the insurance industry. The Counterparty or its respective affiliates may engage RMS to provide consulting services or enter into other types of business relations with RMS from time to time. The Issuer has agreed to pay the fees and expenses of RMS in its capacity as Calculation Agent.

Use of Different Models

The Counterparty may use for its own risk management purposes its own internal model or third party vendor models, which may produce significantly different results from that reflected in the RMS Expert Risk Analysis Reports. The Counterparty does not intend to, and will not be required to, disclose the results of these models to any purchaser of Notes. Accordingly, the Counterparty may have a materially different view of the risk of loss to the Notes than the investors or RMS. The Counterparty disclaims all responsibility for any modeling results and the views of any modeling firm included in this Offering Circular.

Risks Associated with the Reporting Sources

Errors in Data reported by Reporting Sources

In addition, the Data as reported by the Reporting Sources is subject to certain margins of error as a result of the degree of precision and the methodologies utilized by the Reporting Sources. There is an inherent risk that any Principal Reduction calculated using the Data would have been smaller, or that there would have been no Principal Reduction at all, had the Reporting Sources utilized more precise or different methodologies. Investors in the Notes will have no recourse to the Issuer, the Counterparty, the Calculation Agent, the Initial Purchasers, the Reporting Sources or any other entity should the Notes be subject to a Principal Reduction (and a Loss Payment made to the Counterparty) as a result of the application of the parameters as reported by the Reporting Sources or any alternative source.

No Contractual Relationship with Reporting Sources

Neither the Issuer nor the Calculation Agent will enter into any agreement with any Reporting Source in respect of the publication by such Reporting Sources of Mortality Rates, Deaths and Population for any Country or Calendar Year. Accordingly, although the Reporting Sources have historically reported such data, they are under no obligation to the Issuer or the Calculation Agent to do so. Neither the Issuer nor any investor in the Notes will have recourse to the Calculation Agent in respect of failure by the Calculation Agent to publish Mortality Rates, Deaths and Population for any Country or Calendar Year or for any failure by the Calculation Agent to follow its published methodologies in the production of such data. In the event that the Calculation Agent certifies that all future Event Reports would register any Country within the Covered Area as Unreported, the Counterparty may elect to terminate the Counterparty Contract, which election will result in an Early Redemption Event in respect of the applicable Class of Notes.

Permitted Investments

Noteholders are exposed to the value of the underlying Permitted Investments

The Issuer's sources of funds for repayment of the Outstanding Principal Amount of each Class of Notes will be the proceeds of the redemption or liquidation of the corresponding Permitted Investments. There can be no assurance that there will be no default with respect to payments on the Permitted Investments or mark-to-market declines in the value of Permitted Investments.

Interest payments may be reduced by fees and withholding tax

The Issuer's sources of funds for payments of interest on each Class of Notes will comprise the Periodic Payments received from the Counterparty under the applicable Counterparty Contract and the relevant Permitted Investment Yield. The interest on the Notes will be paid to Noteholders net of any applicable withholding taxes and fees and no "gross-up" payment or additional amounts will be paid to the Noteholders in this respect.

Permitted Investments may be affected by the insolvency of the Custodian or any intermediary or clearing system

EBRD Notes acquired by the Issuer will be held in a segregated account in the name of the Issuer. Money Market Funds Permitted Investments will be held by the Issuer as registered holder in its own name. In the event of the occurrence of any insolvency or similar proceedings involving the Custodian or any intermediary or clearing system in, through or with which the Permitted Investments are held, the recovery by the Issuer (or the Indenture Trustee enforcing the applicable Deed of Charge) of the Permitted Investments or the income relating thereto is dependent on the right against the entity which is the subject of such proceedings to deliver the Permitted Investments being recognized under all applicable laws as constituting a proprietary interest in the Permitted Investments and not merely a personal right, and on that entity having treated the Permitted Investments in a manner consistent with the existence of such a proprietary interest. A failure by the Issuer to recover the Permitted Investments or the income relating thereto in full or on time in such circumstances may render it unable to make payments of interest on, or repay the Outstanding Principal Amount of, the relevant Class of Notes.

Risks relating to Permitted Investments held in cash

In the event that Permitted Investments consist of a cash credit balance to the applicable Collateral Account: (i) the Permitted Investment Yield may be lower than if the Permitted Investments consist of EBRD Notes or Money

Market Funds Permitted Investments; and (ii) the Issuer will be exposed to credit risk of the bank which holds such Collateral Account. Cash held in accounts with the account bank may not be recoverable in full (or at all) if the account bank becomes subject to insolvency proceedings, and the Issuer would be likely to rank as a general unsecured creditor in relation thereto.

Risks Relating to the EBRD Notes

For so long as the Permitted Investments comprise the EBRD Notes, the Issuer's sources of funds for repayment of the Outstanding Principal Amount will include the proceeds of the redemption of the EBRD Notes. Any failure of the EBRD to redeem the EBRD Notes in whole or in part upon the delivery of an EBRD Put Notice or upon the EBRD Notes Scheduled Maturity Date could result in the Issuer not having sufficient funds on the Redemption Date for a Class of Notes to repay the related Repayment Amount.

Furthermore, the Issuer's sources of funds for payments of interest on a Class of Notes will include the EBRD Notes Coupon Payment. Any failure of the EBRD to pay EBRD Notes Coupon Payments would likely result in the Issuer not paying all or a portion of the interest on the Notes.

In addition, with respect to each Class of Notes, on the first Business Day following the Issuance Date, if the EBRD fails to issue the applicable EBRD Notes to Swiss Re Capital Markets Limited ("SRCML"), as dealer of the EBRD Notes, or if SRCML fails to purchase such EBRD Notes or to deliver them to the Issuer within six (6) Business Days following the Issuance Date, the proceeds from the issuance of the applicable Class of Notes will be invested in applicable Money Market Funds Permitted Investments, if available, or cash instead of the EBRD Notes, and Holders of such Class of Notes would be subject to the risks described below.

In addition, there is currently no secondary market for the EBRD Notes and there is no assurance that a secondary market will develop or, if it does develop, that it will provide liquidity of investment with respect to the EBRD Notes or that it will continue until the EBRD Notes Scheduled Maturity Date. For the avoidance of doubt, the Initial Purchasers are not obligated to make a market in the EBRD Notes and, to the extent they do so, they may discontinue such activity at any time.

The EBRD has not had any involvement in the preparation of this Offering Circular and does not make any representation or warranty, express or implied, as to the accuracy or completeness of the information set forth in this Offering Circular.

Money Market Funds Permitted Investments

The European Securities and Markets Authority has published "Guidelines on a common definition of European Money Market Funds" (the "ESMA MMF Guidelines"). The ESMA MMF Guidelines set out criteria which a collective investment undertaking authorized or regulated under the laws of EU member states must satisfy in order for it to describe itself as a money market fund or a short-term money market fund. The ESMA MMF Guidelines applied from January 1, 2012 in respect of funds authorized prior to July 1, 2011 and are implemented by the laws and/or regulators of EU member states.

Each of the Money Market Funds Permitted Investments is authorized and regulated under the laws of an EU member state and accordingly became subject to the ESMA MMF Guidelines from January 1, 2012. Each of the Money Market Funds Permitted Investments has stated that it satisfies the criteria in the ESMA MMF Guidelines for short-term money market funds. However, none of the Issuer, the Indenture Trustee, the Custodian, the Counterparty or any Initial Purchaser or any of their respective affiliates and representatives, or any of their respective directors or officers, has verified that any such Money Market Funds Permitted Investments in fact satisfies such criteria and shall not be deemed to make or have made, any representation with respect to the satisfaction of such criteria.

If amounts standing to the credit of the applicable Collateral Account are invested in one or more Money Market Funds Permitted Investments, the Issuer's only sources of funds for repayment of the Outstanding Principal Amount will be the sum, on the relevant date, of (i) the proceeds of the liquidation of such Money Market Funds Permitted Investments (less applicable taxes and fees, if any), (ii) the proceeds of the redemption of EBRD Notes, if any, and (iii) cash, if any, deposited in the applicable Collateral Account (less applicable taxes, if any). Noteholders will be exposed to the market value of such investments, which would reflect the value of the underlying assets of the relevant funds, which could materially adversely affect the ability of the Issuer to make payments of principal in full on the Redemption Date for a Class of Notes. The proceeds of the liquidation of such Money Market Funds Permitted Investments, and any other amounts (less applicable taxes and fees, if any) held in the applicable Collateral Account, will be used to repay the

Outstanding Principal Amount net of any applicable tax and fees, and no “gross-up” payment or additional amounts will be paid to Noteholders in this respect.

During any period in which the amounts standing to the credit of the applicable Collateral Account are not invested in Money Market Funds Permitted Investments, such as during the period between the liquidation of any Money Market Funds Permitted Investment and the reinvestment in another Money Market Funds Permitted Investment in accordance with the procedures set forth in the Indenture or if there are no Money Market Funds Permitted Investments with sufficiently high credit ratings so as to be available pursuant to the Indenture, the Money Market Fund Yield will be zero and cash will be held in the applicable Collateral Account. In addition, during such period, the Issuer’s sources of funds for repayment of the Outstanding Principal Amount of a Class of Notes will be the amount standing to the credit of the related Collateral Account for such Class at The Bank of New York Mellon, London branch. The Notes are exposed to the risks of deposits of such amounts with The Bank of New York Mellon, including the risk of insolvency or receivership of The Bank of New York Mellon. See “*Risk Factors—Permitted Investments—Permitted Investments may be affected by the insolvency of the Custodian or any other intermediary or clearing system*”.

A Money Market Funds Permitted Investment may, pursuant to the terms of such investment, be able to suspend or delay redemptions. Any suspension or delay of redemptions may cause a delay or loss in the payment of principal or interest on any Class of Notes. In addition, there can be no assurances that there will not be a delay in the ability of the Indenture Trustee to timely liquidate a Money Market Funds Permitted Investment, particularly when there is a drop in overall market trading volume, or, upon such liquidation, that the amounts realized from the liquidation of the Money Market Funds Permitted Investment will not be less than the Outstanding Principal Amount.

The Money Market Funds are not U.S.-domiciled, and, accordingly, no Money Market Funds Permitted Investments in which funds may be invested are required to comply with Rule 2a-7 or other restrictions under the Investment Company Act, which could create a greater risk of loss than if funds were invested in U.S. domiciled money market funds registered pursuant to the Investment Company Act, which must comply with Rule 2a-7.

Because of current financial market conditions in Europe, investors of the Notes are hereby advised that it is possible that none of the Money Market Funds may meet the requirement under (i)(c) and (ii)(c) in the definition of Money Market Funds Permitted Investments as of the date hereof. The Issuer is unable to make any prediction whether a Money Market Fund will meet the relevant criteria at the applicable time of investment. In such case, if no Money Market Fund meets the relevant criteria, any such proceeds not invested in EBRD Notes will be held in cash.

To the extent that Permitted Investments in a Collateral Account consist of Money Market Funds Permitted Investments and an MMF Negative Yield Event occurs for any reason, including a reverse distribution mechanism by the applicable money market fund, then the net investment earnings actually received by the Issuer from and including such Payment Date until such time as the Negative Yield Deficit has been reduced to zero will be reinvested in Permitted Investments and excluded from the definition of Permitted Investment Yield payable to Noteholders of the applicable Class. In such case, the amount of interest that would otherwise be received by the Noteholders will be reduced by the applicable Top-Up Amounts. In addition, if an MMF Negative Yield Event occurs, the Issuer may be unable to repay the full Outstanding Principal Amount of the applicable Class of Notes on the respective Redemption Date.

Redeeming units of a fund during an unfavorable market environment may affect the net asset value of such fund.

Any Money Market Funds Permitted Investment could experience a decrease in net asset value and/or a negative yield, and such fund’s net asset value also may be adversely affected when selling securities to meet redemption requests if the redemption requests are large or frequent, occur in times of overall market turmoil or declining prices for the securities sold, or when the securities that such fund wishes to, or is required to, sell are illiquid. A Money Market Funds Permitted Investment may be forced to sell its holdings when shareholders of such fund make relatively large redemption requests. Furthermore, when markets are illiquid, a Money Market Funds Permitted Investment may be unable to sell illiquid securities at its desired time or price. Illiquidity can be caused by, among other things, a drop in overall market trading volume, an inability to find a ready buyer, or legal restrictions on the securities’ resale. Certain securities that were liquid when purchased may later become illiquid, particularly in times of overall economic distress. Any of these conditions could materially and adversely affect the Issuer’s ability to pay the Outstanding Principal Amount of, or interest on, a Class of Notes.

Although the funds constituting Money Market Funds Permitted Investments are generally less sensitive to interest rate changes than are funds that invest in longer-term securities, changes in short-term interest rates will cause changes to the Money Market Fund Yield. During periods of rising interest rates, the Money Market Fund Yield (and the

market value of the Money Market Funds Permitted Investment's securities) will generally tend to be lower than prevailing market rates, and in periods of falling interest rates, the Money Market Fund Yield will tend to be higher. In addition, a low-interest rate environment may prevent any such fund from providing a positive Money Market Fund Yield or maintaining a stable net asset value of €1.00, and may cause such fund to provide a negative Money Market Fund Yield. Market disruptions also may impair the liquidity of shares in any such fund. If the market value, yield and/or liquidity of a Money Market Funds Permitted Investment is impaired, the Issuer's ability to pay the Outstanding Principal Amount of, and/or interest on, a Class of Notes could be materially and adversely affected.

The net yield of a fund may become negative for other reasons.

If a Money Market Funds Permitted Investment incurs a management fee during a low interest rate environment, the payment of such fee may prevent the Money Market Funds Permitted Investment from providing a positive Money Market Fund Yield or maintaining a stable net asset value of €1.00, and may cause the Money Market Funds Permitted Investment to provide a negative Money Market Fund Yield. Similarly, if the underlying securities are issued with a negative Money Market Fund Yield, or if a change in regulation requires money market funds to mark to market, the Money Market Funds Permitted Investment may be prevented from providing a positive Money Market Fund Yield or maintaining a stable net asset value of €1.00. In either case, the Issuer's ability to pay the Outstanding Principal Amount of, and/or interest on, a Class of Notes could be materially and adversely affected. In addition, in a negative yield environment, a Money Market Funds Permitted Investment may also trigger a reverse distribution mechanism or other similar actions to help maintain a stable next asset value.

Effective Subordination; Limitations on Enforcement

The principal portion of the investments of the proceeds of each Class of Notes in the respective Collateral Account will be available, prior to an Event of Default, *first*, to satisfy any obligations of the Issuer to the Counterparty under the applicable Counterparty Contract; and *second*, to make payments under the Indenture in respect of such Class of Notes.

Accordingly, the payment of the Repayment Amount of each Class of Notes is subordinated to any obligations of the Issuer to the Counterparty under the applicable Counterparty Contract. Notwithstanding that the Indenture Trustee and the Noteholders have the right upon the occurrence of an Event of Default under the Indenture to declare each Class of Notes to be immediately due and payable and to exercise certain remedial proceedings, as long as the relevant Counterparty Contract is in effect, these rights are subordinated to the rights of the Counterparty under the applicable Counterparty Contract. Neither the Indenture Trustee nor any Noteholder will have access to the principal proceeds of any Class of Notes, or any other assets held in the applicable Collateral Account, until termination of the relevant Counterparty Contract, after giving effect to the payment of any claim payable thereunder.

Enforcement of Counterparty Contracts

Neither the Indenture Trustee nor the Noteholders are parties to the Counterparty Contracts, and absent an Event of Default with respect to the corresponding Class of Notes, they have no right to enforce or take actions thereunder against the applicable Counterparty Contract or any other rights thereunder. The Issuer alone has such rights and is under no obligation to enforce such rights.

Risks Relating to English Law Security Interests and Assignment by way of Security under the Deed of Charge and the Counterparty Deed of Charge

The security interests over the Collateral Account for each Class of Notes and the Interest Payment Account under each respective Deed of Charge and the security interests over the Interest Deposit Account under each respective Counterparty Deed of Charge will be structured as a mortgage, or to the extent such mortgage is not effective, as a fixed charge or, to the extent such fixed charge is not effective, as a floating charge. Under English law, whether or not the security interest over these accounts is held to be a mortgage or a charge, and whether a charge over these accounts is held to be fixed or floating, will depend on the circumstances of the case, in particular whether the Issuer or the Counterparty, as applicable, has sufficient authority or ability to deal with such assets in the course of business. If any of these charges or the assignment by way of security of the assigned rights under each respective Deed of Charge were held to take effect as a floating charge, the claims of the Indenture Trustee (for the benefit of the beneficiaries under the relevant Deed of Charge) or the Issuer (under the relevant Counterparty Deed of Charge) could, in an insolvency proceeding in an English or Irish court involving the Issuer, be subject to claims which may exist which are given priority over a floating charge by law, including certain prior floating charges, prior or subsequent mortgages or fixed charges and the claims of preferential creditors and subject to set-off. In the case of an insolvency proceeding before the

English Courts, a “prescribed part” of the Issuer’s “net property” could be required to be made available for the satisfaction of unsecured debts, if any, in priority of the claim of the Indenture Trustee (for the benefit of the beneficiaries under the relevant Deed of Charge) or the Issuer (under the relevant Counterparty Deed of Charge), if the charge is a floating charge. In addition, in an English or Irish liquidation or administration of the Issuer, the remuneration and expenses of the liquidator or administrator shall have priority over claims to property comprised in, or subject to, any floating charge created by the Issuer. In certain circumstances these mortgages, charges or the assignment by way of security of the assigned rights under each respective Deed of Charge could, in an insolvency proceeding in an English or Irish court, be subject to avoidance or being set aside.

Related Parties

The Initial Purchasers and the various entities involved in the Offering described herein, and their affiliates, are financial institutions engaged, or expected to be engaged in the future, in various activities, which may include insurance and reinsurance, insurance and reinsurance related brokerage, securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage activities. Certain of the Initial Purchasers, the Counterparty and their affiliates have, from time to time, performed, and may in the future perform, various financial advisory, investment banking, insurance and reinsurance and insurance and reinsurance related brokerage services for the Issuer or the Counterparty for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the Initial Purchasers, the Counterparty and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investment and securities activities may involve securities and instruments of the Issuer or the Counterparty and their respective affiliates.

Additionally, each member of the Board has delegated its duties as a CPO to the Manager and the Issuer has delegated (i) to Swiss Re Risk Solutions Corporation (“SRRSC”) certain swap reporting obligations under Title VII of Dodd-Frank; and (ii) to SRCML certain swap reporting obligations of the Issuer under EMIR.

In connection with the issuance of the Notes, SRCML will act as the dealer of the EBRD Notes and, in the future, may engage in other transactions with the EBRD.

Conflicts of Interest

Various potential and actual conflicts of interest may arise as a result of the investment banking, commercial banking, asset management, commodity pool operator and financing and financial advisory services, insurance and reinsurance, insurance and reinsurance related brokerage and products provided by the Initial Purchasers and their affiliates to the Issuer, the Indenture Trustee, the Counterparty, and others, as well as in connection with the investment, trading and brokerage activities of the Initial Purchasers and their affiliates. The following briefly summarizes some of these conflicts, but is not intended to be an exhaustive list of all such conflicts.

The Initial Purchasers will be paid fees and commissions for such service by the Issuer. The Initial Purchasers or any of their affiliates may from time to time hold Notes for investment, trading or other purposes and may enter into derivatives, risk transfer agreements or other financial instruments relating to or referencing such Notes. The Initial Purchasers and their affiliates may provide investment banking, commercial banking, asset management, commodity pool operator and financing and financial advisory services, insurance and reinsurance, insurance and reinsurance related brokerage and products to the Counterparty and its affiliates and may purchase, hold and sell, both for their respective accounts or for the account of their respective clients, on a principal or agency basis, loans, securities, and other obligations and financial instruments of the Counterparty and its affiliates. As a result of such transactions or arrangements, the Initial Purchasers and their affiliates may have interests adverse to those of the Issuer and the Noteholders.

As part of their regular business, the Initial Purchasers and their affiliates may also provide investment banking, commercial banking, asset management, commodity pool operator and financing and financial advisory services and products, insurance and reinsurance, insurance and reinsurance related brokerage to the Issuer and its affiliates, and purchase, hold and sell, both for their respective accounts or for the account of their respective clients, on a principal or agency basis, loans, securities, and other obligations and financial instruments and engage in private equity investment activities. No Initial Purchaser, nor any of its affiliates, will be restricted in their performance of any

such services or in the types of debt or equity investments that they may make. In conducting the foregoing activities, they will be acting for their own account or the account of their customers and will have no obligation to act in the interest of the Issuer.

If an Initial Purchaser becomes a Noteholder, through market-making activity or otherwise, any actions that it takes in its capacity as a Noteholder, including voting, providing consents or otherwise, will not necessarily be aligned with the interests of other Noteholders. To the extent an Initial Purchaser makes a market in the Notes (which it is under no obligation to do), it would expect to receive income from the spreads between its bid and offer prices for the Notes. In connection with any such activity, it will have no obligation to take, refrain from taking or cease taking any action with respect to these transactions and activities based on the potential effect on an investor in the Notes. The price at which an Initial Purchaser may be willing to purchase the Notes, if it makes a market, will depend on market conditions and other relevant factors and may be significantly lower than the issue price for the Notes and significantly lower than the price at which it may be willing to sell the Notes.

As part of its regular business, the Counterparty and its affiliates invest in securities, including bonds, commercial paper and other debt securities and in equity securities of various issuers. It can be expected that the Counterparty and its affiliates may, at the time of issuance of the Notes and at all other times, own securities issued by participants engaged in diverse activities, including the financial services business. Such investments may include those issued by the Indenture Trustee, the Initial Purchasers, and other service providers or their affiliates. Neither the Counterparty nor any of its affiliates will be restricted with regard to their investments in any issuer at any time.

Noteholders must rely on the procedures of Euroclear and Clearstream

The Notes will be represented on issuance by Global Notes that may be deposited with a common depository for Euroclear and Clearstream. Except in the circumstances described in "*Description of the Notes—Definitive Notes*", investors will not be entitled to receive Notes in definitive form. Each of Euroclear and Clearstream and their respective direct and indirect participants will maintain records of the beneficial interests in each Global Note held through it. While the Notes are represented by Global Notes, investors will be able to trade their beneficial interests only through the relevant clearing systems and their respective participants.

While the Notes are represented by Global Notes, the Issuer will discharge its payment obligations under the Notes by making payments through the relevant clearing systems. A holder of a beneficial interest in a Global Note must rely on the procedures of the relevant clearing system and its participants to receive payments under the Notes. The Issuer has no responsibility or liability for the records relating to, or payments made in respect of, beneficial interest in any Global Note.

Holders of beneficial interests in a Global Note will not have a direct right to vote in respect of the Notes so represented. Instead, such holders will be permitted to act only to the extent that they are enabled by the relevant clearing system and its participants to appoint appropriate proxies.

Regulatory Risks

No Regulation of the Issuer by any Regulatory Authority

The Issuer is not licensed or authorized under any current securities, commodities, insurance or banking laws of any jurisdiction and has not applied (and does not expect to apply) for any such licenses or authorizations. There is no assurance, however, that regulatory authorities in one or more jurisdictions would not take a contrary view regarding the applicability of any such laws to the Issuer. The taking of a contrary view by any such regulatory authority could have an adverse impact on the Issuer or the Noteholders.

Legal and Regulatory Provisions Affecting the Issuer or the Counterparty

The European Union has created a European Systemic Risk Board to monitor financial stability and has implemented rules that will increase capital requirements for certain trading instruments or exposures and impose compensation limits on certain employees located in affected countries. In addition, the European Union Commission is considering a wide array of other initiatives, including new legislation that will affect derivatives trading, impose surcharges on "globally" systemically important firms and possibly impose new levies on bank balance sheets. Legal or regulatory changes affecting the Issuer or the Counterparty may affect the investors in such Class of Notes as it may impact the Issuer's ability to repay its obligations under the Notes in full and/or increase compliance costs. The Issuer cannot predict what reforms will be implemented in the future. No assurance can be given generally that laws or

regulations will be adopted, enforced or interpreted in a manner that will not have material adverse effect on the Issuer's business and results of operations.

On July 18, 2013, the International Association of Insurance Supervisors ("IAIS") published an initial assessment methodology for designating global systemically important insurers ("GSIIs"), as part of the global initiative launched by the G20 with the assistance of the Financial Stability Board ("FSB") to identify global systemically important financial institutions ("G-SIFIs"). The assessment methodology, which is endorsed by the FSB, is intended to identify those insurers whose distress or disorderly failure, because of their size, complexity and interconnectedness, would cause significant disruption to the global financial system and economic activity. Also on July 18, 2013, the FSB published its initial list of nine GSIs, which includes the AXA Group. The framework policy measures for GSIs, also published by the IAIS on July 18, 2013 for implementation by the GSIs, include (1) new capital requirements, including (i) a "basic" capital requirement, formerly known as "Backstop Capital Requirement" ("BCR") applicable to all GSIs' activities to serve as a basis for (ii) an additional level of capital, called "Higher Loss Absorbency" ("HLA") capacities to be requested from GSIs in relation to their systemic activities, (2) greater regulatory oversight over holding companies, (3) various measures to promote the structural and financial "self-sufficiency" of group companies and reduce group interdependencies, and (4) in general, a greater level of regulatory scrutiny for GSIs (including a requirement to establish a Systemic Risk Management Plan ("SRMP") and a Recovery and Resolution Plan ("RRP") which may entail significant new processes, reporting and compliance burdens (and costs) as well as potential reorganizations of certain businesses or activities. In November 2014, the FSB, following consultation with the IAIS and national authorities, decided to identify for 2014 the nine GSIs identified in 2013, which includes the AXA Group. The contemplated policy includes the constitution of a Crisis Management Group ("CMG") by the Group-wide supervisor, the preparation of the above-mentioned SRMP and RRP and the development and implementation of the BCR in 2014, while other measures are to be phased in more gradually, such as the HLA, which is to be developed by the end of 2015 and applied as from 2019. On October 23, 2014, the IAIS announced the development of the BCR and its endorsement by the FSB. Beginning in 2015, this BCR, which is lower than the Solvency Capital Requirement required under Solvency II, will be reported on a confidential basis to Group wide supervisors and be shared with the IAIS. Beginning in 2019, the GSIs will be required to hold capital no lower than the BCR plus HLA.

While the manner in which the above-mentioned IAIS policy measures (and any other initiatives launched by the IAIS such as the draft Common Framework for the Supervision of Internationally Active Insurance Groups ("IAIG") and the Insurance Capital Standard portion of the Common Framework which is now undergoing public consultation) will be implemented by legislation or regulation in each applicable jurisdiction is not yet clear, these measures, if implemented, could have far reaching regulatory and competitive implications for the AXA Group and adversely impact its capital requirements, profitability, the fungibility of its capital and ability to provide capital/financial support for group companies, including the Counterparty, its ability to grow through future acquisitions, change the way it conducts business and its overall competitive position versus insurance groups that are not designated as GSIs.

An Early Redemption Event may occur in respect of any Class of Notes if, in the Counterparty's sole judgment (following written advice of the Counterparty's counsel with a copy provided to the Issuer and the Indenture Trustee), any amendment to, or change in, the laws of any jurisdiction (including a change in any official interpretation or application thereof) becomes effective that would materially and adversely impair the Issuer's ability to lawfully perform its obligations under the relevant Class of Notes or the Counterparty's ability to lawfully perform its obligations under the applicable Counterparty Contract. Legal or regulatory changes affecting the Issuer or such Counterparty may indirectly affect the investors in such Class of Notes by exposing such investors to reinvestment risk in respect of the proceeds of the Notes prior to the Scheduled Redemption Date.

Alternative Investment Fund Managers Directive (AIFMD)

EU Directive 2011/61/EU on Alternative Investment Fund Managers ("AIFMD") provides, among other things, that all alternative investment funds ("AIFs") managed within the scope of AIFMD must have a designated alternative investment fund manager ("AIFM") with responsibility for portfolio and risk management. AIFMD is transposed into Irish law by the European Union (Alternative Investment Fund Managers) Regulations 2013 (the "AIFMD Regulations"). The Issuer is exempt from AIFMD and the AIFMD Regulations if it is a securitisation special purpose entity ("SSPE") as defined in AIFMD, being an entity whose sole purpose is to carry on a securitisation within the meaning of Regulation (EC) No 24/2009 of the European Central Bank of 19 December 2008 concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions, as amended, or, with effect from 1 January 2015, Regulation (EU) No 1075/2013 of the European Central Bank of 18 October 2013

concerning statistics on the assets and liabilities of financial vehicle corporations engaged in securitisation transactions (recast) (the “**FVC Regulation**”).

The Issuer will treat itself as carrying on a securitisation for the purposes of the FVC Regulation. Accordingly, it expects to meet the definition of an SSPE and therefore does not currently expect to fall within the ambit of AIFMD.

On 8 November 2013, in order to assist in limiting any uncertainty until definitive positions and practises are finalised, the Central Bank published a fifth edition of its AIFMD Questions and Answers (“**Q&A**”), pursuant to which (i) registered Financial Vehicle Corporations within the meaning of Article 1(2) the FVC Regulation or (ii) financial vehicles engaged solely in activities where economic participation is by way of debt or other corresponding instruments which do not provide ownership rights in the financial vehicle as are provided by the sale of its shares, are advised that they fall outside the scope of the AIFMD regime (unless the Central Bank advises those entities otherwise in a replacement Q&A, which, according to the current and twelfth edition of the Q&A published on 23 January 2015, it does not intend to do at least for so long as the European Securities and Markets Authority (“**ESMA**”) continues its current work on the matter).

ESMA has not yet given any formal guidance on the application of AIFMD to entities such as the Issuer which issue solely debt securities.

As such, although the Issuer believes that it would be exempt from AIFMD and the AIFMD Regulations, there is a risk that the Central Bank may in the future state, either in generally applicable rules or guidelines or specifically in relation to the Issuer, that the Issuer is not so exempt from AIFMD and the AIFMD Regulations. If the Issuer is stated not to be exempt from AIFMD and the AIFMD Regulations, the Issuer would become subject to a number of requirements, including in relation to the Collateral, which could materially increase the regulatory burden for the Issuer. The Issuer would also be classified as a “financial counterparty” under the European Market Infrastructure Regulation EU 648/2012 and may be required to comply with clearing obligations or other risk mitigation techniques with respect to derivative transactions including obligations to post margin to any central clearing counterparty or market counterparty.

In such case, the Counterparty may, but is not obliged to, give notice to the Issuer to terminate the Counterparty Contract thereby resulting in a Change in Law Event and the early redemption of the Notes.

European Market Infrastructure Regulation (EU No. 648/2012) (EMIR)

On 16 August 2012 the European Market Infrastructure Regulation on OTC derivatives, central counterparties and trade repositories (EU No. 648/2012) came into force (“**EMIR**”). The details of its regime have been set out by certain implementing and supplementing regulations adopted by the European Commission, including the Commission Delegated Regulation (EU) No 149/2013 of 19 December 2012. Under EMIR, qualifying over-the-counter (“**OTC**”) derivative contracts that are entered into by either (a) EU-regulated financial counterparties (“**FCs**”), such as investment firms, credit institutions, insurance companies and certain alternative investment funds, or (b) EU-established non-financial counterparties (“**NFCs**”) which have aggregate, worldwide consolidated group NFC positions in non-hedging OTC derivative contracts exceeding at least one of the five specified “clearing thresholds” (such non-financial counterparties, “**NFC+**s”) will have to be centrally cleared (the “**Clearing Obligation**”) via an authorized central counterparty (a “**CCP**”). In addition, EMIR requires the reporting of OTC and exchange-traded derivative contracts to a registered or recognized trade repository (the “**Reporting Obligation**”) and introduces certain “risk mitigation requirements” in relation to OTC derivative contracts that are not required to be centrally cleared by a CCP and which are designed to measure, monitor and mitigate operational risk and counterparty credit risk.

As regards the Clearing Obligation, even though the Issuer will enter into the relevant Counterparty Contracts as an NFC and solely and objectively to reduce risks directly relating to its commercial activity or treasury financing activity, the Issuer could become an NFC+ and therefore become subject to the Clearing Obligation if the Issuer forms part of the Counterparty’s group (as defined by EMIR) and a relevant clearing threshold is exceeded on an aggregate worldwide consolidated group NFC basis pursuant to Article 10(3) EMIR. If the Clearing Obligation applies to the Issuer, this may require amendments to the relevant Counterparty Contract(s), the Selected Transaction Documents or the other transaction documents referenced herein to allow the Issuer to centrally clear its trades and post collateral, amongst other consequences. Thus, as of the date hereof, it cannot be excluded that the Issuer may become subject to the Clearing Obligation in the future in respect of the Counterparty Contracts (or any agreement or transaction replacing the relevant Counterparty Contracts). Further regulation regarding this part of the EMIR regime relating to central clearing and collateralisation is pending.

As regards the Reporting Obligation, for all new OTC and exchange traded transactions, the Issuer must ensure that certain counterparty and contract information about the Counterparty Contracts (and any modifications thereto) is delivered to an ESMA-registered or recognized trade repository within one working day of such trade execution (or modification). EMIR also imposes a record-keeping requirement pursuant to which counterparties must keep records of any derivative contract they have concluded (and any modifications thereto) for at least five years following the termination of the contract.

For OTC derivative contracts not cleared by a CCP, the Issuer must also apply certain risk mitigation techniques in relation to timely confirmation of trades within short prescribed deadlines, portfolio reconciliation of key contract terms, portfolio compression and pre-agreed dispute resolution procedures. The Issuer, to the extent it is or becomes an FC or NFC+, may also be required to conduct daily “marking to market” and bilateral margining (involving the posting and segregation of collateral, in the form of both initial and variation margin) of its uncleared OTC derivative contract trades which are exempt from the Clearing Obligation. Further regulation regarding this part of the EMIR regime relating to bilateral margining is pending.

The EU regulatory framework and legal regime relating to derivatives is set not only by EMIR but also by the Markets in Financial Instruments Directive (*2004/39/EC*) and its implementing measures, which are the subject of amending legislation known as “**MiFID II**”, comprising a directive on markets in financial instruments repealing Directive 2004/39/EC (2014/65/EU) (“**MiFID II Directive**”) and a regulation on markets in financial instruments and amending EMIR (Regulation 600/2014) (“**MiFIR**”). EU member states must adopt and publish by 3 July 2016 the measures transposing the MiFID II Directive into national law and must apply those provisions from 3 January 2017 (subject to certain exceptions). MiFIR will apply from 3 January 2017 (subject to certain exceptions). Among other things, MiFID II will require eligible transactions by FCs and NFC+s in sufficiently liquid OTC derivatives to be executed on a regulated trading venue and will introduce an expanded pre and post trade transparency regime to certain derivatives. It is difficult however to predict the full impact of these regulatory requirements, if any, on the Issuer.

Prospective investors should be aware that the regulatory changes arising from EMIR and MiFID II may in due course significantly raise the costs of entering into derivative contracts and may adversely affect the Issuer's ability to enter into a replacement Counterparty Contract or equivalent arrangement.

In addition, as some of the provisions of EMIR and MiFID II and the technical standards under EMIR and MiFID II are not yet finalized and the date of application for some of these provisions is still uncertain, prospective investors should be aware that the Selected Transaction Documents and the other transaction documents referenced herein may need to be amended during the course of the transaction to ensure that the terms thereof, and the parties' obligations thereunder, are in compliance with EMIR and MiFID II and/or the then subsisting technical standards under EMIR and MiFID II. Any such amendment would be made without the consent of the Noteholders. Failure to comply with the provisions of EMIR and MiFID II may result in administrative fines, censure notices or other sanctions.

Implementation of and/or changes to the Basel II risk-weighted asset framework may result in changes to the risk-weighting of the Notes

The regulatory capital framework published by the Basel Committee on Banking Supervision (the “**Basel Committee**”) in 2006 (the “**Basel II Framework**”) has not been fully implemented in all participating countries. The implementation of the framework in relevant jurisdictions may affect the risk-weighting of the Notes for investors who are or may become subject to capital adequacy requirements that follow the Basel II Framework.

It should also be noted that the Basel Committee has approved significant changes to the Basel II Framework (such changes being commonly referred to as “**Basel III**”), including new capital and liquidity requirements intended to reinforce capital standards and to establish minimum liquidity standards for credit institutions. In particular, the changes refer to, amongst other things, new requirements for the capital base, measures to strengthen the capital requirements for counterparty credit exposures arising from certain transactions and the introduction of a leverage ratio as well as short-term and longer-term standards for funding liquidity (referred to as the “**Liquidity Coverage Ratio**” and the “**Net Stable Funding Ratio**”). Member countries have been required to implement the new capital standards from January 2013 and will be required to implement the new Liquidity Coverage Ratio from January 2015 and the Net Stable Funding Ratio from January 2018. In the United States, on July 9, 2013, the U.S. federal banking agencies approved interim rules establishing a new comprehensive capital framework for U.S. banking organizations implementing, among other requirements, the Basel III capital framework.

As regards credit institutions established in the European Economic Area (“**EEA**”) Basel III has been implemented by EU Regulation 575/2013 which applies the new capital standards (“**Capital Requirements**

Regulation") from 1 January 2014 and introduces the Liquidity Coverage Ratio on a gradual basis starting in 1 January 2015. The Capital Requirements Regulation provides that from 1 January 2016 institutions shall ensure that long term obligations are adequately met with a diversity of stable funding requirements under both normal and stressed conditions but leaves the introduction of the Net Stable Funding Ratio to be the subject of future legislation to be proposed by the European Commission.

The changes approved by the Basel Committee may have an impact on incentives to hold the Notes for investors that are subject to requirements that follow the revised framework and, as a result, they may affect the liquidity and/or value of the Notes. In general, investors should consult their own advisers as to the regulatory capital requirements in respect of the Notes and as to the consequences to and effect on Noteholders of any changes to the Basel II Framework (including the Basel III changes described above) and the relevant implementing measures. No predictions can be made as to the precise effects of such matters on any investor or otherwise.

Dodd-Frank's Volcker Rule Could Restrict the Ability of Certain Investors to Invest in the Notes

Dodd-Frank includes the so-called Volcker Rule which prohibits "banking entities" (as defined therein) from (i) acquiring or retaining an ownership interest in or sponsoring certain hedge funds or private equity funds (together, referred to as "covered funds" and broadly defined to include: any issuer that would be an investment company under the Investment Company Act but for the exemptions provided in Section 3(c)(1) or 3(c)(7) of the Investment Company Act; certain pools; and certain similar non-U.S. funds), (ii) engaging in proprietary trading, and (iii) entering into certain relationships with such funds. Because the Issuer relies upon the exemption in Section 3(c)(7) of the Investment Company Act, it may be considered a covered fund under the Volcker Rule.

On December 10, 2013, the Federal Reserve Board, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the Securities and Exchange Commission and the Commodity Futures Trading Commission adopted a final rule to implement the Volcker Rule. The final rule became effective on April 1, 2014.

By statute, the Volcker Rule became effective on July 21, 2012, notwithstanding that the agencies had not yet adopted final implementing regulations. On April 19, 2012, the Federal Reserve Board announced that banking entities would have the full two-year conformance period provided by the Volcker Rule (i.e., until July 21, 2014) to come into compliance. In connection with the adoption of the final rule implementing the Volcker Rule, the Federal Reserve Board extended the conformance period until July 21, 2015.

Further extensions of the conformance period by the Federal Reserve Board are permitted, but no indication has been given at this time about whether such extensions will be granted. The Federal Reserve Board also stated that during the conformance period banking entities are expected to engage in good-faith efforts that will result in the conformance of their investments and activities with the Volcker Rule by the end of the conformance period. Good faith efforts include evaluating the extent to which the banking entity is engaged in activities and investments that are covered by the Volcker Rule as well as developing and implementing a conformance plan that is appropriately specific about how the banking entity will fully conform all of its covered activities and investments by the end of the conformance period.

No representation is made as to what effect, if any, the Volcker Rule and its implementing regulations will have on the ability of any investor to invest in or retain the Notes, or on the liquidity of the Notes. Each prospective investor in the Notes should consult its own legal advisors regarding such matters and other effects of the Volcker Rule and any rule-making proposals.

Regulation pursuant to the Commodity Exchange Act and the Dodd-Frank Act

A Noteholder that is an investment fund or commodity pool, or other form of investment vehicle, should consult with its own independent legal adviser concerning any regulatory implications to it in respect of (i) its purchase of an interest in the Issuer, which may be a "commodity pool", and (ii) each Counterparty Contract being a "commodity interest", as such terms are defined in the Commodity Exchange Act and the regulations thereunder. An investment by an investment fund or commodity pool, or other form of investment vehicle, in the Issuer may cause such investor to be characterized as a commodity pool and would subject its commodity pool operator to compliance with the Commodity Exchange Act and the regulations thereunder.

The Dodd-Frank Act also contains provisions that include establishing mandatory margin requirements for swap trades that are not cleared through a central counterparty, the clearing and execution of certain swaps through central counterparties, regulated exchanges or electronic facilities, and the reporting of trade information. Although the

CFTC adopted final rules requiring the mandatory clearing through central counterparties of certain credit default swaps and interest rate swaps between financial entities in June 2013, requiring the execution of certain credit default swaps and interest rate swaps between financial entities on regulated exchanges or electronic facilities, and real-time public and regulatory reporting of trade information, the CFTC has not yet finalized its margin requirements for uncleared swaps. In addition, similar regulations have been proposed or adopted in jurisdictions outside the United States and the full impact of the various U.S. and non-U.S. regulatory developments in this area will not be known with certainty until the rules are implemented and market practices and structures develop under the final rules. Given the status of the rule-making process, it is not possible to know at this time what effect, if any, the CFTC's final margin rules or any new rule promulgated by the CFTC or foreign regulator will have on the Issuer, but any new or changed margin requirements may increase the Issuer's ongoing costs and/or result in a Change in Law Event and the early redemption of the Notes.

Changes to the methodology for setting EURIBOR may adversely impact Noteholders

To the extent that Permitted Investments relating to a Class of Notes consist of EBRD Notes, the Permitted Investment Yield will be based on EURIBOR. Following controversies involving the methodology employed by the British Banker's Association for determining LIBOR, regulators, financial institutions and other interested parties have suggested changing the underlying methodology for determining EURIBOR. As of the date of this Offering Circular, no prediction can be made as to what impact such changes, if any, will have on the amount of Permitted Investment Yield available to be paid to Noteholders. In addition, no prediction can be made as to what impact, if any, changes to the methodology used to determine EURIBOR will have on the Notes, Permitted Investments thereunder or Noteholders.

U.S. Taxation Risks

The U.S. Foreign Account Tax Compliance Act Reporting by the Issuer.

Sections 1471 through 1474 of the U.S. Internal Revenue Code of 1986, as amended (the “**Code**”), regulations issued thereunder and any intergovernmental agreement (“**IGA**”) entered into in connection with the implementation thereof, including the IGA between Ireland and the U.S. (the “**U.S.-Ireland IGA**”) and any legislation, regulations, rules or other official guidance issued pursuant to any such IGA (collectively, “**FATCA**”) require certain foreign financial institutions (“**FFIs**”) to disclose to the Irish Revenue Commissioners (for transmittal to the U.S. Internal Revenue Service (“**IRS**”)) the name, address, tax identification number, and other specified information of certain U.S. and non-U.S. persons who own a direct or indirect interest in such FFIs. If an FFI fails to comply, it will be subject to a 30% withholding tax with respect to (i) certain U.S. source income (including interest and dividends) and gross proceeds from any sale or other disposition of property that can produce U.S. source interest or dividends (“**withholdable payments**”) and (ii) “passthru payments” (generally, withholdable payments and payments that are attributable to withholdable payments) made by FFIs. The Issuer expects to be treated as an FFI. Further, if the Issuer is not characterized as an FFI, it may be characterized as a passive non-financial foreign entity, in which case it would appear to be subject to such 30% withholding tax on certain payments unless it either provides information to withholding agents with respect to its “substantial U.S. owners” or makes certain certifications. The FATCA withholding tax is currently imposed on payments of most types of U.S. source income, including interest and dividends, and beginning in 2017 will be imposed with respect to payments of proceeds from the sale of property that gives rise to U.S. source interest and dividends. No FATCA withholding tax will be imposed with respect to non-U.S. source passthru payments made by FFIs prior to January 1, 2017. The IRS has not yet defined the scope of non-U.S. source passthru payment withholding. The Issuer expects its income to be non-U.S. source.

The Issuer may be subject to the requirements imposed on FFIs or passive non-financial foreign entities under FATCA and will use reasonable efforts to avoid the imposition of a withholding tax under FATCA, which may include reporting information to the Irish Revenue Commissioners (for transmittal to the IRS). In this event, Noteholders will be required to provide any information, tax documentation and waivers that the Issuer determines are necessary to avoid the imposition of such withholding tax. The Issuer's ability to satisfy such obligations will depend on each Noteholder providing, or causing to be provided, any information, tax documentation and waivers, including information concerning the direct or indirect owners of such Noteholder, that the Issuer determines is necessary to satisfy such obligations. If the Issuer initially complies or intends to comply with FATCA but is subsequently unable to comply, or fails to comply, distributions from, and proceeds from the disposition of, certain assets held by the Issuer may be subject to a withholding tax, in which case the Issuer will not have sufficient funds to make payments that otherwise would have been made under the Notes.

In the event any Noteholder fails to timely provide any information or tax documentation that the Issuer determines is necessary to satisfy any obligations that it may have under FATCA, or to the extent that the Noteholder's

ownership otherwise would cause the Issuer to be subject to withholding tax under FATCA, (A) the Issuer (or its agents on its behalf) is authorized to withhold amounts otherwise distributable to the Noteholder as compensation for any amount withheld from payments to the Issuer as a result of such failure or such Noteholder's ownership, and (B) to the extent necessary to avoid an adverse effect on the Issuer or any other Noteholder as a result of such failure or such Noteholder's ownership, the Issuer will have the right to compel the Noteholder to sell its Notes within thirty (30) calendar days after notice from the Issuer and, if the Noteholder does not sell its Notes within such 30-day period, the Issuer will have the right, without further notice to such Noteholder, to sell such Notes at a public or private sale called and conducted in any manner permitted by law, and to remit the net proceeds of such sale (taking into account any taxes, commissions and expenses incurred by the Issuer in connection with such sale) to the Noteholder as payment in full for such Notes. The terms and conditions of any sale will be determined in the sole discretion of the Issuer and none of the Issuer, the Counterparty or the Indenture Trustee will be liable to any person having an interest in the Notes sold as a result of any such sale or the exercise of such discretion. The Issuer may also assign each such Note a separate CUSIP or ISIN number in the Issuer's sole discretion. Each Noteholder, by its acceptance of an interest in the Notes, agrees to co-operate with the Issuer to effect such transfers.

Noteholders' Investment Could Be Materially Adversely Affected if the Issuer is Deemed To Be Engaged in Business in the United States

The Issuer is an Irish special purpose company which does not file U.S. federal income tax returns. The Issuer expects to operate in such a manner that it is not subject to U.S. federal income tax on its net income. However, if it were determined that the Issuer were engaged in a trade or business in the United States for U.S. federal income tax purposes, and the Issuer had taxable income that was effectively connected with such U.S. trade or business, the Issuer would be subject under the Code, to the regular U.S. corporate income tax on such effectively connected taxable income and to an additional 30% branch profits tax, unless the Issuer is entitled to the benefits of the U.S. tax treaty with Ireland (the "**Irish Treaty**"). If the Issuer is entitled to the benefits of the Irish Treaty, the Issuer will not be subject to U.S. federal income tax on any income determined to be effectively connected with a U.S. trade or business unless that trade or business is conducted through a permanent establishment of the Issuer in the United States and that income is attributable to the permanent establishment. The Issuer is uncertain whether it is entitled to the benefits of the Irish Treaty because of factual and legal uncertainties.

The Issuer intends to operate such that it will not be engaged in a trade or business within the United States for U.S. federal income tax purposes. In this regard, the Issuer will receive an opinion of Willkie Farr & Gallagher LLP, special U.S. tax counsel to the Issuer, based on certain assumptions and representations from the Issuer regarding this Offering and related transactions and the Issuer's intended future operations that, although the matter is not free from doubt, the Issuer will not be treated as being engaged in a trade or business within the United States. However, this opinion is not binding on the IRS or the courts, and no ruling will be sought from the IRS regarding this, or any other, aspect of the U.S. federal income tax treatment of the Issuer. The standards for determining what constitutes being engaged in a trade or business in the United States are not entirely certain, and there can be no assurance that the IRS will not successfully assert that the Issuer is so engaged (or, if the Issuer were eligible for benefits under the Irish Treaty, that the Issuer has a permanent establishment in the U.S.), that the applicable law will not change in a manner inconsistent with this conclusion or that the Issuer will continue to operate in the manner on which this opinion is based.

If the Issuer were found to have income effectively connected with a U.S. trade or business (or, if the Issuer were eligible for the benefits of the Irish Treaty, the Issuer were found to have profits attributable to a U.S. permanent establishment), then the Issuer's ability to make payments on the Notes could be materially adversely affected.

Alternative Characterizations of the Notes and the Transactions of the Issuer

Although there are no relevant authorities that directly address characterization of the Notes or of instruments substantially similar to the Notes for U.S. federal income tax purposes and the matter is not free from doubt, the Issuer intends to take the position that the Notes constitute equity interests in the Issuer for U.S. federal income tax purposes. However, other characterizations are possible. For example, the Notes could be treated as debt obligations of the Issuer, including contingent payment debt instruments for U.S. federal income tax purposes. If the IRS were successful in asserting that the Notes are contingent payment debt instruments, the timing and character of income thereon could be significantly affected. Potential investors are urged to consult their tax advisors with respect to the classification of the Notes for U.S. federal income tax purposes. In addition, as described more fully below, there are a number of other uncertainties relating to the U.S. federal income taxation of the Issuer's transactions, which, depending on the ultimate resolution of such uncertainties, could have adverse tax consequences to a direct or indirect Noteholder who is a U.S. Person (as defined below).

You Will Agree to Treat Your Notes as Equity in the Issuer, and Interests in the Issuer and Non-U.S. Money Market Fund Permitted Investments Are Expected to Be Interests in a PFIC, Which In Either Case Has Potentially Adverse U.S. Tax Consequences

The Issuer intends to treat the Notes as equity interests in the Issuer for U.S. federal income tax purposes. Pursuant to the Indenture, each Noteholder by its purchase of the Notes will acknowledge and agree to treat the Notes as equity interests in the Issuer for U.S. federal income tax purposes and will covenant to take no action inconsistent with such treatment. Under this characterization, the Issuer will constitute a “passive foreign investment company” (“PFIC”) for U.S. federal income tax purposes, and U.S. Noteholders (other than certain U.S. Noteholders that are subject to the rules pertaining to a “controlled foreign corporation” described below) will be considered to be shareholders in a PFIC. Consequently, it is likely to be advisable for a U.S. Noteholder to make a timely election to treat the Issuer as a “qualified electing fund” (“QEF”) with respect to such U.S. Noteholder in the U.S. Noteholder’s first taxable year in which the U.S. Noteholder owns Notes. If a U.S. Noteholder makes a timely QEF election with respect to the Issuer, and is not subject to the rules pertaining to a “controlled foreign corporation” described below, the electing U.S. Noteholder will be required in each taxable year to include in gross income (as translated into U.S. dollars based on the average exchange rate for the Issuer’s taxable year) a pro rata share of the Issuer’s ordinary income and net capital gain, whether or not distributed. It is possible that a U.S. Noteholder, if it does not choose to make a QEF election, may make a mark-to-market election with respect to the Notes; however, it is uncertain whether a U.S. Noteholder could make this election, because a mark-to-market election can only be made with respect to “marketable stock” and it is not clear whether the Notes would constitute “marketable stock” for this purpose. If a U.S. Noteholder were to make a successful mark-to-market election with respect to the Notes, the U.S. Noteholder, in general, would include as ordinary income each year the excess, if any, of the fair market value of the U.S. Noteholder’s Notes at the end of the taxable year over the U.S. Noteholder’s adjusted basis in the Notes.

A U.S. Noteholder that does not make a timely QEF election or mark-to-market election (if available) and is not subject to the rules pertaining to a “controlled foreign corporation” described below, will be required to report any gain on the disposition of any Notes as ordinary income, rather than capital gain, and to compute the tax liability on such gain and any excess distribution received in respect of the Notes as if such items had been earned ratably over each day in the U.S. Noteholder’s holding period for the Notes. An excess distribution is the amount by which distributions during a taxable year in respect of a Note exceed 125% of the average amount of distributions in respect thereof during the three preceding taxable years (or, if shorter, the U.S. Noteholder’s holding period for the Notes). The U.S. Noteholder will be subject to tax on such items at the highest ordinary income tax rate for each taxable year, other than the current year, in which the items were treated as having been earned and will also be liable for a non-deductible interest charge as if such income tax liabilities had been due with respect to each such prior year. In many cases, the U.S. federal income tax on any gain on disposition or receipt of excess distributions is likely to be substantially greater than the tax if a timely QEF election or mark-to-market election is made.

In addition, if the Issuer invests in a Money Market Funds Permitted Investment that is not incorporated in the United States, such Money Market Funds Permitted Investment may constitute a PFIC for U.S. federal income tax purposes, and as a result, a U.S. Noteholder that is, as described above, treated as owning equity in the Issuer would then be treated as a shareholder in such PFIC to the extent of the U.S. Noteholder’s proportionate share of the Money Market Funds Permitted Investment held through the U.S. Noteholder’s interest in the Issuer. Accordingly, a U.S. Noteholder would be subject to the PFIC rules described above with respect to its indirect investment in such Money Market Funds Permitted Investment. A U.S. Noteholder will not be able to make a mark-to-market election with respect to its indirect interest in any Money Market Funds Permitted Investment. Furthermore, a U.S. Noteholder may not be able to obtain the information and documentation that would be required to make a QEF election with respect to such a Money Market Funds Permitted Investment, in which case, a U.S. Noteholder could be subject to the adverse rules described above that apply when a U.S. Noteholder does not make a timely QEF election or a mark-to-market election.

If You Acquire More than 10% of the Total Value of the Notes, CFC Rules May Apply to You

Each “United States shareholder” of a “controlled foreign corporation” (“CFC”) that owns shares in the CFC on the last day of the CFC’s taxable year on which it is a CFC must include in the shareholder’s gross income for United States federal income tax purposes the shareholder’s pro rata share of the CFC’s “subpart F income”, even if the subpart F income is not distributed. The Issuer will constitute a CFC if more than 50% of the equity interests in the Issuer (or more than 25%, if the Issuer is treated as earning income from the issuance of insurance contracts for U.S. federal income tax purposes), measured by reference to the combined voting power or value of the equity of the Issuer, is owned directly, indirectly, or constructively by “United States shareholders”. For these purposes, a United States shareholder is any U.S. person that owns, directly, or indirectly, or constructively, 10% or more of the total combined

voting power of all classes of equity in the Issuer. As noted above, the Indenture requires the Noteholders to agree to take the position that the Notes constitute equity interests in the Issuer for U.S. federal income tax purposes, and there can be no assurance that, under the CFC rules, a Noteholder will not be deemed to hold voting stock of the Issuer, notwithstanding the absence of conventional voting rights in the Notes. Accordingly, U.S. Noteholders who might, directly or through attribution, acquire 10% or more of the Outstanding Principal Amount of the Notes, any class of outstanding Notes issued by the Issuer or of all of the outstanding Notes issued by the Issuer should consider the possible application of the CFC rules.

The classification of the Issuer's income under the Counterparty Contracts and of the Issuer's status as a non-insurance company is uncertain. Reasons for treating the Issuer's income as non-insurance income and the Issuer as a non-insurance company include, among others, that the obligation of the Issuer to make payments to the Counterparty in respect of the Notes is based on an index of industry wide event loss data and estimates and such obligation does not indemnify the Counterparty against the actual loss suffered by the Counterparty. However, there can be no assurance that the IRS will not contend that the Issuer is an insurance company and that it earns income from the issuance of insurance contracts or that a court will not sustain such a contention.

Potential Application of the Related Person Insurance Income Rules

The Issuer intends to treat the Issuer's income with respect to the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes, although the issue is not free from doubt. If, instead, insurance treatment is the appropriate treatment and (i) the Issuer's related person insurance income ("RPII"), determined on a gross basis, is 20% or more of the Issuer's gross insurance income for a taxable year, (ii) direct and indirect insureds and persons related to such insureds, whether or not U.S. Noteholders, are treated as owning (directly or indirectly through entities) 20% or more of the voting power or 20% or more of the value of the Issuer's equity and (iii) U.S. Noteholders are treated as owning (directly, indirectly through non-U.S. entities or constructively) 25% or more of the Issuer's equity by vote or value, then a U.S. Noteholder (directly or indirectly through non-U.S. entities) on the last day of the taxable year on which the Issuer is a CFC under the RPII rules would be required to include in such U.S. Noteholder's gross income for U.S. federal income tax purposes such person's pro rata share of the Issuer's RPII for the portion of the taxable year during which the Issuer was a CFC under the RPII rules, determined as if all such RPII were distributed proportionately only to U.S. Persons (that own equity directly or indirectly through non-U.S. entities) at that date, regardless of whether such income is distributed. RPII is any insurance income attributable to policies of insurance or reinsurance with respect to which the person (directly or indirectly) insured is a RPII shareholder or a related person to such RPII shareholder. The term "**RPII shareholder**" means any U.S. Noteholder who owns (directly or indirectly through non-U.S. entities) any amount of the Issuer's equity. Generally, the term "**related person**" for this purpose means someone who controls or is controlled by the RPII shareholder or someone who is controlled by the same person or persons which control the RPII shareholder. Control is measured by either more than 50% in value or more than 50% in voting power of stock applying certain constructive ownership principles. A non-U.S. corporation will be characterized as a CFC under the RPII rules if its equity is 25% or more owned (by vote or value) by U.S. Persons (directly, indirectly through non-U.S. entities or constructively) on any day during the taxable year of the non-U.S. corporation.

Potential Recharacterization of Gain on Disposition

Code section 1248 provides that if a U.S. Noteholder sells or exchanges shares in a non-U.S. corporation and such person owned, directly, indirectly through non-U.S. entities or constructively, 10% or more of the voting power of the corporation at any time during the five-year period ending on the date of disposition when the corporation was a CFC, any gain from the sale or exchange of the shares will be treated as a dividend to the extent of the CFC's earnings and profits (determined under U.S. federal income tax principles) during the period that the shareholder held the shares and while the corporation was a CFC (with certain adjustments, including reductions for previously taxed income).

Additionally, Code section 1248 in conjunction with the RPII rules provides that if a U.S. Person disposes of shares in a non-U.S. corporation that has insurance income (as determined for U.S. federal income tax purposes) in which U.S. Noteholders own 25% or more of the shares (even if the amount of gross RPII is less than 20% of the corporation's gross insurance income and the ownership of its shares by direct or indirect insureds and related persons is less than the 20% threshold), any gain from the disposition will generally be treated as a dividend to the extent of the holder's share of the corporation's undistributed earnings and profits that were accumulated during the period that the holder owned the shares (whether or not such earnings and profits are attributable to RPII). If U.S. Noteholders own (directly, indirectly through non-U.S. entities or constructively) 25% or more of the Issuer's equity, these RPII rules would apply to dispositions of Notes if the Issuer's income is characterized as insurance income, in which case gain from the disposition earned by U.S. Persons holding Notes directly would be characterized as a dividend to the extent of

the Issuer's earnings and profits attributable to the disposed of Notes. As noted above, the Issuer intends to treat its income from the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes. Noteholders that have made timely QEF elections should generally not be subject to such income recharacterization with respect to their allocable share of the Issuer's earnings and profits previously subject to tax pursuant to such election. Potential investors are urged to consult their tax advisors.

Potential Unrelated Business Taxable Income

As noted above, the Issuer intends to treat the Issuer's income with respect to the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes, although the issue is not free from doubt. A U.S. tax-exempt organization may recognize unrelated business taxable income if the Issuer is characterized as earning insurance income and a portion of the Issuer's insurance income is allocated to the organization. In general, insurance income will be allocated to a U.S. tax-exempt organization if either the Issuer is a CFC and the tax-exempt Noteholder is a U.S. 10% Shareholder or there is RPII and certain exceptions do not apply.

Potential FBAR Reporting and Reporting of "Specified Foreign Financial Assets"

U.S. Noteholders should consider their possible obligation to file a FinCEN Form 114 - Report of Foreign Bank and Financial Accounts - with respect to the Notes. Additionally, such U.S. Noteholders should consider their possible obligations to annually report certain information with respect to the Issuer with their U.S. federal income tax returns. Noteholders should consult their tax advisors with respect to these or any other reporting requirement which may apply with respect to their acquisition of Notes.

Changes in U.S. Federal Income Tax Law

It is possible that legislation could be introduced and enacted by the current Congress or future Congresses that could have an adverse impact on the Issuer or the Noteholders.

Additionally, the U.S. federal income tax laws and interpretations regarding whether a company is a PFIC, or whether U.S. Persons would be required to include in their gross income the subpart F income or RPII of a CFC, are subject to change, possibly on a retroactive basis. New regulations or pronouncements interpreting or clarifying such rules may be forthcoming. The Issuer cannot be certain if, when or in what form such regulations or pronouncements may be provided and whether such guidance will have a retroactive effect. Prospective investors are urged to consult with their tax advisors.

The Issuer and/or Noteholders could be subject to a European Union financial transaction tax

The European Commission has published a proposal for a Directive for a common financial transaction tax ("FTT") in Austria, Belgium, Estonia, France, Germany, Greece, Italy, Portugal, Slovenia, Slovakia and Spain (the "Participating Member States").

The proposed FTT has very broad scope and could, if introduced in its current form, apply to certain dealings in the Notes (including secondary market transactions) and/or the Issuer's holding of Permitted Investments in certain circumstances.

Under current proposals, the FTT could apply to persons both within and outside of the Participating Member States. Generally, it would apply to certain dealings in the Notes or Permitted Investments where at least one party is a financial institution, and at least one party is established in a Participating Member State. A financial institution may be, or be deemed to be, "established" in a Participating Member State in a broad range of circumstances, including by transacting with a person established in a Participating Member State. The proposed minimum rate of tax is 0.1% of the consideration in relation to securities or 0.01% of the notional amount in relation to a derivative.

The FTT proposal remains subject to negotiation between the participating Member States and could be implemented in a form with more limited scope and/or become subject to legal challenge. Additional EU Member States may decide to participate. The FTT is planned to be introduced by 1 January 2016.

The introduction of the FTT in its current or similar form could have an adverse effect on the Issuer's economic performance. Prospective Noteholders are also advised to seek their own professional advice in relation to the FTT and the possible FTT consequences to them of subscribing, purchasing, holding and disposing of the Notes.

No Retention of a Material Net Economic Interest for the Purposes of Capital Requirements Regulation and Similar Provisions

Articles 404 – 410 of the Capital Requirements Regulation applies, in general, to securitizations issued on or after January 1, 2011 as well as certain existing securitizations issued prior to that date where new assets are added or substituted after December 31, 2014. The Capital Requirements Regulation restricts a credit institution or investment firm authorized in a Member State of the EEA and consolidated group affiliates thereof (each, an “**Affected Investor**”) from investing in a securitization (as defined by the Capital Requirements Regulation) unless the originator, sponsor or original lender in respect of that securitization has explicitly disclosed to the Affected Investor that it will retain, on an ongoing basis, a material net economic interest of not less than 5 percent in that securitization in the manner contemplated by Article 405 of the Capital Requirements Regulation. The Capital Requirements Regulation also requires that an Affected Investor be able to demonstrate that it has undertaken certain due diligence in respect of, amongst other things, each securitization position in which it is invested, and that procedures have been established for monitoring the performance of the underlying exposures on an on-going basis. Failure by an Affected Investor to comply with one or more of the requirements of Articles 404-410 of the Capital Requirements Regulation in relation to any applicable investment may result in the imposition of a penal capital charge or an increased risk-weighting applying with respect to the investment made in the securitization by an Affected Investor.

Article 17 of AIFMD (as supplemented by Article 5 of Commission Delegated Regulation (EU) No 231/2013 (“**AIFMR**”)) contains requirements similar to those set out in Articles 404 – 410 of the Capital Requirements Regulation and applies to EEA authorised alternative investment fund managers. Article 135 of Directive 2009/138/EC (as supplemented by Articles 254 - 257 of Commission Delegated Regulation (EU) 2015/35 (the “**Delegated Regulation**”)) also contains requirements similar to those set out in Articles 404 – 410 of the Capital Requirements Regulation and applies to EEA authorised insurers and reinsurers. Similar risk retention requirements are to apply to EEA undertakings for collective investment in transferable securities subject to the adoption of secondary legislation. For the purpose of this provision, all such requirements, together with the Articles 404 – 410 of the Capital Requirements Regulation, are referred to as the “**Securitization Retention Requirements**”.

For the purposes of Articles 404 – 410 of the Capital Requirements Regulation Article 5 of the AIFMR and Articles 254-257 of the Delegated Regulation, “securitization” is defined as a “transaction or scheme, whereby the credit risk associated with an exposure or pool of exposures is trashed, having both of the following characteristics: (a) payments in the transaction or scheme are dependent upon the performance of the exposure or pool of exposures; and (b) the subordination of tranches determines the distribution of losses during the ongoing life of the transaction or scheme”. It is currently not settled whether event risk linked notes such as the Notes, which are *inter alia* exposed to the credit risk on the eligible investments, constitute a securitization position for the purposes of the Articles 404 – 410 of the Capital Requirements Regulation, Article 5 of the AIFMR and Articles 254-257 of the Delegated Regulation. Investors should be aware that the regulatory capital treatment of any investment in the Notes will be determined by the interpretation which an investor’s regulator places on the provisions of the Securitization Retention Requirements. Prospective investors should therefore be aware that should the relevant investor’s regulator interpret the regulations such that the Securitization Retention Requirements do apply to an investment in the Notes, significantly higher capital charges may be applied to that investor’s holding. Some uncertainty remains as to which transactions are subject to Articles 404-410 of the Capital Requirements Regulation, Article 5 of the AIFMR and Articles 254-257 of the Delegated Regulation and there can be no assurance that the Notes do not constitute a securitization position for the purposes of the Articles 404-410 of the Capital Requirements Regulation, Section 5 of the AIFMR and Articles 254-257 of the Delegated Regulation.

No originator, sponsor or original lender (as such terms are used in the Securitization Retention Requirements) in respect of the Permitted Investments or the Notes nor any party to the transaction has retained or committed to retain any material net economic interest in the transaction for purposes of the Securitization Retention Requirements or take any other action which may be required by investors for the purposes of their compliance with the Securitization Retention Requirements. Each prospective investor in the Notes to whom the Securitization Retention Requirements might apply should consult its legal advisors to determine the applicability of such requirements to its investment in the Notes. None of the Issuer, the Counterparty, the Initial Purchasers or any other party to the transaction makes any representation to any prospective investor or purchaser of the Notes regarding the regulatory capital treatment of their investment in the Notes now or at any time in the future.

If applicable, the Securitization Retention Requirements may negatively impact the regulatory position of individual investors and, in addition, have a negative impact on the price and liquidity of the Notes in the secondary market. No assurance can be given that further changes will not be made to the Securitization Retention Requirements which could impact holders of the Notes.

Other Risks

The Issuer believes that the risks described above are the principal risks inherent in the transaction for the Noteholder, but the inability of the Issuer to pay interest, principal or other amounts on or in connection with the Notes may occur for other reasons and the Issuer does not represent that the above statements regarding the risk of holding the Notes are exhaustive. Although the Issuer believes that the various structural elements described in Offering Circular lessen some of these risks for the Noteholders, there can be no assurance that these measures will be sufficient to ensure payment to Noteholders of interest, principal or any other amounts on or in connection with the Notes on a timely basis or at all.

THE FOREGOING FACTORS ARE NOT EXHAUSTIVE AND DO NOT PURPORT TO BE A COMPLETE EXAMINATION OF ALL THE RISKS AND CONSIDERATIONS INVOLVED IN INVESTING IN THE ISSUER. IN PARTICULAR, THE ISSUER'S PERFORMANCE MAY BE AFFECTED BY CHANGES IN MARKET OR ECONOMIC CONDITIONS AND LEGAL, REGULATORY AND TAX REQUIREMENTS.

THE ISSUER

General

The Issuer is an Irish special purpose company incorporated as a private company with limited liability. The Issuer was incorporated under the laws of Ireland on August 7, 2014 under company number 547693. All of its issued share capital is held in trust for charitable purposes by or on behalf of Deutsche International Finance (Ireland) Limited.

The Issuer's business consists solely of the issuance of the Notes, the entering into and performance of the Counterparty Contracts and related agreements and activities, including the acquisition and holding of Permitted Investments. The Issuer does not, and does not intend to, engage in any other business, incur indebtedness for money borrowed (other than the Notes), pay dividends or make other distributions on its capital (other than a distribution upon liquidation of the Issuer) or enter into any derivative contract or any other risk transfer contract other than the Counterparty Contracts. The Issuer does not and does not intend to conduct business activities in the United States. The Issuer's only office and operations are in Ireland. It is expected that, after all obligations of the Issuer have been satisfied, the directors of the Issuer will recommend to the shareholders of the Issuer that the Issuer be voluntarily wound up with a view toward the distribution of any remaining assets thereof to such shareholders. The Issuer has no subsidiaries and is not a part of any group of companies.

The Issuer's registered office is situated at 6th Floor, Pinnacle 2, Eastpoint Business Park, Dublin 3, Ireland, Ireland, its telephone number is +353(1)680-6000, its facsimile number is +353(1)680-6050, and its email address is corporate.services@db.com.

Share Capital and Share Trustee

The authorized share capital of the Issuer is €1,000 divided into 1,000 ordinary shares of €1.00 each, and one share of €1.00 has been issued and is fully paid up. The issued share is held by Deutsche International Finance (Ireland) Limited, as share trustee (the “**Share Trustee**”). Under the terms of a declaration of trust (the “**Share Declaration of Trust**”), the Share Trustee will hold the issued share in trust for one or more charitable objects (as set forth in the Share Declaration of Trust). The Share Trustee has no beneficial interest and derives no benefit from its holding of the issued share.

Capitalization

The following table illustrates the capitalization of the Issuer, as of the date indicated, assuming and giving effect to the issuance of the Notes and the ordinary shares of the Issuer as of the Issuance Date. All amounts are in euro.

	As of the Issuance Date
	(unaudited)
Debt:	
Class A Notes due January 8, 2020	€135,000,000
Class B Notes due January 8, 2020.....	€150,000,000
Total Debt	€285,000,000
Shareholders' equity:	
Ordinary Shares (€1.00 par value; €1,000 authorized; €1.00 issued and outstanding)...	€1
Total Shareholders' Equity	€1
Total Capitalization	€ 285,000,001

Delegation of Duties as Commodity Pool Operator and other Duties under the Commodity Exchange Act and EMIR

As at the date of this Offering Circular, each member of the Issuer's Board has delegated its duties as CPO to the Manager. The Manager has filed a notice of claim of exemption from registration with the CFTC as a CPO with respect to the Issuer pursuant to CFTC Rule 4.13(a)(3) in reliance on the relief provided in CFTC Letter No. 14-152 (the "CFTC Letter"). As a result, the Manager is not subject to any of the disclosure, reporting and recordkeeping requirements of a registered CPO.

In addition, pursuant to a separate agreement, the Issuer has delegated to SRRSC certain swap-reporting obligations the Issuer may have if it is considered a U.S. Person under the Commodity Exchange Act, and has delegated to SRCML certain swap-reporting obligations of the Issuer under EMIR. The Issuer will indemnify SRRSC and SRCML against certain losses in relation to these agreements.

Financial Statements; Independent Auditors and Reports

The Issuer's financial statements will be audited annually by the Auditor. Mazars Dublin, Harcourt Centre, Block 3, Harcourt Road, Dublin 2, Ireland has been initially appointed as the Auditor. The Auditor is a member of the Institute of Chartered Accountants in Ireland and also serves as the auditor for other members of the AXA group. The Issuer intends to prepare its annual financial statements in accordance with IFRS. The Auditor has neither examined, reviewed nor compiled the accompanying historical, statistical or modeling data, and, accordingly, the Auditor does not express an opinion or any other form of assurance with respect thereto.

The financial year-end of the Issuer is December 31 of each year. The first annual accounts will be prepared in respect of the period ending December 31, 2015, which will be filed with the Irish Companies Registration Office. Since the date of incorporation, the Issuer has not commenced operations and no financial statements have been prepared as at the date of this Offering Circular.

Directors

The Issuer's board of directors (the “**Board**”) consists of two directors, being Connor Blake, who was nominated by the Manager, and Frank Ennis who acts as an independent director. Frank Ennis is independent of, and not related to, the Counterparty or any of its affiliates.

Name	Address	Title	Biography
Connor Blake	6th Floor, Pinnacle 2, Eastpoint Business Park, Dublin 3, Ireland	Director	Mr. Blake is a director of a number of Deutsche Bank companies and previously was Branch Manager of Deutsche Bank AG Dublin Branch. He spent a number of years with Morgan Stanley in London as a financial controller prior to joining Deutsche Bank in Ireland in 2001. He is a chartered management accountant with a Masters in Business Studies and Bachelor of Commerce degree from University College Dublin.
Frank Ennis	39 Northumberland Road Ballsbridge Dublin 4, Ireland	Director	Partner, PricewaterhouseCoopers (1985-2000); Joint CEO and Board Director, Trinity Technology Limited (2000-2001); Independent Corporate Finance Consultant (2001-present); Fellow of the Institute of Chartered Accountants in Ireland. Mr. Ennis has been appointed as an independent director for the following entities affiliated with the AXA group: AXA Private Equity Early Funds of Funds (Ireland) plc, AXA Rosenberg Management Limited, Europe/Americas Select Private Equity (Ireland) I p.l.c. (currently in liquidation) and Europe/Americas Select Private Equity (Ireland) II p.l.c. Mr. Ennis has also previously been retained by the AXA group to serve on the boards of prior AXA group securitization vehicles, including Aura Reinsurance p.l.c. and Osiris Capital p.l.c.

The Board has overall responsibility for the management and control of the Issuer. The company secretary of the Issuer is Deutsche International Corporate Services (Ireland) Limited, 6th Floor, Pinnacle 2, Eastpoint Business Park, Dublin 3, Ireland, Ireland.

Manager

Deutsche International Corporate Services (Ireland) Limited is the manager of the Issuer. Its duties include the provision of certain administrative, accounting, company secretarial and related services. The business address of the Manager is: 6th Floor, Pinnacle 2, Eastpoint Business Park, Dublin 3, Ireland, Phone: +353(1)680-6000, Fax: +353(1)680-6050, E-mail: corporate.services@db.com.

Expense Account

The Issuer will maintain a distinct expense account (the “**Expense Account**”) in which amounts which are required to be paid to the Manager, the Indenture Trustee, the Paying Agent, the Note Registrar, any Calculation Agent and other agents and service providers of the Issuer, and certain other fees, taxes and expenses will be held. The Expense Account will not be part of the Collateral for any Class of Notes and amounts held in the Expense Account will not be available to pay principal and interest.

Ongoing Information Regarding the Issuer

The Issuer is not subject to the informational requirements of the Exchange Act. The Issuer agrees that at any time the Notes are outstanding, it will furnish the Noteholders or prospective purchasers designated by such Noteholders (provided that such prospective purchasers are permitted transferees) the Rule 144A Information, the Available Information and any other information required by law.

The Issuer is required to make public filings of its financial statements and accounts with the Registrar of Companies in Ireland on a periodic basis.

PURPOSE OF THE OFFERING

The purpose of the Offering of the Notes described herein is to provide the Issuer with funds in order to provide the Counterparty with protection against Mortality Events as further described in this Offering Circular. For the avoidance of doubt, the Issuer shall not provide, nor shall it be deemed to be providing, any insurance or reinsurance to the Counterparty.

USE OF PROCEEDS AND PERMITTED INVESTMENTS

On or about the Business Day following the Issuance Date, the proceeds of each Class of Notes will be used by the Issuer to purchase the EBRD Notes, which will be deposited in the Collateral Account for such Class of Notes. The EBRD, under its Global Medium Term Note Programme, will agree, subject to the terms and conditions of a programme agreement dated July 3, 2012, to which SRCML will accede and become a party pursuant to a dealer accession letter to be entered into, to sell to SRCML, as dealer, a principal amount of EBRD Notes equal to the Original Principal Amount on the Issuance Date of the applicable Class of Notes. SRCML will, in turn, sell the EBRD Notes to the Issuer, and the Issuer will purchase the EBRD Notes using the proceeds from the issue of each respective Class of Notes. If the EBRD fails to issue the applicable EBRD Notes to SRCML, as dealer of the EBRD Notes, or if SRCML fails to purchase the EBRD Notes or to deliver them to the Issuer within six (6) Business Days following the Issuance Date, the proceeds from the issuance of the applicable Class of Notes will be invested in applicable Money Market Funds Permitted Investments, if available, or remain uninvested and held in cash instead of the EBRD Notes (see “*Risk Factors—Risks Relating to the EBRD Notes*” and “*—Money Market Funds Permitted Investments*” for a description of risks associated with EBRD Notes and Money Market Funds Permitted Investments, as well as “*Risk Factors—Permitted Investments—Risks relating to Permitted Investments held in cash*” for risks associated with Permitted Investments held in cash).

For each Class of Notes, beginning on the Business Day immediately following the Issuance Date up to and including the Business Day immediately prior to the applicable Redemption Date, the collateral for such Class will consist only of EBRD Notes unless (i) such EBRD Notes are not successfully delivered to such Collateral Account for any reason within six (6) Business Days following the Issuance Date, (ii) an EBRD Put Event occurs with respect to such Class which results in a full redemption of the EBRD Notes being held as collateral for such Class, in which case, unless the proceeds of such redemption are scheduled to be paid out within three (3) Business Days of being deposited in the related Collateral Account, such proceeds will be used to purchase any available Money Market Funds Permitted Investments, (iii) a Counterparty Payment is received by the Issuer pursuant to the Counterparty Contract for such Class, in which case the related amounts will be used to purchase any available Money Market Funds Permitted Investments, or (iv) the EBRD Notes being held as collateral for such Class are wholly or partially redeemed in order to make a Loss Payment for such Class or to be used as a Partial Repayment Amount for such Class. To the extent that any of the foregoing has occurred the applicable proceeds will be held in cash.

The scheduled maturity of EBRD Notes for each Class of Notes is January 6, 2023. At the option of the Issuer, the EBRD Notes for a Class of Notes can be wholly or partially redeemed at par (in minimum denominations of €1,000 per note, as applicable) effective on any related EBRD Coupon Payment Date starting on the first EBRD Coupon Payment Date following the related Issuance Date upon not less than five (5) Business Days prior written notice to the EBRD. Any failure of the EBRD to redeem EBRD Notes for a Class of Notes in whole or in part upon the delivery of an EBRD Put Notice for any reason could result in the Issuer not having sufficient funds on the related Redemption Date to repay the related Outstanding Principal Amount to Noteholders.

The EBRD Notes will be denominated in euro and will bear an interest rate equal to the EBRD Interest Rate.

In connection with the EBRD Notes, the EBRD Interest Rate will be equal to EURIBOR determined by the EURIBOR Calculation Agent in accordance with the terms and conditions of the EBRD Notes using a designated maturity of three (3) months, minus (i) with respect to the EBRD Notes purchased with the proceeds of the Class A Notes, 43.5 basis points and (ii) with respect to the EBRD Notes purchased with the proceeds of the Class B Notes, 44.5 basis points (but in no event shall the EBRD Interest Rate with respect to either Class of Notes be less than zero); *provided*, that for the Accrual Period immediately preceding the First Payment Date and the Final Extended Redemption Date (if applicable), EURIBOR will be determined by the EURIBOR Calculation Agent using straight-line linear interpolation.

Under the terms of EBRD Notes for each Class of Notes, interest on EBRD Notes in respect of each related Payment Date will accrue from, and including, the immediately preceding related Payment Date (or the related EBRD Notes Issuance Date in the case of the related First Payment Date) to, but excluding, such Payment Date, except that in connection with the redemption or partial redemption of the EBRD Notes, interest from the EBRD to the Issuer with respect to such EBRD Notes will be paid on such redemption date and will accrue up to, but excluding, such redemption date.

RATINGS

It is expected that, on the Issuance Date, the Class A Notes will have a Rating of BB+ (sf) and the Class B Notes will have a Rating of BB (sf) by the Rating Agency.

Each Rating, if obtained, will address the likelihood that the Noteholders of the related Class of Notes will receive timely payment of interest and ultimate payment of the principal amount of such Class on the related Redemption Date. However, the Rating Agency will not evaluate, and each Rating will not address, the likelihood of payment of the principal amount of any Class by the Scheduled Redemption Date of such Class. The Ratings will not be recommendations to purchase, hold or sell any Notes of any Class. The Ratings will not comment as to the market price, fair market value, or suitability for a particular investor of any Notes of any Class, nor do they address the likelihood that a Noteholder will be able to sell such Notes. Each Rating will be based on the then-current information furnished to the Rating Agency by the Issuer and/or the Counterparty, and such other information, if any, that the Rating Agency may obtain from other sources including, but not limited to, RMS. The Ratings, if obtained, may be changed, suspended or withdrawn at any time as a result of changes in, or the unavailability of, certain information, including information that is outside the control of, and unknown to, the Issuer or the Counterparty.

In addition to the expected rating set forth herein, other NRSROs that have not been engaged to rate the Notes may nevertheless issue Unsolicited Ratings on the Notes, relying on information they receive pursuant to Rule 17g-5 under the Exchange Act. If any such Unsolicited Ratings are issued, no assurance is made that they will be equivalent to the ratings assigned by a hired Rating Agency. See “*Risk Factors—Risks Relating to Ratings and Rating Agencies—Rating Agencies May Have Certain Conflicts of Interest; and the Notes May Receive an Unsolicited Rating, Which May Have an Adverse Effect on the Liquidity or the Market Price of the Notes*”.

THE COUNTERPARTY

AXA Global Life is a wholly owned subsidiary of AXA and an internal AXA Group reinsurance company that oversees AXA Group’s global life operations.

The offices of AXA Global Life are located at 40, rue du Colisée, 75008 Paris, France.

Prospective investors should consider carefully the information set forth under the caption “*Risk Factors—Risks Relating to the Counterparty*” before making an investment in the Notes.

SUMMARY OF CERTAIN DOCUMENTS

The following summaries describe, for each Class of Notes, the material terms of (i) the Counterparty Contract, (ii) the Calculation Agent Agreement, (iii) the Deed of Charge, (iv) the Custody Agreement, (v) the Counterparty Deeds of Charge, (vi) the Management Agreement and (vii) the Reimbursement Agreement. The summaries do not purport to be complete and are subject to, and are qualified in their entirety by reference to, all of the provisions of the Selected Transaction Documents, including the definitions contained therein of certain terms.

The Selected Transaction Documents may be obtained upon request to the Issuer as specified in the “*Available Information*” section of this Offering Circular.

Counterparty Contract

On the Issuance Date, the Issuer will enter into a separate financial contract with the Counterparty for each Class of Notes, referred to herein as a Counterparty Contract.

The Counterparty Contract for each Class of Notes will be exposed to the reporting of Deaths by the relevant Reporting Sources for each Country within the Covered Area and for each Calendar Year within the applicable Risk Period.

For each Counterparty Contract, the Risk Period will commence on January 1, 2015 and continue up to and including the earlier of (i) December 31, 2019 or (ii) in the event of an Early Redemption Event or an Optional Redemption with respect to such Class of Notes, December 31 of the Calendar Year immediately preceding such Early Redemption Event, or Optional Redemption.

Each Counterparty Contract will provide for payments following the occurrence of certain Mortality Events as described in this Offering Circular. Each Counterparty Contract (i) will require the Issuer to make Loss Payments to the Counterparty equal to any Event Payment greater than zero and (ii) will require the Counterparty to make Counterparty Payments to the Issuer equal to the absolute value of any Event Payment less than zero. Any Loss Payment or Counterparty Payment will be made on the date or dates specified in the applicable Counterparty Contract.

The aggregate of all Loss Payments to be made by the Issuer to the Counterparty under a Counterparty Contract (net of aggregate Counterparty Payments, if any) may not exceed the Original Principal Amount of the related Class of Notes, as reduced by any Partial Repayment Amount. Each Counterparty Contract will be documented on the basis of an ISDA Master Agreement, and a schedule and confirmation thereunder, to be entered into between the Counterparty and the Issuer and will be governed by New York law.

Periodic Payments

The Counterparty will be obligated to make or cause to be made the following Periodic Payments to the Issuer under the Counterparty Contract for each Class of Notes, which will be calculated with respect to each Accrual Period:

(i) from, and including, the Issuance Date up to and including the earliest of the Early Redemption Date, the Optional Redemption Date and the Scheduled Redemption Date for such Class of Notes, as the case may be, an amount equal to the Interest Spread Amount for such Class and for such Accrual Period;

(ii) during the Extension Period, if any, up to and including the Extended Redemption Date of such Class, an amount equal to the applicable Extension Spread Amount of such Class for such Accrual Period (each payment under (i) and (ii), is referred to herein as an Interest Periodic Payment and collectively, the Interest Periodic Payments);

(iii) the Early Redemption Event Premium due for such Class of Notes, if applicable; and

(iv) the Optional Redemption Event Premium due for such Class of Notes, if applicable.

Each Interest Periodic Payment will be deposited by the Counterparty into the Interest Deposit Account and will be transferred by the Indenture Trustee into the Interest Payment Account on the third (3rd) Business Day preceding the applicable Payment Date.

Each payment referred to in (iii) and (iv) above, if applicable, will be deposited by the Counterparty into the Interest Payment Account on the third (3rd) Business Day preceding such Payment Date.

Early Termination

Each Counterparty Contract may be terminated early at the option of the Counterparty if a Clean-Up Termination Event, Reporting Source Failure Event, Service Provider Failure Event, Change in Law Event, Counterparty Tax Event, Supplemental Expenses Termination Event or EBRD Termination Event occurs in respect of such Counterparty Contract.

In addition to the foregoing termination events, each Counterparty Contract will provide for early termination thereof at the option of the non-defaulting, non-affected or, in certain circumstances, affected party, only in certain limited circumstances, which include: (i) a payment default by the Issuer or the Counterparty thereunder, (ii) insolvency with respect to the Issuer or the Counterparty, (iii) a merger by the Counterparty with or into another entity, if the surviving entity fails to assume the obligations of the Counterparty under the relevant Counterparty Contract, (iv) illegality of the Counterparty Contract with respect to either the Counterparty or the Issuer, (v) the occurrence of a change in tax law or the interpretation thereof resulting in a deduction or withholding with respect to any amounts payable under the relevant Counterparty Contract in respect of which the Counterparty receives or will receive amounts net of certain withholding taxes, and (vi) a merger by the Counterparty with or into another entity, if such merger results in a deduction or withholding with respect to any amounts payable under the relevant Counterparty Contract in respect of which the Issuer is required to pay additional amounts or receive amounts net of certain withholding taxes. Any early termination of the relevant Counterparty Contract resulting from any of clauses (i) through (vi) will not trigger any mark-to-market termination payment and in lieu thereof, the Counterparty and the Issuer will only be obligated to pay their respective accrued payments through the Early Redemption Date which would have otherwise been payable for the period from, and including, the “Early Termination Date” of the relevant Counterparty Contract, until the Redemption Date. In the event that the Counterparty fails to pay any such amount, then the Issuer will be unable to pay the Noteholders the Interest Spread Amount, Extension Spread Amount, Early Redemption Event Premium and/or Optional Redemption Event Premium, as applicable, due on the Redemption Date following such termination of the relevant Counterparty Contract.

If a Counterparty Contract is terminated prior to the Scheduled Redemption Date of the respective Class of Notes as a result of a payment default of the Counterparty thereunder, the Early Redemption Event Premium for such Class will be payable on the Early Redemption Date (for more information, see *“Overview—Offering of Notes—Early Redemption Events—Early Redemption Event Premium”*).

Optional Termination

Under each Counterparty Contract, the Counterparty may elect to terminate such Counterparty Contract early by providing written notice of such election to the Issuer and the Indenture Trustee at least ten (10) Business Days prior to the applicable Optional Redemption Date (or, if any such day is not a Business Day, the next succeeding Business Day). In the event of any such optional termination, the Counterparty will be required to make a payment to the Issuer under such Counterparty Contract in an amount equal to the applicable Optional Redemption Event Premium.

Extension

The Counterparty may at its option, by issuing an Extension Notice, require the Issuer to extend the term of a Counterparty Contract (and also the maturity of the corresponding Class of Notes) beyond the applicable Scheduled Redemption Date to one or more Extended Redemption Dates, but no later than the Final Extended Redemption Date. In addition, the Counterparty will be obligated to require the Issuer to extend the term of a Counterparty Contract (and also the maturity of the corresponding Class of Notes) beyond the applicable Scheduled Redemption Date to a date that is no later than the Final Extended Redemption Date in certain circumstances if a Minimum Development Period remains in effect. Any extension of the term of a Counterparty Contract (and the maturity of a Class of Notes) will not have the effect of extending the relevant Risk Period.

Governing Law

The Counterparty Contract for each Class of Notes will be documented using an ISDA Master Agreement and a schedule and confirmation thereunder, and will be governed by and construed in accordance with the laws of the State of New York.

Calculation Agent Agreement

On the Issuance Date, the Issuer will enter into the Calculation Agent Agreement with Risk Management Solutions, Inc., as the Calculation Agent, pursuant to which the Calculation Agent shall perform certain services, including in connection with the preparation and delivery of an Event Report as described below.

The Counterparty may, by giving an Event Notice, instruct the Calculation Agent to determine, among other things and in accordance with certain procedures specified in the Calculation Agreement, the relevant Mortality Index Value(s), the relevant Annual Country Percentage(s), the Aggregate Percentage and the Event Payment with respect to one or more Countries and Calendar Years.

The Calculation Agent will be required to submit an Initial Event Report to the Issuer and the Counterparty (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) no later than the Initial Event Reporting Date, which is the fifteenth (15th) Business Day prior to the first Payment Date after the date the applicable Event Notice is issued or, if such Initial Event Report is available sooner for submission, promptly following such earlier date, using the most recent available Sufficient Data available during the preparation of such Initial Event Report; provided, that, if such Event Notice is issued less than thirty (30) Business Days prior to a Payment Date, the Initial Event Reporting Date will be the fifteenth (15th) Business Day prior to the Payment Date immediately succeeding such Payment Date; provided, further, that if such Event Notice is issued less than thirty (30) Business Days but more than twenty-two (22) Business Days prior to the applicable Redemption Date, the Calculation Agent will be required to submit the Initial Event Report no later than three (3) Business Days prior to such Redemption Date.

Thereafter, the Calculation Agent shall continue to issue an Event Report for each applicable Country and Calendar Year specified in an Event Notice at least fifteen (15) Business Days prior to each subsequent Payment Date or, if such Event Report is available sooner for submission, promptly following such earlier date, until and including the earlier of (i) the first Payment Date on which the Final Data for all applicable Countries and Calendar Years specified in an Event Notice is included in an Event Report and (ii) the last Event Reporting Date prior to the Redemption Date, in each case using the most recent Sufficient Data available during the preparation of such Event Report; *provided*, that the Calculation Agent shall not be required to provide an Event Report with respect to a subsequent Payment Date unless on or before the thirtieth (30th) Business Day prior to the applicable subsequent Payment Date, new or revised Sufficient Data has been reported by the Reporting Source in addition to the Data on which the most recent prior Event Report was based; *provided, further*, in the case of the Final Extended Redemption Date, the applicable Subsequent Event Reporting Date will be three (3) Business Days prior to the Final Extended Redemption Date.

From time to time, due to changes in reporting or in the case where Preliminary Data is used, a Reporting Source may report Mortality Rates, Deaths, or Population on a different basis from that used for the RMS Expert Risk Analysis Report attached hereto. Below are guidelines for the Calculation Agent for possible Basis Changes:

(i) **Different Grouping Method:** If data is grouped in more age or gender categories than what was used for the purposes of the RMS Expert Risk Analysis Report, Deaths and Population figures for such year(s) will be combined to match earlier categories used for the RMS Expert Risk Analysis Report. If data is grouped in fewer age or gender categories than what was used for the purposes of the RMS Expert Risk Analysis Report, such specified Index Weights (as defined in Appendix B) for the calculation of the Mortality Index from the earlier categorizations will be combined to allow a consistent comparison basis for the Reporting Source.

(ii) **Regions:** Except as set forth in this subsection (ii), no adjustment will be made to the definitions of France, Japan or the United States regardless of any annexation or cession of territory.

If any annexation of territory occurs with respect to any Country, the Calculation Agent will, to the extent possible, exclude the Data for such annexed territory in calculating a Mortality Index Value for such Country.

If a region is not reported due to a failure by the Reporting Source to obtain necessary data, then that Country will be considered Unreported unless reported regions comprise at least 95% of such Country's Population based on the most recent one-year period of full reporting. However, from, but not including, twenty-four (24) months following the end of a Calendar Year, if such failure to obtain necessary Data with respect to such Calendar Year arises due to a cession of territory from a Country, and no Alternative Data is available, the Calculation Agent will exclude such ceded territory from the applicable Country when calculating the applicable Mortality Index Value and the exclusion of such territory will not prevent such Country from becoming Reported.

Should the reporting basis for any region in any Country change (other than with respect to an annexation or cession), the Calculation Agent, to the extent possible, shall exclude Data with respect to such change of basis when calculating the Mortality Index Value to allow for a reasonably consistent comparison basis. Only if excluding such Mortality Rates for any region in such Country is not possible shall the Calculation Agent include them in such Country.

(iii) Reporting Period for Data relating to Deaths: If the Reporting Source changes the annual reporting period of Data relating to Deaths in a Calendar Year, the Calculation Agent will use Data relating to Deaths in the following order of priority:

(A) Deaths reported on a monthly basis such that the Calculation Agent will aggregate Deaths for each monthly period across a Calendar Year.

(B) Deaths reported on an annual basis which does not correspond to a Calendar Year basis such that if (a) the annual reporting period begins on or before June 30 of a Calendar Year, the Calculation Agent will use Deaths for such annual reporting period as the Deaths for such Calendar Year, and (b) if the annual reporting period begins on or after July 1 of a Calendar Year, the Calculation Agent will use Deaths for such annual reporting period as the Deaths for the Calendar Year immediately following such Calendar Year; provided, that Data relating to Deaths for an annual reporting period where part of such annual reporting period is not within the Risk Period shall not be used in the calculation of an Annual Country Percentage for the related Country and Calendar Year and such Annual Country Percentage shall be deemed to be equal to zero.

Notwithstanding clauses (i) – (iii) above, where Basis Changes have occurred with respect to any year and it is not reasonably possible to disregard such changes, the Calculation Agent will attempt to adjust any Mortality Index Value and the related Reference Index Value as necessary to achieve a reasonably consistent comparison basis between each applicable Calendar Year and the Index Reference Year, where the available Data would permit this.

All factual determinations made by the Calculation Agent in an Event Report prepared and delivered shall be final and binding on the Issuer and the Counterparty, absent manifest error or manifest breach by the Calculation Agent of the Calculation Agent Agreement. In the event of manifest error in any Event Report for any Class of Notes or manifest breach by the Calculation Agent in the performance of its duties under the Calculation Agent Agreement, such Event Report shall not be effective and no Loss Payment or Counterparty Payment shall occur as a result thereof. For the avoidance of doubt, the relevant Loss Payment or Counterparty Payment shall occur in accordance with the terms of the related Counterparty Contract when such manifest error or breach has been cured by the Calculation Agent in accordance with the Calculation Agent Agreement.

If the appointment of the Calculation Agent under the Calculation Agent Agreement has been terminated, no termination of the Calculation Agent Agreement, or other resignation or removal of the Calculation Agent, and no appointment of a successor Calculation Agent, will become effective until (i) the acceptance of such appointment by the successor calculation agent in accordance with the Calculation Agent Agreement, and (ii) the Issuer will have provided written notice thereof to the Rating Agency, and the Rating Agency will have confirmed in writing that the ratings of the Notes shall not be reduced or placed on “watch” (or any equivalent status) for possible downgrade as a result of such termination, resignation or removal, or subsequent appointment. Any successor Calculation Agent will (i) be an independent, internationally reputable company experienced in performing the services under the Calculation Agent Agreement, and (ii) not be affiliated with the Issuer or the Counterparty and (iii) deliver a written acceptance of its appointment to the retiring calculation agent and to the Issuer. If (i) the appointment of the Calculation Agent has been terminated because the Calculation Agent has become incapable of performing, or has failed to perform, its duties and obligations under the Calculation Agent Agreement, and (ii) the Issuer, after using its commercially reasonable efforts, in cooperation with the Counterparty, has been unable to engage a suitable replacement calculation agent that has experience in the analysis and modeling of excess mortality risk within forty-five (45) calendar days following such failure, the Counterparty may elect to give written notice to the Issuer to trigger a termination of the related Counterparty Contract, in which case a Service Provider Failure Event will occur.

In consideration for such services rendered, the Issuer will be required to pay a fee to the Calculation Agent. In addition, the Issuer will agree under the Calculation Agent Agreement to indemnify the Calculation Agent in respect of certain claims, losses and expenses.

The Calculation Agent Agreement will be governed by the laws of England and Wales.

Deed of Charge

For each Class of Notes, the Issuer will, pursuant to the Deed of Charge, mortgage, charge and/or assign by way of security to the Indenture Trustee for the benefit of itself, the Counterparty and the Noteholders of such Class, as security for the payment of certain of the Issuer's obligations to such parties, all the Issuer's right, title and interest in, to and under the following Collateral:

- (i) the related Counterparty Contract, including the right to receive all payments due and payable from the Counterparty thereunder;
- (ii) the Collateral Account of such Class and the proceeds of the issuance of such Class deposited therein and any amount standing to the credit of such Collateral Account, and all proceeds thereof;
- (iii) the related Counterparty Deed of Charge;
- (iv) the Interest Payment Account of such Class established pursuant to the Indenture; and
- (v) the Custody Agreement.

The Collateral does not include any interest of the Issuer in (i) the Expense Account, any assets therein and any proceeds earned thereon, (ii) the Reimbursement Agreement (including, for the avoidance of doubt, the Closing Payment and any Supplemental Payment), (iii) amounts representing the Issuer's ordinary share capital and any proceeds earned thereon and (iv) the Issuer's annual profit of €1,000 per annum and any proceeds earned thereunder.

Neither the Indenture Trustee nor any Noteholder will have the right to enforce or otherwise realize upon the Indenture Trustee's security interest in the Collateral Account and any Permitted Investments held therein until all of the Issuer's obligations under the related Counterparty Contract (including the potential liability for any claim under such Counterparty Contract) have been satisfied or terminated in accordance with the terms thereof.

Under each Deed of Charge, the proceeds of enforcement of the security over investment earnings on the assets standing to the credit of the applicable Collateral Account, the security over the applicable Interest Payment Account, the security over the applicable Counterparty Contract will be applied toward the payment of the interest on, and then, the Outstanding Principal Amount of, the applicable Class of Notes, subject to first discharging the fees, costs and expenses of the Indenture Trustee and Paying Agent. The proceeds of enforcement of the security over the remainder of the Collateral with respect to such Class of Notes will be applied first to discharge the obligations of the Issuer to the Counterparty pursuant to the Counterparty Contract and then toward the payment of interest on, and then, the Outstanding Principal Amount of, such Class of Notes, subject to first discharging the fees, costs and expenses of the Indenture Trustee and Paying Agent.

In certain circumstances, any first fixed charge and assignment by way of security described above may be held by the English courts to take effect as a floating charge (for more information, see "*Risk Factors—Risks Relating to English Law Security Interests and Assignment by way of Security under the Deed of Charge and the Counterparty Deed of Charge*").

The Deed of Charge with respect to each Class of Notes will be governed by the laws of England and Wales.

Custody Agreement

With respect to each Class of Notes, the Issuer and the Custodian will enter into a Custody Agreement for such Class under which, among other things, the Custodian will establish a Collateral Account for such Class for the custody and safekeeping of the related Permitted Investments.

The Custody Agreement for each Class of Notes will be governed by the laws of England and Wales.

Counterparty Deed of Charge

For each Class of Notes, the Counterparty will pursuant to the Counterparty Deed of Charge, secure by way of a mortgage and/or charge, in favor of the Issuer, the related Interest Deposit Account to secure its obligations to make payments of the applicable (i) Interest Spread Amount or (ii) Extension Spread Amount, as the case may be, for such Class of Notes for the relevant Accrual Period, in the event that an Event of Default under the Indenture has occurred

as a result of the default of the Counterparty under the related Counterparty Contract. In certain circumstances, any first fixed charge created under the Counterparty Deed of Charge as described above may be held by the English courts to take effect as a floating charge (for more information, see “*Risk Factors—Risks Relating to English Law Security Interests and Assignment by way of Security under the Deed of Charge and the Counterparty Deed of Charge*”).

In the event that an Event of Default under the Indenture has occurred in respect of a Class of Notes as a result of the default of the Counterparty under the related Counterparty Contract, the Indenture Trustee will be permitted to realize upon the security interest of the Issuer and acquire the rights to all assets standing to the credit of the Interest Deposit Account, provided that any investment earnings in the Interest Deposit Account will be paid directly to the Counterparty. As a result, the Indenture Trustee, as the Issuer’s mortgagee or chargee of such Interest Deposit Account, may apply amounts standing to the credit of such Interest Deposit Account (other than investment earnings) to pay the Interest Spread Amount or Extension Spread Amount to Noteholders of such Class.

Any amounts standing to the credit of the Interest Deposit Account for a Class of Notes in excess of those necessary to secure Interest Spread Amount or Extension Spread Amount, as the case may be, for each Class of Notes for a period of three (3) months (see “*Overview—Counterparty Contract—Interest Deposit Account; Interest Deposit Account Amount; Interest Deposit Investments*”) and any amounts remaining in the relevant Interest Deposit Account following the redemption of a Class of Notes will be paid over to the Counterparty (see “*Overview—Permitted Investments—Money Market Funds Permitted Investments—Assignment of Interest Deposit Account; Counterparty Deed of Charge*”).

The Counterparty Deed of Charge with respect to each Class of Notes will be governed by the laws of England and Wales.

Management Agreement

On the Issuance Date, the Issuer will enter into a management agreement with the Manager (the “**Management Agreement**”). Pursuant to the Management Agreement, the Manager is obligated to provide or procure, as applicable, such services as are necessary and appropriate for the Issuer’s business in Ireland. Such services are directed to the administration of the Issuer’s business and include, among other things, maintenance of corporate affairs, record keeping, filing and correspondence with any regulatory authorities, and correspondence relating to the Notes and each respective Counterparty Contract.

In consideration of such services, the Issuer is required to pay a fee to the Manager as specified in the Management Agreement. The Issuer is required to indemnify the Manager against liabilities and actions as specified in the Management Agreement.

The Management Agreement may be terminated at the option of the affected party in certain limited circumstances which include (i) a wilful default, fraud, illegal dealing, negligence or material breach of the terms and/or conditions of the Management Agreement and failure to remedy such within thirty (30) Business Days (or such other period as shall be agreed between the parties) of being required to do so or (ii) the entry of the Manager or the Issuer into insolvency proceedings. The Management Agreement will terminate automatically upon the liquidation and dissolution of the Issuer. Except in the event of dissolution, liquidation and winding up of the Issuer, no termination of the Management Agreement, or other resignation or removal of the Manager, and no appointment of a successor manager, will become effective until (i) the acceptance of appointment by the successor manager in accordance with the terms of the Management Agreement; (ii) the Issuer has received confirmation that the successor manager is not a “United States person” as defined under Section 7701(a)(30) of the Internal Revenue Code of 1986, as amended, and shall otherwise satisfy all the requirements imposed upon the retiring Manager and be subject to the provisions of the Management Agreement; and (iii) the Issuer has provided written notice thereof to the Rating Agency. If (i) the appointment of the Manager under the Management Agreement has been terminated because of any of the foregoing, and (ii) the Issuer, after using its commercially reasonable efforts, in cooperation with the Counterparty, has been unable to engage a suitable replacement manager within forty-five (45) calendar days following such failure, the Counterparty may elect to give written notice to the Issuer to trigger a termination of the related Counterparty Contract, in which case a Service Provider Failure Event will occur.

The Management Agreement will be governed under the laws of Ireland.

Reimbursement Agreement

Pursuant to the Reimbursement Agreement, the Counterparty will make the following payments to the Issuer: (i) Closing Payment and (ii) from time to time, if required and applicable, Supplemental Payments subject to an aggregate maximum amount in any calendar year of €350,000 for both Classes of Notes or as otherwise approved by the Counterparty at its sole discretion; *provided*, that any Negative Yield Expense Fees shall not be counted toward such maximum amount. Such maximum amount will be calculated net of any interest earned on amounts standing to the credit of the Expense Account and such payments will be deposited in the Expense Account. Any amounts remaining in the Expense Account immediately prior to the winding-up of the Issuer will revert to the Counterparty, for the avoidance of doubt, following the payment of all winding-up costs of the Issuer including the costs of the liquidator (for more information, see “*Overview—Counterparty Contract—Reimbursement Agreement; Closing Payment; Supplemental Payment*”).

The Reimbursement Agreement will be governed under the laws of the state of New York.

Other Agreements

The Issuer will enter into other agreements in connection with the Offering.

DESCRIPTION OF THE NOTES

The following contains a summarized description of the terms and conditions of the Notes, and relevant provisions of the Indenture. This summary does not purport to be complete and is subject to, and is qualified in its entirety by reference to, all of the provisions of the Indenture and the Notes, including the definitions contained therein of certain terms. These documents may be obtained upon request to the Issuer as specified in the “*Available Information*” section of this Offering Circular.

General

Principal Reductions; Principal Increases; Repayment Amount

For each Class of Notes, if one or more Mortality Events have occurred resulting in an Event Payment as of a Payment Date, or if a Partial Extension has occurred, the Outstanding Principal Amount of such Class will be reduced or increased by the amount of any Principal Reduction or Principal Increase for such Class, respectively, for such Payment Date. On or after the Scheduled Redemption Date for such Class, the Outstanding Principal Amount of such Class may also be reduced as a result of a Partial Extension (see “*Overview—Offering of Notes—Extension—Partial Extension Notice; Partial Extension; Partial Repayment Amount*”).

The Repayment Amount for each Class of Notes will be paid to Noteholders of such Class by the Issuer on the respective Redemption Date.

The Repayment Amount for each Class of Notes will be equal to the sum of (i) 100% of the Outstanding Principal Amount of such Class, determined as of the Redemption Date of such Class, *plus* (ii) if applicable, the Early Redemption Event Premium or Optional Redemption Event Premium of such Class; *provided*, that the Repayment Amount of such Class will not be greater than the sum of (a) the proceeds of the liquidation of any Permitted Investments (*less* applicable taxes and fees, if any) held in the Collateral Account of such Class, *plus* (b) if applicable, the Early Redemption Event Premium or Optional Redemption Event Premium of such Class.

Payments of Interest

Interest on each Class of Notes will accrue from and including the Issuance Date and will be payable periodically in arrears on each Payment Date, which will be: (i) on the eighth (8th) of each January, April, July and October, commencing on the First Payment Date and continuing to, but excluding, the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date of such Class, if any, and the Scheduled Redemption Date of such Class (and in each case, if any such day is not a Business Day, on the next succeeding Business Day); (ii) on the earliest of the Early Redemption Date of such Class, if any, the Optional Redemption Date of such Class, if any, and the Scheduled Redemption Date of such Class; and (iii) if there is one or more Extension Events for such Class, on each Extended Redemption Date of such Class. See “*Risk Factors—Risks Relating to the Issuer—Limited Sources of Funds for Payment of Interest*.”

For each Accrual Period from and including the Issuance Date to, but excluding, the applicable Redemption Date, interest on each Class of Notes will be calculated as the sum of:

- (i) the related Permitted Investment Yield for such Accrual Period, *plus*
- (ii) the amount of interest accrued during such Accrual Period on the Outstanding Principal Amount of such Class of Notes, determined as of the first day of such Accrual Period (after giving effect to any adjustment to the Outstanding Principal Amount on such first day), at a *per annum* rate equal to (a) for Accrual Periods beginning prior to the Scheduled Redemption Date, the Interest Spread for such Class of Notes or (b) for Accrual Periods beginning on or after the Scheduled Redemption Date, the applicable Extension Spread for such Class of Notes; in each case calculated on the basis of the actual number of days elapsed in the related Accrual Period and a 360-day year.

Early Redemption

If an Early Redemption Event has occurred with respect to a Class of Notes, such Class will be redeemed in whole earlier than the Scheduled Redemption Date of such Class or, if applicable, on the immediately succeeding Extended Redemption Date following such Early Redemption Event, as the case may be. The Early Redemption Date will be the earliest eighth (8th) of January, April, July and October that occurs at least ten (10) Business Days after the

date on which an Early Redemption Event has occurred (and in each case, if such day is not a Business Day, on the next succeeding Business Day); *provided, that* if an Early Redemption Event occurs less than ten (10) Business Days prior to the Scheduled Redemption Date or Extended Redemption Date of such Class, if applicable, then such Class will be redeemed on such Scheduled Redemption Date or such relevant Extended Redemption Date, as the case may be; *provided, further, that* if the EBRD Notes for such Class have not been fully redeemed as of an intended Early Redemption Date, the Early Redemption Date will be on the Payment Date immediately succeeding such intended Early Redemption Date. The Early Redemption Events for each Class of Notes are listed under “*Overview—Offering of Notes—Early Redemption Events—Early Redemption Events*”.

Optional Extension

For each Class of Notes, the Counterparty may at its option elect to require the Issuer to extend the maturity of such Class of Notes beyond the Scheduled Redemption Date of such Class, by providing an Extension Notice on or prior to the Extension Determination Date immediately preceding the Scheduled Redemption Date or an Extended Redemption Date of such Class, as applicable. An Optional Extension Event for a Class of Notes will occur on the date when the Issuer receives the related Extension Notice for such Class from the Counterparty (*provided, that* such date is on or prior to the relevant Extension Determination Date), and the Optional Extension Spread will be used to determine the interest rate for such Class in respect of each Accrual Period in which such Optional Extension Event is in effect, starting with the first full Accrual Period following the occurrence of such Optional Extension Event (*provided, that* a Mandatory Extension Event has not occurred with respect to such Accrual Period, in which case the Mandatory Extension Spread will apply).

If the maturity of a Class of Notes has been extended to an Extended Redemption Date due to the occurrence of an Optional Extension Event, the maturity of such Class will automatically be further extended to each subsequent Extended Redemption Date unless and until (i) the Counterparty elects to send a written notice to the Issuer and the Indenture Trustee, on or prior to the relevant Extension Determination Date, to terminate such Optional Extension Event, in which case such Class will be redeemed on the immediately succeeding Extended Redemption Date or (ii) the Indenture Trustee has received an Extension Notice on or prior to the relevant Extension Determination Date to convert such Optional Extension Event into a Mandatory Extension Event.

Following the receipt of such notice terminating an Optional Extension Event for such Class under (i) above, if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Extended Redemption Date, the redemption of such Class will occur on the next succeeding Extended Redemption Date and the Optional Extension Spread will be used to determine the interest rate for such Class in respect of the Accrual Period ending on such next succeeding Extended Redemption Date.

Mandatory Extension

For each Class of Notes, if a Minimum Development Period is or will be in effect for such Class of Notes as of the Payment Date immediately following an Extension Determination Date, the Counterparty will be obligated to require the Issuer to extend the maturity of such Class until no Minimum Development Periods remain in effect, at which time the Counterparty will be required to send a notice to the Issuer and the Indenture Trustee (with a copy to the Paying Agent, the Note Registrar and the Calculation Agent) on or prior to the relevant Extension Determination Date to terminate such Mandatory Extension Event for such Class. Following the receipt of such notice terminating a Mandatory Extension Event for such Class, if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Extended Redemption Date, the redemption of such Class will occur on the next succeeding Extended Redemption Date and the Mandatory Extension Spread will be used to determine the interest rate for such Class in respect of such Accrual Period.

A Mandatory Extension Event for a Class of Notes will occur on the date when the Issuer receives the related Extension Notice (*provided, that* such date is on or prior to the relevant Extension Determination Date and the conditions for a Mandatory Extension Event for such Class are satisfied), and the Mandatory Extension Spread will be used to determine the interest rate for such Class in respect of each Accrual Period in which such Mandatory Extension Event is in effect, starting with the first full Accrual Period following the occurrence of such Mandatory Extension Event.

Partial Extension

For each Class of Notes, with respect to the Scheduled Redemption Date or any Extended Redemption Date, the Counterparty may, at any time prior to the relevant Extension Determination Date, elect to give a Partial Extension Notice to the Issuer (with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar) under the related

Counterparty Contract to reduce its Notional Amount, requiring the Issuer to repay to the Noteholders of such Class the Partial Repayment Amount specified in such notice, which shall be equal to the reduction of such Notional Amount.

The Partial Repayment Amount for such Class will be payable on the first Payment Date that occurs (i) on or after the Scheduled Redemption Date and (ii) at least ten (10) Business Days after the Partial Extension Date on which the Partial Extension Notice is properly submitted; *provided*, that if the Indenture Trustee has not delivered an EBRD Put Notice for such Class at least six (6) Business Days prior to the relevant Payment Date, the Partial Extension Date will occur on the next succeeding Payment Date. Such payment will be allocated pro rata among the Noteholders of such Class. The Outstanding Principal Amount of such Class will be reduced by the Partial Repayment Amount for such Class on the applicable Partial Extension Date.

Events of Default

The Indenture specifies the Events of Default with respect to the Issuer and each Class of Notes, as described under “*Overview—Events of Defaults; Acceleration; Covenants; No Petition; Extinguishment of Obligations—Defaults and Remedies*”.

Assignment

Under the Indenture, the Issuer will assign and pledge to the Indenture Trustee for the benefit of all Noteholders, all of the Issuer’s right, title, benefit and interest in, to and under the Assigned Agreements, specifically the Management Agreement and the Calculation Agent Agreement.

Record Date

The Record Date, with respect to a Payment Date or Redemption Date for each Class of Notes, will be the close of business on the fifteenth (15th) Business Day immediately preceding such day. On each Payment Date or Redemption Date for each Class, distributions will be made to Noteholders in whose name the Notes are registered on the Record Date immediately preceding such Payment Date.

No Petition

By its acquisition of a Note, each Noteholder agrees that neither it nor the Indenture Trustee on its behalf or for its benefit may commence, or join in against the Issuer or institute against the Issuer any bankruptcy, reorganization, arrangement, insolvency, examinership or liquidation proceedings, or other proceedings under any federal, state or foreign bankruptcy law (including the laws of Ireland) until the expiration of two (2) years (or, if longer, the applicable preference period under any applicable law including the laws of Ireland) and one (1) calendar day from the day when (a) no Notes remain outstanding and (b) all of the Counterparty Contracts have been terminated in accordance with their respective terms and any amounts due and owing thereunder have been satisfied.

Recourse; Extinguishment of Obligations

Noteholders of each Class of Notes will have recourse only to the Collateral for such Class of Notes (subject to the prior interest of the Counterparty in such Collateral) and to the Periodic Payments payable under the related Counterparty Contract, and will have no recourse to any other Collateral nor to any Periodic Payments payable under any Counterparty Contract related to any other Class of Notes. Noteholders of each Class of Notes will rank *pari passu* with all other Noteholders of such Class.

All obligations of the Issuer under the Indenture with respect to the Classes of Notes will be limited recourse obligations of the Issuer payable solely from the related Collateral (subject to the prior interest of the Counterparty) and will be deemed to be extinguished if, at any time, the Issuer has no assets (which will include claims that may be asserted by the Issuer with respect to contractual obligations of third parties to the Issuer) or such Collateral has been depleted.

Modification of the Indenture and Waiver

The Issuer and the Indenture Trustee may amend, supplement or modify the Indenture or the terms of each Class of Notes without the consent of the Noteholders of any Class of Notes outstanding, for any of the following purposes: (a) correcting or amplifying the description of any property at any time subject to the lien or other security interests under the applicable Deed of Charge or better assuring, conveying and confirming to the Indenture Trustee any

property subject to or required to be subject to the lien or other security interests under the applicable Deed of Charge or subjecting additional property to the lien or other security interests under the applicable Deed of Charge, (b) evidencing the succession, in compliance with the applicable provisions thereof, of another person to the Issuer, and the assumption by any such successor of the covenants of the Issuer contained in the Indenture or in each Class of Notes, (c) adding to the covenants of the Issuer, for the benefit of the Noteholders of each Class of Notes, or surrendering any right or power conferred in the Indenture upon the Issuer, (d) conveying, transferring, assigning, mortgaging or pledging any property to or with the Indenture Trustee, (e) curing any ambiguity or manifest error, correcting or supplementing any provision in the Indenture that may be inconsistent with any other provision in the Indenture or making any other provisions with respect to matters or questions arising under the Indenture which will not be inconsistent with other provisions of the Indenture, (f) evidencing and providing for the acceptance of the appointment under the Indenture by a successor trustee with respect to the Notes and adding to or changing any of the provisions of the Indenture as will be necessary to facilitate the administration of the trusts under the Indenture by more than one trustee, pursuant to the Indenture, or (g) enabling the Issuer or the Counterparty to comply with any requirements under applicable law, *provided, however,* that with respect to any of (a) through (g) the Issuer and the Indenture Trustee have received an opinion of counsel that (A) the interest of any Noteholder will not be adversely affected to any material extent with respect to U.S. federal income taxes as a result of the proposed supplemental indenture, and (B) the proposed supplemental indenture will not cause the Issuer to be treated as engaged in a U.S. trade or business or otherwise subject to U.S. federal income tax on a net income tax basis. No modification that could have an adverse effect upon the Counterparty in connection with its rights and obligations under the relevant Counterparty Contract (including, without limitations, modifications which would modify the subordination provisions in the Indenture) will be made without the prior written consent of the Counterparty.

The Indenture also contains provisions permitting the Issuer and the Indenture Trustee, with the consent of the Noteholders representing not less than sixty-six and two thirds percent (66 $\frac{2}{3}$ %) of the Outstanding Principal Amount of the Class of Notes affected thereby, to amend the Indenture by adding any provisions to it, or changing it in any manner or eliminating any of its provisions or modifying in any manner the rights of the Noteholders of the relevant Class under the Indenture; provided, that (i) no modification that could have an adverse effect upon the Counterparty in connection with its rights and obligations under the relevant Counterparty Contract (including, without limitations, modifications which would modify the subordination provisions in the Indenture) will be made without the prior written consent of the Counterparty, (ii) the Rating Agency Condition (as defined in the Indenture) will have been satisfied, (iii) the Issuer and the Indenture Trustee will have received an opinion of counsel to the effect that (A) the interest of any Noteholder of each Class will not be adversely affected to any material extent with respect to U.S. federal income taxes as a result of the proposed supplemental indenture, and (B) the Indenture will not cause the Issuer to be treated as engaged in a U.S. trade or business or otherwise subject to U.S. federal income tax on a net income tax basis, and (iv) the Indenture will not, without the consent of each Noteholder of the relevant Class affected thereby and without prior notice to any other Noteholder of the relevant Class: (a) change the applicable Scheduled Redemption Date or the applicable Extended Redemption Date, reduce the amounts required to be paid on the Notes at any Payment Date, the Scheduled Redemption Date or the Extended Redemption Date, change the provisions of the Indenture relating to the application of collections on, or the proceeds of the sale of, the Collateral to payment of the principal of or interest on the relevant Class of Notes, or change any place of payment where, or the coin or currency in which, any Note of the relevant Class or the interest thereon is payable, or impair the right to institute suit for the enforcement of any payment on or with respect to a Note of the relevant Class; (b) reduce the percentage of the Outstanding Principal Amount, the Noteholders of the relevant Class of which must consent to an amendment or modification of, or supplement to, the Indenture or waiver of compliance with certain provisions of the Indenture or certain defaults thereunder and their consequences provided for in the Indenture; (c) modify or alter the provisions of the proviso to the definition of the term "Outstanding" under the Indenture; (d) reduce the percentage of the Outstanding Principal Amount required to direct the Indenture Trustee to sell or liquidate the Collateral pursuant to the Indenture if the proceeds of such sale would be insufficient to pay the Outstanding Principal Amount and accrued but unpaid interest on the relevant Class of Notes; (e) modify any provision of the Indenture specifying a percentage of the aggregate Outstanding Principal Amount necessary to amend the Indenture or the other basic transaction documents except to increase any percentage specified therein or to provide that certain additional provisions of the Indenture or the other basic transaction documents cannot be modified or waived without the consent of all Noteholders of the relevant Class affected thereby; (f) modify any of the provisions of the Indenture in such manner as to affect the calculation of the amount of any payment of interest or the Outstanding Principal Amount due on any Note of the relevant Class on any Payment Date or Redemption Date; or (g) permit the creation of any lien or other security interest ranking prior to or on a parity with the lien or other security interests under the applicable Deed of Charge with respect to any part of the related Collateral or, except as otherwise permitted or contemplated in the Indenture or in such Deed of Charge, terminate the lien or other security interests under such Deed of Charge on any such collateral at any time subject thereto or deprive any Noteholder of the security provided by the lien or other security interests under such Deed of Charge.

Amendment of Other Documents

Any of the Counterparty Contracts, Deeds of Charge, Counterparty Deeds of Charge, Management Agreement, Reimbursement Agreement, Calculation Agent Agreement and Custody Agreements may be amended in accordance with its respective terms with the consent of the relevant parties (subject in certain cases to notification to, or consent from, as applicable, the Rating Agency, the Counterparty or the Indenture Trustee, with respect to each Class of Notes affected thereby) at any time without the consent of the Noteholders.

Modification of the Memorandum and Articles of Association

The Issuer may by special resolution amend, supplement or modify its Memorandum and Articles of Association without the consent of the Noteholders to correct any error, to address any unforeseen circumstance or to clarify any term or provision or for any other reason; *provided, however*, that no amendment can be made that would adversely affect in any material respect the interest of the Noteholders without the consent of a majority in Outstanding Principal Amount of each Class of Notes affected thereby.

Permitted Jurisdictions

In the event that the Issuer notifies the Indenture Trustee in writing that it has received interpretations from insurance regulatory authorities or opinions or advice of counsel, satisfactory to the Issuer in its sole discretion based on written advice by its legal counsel, to the effect that a transferee of the Notes in a State or jurisdiction other than a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction should not be required to be licensed as an insurer or reinsurer in such State or jurisdiction, or otherwise be subject to the insurance laws and regulations of such State or jurisdiction, and upon receipt of such written notice by the Indenture Trustee, such State or jurisdiction shall be deemed to be a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction and sales or transfers to residents of such State or jurisdiction shall, subject to compliance with all other restrictions on transfer set forth herein, be permitted. Additionally, in the event that the Issuer notifies the Indenture Trustee in writing that it has received interpretations from insurance regulatory authorities or opinions or advice of counsel, satisfactory to the Issuer in its sole discretion based on written advice by its legal counsel, that a transferee of the Notes in a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction should be required to be licensed as an insurer or reinsurer in such jurisdiction, or otherwise be subject to the insurance laws and regulations of such jurisdiction, and upon receipt of such written notice by the Indenture Trustee, such jurisdiction shall no longer be deemed a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction and sales or transfers to residents of such jurisdiction shall not be permitted. At any time the list of Permitted Non-U.S. Jurisdictions or Permitted U.S. Jurisdictions is amended, the Issuer shall furnish the Indenture Trustee with a revised list of Permitted Non-U.S. Jurisdictions or Permitted U.S. Jurisdictions.

If any Noteholder is not a resident of a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction, the Issuer will require such Noteholder to show proof of residency. If the Issuer determines, based on written advice from counsel, that such Noteholder does not reside in a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction (a “**Non-Permitted Noteholder**”) the Issuer will require such Non-Permitted Noteholder to sell its interest in the Notes to a person who is a resident of a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction within thirty (30) calendar days after notice from the Issuer that it must sell the Notes to a person who is a resident of a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction. If such Non-Permitted Noteholder fails to effect the sale within such 30-day period, the Issuer will have the right, without further notice to such Non-Permitted Noteholder, to compel the Non-Permitted Noteholder to sell the Notes or interest in the Notes to a purchaser selected by the Issuer who is a resident of a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction on such terms as the Issuer may choose. The Issuer may select the purchaser by soliciting one or more bids from one or more brokers or other market professionals that regularly deal in securities similar to the Notes, and selling such Notes to the highest such bidder. However, the Issuer may select a purchaser by any other means determined by it in its sole discretion. Each Noteholder, Non-Permitted Noteholder and each other person in the chain of title from the new Noteholder to the Non-Permitted Noteholder, by its acceptance of an interest in the Notes, agrees to co-operate with the Issuer to effect such transfers. The proceeds of such sale, net of any commissions, expenses and taxes due in connection with such sale will be remitted to the Non-Permitted Noteholder. The terms and conditions of any sale will be determined in the sole discretion of the Issuer and none of the Issuer, the Counterparty or the Indenture Trustee will be liable to any person having an interest in the Notes sold as a result of any such sale or the exercise of such discretion.

Form, Denomination and Title of the Notes

The Notes will initially be issued in book-entry form (a “**Book-Entry Note**”) and each Class of Notes will be represented by one or more certificates, in fully registered form without interest coupons in an amount equal to the

Original Principal Amount (each, a “**Global Note**”). Each Global Note will be deposited with and registered in the name of Clearstream or Euroclear, or any other depositary, as specified in this Offering Circular, or their nominees (each, a “**Depository**”). The Depository will be the only holder of the Notes represented by that Global Note. A Global Note may be deposited with one or more Depositories.

Unless and until Definitive Notes are issued under the limited circumstances described herein, no purchaser of an ownership interest in the Notes (the “**Beneficial Owner**”) will be entitled to receive a Note representing such Beneficial Owner’s interest in such Note. Until such time, all references herein to actions by holders of any Notes will refer to actions taken by the Depository upon instructions from its participating organizations (“**Participants**”), and all references herein to distributions, notices, reports, and statements to a Depository or its nominee, as the registered holder of such Notes, for distribution to the appropriate Noteholders in accordance with the Depository’s procedures. Interests in the Book-Entry Notes and the Definitive Notes will be recorded in denominations of €250,000 and integral multiples of €1,000 in excess thereof.

The Notes have not been and will not be registered under the Securities Act and are subject to certain restrictions on transfer. The Notes (including beneficial interests therein) are being offered only to investors (the “**Eligible Purchasers**”) that are (i) Qualified Institutional Buyers that, with respect to U.S. Persons, are also Qualified Purchasers, (ii) Qualified Eligible Persons as defined in CFTC Rule 4.7, and (iii) residents of, and purchasing in, Permitted U.S. Jurisdictions or Permitted Non-U.S. Jurisdictions. The Notes will bear a legend and may not be transferred except in compliance with the transfer restrictions set forth in the Notes, in such legend and in the Indenture. The Notes may be reoffered and sold only to Eligible Purchasers. See “*Notice to Investors*”. Each purchaser of a Note will be deemed to have made the representations set forth in “*Notice to Investors—Representations of Purchasers*”.

Pursuant to the Indenture, the Issuer will appoint The Bank of New York Mellon, acting through its London branch, as paying agent (the “**Paying Agent**”) and The Bank of New York Mellon (Luxembourg) S.A., as note registrar (the “**Note Registrar**”). The Note Registrar will be responsible for, among other things, (i) maintaining a register in which the Issuer will provide for the registration of the Notes and registration of transfers of the Notes, and (ii) accepting applicable Notes for exchange and registration of transfer. The Paying Agent will be responsible for, among other things, ensuring that payments received from the Issuer or the Counterparty by the Indenture Trustee, are duly paid to the applicable Noteholders. Each Collateral Account will be held in the name of the Issuer and will be held with a branch of The Bank of New York Mellon, acting through its London branch located outside the United States. Payment on the Notes will be made in accordance with the standard practices of the relevant Depository.

The Issuer may vary or terminate the appointment of the Paying Agent and the Note Registrar (or of the Indenture Trustee in its capacity as paying agent or note registrar, if the Indenture Trustee is then acting in such capacities). The Issuer may also appoint additional or other note registrars or paying agents or approve any change in the office through which any note registrar or paying agent acts, provided, that at all times any paying agent will be located outside the U.S. The Issuer will cause notice of any resignation, termination or appointment of the Indenture Trustee or any paying agent or note registrar and of any change in the office through which any such agent will act to be provided to the appropriate Noteholders.

Beneficial Owners may hold their interests in the Book-Entry Notes through Clearstream or Euroclear in Europe, if they are Participants, or otherwise indirectly through organizations that are Participants. The Depositories may also be Participants in one another’s systems. The nominee for the Depository or Depositories shall be The Bank of New York Depository (Nominees) Limited.

A Beneficial Owner’s ownership of a Book-Entry Note will be recorded on the records of the brokerage firm, bank, thrift institution or other financial intermediary (each, a “**Financial Intermediary**”) that maintains the Beneficial Owner’s account for such purpose. In turn, the Financial Intermediary’s ownership of such Book-Entry Note will be recorded on the records of the relevant Depository (or of a Participant that acts as agent for the Financial Intermediary, whose interest will in turn be recorded on the records of the relevant Depository, if the Beneficial Owner’s Financial Intermediary is not a Participant and on the records of the relevant Depository, as appropriate).

Beneficial Owners will receive all distributions allocable to the Book-Entry Notes from the Indenture Trustee through the applicable Depository and its Participants. While the Book-Entry Notes are outstanding (except under the circumstances described below), under the rules, regulations and procedures creating, governing and affecting the Depository and its operations (the “**Rules**”), the Depository is required to make book-entry transfers among its Participants on whose behalf it acts with respect to the Notes. The Depository is required to receive and transmit distributions allocable to the Notes. Participants and Financial Intermediaries with whom Beneficial Owners have accounts with respect to any Notes are similarly required to make book-entry transfers and receive and transmit such

distributions on behalf of their respective Beneficial Owners. Accordingly, although Beneficial Owners will not possess physical certificates, the Rules provide a mechanism by which Beneficial Owners will receive distributions and will be able to transfer their beneficial ownership interests in the Notes.

Beneficial Owners will not receive or be entitled to receive Definitive Notes, except under the limited circumstances described below. Unless and until Definitive Notes are issued, Beneficial Owners who are not Participants in a Depositary may transfer ownership of Notes only through Participants and Financial Intermediaries by instructing such Participants and Financial Intermediaries to transfer beneficial ownership interests in the Notes by book-entry transfer through the Depositary for the account of the purchasers of such Notes, which account is maintained with their respective Participants or Financial Intermediaries. Under the Rules and in accordance with the Depositary's normal procedures, transfers of ownership of Notes will be executed through the Depositary and the accounts of the respective Participants will be debited and credited. Similarly, the Participants and Financial Intermediaries will make debits or credits, as the case may be, on their records on behalf of the selling and purchasing Beneficial Owners.

Clearstream has advised that it is incorporated under the laws of the Grand Duchy of Luxembourg as a professional depositary. Clearstream holds securities for its Participants. Clearstream facilitates the clearance and settlement of securities transactions between Clearstream Participants through electronic book-entry changes in accounts of Clearstream Participants, eliminating the need for physical movement of securities. Clearstream provides to Clearstream Participants, among other things, services for safekeeping, administration, clearance and settlement of internationally traded securities and securities lending and borrowing. Clearstream interfaces with domestic markets in several countries. As a professional depositary, Clearstream is subject to regulation by the Luxembourg Commission for the Supervision of the Financial Sector. Clearstream Participants are recognized financial institutions around the world, including underwriters, securities brokers and dealers, banks, trust companies, clearing corporations and certain other organizations. Indirect access to Clearstream is also available to others, such as banks, brokers, dealers and trust companies that clear through or maintain a custodial relationship with a Clearstream Participant, either directly or indirectly.

Distributions, to the extent received by the relevant Depositary for Clearstream, with respect to the Notes held beneficially through Clearstream will be credited to cash accounts of Clearstream Participants in accordance with its rules and procedures.

Euroclear was created in 1968 to hold securities for its Participants and to clear and settle transactions between Euroclear Participants through simultaneous electronic book-entry delivery against payment, thereby eliminating the need for movement of physical securities and any risk from lack of simultaneous transfers of securities and cash. Transactions may be settled in any of 32 currencies, including United States Dollars. Euroclear provides various other services, including securities lending and borrowing. Euroclear is operated by Euroclear Bank S.A./NV under contract with Euroclear Clearance Systems S.C., a Belgian cooperative corporation. Euroclear Bank S.A./NV conducts all operations. All Euroclear securities clearance accounts and Euroclear cash accounts are accounts with Euroclear Bank S.A./NV, not Euroclear Clearance Systems S.C. Euroclear Clearance Systems S.C. establishes policy for Euroclear on behalf of Euroclear Participants. Euroclear Participants include banks (including central banks), securities brokers and dealers and other professional financial intermediaries. Indirect access to Euroclear is also available to other firms that clear through or maintain a custodial relationship with a Euroclear Participant, either directly or indirectly.

Euroclear Bank S.A./NV has advised that it is licensed by the Belgian Banking and Finance Commission to carry out banking activities on a global basis. As a Belgian bank, it is regulated and examined by the Belgian Banking Commission.

Securities clearance accounts and cash accounts with Euroclear Bank S.A./NV are governed by the Terms and Conditions Governing Use of Euroclear and the related Operating Procedures of the Euroclear System and applicable Belgian law. These terms and conditions, operating procedures and laws govern transfers of securities and cash within Euroclear, withdrawals of securities and cash from Euroclear, and receipts of payments with respect to securities in Euroclear. All securities in Euroclear are held on a fungible basis without attribution of specific certificates to specific securities clearance accounts. Euroclear Bank S.A./NV acts under the Terms and Conditions only on behalf of Euroclear Participants, and has no record of or relationship with persons holding through Euroclear Participants.

The Paying Agent will make distributions, or will procure that distributions are made, on the applicable Book-Entry Notes on each Payment Date to the relevant Depositary or Depositaries. Such Depositary or Depositaries will be responsible for crediting the amount of such payments to the accounts of the applicable Participants in accordance with the applicable Rules. Each Participant will be responsible for disbursing such payments to the Beneficial Owners that it

represents and to each Financial Intermediary for which it acts as agent. Each such Financial Intermediary will be responsible for disbursing funds to the Beneficial Owners that it represents.

Under a book-entry format, Beneficial Owners may experience some delay in their receipt of payments, since the Paying Agent will forward such payments, or will procure that such payments are forwarded, to the relevant Depositary, which will in turn be responsible for making distributions to the Beneficial Owners as described above. Distributions with respect to Book-Entry Notes will be credited to the cash accounts of the applicable Participants in accordance with the relevant Depositary's Rules, to the extent received by the relevant Depositary. Such distributions will be subject to tax reporting in accordance with the tax laws and regulations of the jurisdiction of the relevant Depositary. Because a Depositary can only act on behalf of its Participants that in turn can only act on behalf of Financial Intermediaries, the ability of a Beneficial Owner to pledge Book-Entry Notes to persons or entities that do not participate in the relevant Depositary's system, or otherwise take actions in respect of such Book-Entry Notes, may be limited due to the lack of physical certificates for such Book-Entry Notes. In addition, issuance of the Book-Entry Notes in book-entry form may reduce the liquidity of such Notes in the secondary market since certain potential investors may be unwilling to purchase Notes for which they cannot obtain physical certificates.

Although Clearstream and Euroclear have agreed to the foregoing procedures to facilitate transfers of securities among Clearstream Participants and Euroclear Participants, they are under no obligation to perform or continue to perform such procedures and such procedures may be discontinued at any time.

None of the Issuer, the Counterparty, the Indenture Trustee, the Note Registrar or the Paying Agent will have any responsibility for any aspect of the records relating to or payments made on account of beneficial ownership interests of the Book-Entry Notes held by a Depositary or for maintaining, supervising or reviewing any records relating to such beneficial ownership interests. As long as Notes are held in global form, Beneficial Owners will have no recourse to the Issuer in respect of their interest in the Notes, and all legal rights and remedies that may be asserted against the Issuer on the Notes or the Indenture will inure to the benefit of the relevant Depositary as holder of the Global Note. Beneficial Owners' rights will be determined solely by the relevant Depositary's Rules.

Notices

Notices to Noteholders will be sent by mail to the registered holders for Notes issued in definitive form, and to the relevant Depositary which in turn will notify the Noteholders for the Notes issued in global form.

Definitive Notes

Physical certificates representing the Notes (each, a "**Definitive Note**") will be issued under the following circumstances:

- In the event that a Depositary advises the Issuer in writing that it is no longer willing or able to properly discharge its responsibilities as depositary with respect to the Notes, and the Issuer is unable to locate a qualified successor, Beneficial Owners will receive Definitive Notes.
- The Issuer may, at its option, advise the Indenture Trustee and the Note Registrar in writing of its election to terminate the book-entry system through a Depositary, in which event Beneficial Owners of the affected Notes will receive Definitive Notes.

Upon the occurrence of any of such events specified in the Indenture, the relevant Depositary will be required to notify all its Participants of the availability through the relevant Depositary of the applicable Definitive Notes. Upon surrender by the relevant Depositary of the applicable Global Notes and instruction for re-registration, the Note Registrar and the Issuer, as applicable, will issue the applicable Book-Entry Notes in the form of Definitive Notes, and thereafter the Note Registrar and the Issuer will recognize the holders of such Definitive Notes as Noteholders. Thereafter, payments on the Notes will be made by the Paying Agent, directly to the appropriate Noteholders in accordance with the procedures set forth herein and in the Indenture. Distributions on each Payment Date will be made to Noteholders in whose name the applicable Definitive Notes were registered on the related Record Date. Distributions will be made by wire transfer or by check mailed to the address of such Noteholder as it appears on the register maintained by the Note Registrar. The final distribution with respect to any Definitive Note, however, will be made only upon presentation and surrender of such Definitive Note on the Redemption Date, at such office or agency as is specified in the notice of final payment to Noteholders. The Indenture Trustee or the Note Registrar, as applicable, will provide such notice to registered Noteholders no later than two (2) Business Days prior to the Redemption Date.

Definitive Notes will be transferable and exchangeable at the offices of the Note Registrar, as applicable. No service charge will be imposed for any registration or transfer or exchange, but the Note Registrar may require payment of a sum sufficient to cover any tax or other governmental charge imposed in connection therewith. The Note Registrar will not be required to register the transfer or exchange of Definitive Notes during any period of time beginning fifteen (15) Business Days prior to the relevant Redemption Date and ending on the relevant Redemption Date.

Prescription

Subject to applicable laws with respect to escheatment of funds, any money held by the Indenture Trustee or any Paying Agent in trust for the payment of any amount due with respect to any Note and remaining unclaimed for two (2) years after such amount has become due and payable shall be discharged from such trust and be paid to the Issuer upon request; and the Noteholder of such Note shall thereafter, as an unsecured general creditor, look only to the Issuer for payment thereof (but only to the extent of the amounts so paid to the Issuer), and all liability of the Indenture Trustee or such Paying Agent with respect to such trust money shall thereupon cease; *provided, however,* that the Indenture Trustee or such Paying Agent, before being required to make any such repayment, shall at the expense and direction of the Issuer cause to be published once, in a newspaper published in the English language, customarily published on each Business Day and of general circulation in The City of New York and London, notice that such money remains unclaimed and that, after a date specified therein, which shall not be less than thirty (30) calendar days from the date of such publication, any unclaimed balance of such money then remaining shall be repaid to the Issuer. The Indenture Trustee shall also adopt and employ, at the expense and direction of the Issuer, any other reasonable means of notification of such repayment (including, but not limited to, mailing notice of such repayment to Holders whose right to or interest in monies due and payable but not claimed is determinable from the records of the Indenture Trustee or of any Paying Agent, at the last address of record for each such Holder).

Governing Law; Consent to Jurisdiction

The Indenture and each Class of Notes will be construed and enforced in accordance with and governed by the laws of the State of New York applicable to agreements made and to be performed therein including General Obligations Law §5-1401, but otherwise without regard to conflict of laws principles. The Deeds of Charge and the security interests in the Collateral created thereby will be governed by the laws of England and Wales. The Indenture provides that the Issuer irrevocably submits to the jurisdiction of any New York State court or United States federal court sitting in the City of New York in respect of any suit, action or proceeding arising out of or in relation to the Indenture or the Notes.

Although the Issuer has irrevocably agreed that it may be served with process in New York, New York with respect to any action arising out of, or relating to, the Indenture or the Notes offered hereby, it could be difficult or impossible for investors to effect service of process within the United States on directors of the Issuer who are currently residents of Ireland or to recover against the Issuer or such directors on judgments of United States courts predicated upon civil liabilities under the United States federal securities laws. See "*Risk Factors—Risks Relating to the Issuer—Limited Ability to Serve Process On, or Enforce Judgments Against, the Issuer and its Directors and Officers*".

Indenture Trustee

The Bank of New York Mellon, acting through its London branch, will be the Indenture Trustee under the Indenture and will perform its functions through its offices located in London, England.

Under the Indenture, the Indenture Trustee may (i) be removed, with the consent of the Counterparty, by Noteholders representing at least a majority of the Outstanding Principal Amount of each Class of Notes of the Issuer, or (ii) resign at any time upon not less than ninety (90) calendar days' written notice. If the Indenture Trustee resigns or is removed, or if a vacancy occurs in the office of the trustee for any reason, a successor indenture trustee will be appointed in accordance with the provisions of the Indenture. No such resignation or removal will be effective until a successor indenture trustee has been appointed.

The Issuer will indemnify the Indenture Trustee with respect to certain matters relating to the Indenture.

EBRD NOTES

Overview of EBRD

The following information was derived from publicly available information, as described below.	
Name:	European Bank for Reconstruction and Development.
Address:	One Exchange Square, London EC2A 2JN, United Kingdom.
Country of Incorporation:	Not applicable. The EBRD is an international organization formed under the Agreement Establishing the European Bank for Reconstruction and Development dated May 29, 1990 (the “ EBRD Agreement ”) signed by 40 countries, including the U.S., together with the European Economic Community and the European Investment Bank. The EBRD Agreement came into force on 28 March 1991 and the EBRD commenced operations on 15 April 1991. The EBRD currently has 66 members.
Nature of Business:	The purpose of the EBRD is to foster the transition towards open market-oriented economies and to promote private and entrepreneurial initiatives in its countries of operations which are committed to and applying the principles of multi-party democracy, pluralism and market economics. The EBRD finances project lending and operational needs by borrowing funds on the international capital markets. To finance its loans, the EBRD borrows funds in the international markets by issuing bonds and other debt instruments.
Listing:	The EBRD Notes will not be listed or admitted to trading on any exchange.
Credit Rating:	As of the date of this Offering Circular, the EBRD’s credit rating is “AAA (stable outlook)” from S&P, “Aaa (stable outlook)” from Moody’s and “AAA (stable outlook)” from Fitch, each of which rating agencies is established in the European Union and is registered under the Credit Rating Agency Regulation.

EBRD Global Medium Term Note Programme

The EBRD Notes will be issued pursuant to the €35,000,000,000 Global Medium Term Note Programme established by the EBRD. Certain series of notes issued by the EBRD pursuant to the EBRD Global Medium Term Note Programme are listed on the London Stock Exchange (other than the EBRD Notes, which will not be listed on any stock exchange). Notes issued pursuant to the EBRD Global Medium Term Note Programme may be distributed by way of private or public placement and in each case on a syndicated or a non-syndicated basis.

Notes issued pursuant to the EBRD Global Medium Term Note Programme constitute direct and unsecured obligations of the EBRD and rank *pari passu* without any preference among themselves, and, subject to certain conditions, equally with all its other unsecured and unsubordinated obligations. Notes issued pursuant to the EBRD Global Medium Term Note Programme are not obligations of any government or member of the EBRD.

Notes issued pursuant to the EBRD Global Medium Term Note Programme are exempted securities within the meaning of Section 3(a)(2) of the Securities Act and Section 3(a)(12) of the Exchange Act.

The EBRD Notes are governed by the laws of England and Wales.

Further Information regarding EBRD and EBRD Notes

The information herein relating to the EBRD and the EBRD Global Medium Term Note Programme was derived from, and more information regarding the EBRD and the EBRD's Global Medium Term Note Programme can be found on, the EBRD's official website <http://www.ebrd.com>.* None of the Issuer, the Counterparty, the Initial Purchasers nor any of their affiliates or respective officers, directors or agents have independently verified any of the information herein in respect of the EBRD and the EBRD's Global Medium Term Note Programme or any of the information contained on such website or any materials contained therein for the purposes of this Offering Circular or any other materials prepared in relation to the Notes, nor do they accept responsibility for such materials or any errors or omissions contained in such information or materials. Any such information on such website or any materials contained therein is not incorporated herein by reference, and does not form part of this Offering Circular or any other materials prepared in relation to the Notes.

The EBRD has had no involvement in the preparation of this Offering Circular. The EBRD does not make any representation or warranty, express or implied, as to the accuracy or completeness of any information set forth in this Offering Circular.

* The extraction from this source has been accurately reproduced and, as far as the Issuer is aware and is able to ascertain from information published by that source, no facts have been omitted which would render the reproduced information inaccurate or misleading.

CERTAIN U.S. FEDERAL INCOME TAX CONSIDERATIONS

The following discussion summarizes certain of the U.S. federal income tax consequences of the purchase, ownership and disposition of the Notes. It applies to you only if you acquire your Notes in this Offering and you hold your Notes as capital assets for tax purposes. This section does not apply to you if you are a member of a special class of holders subject to special rules, including:

- A dealer in securities or currencies,
- A trader in securities that elects to use a mark-to-market method of accounting for securities holdings,
- A bank or other financial institution,
- A regulated investment company or a real estate investment trust,
- A tax-exempt organization,
- An insurance company,
- A person liable for alternative minimum tax,
- A person that holds the Notes as part of a straddle or a hedging or conversion transaction,
- A U.S. expatriate,
- A person that directly, indirectly or constructively owns 10% or more of the sum of the aggregate Outstanding Principal Amount of Notes, any class of outstanding Notes issued by the Issuer or of all of the outstanding Notes issued by the Issuer (other than as specifically addressed below), or
- A U.S. Noteholder (as defined below) whose functional currency is not the U.S. dollar.

This section is based on the Code, its legislative history, existing and proposed regulations, and published rulings and court decisions, all as currently in effect.

If a partnership holds the Notes, the United States federal income tax treatment of a partner will generally depend on the status of the partner and the tax treatment of the partnership. A partner in a partnership holding the Notes should consult its tax advisor with regard to the United States federal income tax treatment of its investment in the Notes.

You are a “**U.S. Noteholder**” if you are a beneficial owner of the Notes and you are:

- A citizen or resident of the United States,
- A corporation (or other entity that is treated as a corporation for U.S. federal income tax purposes) that is created or organized in or under the laws of the United States or any State thereof (including the District of Columbia),
- An estate whose income is subject to United States federal income tax regardless of its source, or
- A trust if a United States court can exercise primary supervision over the trust’s administration and one or more United States persons are authorized to control all substantial decisions of the trust.

You are a “**non-U.S. Noteholder**” if you are a beneficial owner of the Notes and you are not a United States person or an entity treated as a partnership for United States federal income tax purposes.

EACH PROSPECTIVE NOTEHOLDER SHOULD CONSULT WITH ITS OWN TAX ADVISORS AS TO THE U.S. FEDERAL, STATE, LOCAL, NON-U.S. AND ANY OTHER TAX CONSEQUENCES IN ITS PARTICULAR CIRCUMSTANCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF THE NOTES.

U.S. Federal Income Tax Treatment of the Issuer

The Issuer is an Irish special purpose vehicle which does not file U.S. federal income tax returns. The Issuer expects to operate in such a manner that it is not subject to U.S. federal income tax on its net income. However, if it were determined that the Issuer were engaged in a trade or business in the United States for U.S. federal income tax purposes, and the Issuer had taxable income that was effectively connected with such U.S. trade or business, the Issuer would be subject under the Code to the regular U.S. corporate income tax on such effectively connected taxable income and to an additional 30% branch profits tax as well, unless the Issuer is entitled to the benefits of the Irish Treaty. If the Issuer is entitled to the benefits of the Irish Treaty, the Issuer will not be subject to U.S. federal income tax on any income determined to be effectively connected with a U.S. trade or business unless that trade or business is conducted through a permanent establishment in the United States and the income is attributable to the permanent establishment.

An Irish resident will generally be entitled to the benefits of the Irish Treaty if among other reasons, (i) at least 50% of the shares, measured by both vote and value, are owned by Irish citizens or U.S. citizens or residents and less than 50% of such company's gross income for the relevant taxable period is paid or accrued directly or indirectly to persons who are not U.S. or Irish residents in the form of payments that are deductible for Irish income tax purposes or (ii) the Irish resident company is considered as engaged in the active conduct of a trade or business in Ireland and its ECI (as defined below) is connected with or incidental to that trade or business.

The Issuer is uncertain whether it is eligible for the benefits of the Irish Treaty because of factual and legal uncertainties.

The Issuer intends to operate such that it will not be engaged in a trade or business within the United States for U.S. federal income tax purposes. In this regard, the Issuer will receive an opinion of Willkie Farr & Gallagher LLP, special U.S. tax counsel to the Issuer, based on certain assumptions and representations from the Issuer regarding this Offering and related transactions and the Issuer's intended future operations that, although the matter is not free from doubt, the Issuer will not be treated as being engaged in a trade or business within the United States. However, this opinion is not binding on the IRS or the courts, and no ruling will be sought from the IRS regarding this, or any other, aspect of the U.S. federal income tax treatment of the Issuer. The standards for determining what constitutes being engaged in a trade or business in the United States are not entirely certain, and there can be no assurance that the IRS will not successfully assert that the Issuer is so engaged (or, if the Issuer were eligible for benefits under the Irish Treaty, that the Issuer has a permanent establishment in the United States), that the applicable law will not change in a manner inconsistent with this conclusion or that the Issuer will continue to operate in the manner on which this opinion is based. If the Issuer were found to have income effectively connected with a U.S. trade or business (or, if the Issuer were eligible for the benefits of the Irish Treaty, the Issuer were found to have profits attributable to a U.S. permanent establishment), then the Issuer's ability to make payments on the Notes could be materially adversely affected. The balance of this discussion assumes that the Issuer is not subject to U.S. federal income tax on its net income.

Non-U.S. corporations not engaged in a trade or business in the United States are nonetheless subject to a 30% U.S. federal income tax imposed by withholding (the "**Withholding Tax**") on certain "fixed or determinable annual or periodic gains, profits and income" ("**FDAP**") derived from sources within the United States (such as dividends and certain interest on investments), subject to limited exemptions under the Code or reduction by applicable treaties. As noted above, the Issuer cannot be certain that it will be eligible for Irish Treaty benefits.

Additionally, as noted above, the Issuer intends to treat the Issuer's income with respect to the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes, although the issue is not free from doubt. If, instead, the Issuer's income with respect to the Counterparty Contracts is treated as insurance income, payments made under the Counterparty Contracts should be characterized as premiums and subject to the U.S. federal insurance excise tax ("**FET**") on insurance premiums paid to non-U.S. insurers with respect to risks of a U.S. entity or individual located wholly or partly within the U.S. and with respect to a non-U.S. entity or individual engaged in trade or business in the U.S. risks located within the U.S. and on reinsurance premiums for any reinsurance policy covering any such risks ("**U.S. Situs Risks**"). The rate of FET applicable to such reinsurance premiums paid to non-U.S. insurers is 1% unless the Issuer is eligible for Irish Treaty benefits.

The IRS, in Revenue Ruling 2008-15, formally announced its position that the FET is applicable (at a 1% rate on premiums) to all reinsurance cessions or retrocessions of risks by non-U.S. insurers or reinsurers to non-U.S. reinsurers where the underlying risks are U.S. Situs Risks, even if the FET has been paid on prior cessions of the same risks, unless an exemption applies pursuant to a U.S. income tax treaty. The jurisdictional basis for the IRS' position is unclear, and the District Court for the District of Columbia recently held that the FET does not apply to retrocession

contracts. As noted above, the Issuer intends to treat the Counterparty Contracts as notional principal contracts for U.S. federal tax purposes.

FATCA Reporting by the Issuer

FATCA and the U.S.-Ireland IGA require certain foreign financial institutions (“FFIs”) to disclose to the Irish Revenue Commissioners (for transmittal to the IRS) the name, address, tax identification number, and other specified information of certain U.S. and non-U.S. persons who own a direct or indirect interest in such FFIs. If an FFI fails to comply, it will be subject to a 30% withholding tax with respect to (i) certain U.S. source income (including interest and dividends) and gross proceeds from any sale or other disposition of property that can produce U.S. source interest or dividends (“withholdable payments”) and (ii) “passthru payments” (generally, withholdable payments and payments that are attributable to withholdable payments) made by FFIs. The Issuer expects to be treated as an FFI.

Further, if the Issuer is not characterized as an FFI, it may be characterized as a passive non-financial foreign entity, in which case it would appear to be subject to such 30% withholding tax on certain payments unless it either provides information to withholding agents with respect to its “substantial U.S. owners” or makes certain certifications. The FATCA withholding tax is currently imposed on payments of most types of U.S. source income, including interest and dividends, and beginning in 2017 will be imposed with respect to payments of proceeds from the sale of property that gives rise to U.S. source interest and dividends. No FATCA withholding tax will be imposed with respect to non-U.S. source passthru payments made by FFIs prior to January 1, 2017. The IRS has not yet defined the scope of non-U.S. source passthru payment withholding. The Issuer expects its income to be non-U.S. source.

The Issuer may be subject to the requirements imposed on FFIs or passive non-financial foreign entities under FATCA and will use reasonable efforts to avoid the imposition of a withholding tax under FATCA, which may include reporting information to the Irish Revenue Commissioners (for transmittal to the IRS). In this event, Noteholders will be required to provide any information, tax documentation and waivers that the Issuer determines are necessary to avoid the imposition of such withholding tax. The Issuer’s ability to satisfy such obligations will depend on each Noteholder providing, or causing to be provided, any information, tax documentation and waivers, including information concerning the direct or indirect owners of such Noteholder, that the Issuer determines is necessary to satisfy such obligations. If the Issuer initially complies or intends to comply with FATCA but is subsequently unable to comply, or fails to comply, distributions from, and proceeds from the disposition of, certain assets held by the Issuer may be subject to a withholding tax, in which case the Issuer will not have sufficient funds to make payments that otherwise would have been made under the Notes.

In the event any Noteholder fails to timely provide any information or tax documentation that the Issuer determines is necessary to satisfy any obligations that it may have under FATCA, or to the extent that the Noteholder’s ownership otherwise would cause the Issuer to be subject to withholding tax under FATCA, (A) the Issuer (or its agents on its behalf) is authorized to withhold amounts otherwise distributable to the Noteholder as compensation for any amount withheld from payments to the Issuer as a result of such failure or such Noteholder’s ownership, and (B) to the extent necessary to avoid an adverse effect on the Issuer or any other Noteholder as a result of such failure or such Noteholder’s ownership, the Issuer will have the right to compel the Noteholder to sell its Notes within thirty (30) calendar days after notice from the Issuer and, if the Noteholder does not sell its Notes within such 30-day period, the Issuer will have the right, without further notice to such Noteholder, to sell such Notes at a public or private sale called and conducted in any manner permitted by law, and to remit the net proceeds of such sale (taking into account any taxes, commissions and expenses incurred by the Issuer in connection with such sale) to the Noteholder as payment in full for such Notes. The terms and conditions of any sale will be determined in the sole discretion of the Issuer and none of the Issuer, the Counterparty or the Indenture Trustee will be liable to any person having an interest in the Notes sold as a result of any such sale or the exercise of such discretion. The Issuer may also assign each such Note a separate ISIN number in the Issuer’s sole discretion. Each Noteholder, by its acceptance of an interest in the Notes, agrees to cooperate with the Issuer to effect such transfers.

U.S. Federal Income Tax Treatment of Noteholders

Classification of the Notes as Debt or Equity

For U.S. federal income tax purposes, the tax classification of the Notes is uncertain. Each Class of Notes issued by the Issuer rank *pari passu* with respect to one another as a matter of contract law. However, it is possible that one Class of Notes issued by the Issuer might be considered senior to another Class of Notes issued by the Issuer in the Issuer’s capital structure, resulting in the more senior Class of Notes issued by the Issuer being treated as indebtedness, even though the Issuer intends to treat each Class of Notes issued by the Issuer as equity for U.S. federal income tax

purposes. The Issuer's treatment of the Notes as equity for U.S. federal income tax purpose will be binding on Noteholders (but not the IRS). Finally, if the Notes are treated as debt for U.S. federal income tax purposes, the Notes may be treated as being issued with original issue discount or as contingent payment debt instruments subject to special rules under the U.S. tax laws, described below.

The Indenture requires Noteholders to agree to take the position that the Notes constitute equity interests in the Issuer for U.S. federal income tax purposes. Moreover, each Noteholder by its purchase of Notes will acknowledge and agree to treat the Notes as equity interests and will covenant to take no action inconsistent with such treatment. **As described below, there may be adverse U.S. federal income tax consequences to a U.S. Noteholder if the Notes constitute equity of the Issuer for U.S. federal income tax purposes and the U.S. Noteholder fails to make certain elections with respect to the Notes. Accordingly, U.S. Noteholders are cautioned that, if they attempt to treat the Notes as debt for U.S. federal income tax purposes and fail to make the relevant election, they may be subject to adverse U.S. federal income tax consequences if the IRS determines that the Notes in fact constitute equity of the Issuer for U.S. federal income tax purposes.**

U.S. Federal Income Tax Treatment of U.S. Noteholders if the Notes are Treated as Equity

PFIC Considerations

If, as intended, the Notes are treated as equity, the following U.S. federal income tax treatment will apply.

The Issuer will constitute a PFIC for U.S. federal income tax purposes, and U.S. Noteholders (other than certain U.S. Noteholders that are subject to the rules pertaining to a “controlled foreign corporation” described below) will be considered shareholders in a PFIC. Consequently, it is likely to be advisable for a U.S. Noteholder to make a timely election to treat the Issuer as a QEF with respect to such U.S. Noteholder in the U.S. Noteholder's first taxable year in which the U.S. Noteholder owns Notes.

Generally, in order to make a timely QEF election with respect to the Issuer, a U.S. Noteholder must complete IRS Form 8621 and attach a copy of that form to its U.S. federal income tax return for the first taxable year of such U.S. Noteholder that includes its holding period for the Notes.

If a U.S. Noteholder makes a timely QEF election with respect to the Issuer, the electing U.S. Noteholder will be required in each taxable year to include in gross income (as translated into U.S. dollars based on the average exchange rate for the Issuer's taxable year, in the case of the Class A Notes) (i) as ordinary income, such U.S. Noteholder's pro rata share of the Issuer's ordinary earnings and (ii) as capital gain, such U.S. Noteholder's pro rata share of the Issuer's net capital gain (if any), whether or not distributed. In situations where, as here, a PFIC has more than one class of equity outstanding, the calculation of an electing U.S. Noteholder's pro rata share is unclear and could result in income inclusions in excess of distributable income. The Issuer expects most or all of its income to be ordinary earnings. A U.S. Noteholder will not be eligible for the dividends received deduction in respect of such income or gain or the reduced rate of tax on certain qualified dividend income. In addition, any net losses of the Issuer in a taxable year will not be available to such U.S. Noteholder and may not be carried back or forward in computing the Issuer's ordinary earnings and net capital gain in other taxable years. If applicable, the rules pertaining to a “controlled foreign corporation” discussed below generally override those pertaining to a PFIC.

In certain cases in which a QEF does not distribute all of its earnings in a taxable year, the electing U.S. Noteholder may also be permitted to elect to defer payment of some or all of the taxes on the QEF's income, subject to a non-deductible interest charge on the deferred amount. In this respect, prospective U.S. Noteholders should be aware that, in any given year, the Issuer may have amounts of earnings for U.S. federal income tax purposes that are not distributed on the Notes. Thus, absent an election to defer payment of taxes, U.S. Noteholders that make a QEF election with respect to the Issuer may owe tax on “phantom” income.

The Issuer will provide, upon written request by a U.S. Noteholder, all information and documentation that a U.S. Noteholder making a QEF election with respect to the Issuer is required to obtain from the Issuer in order to make a QEF election with respect to the Issuer for U.S. federal income tax purposes.

If the Notes are treated as marketable stock, a U.S. Noteholder may make a mark-to-market election instead of a QEF election. Generally, in order for the Notes to be considered “marketable stock” for this purpose, the Notes must be regularly traded on a “qualified exchange or other market”. There is currently little guidance as to whether any particular foreign exchange should be treated as a “qualified exchange or other market” for this purpose, and therefore, there is no certainty with respect to whether the Notes should be treated as “marketable stock”. In addition, there is no

certainty as to whether the Notes will be regularly traded. Accordingly, U.S. Noteholders should consult their own tax advisors regarding the eligibility of the Notes for the mark-to-market election.

If a U.S. Noteholder successfully makes a mark-to-market election with respect to the Notes, the U.S. Noteholder, in general, will include as ordinary income each year the excess, if any, of the fair market value of the U.S. Noteholder's Notes at the end of the taxable year over the U.S. Noteholder's adjusted basis in its Notes. These amounts of ordinary income would not be eligible for the favorable tax rates applicable to qualified dividend income or long-term capital gains. A U.S. Noteholder would also be allowed to take an ordinary loss in respect of the excess, if any, of the adjusted basis in the U.S. Noteholder's Notes over their fair market value at the end of the taxable year (but only to the extent of the net amount of previously included income as a result of the mark-to-market election). A U.S. Noteholder's basis in its Notes would be adjusted to reflect any such income or loss amounts.

If a U.S. Noteholder makes a mark-to-market election with respect to the Notes, the U.S. Noteholder would be treated as having a new holding period in the U.S. Noteholder's Notes beginning on the first day of the first taxable year beginning after the last taxable year for which the mark-to-market election applies.

A U.S. Noteholder that does not make a timely QEF election or a mark-to-market election (if available), will be required to report any gain on the disposition of any Notes as ordinary income, rather than capital gain, and to compute the tax liability on such gain and any "Excess Distribution" (as defined below) received in respect of the Notes as if such items had been earned ratably over each day in the U.S. Noteholder's holding period for the Notes. An "**Excess Distribution**" is the amount by which distributions during a taxable year in respect of a Note exceed 125% of the average amount of distributions in respect thereof during the three preceding taxable years (or, if shorter, the U.S. Noteholder's holding period for the Note). The U.S. Noteholder will be subject to tax on such items at the highest ordinary income tax rate for each taxable year, other than the current year, in which the items were treated as having been earned, regardless of the ordinary income tax rate otherwise applicable to the U.S. Noteholder. Further, such U.S. Noteholder will also be liable for a non-deductible interest charge as if such income tax liabilities had been due with respect to each such prior year. For purposes of these rules, gifts, exchanges pursuant to corporate reorganizations and use of the Notes as security for a loan may be treated as a taxable disposition of such Notes.

In many cases, the U.S. federal income tax on any gain on disposition or receipt of Excess Distributions is likely to be substantially greater than the U.S. federal income tax if a timely QEF election or a mark-to-market election is made. A U.S. Noteholder is strongly advised to consider making a QEF election or a mark-to-market election with respect to the Notes.

In addition, if the Issuer invests in a Money Market Funds Permitted Investment that is not incorporated in the United States, such Money Market Funds Permitted Investments may constitute a PFIC for U.S. federal income tax purposes, and as a result, a U.S. Noteholder that is, as described above, treated as owning equity in the Issuer would then be treated as a shareholder in such PFIC to the extent of the U.S. Noteholder's proportionate share of the Money Market Funds Permitted Investment held through the U.S. Noteholder's interest in the Issuer. Accordingly, a U.S. Noteholder would be subject to the PFIC rules described above with respect to its indirect investment in such Money Market Funds Permitted Investment. The Issuer will use commercially reasonable efforts to obtain and provide to a U.S. Noteholder, upon written request by a U.S. Noteholder, all information and documentation that a U.S. Noteholder making a QEF election with respect to a Money Market Funds Permitted Investment treated as a PFIC is required to obtain from the Money Market Funds Permitted Investment. However, the Issuer may not be able to obtain or provide the information and documentation that would be required for a U.S. Noteholder to make a QEF election with respect to such Money Market Funds Permitted Investment. In addition, if a U.S. Noteholder has made a mark-to-market election with respect to the Issuer, such election would only be effective with respect to the Issuer and would not apply to any such Money Market Funds Permitted Investments. If a U.S. Noteholder cannot or does not make a QEF election with respect to a Money Market Funds Permitted Investment that is not incorporated in the U.S., the U.S. Noteholder could be subject to the adverse rules described above that apply when a U.S. Noteholder does not make a timely QEF election or a mark-to-market election.

A U.S. Noteholder that is a shareholder in a PFIC will generally be required to file an annual report with the IRS on Form 8621.

Distributions on the Notes treated as Equity

Subject to the discussion of "controlled foreign corporations" below, the treatment of actual distributions of cash on the Notes, in very general terms, will vary depending on whether a U.S. Noteholder has made a timely QEF election. If a timely QEF election has been made, distributions should be allocated first to amounts previously taxed

pursuant to the QEF election and to this extent will not be taxable to U.S. Noteholders. In general, a U.S. Noteholder of the Class A Notes will recognize exchange gain or loss with respect to amounts previously taxed pursuant to a QEF election (or pursuant to the “controlled foreign corporation” rules discussed below, if applicable) equal to the difference, if any, between the U.S. dollar value of the payment in euro on the date received (based on the U.S. dollar / euro spot rate on the date received) and the U.S. dollar value of the previously taxed amount allocable to the distribution. Any exchange gain or loss will generally be treated as non-U.S. source ordinary income or loss. The U.S. dollar value of any distributions in excess of such previously taxed amounts, translated into U.S. dollars at the U.S. dollar / euro spot rate on the date received will be taxable to U.S. Noteholders as ordinary income upon receipt, to the extent of any remaining amounts of untaxed current and accumulated earnings and profits (as determined for U.S. federal income tax purposes) of the Issuer. Distributions (which will be the U.S. dollar value thereof, based on the exchange rate on the date such distributions are received) in excess of previously taxed amounts and any remaining current and accumulated earnings and profits of the Issuer will be treated first as a nontaxable return of capital and thereafter as capital gain.

A U.S. Noteholder’s tax basis in any euro received as a payment on the Note will equal the U.S. dollar amount used to calculate the U.S. Noteholder’s income. Any gain or loss recognized on a subsequent conversion or other disposition of the euro for a different U.S. dollar amount will generally be U.S. source ordinary income or loss.

In the event that a U.S. Noteholder does not make a timely QEF election or a mark-to-market election, some or all of any distributions with respect to the Notes may constitute Excess Distributions, taxable as described above.

Interest paid with respect to the Notes by the Issuer to a corporate U.S. Noteholder will not be eligible for the dividends-received deduction provided by Section 243 of the Code or the reduced rate of tax on certain qualified dividend income. The interest and amounts included in income as a result of a QEF election will be non-U.S. source income for purposes of the Code. Special sourcing rules, however, may apply for purposes of computing a U.S. Noteholder’s foreign tax credit if the Issuer is deemed to be a United States-owned foreign corporation (*i.e.*, if 50% or more by value of Notes issued by the Issuer outstanding that are treated as equity of the Issuer for U.S. federal income tax purposes are directly, indirectly or constructively owned, for U.S. federal income tax purposes, by persons that are U.S. persons for U.S. federal income tax purposes).

Sale, redemption, or other disposition of the Notes treated as Equity

Subject to the discussion of “controlled foreign corporations” below, in general, a U.S. Noteholder that makes an effective QEF election or a mark-to-market election with respect to a Note will recognize gain or loss upon the sale, redemption, or other disposition of a Note equal to the difference between the amount realized and such U.S. Noteholder’s adjusted tax basis in its Note.

Initially, a U.S. Noteholder’s tax basis will equal the U.S. dollar cost of the Notes. A U.S. Noteholder’s basis in its Notes will be increased to reflect taxed but undistributed income. Distributions of previously taxed income (*i.e.*, income that has been taxed previously under the QEF rules discussed above or under the “controlled foreign corporation” rules discussed below) will result in a corresponding reduction of basis in the Notes and will not be taxed again as a distribution to the U.S. Noteholder.

A U.S. Noteholder that receives foreign currency on the sale or other disposition of the Notes will realize an amount equal to the U.S. dollar value of the foreign currency on the date of sale or other disposition (or in the case of cash basis and electing accrual basis taxpayers, the settlement date). A U.S. Noteholder that is a non-electing accrual basis taxpayer will recognize exchange gain or loss if the U.S. dollar value of the currency received at the spot rate on the settlement date differs from the amount realized. A U.S. Noteholder will have a tax basis in the foreign currency received equal to its value at the spot rate on the settlement date. Any exchange gain or loss realized on the settlement date or on a subsequent conversion of the foreign currency into U.S. dollars will generally be U.S. source ordinary income or loss.

Subject to the discussion of exchange gain or loss above, gain or loss from the sale, redemption or other disposition of a Note will generally be long-term capital gain or loss if the U.S. Noteholder has a holding period in the Note for more than one year. Generally, a non-corporate U.S. Noteholder may be entitled to preferential rates of taxation for long-term capital gains; however, the ability of U.S. Noteholders to offset capital losses against ordinary income is limited. The gain or loss will generally be income or loss from sources within the United States for foreign tax credit limitation purposes.

If a U.S. Noteholder does not make a timely QEF election or a mark-to-market election, any gain realized on the sale, redemption, or other disposition of a Note (or any gain deemed to accrue prior to the time a non-timely QEF

election is made) will be taxed as ordinary income and subject to an additional tax reflecting a deemed interest charge under the special PFIC rules described above.

Controlled Foreign Corporation Rules

The Issuer will constitute a CFC if more than 50% of the equity interests in the Issuer (or more than 25%, if the Issuer is treated as earning income from the issuance of insurance contracts for U.S. federal income tax purposes), measured by reference to the combined voting power or value of the equity of the Issuer, is owned directly, indirectly, or constructively by “United States shareholders”. For these purposes, a United States shareholder is any U.S. person that owns directly, indirectly, or constructively 10% or more of the combined voting power of all classes of equity in the Issuer. Notwithstanding their terms, it is possible that the Notes will be treated as voting securities for U.S. federal income tax purposes to the extent that they are treated as equity interests in the Issuer. In this case, a U.S. Noteholder possessing directly, indirectly, or constructively 10% or more of the sum of the aggregate Outstanding Principal Amount of the Notes issued by the Issuer that are treated as equity interests in the Issuer for U.S. federal income tax purposes would be treated as a United States shareholder. If more than 50% of such Notes (or more than 25%, if the Issuer is treated as earning income from the issuance of insurance contracts for U.S. federal income tax purposes) are owned directly, indirectly, or constructively by persons treated as United States shareholders, the Issuer would be treated as a CFC.

If, for any given taxable year, the Issuer is treated as a CFC for an uninterrupted period of 30 days or more, a person who directly or indirectly owns Notes on the last day of the Issuer’s taxable year on which it is a CFC and who is also treated as a United States shareholder of the Issuer would be required to include as ordinary income an amount equal to that person’s pro rata share of the Issuer’s “subpart F income” (generally, passive investment income) at the end of such taxable year (translated into U.S. dollars based on the average exchange rate for the Issuer’s taxable year). In situations where, as here, a CFC has more than one class of equity outstanding, the calculation of a United States shareholder’s pro rata share of the CFC’s “subpart F income” is unclear and could result in income inclusions in excess of distributable income. If more than 25%, but not more than 50%, of the aggregate amount of all Classes of Notes of the Issuer that are treated as equity are owned directly, indirectly or constructively by persons treated as United States shareholders, then, subject to certain exceptions, the Issuer’s subpart F income will generally include only certain types of insurance income (in general, premium and investment income attributable to contracts treated as insurance for U.S. federal income tax purposes). If more than 50% of the aggregate amount of all Classes of Notes that are treated as equity are owned directly, indirectly or constructively by persons treated as United States shareholders, then the Issuer’s subpart F income will generally include all of its income.

The classification of the Issuer’s income under each Counterparty Contract and of the Issuer’s status as a non-insurance company is uncertain. Reasons for treating the Issuer’s income as non-insurance income and the Issuer as a non-insurance company include, among others, that the obligation of the Issuer to make payments to the Counterparty in respect of the Notes is based on an index of industry wide event loss data and estimates and such obligation does not indemnify the Counterparty against the actual loss suffered by the Counterparty. However, there can be no assurance that the IRS will not contend that the Issuer is an insurance company and that it earns income from the issuance of insurance contracts or that a court will not sustain such a contention.

If the Issuer is treated as a CFC and a U.S. Noteholder is treated as a United States shareholder of the Issuer, the Issuer would not be treated as a PFIC with respect to such U.S. Noteholder for the period during which the Issuer remains a CFC and such U.S. Noteholder remains a United States shareholder of the Issuer (the “qualified portion” of the U.S. Noteholder’s holding period for the Notes). As a result, to the extent the Issuer’s subpart F income includes net capital gains, such gains would be treated as ordinary income to a Noteholder who is treated as a United States shareholder under the CFC rules, notwithstanding the fact that the character of such gains generally would otherwise be preserved under the QEF rules. If the qualified portion of such U.S. Noteholder’s holding period for the Notes subsequently ceases (either because the Issuer ceases to be a CFC or the U.S. Noteholder ceases to be a United States shareholder), then solely for purposes of the PFIC rules, such U.S. Noteholder’s holding period for the Notes would be treated as beginning on the first day following the end of such qualified portion, unless the U.S. Noteholder had owned any Notes for any period of time prior to such qualified portion and had not made a QEF election with respect to the Issuer. In that case, the Issuer would again be treated as a PFIC which is not a QEF with respect to such U.S. Noteholder, and the beginning of such U.S. Noteholder’s holding period for the Notes would continue to be the date upon which such U.S. Noteholder acquired the Notes, unless the U.S. Noteholder makes either a “deemed sale” or “deemed dividend” election with respect to the Notes and a QEF election with respect to the Issuer.

If the Issuer is treated as a CFC and a U.S. Noteholder is treated as a “United States shareholder” of the Issuer, any distributions made to the U.S. Noteholder would not be treated as taxable dividends to the extent attributable to

earnings previously taxed (either pursuant to a timely QEF election or pursuant to the CFC rules), but will reduce the Issuer's earnings and profits by the amount of such distributions, and any gain realized by such a U.S. Noteholder upon the disposition of a Note (other than gain subject to the PFIC rules, if applicable) would be treated as ordinary income to the extent of the U.S. Noteholder's pro rata share of the Issuer's current and accumulated earnings and profits not previously taxed pursuant to a timely QEF election or pursuant to the CFC rules.

As discussed above, in general, a U.S. Noteholder will recognize exchange gain or loss generally treated as non-U.S. source ordinary income or loss with respect to distributions previously taxed under the CFC rules in an amount equal to the difference, if any, between the U.S. dollar value of any distribution paid in euro on the date received (based on the U.S. dollar / euro spot rate on the date received) and the U.S. dollar value of the previously taxed amount allocable to the distribution. A U.S. Noteholder's tax basis in any euro received as a payment on the Notes will equal the U.S. dollar amount used to calculate such gain or loss. Any exchange gain or loss upon receipt of a distribution or upon a subsequent conversion or other disposition of euro received as a payment on the Notes will generally be U.S. source ordinary income or loss.

As discussed above, a U.S. Noteholder that receives foreign currency on the sale or other disposition of the Notes will realize an amount equal to the U.S. dollar value of the foreign currency on the date of sale or other disposition (or in the case of cash basis and electing accrual basis taxpayers, the settlement date). A U.S. Noteholder that is a non-electing accrual basis taxpayer and that receives foreign currency on the sale or other disposition of a Note will recognize exchange gain or loss if the U.S. dollar value of the currency received at the spot rate on the settlement date differs from the amount realized. A U.S. Noteholder that receives foreign currency on the sale or other disposition of a Note will have a tax basis in the foreign currency received equal to its value at the spot rate on the settlement date. Any exchange gain or loss realized on the settlement date or on a subsequent conversion or other disposition of the foreign currency will generally be U.S. source ordinary income or loss.

Code section 1248 provides that if a U.S. Noteholder sells or exchanges equity in a non-U.S. corporation and such person owned, directly, indirectly through certain non-U.S. entities or constructively, 10% or more of the voting power of the corporation at any time during the five-year period ending on the date of disposition when the corporation was a CFC, any gain from the sale or exchange of the shares will be treated as a dividend to the extent of the CFC's earnings and profits (determined under U.S. federal income tax principles) during the period that the shareholder held the shares and while the corporation was a CFC (with certain adjustments). In this regard, earnings and profits should not include any amounts previously taxed pursuant to a timely QEF election or pursuant to the CFC rules. Potential investors are urged to consult their tax advisors. Additionally, a 10% U.S. Noteholder may in certain circumstances be required to report a disposition of shares of a CFC by attaching IRS Form 5471 to the U.S. federal income tax or information return that it would normally file for the taxable year in which the disposition occurs. In the event this is determined necessary, the Issuer will provide the relevant information necessary to complete an IRS Form 5471.

Additionally, Code section 1248 in conjunction with the RPII rules provides that if a U.S. Noteholder disposes of equity in a non-U.S. corporation that has insurance income (as determined for U.S. federal income tax purposes) in which U.S. persons own 25% or more of the shares (even if the amount of gross RPII is less than 20% of the corporation's gross insurance income and the ownership of its shares by direct or indirect insureds and related persons is less than the 20% threshold), any gain from the disposition (excluding foreign currency gain) will generally be treated as a dividend to the extent of the holder's share of the corporation's undistributed earnings and profits that were accumulated during the period that the holder owned the shares (whether or not such earnings and profits are attributable to RPII). In addition, such a holder will be required to comply with certain reporting requirements, regardless of the amount of shares owned by the holder. As noted above, the Issuer intends to treat the Issuer's income with respect to the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes, although the issue is not free from doubt. If, instead, the Issuer's income is characterized as insurance income, the Issuer expects these RPII rules would apply to dispositions of Notes, because the Issuer expects U.S. Noteholders to own (directly, indirectly through non-U.S. entities or constructively) 25% or more of the Issuer's equity. If the RPII rules apply, gain from a disposition of Notes earned by U.S. Noteholders directly should be characterized as a dividend to the extent of the Issuer's earnings and profits attributable to the disposed of Notes. In this regard, earnings and profits should not include any amounts previously taxed pursuant to a timely QEF election. Potential investors are urged to consult their tax advisors with respect to these rules.

A U.S. Noteholder who expects to hold directly, indirectly or constructively, or expects to be treated as holding under U.S. federal income tax rules, 10% or more of the Notes, or any Class of outstanding Notes issued by the Issuer or of all of the outstanding Notes issued by the Issuer that are treated as equity should consult its own tax advisor with respect to the potential application of the CFC rules, including any applicable information reporting rules, and with

respect to the classification of the Issuer's income under each Counterparty Contract as insurance or non-insurance income.

The RPII CFC Provisions

As noted above, the Issuer intends to treat the Issuer's income with respect to the Counterparty Contracts as notional principal contract income for U.S. federal income tax purposes, although the issue is not free from doubt. If, instead, insurance treatment is appropriate, the special RPII CFC income inclusion rules could apply if (i) the Issuer's RPII, determined on a gross basis, is 20% or more of the Issuer's gross insurance income for a taxable year, (ii) direct and indirect insureds and persons related (as defined below) to such insureds, whether or not U.S. Noteholders, are treated as owning (directly or indirectly through entities) 20% or more of the voting power or 20% or more of the value of the Issuer's equity and (iii) RPII shareholders (as defined below) are treated as owning (directly, indirectly through non-U.S. entities or constructively) 25% or more of the Issuer's equity by vote or value.

RPII is any insurance income attributable to policies of insurance or reinsurance with respect to which the person (directly or indirectly) insured is a RPII shareholder or a related person to such RPII shareholder. The term "**RPII shareholder**" means any U.S. Noteholder who owns (directly or indirectly through non-U.S. entities) any amount of the Issuer's equity. Generally, the term "related person" for this purpose means someone who controls or is controlled by the RPII shareholder or someone who is controlled by the same person or persons which control the RPII shareholder. Control is measured by either more than 50% in value or more than 50% in voting power of stock applying certain constructive ownership principles.

If the special RPII CFC income inclusion rules apply to the Issuer, each U.S. Noteholder owning directly or indirectly through non-U.S. entities, any Notes on the last day of the Issuer's taxable year on which it is a CFC under the RPII rules will be required to include in its gross income for U.S. federal income tax purposes its share of the Issuer's RPII for the portion of the taxable year during which the Issuer was a CFC under the RPII provisions, determined as if all such RPII were distributed proportionately only to such U.S. Noteholders at that date, but limited by each such U.S. Noteholder's share of the Issuer's current-year earnings and profits as reduced by the U.S. Noteholder's share, if any, of certain prior-year deficits in earnings and profits. Prospective investors are urged to consult their tax advisors concerning the application and effects of the RPII rules to their particular situation.

Foreign Tax Credit

If U.S. Noteholders own a majority of the Notes, only a portion of the current income inclusions under the PFIC, CFC and RPII rules and of dividends (including for these purposes interest on the Notes) paid by the Issuer (including any gain from the sale of Notes that is treated as a dividend under section 1248 of the Code) will be treated as foreign source income for purposes of computing a U.S. Noteholder's U.S. foreign tax credit limitations. The Issuer will consider providing shareholders with information regarding the portion of such amounts constituting foreign source income to the extent such information is reasonably available. It is also likely that substantially all of the subpart F income, QEF inclusions and dividends that are foreign source income will constitute either "passive" or "general" income for foreign tax credit limitation purposes. Thus, it may not be possible for most shareholders to utilize excess foreign tax credits to reduce U.S. tax on such income. Each U.S. Noteholder is urged to consult its own tax advisor concerning whether a foreign tax credit will be available.

Information Reporting and Transfer Reporting Requirements

A U.S. Noteholder that purchases the Notes for cash would be required to file a IRS Form 926 with the IRS, if (i) such person is treated as owning, directly or by attribution, immediately after the transfer at least 10% by vote or value of the equity of the Issuer or (ii) if the amount of cash transferred by such person (or any related person) to the Issuer during the 12-month period ending on the date of such transfer exceeds \$100,000.

Under certain circumstances, U.S. Noteholders that own (directly or indirectly) shares in a non-U.S. corporation are required to file IRS Form 5471 with their U.S. federal income tax returns. Generally, information reporting on IRS Form 5471 is required by (i) a 10% U.S. Shareholder of a non-U.S. corporation that is a CFC for an uninterrupted period of 30 days or more during any tax year of the non-U.S. corporation who owned (directly or indirectly through non-U.S. entities) any stock in the non-U.S. corporation on the last day of that year and (ii) under certain circumstances, a U.S. Noteholder who acquires stock in a non-U.S. corporation and as a result thereof owns 10% or more of the voting power or value of such non-U.S. corporation, whether or not such non-U.S. corporation is a CFC. Additionally, information reporting on Form 5471 is generally required if the RPII CFC rules apply. A U.S. Noteholder

will be required to file an IRS Form 8621 (which is a form that is required to be filed by holders of equity in a PFIC) for each tax year that it holds Notes and the Issuer is characterized as a PFIC.

U.S. Noteholders should consider their possible obligation to file a FinCEN Form 114 – Report of Foreign Bank and Financial Accounts - with respect to the Notes. Additionally, such U.S. Noteholders should consider their possible obligations to annually report certain information with respect to the Issuer with their U.S. federal income tax returns. Noteholders should consult their tax advisors with respect to these or any other reporting requirements which may apply with respect to their purchase, holding and/or sale of the Notes.

U.S. Noteholders should consult their tax advisors with respect to this or any other reporting requirement that may apply with respect to their acquisition of the Notes.

Tax-exempt Noteholders

Tax-exempt entities will be required to treat certain subpart F insurance income, including RPII, that is includable in income by the tax-exempt entity as unrelated business taxable income. Prospective investors that are tax exempt entities are urged to consult their tax advisors as to the potential impact of the unrelated business taxable income provisions of the Code. As noted above, the Issuer intends to treat the Issuer's income as notional principal contract income for U.S. federal income tax purposes. A tax-exempt organization that is treated as a 10% U.S. shareholder or a RPII Shareholder also must file IRS Form 5471 in the circumstances described above. Prospective investors that are tax exempt entities are urged to consult their tax advisors as to the potential impact of the unrelated business taxable income provisions of the Code.

U.S. Federal Income Tax Treatment of Non-U.S. Noteholders of the Notes treated as Equity

In general, subject to discussions of FATCA and back-up withholding herein, payments on the Notes to a non-U.S. Noteholder and gain realized on the sale, exchange or retirement of the Notes by a Non-U.S. Noteholder will not be subject to U.S. federal income or withholding tax, unless (i) such income is effectively connected with a trade or business conducted by such non-U.S. Noteholder in the United States and, if required by an applicable income tax treaty as a condition for subjecting the non-U.S. Noteholder to United States taxation on a net income basis, the income is attributable to a permanent establishment that it maintains in the United States, or (ii) in the case of gain, such non-U.S. Noteholder is a nonresident alien individual who holds the Notes as a capital asset and is present in the United States for more than 183 calendar days in the taxable year of the sale and certain other conditions are satisfied. For a corporate non-U.S. Noteholder, “effectively connected” dividends and gains that it recognizes may also, under certain circumstances, be subject to an additional “branch profits tax” at a 30% rate or at a lower rate if it is eligible for the benefits of an income tax treaty that provides for a lower rate.

U.S. Federal Income Tax Treatment of U.S. Noteholders if the Notes are Treated as Debt

If, contrary to the Issuer's intention, the Notes are treated as debt for U.S. federal income tax purposes, the Notes would likely be subject to the special rules governing contingent payment debt instruments.

Under these rules, a U.S. Noteholder would be required to accrue interest on its Notes in accordance with the yield (the “**comparable yield**”) at which the Issuer would issue a non-contingent fixed-rate debt instrument with terms and conditions that are otherwise the same as the U.S. Noteholder's Notes. In addition, payments of interest will be taken into account using a projected payment schedule (which must produce a yield equal to the comparable yield) with adjustments made where actual payments of interest differ from the projected payment schedule. Because the Issuer is taking the position that the Notes are equity for U.S. federal income tax purposes, the Issuer will not publish a projected payment schedule. While not entirely clear, the “comparable yield” required to be accrued and subject to U.S. federal income tax for any tax year, may exceed the amount of actual interest paid on the Notes during that tax year. In addition, where actual interest paid exceeds the projected interest to be paid in a given period, such excess will generally be treated as additional interest to a U.S. Noteholder. Where the actual interest paid is less than the projected interest payment, the negative amount would generally (a) reduce your interest income on the Notes for that taxable year, and (b) to the extent of any excess after the application of (a), give rise to an ordinary loss to the extent of your interest income on the Notes during prior taxable years, reduced to the extent such interest was offset by prior negative adjustments. Any negative amount in excess of the amounts described in (a) and (b) will be carried forward against future payments. A U.S. Noteholder will generally adjust its basis in the Notes based on the projected payment schedule.

The rules for translating foreign currency amounts into U.S. dollars for purposes of accruing interest income or loss and determining basis in the Notes are complicated, and a U.S. Noteholder should consult its own tax advisor.

Interest recognized by the U.S. Noteholder on the Notes would be income from sources outside the United States, subject to additional rules regarding the foreign tax credit allowable to a U.S. Noteholder. Under the foreign tax credit rules, interest recognized by a U.S. Noteholder would, depending on the U.S. Noteholder's circumstances, be "passive" or "general" income which, in either case, is treated separately for purposes of computing the foreign tax credit.

A U.S. Noteholder would generally recognize gain or loss on the sale or retirement of its Note equal to the difference between the amount realized on the sale or retirement, and the U.S. Noteholder's tax basis in its Note. A U.S. Noteholder's tax basis in its Note generally would be the Noteholder's U.S. dollar cost of the Note adjusted based on the projected payment schedule described above, translated into U.S. dollars. Any gain recognized by a U.S. Noteholder upon the sale or retirement of its Note would be ordinary income, and any loss recognized at that time would be ordinary to the extent of interest such U.S. Noteholder included in income in the current and all prior taxable years in respect of its Notes (but reduced by any adjustments described above), and thereafter, as capital loss. The deductibility of capital losses is subject to limitations.

The rules governing contingent payment debt instruments, and the rules governing foreign currency denominated debt instruments, are complex. U.S. Noteholders are urged to consult their tax advisors regarding the application of these rules to the Notes.

U.S. Federal Income Tax Treatment of Non-U.S. Noteholders if the Notes are Treated as Debt

Subject to the discussions of FATCA and back-up withholding herein, non-U.S. Noteholders will generally not be subject to U.S. federal income tax, including withholding tax, on payments of interest on the Notes, whether or not such non-U.S. Noteholder is engaged in a trade or business in the United States, provided that:

- the non-U.S. Noteholder does not own directly or indirectly, actually or constructively, 10% or more of the total combined voting power of all classes of the Issuer's stock entitled to vote;
- the non-U.S. Noteholder is not a controlled foreign corporation that is related to the Issuer directly or constructively through stock ownership;
- the non-U.S. Noteholder is not a bank receiving interest on a loan entered into in the ordinary course of its trade or business;
- such interest (including OID) is not effectively connected with the conduct by the non-U.S. Noteholder of a trade or business within the United States; and
- the Issuer, or its paying agent, receives appropriate documentation (generally an IRS Form W-8BEN, W-8BEN-E, or W-8ECI) establishing that the Non U.S. Holder is not a U.S. person.

Medicare Tax on U.S. Noteholders

A U.S. Noteholder that is an individual or estate, or a trust that does not fall into a special class of trusts that is exempt from such tax, is subject to a 3.8% tax on the lesser of (1) the U.S. Noteholder's "net investment income," or "undistributed net investment income" in the case of an estate or trust, for the relevant taxable year and (2) the excess of the U.S. Noteholder's modified adjusted gross income for the taxable year over a certain threshold (which, in the case of individuals, is between \$125,000 and \$250,000, depending on the individual's circumstances). A U.S. Noteholder's net investment income generally includes its gross distributions treated as dividend or interest income and its net gains from the disposition of Notes, unless such distributions treated as dividend or interest payments or net gains are derived in the ordinary course of the conduct of a trade or business (other than a trade or business that consists of certain passive or trading activities). U.S. Noteholders that are individuals, estates or trusts are urged to consult their tax advisors regarding the applicability of the Medicare tax to their income and gains in respect of their investment in the Notes.

Information with Respect to Foreign Financial Assets

Owners of “specified foreign financial assets” with an aggregate value in excess of \$50,000 (and in some circumstances, a higher threshold) may be required to file an information report with respect to such assets with their tax returns. “Specified foreign financial assets” may include any financial accounts maintained by foreign financial institutions, as well as any of the following, but only if they are held for investment and not held in accounts maintained by financial institutions: (i) stocks and securities issued by non-U.S. persons, (ii) financial instruments and contracts that have non-U.S. issuers or counterparties, and (iii) interests in foreign entities. The Notes may be subject to these rules. U.S. Noteholders are urged to consult their tax advisors regarding the application of this reporting requirement to their ownership of the Notes.

Backup Withholding and Information Reporting

Non-corporate U.S. Noteholders generally will be subject to information reporting requirements, on Internal Revenue Service Form 1099, with respect to payments of principal and interest on a Note within the United States, and the payment of proceeds to the non-corporate U.S. Noteholder from the sale of a Note effected at a U.S. office of a broker.

Non-U.S. Noteholders are generally exempt from backup withholding and information reporting requirements with respect to payments of principal and interest made to the non-U.S. Noteholder outside the United States by the Issuer or another non-U.S. payor. Non-U.S. Noteholders are also generally exempt from backup withholding and information reporting requirements in respect of payments of principal and interest made within the United States and the payment of the proceeds from the sale of a Note effected at a U.S. office of a broker, as long as either (i) the payor or broker does not have actual knowledge or reason to know that the non-U.S. Noteholder is a U.S. person and the non-U.S. Noteholder has furnished a valid IRS Form W-8BEN-E or other documentation upon which the payor or broker may rely to treat the payments as made to a non-United States person, or (ii) the non-U.S. Noteholder otherwise establishes an exemption.

Payment of the proceeds from the sale of a note effected at a foreign office of a broker generally will not be subject to information reporting or backup withholding. However, a sale effected at a foreign office of a broker could be subject to information reporting in the same manner as a sale within the United States (and in certain cases may be subject to backup withholding as well) if (i) the broker has certain connections to the United States, (ii) the proceeds or confirmation are sent to the United States or (iii) the sale has certain other specified connections with the United States.

A Noteholder generally may obtain a refund of any amounts withheld under the backup withholding rules that exceed your income tax liability by filing a refund claim with the IRS.

Proposed U.S. Tax Legislation

It is possible that legislation could be introduced and enacted by the current U.S. Congress or future Congresses that could have an adverse impact on the Issuer or the Noteholders. Any such legislation could have a retroactive effect.

Additionally, the U.S. federal income tax laws and interpretations regarding whether a company is engaged in a trade or business within the United States or is a PFIC, or whether U.S. Persons would be required to include in their gross income the subpart F income or RPII of a CFC are subject to change, possibly on a retroactive basis. New regulations or pronouncements interpreting or clarifying such rules may be forthcoming. The Issuer cannot be certain if, when or in what form such regulations or pronouncements may be provided and whether such guidance will have a retroactive effect.

Disclosure Requirements for U.S. Noteholders Recognizing Significant Losses

A U.S. Noteholder of 10% of all of the interests in the Issuer that are treated as equity for U.S. federal income tax purposes may be subject to certain disclosure requirements for “reportable transactions” if the Issuer recognizes losses of \$10 million or more with respect to a transaction or enters into a transaction that is offered under conditions of confidentiality. In the case of a U.S. Noteholder that is an individual or a trust, reporting may be required with respect to foreign currency losses of \$50,000 or more. Prospective U.S. Noteholders should consult their tax advisers concerning any possible disclosure obligation with respect to the Notes.

CERTAIN IRISH INCOME TAX CONSIDERATIONS

The following is a general outline of certain Irish tax considerations relating to the Notes based on the current law and practice in Ireland. It does not purport to be a complete analysis of all Irish tax considerations relating to the Notes. It relates to the position of persons who are the absolute beneficial owners of Notes and may not apply to certain classes of persons such as dealers and certain tax exempt bodies. This general summary is based upon Irish taxation laws currently in force, regulations promulgated thereunder, specific proposals to amend any of the foregoing publicly announced prior to the date hereto and the currently published administrative practices of the Irish Revenue Commissioners, all as of the date hereof. Taxation laws are subject to change, from time to time, and no representation is or can be made as to whether such laws will change or what impact, if any, such changes will have on the statements contained in this summary. It is assumed for the purposes of this summary that any proposed amendments will be enacted in the form proposed. No assurance can be given that proposed amendments will be enacted as proposed or that legislative or judicial changes or changes in administrative practice will not modify or change the statements expressed herein. This summary is of a general nature only. It does not constitute tax or legal advice and does not discuss all aspects of Irish taxation that may be relevant to any particular holder of Notes (including but not limited to social welfare taxes and universal social charges).

PROSPECTIVE INVESTORS ARE ADVISED TO CONSULT THEIR OWN TAX ADVISERS WITH RESPECT TO THE APPLICATION OF IRISH TAXATION LAWS TO THEIR PARTICULAR CIRCUMSTANCES IN RELATION TO THE PURCHASE, OWNERSHIP OR DISPOSITION OF NOTES.

Irish Taxation

Taxation of the Issuer

The Issuer will be taxable as a securitization company pursuant to Section 110 of the Taxes Consolidation Act 1997 of Ireland (“TCA”). Profits arising to the Issuer shall be taxable at a rate of 25%. The rules applicable in order to calculate this tax are generally the same as those applicable to a regular trading company.

Where the interest on the Notes does not represent more than a reasonable commercial return on the principal outstanding and it is not dependent on the results of the company’s business, the interest in respect of the Notes issued should be deductible in determining the taxable profits of the company.

However, where the interest on the Notes represents more than a reasonable commercial return on the principal outstanding or is dependent on the results of the company business, the interest will not be deductible if:

- (a) at the time the interest is paid on the Notes, the Issuer is in possession, or aware, of information that can reasonably be taken to indicate that the payment is part of a scheme or arrangement, the main benefit or one of the main benefits of which is the obtaining of a tax relief or the reduction of a tax liability, the benefit of which would be expected to accrue to a person who, in relation to the Issuer is a “specified person” (as defined below); or
- (b) the interest is paid to a person that:
 - (i) is not resident in Ireland or if so resident, is not otherwise within the charge to corporation tax in Ireland in respect of that interest; and
 - (ii) is not a pension fund, government body or other person resident in a relevant territory who, under the laws of that relevant territory, is exempted from tax which generally applies to profits, income or gains in that territory (or if such a person, the person is a specified person); and

that income is not subject (A) to a tax under the laws of a “relevant territory” (as defined below), without any reduction computed by reference to the amount of such interest, which generally applies to profits, income or gains received in the relevant territory by persons from outside the relevant territory or (B) to Irish withholding tax at the standard rate of income tax (currently 20%).

The provisions at (b) above, will not apply in respect of an interest payment in respect of a “specified instrument” (as defined below) (see “—*Withholding Tax*” below), except where the interest is paid to a specified person and at the time the quoted Eurobond or wholesale debt instrument was issued, the Issuer was in possession, or aware, of information, including information about any arrangement or understanding in relation to ownership of the quoted Eurobond or the wholesale debt instrument after that time, which could reasonably be taken to indicate that interest which would be payable in respect of that quoted Eurobond or wholesale debt instrument would not be subject, without any reduction computed by reference to the amount of such interest, to a tax in a relevant territory which generally applies to profits, income or gains received in that territory, by persons, from sources outside that territory.

Where a payment is made out of the assets of the Issuer under a “return agreement” (as defined below) that is dependent on the results of the Issuer’s business or any part of its business and that interest would not be deducted in computing the profits or gains of the Issuer if the payment was to be treated for the purposes of the TCA (other than section 246 thereof) as a payment of interest in respect of securities of the Issuer other than a “specified instrument” that was dependent on the results of the Issuer’s business, that payment will be treated as a payment of interest for the purposes of the provisions set out at (a) or (b) above.

For the purposes of this “*Certain Irish Income Tax Considerations*” section, terms have the meanings as set out below:

A “**specified person**” means (i) a company which directly or indirectly controls the Issuer or (ii) a person or connected persons from whom assets were acquired or to whom the Issuer has made loans or advances or with whom the Issuer has entered into certain “specified agreements”, where the aggregate value of such assets, loans, advances or agreements represents not less than 75 percent of the aggregate value of the qualifying assets of the Issuer.

A “**specified agreement**” includes any agreement, arrangement or understanding that (a) provides for the exchange, on a fixed or contingent basis, of one or more payments based on the value, rate or amount of one or more interest or other rates, currencies, commodities, securities, instruments of indebtedness, indices, quantitative measures, or other financial or economic interests or property of any kind, or any interest therein or based on the value thereof, and (b) transfers to a person who is a party to the agreement, arrangement or understanding or to a person connected with that person, in whole or in part, the financial risk associated with a future change in any such value, rate or amount without also conveying a current or future direct or indirect ownership interest in an asset (including any enterprise or investment pool) or liability that incorporates the financial risk so transferred.

A “**specified instrument**” means a quoted Eurobond for the purposes of Section 64 of the TCA or a wholesale debt instrument within the meaning of Section 246A of the TCA.

A “**relevant territory**” is:

- (a) a Member State of the European Communities other than Ireland;
- (b) not being such a Member State, a territory with which Ireland has signed a double taxation agreement that is in effect; and
- (c) a territory with the government of which arrangements have been made which on completion of the procedures set out in Section 826(1) of the TCA will have the force of law.

A “**return agreement**” is a specified agreement whereby payments due under the specified agreement are dependent on the results of the Issuer’s business or any part of the Issuer’s business.

Taxation of Noteholders

Persons Subject to Irish Income or Corporation Tax

In general, persons who are resident in Ireland are liable to Irish taxation on their world-wide income whereas persons who are not resident in Ireland are only liable to Irish taxation on their Irish source income. All persons are under a statutory obligation to account for Irish tax on a self-assessment basis and there is no requirement for the Irish Revenue Commissioners to issue or raise an assessment.

Interest paid and discounts realized on the Notes have an Irish source and therefore interest earned and discounts realized on such Notes will be regarded as Irish source income. Accordingly, pursuant to general Irish tax

rules, a non-Irish resident person in receipt of such income would be technically liable to Irish income tax (and the universal social charge if received by an individual) subject to the provisions of any applicable double tax treaty. Ireland has currently 72 double tax treaties of which 68 are in effect (see “—*Withholding Tax*” below) and the majority of them exempt interest (which sometimes includes discounts) from Irish tax when received by a resident of the other jurisdiction. Credit is available for any Irish tax withheld from income on account of the related income tax liability. Non-Irish resident companies, where the income is not attributable to a branch or agency of the company in Ireland, are subject to income tax at the standard rate. Therefore any withholding tax suffered should be equal to and in satisfaction of the full income tax liability. (Non-Irish resident companies operating in Ireland through a branch or agency of the company in Ireland to which the income is attributable would be subject to Irish corporation tax).

There is an exemption from Irish income tax under Section 198 of the TCA in certain circumstances. These circumstances include:

- (a) where the interest is paid by a company in the ordinary course of business carried on by it to a company
 - (i) which, by virtue of the law of a relevant territory, is resident in the relevant territory for the purposes of tax, and that relevant territory imposes a tax that generally applies to interest receivable in that territory by companies from sources outside that territory, or (ii) where the interest is either (A) exempted from the charge to income tax under arrangements made with the government of a territory outside Ireland having the force of law under procedures set out in Section 826(1) of the TCA, or (B) would be exempted from the charge to income tax if arrangements made, on or before the date of payment of the interest with the government of a territory outside Ireland that do not have force of law under procedures set out in Section 826(1) of the TCA, had the force of law when the interest was paid;
- (b) where the interest is paid by a qualifying company within the meaning of Section 110 of the TCA out of the assets of that qualifying company to a person who is resident in a relevant territory (residence to be determined under the laws of that relevant territory);
- (c) where the interest is payable on a quoted Eurobond (see “—*Withholding Tax*” below) and is paid by a company to a person who is resident in a relevant territory (residence to be determined under the laws of that relevant territory) or to a company controlled, either directly or indirectly by a person or persons who are resident in a relevant territory and are not controlled, either directly or indirectly by persons who are not so resident; or
- (d) where discounts arise to a person in respect of securities issued by a company in the ordinary course of a trade or business, where that person is resident in a relevant territory (residence to be determined under the laws of that relevant territory).

Interest on the Notes and discounts realized which do not fall within the exemptions in Section 198 of the TCA are within the charge to Irish income tax to the extent that a double tax treaty does not exempt the interest or discount as the case may be. However, it is understood that the Irish Revenue Commissioners have, in the past, operated a practice (as a consequence of the absence of a collection mechanism rather than adopted policy) whereby no action will be taken to pursue any liability to such Irish tax in respect of persons who are regarded as not being resident in Ireland except where such persons:

- (i) are chargeable in the name of a person (including a trustee) or in the name of an agent or branch in Ireland having the management or control of the interest; or
- (ii) seek to claim relief and/or repayment of tax deducted at source in respect of taxed income from Irish sources; or
- (iii) are chargeable to Irish corporation tax on the income of an Irish branch or agency or to income tax on the profits of a trade carried on in Ireland to which the interest is attributable.

There can be no assurance that the Irish Revenue Commissioners will apply this practice in the case of the holders of Notes and, as mentioned above, there is a statutory obligation to account for Irish tax on a self-assessment basis and there is no requirement for the Irish Revenue Commissioners to issue or raise an assessment.

Withholding Tax

In general, withholding tax (unless exempted) at the standard rate of income tax (currently 20%) must be deducted from interest payments made by an Irish resident company. However, there is an exemption from withholding tax under Irish domestic law in respect of, *inter alia*, interest payments made by a qualifying company (within the meaning of Section 110 of the TCA) to a person resident for the purposes of tax in a relevant territory except where the person is a company and the interest is received in connection with a trade carried out by that company through a branch or agency in Ireland. There is a further exemption from withholding tax under Irish domestic law in respect of interest on “**quoted Eurobonds**” in certain circumstances, which is expected to apply to the interest payments on the Notes.

A “quoted Eurobond” is defined as a security which:

- (i) is issued by a company;
- (ii) is quoted on a recognized stock exchange; and
- (iii) carries a right to interest.

There is no obligation to withhold tax on quoted Eurobonds where:

- (i) the person by or through whom the payment is made is not in Ireland, or
- (ii) the payment is made by or through a person in Ireland, and
 - (A) either the quoted Eurobond is held in a recognized clearing system, or
 - (B) the person who is the beneficial owner of the quoted Eurobond and who is beneficially entitled to the interest is not resident in Ireland and has made an appropriate written declaration to this effect.

Capital Gains Tax on Disposal of Notes

Persons who are resident in Ireland or companies which carry on a trade in Ireland through a branch or agency to which the Notes are attributable and who realize a gain on the disposal of a Note may be liable to Irish taxation on capital gains at a rate of 33% of the amount of the chargeable capital gain. In addition, any currency gain realized by such a person from a U.S. dollar denominated offering may be also liable to capital gains at a rate of 33% of the amount of the currency gain. Individuals who are neither resident nor ordinarily resident in Ireland and companies that are not resident in Ireland and do not carry on a trade in Ireland through a branch or agency to which the Notes are attributable will not be subject to Irish capital gains tax on the disposal of Notes.

Stamp Duty

Stamp duty will not be imposed on the issue or transfer of the Notes provided the Notes are not charged on property situated in Ireland.

Capital Acquisitions Tax

A gift or inheritance of Notes will be subject to capital acquisitions tax (“CAT”) if either the disposer or the beneficiary of the Notes is resident or ordinary resident in Ireland or if any of the Notes are regarded as property situate in Ireland. CAT is a tax imposed primarily on the beneficiary. It is payable at a rate of 33% on the taxable value of the gift or inheritance subject to tax free thresholds. Gifts and inheritances between spouses are exempt from CAT.

FATCA

The summary of “*Certain U.S. Federal Income Tax Considerations*” contains a description of the U.S. Foreign Account Tax Compliance Act (FATCA) rules under the heading “*FATCA Reporting by the Issuer*”.

FATCA Implementation in Ireland

On December 21, 2012, the Governments of Ireland and the United States signed the U.S.-Ireland IGA. This agreement will significantly increase the amount of tax information automatically exchanged between Ireland and the United States. It provides for the automatic reporting and exchange of information in relation to accounts held in Irish “financial institutions” by U.S. persons, and the reciprocal exchange of information regarding U.S. financial accounts held by Irish residents. It is likely that the Issuer will be subject to these rules.

Under the U.S.-Ireland IGA, an entity classified as an FFI that is treated as resident in Ireland is expected to provide the Irish tax authorities with certain information on U.S. holders of its securities. Information on U.S. holders will be automatically exchanged with the IRS. The Issuer expects to be treated as an FFI and provided it complies with the requirements of the U.S.-Ireland IGA and the Irish legislation, it should not be subject to FATCA withholding on any payments it receives. Although the Issuer will attempt to satisfy any obligations imposed on it to avoid the imposition of the FATCA withholding tax, no assurance can be given that the Issuer will be able to satisfy these obligations. The imposition of such taxes could materially affect the Issuer's financial ability to make payments on the Notes or could reduce such payments.

If the Notes qualify as “regularly traded on an established securities market” under the U.S.-Ireland IGA, the Issuer does not expect to be subject to information reporting in respect of the Noteholders' ownership of the Notes; however, Noteholders holding the Notes through any foreign financial institution other than the Issuer should expect that payments in respect of their Notes may be subject to information reporting by such financial institution.

The Issuer (or any nominated service provider) shall be entitled to require Noteholders to provide any information regarding their tax status, identity or residency in order to satisfy any reporting requirements which the Issuer may have as a result of the U.S.-Ireland IGA or any legislation promulgated in connection with the agreement and investors will be deemed, by their subscription for or holding of the Notes to have authorized the automatic disclosure of such information by the Issuer (or any nominated service provider) or any other person to the relevant tax authorities.

The Issuer (or any nominated service provider) will agree that information (including the identity of any Noteholder) supplied for purposes of FATCA compliance is intended for the Issuer's (or any nominated service provider's) use for purposes of satisfying FATCA requirements and the Issuer (or any nominated service provider) will agree, to the extent permitted by applicable law, that it will take reasonable steps to treat such information in a confidential manner, except that the Issuer may disclose such information (i) to its officers, directors, agents and advisors, (ii) to the extent reasonably necessary or advisable in connection with tax matters, including achieving FATCA compliance, (iii) to any person with the consent of the applicable Noteholder, or (iv) as otherwise required by law or court order or on the advice of its advisors.

In addition, the terms and conditions of the Notes provide that (a) each holder of the Notes is required to provide the Issuer (or any nominated service provider) with any information necessary for the Issuer (or any nominated service provider) to comply with the legislation (including any Irish legislation, regulations, rules, or other guidance relating to FATCA) and (b) the Issuer (or any nominated service provider) may take any action necessary or advisable to permit them to comply with the reporting and disclosure requirements of such legislation. If a Noteholder fails for any reason to provide to the Issuer and the Indenture Trustee information or documentation, or to update or correct such information or documentation, that the Issuer may believe is necessary or helpful (in the sole determination of the Issuer or the Indenture Trustee or their agents, as applicable) to achieve FATCA compliance, or such information or documentation is not accurate or complete, the Issuer shall have the right, (i) to compel such Noteholder to sell its interest in such Note and/or (ii) sell such interest on such Noteholder's behalf.

Prospective investors should consult their tax advisors regarding this legislation.

THE SAVINGS DIRECTIVE (COUNCIL DIRECTIVE) 2003/48/EC

Under the EU Savings Directive n. 2003/48/EC (as amended by an EU Council Directive adopted by the European Council on March 24, 2014) (the “**Savings Directive**”), each Member State is required to provide to the tax authorities of another Member State details of payments of interest or other similar income paid by a person within that jurisdiction to, or collected by such person for, an individual or certain limited types of entity, established in that other Member State. However, for a transitional period, Austria and Luxembourg are instead required to, subject to certain exceptions, apply a withholding system in relation to such payments, deducting tax at a rate of 35%, unless they elect to provide information in accordance with the Savings Directive. On April 10, 2013, the Luxembourg Ministry of finance announced that financial institutions in Luxembourg will comply with the exchange of information obligations set forth by the Savings Directive as from January 1, 2015, so that, if such reform is enacted, Luxembourg would no longer apply the withholding tax system as from that date. The transitional period is to terminate at the end of the first full fiscal year following agreement by certain non-EU countries (i.e., the Swiss Federation, Liechtenstein, San Marino, Monaco, Andorra and the United States) will each enter into an agreement with the EU providing for an exchange of information upon request as defined in the OECD Model Agreement on Exchange of Information on Tax Matters released on April 18, 2002 with respect to interest payments made by paying agents established within those countries to beneficial owners located within the EU.

A number of non-EU countries and certain dependent or associated territories of certain Member States have adopted similar measures (either provision of information or transitional withholding) in relation to payments made by a person in its jurisdiction to, or collected by such a person for, an individual or certain limited types of entity established in a Member State. In addition, the Member States have entered into reciprocal provision of information or transitional withholding arrangements with certain of those dependent or associated territories in relation to payments made by a person in a Member State to, or collected by such a person for, an individual resident or certain limited types of entity established in one of those territories.

On 24 March 2014, the European Council adopted an EU Council Directive amending and broadening the scope of the requirements described above. In particular, the changes expand the range of payments covered by the Savings Directive to include certain additional types of income, and widen the range of recipients to whom payments are covered by the Directive, to include certain other types of entity and legal arrangement. Member States are required to implement national legislation giving effect to these changes by 1 January 2016 (which national legislation must apply from 1 January 2017).

For the purposes of this section, the non-EU and dependent or associated territories referred to in the second paragraph above are Aruba, the former Netherlands Antilles, Jersey, Gibraltar, Guernsey, Isle of Man, Anguilla, British Virgin Islands, Cayman Islands, Andorra, Liechtenstein, Monaco, San Marino, the Swiss Federation, Montserrat and Turks and Caicos Islands.

CERTAIN BENEFIT PLAN CONSIDERATIONS

The United States Employee Retirement Income Security Act of 1974, as amended (“**ERISA**”), and the Code impose certain restrictions on (i) employee benefit plans (as defined in Section 3(3) of ERISA) that are subject to Title I of ERISA, (ii) plans described in section 4975(e)(1) of the Code that are subject to Section 4975 of the Code, including individual retirement accounts and Keogh plans, (iii) any entities whose underlying assets include plan assets by reason of a plan’s investment in such entities (each of (i), (ii) and (iii), a “**Plan**”) and (iv) persons who have certain specified relationships to such Plans (“**Parties in Interest**”) under ERISA and “**Disqualified Persons**” under the Code). ERISA also imposes certain duties on persons who are fiduciaries of Plans subject to ERISA and both ERISA and the Code prohibit certain transactions between a Plan and Parties in Interest or Disqualified Persons with respect to such Plans.

Because of their own activities and the activities of their affiliates, the Issuer, any Initial Purchaser, the Counterparty and the Indenture Trustee may be or become a Party in Interest or Disqualified Person with respect to one or more Plans. Accordingly, the acquisition and holding of Notes by a Plan could be deemed to constitute a transaction prohibited under Title I of ERISA or Section 4975 of the Code (e.g., the indirect transfer of the assets of a Plan to or use by a Party in Interest or Disqualified Person). The U.S. Department of Labor (the “**DOL**”) has issued five prohibited transaction class exemptions (“**PTCEs**”) that may provide exemptive relief if required for direct or indirect prohibited transactions. Potentially applicable exemptions include PTCE 90-1 (exempts certain transactions involving insurance company pooled separate accounts), PTCE 95-60 (exempts certain transactions involving insurance company general accounts), PTCE 91-38 (exempts certain transactions involving bank collective investment funds), PTCE 84-14 (exempts certain transactions entered into on behalf of a Plan by a “qualified professional asset manager”) and PTCE 96-23 (exempts certain transactions entered into by or on behalf of a Plan by an “in-house” asset manager). In addition, ERISA Section 408(b)(17) and Section 4975(d)(20) of the Code each may provide for an exemption for the purchase and sale of securities offered hereby, provided, that none of the Issuer, Initial Purchasers or Counterparty nor any of their respective affiliates have or exercise any discretionary authority or control or render any investment advice with respect to the assets of any Plan involved in the transaction, and provided further that the Plan pays no more and receives no less than “adequate consideration” in connection with the transaction. Such exemptions may not, however, apply to all the transactions that could be deemed prohibited transactions in connection with a Plan’s investment in the Notes.

Employee benefit plans that are governmental plans (as defined in Section 3(32) of ERISA), certain church plans (as defined in Section 3(33) of ERISA) and non-U.S. plans (as described in Section 4(b)(4) of ERISA) are not subject to the requirements of ERISA or Section 4975 of the Code; however, such plans may be subject to foreign, U.S. federal, state, local or non-U.S. laws or regulations which affect their ability to invest in the Notes (“**Similar Laws**”). Any fiduciary of such a governmental, church or non-U.S. plan considering an investment in the Notes should determine the permissibility of acquiring and holding investing in the Notes under applicable laws and regulations, including the need for, and, if necessary, the availability of, any exemptive relief under such laws or regulations.

Plan Asset Regulation

In addition, the DOL has issued a regulation (29 C.F.R. Section 2510.3-101), as modified by Section 3(42) of ERISA, concerning the definition of what constitutes the assets of a Plan (“**Plan Asset Regulation**”). This regulation provides that, as a general rule, the underlying assets and properties of corporations, partnerships, trusts and certain other entities in which a Plan purchases an “equity interest” will be deemed to be assets of the investing Plan for purposes of ERISA, unless certain exceptions apply.

The Plan Asset Regulation defines an “equity interest” as any interest in an entity other than an instrument that is treated as indebtedness under applicable local law and which has no substantial equity features. Although the Notes are denominated as debt and there are no relevant authorities that directly address the characterization of the Notes for these purposes and the matter is not free from doubt, the Notes may be treated as “equity interests” for purposes of the Plan Asset Regulation and the remainder of this disclosure assumes that the Notes will be treated as equity. In addition, if Plan investors acquire 25% or more of the total value of any class of equity of the Issuer, it is likely that none of the exceptions set forth in the Plan Asset Regulation will apply.

Under the terms of the Plan Asset Regulation, if the Issuer were deemed to hold “plan assets” by reason of a Plan’s investment in the Notes, such “plan assets” would include an undivided interest in the assets held by the Issuer, including the Issuer’s interest in the Counterparty Contracts and the Permitted Investments and, perhaps, the Money Market Funds Permitted Investments. In such event, the persons with discretionary authority with respect to such assets may be subject to the fiduciary responsibility provisions of Title I of ERISA and the prohibited transaction provisions of ERISA and Section 4975 of the Code with respect to transactions involving such assets. Moreover, certain actions taken

with respect to such assets could be deemed to constitute prohibited transactions under ERISA or the Code. In addition, ERISA generally provides that discretionary authority with respect to the management or disposition of a Plan's assets may be delegated only to certain "investment managers" who acknowledge in writing that they are fiduciaries of the Plan. The persons responsible for investing the assets of the Issuer in any Permitted Investments (and, perhaps, the assets of Money Market Funds Permitted Investments, if any) might not be "investment managers" within the meaning of ERISA and the investment in the Issuer and/or Permitted Investments by a Plan could constitute an improper delegation of investment authority by the fiduciary of such Plan, who would remain liable for such investment activities.

In addition, ERISA provides that a Plan fiduciary must maintain the indicia of ownership of "plan assets" within the jurisdiction of the district courts of the United States ("**U.S. Indicia Requirements**"), except as authorized in DOL regulations. The DOL has published a regulation on the U.S. Indicia Requirements, 29 C.F.R. Section 2510.404b-1, concerning Plan investment in "foreign securities" and foreign currency. Each fiduciary considering a purchase of Notes for a Plan subject to the U.S. Indicia Requirements should take into account that the Issuer is an Irish special purpose company. In addition, such a fiduciary should take into account that duplicate original copies of the Indenture, evidence of ownership of the Permitted Investments and the Counterparty Contracts will be held in New York City by the Indenture Trustee. Each Plan fiduciary should further take into account the fact that if EBRD Notes are redeemed early the Issuer will invest in Money Market Funds Permitted Investments or hold cash in the Collateral Account if no such Money Market Funds Permitted Investments are available. Each fiduciary considering a purchase of Notes for a Plan subject to the U.S. Indicia Requirements must make its own determination as to whether those requirements will be met if it proceeds to make such a purchase.

In order to minimize the potential for ERISA violations, each person directing a Plan's investment in the Notes, on behalf of itself and the investing Plan, by purchasing Notes, will be deemed to have (i) directed that the assets be used to purchase the Permitted Investments and directed the Issuer to enter into each Counterparty Contracts, the Deed of Charge, the Custody Agreement and the Indenture, and (ii) represented and warranted that one or more statutory or administrative exemptions from the prohibited transaction rules of ERISA and Section 4975 of the Code (or any comparable provision of Similar Laws) apply such that the acquisition and holding of the Notes will not constitute or result in a non-exempt prohibited transaction. Original copies of the Indenture and each Counterparty Contract may be obtained from the Initial Purchasers or may be inspected at the offices of the Indenture Trustee in New York City. Each investing Plan, by purchasing Notes, will also be deemed to have represented and agreed with that it does not and will not consider any person with authority or control respecting the management or disposition of Permitted Investments, if any, as a fiduciary for purposes of ERISA, Section 4975 of the Code or Similar Laws with respect to the assets of any investing Plans. If the purchaser is making the representations set forth in clause (ii), above, the person making the decision to purchase such Notes is making such representations on behalf of such purchaser both in their individual capacity as well as their fiduciary capacity, and further represents that in connection with such purchase, such person has determined that the purchaser will receive no less, and pay no more, than adequate consideration as provided in Section 408(b)(17) of ERISA and Section 4975(d)(20) of the Code.

Due to the complexity of these rules and the penalties that may be imposed upon persons involved in non-exempt prohibited transactions, it is particularly important that fiduciaries or other persons considering purchasing Notes on behalf of or with "plan assets" of any Plan (or any Plan subject to Similar Laws) consult with their counsel regarding the potential consequences if the assets of the trust were deemed to be "plan assets" and the availability of exemptive relief under the PTCEs mentioned above or any other applicable exemption or an exemption under any applicable Similar Laws.

Special Considerations for Insurance Companies

An insurance company considering an investment in the Notes should consider whether its general account may be deemed to include assets of the plans investing in the general account, for example, through the purchase of an annuity contract. In *John Hancock Mutual Life Insurance Co. v. Harris Trust and Savings Bank*, 510 U.S. 86 (1993), the United States Supreme Court held that assets held in an insurance company's general account may be deemed to be "plan assets" under certain circumstances. In that event, the insurance company might be treated as a fiduciary with respect to such plans. However, PTCE 95-60 may exempt some or all of the transactions that could occur as the result of the acquisition and holding of the Notes by an insurance company general account. Therefore, insurance company investors should analyze whether John Hancock and PTCE 95-60 or any other exemption may have an impact with respect to their purchase of the Notes.

In addition, the Small Business Job Protection Act of 1996 added a new Section 401(c) of ERISA relating to the status of the assets of insurance company general accounts under ERISA and Section 4975 of the Code. Pursuant to

Section 401(c), the DOL issued general account regulations with respect to insurance policies issued on or before December 31, 1998 that are supported by an insurer's general account. As a result of these regulations, assets of an insurance company general account will not be treated as "plan assets" for purposes of the fiduciary responsibility provisions of ERISA and Section 4975 of the Code to the extent such assets relate to contracts issued to employee benefit plans on or before December 31, 1998 and the insurer satisfies various conditions. The "plan asset" status of insurance company separate accounts is unaffected by Section 401(c) of ERISA, and separate account assets continue to be treated as the "plan assets" of any such Plan invested in a separate account.

General Investment Considerations

Any Plan fiduciary that proposes to cause a Plan to purchase Notes should consult with its counsel with respect to the potential applicability of ERISA and the Code to such investment.

Moreover, each Plan fiduciary should determine whether under the general fiduciary standards of investment prudence and diversification, an investment in the Notes is appropriate for the Plan, taking into account the overall investment policy of the Plan and the composition of the Plan's investment portfolio.

The discussion herein of ERISA, the Code and relevant DOL regulations is general in nature and is not intended to be complete. Any fiduciary of a Plan, governmental plan, church plan or a non-U.S. plan considering an investment in the Notes should consult with its legal advisors regarding the consequences and advisability of such investment.

PLAN OF DISTRIBUTION

SRCMC, Natixis, Aon Benfield Securities, Inc. and BNP Paribas (the “**Initial Purchasers**”) have agreed, subject to the terms and conditions of the Purchase Agreement dated April 21, 2015, entered into between the Initial Purchasers and the Issuer, to purchase from the Issuer (and the Issuer has agreed to sell) the Notes.

The purchase price of each Class of Notes payable by the Initial Purchasers represents the Offering Price of 100% of the Original Principal Amount thereof. Under the terms and conditions of the Purchase Agreement, the Initial Purchasers are committed to purchase and pay for all the Notes when offered by the Issuer. The fees and commissions of the Initial Purchasers are payable by the Issuer and will be funded on the Issuer’s behalf by the Counterparty pursuant to the Reimbursement Agreement.

Each Initial Purchaser will agree to offer and sell the Notes at the Offering Price only to investors who are, among other things, (i) Qualified Institutional Buyers that, with respect to U.S. Persons, are also Qualified Purchasers, (ii) Qualified Eligible Persons under CFTC Rule 4.7, and (iii) are residents of, and purchasing in, holding in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction and otherwise agree to be bound by the transfer restrictions described under “*Notice to Investors*” in the accompanying Offering Circular. The Notes may be reoffered and sold only to investors who (i) are Qualified Institutional Buyers that, with respect to U.S. Persons, are also Qualified Purchasers; (ii) are Qualified Eligible Persons and (iii) are residents of, and purchasing in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction and otherwise agree to be bound by the transfer restrictions described under “*Notice to Investors*”.

The Notes have not been and will not be registered under the Securities Act or any applicable state or foreign securities laws, and the Issuer is not and will not be registered under the Investment Company Act.

The Issuer and the Counterparty have agreed to indemnify the Initial Purchasers and certain other persons against certain liabilities, including liabilities under the Securities Act.

The Initial Purchasers and their affiliates may provide investment banking, commercial banking, asset management, commodity pool operator and financing and financial advisory services, insurance and reinsurance, insurance and reinsurance related brokerage and products to the Counterparty and its affiliates and may purchase, hold and sell, both for their respective accounts or for the account of their respective clients, on a principal or agency basis, loans, securities, and other obligations and financial instruments of the Counterparty and its affiliates. As a result of such transactions or arrangements, the Initial Purchasers and their affiliates may have interests adverse to those of the Issuer and the Noteholders.

As part of their regular business, the Initial Purchasers and their affiliates may also provide investment banking, commercial banking, asset management, commodity pool operator and financing and financial advisory services and products, insurance and reinsurance, insurance and reinsurance related brokerage to the Issuer and its affiliates, and purchase, hold and sell, both for their respective accounts or for the account of their respective clients, on a principal or agency basis, loans, securities, and other obligations and financial instruments and engage in private equity investment activities. No Initial Purchaser, nor any of its affiliates, will be restricted in their performance of any such services or in the types of debt or equity investments that they may make. In conducting the foregoing activities, they will be acting for their own account or the account of their customers and will have no obligation to act in the interest of the Issuer.

Furthermore, the Counterparty may, from time to time, directly or indirectly own equity or debt of one or more of the Initial Purchasers or their affiliates. BNP Paribas and Natixis, or their respective affiliates, are lenders under a revolving credit agreement and/or other credit arrangements with the parent of Counterparty.

Each Initial Purchaser may purchase the Notes for its own account and for the accounts of its affiliates.

The Offering of each Class of Notes will be new issues of Notes with no established trading market. The Initial Purchasers have advised the Issuer and the Counterparty that they may make a market in the Notes but are not obligated to do so and may discontinue market-making at any time without notice. No assurance can be given as to the liquidity of the trading market for the Notes.

United Kingdom

The Initial Purchasers have represented, warranted and agreed that: they have (i) only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of section 21 of the Financial Services and Markets Act 2000 of the United Kingdom (the “**FSMA**”) received by them in connection with the issue or sale of the Notes in circumstances in which section 21(1) of the FSMA does not apply to the Issuer; and (ii) complied and will comply with all applicable provisions of the FSMA with respect to anything done by them in relation to the Notes in, from or otherwise involving the United Kingdom.

European Economic Area

Each Initial Purchaser has, and each future holder of the Notes shall be deemed to have, represented, warranted and agreed that: in relation to each member state of the European Economic Area which has implemented the Prospectus Directive (each, a “**Relevant Member State**”), with effect from and including the date on which the Prospectus Directive is implemented in that Relevant Member State (the “**Relevant Implementation Date**”), it has not made and will not make an offer of the Notes which are the subject of the Offering to the public in that Relevant Member State other than:

- (A) to any legal entity which is a Qualified Investor as defined in the Prospectus Directive;
- (B) to fewer than 150 natural or legal persons (other than Qualified Investors as defined in the Prospectus Directive) subject to obtaining the prior consent of the Issuer for any such offer; or
- (C) in any other circumstances falling within article 3(2) of the Prospectus Directive;

provided, that no such offer of the Notes referred to in (A) to (C) above shall require the Issuer to publish a prospectus pursuant to article 3 of the Prospectus Directive or supplement a prospectus pursuant to article 16 of the Prospectus Directive.

For the purposes of this provision, the expression an “**offer of Notes to the public**” in relation to any Notes in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the Notes to be offered so as to enable an investor to decide to purchase or subscribe for the Notes, as the same may be varied in that member state by any measure implementing the Prospectus Directive in that member state and the expression “**Prospectus Directive**”, in this context, means Directive 2003/71/EC as amended, including by Directive 2010/73/EU, and includes any relevant implementing measure in the Relevant Member State.

Ireland

Each Initial Purchaser has, and each future holder of the Notes shall be deemed to have, represented, warranted and agreed that, to the extent applicable:

- (i) it has not and will not underwrite the issue of, or place, any Notes, otherwise than in conformity with the provisions of the Central Bank Acts 1942 to 2014 and any codes of conduct or rules made under section 117(1) of the Central Bank Act 1989;
- (ii) it has not and will not underwrite the issue of, or place, any Notes, otherwise than in conformity with the provisions of (i) the European Communities (Markets in Financial Instruments) Regulations 2007 (as amended), including, without limitation, parts 6, 7 and 12 thereof and any codes of conduct, guidance and other requirements issued in connection therewith and (ii) the Investor Compensation Act, 1998;
- (iii) it has not and will not underwrite the issue of, or do anything in Ireland in respect of any Notes otherwise than in conformity with the provisions of the Prospectus Regulations and any rules issued under section 51 of the Investment Funds, Companies and Miscellaneous Provisions Act 2005 by the Central Bank;
- (iv) it has not and will not underwrite the issue of, place or otherwise act in Ireland in respect of any Notes, otherwise than in conformity with the provisions of the EU Directive 2003/6/EC on insider dealing and market manipulation and Irish Market Abuse law (as such term is defined in the Irish Investment Funds, Companies and Miscellaneous Provisions Act, 2005 (the “**2005 Act**”) and the Market Abuse (Directive 2003/6/EC) Regulations 2005 (as amended) and any rules issued under section 34 of the Investment Funds, Companies and Miscellaneous Provisions Act 2005 by the Central Bank); and

- (v) it has complied with and will comply all applicable provisions of Irish Companies Act 1963-2013.
(as each of the foregoing may be amended, varied or supplemented from time to time).

In connection with the Offering, each Initial Purchaser may purchase and sell the Notes in the open market. These transactions may include over-allotment and stabilizing transactions and purchases to cover short positions created by an Initial Purchaser in connection with the Offering. Stabilizing transactions consist of certain bids or purchases for the purpose of preventing or retarding a decline in the market price of the Notes, and short positions created by an Initial Purchaser involve the sale by such Initial Purchaser of a greater number of Notes than it is required to purchase from the Issuer in the Offering. An Initial Purchaser also may impose a penalty bid, whereby selling concessions allowed to broker-dealers in respect of the Notes sold in the Offering may be reclaimed by such Initial Purchaser if such Notes are repurchased by such Initial Purchaser in stabilizing or covering transactions. These activities may stabilize, maintain or otherwise affect the market price of the Notes, that may be higher than the price that might otherwise prevail in the open market; and these activities, if commenced, may be discontinued at any time. These transactions may be effected in the over-the-counter market or otherwise.

In connection with the issue of the Notes, an Initial Purchaser (“**Stabilizing Manager**”) (or persons acting on behalf of a Stabilizing Manager) may over-allot Notes (provided, that, in the case of any Notes to be admitted to trading on the regulated market of the Irish Stock Exchange or any other regulated market (within the meaning of the markets in the Financial Instruments Directive (Directive 2004/39/EC)) in the European Economic Area, the aggregate principal amount of Notes allotted does not exceed 105 percent of the aggregate principal amount of the Notes) or effect transactions with a view to supporting the market price of the Notes at a level higher than that which might otherwise prevail. However, there is no assurance that a Stabilizing Manager (or persons acting on behalf of such Stabilizing Manager) will undertake stabilization action. Any stabilization action may begin on or after the date on which adequate public disclosure of the terms of the offer of the Notes is made and, if begun, may be ended at any time, but it must end no later than the earlier of thirty (30) days after the issue date of the Notes and sixty (60) days after the date of the allotment of the Notes. Any stabilization action or over-allotment must be conducted by the relevant Stabilizing Manager(s) (or person(s) acting on behalf of any Stabilizing Manager(s)) in accordance with all applicable laws and rules.

Sales by SRCMC outside the United States may be made through its selling agent, SRCML. Sales by Aon Benfield Securities, Inc. outside the United States may be made through its selling agent, Aon Benfield Securities Limited.

For investors in the United Kingdom and member states of the European Economic Area, SRCML may act as a placement agent in connection with its distribution in the European Economic Area. SRCML (FCA register number 187863), of 30 St. Mary Axe, London EC3A 8EP, is a company authorized and regulated in the conduct of its investment business in the United Kingdom by the Financial Conduct Authority (“FCA”) and is entered in the Financial Services Register. The FCA’s website <http://www.fca.org.uk/> contains a wide range of information of specific relevance to United Kingdom investors and provides access to the Financial Services Register. Persons dealing with SRCML outside the United Kingdom are not covered by all the rules and regulations made for the protection of investors in the United Kingdom and may not have the right to claim through the United Kingdom’s Financial Services Compensation Scheme.

Any distribution of the Notes to U.S. Persons will be through a U.S.-registered broker-dealer.

Settlement

It is expected that delivery of the Notes will be made against payment therefor on or about April 24, 2015, which is expected to be three Business Days following the date of pricing of the Notes.

NOTICE TO INVESTORS

Because of the following restrictions, investors are advised to consult legal counsel before making any offer, resale, pledge or other transfer of the Notes.

The Notes have not been and will not be registered under the Securities Act or any applicable U.S. state or foreign securities laws and may not be sold or otherwise transferred unless an exemption from registration is available. Notwithstanding the availability of an exemption from the registration requirements under the Securities Act, the Notes are being offered and sold only to, and may be reoffered, sold or otherwise transferred only to, investors who (i) are Qualified Institutional Buyers that, with respect to U.S. Persons, are also Qualified Purchasers, (ii) are Qualified Eligible Persons under CFTC Rule 4.7, and (iii) are residents of, and purchasing in, and holding in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction.

Each purchaser of the Notes must comply with all applicable laws and regulations in force in any jurisdiction in which it purchases, offers or sells Notes or possesses or distributes this Offering Circular or any part of it and must obtain any consent, approval or permission required by such purchaser for the purchase, offer or sale by such purchaser of Notes under the laws and regulations in force in any jurisdiction to which it is subject or in which it makes such purchases, offers or sales and none of the Issuer, the Counterparty, the Initial Purchasers, the Indenture Trustee, the Paying Agent, the Note Registrar or any of their respective officers, directors, agents or affiliates will have any responsibility therefor.

Investment Company Act, Commodity Exchange Act and Insurance Laws

In reliance on Section 3(c)(7) under the Investment Company Act, the Issuer has not registered and does not intend to register as an investment company pursuant to the Investment Company Act. To rely on Section 3(c)(7), the Issuer must have a “reasonable belief” that all purchasers of the Notes which are U.S. Persons (including any Initial Purchaser and subsequent transferees) are Qualified Purchasers (as such term is defined in Section 2(a)(51) of the Investment Company Act and the rules and regulations thereunder) at the time of their purchase of the related Notes. In addition, the Manager has filed a notice of claim of exemption from registration with the CFTC as a CPO with respect to the Issuer pursuant to CFTC Rule 4.13(a)(3) in reliance on the relief provided in the CFTC Letter. To rely on CFTC Rule 4.13(a)(3), the Manager must have a “reasonable belief” that all purchasers of the Notes are Qualified Eligible Persons. Furthermore, because the Notes may be categorized as risk-linked securities, it is possible that in some jurisdictions, purchasers of the Notes may become subject to regulation as providers of insurance or reinsurance. The Issuer will establish a reasonable belief that purchasers are Qualified Persons for purposes of Section 3(c)(7) and the Manager will establish a reasonable belief that purchasers are Qualified Eligible Persons. In addition, the Issuer will ensure that purchasers are aware of the insurance-related risks involved in investing in the Notes based upon the representations deemed made by the purchasers of the Notes as set forth under “—*Representations of Purchasers*” and the covenants and undertakings of the Issuer referred to below.

Reminder Notices

Whenever the Issuer sends a report to the Noteholders, it will send a reminder notice (each, a “**Reminder Notice**”) to the holder of the Notes. Each Reminder Notice will state that (i) each holder of a Note (or an interest in a Note) that is a U.S. Person must be able to make the representations set forth below in paragraph (iii)(b) under “—*Representations of Purchasers*” (the “**3(c)(7) Representations**”); (ii) the Notes (or interests in the Notes) are transferable only to purchasers deemed to have made the 3(c)(7) Representations and satisfy the other transfer restrictions applicable to the Notes; (iii) each holder of a Note (or an interest in a Note) must be able to make the representations with respect to Permitted U.S. Jurisdictions or Permitted Non-U.S. Jurisdictions set forth below under “—*Representations of Purchasers*” (the “**Risk-Linked Notes Representations**”); (iv) the Notes (or interests in the Notes) are transferable only to purchasers deemed to have made the Risk-Linked Notes Representations and (v) if any holder of a Note (or an interest in a Note) (a) that is a U.S. Person is determined not to be a Qualified Purchaser or (b) is determined not to be a resident of or not to have purchased or held in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, then the Issuer will have the right (exercisable in its sole discretion) to treat the transfer to such purchaser as null and void and require such purchaser to sell all of its Notes (and all interests therein) to a transferee designated by the Issuer. The Issuer will send a copy of each annual or other periodic report (and each Reminder Notice) to the Relevant Depositary with a request that Participants pass them along to the Beneficial Owners.

Euroclear Actions with Respect to the Notes

The Issuer will direct Euroclear to take the following steps in connection with the Book-Entry Notes:

- (i) the security name will reference “144A/3c7” in the Euroclear securities database in order to indicate that sales are limited to (a) Qualified Institutional Buyers and, with respect to U.S. Persons, Qualified Purchasers, and (b) purchasers who are residents of and purchasing in, and will hold the Notes in, a Permitted U.S. Jurisdiction or Permitted Non-U.S. Jurisdiction;
- (ii) participants will receive a daily portfolio report listing their positions in the Notes held through Euroclear and a daily settlement report confirming settlement in all trades executed by the participant that day. In each report, the Notes will be listed by name, which will include “144A/3(c)7”. The 3(c)(7) restrictions will be further explained in the New Issues Acceptance Guide;
- (iii) Euroclear will periodically (and at least annually) send to the Euroclear participants holding positions in 3(c)(7) securities an electronic “Important Notice” outlining the restrictions applicable to 3(c)(7) securities; and
- (iv) the Issuer will from time to time make a request to Euroclear to deliver to the Issuer a list of all Euroclear Participants holding an interest in the Notes.

The Issuer has requested that Euroclear include the risk-linked securities (“**RLS**”) descriptor in its securities database in order to indicate that sales are limited to purchasers who are residents of and purchasing in Permitted U.S. Jurisdictions or Permitted Non-U.S. Jurisdictions and that the RLS restrictions will be further explained in the New Issues Acceptance Guide. The Issuer has further requested that risk-linked securities notification be included in the Important Notice.

Clearstream Actions with Respect to the Notes

The Issuer will direct Clearstream to take the following steps in connection with the Book-Entry Notes:

- (i) the security name will reference “144A/3c7/RLS” in the Clearstream securities database in order to indicate that sales are limited to (a) Qualified Institutional Buyers with respect to U.S. Persons, Qualified Purchasers, and (b) purchasers who are residents of and purchasing in, and will hold the Permitted Non-U.S. Jurisdiction;
- (ii) participants will receive a daily portfolio report listing their positions in the Notes held through Clearstream and a daily settlement report confirming settlement in all trades executed by the participant that day. In each report, the Notes will be listed by name, which will include “144A/3(c)7/RLS”. The 3(c)(7) and RLS restrictions will be further explained in the Clearstream Banking Customer Handbook;
- (iii) Clearstream will send on or prior to the Issuance Date an “Important Notice” to all relevant Clearstream Participants in connection with the offering of the Notes. The “Important Notice” will be in substantially the form of an exhibit to the Indenture and will notify all relevant Clearstream Participants that the Notes are Section 3(c)(7) securities and risk-linked securities. The Issuer may instruct Clearstream from time to time (but not more frequently than every six months) to reissue the Important Notice; and
- (iv) the Issuer will from time to time make a request to Clearstream to deliver to the Issuer a list of all relevant Clearstream Participants holding an interest in the Notes.

Bloomberg Screens, Etc.

The Issuer will from time to time request all third-party vendors to include on screens maintained by such vendors appropriate legends regarding Rule 144A, Section 3(c)(7) and risk-linked securities restrictions on the Global Notes. Without limiting the foregoing, the Initial Purchasers will request that Bloomberg, L.P. include the following on each Bloomberg screen containing information about the Notes:

- (i) The bottom of the “Security Display” page describing the Global Notes should state “ISS’D UNDER 144A/3c7. GRLS. SEE OM—ONLY QIB/QP/PERMITTED JURISDICTIONS. NON-COMPLIANT PURCHASE MAY BE VOIDED/RESULT IN FORCED SALE.”

- (ii) The “Security Display” page should have a flashing red indicator stating “See Additional Note Pg.”
- (iii) Such indicator should link to an “Additional Security Information” page, which should state that the Global Notes are being offered in reliance on the exemption from registration under Rule 144A of the Securities Act of 1933, as amended (the “**Securities Act**”) to persons that are (1) “qualified institutional buyers” as defined in Rule 144A under the Securities Act; (2) with respect to U.S. Persons, “qualified purchasers” as defined under Section 3(c)(7) of the Investment Company Act of 1940, as amended; and (3) that are residents of, and purchasing in jurisdictions (“**Permitted U.S. Jurisdictions**” and “**Permitted Non-U.S. Jurisdictions**”) that would not, as a result of such residence or purchase, result in the purchasers’ being subject to regulation as insurers or reinsurers. The page should also set forth those jurisdictions that the Issuer considers to be “Permitted U.S. Jurisdictions” and “Permitted Non-U.S. Jurisdictions.”

CUSIPs

The Issuer will cause each “CUSIP” number obtained for a Global Note to have an attached “fixed field” that contains “3c7”, “144A” and “GRLS” indicators.

Legends

The Issuer will not remove the legend set forth below in “—*Representations of Purchasers*” at any time.

Representations of Purchasers

Each purchaser (including subsequent transferees) of Notes (or a beneficial interest therein) will be deemed to represent, warrant, covenant and agree as follows:

- (i) The purchaser is purchasing or otherwise acquiring the Notes for its own account or for a beneficial owner for which such person is acting as fiduciary or agent with complete investment discretion and with authority to bind such other person (the purchaser, and each such beneficial owner, collectively, the “**Purchaser**”), and not with a view to any public resale or distribution thereof.
- (ii) The Purchaser understands and acknowledges that the Notes have not been registered under the Securities Act or any other applicable securities law, and may not be offered, sold or otherwise transferred except pursuant to an exemption from registration. Notwithstanding the availability of an exemption from the registration requirements under the Securities Act, the Notes may not be resold or transferred except to a Qualified Institutional Buyer (within the meaning of Rule 144A) pursuant to Rule 144A that (i), in the case of a purchaser that is a U.S. Person (as defined in Rule 902(k) under the Securities Act), is also a Qualified Purchaser (as defined in Section 2(a)(51) of the Investment Company Act) in reliance on the exception from the registration thereunder provided by Section 3(c)(7), (ii) is a Qualified Eligible Person as defined in CFTC Rule 4.7 and (iii) is a resident of and purchasing in, and will hold the Notes in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction.
- (iii) The Purchaser is (a) a Qualified Institutional Buyer and, (b) if a U.S. Person, a Qualified Purchaser, (c) a Qualified Eligible Person, and (d) a resident of, and purchasing in, and will hold the Notes in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, and is aware (and any other person for whom such purchaser is purchasing is aware) that any sale of the Notes to it will be made in reliance on Rule 144A and, if a U.S. Person, the exception from registration provided in Section 3(c)(7) of the Investment Company Act, and such acquisition will be for its own account or for the account of another Qualified Institutional Buyer, Qualified Eligible Person and Qualified Purchaser (if a U.S. Person) who is also aware that the sale to it is being made in reliance on Rule 144A and CFTC Rule 4.7 and, if a U.S. Person, the exception from registration provided in Section 3(c)(7) of the Investment Company Act.
- (iv) The Purchaser (if a U.S. Person) is not a broker-dealer which owns and invests on a discretionary basis less than \$25,000,000 in securities of issuers unaffiliated with such broker-dealer.
- (v) The Purchaser (if a U.S. Person) is not a participant-directed employee plan, such as a 401(k) plan, or a trust holding the assets of such plan, unless the investment decisions with respect to such plan are made solely by the fiduciary, trustee or sponsor of such plan.

- (vi) The Purchaser and each account for which it is purchasing or otherwise acquiring the Notes (or beneficial interests therein), will purchase, hold or transfer at least €250,000 of the Notes (or beneficial interests therein).
- (vii) The Purchaser (if a U.S. Person) was not formed, reformed or recapitalized for the specific purpose of investing in the Notes and/or other securities of the Issuer (unless all of the beneficial owners of such entity's securities are both Qualified Institutional Buyers and Qualified Purchasers).
- (viii) If the Purchaser is an investment company excepted from the Investment Company Act pursuant to Section 3(c)(1) or Section 3(c)(7) thereof (or a foreign investment company under Section 7(d) thereof relying on Section 3(c)(1) or 3(c)(7) with respect to its holders that are U.S. Persons) and was formed on or before April 30, 1996, it has received the consent of its beneficial owners who acquired their interests on or before April 30, 1996, with respect to its treatment as a Qualified Purchaser in the manner required by Section 2(a)(51)(C) of the Investment Company Act and the rules promulgated thereunder.
- (ix) The Purchaser (if a U.S. Person) is not a partnership; common trust fund; or corporation, special trust, pension fund or retirement plan, or other entity, in which the partners, beneficiaries, beneficial owners, participants, shareholders or other equity owners, as the case may be, may designate the particular investment to be made, or the allocation thereof, unless all such partners, beneficiaries, beneficial owners, participants, shareholders or other equity owners are both Qualified Institutional Buyers and Qualified Purchasers.
- (x) The Purchaser (if a U.S. Person) has not invested more than forty percent (40%) of its assets in the Notes (or beneficial interests therein) and/or other securities of the Issuer after giving effect to the purchase of the Notes (or beneficial interests therein) (unless all of the beneficial owners of such entity's securities are both Qualified Institutional Buyers and Qualified Purchasers).
- (xi) The Purchaser (if a U.S. Person) agrees that the Issuer shall be entitled to require any holder of the Notes (or a beneficial interest therein) that is determined not to have been a Qualified Institutional Buyer, a Qualified Eligible Person and a Qualified Purchaser (and to have met the other requirements set forth in paragraphs (i) through (xv) of this *"Notice to Investors—Representations of Purchasers"*) at the time of acquisition of the Notes (or such beneficial interest) to sell the Notes (or such beneficial interest) in accordance with the provisions described below.
- (xii) The Purchaser understands that the Issuer may receive a list of the participants from the applicable Depositary or any other depositary holding beneficial interests in the Notes.
- (xiii) The Purchaser and each person for which it is acting understands that any sale or transfer to a person that does not comply with the requirements set forth in paragraphs (i) through (xv) of this *"Notice to Investors—Representations of Purchasers"* relating to the requirements for Qualified Purchasers, Qualified Institutional Buyers and Qualified Eligible Persons will be considered to be void and of no effect.
- (xiv) The Purchaser, or, in the case of a collective investment vehicle, any person acting as the CPO of the Purchaser, either (a) is registered with the CFTC and is a member of the NFA, (b) has qualified for an exemption or an exclusion from such requirements or (c) is not required to comply with such requirements; and will remain in compliance with any applicable CFTC registration and NFA membership requirements while a holder of the Notes.
- (xv) The Purchaser will provide notice of these transfer restrictions to any subsequent transferees and agrees not to act as a swap counterparty or other type of intermediary whereby any other party will acquire an economic or beneficial interest in the Notes or reoffer, resell, pledge or otherwise transfer the Notes (or any beneficial interests therein), to any person except to a person that (x) meets all of the requirements in paragraphs (i) through this paragraph (xv) of this *"Notice to Investors—Representations of Purchasers"* and (y) agrees not to subsequently transfer the Notes (or any beneficial interest therein) except in accordance with these transfer restrictions.

The Issuer and the Indenture Trustee may require a holder of the Notes (or any owner of a beneficial interest therein) to provide them with an opinion of counsel addressed to and satisfactory to each of them to the effect that such reoffer, resale, exchange, pledge or other transfer will not require the Issuer to register as an investment company under the Investment Company Act.

If any person acquiring a Note (or a beneficial interest therein) is not a Qualified Institutional Buyer, a Qualified Eligible Person and, in the case of a U.S. person, a Qualified Purchaser (meeting the requirements for Qualified Purchasers set forth in this section headed “*Notice to Investors—Representations of Purchasers*”) at the time of acquisition thereof, such acquisition will be regarded as null and void and of no effect. Any person who holds any interest in the Notes, who does not reside and hold such interest in a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction, or was not a “Qualified Institutional Buyer”, a “Qualified Eligible Person” and, if a U.S. person, also a “Qualified Purchaser” at the time of the acquisition of an interest in the Notes, may be forced to transfer or sell such interest to a person who meets the requirements set forth in this section headed “*Notice to Investors—Representations of Purchasers*” within thirty (30) calendar days after notice of the sale requirement is given. If such holder (or beneficial owner) fails to effect the sale within such thirty (30) calendar day period, the Issuer has the right to sell the Notes (or such beneficial interest) to a purchaser selected by the Issuer who meets the requirements set forth in this section headed “*Notice to Investors—Representations of Purchasers*” on such terms as the Issuer may choose as provided in the Indenture. The Issuer may select the purchaser by soliciting one or more bids from one or more brokers or other market professionals that regularly deal in securities similar to the Notes, and selling the Notes to the highest such bidder. However, the Issuer may select a purchaser by any other means determined by it in its sole discretion.

In the event any Noteholder fails to timely provide any information or tax documentation that the Issuer determines is necessary to satisfy any obligations that it may have under FATCA, or to the extent that the Noteholder’s ownership otherwise would cause the Issuer to be subject to withholding tax under FATCA, (A) the Issuer (or its agents on its behalf) is authorized to withhold amounts otherwise distributable to the Noteholder as compensation for any amount withheld from payments to the Issuer as a result of such failure or such Noteholder’s ownership, and (B) to the extent necessary to avoid an adverse effect on the Issuer or any other Noteholder as a result of such failure or such Noteholder’s ownership, the Issuer will have the right to compel the Noteholder to sell its Notes within thirty (30) calendar days after notice from the Issuer and, if the Noteholder does not sell its Notes within such 30-day period, the Issuer will have the right, without further notice to such Noteholder, to sell such Notes at a public or private sale called and conducted in any manner permitted by law, and to remit the net proceeds of such sale (taking into account any taxes, commissions and expenses incurred by the Issuer in connection with such sale) to the Noteholder as payment in full for such Notes. The terms and conditions of any sale will be determined in the sole discretion of the Issuer and none of the Issuer, the Counterparty or the Indenture Trustee will be liable to any person having an interest in the Notes sold as a result of any such sale or the exercise of such discretion. The Issuer may also assign each such Note a separate ISIN number in the Issuer’s sole discretion. Each Noteholder, by its acceptance of an interest in the Notes, agrees to co-operate with the Issuer to effect such transfers.

The Purchaser understands that the Notes will bear a legend to the effect set forth below:

NEITHER THIS NOTE NOR ANY BENEFICIAL INTEREST IN THIS NOTE HAS BEEN OR WILL BE REGISTERED UNDER THE UNITED STATES SECURITIES ACT OF 1933, AS AMENDED (THE “**SECURITIES ACT**”), OR UNDER ANY U.S. STATE OR FOREIGN SECURITIES LAWS AND BENU CAPITAL LIMITED (THE “**ISSUER**”) HAS NOT BEEN REGISTERED UNDER THE UNITED STATES INVESTMENT COMPANY ACT OF 1940, AS AMENDED (THE “**INVESTMENT COMPANY ACT**”) IN RELIANCE ON THE EXCEPTION PROVIDED BY SECTION 3(c)(7) THEREOF. INTERESTS IN THIS NOTE MAY BE OFFERED, REOFFERED, SOLD, PLEDGED OR OTHERWISE TRANSFERRED ONLY (I) TO “QUALIFIED INSTITUTIONAL BUYERS” (“**QUALIFIED INSTITUTIONAL BUYERS**”) AS DEFINED IN RULE 144A UNDER THE SECURITIES ACT, THAT IN EACH CASE WITH RESPECT TO “U.S. PERSONS” AS DEFINED IN RULE 902(k) UNDER THE SECURITIES ACT (“**U.S. PERSONS**”), ARE “QUALIFIED PURCHASERS” (“**QUALIFIED PURCHASERS**”), AS DEFINED IN SECTION 2(A)(51) OF THE INVESTMENT COMPANY ACT AND THE RULES AND REGULATIONS THEREUNDER, FOR PURPOSES OF SECTION 3(c)(7) OF THE INVESTMENT COMPANY ACT, EACH OF WHICH MUST BE A RESIDENT OF, AND PURCHASING IN, AND WILL HOLD THE NOTES IN, A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION, (II) “QUALIFIED ELIGIBLE PERSONS” (“**QUALIFIED ELIGIBLE PERSONS**”) AS DEFINED IN U.S. COMMODITY FUTURES TRADING COMMISSION (“**CFTC**”) RULE 4.7 AND (III) IN ACCORDANCE WITH ALL APPLICABLE SECURITIES LAWS OF THE UNITED STATES, ANY STATE OF THE UNITED STATES AND ANY OTHER APPLICABLE JURISDICTION. EACH PURCHASER OF AN INTEREST IN THIS NOTE AND EACH SUBSEQUENT HOLDER OF AN INTEREST IN THIS NOTE IS REQUIRED TO NOTIFY ANY PURCHASER OF AN INTEREST IN THIS NOTE OF THE ABOVE TRANSFER RESTRICTIONS.

THE PERMITTED U.S. JURISDICTIONS AND PERMITTED NON-U.S. JURISDICTIONS AS OF THE ISSUANCE DATE ARE REFERENCED IN THE ISSUER'S OFFERING CIRCULAR DATED APRIL 21, 2015. ANY PERSON WHO HOLDS ANY INTEREST IN THIS NOTE, WHO DOES NOT RESIDE AND HOLD SUCH INTEREST IN A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION, MAY BE FORCED TO TRANSFER SUCH INTEREST TO A PERSON IN A PERMITTED U.S. JURISDICTION OR PERMITTED NON-U.S. JURISDICTION.

EACH PURCHASER (INCLUDING SUBSEQUENT TRANSFEREES) OF THIS NOTE (OR A BENEFICIAL INTEREST HEREIN) WILL BE DEEMED TO HAVE REPRESENTED, WARRANTED, ACKNOWLEDGED AND AGREED THAT: (1) THE PURCHASER IS PURCHASING THIS NOTE (OR A BENEFICIAL INTEREST HEREIN) FOR ITS OWN ACCOUNT OR FOR A BENEFICIAL OWNER FOR WHICH SUCH PERSON IS ACTING AS FIDUCIARY OR AGENT WITH COMPLETE INVESTMENT DISCRETION AND WITH AUTHORITY TO BIND SUCH OTHER PERSON (THE PURCHASER, AND EACH SUCH BENEFICIAL OWNER, COLLECTIVELY, THE "**PURCHASER**"), AND NOT WITH A VIEW TO ANY PUBLIC RESALE OR DISTRIBUTION THEREOF; (2) THE PURCHASER UNDERSTANDS AND ACKNOWLEDGES THAT THIS NOTE AND ANY BENEFICIAL INTEREST HEREIN HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OR ANY OTHER APPLICABLE SECURITIES LAW, AND MAY NOT BE OFFERED, SOLD OR OTHERWISE TRANSFERRED EXCEPT PURSUANT TO AN EXEMPTION FROM REGISTRATION. NOTWITHSTANDING THE AVAILABILITY OF AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS UNDER THE SECURITIES ACT, THIS NOTE MAY NOT BE RESOLD OR TRANSFERRED EXCEPT TO (I) A QUALIFIED INSTITUTIONAL BUYER (WITHIN THE MEANING OF RULE 144A UNDER THE SECURITIES ACT) PURSUANT TO RULE 144A THAT, IN THE CASE OF A PURCHASER THAT IS A U.S. PERSON (AS DEFINED IN RULE 902(k) UNDER THE SECURITIES ACT), IS ALSO A QUALIFIED PURCHASER (AS DEFINED IN SECTION 2(a)(51) OF THE INVESTMENT COMPANY ACT AND THE RULES AND REGULATIONS THEREUNDER) IN RELIANCE ON THE EXCEPTION FROM THE REGISTRATION THEREUNDER PROVIDED BY SECTION 3(c)(7), (II) A QUALIFIED ELIGIBLE PERSON AS DEFINED IN CFTC RULE 4.7 AND (III) A RESIDENT OF, AND PURCHASING IN, AND WILL HOLD THE NOTES IN, A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION; (3) THE PURCHASER IS (I) A QUALIFIED INSTITUTIONAL BUYER, (II) IF A U.S. PERSON, A QUALIFIED PURCHASER AND (III) A QUALIFIED ELIGIBLE PERSON AND (IV) THE PURCHASER IS A RESIDENT OF, AND PURCHASING IN, AND WILL HOLD THIS NOTE (OR A BENEFICIAL INTEREST HEREIN) IN, A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION, AND IS AWARE (AND ANY OTHER PERSON FOR WHOM SUCH PURCHASER IS PURCHASING IS AWARE) THAT ANY SALE OF THIS NOTE (OR BENEFICIAL INTEREST HEREIN) TO IT WILL BE MADE IN RELIANCE ON RULE 144A AND, IF A U.S. PERSON, THE EXCEPTION FROM REGISTRATION PROVIDED IN SECTION 3(c)(7) OF THE INVESTMENT COMPANY ACT, AND SUCH ACQUISITION WILL BE FOR ITS OWN ACCOUNT OR FOR THE ACCOUNT OF ANOTHER QUALIFIED INSTITUTIONAL BUYER, QUALIFIED ELIGIBLE PERSON AND QUALIFIED PURCHASER (IF A U.S. PERSON) WHO IS ALSO AWARE THAT THE SALE TO IT IS BEING MADE IN RELIANCE ON RULE 144A AND, IF A U.S. PERSON, THE EXCEPTION FROM REGISTRATION PROVIDED IN SECTION 3(c)(7) OF THE INVESTMENT COMPANY ACT; (4) THE PURCHASER (IF A U.S. PERSON) IS NOT A BROKER-DEALER WHICH OWNS AND INVESTS ON A DISCRETIONARY BASIS LESS THAN \$25,000,000 IN SECURITIES OF ISSUERS UNAFFILIATED WITH SUCH BROKER-DEALER; (5) THE PURCHASER IS NOT A PARTICIPANT-DIRECTED EMPLOYEE PLAN, SUCH AS A 401(k) PLAN, OR A TRUST HOLDING THE ASSETS OF SUCH PLAN, UNLESS THE INVESTMENT DECISIONS WITH RESPECT TO SUCH PLAN ARE MADE SOLELY BY THE FIDUCIARY, TRUSTEE OR SPONSOR OF SUCH PLAN; (6) THE PURCHASER AND EACH ACCOUNT FOR WHICH IT IS PURCHASING OR OTHERWISE ACQUIRING THIS NOTE (OR BENEFICIAL INTERESTS HEREIN), WILL PURCHASE, HOLD OR TRANSFER AT LEAST €250,000 OF THE NOTES (OR BENEFICIAL INTERESTS HEREIN); (7) THE PURCHASER (IF A U.S. PERSON) WAS NOT FORMED, REFORMED OR RECAPITALIZED FOR THE SPECIFIC PURPOSE OF INVESTING IN THE NOTES AND/OR OTHER SECURITIES OF THE ISSUER (UNLESS ALL OF THE BENEFICIAL OWNERS OF SUCH ENTITY'S SECURITIES ARE BOTH QUALIFIED INSTITUTIONAL BUYERS AND QUALIFIED PURCHASERS); (8) IF THE PURCHASER IS AN INVESTMENT COMPANY EXCEPTED FROM THE INVESTMENT COMPANY ACT PURSUANT TO SECTION 3(c)(1) OR SECTION 3(c)(7) THEREOF (OR A FOREIGN INVESTMENT COMPANY UNDER SECTION 7(d) THEREOF RELYING ON SECTION 3(c)(1) OR 3(c)(7) WITH RESPECT TO ITS HOLDERS THAT ARE U.S. PERSONS) AND WAS FORMED ON OR BEFORE APRIL 30, 1996, IT HAS RECEIVED THE CONSENT OF ITS BENEFICIAL OWNERS WHO ACQUIRED THEIR INTERESTS ON OR BEFORE APRIL 30, 1996, WITH RESPECT TO ITS TREATMENT AS A QUALIFIED PURCHASER IN THE MANNER REQUIRED BY SECTION 2(a)(51)(c) OF THE INVESTMENT COMPANY ACT AND THE RULES PROMULGATED THEREUNDER; (9) THE PURCHASER (IF A U.S. PERSON) IS NOT A PARTNERSHIP, COMMON TRUST FUND OR CORPORATION, SPECIAL TRUST,

PENSION FUND OR RETIREMENT PLAN, OR OTHER ENTITY, IN WHICH THE PARTNERS, BENEFICIARIES, BENEFICIAL OWNERS, PARTICIPANTS, SHAREHOLDERS OR OTHER EQUITY OWNERS, AS THE CASE MAY BE, MAY DESIGNATE THE PARTICULAR INVESTMENT TO BE MADE, OR THE ALLOCATION THEREOF, UNLESS ALL SUCH PARTNERS, BENEFICIARIES, BENEFICIAL OWNERS, PARTICIPANTS, SHAREHOLDERS OR OTHER EQUITY OWNERS ARE BOTH QUALIFIED INSTITUTIONAL BUYERS AND QUALIFIED PURCHASERS; (10) THE PURCHASER (IF A U.S. PERSON) HAS NOT INVESTED MORE THAN FORTY PERCENT (40%) OF ITS ASSETS IN THIS NOTE (OR BENEFICIAL INTEREST HEREIN) AND/OR OTHER SECURITIES OF THE ISSUER AFTER GIVING EFFECT TO THE PURCHASE OF THIS NOTE (OR BENEFICIAL INTEREST HEREIN) (UNLESS ALL OF THE BENEFICIAL OWNERS OF SUCH ENTITY'S SECURITIES ARE BOTH QUALIFIED INSTITUTIONAL BUYERS AND QUALIFIED PURCHASERS); (11) THE PURCHASER (IF A U.S. PERSON) AGREES THAT THE ISSUER SHALL BE ENTITLED TO REQUIRE ANY HOLDER OF THIS NOTE (OR A BENEFICIAL INTEREST HEREIN) THAT IS DETERMINED NOT TO HAVE BEEN A QUALIFIED INSTITUTIONAL BUYER, A QUALIFIED ELIGIBLE PERSON AND A QUALIFIED PURCHASER (AND TO HAVE MET THE OTHER REQUIREMENTS SET FORTH IN CLAUSES (1)-(15) ABOVE) AT THE TIME OF ACQUISITION OF THIS NOTE (OR BENEFICIAL INTEREST HEREIN) TO SELL THIS NOTE (OR BENEFICIAL INTEREST HEREIN) IN ACCORDANCE WITH THE PROVISIONS DESCRIBED BELOW; (12) THE PURCHASER UNDERSTANDS THAT THE ISSUER MAY RECEIVE A LIST OF THE PARTICIPANTS FROM EUROCLEAR BANK S.A./N.V./CLEARSTREAM BANKING, SOCIETE ANONYME, LUXEMBOURG ("EUROCLEAR/CLEARSTREAM") HOLDING BENEFICIAL INTERESTS IN THE NOTES; (13) THE PURCHASER AND EACH PERSON FOR WHICH IT IS ACTING UNDERSTANDS THAT ANY SALE OR TRANSFER TO A PERSON THAT DOES NOT COMPLY WITH THE REQUIREMENTS SET FORTH IN (1)-(15) RELATING TO THE REQUIREMENTS FOR QUALIFIED PURCHASERS, QUALIFIED INSTITUTIONAL BUYERS AND QUALIFIED ELIGIBLE PERSONS WILL BE CONSIDERED TO BE VOID AND OF NO EFFECT; (14) THE PURCHASER, OR, IN THE CASE OF A COLLECTIVE INVESTMENT VEHICLE, ANY PERSON ACTING AS THE CPO OF THE PURCHASER, EITHER (A) IS REGISTERED WITH THE CFTC AND IS A MEMBER OF THE NATIONAL FUTURES ASSOCIATION ("NFA") (B) HAS QUALIFIED FOR AN EXEMPTION OR AN EXCLUSION FROM SUCH REQUIREMENTS OR (C) IS NOT REQUIRED TO COMPLY WITH SUCH REQUIREMENTS; AND WILL REMAIN IN COMPLIANCE WITH ANY APPLICABLE CFTC REGISTRATION AND NFA MEMBERSHIP REQUIREMENTS WHILE A HOLDER OF THE NOTES; AND (15) THE PURCHASER WILL PROVIDE NOTICE OF THESE TRANSFER RESTRICTIONS TO ANY SUBSEQUENT TRANSFEREES AND AGREES NOT TO ACT AS A SWAP COUNTERPARTY OR OTHER TYPE OF INTERMEDIARY WHEREBY ANY OTHER PARTY WILL ACQUIRE AN ECONOMIC OR BENEFICIAL INTEREST IN THIS NOTE OR REOFFER, RESELL, PLEDGE OR OTHERWISE TRANSFER THIS NOTE (OR ANY BENEFICIAL INTEREST HEREIN), TO ANY PERSON EXCEPT TO A PERSON THAT (X) MEETS ALL OF THE REQUIREMENTS IN (1)-(15) AND (Y) AGREES NOT TO SUBSEQUENTLY TRANSFER THIS NOTE OR ANY BENEFICIAL INTEREST HEREIN EXCEPT IN ACCORDANCE WITH THESE TRANSFER RESTRICTIONS.

THE ISSUER AND THE INDENTURE TRUSTEE MAY REQUIRE THE HOLDER OF THIS NOTE (OR ANY OWNER OF A BENEFICIAL INTEREST HEREIN) TO PROVIDE THEM WITH AN OPINION OF COUNSEL ADDRESSED TO AND SATISFACTORY TO EACH OF THEM TO THE EFFECT THAT SUCH REOFFER, RESALE, EXCHANGE, PLEDGE OR OTHER TRANSFER WILL NOT REQUIRE THE ISSUER TO REGISTER AS AN INVESTMENT COMPANY UNDER THE INVESTMENT COMPANY ACT.

IF ANY PERSON ACQUIRING THIS NOTE (OR A BENEFICIAL INTEREST HEREIN) IS NOT, AT THE TIME OF ACQUISITION HEREOF, (I) A QUALIFIED INSTITUTIONAL BUYER AND, IN THE CASE OF A U.S. PERSON, A QUALIFIED PURCHASER (MEETING THE REQUIREMENTS FOR QUALIFIED PURCHASERS SET FORTH HEREIN) AND (II) A QUALIFIED ELIGIBLE PERSON, SUCH ACQUISITION WILL BE REGARDED AS NULL AND VOID AND OF NO EFFECT. ANY PERSON WHO HOLDS ANY INTEREST IN THIS NOTE, WHO DOES NOT RESIDE AND HOLD SUCH INTEREST IN A PERMITTED U.S. JURISDICTION OR A PERMITTED NON-U.S. JURISDICTION, OR WAS NOT, AT THE TIME OF THE ACQUISITION OF AN INTEREST IN THIS NOTE, A "QUALIFIED INSTITUTIONAL BUYER", A "QUALIFIED ELIGIBLE PERSON" AND, IF A U.S. PERSON, ALSO A "QUALIFIED PURCHASER", MAY BE FORCED TO TRANSFER OR SELL SUCH INTEREST TO A PERSON WHO MEETS THE REQUIREMENTS SET FORTH HEREIN WITHIN 30 CALENDAR DAYS AFTER NOTICE OF THE SALE REQUIREMENT IS GIVEN. IF SUCH HOLDER (OR BENEFICIAL OWNER) FAILS TO EFFECT THE SALE WITHIN SUCH THIRTY (30) CALENDAR DAY PERIOD, THE ISSUER HAS THE RIGHT TO SELL THIS NOTE (OR SUCH BENEFICIAL INTEREST) TO A PURCHASER SELECTED BY THE ISSUER WHO MEETS THE REQUIREMENTS SET FORTH HEREIN ON SUCH TERMS AS THE ISSUER MAY CHOOSE AS PROVIDED IN THE INDENTURE. THE ISSUER MAY SELECT THE PURCHASER BY SOLICITING ONE OR MORE BIDS FROM ONE OR MORE BROKERS OR

OTHER MARKET PROFESSIONALS THAT REGULARLY DEAL IN SECURITIES SIMILAR TO THIS NOTE, AND SELLING THIS NOTE TO THE HIGHEST SUCH BIDDER. HOWEVER, THE ISSUER MAY SELECT A PURCHASER BY ANY OTHER MEANS DETERMINED BY IT IN ITS SOLE DISCRETION.

THE PURCHASER OR OTHER HOLDER OF THIS NOTE EITHER (A) IS NOT AND WILL NOT BE (i) AN “EMPLOYEE BENEFIT PLAN” AS DEFINED IN SECTION 3(3) OF THE EMPLOYEE RETIREMENT INCOME SECURITY ACT OF 1974, AS AMENDED (“**ERISA**”), THAT IS SUBJECT TO TITLE I OF ERISA, (ii) A “PLAN” AS DEFINED IN SECTION 4975(e)(1) OF THE INTERNAL REVENUE CODE OF 1986, AS AMENDED (THE “**CODE**”), THAT IS SUBJECT TO SECTION 4975 OF THE CODE, (iii) AN ENTITY WHOSE UNDERLYING ASSETS INCLUDE “PLAN ASSETS” BY REASON OF ANY SUCH EMPLOYEE BENEFIT PLAN’S OR PLAN’S INVESTMENT IN THE ENTITY (COLLECTIVELY “**PLANS**”), OR (iv) ANY OTHER PLAN THAT IS SUBJECT TO ANY U.S. FEDERAL, U.S. STATE, LOCAL OR NON-U.S. LAW OR REGULATION THAT IS SUBSTANTIALLY SIMILAR TO THE PROVISIONS OF SECTION 406 OF ERISA OR SECTION 4975 OF THE CODE (“**SIMILAR PLAN**”) AND IS NOT PURCHASING THIS NOTE OR ANY BENEFICIAL INTEREST HEREIN ON BEHALF OF, OR WITH “**PLAN ASSETS**” OF, ANY SUCH PLAN OR SIMILAR PLAN; OR (B) IS ACTING ON BEHALF OF OR PURCHASING THIS NOTE (OR BENEFICIAL INTEREST HEREIN) WITH THE ASSETS OF SUCH A PLAN OR SIMILAR PLAN AND SUCH PURCHASER’S OR OTHER HOLDER’S PURCHASE, HOLDING AND SUBSEQUENT DISPOSITION OF SUCH INTEREST IN THIS NOTE IS AND WILL BE EXEMPT BY REASON OF SECTION 408(B)(17) OF ERISA AND SECTION 4975(D)(20) OF THE CODE OR PROHIBITED TRANSACTION CLASS EXEMPTION 96-23, 95-60, 91-38, 90-1 OR 84-14 OR ANOTHER APPLICABLE ADMINISTRATIVE OR STATUTORY EXEMPTION (OR IN THE CASE OF ANY SUCH SIMILAR PLAN, A COMPARABLE EXEMPTION APPLICABLE TO THE TRANSACTION). IN ADDITION, EACH PLAN PURCHASER (INCLUDING SUBSEQUENT TRANSFEREES) ACKNOWLEDGES AND AGREES THAT, BY PURCHASING THIS NOTE OR ANY BENEFICIAL INTEREST HEREIN, IT WILL BE DEEMED TO HAVE DIRECTED THAT THE APPLICABLE ASSETS OF THE ISSUER BE INVESTED IN THE PERMITTED INVESTMENTS AND DIRECTED THE ISSUER TO ENTER INTO THE INDENTURE, THE COUNTERPARTY CONTRACT, THE DEED OF CHARGE AND THE CUSTODY AGREEMENT AND DOES NOT AND WILL NOT CONSIDER THE COUNTERPARTY OR ANY OTHER PERSON EXERCISING DISCRETIONARY AUTHORITY OR CONTROL RESPECTING THE MANAGEMENT OR DISPOSITION OF PERMITTED INVESTMENTS AS A FIDUCIARY FOR PURPOSES OF ERISA AND SECTION 4975 OF THE CODE WITH RESPECT TO ANY ASSETS OF INVESTING PLANS. IF THE PURCHASER IS MAKING THE REPRESENTATIONS SET FORTH IN CLAUSE (B) ABOVE, THE PERSON MAKING THE DECISION TO PURCHASE THIS NOTE IS MAKING SUCH REPRESENTATIONS ON BEHALF OF SUCH PURCHASER BOTH IN THEIR INDIVIDUAL CAPACITY AS WELL AS THEIR FIDUCIARY CAPACITY AND FURTHER REPRESENTS THAT IN CONNECTION WITH SUCH PURCHASE, SUCH PERSON HAS DETERMINED THAT IN CONNECTION WITH SUCH TRANSACTION THE PURCHASER WILL RECEIVE NO LESS, AND PAY NO MORE, THAN ADEQUATE CONSIDERATION AS PROVIDED IN SECTION 408(B)(17) OF ERISA AND SECTION 4975(D)(20) OF THE CODE.

ANY INFORMATION PROVIDED TO A PURCHASER OR A PROSPECTIVE TRANSFEREE SHALL BE FOR THE SOLE PURPOSE OF ASSESSING THE INVESTMENT. AS A CONDITION OF ACCESS TO SUCH INFORMATION, EACH PURCHASER AGREES THAT NEITHER IT NOR ANY PROSPECTIVE TRANSFEREE MAY DISCLOSE ANY SUCH INFORMATION TO THIRD PARTIES OTHER THAN AS REQUIRED BY APPLICABLE LAW, INCLUDING U.S. FEDERAL AND STATE SECURITIES LAWS, NOR USE THE INFORMATION FOR ANY PURPOSE OTHER THAN INVESTMENT ANALYSIS. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, ALL PERSONS MAY DISCLOSE TO ANY AND ALL PERSONS, WITHOUT LIMITATION OF ANY KIND, THE U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT OF THE NOTES AND THE ISSUER, ANY FACT THAT MAY BE RELEVANT TO UNDERSTANDING THE U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT OF THE NOTES AND THE ISSUER, AND ALL MATERIALS OF ANY KIND (INCLUDING OPINIONS OR OTHER TAX ANALYSES) RELATING TO SUCH U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT AND THAT MAY BE RELEVANT TO UNDERSTANDING SUCH U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT, OTHER THAN THE NAME OF THE ISSUER OR ANY OTHER PARTIES IDENTIFIED HEREIN, INFORMATION THAT WOULD PERMIT IDENTIFICATION OF THE ISSUER OR ANY OTHER PARTIES IDENTIFIED HEREIN, ANY PRICING TERMS OR OTHER NON-PUBLIC BUSINESS OR FINANCIAL INFORMATION THAT IS UNRELATED TO THE U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT OF THE NOTES AND THE ISSUER AND IS NOT RELEVANT TO UNDERSTANDING THE U.S. FEDERAL, STATE AND LOCAL TAX TREATMENT OF THE NOTES AND THE ISSUER AND ANY INFORMATION TO THE EXTENT THAT SUCH DISCLOSURE COULD RESULT IN A VIOLATION OF ANY U.S. FEDERAL OR STATE SECURITIES LAW.

AS LONG AS THE NOTES ARE IN GLOBAL FORM AND HELD BY A DEPOSITORY: UNLESS THIS NOTE IS PRESENTED BY AN AUTHORIZED REPRESENTATIVE OF EUROCLEAR OR CLEARSTREAM TO THE INDENTURE TRUSTEE FOR REGISTRATION IN THE NAME OF THE BANK OF NEW YORK DEPOSITORY (NOMINEES) LIMITED, AS NOMINEE FOR EUROCLEAR AND CLEARSTREAM, IN ITS CAPACITY AS COMMON DEPOSITORY FOR EUROCLEAR AND CLEARSTREAM OR IN SUCH OTHER NAME AS IS REQUESTED BY AN AUTHORIZED REPRESENTATIVE OF EUROCLEAR OR CLEARSTREAM (AND ANY PAYMENT IS MADE TO THE BANK OF NEW YORK DEPOSITORY (NOMINEES) LIMITED OR TO SUCH OTHER ENTITY, AS IS REQUESTED BY AN AUTHORIZED REPRESENTATIVE OF EUROCLEAR OR CLEARSTREAM), ANY TRANSFER, PLEDGE, OR OTHER USE HEREOF FOR VALUE OR OTHERWISE BY OR TO ANY PERSON IS WRONGFUL INASMUCH AS THE REGISTERED HOLDER HEREOF, THE BANK OF NEW YORK DEPOSITORY (NOMINEES) LIMITED, HAS AN INTEREST HEREIN.

- (xvi) The Purchaser has had access to such financial and other information concerning the Issuer and the Notes as it has deemed necessary in connection with its decision to purchase the Notes. The Purchaser (i) has been given the opportunity to ask questions of and receive answers from the Issuer concerning the terms and conditions of the Offering and other matters pertaining to an investment in the Notes, (ii) has been given the opportunity to request and review such additional information necessary to evaluate the merits and risks of a purchase of the Notes and to verify the accuracy of or to supplement the information contained in this Offering Circular to the extent the Issuer possesses such information and (iii) has received all documents and information reasonably necessary to make an investment decision, subject to contractual restrictions on the Issuer's ability to disclose confidential information. The Purchaser understands the terms, conditions and risks of the Notes and that the Notes involve a high degree of risk as described in this Offering Circular, including possible loss of the Purchaser's entire investment. The Purchaser has not relied upon any advice or recommendation of the Issuer, any Initial Purchaser, the Counterparty, the Calculation Agent, or any of their affiliates, and is making its own investment decision based upon its own judgment and upon the advice of such professional advisors, either employed or independently retained by the Purchaser, as it has deemed necessary to consult. It has not relied on any other version of this Offering Circular other than the final version thereof in making its investment decision with respect to the Notes. The Purchaser acknowledges that no person has been authorized to give any information or to make any representations concerning the Issuer or the Notes other than those contained in this Offering Circular and, if given or made, such other information or representations have not been relied upon. The Purchaser acknowledges that it has reviewed this Offering Circular, including the section "*Risk Factors*" and the legends in the forward part of this Offering Circular. The Purchaser has determined that it has the legal power, authority and right to purchase the Notes. The Purchaser understands that there is no assurance that a secondary market for the Notes will develop, the fair market value of the Notes may reflect a substantial discount from the Purchaser's initial investment and substantial volatility in light of certain events under the Counterparty Contract, and that the Notes may trade at a value other than that which may be inferred from the current levels of interest rates, due to other factors including, but not limited to, expectations of the future levels of interest rates and the occurrence of certain Mortality Events.
- (xvii) The Purchaser or other holder of a Note either (A) is not (i) an "employee benefit plan" as defined in Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), that is subject to Title I of ERISA, (ii) a "plan" as defined in Section 4975(e)(1) of the Internal Revenue Code of 1986, as amended (the "Code"), that is subject to Section 4975 of the Code, (iii) an entity whose underlying assets include "plan assets" by reason of any such employee benefit plan's or plan's investment in the entity (collectively (i), (ii) and (iii), the "Plans"), or (iv) any other plan that is subject to any U.S. federal, U.S. state, local or non-U.S. law or regulation that is substantially similar to the provisions of Section 406 of ERISA or Section 4975 of the Code ("Similar Plan") and is not purchasing an interest in the Notes on behalf of, or with "plan assets" of, any such Plan or Similar Plan; or (B) is acting on behalf of or purchasing a Note (or any beneficial interest therein) with the assets of such a Plan or Similar Plan and such Purchaser's or other holder's purchase, holding and subsequent disposition of such interest in the Notes is and will be exempt by reason of Section 408(b)(17) of ERISA and Section 4975(d)(20) of the Code or prohibited transaction class exemption 96-23, 95-60, 91-38, 90-1 or 84-14 or another applicable administrative or statutory exemption (or in the case of any such Similar Plan, a comparable exemption applicable to the transaction). In addition, each plan purchaser (including subsequent transferees) acknowledges and agrees that, by purchasing a Class of Notes, it will be deemed to have directed that the applicable assets of the Issuer be invested in the Permitted Investments for such Class and directed the Issuer to enter into the Indenture, the applicable Counterparty Contract, the applicable Deed of Charge and the

applicable Custody Agreement and does not and will not consider the Counterparty or any other person exercising discretionary authority or control respecting the management or disposition of Permitted Investments as a fiduciary for purposes of ERISA and Section 4975 of the Code with respect to any assets of investing Plans. If the Purchaser is making the representations set forth in clause (B) above, the person making the decision to purchase such Notes is making such representations on behalf of such Purchaser both in their individual capacity as well as their fiduciary capacity and further represents that in connection with such purchase, such person has determined that in connection with such transaction the Purchaser will receive no less, and pay no more, than adequate consideration as provided in Section 408(b)(17) of ERISA and Section 4975(d)(20) of the Code.

- (xviii) The Purchaser agrees, for U.S. federal income tax purposes, to treat the Notes as evidencing equity interests in the Issuer and will take no action inconsistent with such treatment.
- (xix) The Purchaser understands that the Issuer may require the Purchaser to provide certification or information acceptable to the Issuer which is necessary for the Issuer (i) to prevent withholding or qualify for a reduced rate of withholding or backup withholding in any jurisdiction from or through which the Issuer receives Interest Periodic Payments and any Early Redemption Event Premium or Optional Redemption Event Premium, or payments on its assets, (ii) to make payments of principal and interest on the Notes without, or at a reduced rate of, withholding or backup withholding in any jurisdiction, or (iii) to enable the Issuer or its agents to satisfy reporting and other obligations under the Code and Treasury Regulations, or under any other applicable law, and to update or replace such form or certification in accordance with its terms or its subsequent amendments. The Purchaser agrees to provide any such certification or information that is requested by the Issuer. If a Purchaser fails to provide any such certification or information that is requested by the Issuer or if a Purchaser's ownership of the Notes would cause the Issuer to be subject to withholding tax, the Issuer is authorized to withhold amounts otherwise distributable to such Purchaser or to compel such Purchaser to sell its Notes (and all interests therein) to a transferee designated by the Issuer meeting the requirements set forth in this *"Notice to Investors—Representations of Purchasers"*, and, if such Purchaser does not sell its Notes within ten (10) Business Days after notice from the Issuer (or an agent of the Issuer), the Issuer is authorized to sell such Notes on behalf of such Purchaser.
- (xx) With respect to any period during which the Purchaser owns more than 50% of the Notes (by number or value), or is otherwise treated as a member of the Issuer's "expanded affiliated group" (as defined in Treasury regulations section 1.1471-5T(i) (or any successor provision), the Purchaser covenants that any member of such expanded affiliated group (other than the Issuer) that is treated as a "foreign financial institution" within the meaning of Section 1471(d)(4) of Code and any Treasury regulations promulgated thereunder will be either a "participating FFI" or a "registered deemed-compliant FFI" or an "exempt beneficial owner" within the meaning of Treasury regulations section 1.1471-4T(e) (or any successor provision), and the Purchaser will cooperate with the Issuer to allow the Issuer to submit any required registration form or other document to the IRS so that the Issuer may qualify as a participating FFI.
- (xxi) The Purchaser agrees, prior to the sale by such Purchaser of any Notes, to provide any potential purchaser that is a permitted transferee the opportunity to review any Available Information and Rule 144A Information received by the Purchaser prior to the date of such sale.
- (xxii) The Purchaser agrees that:
 - (I) It has not underwritten, and will not underwrite, the issue of, or place or take any other action in connection with any of the Notes, otherwise than in conformity with (i) the provisions of the European Communities (Markets in Financial Instruments) Regulations, 2007 (as amended) including, without limitation, Parts 6, 7 and 12 thereof and any codes of conduct, guidance and other requirements issued in connection therewith (as each of the foregoing may be amended, varied or supplemented from time to time) and (ii) the provisions of the Investor Compensation Act, 1998 (as may be amended, varied and/or supplemented from time to time);
 - (II) It has not underwritten, and will not underwrite, the issue of, or place, any Notes, otherwise than in conformity with the provisions of The Central Bank Acts 1942 to 2014 and any codes

of conduct or rules made under Section 117(1) of The Central Bank Act 1989 (as each of the foregoing may be amended, varied and/or supplemented from time to time);

- (III) It has not underwritten, and will not underwrite, the issue of, or do anything in Ireland in respect of any Notes otherwise than in conformity with the provisions of the Prospectus (Directive 2003/71/EC) Regulations 2005, as amended, and any rules issued under Section 51 of the Investment Funds, Companies and Miscellaneous Provisions Act 2005 by the Central Bank of Ireland (as each of the foregoing may be amended, varied and/or supplemented from time to time); and
 - (IV) It has not underwritten, and will not underwrite, the issue of, place or otherwise act in Ireland in respect of any Notes, otherwise than in conformity with the provisions of the EU Directive 2003/6/EC on insider dealing and market manipulation and Irish Market Abuse Law (as such term is defined in The Irish Investment Funds, Companies and Miscellaneous Provisions Act, 2005 (the “**2005 Act**”)) and the Market Abuse (Directive 2003/6/EC) Regulations 2005, as amended, and any rules issued under Section 34 of the 2005 Act by the Central Bank of Ireland (as each of the foregoing may be amended, varied and/or supplemented from time to time).
- (xxiii) The Purchaser (if other than the Initial Purchasers) acknowledges that the Issuer, each Initial Purchaser and other persons will rely upon the truth and accuracy of the foregoing acknowledgements, representations and agreements and agrees that if any of the acknowledgements, representations and agreements deemed to have been made by its purchase of an interest in Notes are no longer accurate, it will promptly notify the Issuer and each Initial Purchaser.

The Issuer is not, and will not be, regulated by the Central Bank by virtue of the issue of the Notes. Any investment in the Notes does not have the status of a bank deposit and is not subject to the deposit protection scheme operated by the Central Bank.

Investors are strongly urged to have these representations and agreements reviewed by their counsel prior to making any decision to invest in the Notes.

Third Party Information

The Issuer has only made very limited enquiries in relation to information provided by third parties (“**Third Party Information**”) and does not make any representation or warranty, expressed or implied, as to the accuracy or completeness of the Third Party Information and prospective investors in the Notes should not rely upon, and should make their own independent investigations and enquiries in respect of, the same.

LISTING AND GENERAL INFORMATION

Application to the Irish Stock Exchange

This Offering Circular constitutes a prospectus for the purpose of the Prospectus Directive in respect of asset-backed securities within the meaning of Article 2 (5) of the Commission Regulation (EC) No. 809/2004 of 29 April 2004 and the relevant implementing provisions in Ireland. This Offering Circular has been approved by the Central Bank, as competent authority under the Prospectus Directive. The Central Bank only approves this Offering Circular as meeting the requirements imposed under Irish and EU law pursuant to the Prospectus Directive. Such approval relates only to the Notes which are admitted to trading on a regulated market for the purposes of Directive 2004/39/EC and/or which are to be offered to the public in any Member State of the European Economic Area. This Offering Circular will be filed with the Irish Companies Registration Office in accordance with Regulation 38(i1)(b) of the Prospectus Regulations.

Application has been made to the Irish Stock Exchange for the Notes to be admitted to the Official List and trading on its regulated market, the Main Securities Market. There is no guarantee that such application will be successful. References in this Offering Circular to Notes being “listed” (and all related references) shall mean that such Notes have been admitted to trading on the Irish Stock Exchange’s regulated market and have been admitted to the Main Securities Market. The regulated market is a regulated market for the purposes of MIFID.

Expenses

All expenses relating to the listing and offering of each Class of Notes will be paid by the Issuer out of the Closing Payment and any Supplemental Payment payable to the Issuer by the Counterparty pursuant to the Reimbursement Agreement. The expenses related to the admission to listing and trading of the Notes are approximately €5,300.

Legal Proceedings

Since the date of incorporation of the Issuer, there have been no governmental, legal or arbitration proceedings (including any such proceedings which are pending or threatened of which the Issuer is aware) which may have or have had in the recent past a significant effect on the Issuer’s financial position or profitability.

No Material Adverse Change

Save as disclosed in this Offering Circular, there has been no significant change in the financial or trading position of the Issuer since the date of the Issuer’s incorporation and there has been no material adverse change in the financial condition or prospects of the Issuer since the date of the Issuer’s incorporation.

Material Contracts

Since its date of incorporation, the Issuer has not entered into any material contracts other than the Transaction Documentation to which it is a party, being contracts entered into other than in its ordinary course of business.

Websites

The information on any website mentioned in this Offering Circular or any website directly or indirectly linked to any website mentioned in this Offering Circular is not part of, or incorporated by reference into, nor forms part of this Offering Circular.

Documents on Display

Throughout the life of the Notes, at the offices of the Indenture Trustee, the following documents (or electronic or physical copies thereof), where applicable, may be inspected, without charge:

- (a) the constitutional documents of the Issuer;
- (b) the Indenture, the Counterparty Contracts, the Deeds of Charge, the Counterparty Deed of Charge, the Management Agreement, the Reimbursement Agreement and the Calculation Agent Agreement;
- (c) the audited financial statements of the Issuer; and
- (d) this Offering Circular.

Authorization of the Issuance of the Notes

The issuance of the Notes will be authorized by a resolution of the Board of the Issuer prior to the Issuance Date. Since incorporation, the Issuer has not commenced trading, established any accounts or declared any dividends, except for the transactions described herein relating to the issuance of the Notes.

Language

The language of this Offering Circular is English. Certain names, legislative references and technical terms or references have been cited in their original language in order that the correct technical meaning may be ascribed to them under applicable law.

Financial Statements

As the Issuer is a newly formed company and has not commenced operations, no statutory accounts in respect of any financial year of the Issuer have been prepared. So long as any Class of Notes (or any of them) are admitted to trading on the Main Securities Market of the Irish Stock Exchange, the most recent published accounts of the Issuer from time to time will be available at the specified office of the Irish Listing Agent in Dublin. The Issuer does not publish interim accounts.

Post-Issuance Information

Other than the annual audited financial statements of the Issuer, the Issuer does not intend to provide any post-issuance transaction information regarding the Notes to be admitted to trading or the performance of the Collateral.

Irish Listing Agent

The Issuer has appointed Walkers Listing & Support Services Limited as its Irish Listing Agent. The Irish Listing Agent is acting solely in its capacity as listing agent for the Issuer in relation to the Notes and is not itself seeking admission of the Notes to the Official List of the Irish Stock Exchange or to trading on the Main Securities Market of the Irish Stock Exchange.

RELATED PARTIES

The Initial Purchasers and their affiliates are financial institutions engaged in various activities, which may include insurance and reinsurance, insurance and reinsurance related brokerage, securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage activities. Certain of the Initial Purchasers, the Counterparty and their affiliates have, from time to time, performed, and may in the future perform, various financial advisory, investment banking, insurance and reinsurance and insurance and reinsurance related brokerage services for the Issuer or the Counterparty for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the Initial Purchasers, the Counterparty and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investment and securities activities may involve securities and instruments of the Issuer or the Counterparty.

Additionally, the Issuer has delegated to SRRSC certain swap-reporting obligations the Issuer may have if it is considered a U.S. Person under the Commodity Exchange Act and has delegated to SRCML certain swap-reporting obligations of the Issuer under EMIR.

In connection with the issuance of the Notes, SRCML will act as dealer of the EBRD Notes and, in the future, may engage in other transactions with the EBRD.

EXPERTS

The statistical data, risk modeling and explanations thereof included in the “*RMS Expert Risk Analysis Methodology*” attached hereto as Appendix B, the “*RMS Expert Risk Analysis Results*” attached hereto as Appendix C and the RMS Data File Information referred to in Appendix E, and any related disclosure herein have been included in reliance upon RMS as an expert in modeling techniques and the analysis of risks associated with extreme mortality events in the Covered Area. RMS has given and not withdrawn its written consent to the inclusion in this Offering Circular of the foregoing RMS Expert Risk Analysis Reports.

VALIDITY OF THE NOTES

The validity of the Notes will be opined upon for the Issuer by Willkie Farr & Gallagher LLP, New York, New York, and Walkers, Dublin, Ireland. Willkie Farr & Gallagher LLP will rely, without independent investigation, on the opinions of Walkers as to matters of Irish law. Walkers has advised the Issuer as to other legal matters relating to Irish law. Cadwalader, Wickersham & Taft LLP has advised the Initial Purchasers as to certain legal matters including securities law matters.

APPENDIX A

INDEX OF DEFINED TERMS

1990 Act	56	Code.....	74, 136, 138
2005 Act.....	xxiv, 127, 140	Collateral.....	37
3(c)(7) Representations.....	129	Collateral Account.....	36
Accrual Period.....	12	COMI.....	54
Affected Investor.....	79	<i>Comisión Nacional del Mercado de Valores.....</i>	xxx
AFM.....	xxviii	Commodity Exchange Act.....	v
Aggregate Percentage.....	17	Common Code.....	xxxii
<i>AIFM</i>	70	comparable yield.....	114
<i>AIFMD</i>	70	Corporations Act.....	xiii
<i>AIFMD Regulations</i>	70	Counterparty.....	1
AIFMR.....	79	Counterparty Contract.....	23
<i>AIFs</i>	70	Counterparty Contract Termination Event.....	9
Alternative Data	18	Counterparty Deed of Charge.....	38
Annual Country Percentage	17	Counterparty Payment.....	23
Assigned Agreements.....	39	Counterparty Tax Event.....	10
Auditor.....	47	Country	13
Authorized Recipient.....	i	Covered Area.....	13
Available Information	xxxii	CPO	v
Base Indenture	xxxii	Credit Rating Agency Regulation.....	iii
Basel Committee	72	Custodian.....	39
Basel II Framework	72	Custody Agreement.....	39
Basel III	72	Data.....	18
Baseline Model.....	.ix, 58	Deaths.....	19
Basis Changes.....	19	Deed of Charge	37
BCR	70	Definitive Note.....	101
Beneficial Owner.....	99	Delegated Regulation.....	79
Board.....	83	Depository	99
Book-Entry Note	98	Discounting Rate	10, 11
Business Day	47	Disqualified Persons	123
BVI	xv	Dodd-Frank	9
Calculation Agent.....	21, 47	DOL	123
Calculation Agent Agreement.....	21	Early Redemption Date	8, 94
Calendar Year	13	Early Redemption Event	8
Capital Requirements Regulation	73	Early Termination Date.....	9
CAT.....	120	EBRD.....	29
CCP.....	71	EBRD Agreement	103
CDC	13	EBRD Coupon Payment Date	29
Central Bank	cover	EBRD Interest Rate	29
CFC.....	76	EBRD Notes	29
CFTC	cover, v, 133	EBRD Notes Coupon Payment	29
CFTC Letter	v, 82	EBRD Notes Issuance Date	29
Change in Law Event	9	EBRD Notes Scheduled Maturity Date	29
CISA	xxx	EBRD Put Date	30
CISO	xxx	EBRD Put Event	30
Class.....	cover, 1	EBRD Put Notice	30
Class A Dropdown Level	15	EBRD Termination Event	10
Class A Notes	cover, 1	ECJ	54
Class B Notes	cover, 1	EEA	72
Class of Notes	cover, 1	Eligible Purchasers	99
Class Supplement	xxxii	EMIR	71
Clean-Up Redemption Event	8	ERISA	123, 136, 138
Clearing Obligation	71	ESMA	71
Clearstream.....	46	ESMA MMF Guidelines	65
Closing Payment	26	EURIBOR Calculation Agent	29
CMG	70	Euroclear	46

EUROCLEAR/CLEARSTREAM	135
Euro Government Money Market Fund.....	32
Euro Prime Money Market Fund	32
Eurostat.....	13
Event Notice	21
Event of Default	40
Event Payment.....	17
Event Report.....	22
Event Reporting Date	22
Excess Distribution.....	109
Exchange Act.....	xii, xxxii
Exhaustion Level.....	16
Expense Account.....	83
Extended Redemption Date.....	4
Extension Determination Date	6
Extension Event	5
Extension Notice	6
Extension Period	5
Extension Spread.....	12
Extension Spread Amount.....	11
FATCA	74
FCA.....	128
FCs.....	71
FDAP	106
FET	106
FETL.....	xxvi
FFIs	74, 107
FIEL	xxvi
Final Data	18
Final Extended Redemption Date	4
Financial Intermediary	99
First Payment Date	13
Fitch	iii
FSA	xxviii
FSB	70
FSCMA.....	xxvi
FSMA	127
FTT	78
<i>FVC Regulation</i>	71
Global Note	99
G-SIFIs	70
GSIIIs	70
HLA	70
Holders	cover
Hong Kong	xxiii
<i>IAIG</i>	70
IAIS.....	70
IFRS	50
IGA	74
Incomplete Data	19
Indenture	xxxii, 36
Indenture Trustee.....	46
Initial Event Report	22
Initial Event Reporting Date	22
Initial Purchaser.....	cover
Initial Purchasers	126
Initial Trigger Level	15
Interest Calculation Convention.....	11
Interest Deposit Account.....	24
Interest Deposit Account Amount	24
Interest Deposit Investments.....	24
Interest Payment Account.....	36
Interest Periodic Payment	25
Interest Periodic Payments.....	25
Interest Spread.....	12
Interest Spread Amount	11
IntraLinks	xxxii
Investment Company Act	cover, 133
Investment Professionals	ii, xxxi
Irish Listing Agent	47
Irish Stock Exchange	cover
Irish Treaty	75
IRS	74, 106
ISIN	xxxii
Issuance Date.....	2
Issuer	i, 3, 1, 133
Issuers Regulation	xxv
Japan	13
Liquidity Coverage Ratio.....	72
Loss Payment.....	23
Management Agreement.....	92
Manager.....	v, 47
Mandatory Extension Event.....	7
Mandatory Extension Spread.....	12
Material Fact	xviii
MiFID II	72
MiFID II Directive	72
MiFIR	72
Minimum Development Period	5
Misrepresentation	xviii
MMF Criteria Level	35
MMF Negative Yield Deficit	27
MMF Negative Yield Event	27
Money Market Fund.....	32
Money Market Fund Yield	35
Money Market Funds Permitted Investments	32
Moody's.....	iii
Mortality Event	15
Mortality Index.....	14
Mortality Index Value.....	14
Mortality Rates.....	19
Negative Yield Expense Fee	28
Net Stable Funding Ratio	72
NFA	135
NFC+	71
NFCs.....	71
NI 45-106	xvi
Non-Payment Notice	30
Non-Payment Put Event	30
Non-Permitted Noteholder	98
Non-QEF Investment Fund	35
non-U.S. Noteholder	105
Note Registrar	46, 99
Noteholders	cover
Notes	cover, 1
Notional Amount	4
NRSROs	52
offer of Notes to the public	xx, 127
Offering	ii
Offering Circular	cover

Offering Price	2
Optional Extension Event I	6, 95
Optional Extension Spread	12
Optional Redemption	11
Optional Redemption Date	11
Optional Redemption Event Premium	11
Order	ii, xxxi
Original Principal Amount	3
OSC	xvii
OTC	71
Outstanding Principal Amount	3
Partial Extension	7
Partial Extension Notice	7
Partial Repayment Amount	7
Partial Extension Date	7
Participants	99
Participating Member States	78
Parties in Interest	123
Paying Agent	47, 99
Payment Date	12
Periodic Payments	25
Permitted Investment Yield	27
Permitted Investments	27
Permitted Non-U.S. Jurisdictions	46, 131
Permitted U.S. Jurisdictions	46, 131
PFIC	76
Plan	123
Plan Asset Regulation	123
Plan Assets	136
Plans	136, 138
Population	19
Population Data	19
Preliminary Data	18
Preliminary Offering Circular	i
Principal Increase	3
Principal Reduction	3
Prospectus Directive	cover, xxi, 127
Prospectus Regulations	cover
PTCEs	123
Purchaser	131, 134
Q&A	71
QEFA	76
QIIS	xxvi
Qualified Eligible Persons	cover
Qualified Institutional Buyers	cover
Qualified Investors	xxv, xxx
Qualified Purchasers	cover
Quoted Eurobonds	120
Rating	47
Rating Agency	47
Record Date	46
Redemption Date	4
Reference Index Value	14
Regulated	xxiii
Reimbursement Agreement	26
related person	77
Relevant Court	57
Relevant Implementation Date	xx, 127
Relevant Member State	xx, 127
Relevant Persons	ii, xxii, xxxi
relevant territory	118
Reminder Notice	129
Repayment Amount	3
Reported	18
Reporting Obligation	71
Reporting Source	13
Reporting Source Failure Event	8
return agreement	118
Risk Period	13
Risk-Linked Notes Representations	129
RLS	130
RMS	iii, 47
RMS Data File	E-1
RMS Data File information	E-1
RMS Earthquake Casualty Models	ix, 58
RMS Expert Risk Analysis Reports	ix
RMS Infectious Disease Model	ix, 58
RMS Japan Earthquake Casualty Model	ix, 58
RMS Longevity Model	ix, 58
RMS Models	58
RMS Probabilistic Terrorism Models	ix, 58
RMS Residual Risk Model	ix, 58
RMS Tsunami Scenario Model	ix, 58
RMS U.S. Earthquake Casualty Model	ix, 58
RPII	77
RPII shareholder	77, 113
RRP	70
Rule 144A	cover
Rule 144A Information	xxxii
Rule 17g-5	52
Rules	99
S&P	iii
Savings Directive	122
SBJ	13
Scheduled Redemption Date	4
Securities Act	cover, 131, 133
Securities Act 1978	xxviii
Securitization Retention Requirements	79
Selected Transaction Documents	xxxii
Service Provider Failure	9
Service Provider Failure Event	9
SFA	xxix
Share Declaration of Trust	81
Share Trustee	81
SIBA	xv
Similar Laws	123, 124
Similar Plan	136, 138
specified agreement	118
specified instrument	118
specified person	118
SRCLM	65
SRMP	70
SRRSC	68
SSPE	70
Stabilizing Manager	128
Subsequent Event Reporting Date	22
Sufficient Data	18
Supplemental Expenses Redemption Event	10
Supplemental Payment	26
TARGET Settlement Date	47

TCA	117	U.S. Noteholder.....	105
TCA 1997	57	U.S. Persons	cover, 133
Third Party Information	iv, 140	U.S. Situs Risks.....	106
Top-Up Amount	27	U.S.-Ireland IGA.....	74
Total Permitted Investment Amount.....	27	Unreported.....	17
Trigger Level	16	Unsolicited Ratings.....	52
Trigger Reduction Amount	15	withholdable payments	74
U.S. Census Bureau	14	Withholding Tax	106
U.S. Indicia Requirements	124	Workspace Administrator	xxxii



CORPORATE
HEADQUARTERS

7575 Gateway Blvd.
Newark, CA 94560
Tel: 1.510.505.2500
Fax: 1.510.505.2501

EUROPEAN
HEADQUARTERS

Risk Management
Solutions Ltd
Peninsular House
30 Monument Street
London EC3R 8NB UK
Tel: 44.20.7444.7600
Fax: 44.20.7444.7601

www.rms.com

APPENDIX B

RMS RISK ANALYSIS

METHODOLOGY

INTRODUCTION TO RMS

Risk Management Solutions, Inc. ("RMS") is a provider of products and services for the quantification, management, and transfer of mortality and longevity risk. RMS offers mortality and casualty assessment models for longevity, infectious diseases, terrorist attacks, and earthquakes and residual risks. RMS also offers property catastrophe risk assessment models for over 50 territories worldwide, encompassing major perils such as earthquakes, tropical cyclones and other windstorms, winter storms and floods. Founded at Stanford University in 1988, RMS operates today from eleven offices in the U.S., U.K., Switzerland, Bermuda, Singapore, China, India and Japan, with headquarters in Newark, California. RMS is a subsidiary of the U.K.-based Daily Mail and General Trust (DMGT), PLC media enterprise.

With approximately 1,000 employees worldwide, RMS employs professionals with backgrounds in actuarial and statistical sciences, epidemiology, virology, mathematical biology, physics, geology, seismology, meteorology, structural and civil engineering, management consulting, economics and finance. RMS also utilizes a global network of academic contacts and consulting engineers who are retained for periodic review of RMS technology or for specific projects.

LIMITATIONS OF RMS MODELS

The RMS Risk Model descriptions described in this document are subject to the disclaimers set forth in this Offering Circular and the "Risk Factors" section of this Offering Circular. The technology and data used in providing this information used to support this risk analysis are derived from pertinent scientific data, mathematical and empirical models, and the encoded experience of epidemiologists, virologists, medical doctors, biostatisticians, terrorism experts, mathematicians, earthquake engineers, and seismologists. As with any model of complex stochastic systems, particularly those with low frequencies of occurrence and potentially high severity outcomes, the actual realized mortality rates may differ from the results of simulation analyses. Mortality is modeled via a hybrid approach, a blend of actuarial and structural modeling methods, combined to forecast a distribution of mortality in future years resulting from feasible advances in medical science and public health. Actual mortality rates are likely to differ from the expected or average results of the forecast model, and the accuracy of the forecast model is largely dependent on the accuracy of the underlying data used to construct it.

THIS INFORMATION IS PROVIDED "AS IS", AND RISK MANAGEMENT SOLUTIONS, INC. DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, WITH RESPECT TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RISK MANAGEMENT SOLUTIONS, INC. BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING FROM ANY USE OF THIS INFORMATION.

THE INFORMATION CONTAINED IN THE RMS MODELS DESCRIPTION IS SUBJECT TO THE RISK FACTORS AND RMS DISCLAIMERS SET FORTH ON PAGES IX THROUGH XII AND PAGES 58 THROUGH 63 OF THIS OFFERING CIRCULAR. INVESTORS ARE STRONGLY ENCOURAGED TO READ THE RISK FACTORS AND RMS DISCLAIMERS IN CONJUNCTION WITH THE RMS MODEL DESCRIPTION.

RMS MODELS DESCRIPTIONS

The quantification of future patterns of survival is central to the management of longevity and mortality risk. Given the complex etiology of potential excess mortality events or adverse longevity trends, RMS models incorporate established principles of evidence based medicine, mathematical biology, epidemiology, virology, biostatistics, seismology, earthquake engineering, terrorist threat analysis and other related fields to estimate the likelihood and severity of plausible shocks to mortality levels and trends in mortality improvement.

To estimate possible losses resulting from these phenomena, RMS has developed software and related utilities that provide a stochastic representation of excess mortality events and the future evolving path of mortality rates. RMS used the following models and model components for the purposes of this RMS Risk Analysis:

- The RMS Longevity Model reflects potential future changes in mortality and the associated uncertainty therein, excluding the temporary impact of extreme mortality events.
- The RMS Infectious Disease Model estimates mortality that could result from an influenza or emerging infectious disease pandemic.
- The RMS Earthquake Casualty Models reflect additional mortality that could result from the occurrence of severe earthquake events in the United States and Japan. Since earthquake activity in France is far smaller in terms of both frequency and severity than in the United States or Japan, it is not included in the RMS Risk Analysis Results.
- The RMS Probabilistic Terrorism Models reflect additional mortality that could result from the occurrence of severe non-military acts of violence in the United States and France.
- The RMS Statistically Modeled Perils (collectively, “**Residual Risk Models**”) reflect additional mortality that could result from the occurrence of storms, floods, extreme temperatures, mass movements, wildfires and volcanic eruptions in France, Japan and the United States. In Japan, the model also reflects additional mortality that could result from tsunamis.

RMS believes that infectious disease, earthquake, terrorism and statistically modeled perils to be the principal drivers of excess mortality risk. While additional causes, including, but not limited to, wars and other natural catastrophes, are able to cause excess mortality in the Covered Area, contribution to extreme mortality risk from these causes is considered *de minimis* for the purpose of this report.

The mortality rates output from the Longevity Model and each excess mortality peril model were input into a simulation procedure, described in detail in the Risk Analysis Results section of this Offering Circular.

Parameter Uncertainty

When an actuarial model is built, the mean trend and variability of mortality rates can be estimated based on sample historical data. These statistics can be used to guide the choice of parameters that govern the probability distribution of future mortality rates. While this approach adequately characterizes the variability of past historical data, it does not necessarily account for all possible variation in the future.

Parameter uncertainty represents possible variability in the distribution’s parameters themselves. It is possible that, for example, a particular model’s parameters could change over time, resulting in an overall different projection of both the expected outcome and the variability around it.

The RMS Longevity Model explicitly includes parameter uncertainty. In addition to the uncertainty in the path of mortality improvement for a given age and gender cohort, there is also modeled uncertainty in the magnitude of that cohort’s mortality trend.

Secondary Uncertainty

Secondary uncertainty represents the uncertainty in the number of fatalities, given that a specific event has occurred, and is represented in the model output by standard deviations in each event fatality level.

Each peril has its own characteristic type of hazard uncertainty. Uncertainties related to earthquakes include the effects of ground motion attenuation, soil amplification, and collateral hazards (such as landslide and liquefaction). Uncertainties related to terrorism include intensity and area of damage driven by external factors such as wind strength and direction, and time of day of an attack. Examples of uncertainties related to infectious disease include the national and international responses to control the disease, rapidity of vaccine production and its ensuing efficacy and the performance of antiviral medication.

Secondary uncertainty is also affected by the level of specificity of the relevant model parameters. A less detailed model produces a mortality rate with higher systematic uncertainty. Specification uncertainty can arise from several sources: for example, local conditions can be modeled at varying levels of geographic resolution, which can impact secondary uncertainty in the perils of terrorism and earthquake. Refinements in a model's capacity to accurately reflect higher levels of detail reduce the uncertainty in the model's loss estimates.

Portfolio data uncertainty reflects the level of detail in the model input data. More detailed data generally results in less uncertainty reflected in the model. This uncertainty is not the same as specification uncertainty, which addresses the model parameters, not the actual data used as inputs to the model. For example, using human exposure data with location information at the street address level instead of at the ZIP code level typically decreases the secondary uncertainty, especially for perils with highly localized hazard, such as terrorist attacks. Likewise, less detailed portfolio data tends to increase the uncertainty reflected in the model.

RMS MODEL VERSIONS

RMS maintains a constantly evolving program of model updates, in which adjustments may be made to models throughout their lifetimes. Updates are implemented in the latest commercially released version of the relevant RMS software platform or, on occasion, via the application of software patches. Throughout the commercial lifetime of an RMS Risk Model, such changes may include but are not limited to:

- Adjustments to model parameters and associated uncertainty;
- Adjustments to model assumptions as a result of improved scientific understanding or historical data.
- Updates to geographical data including address classification systems and geocoding information; and
- Alterations to financial modeling assumptions.

The RMS Models used in this Risk Analysis are as follows:

RMS Model (“**RMS Model**”): an aggregation of the simulated mortality rates from the RMS Longevity Model, RMS Infectious Disease Model, RMS Earthquake Casualty Models, RMS Probabilistic Terrorism Models and RMS Residual Risk Models as defined below:

- RMS Longevity Model, first released in 2010, last updated in 2013 (“**RMS Longevity Model**”)
- RMS Infectious Disease Model, first released in 2007, last updated in 2011 (“**RMS Infectious Disease Model**”).
- RMS United States Earthquake Casualty Model Version 13.1, upgraded in 2014 (“**RMS U.S. Earthquake Casualty Model**”) and RMS Japan Earthquake Casualty Model Version 11.0 SP4, upgraded in 2012 (“**RMS Japan Earthquake Casualty Model**”, collectively the “**RMS Earthquake Casualty Models**”)
- RMS United States Probabilistic Terrorism Model Version 3.1.4, upgraded in 2012 and the RMS France LifeRisks Terrorism Model Version 2.0, created in 2012, (collectively the “**RMS Probabilistic Terrorism Models**”)
- RMS Residual Risk Model 2.0, first released in 2012 (the “**RMS Residual Risk Model**”)
- RMS Global Tsunami Scenario Model, first released in 2014 (“**RMS Tsunami Scenario Model**”)

Further details on each of the RMS Models, as well as information relating to historical data and events, can be found in the following sections.

RMS LONGEVITY MODEL

Longevity risk is the consequence of inherent uncertainty in future life expectancies. Standard actuarial methods rely heavily on projecting historical trends into the future. In addition to this standard approach of building an analysis around historical trends, the RMS Longevity Model explicitly models the mechanism that drives future mortality improvements.

The RMS Longevity Model employs actuarial methods to determine prevailing near term mortality trends. These trends are then expanded upon via stochastic modeling of the underlying drivers of future longevity changes to develop long-term projections. The medical science specific to longevity risk is termed *geroscience*. This is the study of the interface between aging and age-related diseases and establishes the inter-disciplinary scientific foundation for longevity risk, covering fields ranging from molecular genetics and systems biology to bioinformatics. As with all medical science, the path of geroscience advancement is not deterministically predictable – it is inherently a stochastic process (i.e. a time-dependent, random variable). There are numerous granular sources of mortality improvement (“**Vitagions**”), which enhance longevity and tend to spread quickly amongst populations of different countries.

A key challenge in using medical science to inform future mortality trends is the lack of a predictable timeline for medical developments. Consequently, the accuracy of any prediction is limited by the randomness inherent in medical discovery. On average, for every 10,000 chemical compounds investigated, only one leads to a marketable licensed drug. No definitive timeline can be given for an ambitious medical objective, such as curing AIDS. Serendipity plays a major role in medical discovery. Many of the most important breakthroughs in medicine have come from unexpected sources in seemingly unrelated fields, and have frequently depended on luck, accident and error (Meyers, 2007). AZT, the well-known treatment for AIDS, was first created in the 1960s to combat cancer. After initially showing no success in reducing cancer mortality, it emerged two decades later as a revolutionary treatment for AIDS.

In the RMS Longevity Model the numerous granular sources of mortality improvement are not individually simulated, as has been attempted by others in the past. Rather, they are grouped into the following five broad categories (each denoted a “**Vitagion Category**”), which are amenable to stochastic modeling:

- Lifestyle—Individual risk factors that affect health, such as smoking and obesity rates
- Medical Intervention—New medical treatments, including pharmaceuticals, biologics, and vaccines, improvements in diagnostics, surgical techniques, and the delivery of new or existing treatments
- Health Environment—Hygiene, sanitation, pollution, knowledge and awareness of health issues, access to healthcare, health and safety legislation and regulation of the food chain
- Regenerative Medicine—Techniques for repairing and renewing cells and organs, including stem cell therapy and nanomedicine
- Anti-Aging Processes—Discoveries that directly affect the human aging process, and may decrease an individual's effective biological age below actual chronological age

Each of these categories is rigorously researched through a process that involves an extensive literature review, data aggregation, solicitation of expert opinion, and data analysis techniques to ensure data quality and garner key insights. The end result is an assessment of the potential mortality impact ascribed to each Vitagion Category.

The five Vitagion Categories are incorporated into the RMS Longevity Model, which offers all the familiar aspects of a stochastic mortality projection model coupled with the ability to decompose future trends into its key drivers. By modeling the mechanism underlying mortality levels, the RMS Longevity Model manages to bridge the gap between assessing historical trends and projecting future mortality improvements.

Of the five Vitagion Categories, only three are considered to be actively generating mortality improvements today: Lifestyle, Medical Intervention and Health Environment (“**Current Vitagions**”). Although they account for less than 5% of expected mortality reduction over the next two decades, Regenerative Medicine and Anti-Aging Processes (“**Future Vitagions**”) could have a significant impact on mortality improvement in the long term. In a given simulation of future mortality, improvements are very unlikely to be isolated to any one Vitagion Category. Instead the vast majority of sample paths will combine contributions from multiple Vitagion Categories.

FRAMEWORK FOR RMS LONGEVITY MODEL

The RMS Longevity Model is constructed around five core random walks, each representing the evolution of one of the Vitagion Categories. The random walk paradigm is motivated by a meta-model of geroscience advancement where progress arising in a given field occurs incrementally over time and ultimately converges to a practical limit. This practical limit quantifies the maximum capacity for improvement ascribed to a specific Vitagion Category ("VMAX"), and each Vitagion Category carries its own VMAX. Figure 1 shows a flowchart of the risk assessment process.

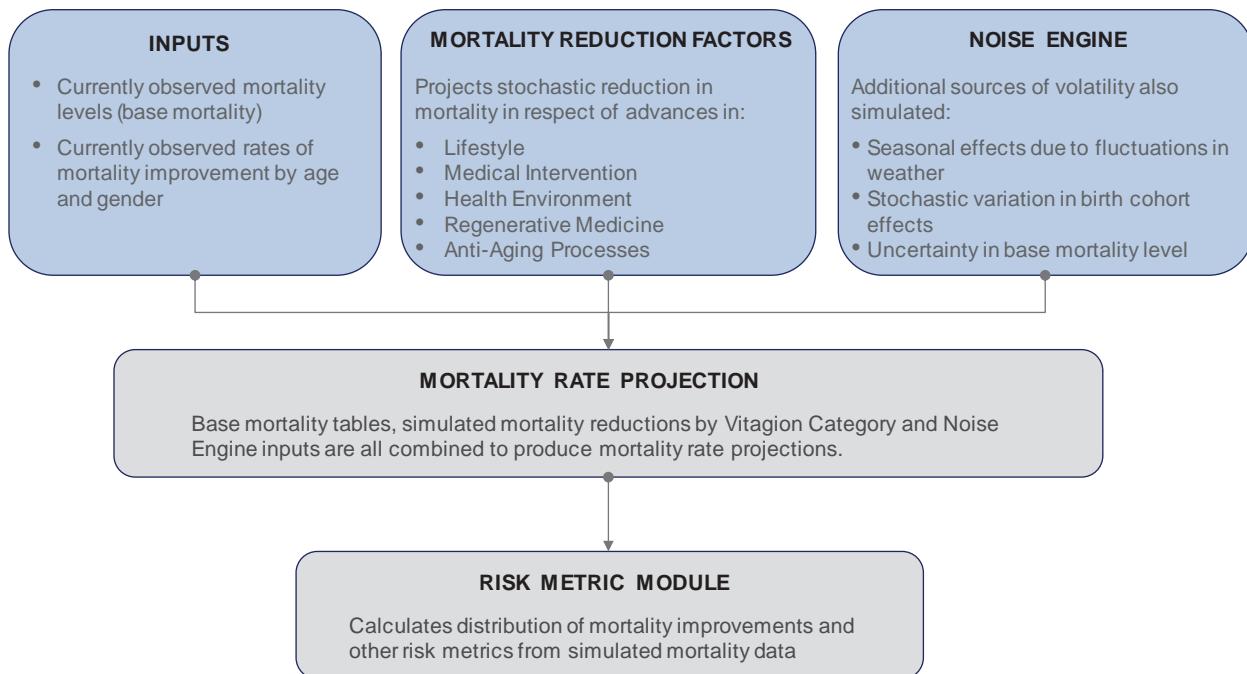


Figure 1: Framework for RMS Longevity Model

Modeling Medical Progress

The RMS Longevity Model was built to be stochastic rather than deterministic to mimic as closely as practical the characteristics of medical progress. For mortality change to be projected into an uncertain medical future, the underlying stochastic process of medical advancement needs to be modeled. This requires construction of a meta-model of medical progress.

Scientific discovery can be conceptualized as searching through a large unmapped information space, where decisions about where to look next are informed by past experience. It is a stochastic branching process in which branches proliferate in many directions; some leading nowhere, but others leading to new medical knowledge.

Accordingly, over and above the smooth evolution of progress, a random walk component is necessary to reflect the heuristic search aspect of scientific discovery, the haphazard aspects of the clinical trials and regulatory process, the possibility of latent side-effects and litigation, medical errors and scientific research malpractice, and socio-ethical objections to new forms of medical treatment.

The RMS Longevity Model encodes the characteristic randomness of medical research and the geometrical spread of research branches through a widening cone of uncertainty: the more distant the time horizon, the greater the possible range of progress. The cone is bounded by estimates of the least and greatest plausible progress trend rates. The uppermost plausible trend rate can be estimated by assessing the optimal system logistics of the complete development cycle from research laboratory to treatment development and trials, through regulatory approval and onto clinical usage.

The essential requirement for the international replicability of experimental results and rigorous scientific peer review would delay the scientific acceptance of even the greatest advancement. It typically takes about 15 years for a medical treatment to gain approval by the Food and Drug Administration (FDA). The potential mortality impact of radically new treatment modalities over the next ten years is assumed to be minimal due to the constraints of the drug peer-review process; essentially, anything that emerges in the next decade must already be in the pipeline. Consequently, the Future Vitagions can make only a negligible contribution over this time-frame.

Components for Mortality Improvement

Current trends in mortality, by age, over time (“**Age-Period**”) and between successive generations (“**Birth-Cohort**”) are combined to forecast future mortality. The Age-Period component, typically the dominant effect, is caused by advances in medical technology, lifestyle, and the efficiency of healthcare delivery that impact persons of a specific age equally, regardless of which generation they belong to. The Birth-Cohort trend relates to the mortality influences that are particular to each successive generation determining the characteristic mortality level of each.

Age-Period trends describe changes in mortality for a specific age-group over time. They could arise, for example, due to gains in the response times of ambulances. Expediting the arrival of emergency services would have the greatest impact on age groups with a large portion of deaths attributed to acute illnesses where time-critical responses affect outcomes, such as trauma and heart attacks.

Conversely, Birth-Cohort effects are determined by so-called “life-course events”. Circumstances in youth, childhood, or even in utero may have a lasting impact on mortality rates throughout life. For example, birth weight is related to cardiovascular disease (“**CVD**”) rates in later life, educational achievement correlates with longevity, and maternal nutrition may affect Type II diabetes in late-middle age. (Rich-Edwards *et al.*, 1997; Pensola & Martikainen, 2004; Ozanne *et al.*, 2011).

The forward evolution of Age-Period trends depends strongly on future medical and lifestyle advances, and consequently, this is where most of the uncertainty in longevity modeling resides. By contrast Birth-Cohort effects largely depend on past and present characteristics of specific generations that will affect their future health. In view of this distinction, structural modeling in which mortality change is decomposed into component drivers is targeted at the Age-Period component only in the RMS Longevity Model. Birth-Cohort effects are simulated from a purely statistical noise perspective.

Modeling Age-Period Mortality Improvement

There is uncertainty in both the trend and path of progress of any single Vitagion Category due to intrinsic randomness in medical discoveries and social/behavioral changes. However, it is possible to place bounds on both the absolute reduction in mortality from any single source of improvement and the time frame over which that reduction develops. In order to model the uncertainty, the following parameters are required for each Vitagion Category:

- Size of the maximum possible mortality reduction or the proportion of mortality deemed modifiable (VMAX).
- Mean of the possible trends towards VMAX (“**Mean Trend**”) – for example progress might be trending at 3% of modifiable mortality per annum (equivalent to an initial annual mortality improvement of $3\% \times \text{VMAX}$).
- Volatility in the long-term trend towards VMAX (“**Trend Volatility**”) – an expected governing trend of 3% of VMAX per annum might initially be associated with a standard deviation of 1.5%.
- Volatility in the year-on-year fluctuations about this trend (“**Path Volatility**”) – supposing a governing trend of 3% per annum has been sampled for a particular progress scenario, the standard deviation in annual improvements along this path might typically be ~1.5% also.

These four core parameters are illustrated schematically in Figure 2. Note that in addition to uncertainty within each Vitagion Category, the RMS Longevity Model recognizes volatility around the Birth-Cohort effect (“**Cohort Effect Volatility**”) and the base mortality estimate (“**Base Table Volatility**”). Cohort Effect Volatility is calibrated from historical data.

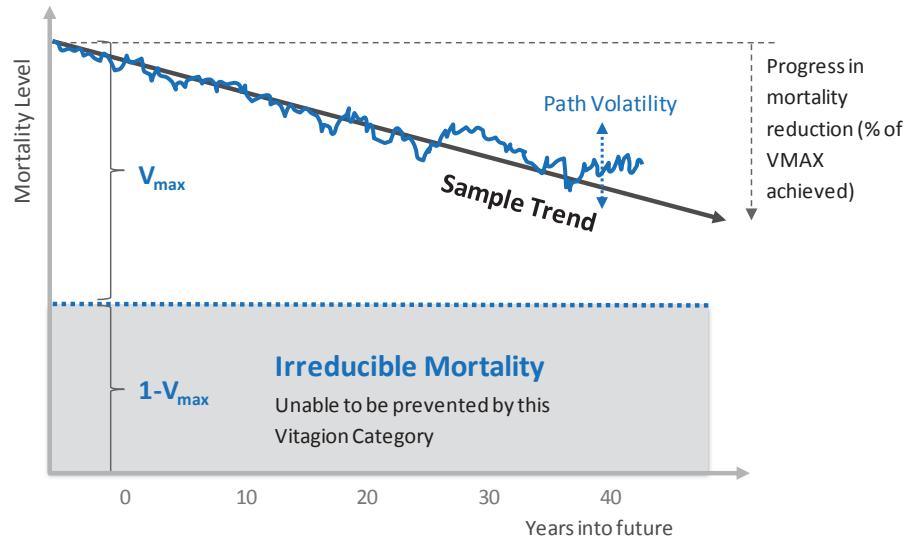


Figure 2: Schematic diagram of the model parameters for a Vitagion Category

Decomposing Current Mortality Improvement Trends by Vitagion Category

Current mortality improvements are divided among the three Current Vitagions (Lifestyle, Health Environment, and Medical Intervention – see Figure 3). The RMS Longevity Model is informed by data on the underlying causes of mortality (“Cause of Death”) that is coded according to the ICD-10 system maintained by the World Health Organization. The fraction of total mortality improvement attributed to each Vitagion Category depends on the extent to which specific Causes of Death are impacted by the Vitagion Category and also on the predominance or prevalence of these causes relative to the total mortality load. For example, a strong reduction in mortality from accidents at age 80 will only translate into a small contribution to total mortality improvement due to the small fraction of deaths accounted for by accidents at that age. By contrast, an equivalent impact on cardiovascular disease would yield a much more significant result.

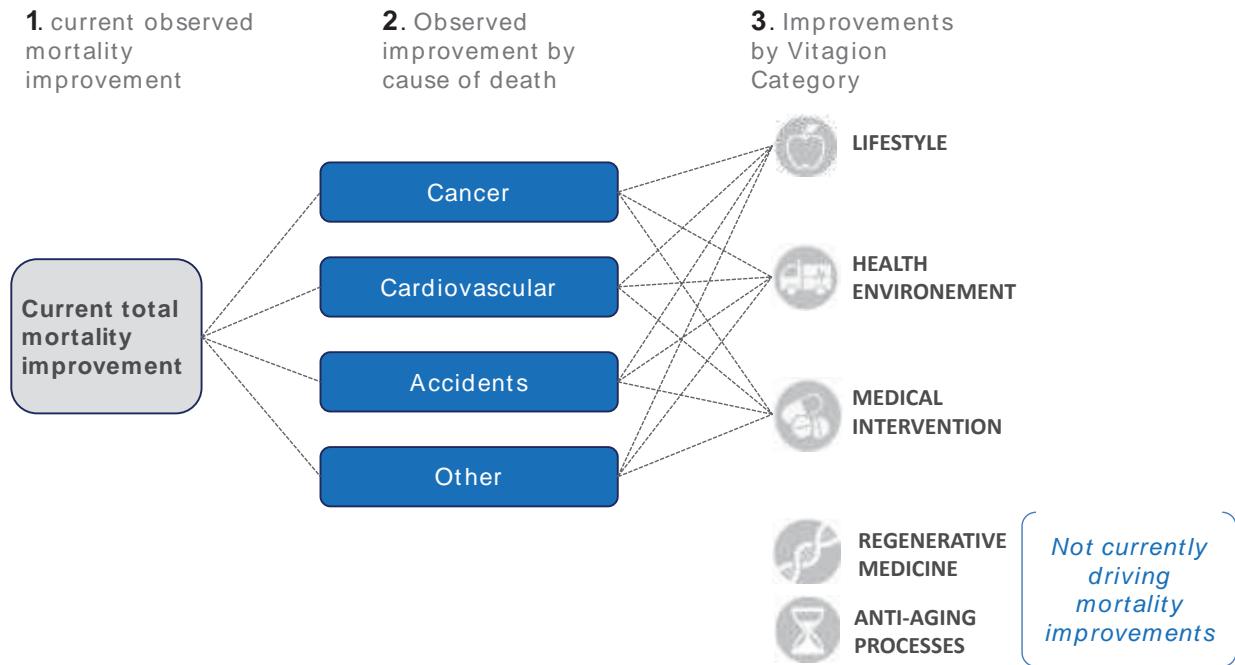


Figure 3: Interaction of Vitagion Categories with Cause of Death

Figure 4 shows the RMS Longevity Model's expected mortality improvements as a function of time for an indicative population broken down by Vitagion Category. Combining mortality reductions from the five Vitagion Categories leads to a projection of mortality improvement dominated in the short term by Lifestyle and Medical Intervention, but more dependent on progress in Regenerative Medicine and the Anti-Aging Processes towards the middle and latter parts of this century.

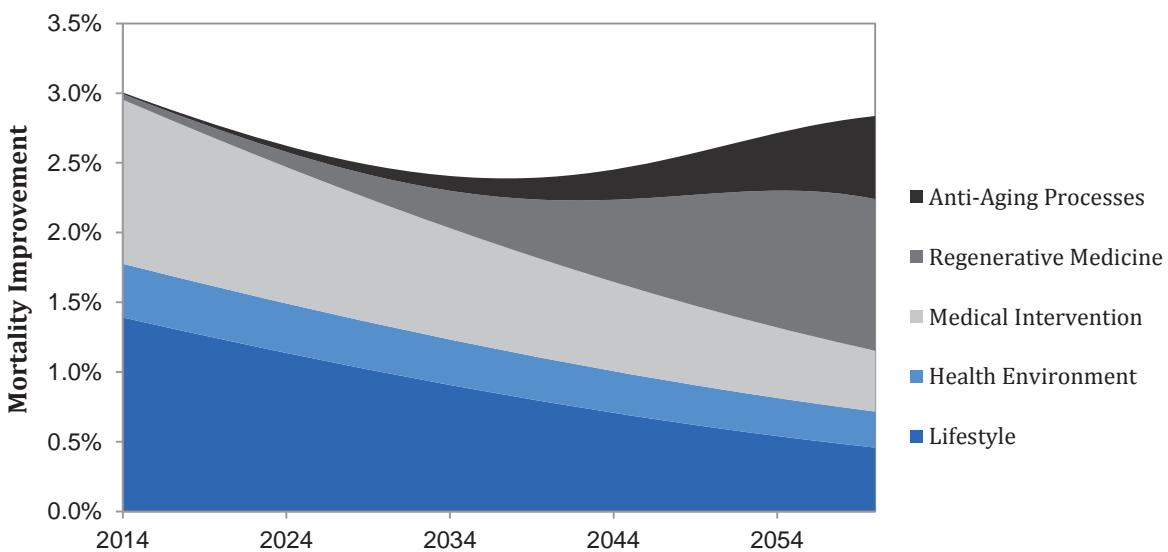


Figure 4: RMS Longevity Model's indicative mortality improvement by Vitagion Category over time

Maximum Possible Reduction in Mortality (VMAX)

There is a practical limit to the survival impact of any particular longevity driver. Accordingly RMS imposes the VMAX limit to the reduction in mortality that can be achieved by each Vitagion Category. Mortality improvements due to a given Vitagion Category will eventually begin to diminish as progress in each field approaches its maximum potential. VMAX is calculated by aggregating a Vitagion Category's maximum potential impact on the component Causes of Death that make up the total mortality burden in a given population.

Lifestyle VMAX

The maximum mortality reduction achievable through lifestyle changes is assessed by calculating the mortality impact of transitioning from current population levels of measurable lifestyle risk factors to their optimal states. These risk factors include blood pressure, cholesterol, smoking, obesity, alcohol consumption, exercise, and diet.

Figure 5 and Figure 6 summarize recent trends in smoking and obesity in France, Japan and the United States.

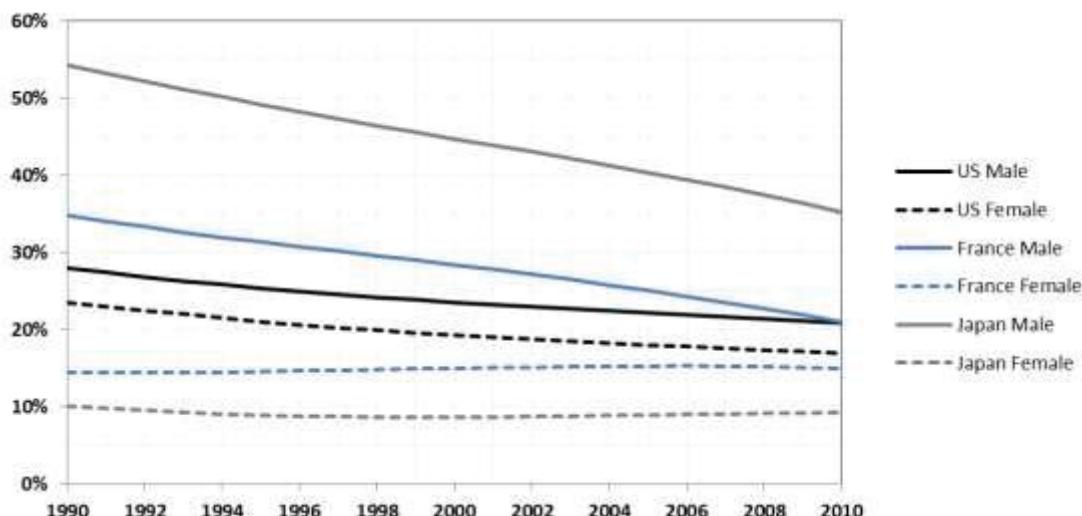


Figure 5: Smoking prevalence in France, Japan and the U.S. adults aged 60

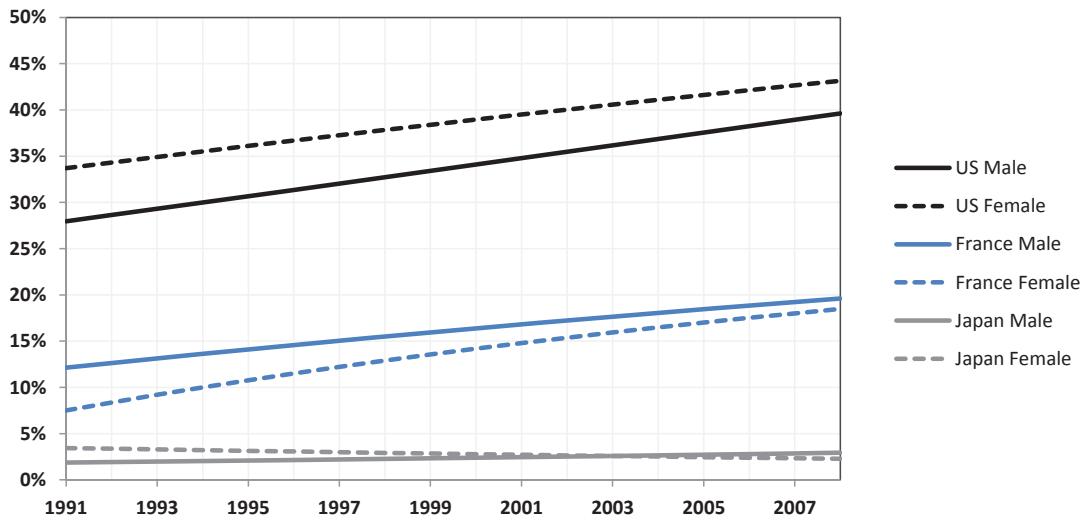


Figure 6: Obesity prevalence in France, Japan and the U.S. adults aged 60. Note: obesity defined as Body Mass Index > 30

The cause-specific mortality impacts associated with transitioning from current risk factor levels to optimum levels are calculated via standard epidemiological methods (Martin et al., 2008), and subsequently augmented in recognition of the potential of un-modeled lifestyle risk factors. The resulting estimated potential lifestyle impacts can be validated against related estimates from the epidemiological literature. For cardiovascular disease a large global study suggested that about 90% of cardiovascular risk was explained by nine principal risk factors, which are nearly all lifestyle related (Yusuf et al., 2004; Igbal et al., 2008). Conversely, estimates for cancer indicate only 23% of mortality is attributable to lifestyle (Cutler, 2008); though, the WHO Global Health Risks Analysis estimates the number is higher, 37%, in high-income countries (WHO, 2009). For accidents, in 1996, 14% of deaths were thought to be alcohol related (Britton & McPherson, 2001). For respiratory disease, about 40% of these deaths in 2008 were due to chronic lower respiratory disease, and 80% of those relate to smoking, suggesting that about a third of respiratory deaths are lifestyle related.

Health Environment VMAX

The health environment category covers the following areas:

- Hygiene
- Sanitation
- Access to healthcare
- Housing quality and environmental exposure
- Knowledge and awareness of health issues
- Physical and mental work-related stress

All of these factors are strongly linked to socioeconomic status and the mortality levels observed by socioeconomic class are used to inform the Health Environment VMAX. Mortality by socioeconomic status is not a straightforward assessment for the impact of Health Environment, because Lifestyle risk factors are also known to vary across these groups. By examining the mortality gap between the socioeconomic classes after accounting for the distribution of Lifestyle risk factors, RMS is able to assess the contribution of Health Environment to mortality reduction. RMS has set the VMAX for Health Environment effects commensurate with a limiting scenario in which all individuals attain health environment standards in excess of those currently enjoyed by the highest socioeconomic tiers.

Medical Intervention VMAX

There have been unprecedented improvements in cardiovascular disease mortality in the past two decades, with Medical Intervention estimated to account for close to half of this (Bajekal et al., 2012; Unal et al., 2004). While a number of treatments known to prevent cardiovascular have yet to be maximally applied, there is little scope for introducing novel drug classes to moderate critical disease parameters. Analysis of the coverage of current cardiovascular disease treatments suggests a

certain degree of further mortality reduction is possible by increased application of existing treatments. This component is reflected in the deaths Medical Intervention VMAX.

Reductions in mortality from cancer have been much less dramatic than those experienced for cardiovascular disease, and therefore the greatest remaining scope for improvement from medical intervention. The slow progression and multistage nature of cancer suggests the possibility of significant progress through composite screening and early intervention strategies. However a complex and heterogeneous set of causes limits the potency of any single cancer technology in isolation. The near elimination of infectious disease mortality through vaccinations, sanitation and antibiotics during the first half of the 20th century will be comparatively difficult to emulate for cancer. Nevertheless, the potential for cancer mortality reduction is the most significant component of VMAX for medical intervention.

The category of “other” disease encompasses a wide variety of illnesses, of which the most significant group are respiratory conditions arising from structural damage that standard medical interventions are unable to remedy. The primary contributor to respiratory disease death is chronic obstructive pulmonary disease (COPD) which includes emphysema and chronic bronchitis. The majority of recent improvements in the ‘other’ category have been mediated through the impact of lower smoking rates on COPD. After accounting for mortality gains from the control of other extraneous causes of COPD, such as pollution and occupational exposure to noxious substances, reductions due to medical intervention have been comparatively limited.

The advent of regenerative medicine may make significant inroads in respiratory disease mortality but, for the near term, the current phase III drugs pipeline suggests only continued application of low impact palliative interventions in the form of anti-inflammatory agents and bronchodilators. Accordingly the medical intervention VMAX draws its smallest contribution from “other” disease. Figure 7 illustrates the approach to modeling the medical intervention VMAX.

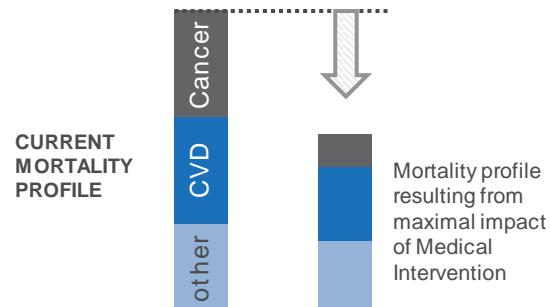


Figure 7: Schematic of Medical Intervention VMAX by Cause of Death

Possible Trajectories of Progress towards the Maximum Possible Mortality Reduction

Progress over time towards the maximum possible mortality reduction is modeled for each Vitagion Category. For this purpose, RMS has parameterized a plausible range of progress trends by Vitagion Category, bounded within the limits of biological and sociological possibility.

Figure 8 illustrates the impact of this limit on the potential space of future mortality reductions.

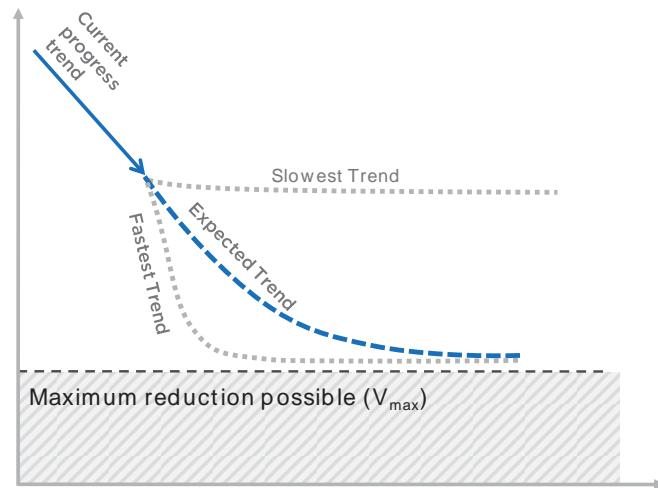


Figure 8: Long-term mortality reduction dynamics arising from each Vitagion Category

Mortality improvements owing to Lifestyle, Medical Intervention and Health Environment changes are expected to diminish over time as progress in each field approaches its maximum potential.

Uncertainty in Vitagion Category-specific progress is captured via a log-normally distributed progress trend. RMS has identified extreme improvement scenarios, or 'maximal trends', at the 99th percentile for each Vitagion Category. These maximal trends bound the speed of progress towards VMAX. The following examples illustrate the modeling of trend uncertainty.

Lifestyle Trend Uncertainty

Based on an analysis of historical lifestyle transitions (e.g. smoking cessation and reductions in drunk-driving related traffic fatalities) and the particular constraints currently preventing rapid changes in population level lifestyle, RMS estimates the probability of progressing by more than 55% towards the optimum lifestyle state within 15 years to be 1-in-100. Comparison of this extreme improvement scenario with the expected trend, along with the assumption of log-normally distributed trends, yields a coefficient of variation to be used in the stochastic simulation.

Health Environment Trend Uncertainty

Volatility in progress towards the maximum mortality reduction owing to Health Environment is much lower than for Medical Intervention and Lifestyle. The sanitary revolution has run its course in the developed world and the remaining levers for altering Health Environment are intertwined with complex social and economic issues. The political and economic trends that surround these issues and constrain progress towards improvements in working conditions, economic equality, housing, healthcare access and public health education play out over long timescales, regardless of whatever individual will exists for making more rapid changes. Because short-term economic fluctuations do not correlate with mortality rates, the RMS Longevity Model is informed by the assumption that long-term patterns of economic development are required to significantly alter Health Environment at the population level. Accordingly the risk of a material trend change arising from Health Environment impacts over the short term is limited.

Medical Intervention Trend Uncertainty

Progress towards maximum disease reduction owing to Medical Intervention is likely to be mediated through cardiovascular disease in the short term, as existing treatments for modifying risk factors are more efficiently applied. The medium-term possibility of breakthrough therapies is more relevant to cancer mortality. Cancer treatment research and development has been the recipient of heavy state and industry research funds cumulatively over the past three decades. Despite this, progress in reducing mortality from cancer has been relatively slow. Unlike cardiovascular disease, for which

many effective treatments already exist, successful cancer treatment is still limited by technological barriers, and novel therapies working their way through the development pipeline can have a striking impact on mortality reduction arising from Medical Intervention.

The technology required to achieve a 50% reduction in cancer mortality does not yet exist. While nearly a quarter of the drugs currently undergoing phase III review by the FDA target primary cancers, RMS estimates that a minimum 10 year buffer of additional research time is required before the efficacy of oncology drugs reaches the threshold at which large scale reductions become feasible. Once the technological capital exists, there remain significant hurdles to overcome including (i) the regulatory time required to review and approve new drug applications, (ii) the non-trivial task of formalizing large-scale, health authority sanctioned manufacturing for a new drug and (iii) dissemination of new drug information to support widespread healthcare payer coverage decisions to promote physician awareness and drive staff education and training. Depending on the drug, the construction of additional medical facilities may also be required before the optimal use of treatments can be realized clinically.

Major advances in the scientific understanding of infectious disease, vaccination, sanitation, and hygiene – coupled with the discovery of antibiotics – produced some of the strongest improvement trends ever recorded for disease specific mortality. Infectious disease mortality improvement reached unprecedented highs of 15% per annum (for 40-55 year olds) after the advent of industrial production of antibiotics and widespread use of vaccines in the wake of World War II. By comparison, the height of the cardiovascular disease revolution is showing peaks of improvement just below 6% per annum for different age groups since 1990. Cancer improvement is yet to top 3% per annum. A pattern of lowering the pace of progress against these three diseases is consistent with the increasing complexity of the disease mechanism, culminating in cancer; a deeply embedded illness operating at the genetic level to subvert the cellular architecture of living tissue.

In light of these challenges, RMS attaches very low likelihood to any trend which attains proximity to VMAX for medical intervention in less than 30 years.

Correlation of Improvement Trends between Countries

Cultural interchange and a common medical research base between developed Western countries suggest a moderate degree of mortality correlation – a phenomena that is supported by the historical record. While annual changes in mortality have shown only low correlation, key events in the progression of epidemiology and medicine have coincided to produce similar long-term outcomes. For example, the evidence of smoking's negative health effects in the 1950s and consequent decline in tobacco usage thereafter in the developed world gave rise to material correlation in mortality change through Lifestyle progress. The discovery of antibiotics and, subsequently, treatment strategies for cardiovascular disease has also led to correlated mortality impacts from Medical Intervention over the 20th century. Coinciding advances in sanitation and the control of industrial pollution are analogous examples pertaining to the Health Environment Vitigation Category.

Current Causes of Death in France, Japan and the United States,

Figure 9, Figure 10 and Figure 11 show, for each age, the proportion of total deaths accounted for by different causes in the United States (CDC data), France (Eco-Santé data) and Japan (WHO data) respectively.

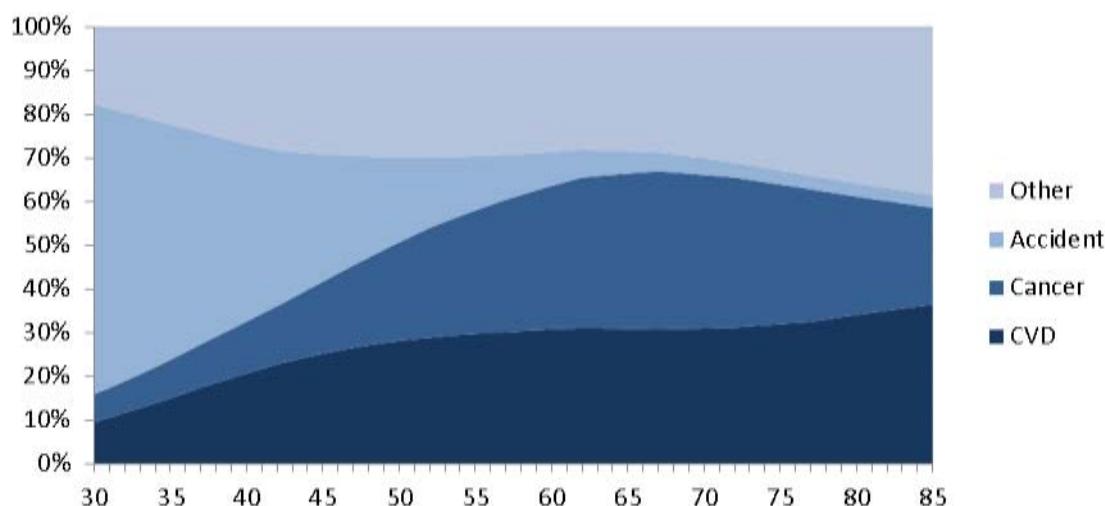


Figure 9: 2010 mortality level, contributions by Cause of Death and age for U.S. Males

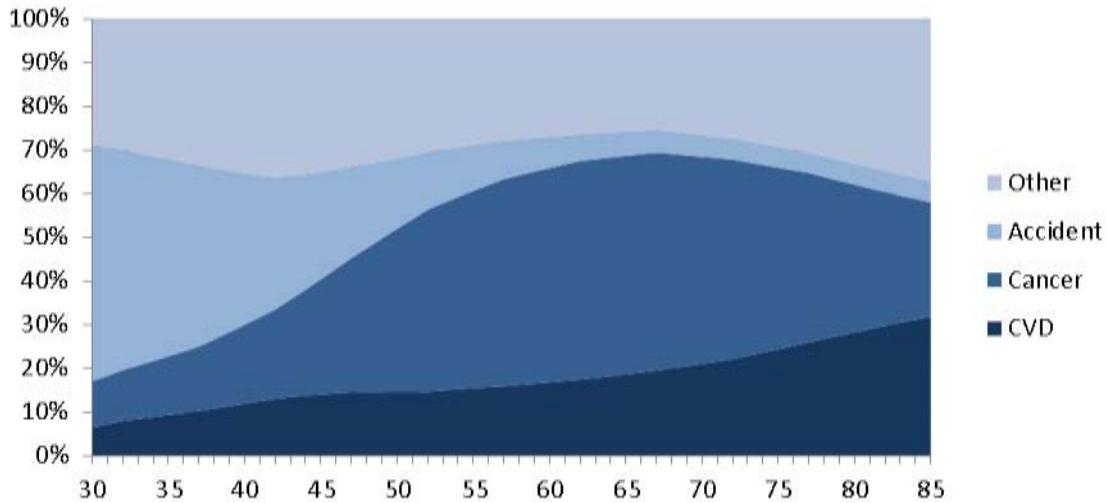


Figure 10: 2010 mortality level, contributions by Cause of Death and age for France Males

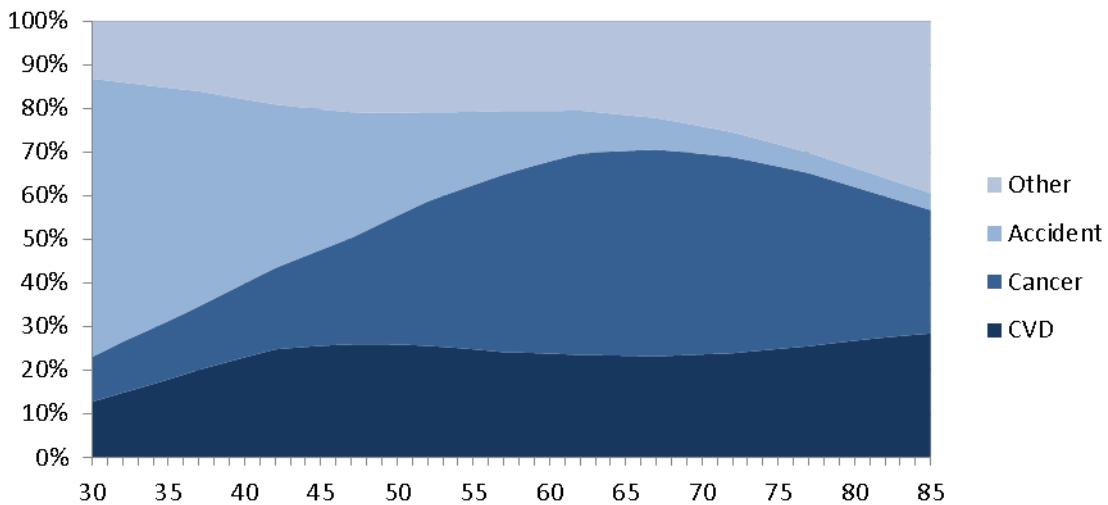


Figure 11: 2011 mortality level, contributions by Cause of Death and age for Japan Males

For the past three decades, improvements in CVD mortality have been increasing at a greater rate than other Cause of Death groups in the France, Japan and the United States. As a consequence the proportion of deaths accounted for by CVD has diminished.

Overall, the Cause of Death structure of mortality is similar across middle-aged and elderly males for the two countries, with a slightly higher prevalence of cancer mortality in France and Japan, and CVD mortality in the United States. This suggests moderate correlation in mortality trend as medical developments targeted at a particular disease, if applied equally in both countries, will induce similar reductions in total mortality level. Each Vitagion Category is expected to produce correlated impacts on (i) different age groups, (ii) different genders and (iii) the different countries.

RMS has calibrated the variation in correlation by age, gender and country against historical mortality trend data. To capture the broad pattern of increasing correlation over greater time periods, the RMS Longevity Model assumes there is moderate correlation in progress trends but weaker correlation in the annual volatility around these trends.

Example of Historical Correlation in a Lifestyle Risk Factor: Smoking

Figure 12 compares mortality rates in the France and the United States between 1950 and 2010 in panel (A) against estimates of male smoking prevalence (B). The plateau in mortality occurring in the 1950s and 1960s coincides with the peak of tobacco-related mortality. The fall of smoking and smoking-related deaths, which tend to lag smoking prevalence by ten to

twenty years, coincided with a correlated decline in mortality between the France and the United States, beginning in the early 1970s.

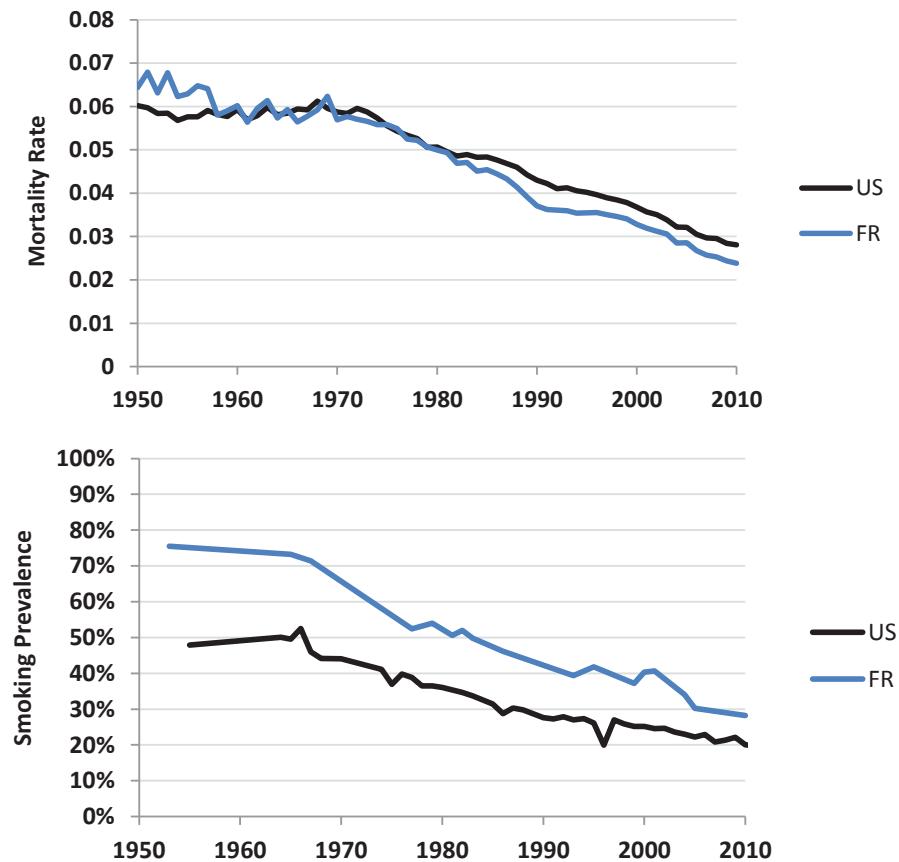


Figure 12: Comparison of declining mortality rate alongside reduction in smoking prevalence. The approximate lag time between a shift in smoking prevalence and its impact on mortality is ten to twenty years. (A) Average mortality rate for Males aged 70-74 in France (blue) and United States (black). (B) Adult smoking prevalence in France (Blue) and the United States (Black).

Example of Correlation in a Medical Intervention Risk Factor: Cardiovascular Disease and Cancer

Attempts to understand the cardiovascular disease epidemic gathered momentum after World War II when large epidemiological studies were used to elucidate risk factors for CVD death. During the 1970s and 1980s systematic reductions in blood cholesterol levels, smoking prevalence and hypertension in the France, Japan and the United States have driven coincident declines in CVD mortality. During the same period significantly less progress was made in the “war on cancer” in each country. The structural similarities in mortality by cause arising from shared medical successes and failures between the United States, France and Japan provide an intuitive picture of mortality trend correlation as seen in Figure 13.

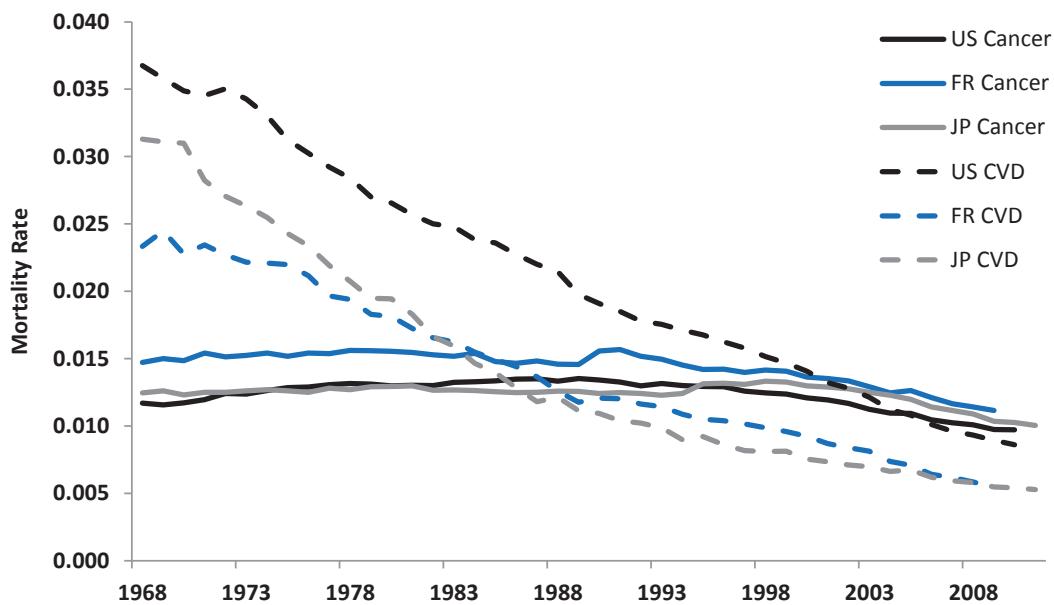


Figure 13: Cancer and CVD mortality rates for ages 70-74 in the U.S. (black), France (blue), and the Japan (gray)

Volatility in the Path of Future Mortality Improvements

In addition to the uncertainty in the trend of mortality improvement, there is also Path Volatility surrounding the path that improvement will take over time. In the RMS Longevity Model, the volatility of realized Vitagion Category progress trajectories has been set to ensure consistency with historically observed mortality rate volatility by country. Correlation of Path Volatilities between countries and age groups is also modeled. Inspection of year-on-year correlation in mortality improvement suggests Vitagion Category Path Volatility correlation should be weaker than long-term trend correlation. This behavior has been encoded in the RMS Longevity Model. Lower annual year-on-year progress correlation by Vitagion Category is intuitively reasonable. For example the staggered timing of smoking bans between France, Japan and the United States has acted to break annual correlation, while at the same time supporting a more highly correlated long-term trend in mortality improvement through smoking cessation. The timing of the introduction and dissemination of new drugs or other public health legislations also supports this dynamic.

The Impact of Birth-Cohort Effects versus Age-Period Effects

Evidence gathered from across a wide range of disciplines, including demography, medical science and health economics, indicates that people born in different generations may experience different health characteristics in later life. The living experience of different generations in childhood and in adulthood varies in numerous ways: excessive or calorie restricted diets, public healthcare, and social habits such as smoking and drinking. This may have a marked influence on their mortality as well as morbidity. The term ‘Birth-Cohort effect’ describes this phenomenon and has been extensively discussed by Willets (2003).

Historically, advances in medical technology, lifestyle and the efficiency of healthcare delivery have caused improvements that target to some extent persons of specific age. The consequent trends in mortality at a given age over successive time periods are referred to as Age-Period trends. Age-Period trends can be extrapolated to inform short-term projections of mortality.

The adoption of new medical treatments and lifestyle advances may partially occur on a generational basis, benefiting younger generations whilst bypassing older generations whose health behavior is too ingrained. By consequence as new generations or Birth-Cohorts mature they may exhibit mortality rates that defy the prevailing Age-Period trends. The magnitude of such Birth-Cohort improvements can be estimated from historical mortality data. For example, suppose generations born 1931 onwards are the first not to follow a certain risky behavior. One would expect these generations to exhibit better survival gains than historical Age-Period trends suggest. In forecasting mortality improvement in, for example, 2016 starting from 2009, the historical mortality performance seen for 75-85 year olds from generations born in 1931-1941 can be used to augment projected Age-Period trends.

Figure 14 illustrates the difference between improvements over Age-Period and Birth-Cohort effects.

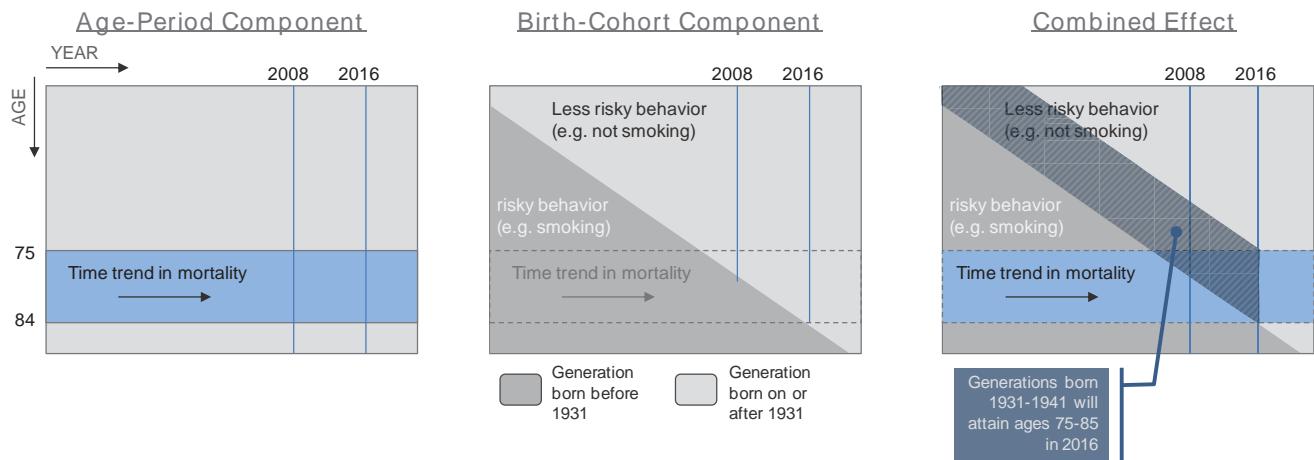


Figure 14: Schematic of components of mortality improvement

Illustrated in Figure 15, diagonal features are readily apparent within the graphs of annual mortality improvement, demonstrating the Birth-Cohort effect in France, Japan and the United States. Features that impact multiple birth years identify instances when factors of mortality risk have persistently attached to particular generations and sustained them in a distinguished risk state throughout their lives. For example, relatively heavy mortality has been exhibited by American males born between 1950 and 1955.

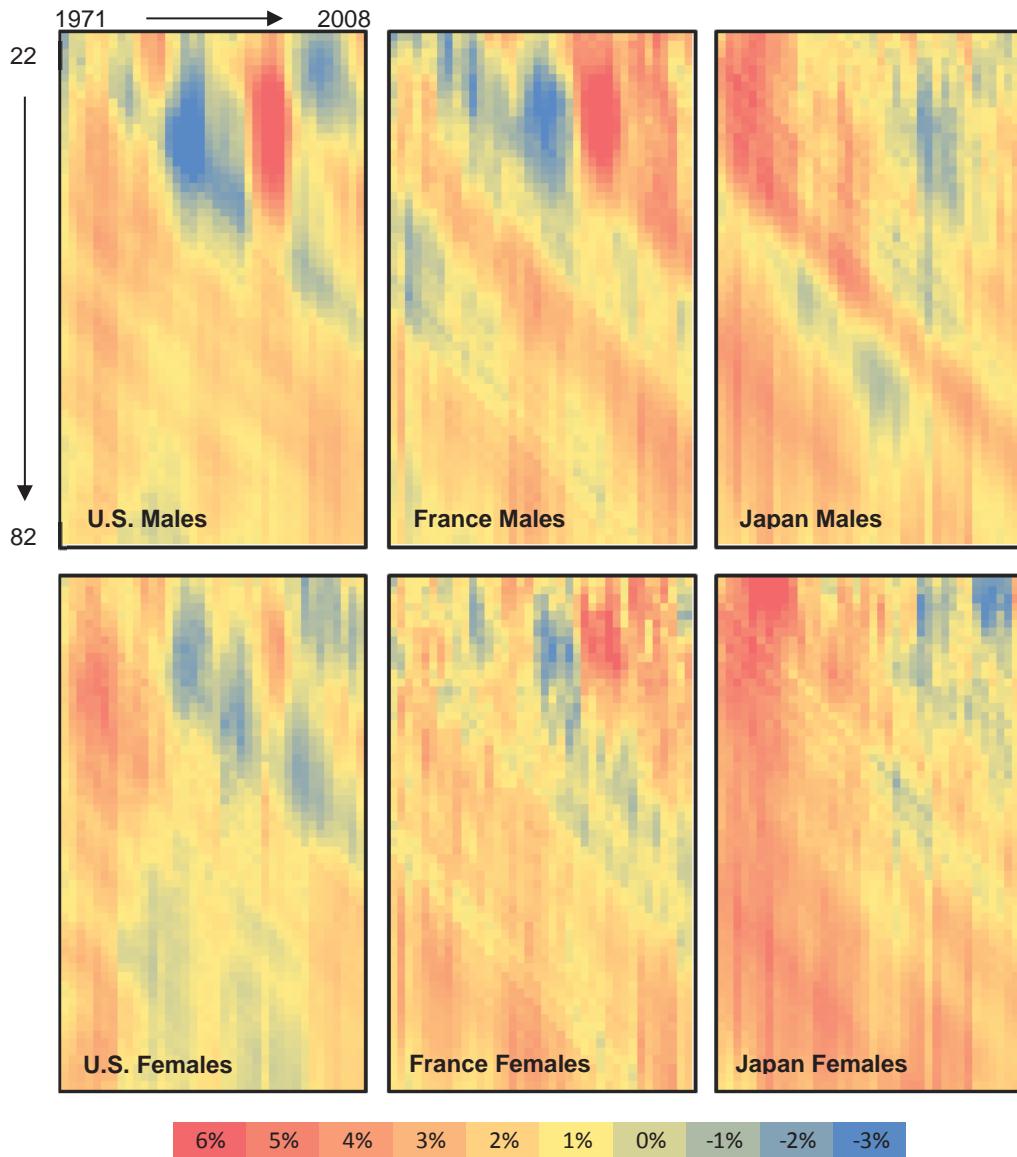


Figure 15: Historical mortality improvement for France, Japan and the U.S. males (first row) and females (second row), aged 22-82 from 1971 to 2008, smoothed over a five-year age and time window.

Combining the Components: Technical Formulation of the RMS Longevity Model

Current Vitagions

The RMS Longevity Model projects reduction factors for each Current Vitagion (j), where $j = 1, 2$ or 3 , within each gender and country. These reduction factors decay exponentially to a floor of $(1 - VMAX)$ as follows:

$$F_j(x, t) = (1 - VMAX_j) + \exp\left(-\hat{u}_j \cdot r_{j,x} \cdot (t - t_0 + \hat{n}_j(t))\right) \cdot VMAX_j$$

Table 1 describes the terms in this formula.

Table 1: Formula Terms for Mortality Reduction Factors

Term	Description
$F_j(x, t)$	Reduction in base mortality for Vitagion Category j at age x , and time t . $F_j(x, t_0) = 1$
$VMAX_j$	A constant: the maximum possible mortality reduction due to Vitagion Category j .
$r_{j,x}$	A constant: expected trend towards VMAX.
\hat{u}_j	A random variable: log-normally distributed factor with mean=1 capturing Vitagion Category Trend Volatility.
$\hat{n}_j(t)$	A random process: Brownian motion with zero mean capturing Vitagion Category Path Volatility.

The following constraint ensures consistency with historical trends:

$$\sum_{j=1}^3 r_{j,x} \cdot VMAX_j = r_x,$$

where r_x is the current Age-Period improvement at age x , as measured by actuarial techniques from historical data.

Regenerative Medicine Vitagion Category

The RMS Longevity Model projects reduction factors in respect of the Regenerative Medicine Vitagion Category ($j = 4$) as follows:

$$F_4(x, t) = (1 - VMAX_4) + \frac{1 + D_4}{\exp(\hat{u}_4 \cdot r_{4,x} \cdot (t - t_0 + \hat{n}_4(t))) + D_4} \cdot VMAX_4,$$

where all terms are as defined in Table 1 with the exception of D_4 . $D_4 = \exp(-i_4)$ where i_4 is a parameter controlling the delay in onset of mortality reductions in respect of Regenerative Medicine. Note that setting $D_4 = 0$ recovers the expression for the Current Vitagions. It should be noted that the progress towards the trend has the form $r_{4,x} = r_4 \cdot \psi_x$, where the mean of r_4 is calibrated to attain a specific progress level at $t=50$ (i.e. the 50-year trend), and ψ_x modifies the trend progress at old age to account for frailty preventing certain aggressive interventions.

Anti-Aging Processes

The RMS Longevity Model projects reduction factors in respect of the Anti-Aging Processes Vitagion Category ($j = 5$) as follows:

$$F_5(x, t) = \frac{h(x - \sum_{s=t_0}^t \phi(s))}{h(x)}.$$

The Anti-Aging Processes Vitagion Category, $F_5(x, t)$, counts $\phi(s)$ as the differential achieved at time s between the advancement of biological and chronological age. These “age-shifts” are accumulated over time. The Makeham-Beard hazard function $h(x)$ translates the cumulative age-shifts into the associated mortality reductions.

This age-shift is projected over time as follows:

$$F_5(x, t) = \left(1 - \frac{1 + D_5}{\exp(\hat{u}_5 \cdot r_5 \cdot (t - t_0 + \hat{n}_5(t))) + D_5} \right) \cdot VMAX_5,$$

where $D_5 = \exp(-i_5)$ with i_5 a parameter controlling the delay in onset of the “age-shift” resulting from advances in the science of Anti-Aging Processes.

Reduction factors are combined multiplicatively to produce a mortality forecast:

$$m(x, t) = m(x, t_0) \times \prod_{j=1}^5 F_j(x, t) \times BC(x, t - x),$$

with $m(x, t)$ denoting the average rate of mortality experienced during year t by persons aged x (“**Central Rate of Mortality**”). The base mortality, $m(x, t_0)$, is multiplicatively decremented by progress in the five Vitagion Categories.

The expression $BC(x, t - x) = \exp(O(x) \cdot [\gamma(t - x) - \gamma(t_0 - x)])$ encodes the characteristic mortality levels experienced by different birth-generations after controlling for Age-Period effects, with $O(x)$ acting to decay Birth-Cohort effects, $\gamma(t - x)$, in old age.

Further Sources of Uncertainty in the RMS Longevity Model

Additional uncertainty has been modeled pertaining to the following items:

- *Base mortality rate error*: the base mortality rates, $m(x, t_0)$, are associated with measurement error arising from death count variation and transient mortality effects. Historical volatility in mortality levels has been used to estimate the additional volatility of mortality rates in each cohort not encoded in the path volatility of the Vitagion Category trajectories. This additional volatility is reflected in the base mortality rate error with a coefficient of variation of 0.2% for the United States, 0.4% for Japan and 0.5% for France. Base error between different country-gender cells is assumed to be independent.
- *Birth cohort mortality rate error*: the birth cohort function, $\gamma(t - x)$, is associated with measurement error and the possibility of instability in its forward behavior. For example, population migration could alter the risk composition of a given birth cohort relative to its historically observed level. RMS has encoded this uncertainty by randomly scaling the cohort function uniformly across birth years in each simulation.
- *Birth cohort function in old age*: the decay function for cohort modifications, $O(x)$, is associated with a degree of uncertainty. The precise speed at which birth cohort differentiation will diminish with age is unknown. RMS has added volatility to the progression of the expected decay function via a cumulative noise term modulating the ages at which the decay occurs.
- *Future birth cohort mortality differentiation*: the birth cohort function has been determined from historical data for birth years up to and including 1956. Birth cohort terms after 1956 are regarded as increasingly uncertain, and have been generated in each simulation via an AR(1) projection.

Historical Data

Mortality data used to parameterize the RMS Longevity Model is derived from the primary government Reporting Sources in the respective countries.

- In the U.S., death counts are obtained from the Centers for Disease Control and Prevention (the “CDC”) for the years 1968-2010 (CDC, 2012). RMS obtains mid-year population numbers from the U.S. Census Bureau (U.S. Census Bureau, 2010) for the same period.
- In France, death counts are obtained from the European Commission Eurostat (“Eurostat”) for the years 1986-2012 (Eurostat, 2013), and from the Human Mortality Database (“HMD”) for the years 1960-1985 (HMD, 2012). RMS obtains 1 January population numbers from Eurostat for the same period (Eurostat, 2013). All data is for France Metropolitan (France excluding overseas territories but including Corsica).
- In Japan, death counts are obtained from the Ministry of Health Labor and Welfare Vital Statistics of Japan (Volume 1~3) for the years 2009-2012 (Ministry of Health Labor and Welfare, 2013), and from the Human Mortality Database (“HMD”) for the years 1965-2008 (HMD, 2012). RMS obtains 1 October population numbers from Statistics Japan, the Portal Site of Official Statistics of Japan (Statistics Japan, 2013) for the same period.

RMS INFECTIOUS DISEASE MODEL

Infectious diseases are a leading cause of death worldwide, accounting for a quarter to a third of all mortality. In most industrialized countries, infectious disease ranks after cancer and heart disease as a leading cause of mortality. Despite developments in pharmaceuticals, infectious disease rates are rising due to changes in human behavior, larger and denser cities, increased trade and travel, inappropriate use of antibiotic drugs, and the emergence of new and resurgent pathogens.

The RMS Infectious Disease Model is designed to provide a probabilistic view of the number of deaths that could result from the entire range of possible infectious disease pandemics. RMS uses the latest scientific understanding from the disciplines of virology, epidemiology and mathematical biology and has built two distinct event sets that allow the model to capture the characteristics of both influenza and non-influenza emerging infectious disease pandemics.

The influenza event set, consisting of 2,016 scenarios, and the emerging infectious disease event set, consisting of 2,520 scenarios, represent the potential range of characteristics of a pandemic and likelihood of occurrence. Mortality rates per 5-year age cohort are output for each event and for each modeled country. The RMS Infectious Disease Model is a global pandemic model and assumes global occurrence of disease with mortality rates in each modeled country adjusted to take into account country-specific factors and differences in the underlying health of the population at risk.

Secondary uncertainty represents the uncertainty in the number of fatalities, given that a specific pandemic event has occurred, and is represented in the model output by standard deviations in each event fatality rate.

Influenza

Influenza mortality, which can be highly variable from year to year, is a contributor to the variability in the annual mortality rate of industrialized countries. Influenza is a contagious disease caused by a RNA virus and most often affects the upper airway and lungs of birds and some mammals. It causes seasonal epidemics globally and is a leading cause of infectious disease-related deaths in most countries around the world. In non-pandemic years, influenza typically kills hundreds of thousands of people worldwide. The highest rates of mortality are in the elderly, followed by infants and children. Occasionally, flu rates can reach pandemic proportions across the global population. There have been four influenza pandemics since the beginning of the 20th century, in 1918, 1957, 1968 and 2009; each of these was a result of a major genetic change to the virus.

Influenza's symptoms are typically much more severe than those of the common cold, which is caused by a different virus. Typically, recovery from the flu takes about ten days. According to estimates by the World Health Organization (WHO), between 5% and 15% of the world's population contracts the flu each year, resulting in between 250,000 and 500,000 deaths (WHO, 2009). Each year in the U.S. about 10% to 20% of the population is infected with an influenza virus, around 200,000 are admitted to the hospital for an average of 5.5 days, and about 36,000 people die from influenza (Thompson, Shay, Weintraub, Brammer, Bridges, & Cox, 2004). Healthy individuals can be infected with the influenza virus, and serious life-threatening complications from influenza can arise at any age. Adults aged 65 years and older, patients with underlying medical conditions, and young children (age <5 years) are at greater risk for having complications from influenza infection; pneumonia, bronchitis, sinus, and ear infections are some common examples of such complications.

Emerging Infectious Disease

Although there have been declines in incidence and mortality of many communicable diseases because of advances in medicine and public hygiene, infectious diseases continue to be a major cause of excess mortality, sickness, and disability. The discovery of antibiotics, improved sanitation and hygiene, and effective disease surveillance and childhood vaccination programs have reduced the impact of infectious diseases, especially in the developed world for much of the 20th century, resulting in a false sense of security about the threat of infectious disease outbreaks. However, emerging (newly identified) infectious diseases and re-emerging infectious diseases (known diseases that experience resurgence because of changed host-agent-environment conditions) are continuing to appear and spread geographically in both developed and developing countries, creating challenges for the medical and public health community.

At least thirty emerging or re-emerging non-influenza disease agents, for which no vaccines are available, have been identified in human populations in the last few decades, including human immunodeficiency virus (HIV), viruses causing hemorrhagic fevers such as Ebola and Marburg, *E. coli* O157:H7, and SARS. Some of these outbreaks have been more virulent or drug-resistant forms of known pathogens, such as multidrug- and extensively drug-resistant tuberculosis (MDR TB and XDR TB) and Vancomycin- or Methicillin-resistant *Staphylococcus aureus*.

Infectious disease outbreaks can easily cross borders to threaten economic and regional stability, as has been demonstrated historically by the HIV, 2009 H1N1 influenza, and SARS outbreaks. Emerging diseases, by definition, are not

commonly encountered by physicians and are therefore poised to generate widespread infection and mortality prior to identification of the etiologic agent (e.g. HIV/AIDS). Furthermore, the drug development and approval timeline is often offset from emergence of disease and sufficiently long enough for the initial infection to result in significant mortality. The constant adaptation of microbes, along with their ability to evolve and become resistant to antibacterial and antiviral agents, ensures that infectious diseases will continue to be an ever-present and ever-changing threat.

The 2014-15 Ebola Virus Disease Outbreak in West Africa

The first death from the 2014 Ebola virus disease outbreak in West Africa took place in Guinea in December 2013. It took until the summer of 2014 before the outbreak grew into the largest ever Ebola epidemic, causing almost 22,000 cases and 9,000 reported deaths in the region. In comparison to previous outbreaks, this event has been far larger in terms of sustained human-to-human transmission, number of cases and deaths. The vast majority of cases have occurred in the three countries of Guinea, Liberia and Sierra Leone, with each experiencing approximately 3,400, 9,600 and 11,800 reported cases respectively as at mid-March 2015.

Ebola virus becomes significantly transmissible when a patient becomes symptomatic. Given sufficient resources in primary care and public health medicine, tracing anyone who has made contact with someone that ultimately becomes symptomatic should be possible. The CDC estimated that the epidemic could be halted if at least 70% of contacts were traced. However, in the impacted countries, the number of medical staff during the early days of the epidemic and the summer of 2014 were too few to achieve this, and the epidemic began to show the kind of exponential growth that, unchecked could have an extremely severe mortality impact.

The World Health Organization, NGOs and the governments of a number of western countries invested substantial resources into the region in autumn 2014 to check the exponential growth and to achieve a “tipping point”, where the number of new cases per day began to fall. As of mid-January 2015, the number of new cases in Liberia stood at 8 per week, down from a peak of 509; the number of new cases in Guinea stood at 20 per week, compared to a peak of 292; and cases in Sierra Leone were at 117 per week, reduced from 748 earlier in the crisis.

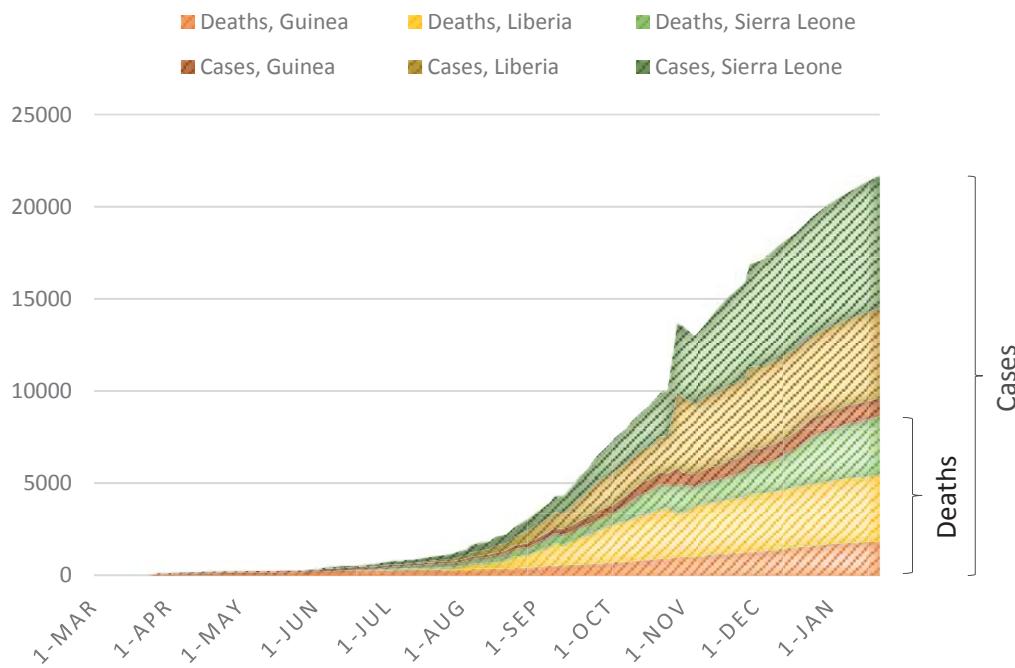


Figure 16: Cumulative Ebola virus deaths and cases in West Africa from the 2014-15 outbreak. The inflection point in the caseload is visible in November 2014

The Covered Area has experienced very few cases in total (5), and as of mid-March there are no reported active (exposed or infected) cases anywhere in the Covered Area. It is also noteworthy that clinical trials of several vaccines are underway. Based on these candidate vaccines' effectiveness in conferring immunity to macaques in pre-clinical trials and some early clinical trials in humans, there is significant hope that vaccines will become available in significant number during 2015.

Model Concept and Structure

The RMS Infectious Disease Model considers risk associated with all infectious diseases. The RMS Infectious Disease Model is a stochastic representation of all the permutations of possible pandemic characteristics contained in two event sets consisting of 4,536 total events, with 2,016 dedicated to flu-specific events. The key variables that form the stochastic model are summarized in the Figure 17 and Figure 18.

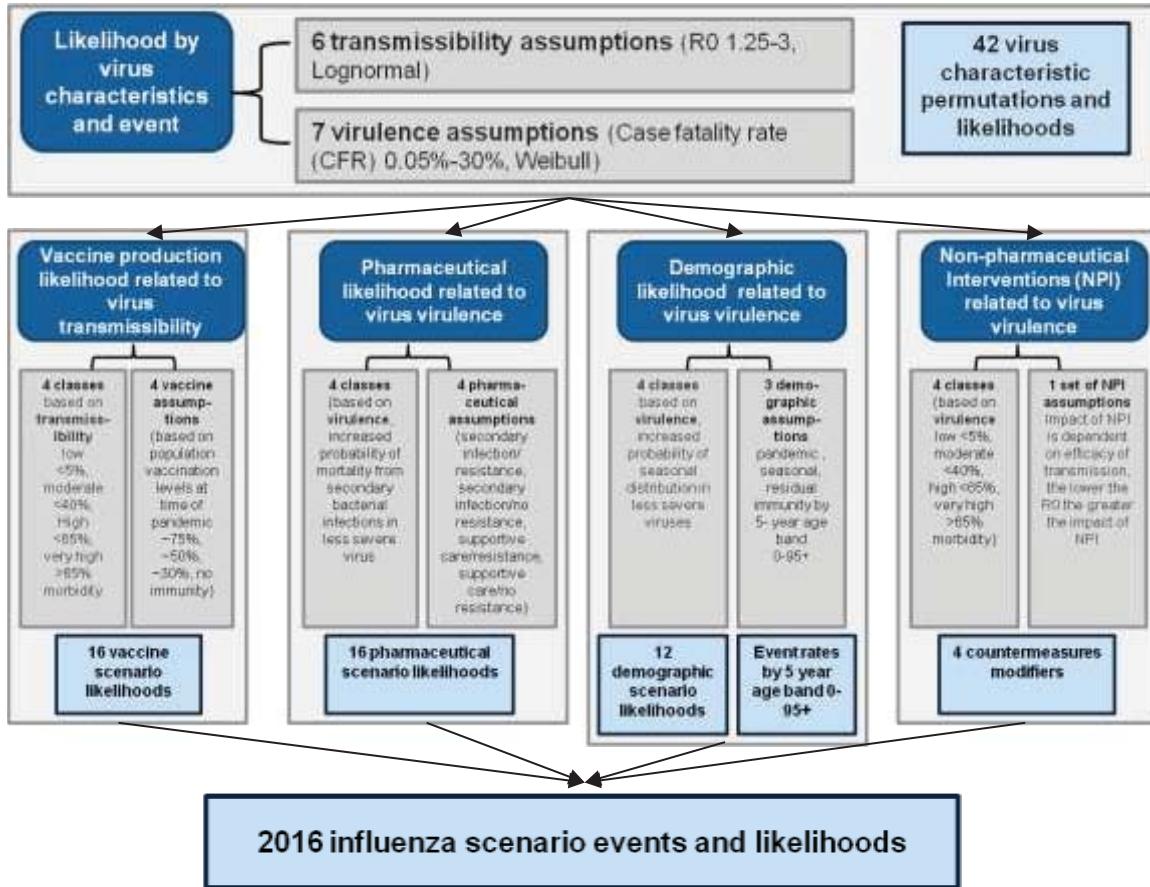


Figure 17: Framework for the RMS Influenza Model

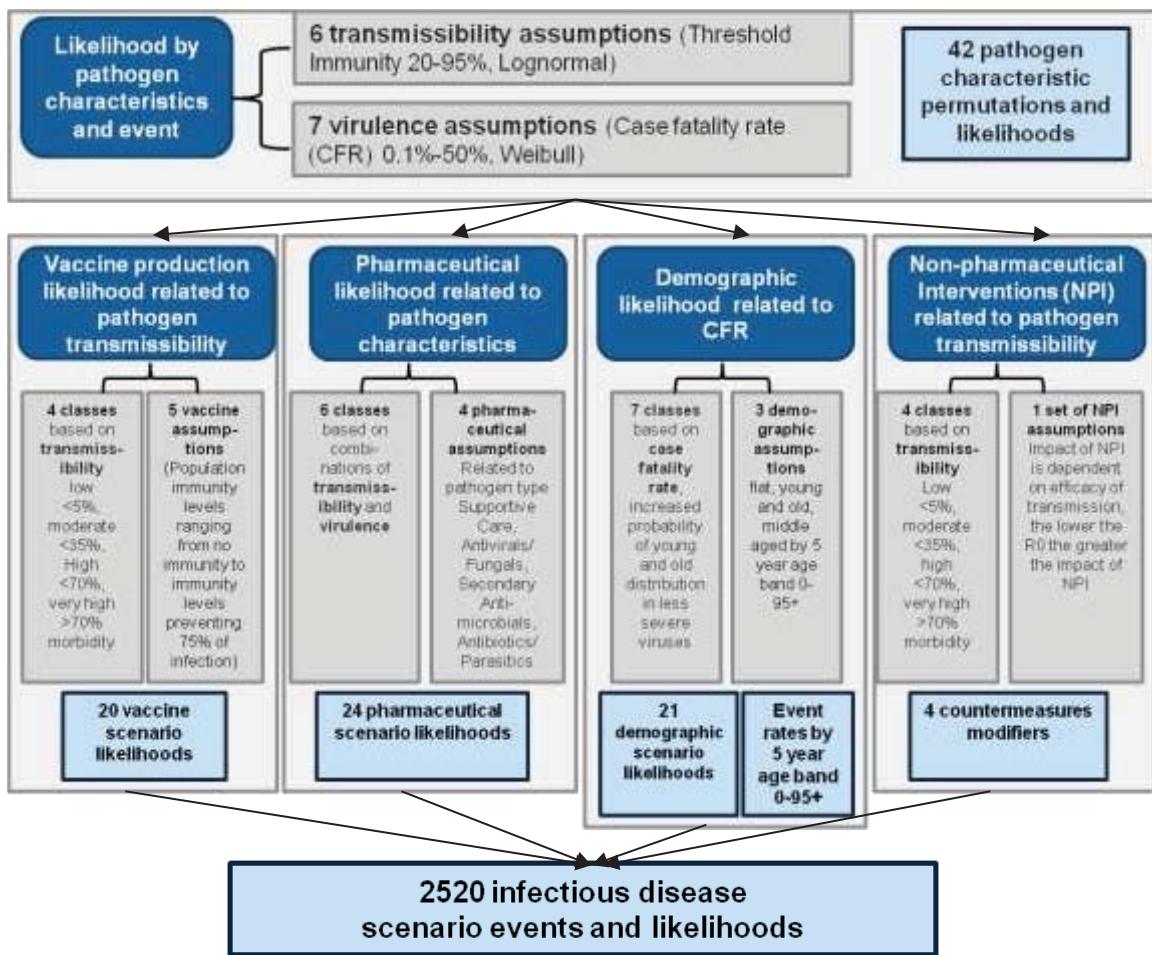


Figure 18: Framework of the RMS Emerging Infectious Disease Model

The explicit modeling of emerging infectious diseases other than influenza represents a significant refinement of the tail risk; while typically less frequent than influenza pandemics, these events are usually more severe. Although influenza could be considered a subset of emerging infectious diseases, RMS believes the influenza virus has distinct characteristics, and our view of risk benefits from a split modeling approach.

The RMS view of influenza risk has been refined based on additional knowledge gained from the emergence of H5N1 avian influenza in human populations and the 2009 H1N1 pandemic. Levels of global preparation, including stockpiling, surveillance, and vaccine manufacturing, have improved since the emergence of H5N1 and 2009 H1N1, and these changes are reflected in the RMS Infectious Disease Model parameters. The 2009 H1N1 pandemic also proved a valuable case study for the rate of global spread of the influenza virus and the demographic distributions of cases and mortality. The body of literature related to influenza has since increased substantially.

SIR Modeling

The morbidity and mortality impact of each pandemic event on the age cohorts of the population affected are modeled using a commonly-used epidemiological approach called a susceptible, infected, and recovered model (**SIR Model**).

The RMS SIR Model computes the theoretical number of people infected with an infectious disease in a closed population over time. This type of modeling is applicable to diseases where an individual that has recovered from the disease is removed from the susceptible population.

In order to derive the equations of the mathematical model, the population of a single region is divided into eight subpopulations: susceptible, vaccinated, exposed, three subsets of infected (untreated, hospitalized, and treated), recovered, and dead.

Figure 19 displays the way the model replicates the dynamics of a pandemic.

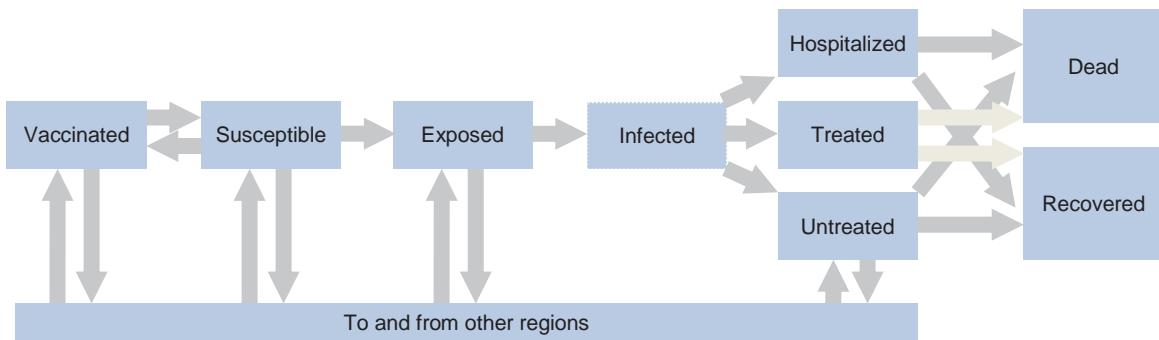


Figure 19: SIR Model

The following assumptions and provisions are included in the RMS SIR Model:

- Possibility of multiple strains
- Illness and deaths from concurrent strains
- No cross-immunity (immunity gained from one strain that gives partial immunity against another)
- Once an individual has survived the virus they are no longer susceptible

The susceptible population is decreased through vaccination and exposure to the virus; conversely, it is increased by the loss of vaccine acquired immunity. Vaccinated individuals are not considered to be completely protected and become exposed at a much lower rate than the susceptible population. Vaccine efficacy can vary over the course of the epidemic. Typically, with an influenza vaccine, a period of time around one month is required after vaccination until the individual has produced sufficient antibodies for the vaccine to be effective. Even after this initial time period, vaccine efficacy will be less than 100 percent, due to varying individual antibody response to vaccine and the possibility of viral mutation or imperfectly-matched vaccine. The model contains different vaccine efficacy assumptions reflected in the scenarios.

After exposure, individuals progress to one of three infected states: untreated, treated, and hospitalized. The proportion of individuals progressing into each category is dependent on viral characteristics. As the virulence of the virus increases, the proportion of the infected receiving treatment also increases. The duration of infectiousness and transmission probabilities are decreased for those receiving treatment. Through this mechanism, the parameters of the model allow for the simulation of behavioral and medical quarantine.

An increase in virulence can result in a reduction of average transmissibility; individuals with a severe virus tend to be too ill to be out in the community transmitting the virus. In addition, those who are receiving treatment or are hospitalized will have reduced contacts and transmissibility due to precautionary measures such as masks, gloves, and isolation. Individuals remain infectious during the entire course of their clinical infection. Once they have progressed out of the infectious state they can no longer transmit the virus to others.

After infection, individuals progress to one of two groups: recovered or dead. The rate at which individuals progress from one of the three infected states (hospitalized, treated, or untreated) to the end states is dependent on virulence and level of treatment during infection. Hospitalized individuals have the highest death rate, followed by treated and untreated cases. Many of the untreated individuals likely have sub-clinical or asymptomatic infections, which reduces death rates despite the fact that some with untreated clinical infections may be more likely to die.

Those individuals progressing to the recovered state are considered to have immunity for the duration of the pandemic. Pandemics tend to come in waves and infect individual areas for short periods of time. It is unlikely that in the case of an influenza pandemic the strain will mutate enough to cause re-infection during a single pandemic wave.

Cross-Country Pandemic Correlation

Correlations in pandemic impacts across countries can be considered as having two components: incidence and severity. RMS models perfect positive correlation ($\rho=1$) for pandemic incidence across countries. By definition, a pandemic is a global event and modern travel patterns ensure the rapid global spread of a novel virus as evidenced by the spread of H1N1 in 2009 to all continents within five weeks. In modeling pandemic severity correlations, RMS takes into account the differentials in age, gender, and geographic region of the impacted populations. Different types of viruses target different age groups and countries can experience different outcomes from the same pandemic due to inherent stochasticity and varying efficacy of countermeasures.

Infectious Disease Model Key Variables

The RMS Infectious Disease Model was built to characterize the risk associated with all infectious diseases. The model is a stochastic representation built around two event sets that capture the full gamut of pandemic characteristics and all possible permutations within the event sets are simulated (4,536 total events with 2,016 dedicated to flu-specific events). This document provides a description of the parameterization of the key variables in the probabilistic model, which are summarized in Figure 20.

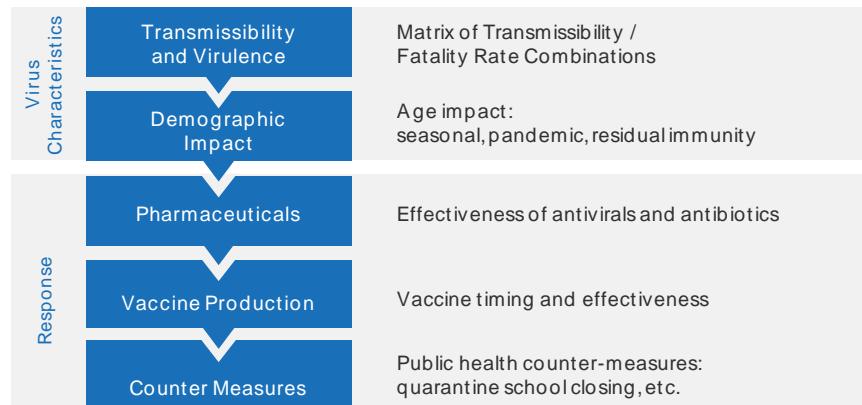


Figure 20: Framework for the RMS Infection Disease Model

Pandemic Frequency

Influenza

Viral mutation is a random process and the occurrence of a previous event does not mean a next event is more or less likely to occur. The model assesses the likelihood of the occurrence of a new communicable influenza virus that crosses national boundaries within a 12-month period and is parameterized for each year of the calendar.

Historically, a frequency of 11 pandemics in the last 300 years, 7 pandemics in the last 200 years or 3.6 influenza pandemics per century is consistent with a “best estimate” of long-term pandemic occurrence. Although, earliest reports of influenza pandemics date back several thousand years, they are not included in the frequency estimate as underreporting of influenza pandemics or misclassification of influenza pandemics as other illnesses was likely before the mechanism was understood. For this reason the last several hundred years are weighted more heavily when parameterizing the frequency and, although there is some evidence that there may be periods with higher influenza pandemic frequency, there is no reason to believe that long-term frequency is materially different now than it has been historically.

History of Influenza Epidemics

There have been five influenza pandemics in the past 120 years (1889, 1918, 1957, 1968, and 2009), where a novel virus circulated through the population in non-seasonal patterns, causing excess mortality. The most severe of these was the 1918-1919 “Spanish Flu” pandemic, where influenza mortality reached as high as thirty-five times the yearly average.

Table 2: Historical Influenza Pandemics (Taubenberger & Morens, 2009)

Year(s)
1510
1557-1558
1580
1729-1730, 1732-1733
1761-1762
1780-1782
1788-1790
1830-1831, 1832-1833, 1836-1837
1889-1893
1918-1919
1957-1958
1968
1977-1978 (not considered “true” pandemic)
2009 H1N1

Pandemics before the 20th Century

Earliest reports of influenza epidemics date back to Hippocrates around 412 BC. In the Middle-Ages infectious disease epidemics were common, many of which were probably influenza. In 1580, a particularly severe pandemic struck Africa, Europe, and the Americas. Death rates were high; over 10 percent of the population of Rome was killed and many Spanish cities were decimated (Beveridge, 1978).

In the past three centuries, ten pandemics have been recorded at intervals of 3 to 49 years with an average of 24 years. During the 17th century, localized epidemics were reported, and in the 18th century at least three pandemics occurred in 1729, 1732, and 1781. Three influenza pandemics also occurred during the 19th century in 1830, 1833, and 1889. The 1889 pandemic, known as the Russian Flu, began in Russia and spread rapidly throughout Europe. It reached North America in December 1889 and spread to Latin America and Asia in February 1890. It is estimated that around 1 million people died in this pandemic.

Pandemics of the 20th Century

In the last century three pandemics took place, in 1918, 1957, and 1968. Owing to advances in molecular biology in the 20th century, influenza viruses are now classified by subtypes such as H1N1, where the ‘H’ indicates the class of hemagglutinin protein and the ‘N’ indicates the class of neuraminidase protein. These proteins are critical for the infection process of influenza. The twentieth century pandemics were caused by the H1, H2, and H3 subtypes. It is not known if other subtypes caused historical pandemics, but since subtyping began no evidence of person-to-person transmission of influenza has been detected for any subtypes other than H1, H2, and H3. The three 20th-century pandemics caused mortality rates of thirty-five times, four times, and two times the influenza mortality rate seen in normal years in developed countries.

1918-19 “Spanish Flu” Pandemic: First Pandemic of the 20th Century

With over one third of the world’s population infected and 50 million deaths worldwide, the most disastrous pandemic of the twentieth century was the global 1918-19 “Spanish Flu” pandemic. It is estimated that between 500,000 and 650,000 Americans died in the 1918 pandemic, which was ~0.6% of the 105 million population at that time (CDC, 2006; U.S.

Department of Health and Human Services, 2009). Mortality rates in France and Japan were comparable to the U.S., at ~0.7% (Ansart *et al.*, 2009; Johnson & Mueller, 2002).

The virus traveled globally and no country was free of cases. The speed of transmission of the epidemic contributed to its disastrous consequences. HIV/AIDS took 25 years to kill 25 million people, a benchmark the 1918 pandemic probably reached in the first 25 weeks.

While the origin of the 1918 pandemic is not fully understood, it is clear that the virus was novel to humans and was most likely the result of a genetic reassortment of an avian-like H1N1 virus (Taubenberger, Reid, *et al.*, 2005; Reid, Taubenberger & Fanning, 2004). Reassortment is a naturally occurring process by which different strains of influenza exchange genetic material and a resulting hybrid strain emerges. The 1918 pandemic caused three notable waves of excess mortality. The first (and smallest) was in the summer of 1918, a time of year that typically has few influenza deaths. The main wave peaked around November of 1918, and the final wave occurred in February and March of 1919. All continents were hit simultaneously by each wave, which further demonstrates the high transmissibility of the virus (Jordan, 1927).

A noteworthy feature of the 1918 pandemic was the elevated case-fatality in the young and middle aged. The excessive production of cytokines, a common class of immune system molecules, in the young and healthy is thought to be a significant contributing factor to the high mortality rate in young adults. This phenomenon is often labeled a "cytokine storm" and can be thought of as the immune system overreacting and resulting in toxicity to an individual. The table below displays the age/gender cohort mortality rates attributable to influenza and pneumonia in 1917 and 1918 in the U.S., and estimated excess deaths caused by the 1918 pandemic calculated as the difference between 1917 and 1918 influenza mortality rates (CDC, 2009). The age mortality impact of the virus can be seen in the increased proportion of deaths in the 15-44 age range when compared to flu deaths in 1917. There was a reduction in fatalities in those older than 75, which suggests that the presence of the H1N1 pandemic virus displaced seasonal flu strains from circulation, resulting in fewer flu-related deaths in the elderly.

Table 3: U.S. Influenza and Pneumonia Mortality Rates by Age Cohort for the 1918 Pandemic (CDC, 2009). The unit is number of deaths per 100,000 people.

Age	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
1917	1474.5	211.5	24.0	38.9	59.3	98.1	148.8	281.4	614.6	1503	3,187.4
1918	2273.3	718.0	176.2	580.5	992.6	554.8	347.8	381.9	646.3	1179	2,230.6
Excess in 1918	798.8	506.5	152.2	541.6	933.3	456.7	199.0	100.5	31.7	-324.0	-956.8

In most places the 1918 H1N1 virus infected less than one third of the population and killed a fraction of those infected; however there were towns in which the entire population was wiped out. The table below shows the U.S. cities with the highest influenza and pneumonia mortality rates during 1918.

Table 4: U.S. Excess Mortality Rates by City for the 1918-19 Influenza Pandemic (Markel et al., 2007). The unit is number of deaths per 100,000 people.

City	State	Excess Pneumonia and Influenza Mortality Rates
Pittsburgh	PA	806.8
Philadelphia	PA	748.4
New Orleans	LA	734.0
Boston	MA	710.0
San Francisco	CA	672.7
Worcester	MA	654.7
Denver	CO	630.9
Fall River	MA	621.3
Nashville	TN	610.4
Washington	DC	607.6

1957 “Asian Flu” Pandemic: Second Pandemic of the 20th Century

The 1957 “Asian Flu” pandemic caused an estimated one million deaths worldwide, with 60,000 in the United States, 30,000 in France and 8,000 in Japan (Viboud, Tam et al., 2006; Mulder, 1960; Reichert et al., 2001; French Ministry of Health, 2011). The pandemic occurred in two waves. During the first wave, the highest caseloads were seen in schoolchildren who transmitted the virus among each other and brought it home to their families. A second wave occurred in January and February of 1958, which struck the hitherto unaffected elderly population.

Table 5: U.S. Influenza and Pneumonia Mortality Rates by Age Cohort for the 1957 Pandemic (CDC, 2009). The unit is number of deaths per 100,000 people.

Age	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
1956	225.3	15.3	2.3	2.4	3.0	7.0	14.0	30.4	80.6	258.0	853.5
1957	239.9	18.3	3.8	5.5	5.6	10.2	20.6	44.3	106.9	298.6	979.8
Excess in 1957	14.6	3.0	1.5	3.1	2.6	3.2	6.6	13.9	26.3	40.6	126.3

1968 “Hong Kong Flu” Pandemic: Third Pandemic of the 20th Century

The 1968 “Hong Kong Flu” Pandemic was responsible for around one million deaths worldwide, including 40,000 in the U.S., 21,000 in France and 17,000 in Japan (Viboud, Grais, et al., 2005). To that extent, it was milder than both the 1918 and 1957 pandemics. The virus was first identified in Hong Kong in early 1968, and spread across the globe over the following two winters, with mortality peaking in the U.S. in the first pandemic season of 1968/1969. The second pandemic season of 1969/1970 was much more severe in Europe and Asia.

Table 6: U.S. Influenza and Pneumonia Mortality Rates by Age Cohort for the 1968 Pandemic (CDC, 2009). The unit is number of deaths per 100,000 people.

Age	≤1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
1967	165.7	9.5	1.7	2.3	3.2	7.1	14.4	29.3	82.3	276.7	961.3
1968	234.9	9.9	1.8	2.8	4.4	9.3	19.9	41.9	106.0	330.7	1167.8
Excess in 1968	69.2	0.4	0.1	0.5	1.2	2.2	5.5	12.6	23.7	54.0	206.5

Table 7 summarizes the three pandemics of the twentieth century and their impacts on France, Japan and the U.S..

Table 7: Influenza Pandemics of the 20th Century: Impact in France, Japan and the U.S.

Date	Strain	Estimated Deaths	Comments*
1918-19 (Spanish Flu)	H1N1	U.S.: 600,000 France: 237,500 Japan: 390,000	Global mortality may have been as high as 100 million. The first outbreak was in military barracks in the U.S.. Virus spread between the U.S. and Europe first (with troops) before reaching Africa and Asia. Majority of deaths between 15 and 35 explains shift in population age pyramid.
1957-58 (Asian Flu)	H2N2	U.S.: 60,000 France: 30,000 Japan: 8,000	The virus was first identified in China. The WHO estimated that as many as two million people died worldwide.
1968-69 (Hong Kong Flu)	H3N2	U.S.: 40,000 France: 21,000 Japan: 17,000	The death rate from this pandemic may have been lower because the strain had a shift in the hemagglutinin (H) antigen only and not in the neuraminidase (N) antigen. Improved medical care and antibiotics that are more effective for secondary bacterial infections were available for those who became ill.

*All three pandemics were characterized by a shift in age distribution of deaths to younger population under age 65, at least initially; shift was particularly dramatic during 1918 pandemic (Britten, 2009; Simonsen, Clarke, et al., 1998; BBC, 2005).

Despite pandemic scares in New Jersey in 1976 (Swine flu), worldwide in 1977 (Russian Flu), and in Hong Kong in 1997 (Avian flu), there were no major pandemics in the 20th century after the 1968 Hong Kong flu.

Pandemics of the 21st Century: 2009 Novel A/H1N1 “Swine Flu” Pandemic

May 2009 saw the emergence from Mexico of a new H1N1 virus capable of human-to-human transmission. The 2009 pandemic H1N1 virus was a novel type of influenza, known commonly as “swine flu” due to its close association with North American and Eurasian pig influenza. Highly transmissible, yet ultimately mild, it rapidly spread around the world, infecting 74 different countries in all six continents within five weeks. The rate of spread of the pandemic was far more rapid than previously observed, enabled by high volumes of international air traffic. The WHO declared a pandemic on June 11, 2009. It ultimately reached more than 200 countries and infected hundreds of millions of people.

The 2009 pandemic H1N1 virus exhibited several unusual characteristics, starting with its emergence in spring in Mexico and continued transmission throughout the summer. Flu viruses usually show a preference for temperate climates and have strong seasonality. It also exhibited an unusual age demographic, with a higher than average death toll in the young and healthy and low mortality amongst the elderly. There is some evidence that older people had pre-existing or residual immunity from contact with a previous virus (Xing & Cardona, 2009).

Despite initial fears, H1N1 had the lowest virulence characteristics of any previously measured pandemic influenza virus. Although pharmaceutical advances, efficient public health measures, and pre-existing levels of immunity reduced the impacts

from this event, the low number of fatalities was predominantly the result of the genetic characteristics of the virus. The initial outbreak in Mexico had a higher case fatality rate, on the order of a percentage point, than that observed once pandemic status was reached (Presanis A.M., De Angelis D., Hagy A., Reed C., Riley S., et al , 2009). This is likely due in part to the low seasonal flu immunity of the Mexican population and poor public health infrastructure as well as possible changes in the characteristics of the virus. In June 2010 the WHO reported over 18,000 confirmed fatalities from H1N1.

The high mortality rate in working age populations rather than in the young and elderly is unexpected for a flu virus with low virulence and has led to a reassessment of insured risk in mild and moderate pandemics. In the summer of 2009, RMS developed a 2009 Novel A/H1N1-specific model, in order to forecast the dynamics of the unfolding pandemic and its impacts. The global transmission of the virus, vaccine production and efficacy of vaccines, pharmaceuticals, and countermeasures all fell within best estimates of the RMS Novel A/H1N1 Model, which appeared to validate the modeling approach. Pandemic 2009 H1N1 is now incorporated into the RMS Infectious Disease Model event set, as it is no longer considered an event in progress. The table below summarizes RMS modeled values compared to CDC estimates for the working age population:

**Table 8: 2009 H1N1 Influenza Pandemic Estimates for the Working Age Population
(modeled by RMS and estimated by the CDC as of April 10, 2010 (CDC, 2010))**

RMS Modeled Expected Value	CDC Lower Bound	CDC Upper Bound
Fatalities		
13,500	6,800	14,000
Hospitalizations		
156,000	114,000	235,000
Cases		
37,000,000	25,000,000	52,000,000

As of August 2010, the WHO has removed the H1N1 influenza virus from Pandemic Alert phase 6 and it is now considered to be in the post-pandemic period. A mutation of the virus into a more virulent form would be necessary for H1N1 to be of concern and this would represent a separate event in the view of RMS. The 2009 H1N1 virus has continued to circulate as a seasonal flu strain since the 2009 pandemic.

H5N1: Potential pandemic virus

H5N1 is a subtype of the influenza A virus, commonly called avian influenza or bird flu. Currently, it is a worldwide epizootic affecting birds and other animal species. There have been cases of H5N1 transmission to humans, but there is currently only one published case of probable secondary human transmission and no evidence of sustained human-to-human transmission. H5N1 has shown to be an extremely virulent virus in both avian and human populations. The case fatality rate in human cases has been reported to be nearly 60 percent. Seasonal flu viruses typically infect cells in the throat, nose, and upper respiratory tract by attaching to cellular receptors. A unique feature seen in H5N1 patients is the involvement of the lower respiratory tract early in the illness and the ability of the H5N1 virus to attach to receptors found in deep lung tissue. This may help explain the severity of illness caused by H5N1 and also may help to explain why there is currently only limited human-to-human transmission as receptors found on cells lining the lower respiratory tract differ from those on cells lining the upper respiratory tract.

Since 1997, when H5N1 began causing illness in humans, the virus has undergone significant genetic changes. Sequencing of the HA gene of the 2005 human H5N1 viruses revealed antigenic differences between circulating strains (Chen, Smith, & Li, 2006). In all likelihood, increased H5N1 circulation and contact with circulating human strains will lead to greater probability of reassortment or mutation into a human-to-human transmissible strain. For this reason extensive surveillance efforts are being undertaken by public health organizations worldwide. However, recent virology research suggests that H5N1 will require significant further adaptation to become human-to-human transmissible and that the process is very complex.

Two controversial H5N1 research studies presented in winter 2011/2012 highlighted the potential threat of a laboratory-created pandemic. Ron Fouchier at the Erasmus Medical Center in Rotterdam and Yoshihiro Kawaoka at the University of Wisconsin independently created strains of laboratory-modified H5N1 avian influenza viruses to study their transmissibility in ferrets, in efforts to understand how the H5N1 avian flu virus could mutate to become more transmissible in humans.

Debate by the scientific community prompted by these studies has also highlighted and provided estimates of the probabilities for a new mechanism for a pandemic occurrence – the accidental or intentional escape of an engineered virus from a research laboratory.

RMS believes that if H5N1 mutates into a human-to-human transmissible form there is a high likelihood of it having higher virulence than circulating strains of seasonal flu. While the likelihood of mutation to a more transmissible and more virulent virus is unknown, this probability is reflected in the model via the uncertainty around the disease's transmissibility and virulence distribution. To this extent, the model currently contains the probability that a variation on the currently circulating H5N1 strain could be the next major pandemic.

Emerging Infectious Disease

Historical occurrence rates suggest that pandemics caused by infectious diseases other than influenza, such as bubonic plague, smallpox, measles and HIV/AIDS, occur on approximately a 1 in 100-year basis. Examples include the HIV/AIDS pandemic of the 20th century, the Cholera pandemics of the 19th century and the Yellow Fever epidemics in the U.S. in the 18th century. There is a substantial historical record reaching back as far as the Plague of Athens in the 5th century BC and the Antonine Plague in the 2nd century (Table 9). The choice of appropriate frequency can affect the excess mortality results for a typical insured population by roughly 20-30%.

The frequency of pandemics is dependent on the rate at which new infectious diseases are emerging into populations lacking immunity. The rate of infectious disease emergence is in turn dependent on many genetic, biological, social, economic and environmental factors.

Table 9: Historical Emerging Infectious Disease Pandemics

Century	Year(s)	Name	Disease or pathogen
5th BC	430 BC	Plague of Athens	Typhoid/Typhus/Plague/Measles*
2nd	165-180	Antonine Plague	Smallpox/measles*
3rd	251-266	Plague of Cyprian	Smallpox/measles*
6th-8th	541-750	Plague of Justinian	Bubonic plague
7th	639	Plague of Emmaus/Amwas	Bubonic plague*
14th	1347-1350	Black Death	Bubonic plague
15th	1489	Spanish Siege of Moorish Granada	Typhus
	1577-1579	Black Assize	Typhus
	1500-1800	Typhus epidemics throughout Europe	Typhus
16th		Smallpox appearance in Europe, spread with colonization	Smallpox
17th	1629-1631	Italian plague/Great Plague of Milan	Bubonic plague
	1665-1666	Great plague of London	Bubonic plague
	1679	Great plague of Vienna	Bubonic plague
18th	1775-1782	North American smallpox	Smallpox
18th	1793; 1890-1878	Yellow fever, U.S.	Yellow fever
19th-20th	1816-1824	First/Asiatic Cholera Pandemic	Cholera
	1826-1837	Second Cholera Pandemic	Cholera
	1846-1863	Third Cholera Pandemic	Cholera
	1863-1875	Fourth Cholera Pandemic	Cholera
	1881-1896	Fifth Cholera Pandemic	Cholera
	1899-1923	Sixth Cholera Pandemic	Cholera
	1962-1966	Seventh/El Tor Cholera Pandemic	Cholera
19th-20th	1855-1959	Third Pandemic	Bubonic plague
20th	1918-1922	Russian Typhus Epidemic	Typhus
20th-21st	1981-present	HIV/AIDS	HIV/AIDS

*Note, that in these cases, the identity of the etiological agent is disputed or uncertain

More than 30 infectious diseases with no population immunity or available vaccine have emerged in the past 20 years (Morens, Taubenberger, Fauci, 2008) and more than 335 new or re-emerging pathogens have been known to cause human disease between 1940 and 2004 (Jones, Patel, *et al.*, 2008). The majority of these disease events are bacterial or viral in etiology. The emergence of drug-resistant bacterial diseases is of significant concern. This corresponds to the global increase in the use (and overuse) of a limited range of anti-microbial drugs.

Emerging infectious diseases are often split into three subgroups: newly emerging, re-emerging and deliberately emerging. Re-emerging diseases are those which have been seen before. However, because there has been a decrease in

the population level immunity, the disease is able to return to epidemic levels. Deliberate emerging infectious diseases include acts of bioterrorism, such as the 2001 U.S. anthrax attacks.

Once an emerging infectious disease is introduced into the population, the characteristics of the pathogen, level of population immunity, extent of public health response and pharmaceutical availability and effectiveness will determine whether it can reach pandemic levels.

Emerging diseases have been identified at a rate of at least one a year since the 1970s, and approximately one emergent disease per century results in excess mortality across different age groups from widespread outbreaks. Some historical non-influenza pandemics include the Black Death in the 14th century (estimated to have killed more than a third of Europe's population), typhus in the 14th century, and smallpox in the 16th century. Six cholera pandemics in the 19th century killed millions across Europe, Africa, and the Americas.

HIV/AIDS

In the 1980s, a new disease became recognized after sudden increases in a rare cancer were discovered in otherwise healthy men. Acquired immunodeficiency syndrome (AIDS) soon became recognized as a killer, and was traced to the human immunodeficiency virus (HIV). Transmission of the virus through sex, communal drug use, and blood transfusion led to a rapid increase of AIDS cases. The full extent of the epidemic was not initially recognized, as the disease at first seemed to affect only subgroups of the population. A 1985 public health campaign recognized that there was a huge hidden case load, but predicted that 150,000 Americans were infected with AIDS, a considerable underestimation. The development of new drugs and lifestyle changes ultimately made the disease more manageable and brought down mortality rates. New AIDS cases began to decline in 1994 and deaths began declining two years later. Even with dramatic advances in antiretroviral therapies, the HIV pandemic is still in progress, with an estimated 33 million people living with HIV globally and estimates of over 2 million people dying with AIDS per year. In the U.S., more than 1 million people live with HIV and nearly 15,000 die with AIDS per year (CDC, 2007).

SARS

The 2002/2003 SARS epidemic lasted less than 9 months with a total caseload of only 8,096 people, of which 775 died. Stringent quarantine measures and low transmissibility (relative to influenza) helped to contain the epidemic. However the speed at which the cases appeared across Asia and the world caused a global crisis. Despite the significant economic impact SARS had on the worldwide economy its transmissibility is relatively low, preventing widespread infection.

Variant Creutzfeldt-Jakob Disease

In May of 1995, 19-year old Stephen Churchill of Wiltshire, U.K. was the first person to die of a rare degenerative central nervous system disorder that causes brain tissue to appear spongy. Prior to this case, Creutzfeldt-Jakob Disease (CJD) was only reported as occurring in people over the age of 50. The new form of CJD that Churchill acquired was named variant CJD (vCJD). After more deaths in people from this new variant form of CJD, scientists learned that vCJD affected mostly younger patients (median age of onset 28 years), and was linked to eating meat contaminated with the prion pathogen causing bovine spongiform encephalopathy (BSE, commonly known as "mad cow disease"). It is believed that modern industrial food processing practices facilitated the transmission of BSE in cattle to humans as a food-borne disease. The vCJD epidemic in the U.K. peaked around 1999-2000, but currently there is still not yet a cure for vCJD or any consistently reliable therapy to stop the disease from progressing. The first known case of BSE in cattle in the U.S. was identified in 2003. There have been 3 fatal cases of vCJD (with onsets of symptoms ranging from 2001-2006) in the U.S., but there is evidence to suggest that these cases were exposed to the BSE agent in the U.K. and Saudi Arabia (CDC, 2010a). Uncertainty remains about whether or not there are people who have been infected with vCJD but will not show symptoms until many years later.

Pathogen Characteristics

Infectious disease pathogens are constantly undergoing genetic change, resulting in new strains of disease that are immune to standard treatments or that have more effective transmission. Mutation processes and rates of mutation are the subject of extensive medical research. Viruses, in particular, are exceptionally adaptable organisms. The process of virus mutation may result in the pathogen jumping hosts (between different animal species) or causing a greater threat to humans due to an increased degree of contagion and/or lethality. Bacterial mutations have resulted in the spread of many novel antimicrobial-resistant strains.

The transmissibility and virulence of an infectious disease pathogen are key parameters in modeling the scale of the overall loss of life during a pandemic event. The transmissibility (or infectiousness) represents the speed at which a pandemic will spread within a population and the total number of people that will be infected. The virulence of a pathogen is measured in terms of its case-fatality rate (CFR).

When CFR is high, it restricts the rate of spread of the disease, because the dead and debilitated are not effective transmitters of the disease. The worst-case pandemic scenario is an infectious disease for which a subset of the population suffers very high death rates when it is infected, and another subset (or additional animal host or vector) has high infection rates but does not suffer greatly from the disease. In this case, the disease can be continuously spread to the susceptible population subset. This type of spread was seen with the Black Plague in Europe where fleas were unaffected by the virus and continued to spread the disease despite the high mortality level in humans.

Influenza

There are several subtypes of influenza A, named according to their surface proteins (e.g., H1N1, H5N1, or H3N2). The "H" stands for hemagglutinin, which allows the virus to bind to and enter the infected cell. The "N" stands for neuraminidase, and is responsible for progeny release within the infected cell. Antigenic variation is the evolutionary mechanism by which viruses evade host immune systems. Influenza viruses accomplish this through minor, incremental genetic changes (i.e., "antigenic drift"), as well as through major genetic alterations (i.e., "antigenic shift"). Antigenic drift specifically refers to frequent, discrete mutations that occur within the genes (e.g., the hemagglutinin or neuraminidase genes) of a given influenza subtype, leading to new strains that escape host immune surveillance. These new strains drive the need to produce annual seasonal flu vaccines. Antigenic shift, on the other hand, refers to the exchange of whole genetic segments between different flu viruses, sometimes resulting in the introduction of novel, transmissible viral subtypes to the immunologically naïve (i.e., lacking protective antibodies) human population. Antigenic shift events are the cause of global pandemics. Epidemiological models can simulate general patterns of sickness and mortality caused by both types of antigenic variations.

Antigenic drift works by natural selection. Over time, a virus evolves into a new strain with novel characteristics, such as drug resistance, increased transmissibility, or increased virulence. This process typically involves trade-offs such that the overall characteristics of the resulting virus are rarely significantly different from existing strains. Evolutionary drift occurs at a rapid rate; as a result, humans are unlikely to develop immunity to all influenza viruses and influenza vaccines will only be effective against a limited number of strains over a short period of time.

Antigenic shift occurs when distinct flu viruses co-infect the same host and mix their genetic material. This process of reassortment produces novel virus subtypes—some of which may be particularly virulent and easily transmissible between humans. Reassortment may occur in animal intermediates or reservoirs, such as birds or pigs, which transmit the reassorted viruses to humans in close contact with the animals, such as farmers or butchers. Reassortment may also occur in humans, when a bird or swine flu virus directly "jumps" to a person already infected with a human influenza virus. Unlike advantageous single mutations that are selected for over time, reassortment is an instantaneous process that facilitates dramatic changes in influenza properties, with potentially devastating consequences to naïve human populations.

International surveillance of influenza activity is coordinated by the Global Influenza Surveillance Network of the WHO. Major objectives of the WHO Global Influenza Surveillance Network include the selection of strains included each year in influenza vaccines, as well as the tracking of new influenza strains before they become established in human populations.

Influenza most often reaches peak incidence in winter, resulting in two flu seasons globally – one in the northern and one in the southern hemisphere. There is no explanation or model that fully explains seasonality, but there are a number of theories and studies. The difference in flu trends between the tropics and temperate regions can elucidate some of the potential differences. Aspects of temperate climates, particularly low levels of sunlight, low humidity (as is often the case in indoor heated environments), and cold temperatures, favor virus survival. In addition, crowding increases seasonal susceptibility of people. In the tropics there tends to be low levels of transmission throughout the year, with no strong seasonality. The lull in the warm season allows the virus to mutate (in the opposite hemisphere) so that it is quantifiably different and the population does not have immunity from the previous season's virus.

Once reassortment or mutation has occurred, the characteristics of the new virus will only be known once a pandemic is underway and several clusters of cases have been confirmed and observed. The infectiousness of influenza is measured by R_0 , the Initial Reproductive Number. This is the basic reproductive rate, or the mean number of secondary cases an infectious case will cause in a population without immunity and without intervention. R_0 must be >1 for an epidemic to occur.

The 2,016 influenza scenarios in the model are initially parameterized by 42 combinations of R_0 (6 transmissibility assumptions, R_0 1.25-3) and CFR (7 virulence assumptions, CFR 0.05%-30%) based on transmissibility and CFR data from historical pandemics (Lipsitch, et al., 2009; Taubenberger & Morens, 2009). The mean value of R_0 in the model is 2.0 with a 90% probability that the R_0 will be between 1.5 and 3.0. Observed historical pandemics have exhibited R_0 s of between 1.75 and 2.25. The virulence of the influenza virus is measured in terms of its CFR. The average base CFR without intervention is ~0.85%, with a 1 in 7 chance that the CFR will equal or exceed that of the 1918 pandemic strain, consistent with the historical record.

Emerging Infectious Disease

R_0 , or the mean number of secondary cases an infectious case will cause in a mostly susceptible population without intervention, is sufficient in the comparison of human-to-human transmissible illness, but not all other infectious diseases can

be measured in this way. For this reason, the immunity threshold, or the minimum population level immunity required to prevent an epidemic, is used to compare the transmissibility of other infectious disease, including vector- or water-borne diseases (such as *E. coli*, dengue hemorrhagic fever, or cholera). The infectiousness of emerging infectious diseases is parameterized in the model as the immunity threshold (IT) value, or proportion of the population that must be immunized or have prior immunity to stem infectious disease transmission.

The term threshold (or herd) immunity has been used by various authors in the epidemiologic literature (Nishiura, 2007; John, 2000). It can be defined as the proportion of subjects with immunity in a given population and can include the indirect protection observed from the reduction of infection or disease. The herd effect applies to immunization or any other health interventions which reduce probability of transmission human to human, or via a vector. It can be very loosely related to R_0 with the formula as $P_c > 1 - 1/R_0$ only when the diseases have a similar natural history (latency period, incubation period, etc) and usually only in the case of vaccine as a specific intervention, but that is an oversimplification.

The use of immunity threshold in the RMS Infectious Disease Model is tied to the existing epidemiologic literature and therefore accounts for pathogen natural history. Immunity threshold is not modeled explicitly in the SIR Model, rather the viral characteristics (such as latency period, infectious time, probability of infection per contact, etc.) for a specific infectious disease with published threshold immunity levels is modeled deterministically.

The threshold immunity infection and mortality rates are designed to cover the entire spectrum of emerging infectious diseases with pandemic potential. Therefore, pathogens that are point sources are assigned to the lowest categories as interventions reduce the population transmission potential. For diseases like measles and smallpox the threshold immunity was determined primarily by studies of vaccination rates. The assignment of threshold immunity is used to feed into the probabilistic component of the model and it is key to determining the probabilities and calibrating against historical events. The choice of immunity threshold to describe transmissibility is helpful in relating the epidemiologic literature and observed historical events to the probabilities.

The 2,520 infectious disease scenarios in the model are initially parameterized by 42 combinations of IT (6 transmissibility assumptions, from threshold immunity of 20-95) and CFR (7 virulence assumptions, with CFRs from 0.1%-50%), using data from historical non-influenza pandemics. A base IT value of slightly greater than 50 is used in the model, with a greater than 15% chance the IT exceeds 85. In the model, the CFR has a base rate of ~5%, with a greater than 15% chance it will exceed 10%.

Vaccines

A main concern about pandemics is that a new influenza virus or emergent pathogen exploits lack of immunity in human populations to spread. Disease immunity can be achieved passively or actively. Passive immunity is achieved when a person is given antibodies without their immune system actually producing them; this can occur when a mother passes antibodies to her baby. Active immunity is achieved when exposure to a particular disease pathogen causes a person's immune system to produce disease-specific antibodies that allow the immune system to recognize and destroy the pathogen. Exposure to the pathogen can be from infection with the disease or from vaccination. Vaccines are preparations of weakened or killed pathogen. They can be used prophylactically, to prevent disease, or in some cases therapeutically, to treat disease.

There are four vaccine types licensed for human use: live, attenuated organisms, killed or inactivated organisms, and less commonly, subunit vaccines and vaccines with partially purified components.

Live, attenuated organism vaccines contain viruses with disabled virulence properties that can still induce an immune response in humans. An example is the smallpox vaccine, which contained a live bovine poxvirus that was similar to the smallpox virus, yet unable to cause human disease. This vaccine was the first developed for widespread use and opened the door for vaccines against other viral and bacterial pathogens. The ability to target antigens, signal the immune system and successfully deliver the antigen and adjuvant make vaccines constructed from live, attenuated viruses very effective at inducing immunity. In addition to their effectiveness, culture techniques yielding high doses make manufacturing effective and cost efficient. However, the risk of reversion to virulence limits vaccine progress against some chronic infections.

Killed or inactivated vaccines contain previously virulent organisms that have been destroyed. When an organism can be inactivated without damaging the antigens, the use of killed or inactivated organisms is appropriate for vaccine production. Because killed vaccines cannot replicate *in vivo*, they are administered with an adjuvant.

Manufacturing techniques are similar for live and inactivated vaccines, but killed vaccines contain less cellular components and can be highly purified.

Less frequently, vaccines are constructed from inactivated toxic compounds or subunits, rather than full live or inactivated organisms. For example, the Hepatitis B vaccine is made up of the virus' surface proteins and is produced using a recombinant vector, meaning the gene of interest is inserted into plasmid DNA, grown in yeast and incorporated, with new purified proteins, into the vaccine. This technique has various methods of delivery, is conducive to large-scale production and

is safe, as attenuated Hepatitis B virus could be lethal with regained virulence. However, downfalls include multiple dosing and the use of adjuvants.

The most common method of vaccine production is the egg-based method. Examples of this include the influenza and yellow fever vaccines. With this method, scientists match virus segments with segments from a less virulent virus that can successfully grow in egg. This new "seed" virus is then inserted into an egg medium where it is allowed to grow and is then purified. Finally, the dead or weakened virus is inserted into the human body, triggering antibody creation. On average, each egg yields between 1-3 vaccine doses and production ranges from 6-9 months.

The rotavirus and hepatitis vaccines, on the other hand, are grown in living tissue culture cells. With this method, a live virus is added to a colony of tissue cells where it self-replicates and infects more cells. The virus is then separated, inactivated and its surface proteins are used as a vaccine. Without the need for egg-based survival, vaccine production time is expected to decrease by 4-6 weeks. In addition to cell-based techniques, advances in genetics will continue to reduce vaccine production time by allowing vaccine strain design from pathogen gene sequences instead of an entire virus (NIAID, 2009).

Influenza

Flu vaccines are very specific and are typically effective against only one viral strain. In order to develop a vaccine for a new strain, manufacturers must have information about the specific antigens in that strain and identify the candidate "seed" strain. After the virus has been identified, with current vaccine production methods it will take at least three months, and on average six months, before influenza vaccine is widely available. At minimum several months will be required to manufacture sufficient quantities of the vaccine to vaccinate the world. The conventional egg-based manufacturing process is laborious and specialized, and global production capacity is limited. New initiatives may make this production process faster in future years and efforts are underway to increase conventional manufacturing capacity.

Once a pandemic has started, the timing of the production and the time needed to vaccinate large numbers of the vulnerable population is a key variable in the overall impact. The rate of spread may also depend on the timing of the pandemic in relation to the normal flu season: if it occurs near the beginning of the flu season (e.g. September in the northern hemisphere) its spread could be accelerated by the natural propensity of flu cases over the subsequent six months. If it occurred late in the season, (e.g. March in the northern hemisphere) the spread may be lessened and a new vaccine might be available before the onset of the next flu season.

Vaccines providing partial immunity may be a key component in preventing mortality. Influenza infection causes a strong immune response, so one person will never be infected with the same strain of the virus twice. Influenza vaccines exploit this effect by simulating contraction of a strain of influenza – either by inactivated virus particles or purified hemagglutinin from the surface of the virus – allowing the body to build up antibodies to combat that strain. Vaccine efficacy is largely dependent on the age and immune status of the vaccine recipient, in addition to how well-matched the vaccine is to the circulating strains. Vaccine efficacy is often lower in the elderly and in immune-compromised individuals. Efficacy will not reach 100%, and it is possible to be vaccinated and still get influenza. Vaccines can provide partial coverage and may help reduce mortality and infection severity even if they do not prevent it.

RMS models different assumptions about the development of a new vaccine to combat the pandemic, including the time required to develop the initial seed culture, manufacturing capacity and distribution and administration logistics. Factors that will accelerate the availability of a new vaccine include new cell-based production techniques and the addition of manufacturing facilities. Factors that could delay the production of vaccines include difficulties isolating the viral strain causing the pandemic, culturing virulent viruses, or getting a new vaccine approved by federal regulatory agencies.

The likelihood of encountering problems when producing a vaccine for a highly virulent virus is higher than for a mild virus because the virulent virus may kill the incubating egg. Difficulties such as this must be balanced against the fact more resources are likely to be put into vaccine development in the event of a severe virus. Highly transmissible viruses reduce the time available for vaccine production. Vaccine efficacy is inferred from SIR modeling and calibrated against seasonal vaccine efficacy data and vaccine uptake (percentage of the population vaccinated) (CDC, 2009c; Fiore, *et al.*, 2007; Kelly, Carville *et al.*, 2009).

Four different vaccination scenarios are considered and probability weighted by virus transmissibility. The vaccine scenarios are as follows:

Table 10: Four Vaccination Scenarios

Population Immunity	Infections Prevented	Production Time
75%	70%	3 months
50%	40%	3 months
30%	20%	6-9 months
No immunity	0%	>12 months

RMS models up to 75% population immunity as this level is sufficient to reduce transmission for influenza. From a population health perspective, flu vaccine levels do not need to reach 100% in order to prevent widespread disease transmission.

For a low transmissibility virus, a base of 50% chance of 75% population immunity and a 5% chance of no immunity is modeled. For a high transmissibility virus, a base of 90+% of no or 30% population immunity is modeled.

Emerging Infectious Disease

Vaccines are disease-specific. The following table describes the types of vaccines that are produced for selected infectious diseases (Ulmer, Valley, & Rappuoli, 2006):

Table 11: Different Vaccines for Selected Infectious Diseases

Vaccine Type	Disease
Live attenuated vaccine	Smallpox Yellow Fever Rotavirus
Killed vaccine	Plague Typhoid Fever Hepatitis A
Recombinant subunit vaccine	Hepatitis B
Purified subunit vaccine	Pertussis Meningococcus Diphtheria

As long as the threshold immunity level is less than the percentage of population that is vaccinated (or has prior immunity) against a pathogen, an epidemic is avoided. A highly transmissible disease, such as measles, has a very high immunity threshold level, meaning that >90% of the population must have immunity to protect the unimmunized and prevent an epidemic.

When population immunity levels drop, resurgences of disease occur. In Japan in 1974, approximately 80% of children were vaccinated for pertussis (whooping cough). As a result of reducing vaccinations, due to the thought that vaccinations were no longer needed and fears that the vaccine was unsafe, the country suffered a major pertussis epidemic in 1979. At the time, vaccinations had fallen to below 10%. After the government began resurrecting its vaccination program in 1981, the number of pertussis cases dropped again (CDC, 2009a).

More recently, in mid-June of 2010 nearly 50,000 children were affected by a measles outbreak in Southern and Eastern Africa, after funding issues and the refusal of some parents to vaccinate their children resulted in vaccination gaps (ProMED-mail, 2010). A 1998 paper published in *The Lancet* claimed a connection between autism spectrum disorders and the measles-mumps-rubella (MMR) vaccine. Concerns about vaccine safety have subsequently resulted in a decrease in

vaccination rates in many countries, and Ireland, the U.S., and the U.K. have recently experienced measles resurgences (Wakefield, Murch, *et al.*, 1998).

RMS models five scenarios for vaccine efficacy and production based on transmissibility and pathogen type.

Table 12: Five Scenarios For Vaccine Efficacy And Production

Population Immunity	Infections Prevented	Production Time
90%	90%	3 months
70%	55%	3 months
50%	35%	6-9 months
30%	15%	6-9 months
No immunity	0%	>12 months

Consistent with scientific advancements, RMS models a vaccine production scenario of 90% population immunity preventing 90% of infections, with production and distribution time of 3 months or less or substantial residual immunity in the population. The average scenario includes 50% population immunity and a normal 6-9 months for production. Despite strides towards more efficacious vaccines and faster production times, there remain a number of highly virulent pathogens such as HIV for which vaccines are ineffective. For this reason, no immunity is modeled and has a non-zero probability regardless of the transmission speed. In general, there is less uncertainty associated with influenza vaccine than with vaccines for emerging infectious disease. The efficacy can vary significantly, given the obstacles to creating a vaccine for a novel pathogen. The infections prevented by a vaccine developed for an emerging pathogen will be less than flu. The exception is that when high levels of population immunity are reached (90% vaccination) transmission will decrease for all but the most infectious diseases.

Emerging infectious disease vaccine production likelihoods are determined based on expert judgment on current manufacturing, and assume more resources will be diverted if the virus becomes more severe. In the event of a pandemic caused by a mild virus, there is a greater probability of 90% immunity in the population. No immunity is the most probable outcome with a very severe virus. The highest probability scenarios include 30-50% vaccine coverage corresponding to conventional egg based techniques and what has been observed in recent pandemics.

Pharmaceuticals

There are several classes of pharmaceuticals available to treat infectious diseases. Antimicrobial or anti-infective drugs, including antibiotics, antiviral agents, antiparasitics, antiprotozoals, and antifungals, are taken to kill or inhibit the spread of different types of infectious pathogens. These drugs can also be taken to treat secondary infections; secondary infections can occur because of changes in a person's immune system resulting from a primary infection or during the treatment of an existing infection. For example, complications such as pneumonia or sinus infections can occur after infection with influenza. Supportive care is available when pharmaceutical interventions are ineffective or unavailable; these include mechanical ventilation, regulation of blood pressure and temperature and management of pain.

There are four sets of assumptions around the use of pharmaceuticals; these assumptions differ for influenza and emerging infectious disease in the model.

Influenza

A number of drugs have been developed that help limit the mortality in flu epidemics. Antiviral drugs such as Zanamivir (Relenza®) and Oseltamivir (Tamiflu®) work by affecting an enzyme that inhibits the release and spread of virions. Clinical trials demonstrate that these drugs may reduce symptoms such as weakness, headache, fever, cough and sore throat after one to three days. Many countries have gathered stockpiles of these drugs to reduce transmission and infection in those exposed. However, the efficacy of this approach and the ability of the influenza virus to develop resistance to these drugs remain unknown.

While antibiotics have no value in preventing transmission of or controlling the flu virus, they help to limit mortality by reducing deaths due to secondary infections such as bacterial pneumonia. Research has suggested that a majority of the deaths during the 1918 flu pandemic may have been caused by secondary bacterial pneumonia (Brundage & Shanks, 2008; Morens, D.M., Taubenberger & Fauci, 2008).

Tamiflu (oseltamivir phosphate), an oral antiviral drug for the treatment of uncomplicated influenza, can be effective in reducing the burden of flu when administered within two days of appearance of symptoms. Tamiflu works by blocking the final stage of the flu virus life cycle and trials by the drug's manufacturer, Roche, show it can reduce mortality by up to 70% when administered correctly within 48 hours. During the course of an infection, treatment with Tamiflu may lead to the selection of novel viruses harboring mutant proteins that no longer bind to oseltamivir and therefore are not vulnerable to its inhibition. This leads to the emergence of 'Tamiflu-resistant' strains that circulate in the population and compete with the Tamiflu-sensitive strains.

For influenza, the key variable is the level of Tamiflu resistance and a discount factor is applied based on one of four scenarios:

- Secondary infection/resistance
- Secondary infection/no resistance
- Supportive care/resistance
- Supportive care/no resistance

Antiviral efficacy and resistance assumptions in the model are based on data from circulating seasonal strains (CDC, 2009b). The mean base case modeled is ~10% antiviral resistance.

Emerging Infectious Disease

For infectious diseases that are bacterial in etiology, there are several classes of antibacterial drugs that are available (e.g., penicillins, quinolones, etc.), that have been proven to be very effective. For example, mortality has been reported to be <15% for treated cases vs. >60% for untreated bubonic plague (Anisimov & Amoako, 2006). During the U.S. anthrax attacks in 2001, the CFR with early antibiotic treatment was ~40% vs. ~75% for delayed antibiotic therapy (IDSA, 2009). Antivirals are typically less effective in reducing viral disease mortality. Antivirals have become more widely available only recently in the developed world for HIV/AIDS, and combination antiretroviral treatment has been shown to be effective in reducing AIDS mortality by approximately 50% (Zolopa, Andersen *et al.* 2009). There are currently only antivirals available for a limited amount of viral diseases, and research is ongoing to design antivirals for the treatment of more viral diseases.

Often secondary complications resulting from infections can be treated with antibiotics. For example, pneumonia is the most common cause of fatality associated with measles; antibiotic therapy in measles patients has been shown to reduce mortality by more than 50% (Samb *et al.*, 1995).

For some infectious diseases, there are not yet effective drug therapies available, and patients are treated with supportive care to manage pain, alleviate symptoms, and prevent circulatory or respiratory failure. Ebola is an example of a disease where the only therapy available is supportive care (although there are vaccines under investigation). Though there has been no demonstrated efficacy for Ebola, there are a few examples of diseases that have been effectively treated with supportive care. Oral rehydration therapy has significantly reduced the case fatality rate of cholera, and the introduction of positive-pressure ventilation has decreased the mortality rate of a severe form of polio.

Discount factors for other infectious disease are tied to the development and use of pharmaceuticals and related to pathogen characteristics:

- Supportive care
- Antivirals/Antiparasitics/Antiprotozoals/Antifungals
- Antibiotics secondary
- Antibiotics primary

The base case assumptions about pharmaceutical likelihoods are illustrated below in Figure 21 and Figure 22. In the base case primary antibiotic treatment is given the most weight in the event of a virus with low transmissibility and low virulence, and supportive care is the most probable treatment of a highly transmissible and virulent virus.

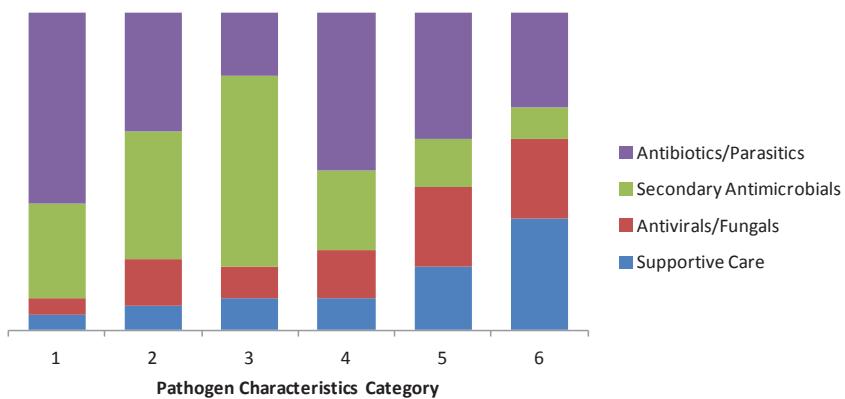


Figure 21: Relative distributions of pharmaceutical likelihoods by pathogen characteristics

CFR	Immunity Threshold					
	20	35	50	65	80	95
0.1	1	1	2	2	3	3
0.5	1	1	2	2	3	3
1	1	1	2	2	3	3
2.5	4	4	5	5	6	6
5	4	4	5	5	6	6
10	4	4	5	5	6	6
50	4	4	5	5	6	6

Figure 22: Pathogen characteristics category definitions

Demographics

The age demographic of the disease is critical to the economic impact of a pandemic. Age-related mortality is considered separately for influenza and for emerging infectious diseases.

Influenza

Seasonal flu tends to be more fatal to the very old and very young. With seasonal flu, the elderly in the U.S. suffer a disproportionate number of flu-related fatalities, even though they are a relatively small percentage of the population. In contrast, pandemic events kill a disproportionate number of people in the middle-age range (Simonsen, Clarke, et al., 1998). The 1918 pandemic was an extreme example of this. The cause of this is an immune response known as a cytokine storm. Cytokines are chemical messengers that signal immune cells to come to the site of infection. In a cytokine storm a positive feedback loop between cytokines and immune cells is established, which can cause substantial damage to organs and tissue and can lead to organ failure and death. If a future pandemic exhibits this immune response, it is likely that death rates will be elevated in the most productive members of society and in the age ranges with the highest insured penetration.

In a pandemic involving a virus causing a cytokine storm-type of reaction, the very old are likely to also experience high rates of mortality, but so will the young and healthy who typically do not die of seasonal flu. In this case children and the middle-aged are likely to have lower mortality than working age adults. The probability of a virus exhibiting either a flat or cytokine storm profile increases with the severity of the virus. Seasonal flu or a mild virus has a high probability of disproportionately affecting the young and old. A very severe virus with high mortality, such as H5N1, is much more likely to cause a cytokine storm and adversely affect working age adults.

Table 13: Demographics of Historical Influenza Pandemic Mortality (Taubenberger & Morens, 2006)

Year	Name	Type	Demographic (mortality)
	Seasonal	varies	90% >65y
1889	Russian	H2N2/H3N8*	
1918	Spanish	H1N1	>95% <65y
1957	Asian	H2N2	36% <65y
1968	Hong Kong	H3N2	48% <65y
1977	Russian	H1N1	majority <20y
2009	Swine	H1N1	86% <65y
2003	Avian	H5N1	majority in young

*Note, that in this instance, the identity of the etiological agent is uncertain

In the model, three age mortality profiles are considered for influenza: seasonal, pandemic, and residual immunity. The age distribution of seasonal and pandemic flu mortality was estimated using observed historical data (1950-2006 influenza mortality rates and 1957-58 and 1968-69 pandemic mortality rates, available from the WHO and CDC) and on hypothesized distributions of potential future pandemics.

The third age mortality profile of residual immunity profile considers data gathered from the 2009 H1N1 pandemic and the 1918 pandemic, which exhibited an unusual age mortality distribution of low mortality rates in the elderly population. There is evidence that older people had pre-existing or residual immunity from contact with a genetically-similar virus that circulated in the past (Xing & Cardona, 2009). Figure 23 shows the three modeled age demographic distributions of infectious disease mortality.

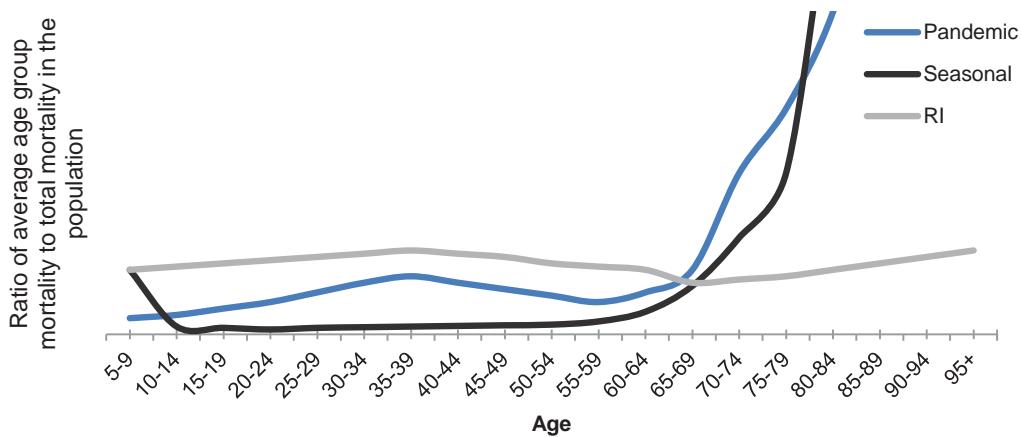


Figure 23: Age-Related Mortality: Average age group mortality compared to total mortality in the population for three classes of influenza pandemic profiles

The relative likelihoods of the demographic profiles are assigned based on virus severity or case-fatality rate. Across the influenza event set, a conditional probability of approximately 40% has been assigned to the pandemic age mortality profile, 35% to residual immunity, and 25% to seasonal.

Emerging Infectious Diseases

On the whole, there has been a shift in the age distribution of infectious disease mortality from younger to older ages due in part to the control or eradication of many childhood diseases through vaccination and improved public health and sanitation measures; this shift has been more dramatic in more developed areas. However, infectious diseases still remain a leading

cause of death in the U.S. The aging of the population means that more people in older age groups are susceptible to infectious diseases.

Age demographics of emerging infectious disease mortality can vary depending on the type of disease. Many infectious diseases tend to affect younger and older individuals and people with weakened immune systems. Examples include food-borne diseases such as botulism and salmonella, which are more likely to cause a complication called hemolytic-uremic syndrome (HUS) in the elderly and infants. Some infectious diseases which are newly emerging and for which the population does not have any kind of immunity, such as Ebola hemorrhagic fever, exhibit a relatively flat mortality profile across different age groups. Other diseases, such as Hantavirus pulmonary syndrome, have been demonstrated to primarily affect the working-age population or otherwise healthy adults. This may be due to occupational exposures; research has also suggested that a cytokine storm-type of mechanism may be implicated.

Figure 24 shows the three modeled age demographic distributions of infectious disease mortality.

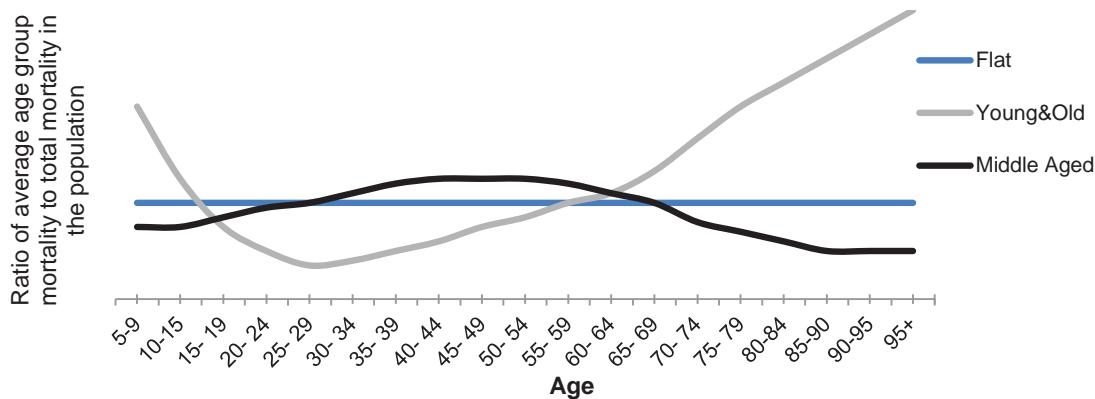


Figure 24: Age-Related Mortality: Average age group mortality compared to total mortality in the population for three classes of other infectious pandemic profiles

The three demographic profiles were modeled using population and selected infectious disease mortality statistics from the WHO. Across the infectious disease event set, a conditional probability of ~15% has been assigned to the flat age mortality profile, ~25% to middle-aged, and ~60% to young-and-old.

Non-Pharmaceutical Interventions

Once breakout has occurred, the speed and effectiveness of response is a key variable in the overall impact on each country affected. Non-Pharmaceutical Interventions (NPIs) are those measures, not including the use of vaccines and antivirals, that attempt to slow the introduction of disease and subsequent transmission throughout a population. They are particularly important in the period between the emergence of an infectious disease and when a vaccine can be developed and made available.

Such measures can include public health and pandemic planning measures, quarantine and isolation, school and business closures and restrictions on travel and public gatherings. The relative wealth and preparedness of some countries will lead to differences in the ability to implement these kinds of measures, particularly between developed and less developed countries. Such measures have two principal benefits; delayed transmission providing extra time for vaccine and antiviral production and a direct reduction in attack rates and number of deaths.

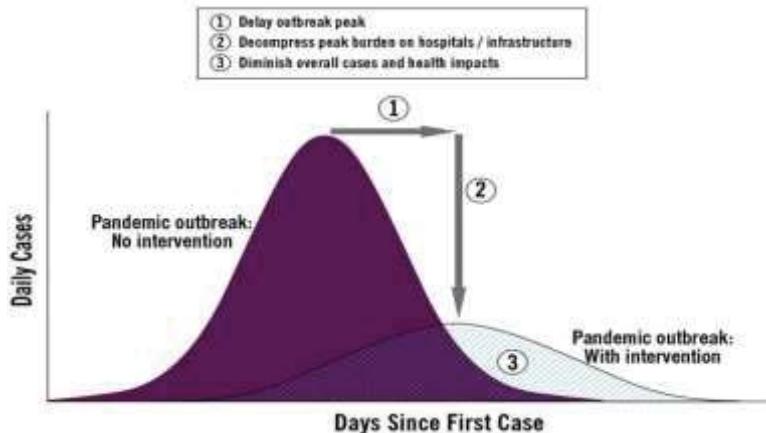


Figure 25: Effects of Non Pharmaceutical Interventions (Flu.gov, 2007)

It is important to note that while non-pharmaceutical interventions may delay epidemics, they will not prevent them. Research indicates a 99.9% reduction in all travel would yield a maximum delay of 4 months on influenza epidemics in most cities (Cooper, Pitman *et al.*, 2006). For a more transmissible virus (i.e., with $R_0 > 2$), no single NPI will completely mitigate an outbreak. Combinations of social distancing, school closures and targeted antiviral prophylaxis (TAP) can successfully slow transmission in the absence of vaccination up to an infectiousness of $R_0 = 2.4$ (Germann, Kadau *et al.*, 2006). NPIs would have an inconsequential impact on the spread of a highly transmissible, reemerging virus such as smallpox, given waning vaccination rates and little residual immunity within the population (Gani & Leach, 2001).

Influenza

The model links the relative impact of countermeasures during a pandemic to virus severity. Government and individual actions are likely to be more extensive in the event of a pandemic with high virulence. In the event of a pandemic, the WHO will issue assessments of virus severity to guide governments on the levels of intervention necessary. Measures such as school and business closures and travel restrictions are very costly and disruptive and are unlikely to be used extensively in the case of a low virulence virus.

The recent H1N1 global pandemic provided opportunities to study the impact of school closures during the holiday season on the transmission of the virus. Secondary school closures in Hong Kong resulted in an estimated ~25% reduction in transmission (Wu, Cowling, & Lau, 2010) and a similar study in France concluded that prolonged school closure during a pandemic could result in a 13-17% reduction in cases and a 39-45% reduction in peak attack rates (Cauchemez *et al.*, 2008).

The set of assumptions used in the base case model assign a 10% mortality reduction due to NPIs for a low virulence virus and a 40% mortality reduction for an influenza virus with high virulence. The benefit in mortality derives in part from reduced numbers of total cases but also from delayed transmission giving more time for the healthcare system to respond and a vaccine to be developed. Simulations suggest that travel restrictions after an outbreak can somewhat delay the spread of disease but do not ultimately impact the total number of cases (Germann *et al.*, 2006). Reduction factors are linearly trended between 10% and 40% for viruses with moderate virulence.

Emerging Infectious Disease

Quarantine efficacy for infectious diseases other than influenza is typically a function of transmissibility, contact tracing and latency period. The latency period is the time between exposure and the onset of infectiousness. This can be shorter or longer than the incubation period, which is the time between infection and the first appearance of symptoms.

The overall effect of response in any given country can be modeled in terms of reductions in the intrinsic characteristics of the virus. The recent example of SARS provides an example of the relative magnitude of mitigation due to differences in speed and effectiveness of response.

The model uses a mortality reduction factor linked to transmissibility, where no reduction is applied for viruses with a very high immunity threshold and a base reduction of 40% is used for diseases with the lowest transmissibility, consistent with modeled and observed epidemics. Mortality reduction is linearly trended between 0% and 40% for moderate and high transmissibility.

RMS PROBABILISTIC TERRORISM MODEL

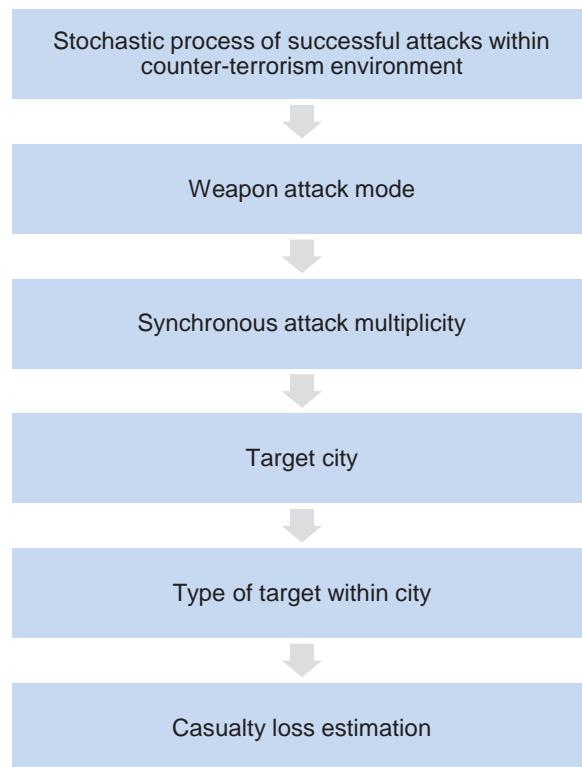
For probabilistic terrorism risk analysis, RMS has developed mathematical models for the key stages leading from terrorist threat to plot to attack to loss. The terrorism risk to the U.S. is modeled using the Probabilistic Terrorism Model v3.1.4 whereas the terrorism risk to France, which is not included in the released Probabilistic Terrorism Model v3.1, is modeled using a simplified version of the same methodology, released as the RMS France LifeRisks Terrorism Model Version 2.0.

Model Overview

The model stages are illustrated in the flow chart below:

- The stochastic process of successful terrorist attacks planned and executed within the prevailing counter-terrorism environment.
- The choice of weapon attack mode and the synchronous attack multiplicity distribution.
- The conditional probability of a city being targeted and the conditional probability of a type of property being targeted within the designated city.
- The estimation of casualty loss arising from the attack.

Probabilistic Terrorism Model Methodology



Background

United States

RMS updated the frequency distribution for the U.S. Terrorism Risk Model for 2012. This update is due to a reduction in the U.S. macro attack frequency rate that has been determined by revisiting the number of macro-terrorism plots in the United

States. This is done by basing the number of plots in the U.S. from court cases, convictions and indictments related to terrorism charges.

The change in the global and U.S. risk landscape supports this revision. The political uprising that has swept through the Middle East and North Africa region, the demise of Al-Qaeda's leader, Osama bin Laden, and the use of U.S. drone strikes to remove key Al-Qaeda agents have reduced the ideological and operational environment in which the main threat for the U.S., Al-Qaeda and its associated groups operate. In light of such a hostile operational environment, these groups have resorted to leveraging homegrown terrorism as an alternative method of executing their terrorist operations, particularly in the West. This change in their approach has significant changes on the terrorism risk in the America. Homegrown operatives have tended to show poor operational skill. To date, a majority of the homegrown jihadi plots have been crude attempts by operatives lacking the sophistication and experience needed to mount a successful macro attack. In light of the change in the terrorism landscape, our frequency distribution has been updated.

France

France has long been a target of Salafi-Jihadist terrorism, in part due to problems of poor integration and perceived marginalization of its very large Muslim population. Domestic policies such as the deeply unpopular headscarf ban or the government's tough law enforcement response to the 2005 riots, which affected Paris and other major towns and cities across France, may have contributed to the feelings of victimization claimed by some sections of the French Muslim community. France has a 10% Muslim population and French foreign policy, such as its involvement in Afghanistan and its military intervention in Mali, has acted as a driver of Islamist radicalization among this large minority population. Of all European countries, the largest contingent of Muslims fighting for ISIL in Syria has come from France. There are concerns that these citizens could return and plot attacks against French interests.

In January 2015, France experienced its most serious terrorist incident in recent years. Three Jihadists were responsible for a series of high profile terror attacks, most notably the Charlie Hebdo shooting in which a number of workers for the satirical magazine were killed at their place of work. The jihadist operatives were known to French counter-terrorism security officers but, with the focus on new jihadists returning from Syria, they were not thought to pose enough of a danger to be kept under surveillance.

The Charlie Hebdo incident may lead to counter-terrorism policy shifts by the French government similar to what was observed after the 9/11 attacks in the U.S. and the 7/7 attacks in the U.K.. For example, the president of the European commission, Jean-Claude Juncker, is seeking to introduce a new program of European counter-terrorism legislation which will include a requirement for airlines to divulge passenger name record data to the police so that jihadist movements to Syria and Iraq can be more easily tracked. This has long been resisted in the European Parliament for civil liberty reasons but it now has the very strong support of the French President. Measures such as these may strengthen France's ability to interdict terrorist attacks which could reduce the risk of terrorist attacks in the future.

A key feature of the recent jihadist attacks on France was its focus. The target of the jihadists was the core French principle of Liberty, in this case the freedom of the press. *Liberté, Égalité, Fraternité* is the national motto of France and so Liberty is a prize target for jihadists whilst its defense is a national priority for France. However, it should be noted that loss of liberty is not subject to terrorism insurance coverage. If there were a shift of the terrorist threat towards suppressing French liberty to blaspheme then this could shift the attack spectrum towards events with comparatively minor casualty loss.

The threat from salafi-jihadists can be traced back to the 1990s where French counterterrorism activity in the 1990s revealed the presence in France of Salafi-Jihadist networks planning attacks on French soil. Most of these plots were associated with the Armed Islamic Group (GIA), which targeted France in revenge for its support for the Algerian government's campaign against the group. Such attacks include the attack on the transportation section (the 1995 Metro bombings), and the aviation sector (the 1994 Air France hijacking). The GIA were unable to establish an operational foothold in France and the threat diminished. More recently, France's commitment of troops to the international military coalition in Afghanistan, as well as its support for other North African and East African governments continues to justify its targeting in the eyes of Salafi-Jihadist groups. This can be seen, for example, in rhetoric issued by Al-Qaeda's leadership and its franchise organization in Algeria, Al-Qaeda in the Islamic Maghreb (AQIM). In a September 2006 statement welcoming the GSPC's declaration of allegiance to Al-Qaeda (which included its re-branding as AQIM), Ayman al-Zawahiri called on the group to be 'a bone in the throat of the American and French Crusaders' and called the new alliance 'a source of chagrin, frustration and sadness for the apostates [of the regime in Algeria], the treacherous sons of France'.

Given France's history of revolutionary politics and militancy, it is perhaps unsurprising that one of the most serious terrorist threats to affect the country also emanates from secular groups. For instance, extreme left-wing groups such as Action Directe. Attacks by Action Directe on property targets gradually gave way to political assassinations. The group never attracted widespread support and in common with other left-wing revolutionary groups such as the Red Brigades was largely a spent force by the late-1980s. Left-wing terrorism does not pose a significant contemporary terrorist threat in France.

France also still faces a persistent though limited threat from regional separatist groups. Corsican and Basque groups remain active in France and have carried out hundreds of attacks over the last two decades. However their attacks are

typically limited to property damage and are geographically restricted to the island of Corsica and the Basque region of northern France.

The Stochastic Process of Successful Attacks

The occurrence of successful macroterror attacks, i.e. those capable of causing significant property or casualty loss, is the outcome of a stochastic control process generated by the dynamics of the confrontation between the forces of terrorism and counter-terrorism. The great majority of terrorist plots in the leading industrialized nations are interdicted by the security and law enforcement services. But some planned attacks are nonetheless successful. However, in democracies, counter-terrorism action is commensurate with the threat, and each successful attack is countered with a swift state response which suppresses the threat of future attacks. This is exemplified by the legislation introduced after both the 9/11 New York/Washington air attacks and the 7/7 London bombings.

The Annual Number of Planned Attacks

A major factor determining whether a planned attack will succeed or fail is the number of operatives involved in the plot. RMS uses social network analysis to understand how increasing the size of a terrorist cell will increase its chances of detection. This information is used to estimate the constraints on the size and frequency of terrorist attacks. A key observational metric is the number of planned attacks or plots that are discovered in a given city or country.

The most objective and auditable procedure for enumerating U.S. terrorist plots is to keep a tally of court convictions and indictments for terrorism targeting the United States homeland. As more information on terrorism court convictions and indictments has become available, RMS has conducted a detailed analysis of court cases related to terrorism charges in the U.S. and found that since 2001, there have been on average 3 macro terrorism plots per year. Accordingly, the annual U.S. macro terrorism plot numbers is 3. RMS reaffirms that this number is a resilient figure for U.S. terrorism insurance risk management. The corresponding assignment is 2 for France.

Through the proficient intelligence services of the leading democracies, the number of planned attacks which are feasible in a country is bounded by the severe logistical security challenge that terrorists face in organizing too many significant plots at the same time. Plots involving more ambitious attack modes and larger sized conspiracies are more likely to be disrupted by the intelligence services. The more plotters at large, the more connections between them become discernible, and the easier it is for the security services to join the dots. A practical operational upper bound of about 10 planned attacks follows from social network analysis.

Counter-Terrorism Non-Interdiction Rate

A planned attack is successful only if it is not interdicted. Given that there have been several dozen unsuccessful attempts to attack the U.S. since 9/11, an upper bound to the success rate may be conservatively set at 25%. Comparison with global counter-terrorism experience suggests a lower bound of 10%. In Israel, which has one of the most extensive intelligence networks, levels of 10% non-interdiction have been achieved. In the IRA terrorist campaign against the U.K., the non-interdiction rate was disclosed by the MI5 director, Stella Rimington, to be 20%. The RMS terrorism model is parameterized using a non-interdiction rate of 20% for the U.S. and 15% for France.

Frequency of Successful Attacks

Accounting for the distribution of planned attacks and the non-interdiction rate variability, the probability distribution of the number of successful macroterror attacks in the U.S. and France is shown in Table 14.

Table 14: Probability Distribution of the Number of Successful Macroterror Attacks

Annual Number of Successful Attacks	U.S. Probability	France Probability
None	59%	72%
One	35%	25%
Two	7%	3%
Three	0.4%	0.0%
Four or more	0.0%	0.0%
Average Annual Number	0.49	0.31

Synchronous Attack Multiplicity

A hallmark of terrorist operations is having multiple synchronous points of attack. A multiplicity of strikes helps terrorists to inflict maximal loss, and allows success still to be claimed even if some of the synchronous attacks fail, as happened on 9/11. Money and material continue to be available for multiple attacks, thus rendering the likelihood of detection the limiting constraint on the multiplicity of attack. As the multiplicity of strikes increases, more targets need to be surveilled, more attack weaponry procured, and more terrorists involved in planning and preparation. Hence, with greater multiplicity, plotters face a higher chance that the whole plot will be undermined by a security lapse. These competing effects culminate in a point at which it is best to stop, rather than continue and risk losing existing gains. Operations research mathematical techniques solve this optimal sequential problem, and yield a Poisson distribution for the multiplicity of synchronous attacks.

The smaller the chance of arrest during attack planning, the bolder and more ambitious terrorists can afford to be in boosting attack multiplicity. For low values of arrest likelihood, such as with simple package bombs or off-the-shelf military weapons like AK47's, mortars and RPG's, terrorists can afford to aim for high multiplicities. However, for high values of arrest likelihood, such as with attacks involving substantial new weapon development, terrorists are prudent in sticking with low multiplicities. The multiplicity distributions for the various attack modes are shown in Table 15:

Table 15: Probabilistic Terrorism Model Attack Multiplicity Distributions

Weapon Mode	One Strike	Two Strikes	Three Strikes	Four Strikes	Five Strikes
Stand-off Weapons	0.22	0.33	0.25	0.15	0.05
Car Bomb	0.10	0.23	0.27	0.20	0.20
Truck Bomb	0.50	0.35	0.10	0.05	
Aircraft Impact	0.65	0.30	0.05		
Conflagration	0.40	0.35	0.15	0.10	
Sabotage - Industrial	0.65	0.30	0.05		
Radiological Dispersal	0.65	0.30	0.05		
Chemical Agent	0.65	0.30	0.05		
Biological Agent	0.65	0.30	0.05		
Nuclear Bomb	1.00				

Choice of Weapons

The handbook of all guerrilla movements is Sun Tzu's 'The Art of War', which defines optimal combat strategy. In hydrology, the principle of minimum energy expenditure governs the pattern of river drainage networks. Using Sun Tzu's water flow paradigm, the flow of terrorist activity is towards weapon modes and targets against which the technical, logistical and security barriers to mission success are least. Since 9/11, the counter-terrorism environment for the development of new weapons and planning complex strategic operations has become oppressive for terrorists. Accordingly, terrorists tend towards off-the-shelf, ready-to-use weapons, (such as missiles, mortars, rocket propelled grenades, hijacked aircraft, and propane tankers), or improvised conventional explosive devices, which do not involve intricate and potentially failure-prone technological development.

The relative likelihood of different weapon attack modes is dependent on the logistical burden of alternative weapon systems, which can be expressed in terms of the demands on terrorist finances, equipment, materiel, trained personnel and sleeper cell support. Additionally, the model explicitly considers the relative likelihood of different attack scales for bombs as a function of the number of operatives. This is accomplished in the model by factoring the non-interdiction probability into the relative attack likelihood. This enhancement was incorporated into the 2011 parameterization to account for the conventional bomb attack interdiction likelihood. The effect of incorporating cell-size dependent interdiction rate variation in the attack mode analysis is to increase the relative frequency of successful smaller bomb attacks relative to larger ones. Superior intelligence which has benefited from the experiences of 9/11 has thwarted several more such ambitious plots.

Table 16: Relative Likelihood of Weapon Attack Modes

Weapon Attack Mode	U.S.	France
Vehicle Bombs	58%	41%
Aircraft Impact	3%	2%
Conflagration	4%	4%
Sabotage - Industrial	3%	3%
Biological	2%	1%
Chemical	2%	2%
Nuclear	0 ¹ %	0 ¹ %
Radiological Dispersal	2%	2%

Calibration against actual experience is possible for conventional attack modes, but not as yet for exotic attack modes, such as Chemical, Biological, Radiological and Nuclear (CBRN). RMS models the CBRN weapon threat by constructing an elaborate event-tree of the diverse pathways by which terrorists can acquire the equipment, material, scientific and technical personnel, laboratories and funding for the procurement or manufacture of weapons and then transport them to their targets. RMS assesses the current CBRN attack threat level to be comparatively low at 5.6% and 4.2% for the U.S. and France respectively.

Target Conditional Attack Probabilities

The potential targets in a country under terrorist threat are ranked in L discrete city tiers (metropolis, provincial capitals, small towns, etc.) and S type classes (government offices, commercial offices, tourist attractions etc.) according to their terrorist utility. Symbolic and publicity value, international name recognition, and economic and human loss consequence are all contributing factors in gauging target utility. Thus New York and Washington comprise the top U.S. city tier, and Paris comprises the top France city tier.

Denote by $N(C)$ the number of cities in the C 'th city class. Denote by $P_{City}(C)$ the relative likelihood of the C 'th city class being targeted. Then the conditional probability of any specific city in the C 'th city class being attacked is given by the normalized expression:

$$P_{City}(C) / \sum_1^L P_{City}(I) * N(I)$$

Denote by $M(T)$ the number of targets in the T 'th target type. Denote by $P_{Type}(T)$ the relative likelihood of the T 'th target type being targeted. Then the conditional probability of any specific target of the T 'th target type being attacked is given by the normalized expression:

$$P_{Type}(T) / \sum_1^S P_{Type}(I) * M(I)$$

¹ Values are greater than 0% but are depicted as 0% due to rounding.

These expressions encapsulate one of the key principles of terrorist targeting: safety in numbers. An increase in the number of available targets offers more choice to attackers, and has a threat dilution effect on other targets. In order to express target prioritization in a quantitative way and assign functional forms to the relative likelihood variables $P_{City}(C)$ and $P_{Type}(T)$, the ranking by city and target type has to be converted into a practical mathematical form. It is evident from terrorist modus operandi, and historical experience, that this mathematical form is nonlinear. A proliferation of minor targets does not compensate for their low ranking in city tier or type class: the large numbers of ordinary residential domestic dwellings are not targeted, despite their minimal security.

In order to arrive at a target probability distribution, a mathematical expression needs to be obtained for the functional dependence of target probability on utility. For this, some game theory is required. In order to maximize the prospects for attack success, irrespective of defensive action by security forces, terrorists will effectively seek to minimize the impact of target hardening. From knowledge of modus operandi, this goal is attained by terrorists adopting a mixed strategy of randomizing target selection, meticulously undertaking surveillance on targets and avoiding targets where the level of security is very uncertain, and switching targets if the original target has hardened.

Such a strategy leads to a power-law fall-off of target probability with city class and target type. The model automatically yields targeting likelihoods akin to a Pareto 80/20 rule, in that it forecasts that the great majority of attacks will be against a minority of potential targets. This focusing of attacks against a small proportion of targets is consistent with historical experience of major terrorist campaigns. Given the minimal likelihood of many small remote towns and communities being targeted, they make a negligible contribution to terrorism risk. Instead, the casualty risk is heightened by the concentration of terrorist attacks in cities with sizeable populations.

Casualty Loss Estimation

RMS has developed casualty models for assessing the human consequence of macroterror attacks, both conventional and non-conventional. These models cover a diverse range of weapons' impact phenomena, including the dynamics of vehicle bomb blasts and aerosol plume dispersal from the release of toxic chemical and biological agents. Each attack scenario yields a casualty loss which depends on the lethality of the weapon mode, the spatial scale and spread of weapon effects, and the population accumulation in the area exposed to the attack. Crowded places are recognized as favored terrorist targets. As most conventional attacks have a limited footprint (major structural damage around a vehicle bomb is confined to the first 400m around the attack), the casualty impact of such attacks is heightened in cities with very concentrated population exposures. The most deadly scenarios are those involving chemical, biological and nuclear weapons. These are capable of killing many thousands or even tens of thousands of people. Of the non-conventional CBRN weapons, radiological weapons are distinct in that they are intended primarily to cause massive socio-economic disruption, rather than massive loss of life.

The U.S. Probabilistic Terrorism Model v3.1.4 uses high resolution VRG footprints that include wind direction modeling for dispersal attacks and also consider the surrounding building environment in determining the spatial extent of damage. Modeling wind dependent dispersal for biological and chemical attacks such as anthrax allows a more accurate estimation of airborne concentrations and of exposed populations. The France LifeRisks Terrorism Model Version 2.0 uses simple damage footprints utilized by RMS' Terrorism Scenario Model (RiskLink Version 10.0). Secondary uncertainty surrounding mean casualty estimates is also output by the Probabilistic Terrorism Model.

Vulnerability curves for all covered regions within the Probabilistic Terrorism Model are based on local quality of construction and associated building properties. Building damage levels from conventional attacks that involve physical damage due to bomb blast or other means directly impact casualty estimations.

Recent Historical Events

September 11, 2001

The resolve of Al Qaeda to inflict maximal loss on the West was realized on September 11, 2001, when four commercial planes were hijacked by terrorists posing as passengers. Two were flown into the World Trade Center in New York City. Another was flown into the Pentagon. The fourth plane crashed before it could strike its designated target. Excluding the 19 hijacker suicides, 2,974 died: 246 on the four planes; 2,603 in Lower Manhattan in the towers and on the ground, and 125 at the Pentagon. Of the fatalities, 2,669 were American citizens, and 67 were British.

July 7, 2005

Crowded places in large cities offer opportunities for terrorists to inflict mass casualties. On July 7, 2005, four Islamist terrorists carrying home-made package bombs attacked the London transport system in the morning rush hour. Three of the bombs exploded inside underground trains, another exploded on the top of a double-decker bus. Excluding the four suicide bombers, there were 52 fatalities, of whom 35 were British citizens.

January 7, 2015

The Paris office of the satirical weekly Charlie Hebdo was attacked by Islamist militants on January 7, 2015, as one of a series of terror incidents. Although not responsible for a high casualty death toll in excess of 50 lives or large economic loss in excess of \$1 billion, this incident is viewed as a macro-terror attack because of the priceless iconic value to French democracy of press freedom, which the terrorists sought to suppress. The wholesale assassination of the editorial committee of Charlie Hebdo, including some of France's leading political cartoonists, ranks with the assassination of senior political figures or prominent public officials as a macro-terror attack that has very widespread societal impact and could lead to significant policy shifts in counter-terrorism legislation.

RMS U.S. EARTHQUAKE CASUALTY MODEL

This section describes the casualty component of the RMS U.S. Earthquake Model and discusses additional considerations in the assessment of the impacts of earthquakes on human populations. Please refer to Appendix A attached to this RMS Risk Analysis Methodology for a description of the hazard components of the RMS U.S. Earthquake Model.

RMS U.S. Earthquake Casualty Model version 13.1 Updates

Version 13.1 of the U.S. Earthquake Casualty Model, released in January 2014, includes updates to three components:

- Mean casualty rates (MCR) across all injury levels.
- Secondary uncertainty levels (coefficients of variation, or CVs) of casualty vulnerability.
- New, additional, sets of CVs for two regions (eastern and western U.S.) that reflect geographically specific uncertainty levels.

RMS used findings from recent scientific literature, as well as data from the Federal Emergency Management Agency's Hazards U.S. Program (HAZUS) on outdoor and commuting populations, to guide the building collapse simulation that resulted in the changes made in this update.

The underlying casualty model methodology, including hazard, event rates, and injury classifications, remains unchanged in this model release.

Determining Uncertainty Levels

Given the occurrence of a seismic event of known intensity at a given location, the RMS U.S. Earthquake Casualty Model provides a probabilistic characterization of the number of injuries for six increasingly severe injury levels, ranging from medical only injuries to fatalities. These injury levels are prescribed by the National Council on Compensation Insurance (NCCI), and are the basis of how workers' compensation claims are categorized in the United States.

Each one of the six injury rates is characterized by a mean casualty rate (MCR) and a coefficient of variation (CV), both of which are generally a function of the earthquake intensity as well as the building construction class, age and height. In the RMS U.S. Earthquake Casualty Model, the MCR values are provided by the mean vulnerability functions, while a separate uncertainty function provides CVs for given MCR values.

The U.S. Earthquake Casualty Model update was made possible by a new event-tree simulation approach, which improves on the existing simulation-based methodology for characterizing secondary uncertainty in casualty rates. The event-tree simulation approach estimates the MCR versus CV relationship for each injury level within each U.S. region. The event tree was constructed such that each node represents a pertinent source of uncertainty, and a Monte Carlo simulation was run to estimate the conditional mean and standard deviation of the casualty rates for all the different injury levels.

Each simulation began with an earthquake event of random intensity during either daytime or night time. Based on the time of occurrence, the model produces a random geographical distribution of the impacted population. A simulated proportion of the population is commuting, and the remainder is located in one of the five main construction classes: wood frame, unreinforced masonry, reinforced masonry, reinforced concrete, and steel frame buildings.

The simulation then applies building-specific fragility functions to determine the damage state of each construction class based on the combination of earthquake intensity and construction class generated in the previous step. This is a key step, as casualty rates are largely driven by whether a building has collapsed, suffered heavy damage, or neither. These three damage states are random events that are both mutually exclusive and collectively exhaustive. The simulation assumes that if a structure has not collapsed or suffered heavy damage, unlike the other two damage states, no severe injuries will have occurred (i.e., no fatal or permanent total). All three damage states explicitly account for uncertainty surrounding building age and height.

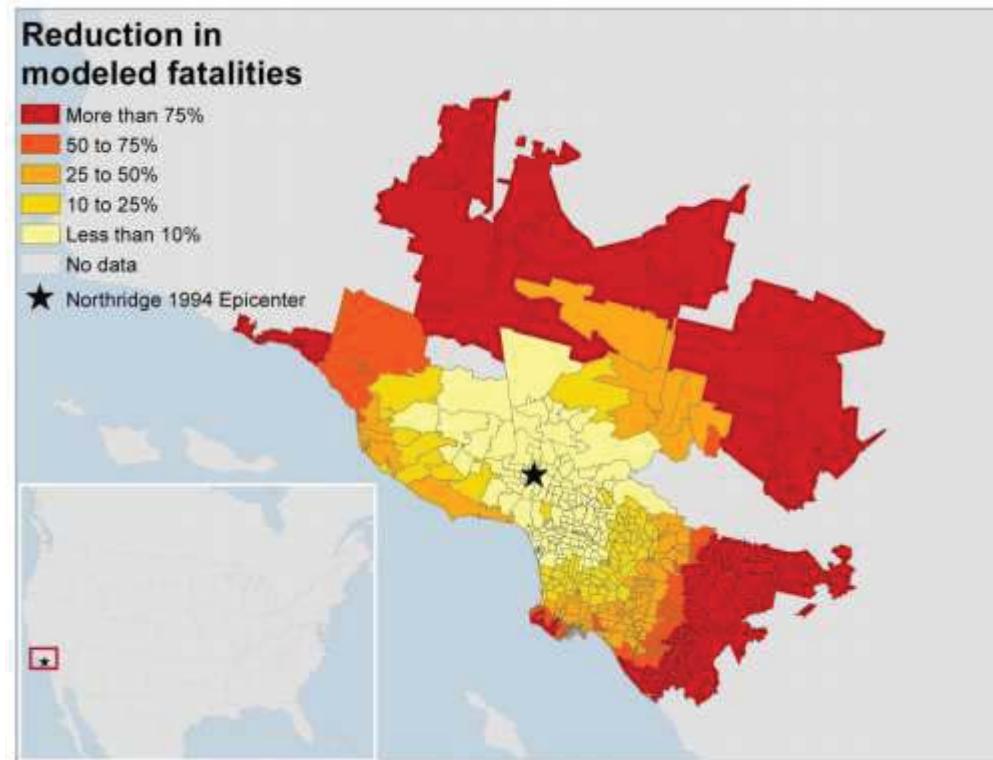
Finally the simulation calculates injury rates and corresponding CVs. The simulation analysis found that the model's casualty distributions warranted a thinner tail: extreme scenarios with high hazard, severe building damage, and injuries resulting from building collapse had lower levels of uncertainty than previously output. Conversely, low hazard events resulted in a wider range of outcomes, necessitating higher CV values. The analysis also found that the eastern and western U.S. regions warranted slightly different CVs. This was principally a result of higher uncertainty around casualty rates in the New Madrid region, where stochastic event rates are lower, event footprints are bigger, and building stock can be more vulnerable to ground motion. These findings formed the basis of the updated MCR-CV functions.

Refinements to Mean Casualty Rates

The second aspect of the model update revises the mean vulnerability functions for all six injury levels, and for each construction class included in the RMS vulnerability database. The revision was driven by a review of historical events with respect to both the level of casualties and their spatial distribution.

Based on newly available data from historical events, prior versions of the U.S. casualty model can now be deemed to be too conservative in determining the number of injuries at large distances from a given event source, where the hazard level is low. As shown in Figure 26, the changes in vulnerability result in reductions in fatalities around the perimeter of a given event footprint, but minimal changes close to the source.

Figure 26: Reduction in Modeled Fatalities in RiskLink 13.1, 1994 Northridge



Exposed Population

Earthquakes generally occur with little or no warning and the resulting number of casualties is dependent on a number of factors including the number of people in the affected area, the severity of ground shaking, and the vulnerability of the structures those people are in or around. People are mobile and the number of people exposed varies depending on the time of day and day of week. The random nature of earthquakes combined with this uncertainty of where people are located at that time gives rise to significant uncertainty in the number of casualties and resulting losses.

Key Historical United States Earthquakes

Table 17 shows a partial list of recent or significant U.S. earthquakes that have caused casualties. The potential for far greater numbers of casualties exists from larger magnitude earthquakes, closer proximity to urban areas, different times of occurrence, or combinations of these factors.

Table 17: Significant Historical U.S. earthquakes

Earthquake	Date	Time	Magnitude	Number of Injuries	Number of Fatalities
San Simeon	12/22/2003	11:15 AM	6.5	50	2
Nisqually	2/28/2001	10:45 AM	6.8	410	1
Yountville	9/3/2000	1:36 AM	5.0	25	0
Northridge	1/17/1994	4:31 AM	6.7	11,800	65
Landers/Big Bear	6/29/1992	4:58 AM	7.4	370	1
Loma Prieta	10/17/1989	5:04 PM	6.9	3,800	63
Whittier Narrows	10/1/1987	7:42 AM	5.9	1,200	8
Coalinga	5/2/1983	4:42 PM	6.5	180	0
San Fernando	2/9/1971	6:00 AM	6.5	2,000	65
San Francisco	4/18/1906	5:12 AM	7.8	Unknown	3,000

Event Occurrence

Earthquakes are random events and the casualty rates are likely to vary significantly depending on when the event happens. The exposure varies by time of day and day of week. The variation in exposure will affect the number and severity of casualties. This is largely the consequence of two factors: vulnerability and exposure. Exposure varies as people migrate throughout the day and week. Individuals may be within highly vulnerable structures at some times and less vulnerable structures or not in a structure at other times. Figure 6 provides an example of three different individuals.

Figure 26: Example Variations in the Locations of Individuals over a 24 Hour Period



Concentrations of people pose a significant risk from an insurance standpoint because they increase the likelihood of large numbers of claims. In the U.S. the likelihood of a large number of building failures and collapses is small, so the greater the dispersion of people, generally the lower the risk. Many factors impact an accurate risk assessment, but an overriding consideration is that earthquakes occurring at times of extreme concentration (such as in a large skyscraper during peak working hours) have a greater potential of being mass-casualty events. Due to this temporal concern, there is greater uncertainty around casualty loss than there is around property damage. This potential for concentrated loss is especially relevant to high-severity earthquakes that occur near major metropolitan areas such as San Francisco, Los Angeles, and Seattle.

Earthquake Casualties

Earthquakes cause death and injury in many different ways. Direct impacts include building or structural collapse, falls, shaking related traffic accidents, exit injuries, and injuries from non-structural hazards. The most significant cause of casualties is from building damage, but epidemiological studies report causes of death from a wide variety of accidents induced by the earthquake, including road traffic accidents, and incidents with overturning items such as heavy furniture or equipment. Earthquake vibrations cause people to fall, and also to panic. People are injured by jumping from windows or falling as they try to run down stairs. Some people suffer cardiac arrests from the shock of the earthquake. Most of the injuries treated after earthquakes are soft-tissue injuries, wounds, contusions, and blunt trauma.

In the absence of secondary hazards such as tsunamis, the major cause of fatalities from earthquakes is due to building damage or collapse. Mortality among those located within buildings that are completely destroyed is significantly greater. The degree of damage is not the only factor influencing the relationship. The type of damage, specifically type of collapse, is a strong driver in the number of casualties. Certain construction classes, such as masonry and unreinforced masonry, are much more likely to collapse without survival space, which contributes significantly to the large numbers of casualties attributable to these construction classes. In contrast, many of the modern engineered structures are designed to maximize survival space even in the event of collapse.

Earthquake Casualty Vulnerability Module

The U.S. Earthquake Casualty Model uses the same techniques as the U.S. Earthquake Model for the stochastic event module and hazard module. The vulnerability of a portfolio of human exposures to earthquakes is expressed through vulnerability functions or casualty rate curves. Earthquake casualty vulnerability functions represent the relationship between earthquake intensity and casualty rate, which is defined as the ratio of the number of people injured to the number of people exposed.

The measure of ground motion intensity spectral acceleration is directly dependent on building height and construction class. The probability of the structure reaching a certain damage state is tied to both the magnitude and frequency measures of the ground motion as well as the characteristics of the building. These building characteristics include the structural lateral system, building height, and building material. The maximum relative displacement between stories (inter-story drift) is used to measure the amount of damage a building would sustain during an earthquake. In order to understand the distribution of building damage, not just the mean damage, the probability of a building in a specific construction class exceeding a given collapse state is modeled. The fatality and injury rates are modeled as a function of collapse state for a given construction class.

Vulnerability curves developed by RMS for casualties are based upon detailed analyses of historical data, supplemented by analytical casualty research. Using observed data from over 100 historical earthquakes around the world, various model components were calibrated by considering the casualty severity distribution in different construction classes with a primary focus on totally and partially collapsed buildings.

Components of Casualty Rates

Casualty rates represent the mean percentage of individuals that fall into a specific injury state given a level of ground shaking. The vulnerability model allows variations on this relationship by factors such as construction class and building height. RMS compiles casualty rates using an event tree approach that considers the following general conditions that give rise to injuries and fatalities:

- People outside buildings are injured by falling cladding or building collapse
- People inside buildings that do not sustain significant structural damage, but may suffer injuries from non-structural hazards. This is a key cause of injuries in earthquakes, but mortality is usually limited.
- People inside buildings that partially collapse, totally collapse or sustain heavy damage. This is the most important cause of casualties in large earthquakes.

These broad conditions account for a number of model components that all contribute to the injury severity distribution (that is, the casualty rates) resulting from an earthquake. These components include:

- **Injury Causes** – Casualty rates account for all injury causes resulting from earthquake including not only the obvious consequences of buildings that collapse, but also fire, smoke inhalation, and injuries sustained while trying to evacuate.
- **Collapse** – The model estimates the probability of collapse for each building given the level of ground shaking. This approach factors in the possibility that for a given building stock there could be a small fraction of buildings that collapse even though the building stock is unlikely to suffer significant damage for any given earthquake shaking on

average. Casualties in earthquakes are a result of the buildings that are on the extremes rather than the mean damage, therefore a distribution around collapse state and probability is used to model the casualty vulnerability.

- **Spectral Response** – The RMS U.S. Earthquake Model considers spectral response to assess the performance of buildings. The expected impacts of this are factored into casualty rates.
- **Landslide and Liquefaction** – Earthquakes may cause landslides or liquefaction of soil which may increase injury severities. These phenomena are accounted for implicitly based on model calibration.

RMS JAPAN EARTHQUAKE CASUALTY MODEL

This section describes the casualty component of the RMS Japan Earthquake Model and discusses additional considerations in the assessment of the impacts of earthquakes on human populations. Please refer to Appendix B attached to this RMS Risk Analysis Methodology for a description of the hazard components of the RMS Japan Earthquake Model.

Exposed Population

Earthquakes generally occur with little or no warning and the resulting number of casualties is dependent on a number of factors including the number of people in the affected area, the severity of ground shaking, and the vulnerability of the structures those people are in or around. People are mobile and the number of people exposed varies depending on the time of day and day of week. The random nature of earthquakes combined with this uncertainty of where people are located at that time gives rise to significant uncertainty in the number of casualties and resulting losses.

Key Historical Japan Earthquakes

On average, more than 1,500 earthquakes occur in and around Japan each year and at least 87 earthquakes have caused loss of life in Japan in the last century. Table 18 below lists some of the key historical earthquakes in Japan with fatality estimates.

Table 18: Significant Historical Japan earthquakes

Earthquake	Magnitude	Date	Number of Fatalities ¹
Kanto	7.9	Sept. 1, 1923	143,000
Tango	7.6	March 7, 1927	3,020
Sanriku	8.4	March 2, 1933	2,990
Tottori	7.4	Sept. 10, 1943	1,190
Tonankai	8.1	Dec. 7, 1944	1,000
Mikawa	7.1	Jan. 12, 1945	1,900
Tonankai	8.1	Dec. 20, 1946	1,330
Fukui	7.3	June 28, 1948	5,390
Kobe	6.9	Jan. 16, 1995	5,502
Hokkaido	8.3	Sept. 26, 2003	0
Niigata	7.2	Oct. 23, 2004	39
Kyushu	6.6	March 20, 2005	1
Great East Japan (Tohoku)	9.0	March 11, 2011	18,500

¹ Fatality counts are derived from a variety of reporting sources issued following each event and do not reflect likely fatalities if the event was to occur again today due to changes in population and building structures.

The most significant loss of life occurred during the Great Kanto Earthquake of 1923 which devastated Tokyo and Yokohama, killing 143,000 people. The majority of deaths were caused by fire storms that swept through the cities following the earthquake.

Earthquake Casualties

The exposed population is assigned one of seven injury states following an event, ranging from uninjured to fatal. Building collapse is responsible for the large majority of earthquake related deaths although the actual etiology can vary significantly from head injuries, asphyxia, crushing injuries and cardiovascular deaths to burns. There is also evidence of increased incidence of non-trauma related deaths during earthquakes such as increased stress leading to cardiac-related fatalities (especially where medical systems are overloaded) and deaths post-event related to exposure. The likelihood of fatalities during building collapse is dependent on building type which determines the probability of survival space remaining post-collapse.

The prevalence of high-rise buildings in Japan means there is the potential for mass casualties during the collapse of high-occupancy structures. These buildings in general are built to more stringent design codes and are less likely to collapse but events such as the 1995 Kobe earthquake illustrate that buildings designed to be earthquake proof can still fail. Mass casualties occurred in the 1999 Istanbul earthquake and 1985 Mexico City earthquake as a result of the collapse of high-rise buildings.

Earthquake Casualty Vulnerability Module

The stochastic event set and associated ground-shaking hazard used to calculate casualty rates is consistent with the RMS Japan Earthquake Model (see Appendix B). The vulnerability of a portfolio of human exposures to earthquakes is expressed through vulnerability functions or casualty rate curves. Earthquake casualty vulnerability functions represent the relationship between earthquake intensity and casualty rate, which is defined as the ratio of the number of people injured to the number of people exposed.

The earthquake casualty vulnerability module has been based on understanding of the impact of ground motion on different types of physical structures in which people may be located at the time an earthquake occurs alongside analyses of observed and reported casualties from historical earthquakes.

Vulnerability is mainly a function of construction type, occupation class, building height and year of construction. Construction class determines both the susceptibility of a building to collapse and its interior volume following a collapse. Certain types of buildings, such as steel frame buildings maintain their structural integrity better leaving large open areas that increase the chance of survival and escape/rescue. Masonry buildings retain little interior volume following collapse. The vulnerability of building types changes when design guidelines are updated or significant changes occur in construction practices so casualty rates will vary depending on the year of construction.

Using observed data from over 100 historical earthquakes around the world, with a strong emphasis on data from earthquakes in Japan, China, and Taiwan, various model components were calibrated by considering the casualty severity distribution in different construction classes with a primary focus on totally and partially collapsed buildings.

Components of Casualty Rates

Casualty rates are compiled using an event tree approach that considers the following general conditions that give rise to injuries and fatalities:

- People outside buildings are injured by falling cladding or building collapse
- People inside buildings that do not sustain significant structural damage, but may suffer injuries from non-structural hazards. This is a key cause of injuries in earthquakes, but mortality is usually limited.
- People inside buildings that partially collapse, totally collapse or sustain heavy damage. This is the most important cause of casualties in large earthquakes.

These broad conditions account for a number of model components that all contribute to the injury severity distribution (that is, the casualty rates) resulting from an earthquake. These components include:

- **Injury Causes** – Casualty rates account for all injury causes resulting from earthquake including not only the obvious consequences of buildings that collapse, but also fires, smoke inhalation, and injuries sustained while trying to evacuate.
- **Collapse** – The model estimates the probability of collapse for each building given the level of ground shaking. This approach factors in the possibility that for a given building stock there could be a small fraction of buildings that collapse (due to poor workmanship or poor maintenance, for example), even though the building stock is unlikely to suffer significant damage for any given earthquake shaking on average.

- **Entrapment** – Some portion of individuals inside a collapsed building will be able to evacuate while others may be trapped. A probability of entrapment is considered.
- **Event Response** – The ability of individuals to evacuate or be rescued if trapped is a function of the health and mobility of those people as well as rapid event response and deployment of fire suppression and search and rescue teams. The model is designed to apply to healthy, working-age adults; children, elderly, and less mobile individuals are less likely to survive and would have even greater casualty rates.
- **Orientation** – The orientation of people inside and outside a building at the time of the earthquake will affect resulting casualties. This level of information is almost always unknown and may be difficult to predict. Casualty rates assume that some portion of individuals will be outdoors in the vicinity of the location and that those indoors are dispersed throughout the building.
- **Spectral Response** – The RMS Earthquake Model for Japan use the spectral response approach to assess the performance of buildings. The expected impacts of this are factored into casualty rates.
- **Landslide and Liquefaction** – Earthquakes may cause landslides or liquefaction of soil that may increase injury severities and increase the proportion of people injured in an area. These phenomena are accounted for implicitly.
- **Fire** – Earthquakes may cause fires, which may result in a higher proportion of fatalities. Fire is accounted for implicitly, but a large conflagration, similar to what happened in the Great Kanto earthquake in Japan is not accounted for. The advances in firefighting and emergency response make this an extremely unlikely scenario today.

RMS STATISTICALLY MODELED PERILS

Model Overview

The purpose of the statistically modeled perils (collectively, “**Residual Risk Model**”) is to quantify the potential loss due to perils that are not explicitly structurally modeled (i.e., infectious disease, terrorism, and earthquake). Specifically, the model accounts for losses from storms, floods, extreme temperatures, accidents, mass movements, wildfires and volcanic eruptions as described below.

The Japan Residual Risk Model also includes an allowance for additional mortality from tsunamis and our modelling reflects this. The Residual Risk Model in respect of other regions does not include an allowance for deaths from tsunamis.

Storms

Storms include tropical cyclones (such as hurricanes in the Atlantic basin), extra-tropical cyclones and local convective storms (such as tornadoes). The deadliest storms of the 20th century have primarily occurred in Asia and include the 1970 Bhola cyclone, which caused 300,000 deaths in present-day Bangladesh as well as the 1922 Swatow typhoon which caused 100,000 deaths in China.

According to the National Oceanic and Atmospheric Administration (NOAA), the U.S. has been in an increased cycle of hurricane activity since 1995, and this trend is expected to continue for another 10 -20 years (NOAA 2005). The advanced warning from established meteorological agencies in the U.S. allows for preparation and evacuation prior to hurricanes. Hence, the most severe U.S. hurricane occurred prior to advances in meteorological technology; the 1900 Galveston Hurricane is associated with 6,000 to 12,000 deaths (Rappaport & Partagas, 1995).

Japan is frequently exposed to storms. During the period between 1 January 1951 and 31 December 2013, the RSMC Tokyo-Typhoon Center records that there have been an average of 26 tropical cyclones reaching tropical storm intensity or higher. The worst typhoon to make landfall in recent times occurred in September 1959 when the Isewan Typhoon struck Japan. The typhoon caused over 5,000 deaths, making it the deadliest typhoon in the country’s history.

As part of mainland Europe, storms have posed less of a threat to the population of France. Nonetheless these events can still occur. Notable examples include the Great Storm of 1987, Cyclone Lothar and Martin (1999) and Cyclone Xynthia (2010).

Some examples of deaths due to major storms are given in Table 19:

Table 19: Deaths due to major storms

Year	Country	Region	Deaths	Source
1959	Japan	Isewan Typhoon, central Japan,	~5,000	Hurricanes: Science and Society
1999	France	Cyclone Lothar and Martin, across most regions of France	88	EQE International
2005	U.S.	Hurricane Katrina, Louisiana,	~1,300	Blanchard 2006
2010	France	Cyclone Xynthia, Northern France	51	French News Online

Floods

Floods include slow-moving river floods that emerge from prolonged rainfall and/or rapid melt of snowpack, and flash floods resulting suddenly from convective storms or dam failures. The annual death toll from floods has decreased substantially since the 1800s in developed countries mainly due to improved warning systems and flood awareness.

The deadliest flood in the United States was the 1889 Johnstown flash flood, which killed approximately 2,200 people as a result of failure of the South Fork Dam 14 miles upstream of Johnstown, PA (Frank, 1988).

Some examples of deaths due to floods are shown in Table 20:

Table 20: Deaths due to floods

Year	Country	Region	Deaths	Source
1957	Japan	Isahaya	357	New York Times
1982	Japan	Nagasaki	345	PreventionWeb
1993	U.S.	Midwest	50	NOAA, 1996
2002	France	Gard	23	MEDDE

Extreme Temperatures

Historically, periods of excessively hot or cold weather typically increase mortality risk in infants, the infirm and the elderly, and often adversely affect those of lower socio-economic means. Recent increase in heat wave mortality and morbidity have been reported in cities in the U.S. (IPCC 2007; Luber and McGeehin 2008) and Europe (Hoffman et al. 2008; Robine et al. 2008). Examples include the 2003 European and 2010 Russian heat waves, resulting in upwards of respectively 70,000 (Larsen, 2006 & Robine 2008) and 56,000 deaths (Munich Re, 2011). France experienced a particularly high number of deaths in the 2003 heatwave with approximately 14,800 heat-related deaths, according to the French National Institute of Health. Most of these deaths were among the elderly.

Climate change, amplified by the heat island effect in inner city environments, is causing increased temperatures and urban risk of heatwaves (Freil 2010). In the United States, the most severe recent heat event occurred in the Midwest during the summer of 1980, with at least 1,300 excess deaths attributed to it (Karl & Qualy, 1981).

Historically the number of deaths attributable to heatwaves in Japan has not been significant. However, in recent years the country has experienced a number of heatwaves, notably in 2010 and 2013, and this has led to excess mortality.

Table 21 gives examples of some major heat waves:

Table 21: Deaths due to major heat waves

Year	Country	Region	Deaths	Source
1995	U.S.	Chicago	696	Whitman, 1997
2003	France	Across France	14,800	BBC
2010	Japan	Across Japan	170	ABC

Accidents

Accidents include industrial and transportation accidents. Historically, industrial accidents, such as nuclear power plant accidents and accidental emission of toxins, tend to impact population mortality over a relatively long time frame and direct causal links are difficult to establish.

For example, the 1986 Chernobyl nuclear accident immediately killed 30 people in the Soviet Union; however, there is still uncertainty surrounding how many deaths can be attributed subsequently to the accident and those due to cancers (IAEA, 2005). Likewise, the 2011 Fukushima nuclear accident remains a developing situation (IAEA, 2011) and the future mortality impact is unknown although to date there are no reported deaths.

Another historical accident is the 1984 Bhopal disaster in India in which a chemical plant released poisonous gas. While there are 3,787 deaths attributed directly to the gas release, up to another 25,000 deaths may be related (Dhara & Dhara, 2002).

The largest historical industrial accident in the United States is the 1947 Texas City disaster in which 576 people died after a ship loaded with ammonium nitrate caught fire in Texas City (Stephens, 2003).

Some examples are shown in Table 22:

Table 22: Deaths due to accidents

Year	Country	Event	Deaths	Source
1959	France	Malpasset Dam Disaster	412	History Channel
1985	Japan	Crash of Japan Airlines Flight 123	520	Daily Telegraph

Mass Movements

Mass movements include landslides, mudslides and avalanches. Landslides and mudslides are caused by saturation of the earth due to precipitation or snowmelt, rising groundwater pressure, loss of vegetation or erosion, with possible triggers being earthquakes, volcanic eruptions or human activity. Avalanches may additionally be caused by heavy snowfall or rapid warming of snowpack.

Two of the deadliest mass movements of the 20th century were triggered by earthquakes: the 1970 Huascarán avalanche in Peru and the 1949 Khait landslide in the Soviet Union, which led to 20,000 and 12,000 deaths, respectively.

The most devastating landslide (in terms of fatalities) in the United States was in 1928: the movement of an existing landslide caused the failure of the St. Francis Dam near Los Angeles. The resulting flash flood in the Santa Clarita valley claimed more than 500 lives (USGS, 2012).

Some examples of landslide and avalanche fatalities are shown in Table 23:

Table 23: Deaths due to mass movements

Year	Country	Source Region	Deaths	Source
1970	France	Avalanche near Val d'Isere ski resort	42	History Channel
1983	Japan	Landslides caused across Japan by Typhoon Forrest	117	PreventionWeb
2003	U.S.	San Bernardino County, California	16	Cannon, 2008

Wildfires

Wildfires can be ignited by natural causes (predominantly lightning) or human activity (such as sparking from electrical equipment, arson or loss of control of intentional burning).

The worst U.S. wildfire by number of deaths was the 1871 Peshtigo fire, which was fanned by strong winds. Approximately 1,500 died. Advances in mitigation, preparedness and firefighting response have made fatalities due to wildfire infrequent in the United States.

During the European Heatwave of 2003, there were a number of forest fires in southern France and five deaths were reported. Wildfires have not been a significant cause of death in Japan.

Volcanic Eruptions

Volcanic eruptions cause hazards such as lava eruptions, pyroclastic flows and carbon dioxide emission. Pyroclastic flows, comprising superheated gas and fragments of rock, were responsible for 30,000 deaths on the island of Martinique following the 1902 eruption of Mount Pelée (Tilling, 1985).

Japan is situated in an active volcanic region – the country contains roughly 10% of the world's active volcanoes. Eruptions occur sporadically and these were responsible for hundreds of deaths during the 20th century. The table below summarises some notable incidents. The eruption of Mount Ontake which caused the death of over 50 people also provides a recent example of this threat,

The 1980 eruption of Mount St. Helens is the deadliest in United States' history and caused 57 deaths.

There have been no deaths reported in France which were attributable to volcanic eruptions.

Table 24: Deaths due to volcanic eruptions

Year	Country	Volcano	Deaths	Source
1902	Japan	Torishima	125	Japan Meteorological Agency
1914	Japan	Sakurajima	58	Japan Meteorological Agency
1926	Japan	Tokachi	144	Japan Meteorological Agency
1991	Japan	Mount Unzen	43	Japan Meteorological Agency

Tsunamis

Tsunamis are a series of waves generated by the displacement of a large volume of water by a large geologic disturbance (such as an earthquake, landslide, volcanic eruption, or meteorite impact). Typically these are associated with earthquake fault displacement on the interface of a subduction zone or in the over-riding plate, or from an underwater or sub-aerial landslide.

In theory tsunamis are a threat to any population within reach of the coast. In practice, tsunamis are very rare in parts of the world and the threat of significant casualties from a tsunami in these regions is very low. For this reason tsunami risk is typically excluded from the Residual Risk Model and this is the case for the regions of France, Hong Kong and the U.S..

However, in some parts of the world tsunamis are relatively common occurrences and pose a significant threat to the local populace, notwithstanding the additional early warning and defense systems which may be installed to mitigate this risk. This is the case with Japan and for this reason the Residual Risk Model does make an allowance for tsunami risk in this region.

Table 25 details significant tsunami incidents which have been observed in past centuries. It does not include the M9.0 1700 Cascadia subduction zone tsunami which affected large portions of the western coast of the United States as this does not have a reliable estimate of fatalities, however it is likely that this event severely impacted the native populations at the time.

Table 245: Historical Tsunamis Causing >10,000 Recorded Deaths (NOAA, 2014)

Year	Source Country	Source Region	Total Deaths
2004	Indonesia	Off W. Coast of Sumatra	227,898
1755	Portugal	Lisbon	60,000
1883	Indonesia	Krakatau	36,000
1498	Japan	Enshunada Sea	31,000
1707	Japan	Nankaido	30,000
1896	Japan	Sanriku	27,122
1868	Chile	N. Chile	25,000
1792	Japan	Shimabara Bay, Kyushu Island	14,818
2011	Japan	Honshu Island	18,500
1771	Japan	Ryukyu Islands	13,486

1765 China	South China Sea	10,000
------------	-----------------	--------

RMS has conducted a separate analysis of potential tsunami scenarios for both Japan and the United States, which is detailed in a separate section. This analysis has been included for informational purposes only, and does not form part of the probabilistic Risk Analysis.

Methodology

The RMS Residual Risk Model, unlike the event-based models used for infectious disease, terrorism and earthquake, is statistical. The model is international in scope, combining comprehensive historical event data from 26 developed countries over the period 1900 to 2011 including the U.S., Japan and France.²

The countries included have levels of disaster preparedness comparable to that of the U.S. and their combined historical record provides a richer body of experience than that of a single country alone.

The model uses the most comprehensive possible set of data and no adjustments are made to account for changes in risk over time. Improvements in preparedness over the past century would likely cause past events to have less impact in the present and future, resulting in this approach offering a conservative view of risk.

Historical excess mortality rate data are obtained from the CRED International Disasters Database (CRED, 2012).

The mortality rate distribution for each peril is obtained by sampling from all mortality rates for that peril across countries and years. The overall residual mortality rate distribution is the mathematical combination (convolution) of the mortality rate distributions for the individual perils. Finally, the exceedance probability ('EP') curve of the overall distribution, which plots the probability of exceeding a loss rate versus increasing loss rate, is fit using a Pareto distribution. EP curve fits using both exponential and lognormal distributions were explored, resulting in an immaterial difference in loss rates compared to the Pareto fit.

There is an additional adjustment when fitting the EP curve in respect of Japan in order to incorporate the peril of tsunami risk.

² The selected countries are the United States, Canada, Australia, Japan, and selected European countries of population exceeding 4 million; namely, Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. Countries of population less than 4 million were excluded because their low populations increase variance in loss rates while their additional data do little to further refine the loss estimates.

RMS HUMAN EXPOSURE DATABASES

In order to model the number of deaths associated with any terrorism or earthquake event, detailed data describing the geographic distribution of the population is required. Areas at greatest risk are those with the highest concentrations of people i.e. major urban metropolises.

This concentration is greatest in the weekday daytime when workers are at their offices. In order to model the full potential of the casualty risk associated with terrorist attacks and earthquake events, this daytime population was used in the Risk Analysis.

RMS U.S. Terrorism and Earthquake Human Exposure Database

The total human exposure database for the perils of U.S. terrorism and earthquake was designed to represent the U.S. general population distribution using both the RMS Industry Exposure database (“IED”) for U.S. workers, and the data from the U.S. Census Bureau (U.S. Census Bureau, 2011) for the non-working population.

The total U.S. population is estimated to be 318.9 million, using the latest United States Census (2010) (U.S. Census Bureau, 2010) extrapolated to July 1 2014 using the latest U.S. population estimates (U.S. Census Bureau, 2014).

Workers Exposure Database Overview

RMS uses a proprietary IED for employee counts in specific buildings and key urban areas with vintages of 2011 (“**RMS Workers IED**”). RMS generates exposures at the building-level resolution where possible and uses the RMS variable resolution grid (VRG) in all other cases.

The RMS variable resolution grid is used to capture data at finer resolutions in dense urban areas and at lower resolutions in rural or unpopulated areas. In major urban areas, the level of resolution is represented using grids as small as 50 meters. Combining the building-level and VRG-level exposure data for human exposures results in revised IEDs suitable for terrorism analysis.

Enhancing the industry exposure begins by estimating employee counts for individual buildings in metropolitan areas. A variety of public and commercial sources were used to generate building footprint and attribute data for approximately 1.2 million buildings in the U.S., with a focus on the major urban areas. At least partial building level coverage exists for the main business districts of the U.S. cities at greatest risk from terrorism.

Employee counts are estimated using a variety of public and commercial sources. For different building occupancies, the average number of employees per square foot is used to infer the working population in specific buildings. Estimated employee counts are checked for reasonableness and are compared with existing aggregate exposure data.

After building-level exposures are independently estimated, the remaining industry exposure is distributed to the remaining areas not covered by building-level data. Using national land-cover data and other available information sources, this industry data is spread to finer levels of resolution than previously existed.

Through the process outlined above, RMS has developed a mixed vintage IED at the building and VRG levels of geographic resolution. The RMS Workers IED contains a total of 102.1 million U.S. workers in all U.S. States except Alaska (where no target exists in the RMS U.S. Terrorism Model).

Non-Workers Exposure Database Overview

To generate the distribution of the U.S. population not accounted for already within the RMS Workers IED (“Non-workers”), RMS calculated the difference between the overall population total and the workers present in the RMS Workers IED using U.S. Census 2010 state level population distribution data (U.S. Census Bureau, 2010). The state level non-working population was then disaggregated to county level, using weightings based on U.S. Census 2010 county resident populations (U.S. Census Bureau, 2010). An adjustment was made for District of Columbia to take into account commuting patterns, using a report on employment-residence ratios by the U.S. Census Bureau (U.S. Census Bureau, 2000). It was assumed that these ratios have remained constant since the date of publishing.

Each county population was then adjusted using population estimates from the U.S. Census Bureau (U.S. Census Bureau, 2012).

A further step is needed to disaggregate the ZIP code level exposure down to the same VRG grid as the RMS Workers IED. This was accomplished using Census 2000 data (U.S. Census Bureau, 2000) and national land cover data. This yields a high resolution exposure database representing the U.S. general population suitable for terrorism analysis.

Finally the July 1 2014 national population estimate of 318.9 million (U.S. Census Bureau, 2014) has been used to scale the population to form the U.S. Terrorism and Earthquake Human Exposure Database for mid-2014.

Exposure Summary

A breakdown of total human exposure by state is presented in Table 256:

Table 256: Exposure by State

State	Population	State	Population
Alabama	4,952,065	Montana	1,021,821
Alaska	733,572	Nebraska	1,887,582
Arizona	6,588,252	Nevada	2,780,600
Arkansas	3,018,341	New Hampshire	1,351,138
California	38,498,441	New Jersey	9,101,141
Colorado	5,195,704	New Mexico	2,142,055
Connecticut	3,711,543	New York	19,979,449
Delaware	936,944	North Carolina	9,843,401
District of Columbia	1,044,283	North Dakota	696,475
Florida	19,432,586	Ohio	11,957,821
Georgia	9,999,864	Oklahoma	3,872,835
Hawaii	1,405,006	Oregon	3,954,603
Idaho	1,618,688	Pennsylvania	13,119,931
Illinois	13,266,835	Rhode Island	1,081,477
Indiana	6,716,103	South Carolina	4,775,831
Iowa	3,140,092	South Dakota	839,909
Kansas	2,950,770	Tennessee	6,510,422
Kentucky	4,475,312	Texas	25,958,891
Louisiana	4,677,470	Utah	2,854,575
Maine	1,376,603	Vermont	643,220
Maryland	5,787,957	Virginia	8,035,445
Massachusetts	6,761,778	Washington	6,949,232
Michigan	10,204,991	West Virginia	1,859,822
Minnesota	5,471,791	Wisconsin	5,881,971
Mississippi	3,073,310	Wyoming	580,997
Missouri	6,173,161	Total	318,892,103

RMS Japan Earthquake Human Exposure Database

The daytime population distribution of Japan has been represented by a human exposure database created from the latest Japan Census data (Statistics Bureau, 2010). The 2010 Census provides nighttime and daytime population estimates by prefecture and by municipality which is the finest geographical resolution available.

A program of municipal mergers has been taking place in Japan over the last decade and the 2010 Census municipalities have been mapped to 2007 vintage consistent with the RMS Japan Earthquake Model. Where municipalities have been merged the constituent populations have been summed. The resulting population distribution is defined for 1,905 municipalities with an average land area of 196 sq km and an average population of ~ 67,000. Municipalities within densely populated cities typically occupy a smaller geographical extent, for example, Tokyo is broken down into 23 municipalities with an average land area of 27 sq km.

The trend in population growth by prefecture was calculated using Japan Statistics Bureau annual (inter-census) population estimates (Statistics Bureau, 2014) and used to project the 2010 data forward to 2013. Finally the latest available national monthly population estimate of 127.1 million (Statistics Bureau, July 1 2014) has been used to scale the population to form the Japan Earthquake Human Exposure Database for mid-2014.

Exposure Summary

A breakdown of total human exposure by prefecture is presented in Table 267:

Table 267: Exposure by Prefecture

Prefecture	Population	Prefecture	Population
Aichi	7,540,210	Miyazaki	1,118,372
Akita	1,046,783	Nagano	2,115,306
Aomori	1,333,273	Nagasaki	1,391,094
Chiba	5,528,912	Nara	1,241,363
Ehime	1,404,228	Niigata	2,326,036
Fukui	794,004	Oita	1,176,180
Fukuoka	5,087,048	Okayama	1,924,488
Fukushima	1,935,025	Okinawa	1,411,937
Gifu	1,965,465	Osaka	9,247,090
Gunma	1,977,583	Saga	840,327
Hiroshima	2,842,683	Saitama	6,386,428
Hokkaido	5,419,377	Shiga	1,365,918
Hyogo	5,309,548	Shimane	700,874
Ibaraki	2,843,905	Shizuoka	3,711,197
Ishikawa	1,159,393	Tochigi	1,965,158
Iwate	1,288,821	Tokushima	766,460
Kagawa	985,245	Tokyo	15,714,577
Kagoshima	1,675,197	Tottori	576,834
Kanagawa	8,267,445	Toyama	1,072,195
Kochi	742,725	Wakayama	958,518
Kumamoto	1,790,286	Yamagata	1,136,972
Kyoto	2,644,337	Yamaguchi	1,410,435
Mie	1,795,664	Yamanashi	837,442
Miyagi	2,327,637	Total	127,100,000

RMS France Terrorism Human Exposure Database

A database of the French daytime working and non-working population was first created at municipality resolution by combining municipality level worker information from the French National Institute of Statistics and Economic Studies (INSEE) and municipality level population data from GfK GeoMarketing (GfK GeoMarketing, 2008). The French daytime working population by municipality was calculated directly from INSEE population at place-of-work data (INSEE, 2008). The non-working population in each municipality was assumed to equal the total resident population of the municipality from the GfK

data minus the working population at place of residence from the INSEE data. The non-working population is assumed to have the same day and night time distribution.

Before analysis, total France population estimates were used to scale both datasets to mid-2014 (INSEE, 2014). It was necessary to assume that relative commuting patterns have remained constant over the period 2009-2014 and that the total number of people commuting has increased at the same growth rate as the population.

The RMS France Terrorism model requires a finer resolution distribution of the daytime population than municipality level for accurate risk analysis results. This was achieved by disaggregating the municipality level daytime working and non-working populations to a single daytime population distributed on the RMS variable resolution grid (VRG). The RMS variable resolution grid is used to capture data at finer resolutions in dense urban areas and at lower resolutions in rural or unpopulated areas.

Disaggregation to VRG-level was achieved in two stages. First, 1 km resolution LandScan population data was used to distribute the two populations onto a 1 km grid. Land Use and Land Cover (LULC) data from the 15 m JPL ASTER data set has been processed by RMS to provide disaggregation weights by VRG for residential, commercial and industrial lines of business. Residential weightings were used to distribute the non-working population and commercial and industrial weightings were used to distribute the working population onto the VRG grid.

The total France daytime population estimated for mid-2014 is 64.4 million.

Exposure Summary

A breakdown of total human exposure by region is presented in Table 278:

Table 278: Exposure by Region

Region	Population	Region	Population
Alsace	1,883,431	Languedoc-Roussillon	2,720,899
Aquitaine	3,335,036	Limousin	761,478
Auvergne	1,388,443	Lorraine	2,400,437
Basse-Normandie	1,516,333	Midi-Pyrénées	2,979,382
Bourgogne	1,689,939	Nord-Pas-de-Calais	4,100,026
Bretagne	3,312,636	Pays de la Loire	3,697,275
Centre	2,621,741	Picardie	1,960,633
Champagne-Ardenne	1,369,945	Poitou-Charentes	1,827,613
Corse	318,869	Provence-Alpes-Côte d'Azur	4,989,115
Franche-Comté	1,207,040	Rhône-Alpes	6,423,828
Haute-Normandie	1,877,288		
Île-de-France	11,978,030	Total	64,359,415

TSUNAMI SCENARIO MODELING

The models used in the Risk Analysis focus on those risks RMS views as most likely to cause loss to the Notes. This section describes additional tsunami scenarios which have not been explicitly modeled. These scenarios have been included for informational purposes only, and do not form part of the probabilistic RMS Risk Analysis Results.

Tsunamis are a series of waves generated by the displacement of a large volume of water by a large geologic disturbance (such as an earthquake, landslide, volcanic eruption, or meteorite impact). Typically, tsunami risk is associated with earthquake fault displacement on the interface of a subduction zone or in the over-riding plate, or from an underwater or sub-aerial landslide. Underwater landslides can be triggered by a subocean crustal fault earthquake that is not otherwise capable of producing a tsunami. Earthquakes in the subducting plate rarely generate severe tsunamis as the resulting displacement on the ocean floor is limited.

In our tsunami scenario modelling we have restricted our attention to Japan and the U.S. which are perceived to be the regions most at risk of a significant tsunami event. The tsunami events have been modeled based on potential tsunamigenic earthquakes that could occur on major subduction zones.

Japan

Japan is situated at the meeting points of several tectonic plates and these unstable regions are frequently the source of volcanic and earthquake activity. This leaves Japan particularly vulnerable to the threat of tsunamis, including the risk of near shore tsunamis that strike with little warning. It is estimated that 40% of near shore tsunamis hit the Japan coastline within 20 minutes of an earthquake occurring. To defend itself against this threat, Japan has invested significant resources into mitigating the impact of tsunami disasters. These defenses include extensive seawalls and an early warning system that aims to alert inhabitants to incoming tsunamis within three minutes of an earthquake occurring.

Exposed regions

The positions of the four main tectonic plates surrounding Japan show that most areas of the country are at risk of tsunami damage. The regions affected by a tsunami would vary depending on the source of the event. For example, a tsunami arising from activity between the Eurasian Plate and the North American Plate could cause damage to the north side of the country whilst leaving the south unscathed; in contrast, activity between the Pacific Plate and the Philippine Sea Plate could affect the southern side without impacting on the north. Seismic activity is possible at any point on the fault lines and so most areas within reach of the coast are prone to the risk of a tsunami.



Source: GLGArcts.net

Historical record

Table 29 details the five largest tsunamis to impact Japan by recorded deaths. Some of these events would pose a risk to the Classes of Notes. It should be noted that many of these tsunamis were caused by earthquakes which impacted Japan directly and therefore some of the fatalities recorded would have been attributable to the earthquake. Fatalities from earthquakes are already included in the Risk Analysis. For reference, Japan first created an early warning system for tsunami threats in 1941.

Table 289: Five Largest Tsunamis to Impact Japan by Recorded Deaths (NOAA, 2011)

Year	Source	Deaths
1923	Sagami Gulf earthquake	101,000
1896	Enshunada Sea earthquake	31,000
1498	Sanriku earthquake	27,000
1293	Kamakura earthquake	23,000
2011	Tohoku earthquake	18,500

RMS Tsunami Scenario modelling

RMS has modeled the fatalities which would arise from three hypothetical tsunami incidents:

1. A tsunami similar to the one caused by the 2011 Tohoku earthquake
2. The impact of a 9.0 magnitude earthquake originating from the Nankai Trough
3. The impact of a 9.0 magnitude earthquake originating from the Ryukyu Trench

RMS has modeled these scenarios using its proprietary RMS Global Tsunami Scenario Catalog. In each case the exposed population was estimated using information from the RMS Japan Earthquake Human Exposure Database. For the purposes of the modelling it was assumed that the population of each prefecture was spread uniformly across the region.

The RMS Global Tsunami Scenario Catalog identifies areas that would be affected by a tsunami incident. These areas are graded according to the depth of water estimated in each area. The RMS Global Tsunami Scenario Catalog contains six distinct grades, the shallowest grade describing peak water depths of less than 1.5 meters, the highest grade indicating peak water depths in excess of 9.0 meters.

Scenarios within the Global Tsunami Scenario Catalog were generated in three sequential stages: Event Generation, Ocean Wave Propagation, and Coastal Inundation. In the Event Generation stage, RMS modeled the seafloor deformation based on the scenario event rupture and used this to estimate initial wave conditions in the near-field from the seafloor deformation. In the next stage, RMS modeled how these waves would propagate across the ocean, employing a numerical solver to approximate 2D shallow water wave equations over both the ocean and complex topography using a finite volume approach. The final stage of the scenario generation involved modelling the movement of water along the wet/dry interface allowing for variable land friction, based on information from the Global Land Cover Characteristics Database by the United States Geological Survey (USGS, 2000).

It should be noted that the generation of scenario events within the Global Tsunami Scenario Catalog does not include tidal dynamics. The model uses mean sea level as the baseline vertical datum.

RMS tested and validated the methodology used to model the three stage tsunami lifecycle against available ground truth observation data for several recent historical events. Coastal inundations were first modeled using published slip distributions for the historical events, where available. The numerical results were then compared to observed inundations during the actual event. Observation data were based on human eye-witness accounts or were instrumentally recorded (NOAA, 2013).

In order to estimate the number of deaths in each of the areas affected by a tsunami, RMS has relied upon research conducted by Koshimura et al (2009). This research, entitled "Developing Fragility Functions for Tsunami damage estimation using numerical model and post-tsunami data from Banda Aceh, Indonesia" provides a credible fragility function for estimating

tsunami casualties at different levels of inundation, using mortality data observed from the 26 December 2004 Tsunami. RMS has used the same parameterization as the researchers to estimate the death ratio at different inundation depths in the event of a Japan tsunami.

The Japanese population is well-educated on the dangers of tsunami events and benefits from a sophisticated early warning system and other tsunami defense mechanisms. In the event of a tsunami it is likely that that a significant portion of the population would evacuate to safer areas before the tsunami hit land, even in the case of a near shore tsunami. RMS has allowed for this in its modelling by making an initial assessment of the proportion of the population exposed to each inundation grade; we have then assumed that these individuals evacuate to an area where the inundation grade is two levels lower by the time the tsunami strikes. For example:

Inundation grade	Initial assessment of population exposed to inundation grade	Final assessment of population exposed to inundation grade, allowing for evacuation to safer regions
0.0m to 1.5m	20%	8%
1.5m to 3.0m	10%	5%
3.0m to 4.5m	8%	2%
4.5m to 6.0m	5%	1%
6.0m to 9.0m	2%	Nil
9.0m or higher	1%	Nil

Numbers are for illustration purposes only.

RMS has assumed that anyone initially situated in 0.0m to 1.5m or 1.5m to 3.0m inundation regions will evacuate to a safe, unaffected area by the time the tsunami strikes and so they are removed from the exposed population.

Japan Scenario 1: A repeat of the 2011 Tohoku Tsunami

The Tohoku tsunami occurred on 11 March 2011 and was one of the most devastating natural disasters to strike Japan in recent times. The tsunami was caused by a magnitude 9.0 earthquake off the Pacific coast of Tohoku. Official statistics estimate that 16,000 people were killed, 6,000 were injured and 2,500 were missing (as at February 2014) as a result of the disaster. Some of the loss of life was due to the earthquake but the majority of the deaths were caused by the tsunami – some estimates suggest that deaths due to drowning were responsible for 90% of the fatalities.

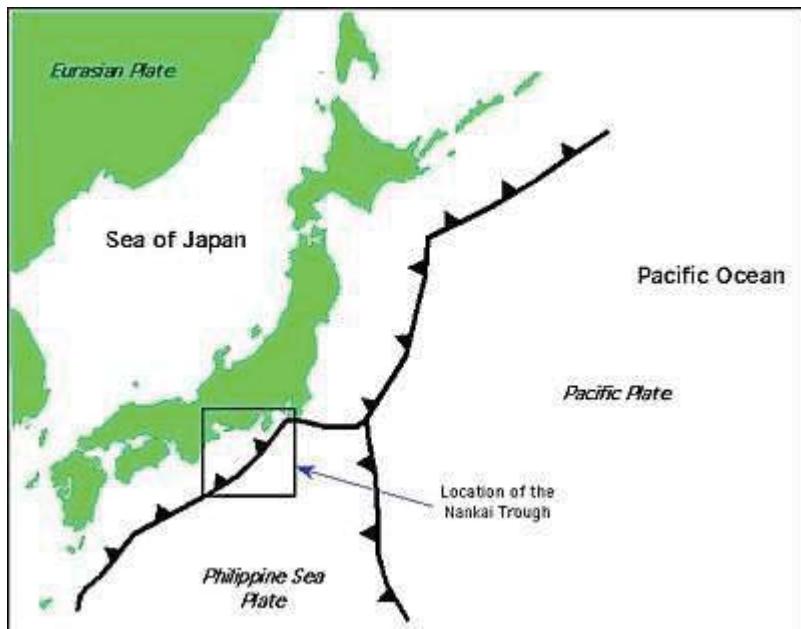
The map below shows the projected impact of a repeat of the 2011 Tohoku tsunami according to our modelling. Areas affected by the flooding are marked in red, with thicker shading applied where the inundation depths are greater.



Our modelling predicts that there would be 17,000 deaths in this scenario.

Japan Scenario 2: The impact of a 9.0 magnitude earthquake originating from the Nankai Trough

The Nankai Trough is an underwater trough approximately 900 kilometers in length off the south coast of Japan. The area marks a subduction zone where the Phillipine Sea Plate is moving under the Eurasian Plate.



Source: Wikipedia

The Nankai trough has been the source of multiple mega-thrust earthquakes in the past, responsible for at least six 8.0 magnitude earthquakes since 1500, all of which resulted in a tsunami. It is feared that a future event is likely at some stage and that this would cause significant destruction in Japan. The seriousness of the threat was enough to persuade the Japanese Government to implement a 10 year program in March 2014 aimed at reducing the loss of life from such an event.

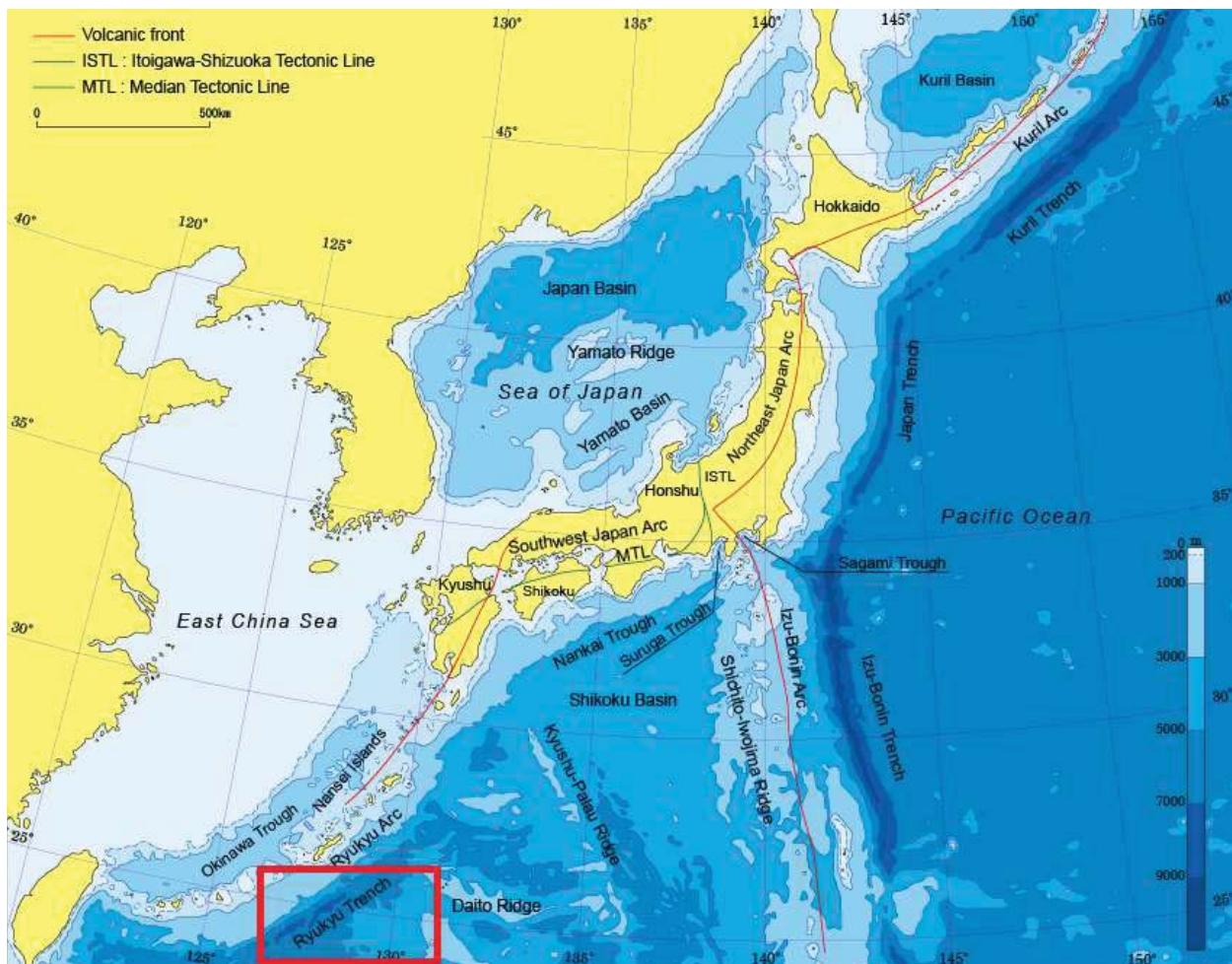
RMS has modeled the impact of a hypothetical 9.0 earthquake originating from the Nankai Trough. The map below shows the projected impact of this event. Areas affected by the flooding are marked in red, with thicker shading applied where the inundation depths are greater.



Our modelling predicts that there would be 50,000 deaths in this scenario.

Japan Scenario 3: The impact of a 9.0 magnitude earthquake originating from the Ryukyu Trench

The Ryukyu Trench is an underwater trench approximately 1,400 kilometers in length off the southeastern side of the Ryukyu Islands of Japan. Similar to the Nankai Trough, the area marks a subduction zone where the Phillipine Sea Plate is moving under the Eurasian Plate.



Source: GLGArcts.net

Earthquakes along the Ryukyu Trench are thought to be responsible for a number of tsunami incidents. The largest recorded earthquake was magnitude 7.5 and occurred on 1 April 1968. It is likely that a tsunami originating from the Ryukyu Trench would not lead to significant loss of life on the mainland of Japan as the warning systems would give civilians sufficient time to evacuate any regions at risk. However, the Prefecture of Okinawa, which includes hundreds of Ryukyu Islands, lies in close proximity to the Ryukyu Trench and any inhabitants would be vulnerable to this tsunami threat.

RMS has modeled the impact of a hypothetical 9.0 magnitude earthquake originating from the Ryukyu Trench. Our modelling predicts that there would be 18,000 deaths in this scenario.

United States

The United States is principally exposed to the risk of tsunamis generated by local subduction zones, suboceanic crustal faults and the Pacific 'Ring of Fire' subduction zones including those in Japan and South America. Fatalities from the latter would likely be mitigated by the Pacific Early Warning System and our modelling will concentrate on local sources. As an example, the tsunami generated by the March 11, 2011 Tohoku earthquake took 8 hours to reach Hawaii and 10 hours to reach the Californian coast.

The western coast of the United States and Canada is vulnerable to tsunamis locally generated by the Cascadia subduction zone and the Aleutian-Alaskan subduction zone.

Cascadia Subduction Zone

The Cascadia subduction zone runs 1,200km in length off the west coast of the United States and Canada from Northern California to northern Vancouver Island and forms the plate boundary between the Juan de Fuca and North America plates. The historical record of earthquakes on the plate boundary is scarce but sedimentary records of tsunami deposits indicate a recurrence interval of ~500-600 years for great earthquakes (>M8.0) associated with tsunamis (Personius, S.F., and Nelson, A.R., 2005). Studies suggest that almost the entire subduction zone could have ruptured in the January 26, 1700 M9.0 earthquake causing a tsunami that affected large parts of the north-western coast of the United States but which is poorly recorded in the historical record (Personius, S.F., and Nelson, A.R., 2005; Dunbar, P. K., & Weaver, C. S., 2008).

The Cascadia subduction zone is modeled in the RMS U.S. Earthquake Model with a recurrence interval of ~300 years for >M8.0 interface events and ~750 years for a full rupture of the subduction zone interface (>M8.8).

Aleutian-Alaskan Subduction Zone

Great earthquakes (>M8.0) generated by movement on the Aleutian-Alaskan subduction zone interface are modeled with a recurrence interval of ~30 years in the RMS U.S. Earthquake Model and magnitude 9+ earthquakes with a recurrence interval of ~400 years. The high recurrence of large earthquakes on this subduction zone and other local sources means that Alaska along with Hawaii bears the highest risk of tsunamis which is borne out by the number of historical fatalities compared to other regions in the U.S. (Dunbar, P. K., & Weaver, C. S., 2008).

Exposed Regions

Pacific North-West and Alaska (U.S.)

The Pacific North-West is vulnerable to tsunamis generated by the Cascadia subduction zone and further afield by the Aleutian-Alaskan subduction zone. The exposed population within the tsunami inundation zone for the State of Oregon is estimated to be 22,201 residents, 14,857 employees and 53,714 daily visitors to coastal Oregon state parks (Wood, N., 2007a). A similar study conducted in the State of Washington estimates that 42,972 residents, 24,934 employees and an average daily 17,029 visitors to coastal Washington State Parks (Wood, N., 2008) are within the tsunami inundation at any one time.

The largest city in the State of Washington, Seattle, is largely protected from tsunamis generated by the Cascadia Subduction Zone by the Strait of Juan de Fuca and the Olympic Peninsula but has some risk from tsunamis generated by shallow local events on the Seattle Fault or others within the Puget Sound.

Alaska is more sparsely populated; as of 2009 it was estimated that 585,000 people live in coastal counties along a roughly 6000 mile coastline (U.S. Census Bureau, 2011). An unknown fraction will live within the potential inundation zone from tsunamis generated by the Aleutian-Alaskan subduction zone.

California (U.S.)

Using a maximum tsunami-inundation zone developed for California, Wood (2013) estimated that 267,347 residents and 168,565 employees were exposed to tsunami hazards in this area. This population can increase substantially during peak holiday periods, with some estimating it can swell to more than 3 million. The risk can be differentiated geographically within California; Northern California is exposed to tsunamis generated by the Cascadia subduction zone (principally Humboldt and Del Norte counties) and Southern California (Los Angeles, Orange, San Diego counties) is exposed to tsunamis generated by smaller magnitude events on near-shore faults. The coastal population of California is concentrated in Central and Southern

California; only an estimated 160,000 people reside within Humboldt and Del Norte counties according to the 2010 U.S. Census.

Hawaii (U.S.)

Hawaii is vulnerable to both tsunamis generated locally and from any ocean-crossing tsunamis generated along the Pacific Ring of Fire. The exposed population is estimated to be 80,443 residents, 67,113 employees along with an average of 50,174 daily visitors to hotels (Wood, N., 2007b).

Atlantic and Gulf Coast (U.S.)

The historical record reveals no reported fatalities or damages due to tsunamis on the Atlantic and Gulf Coasts and no events with a recorded run-up of greater than 1m (Dunbar, P. K., & Weaver, C. S., 2008). Potential sources include landslides generated by small sub-ocean Atlantic or Caribbean coastal earthquakes or by other means. The exposed population is estimated to be 2,861 residents and 7,150 employees in the maximum tsunami hazard zones (Wood, N., 2015).

Historical Record

The most severe Tsunami event reported in the historical record for the United States was the 1946 Alaska Tsunami. 164 deaths were reported, far below the level needed to pose a risk to the Classes of Notes. There are a total of 746 reported deaths due to tsunami for the U.S. with 326 in Hawaii, 222 in Alaska, 25 on the U.S. West Coast, 1 in the U.S. Pacific Island Territories and 172 in Puerto Rico and the Virgin Islands (Dunbar, P. K., & Weaver, C. S., 2008). There are no reported deaths or property damages from tsunami for the Atlantic and Gulf coast and no recorded tsunami run-up greater than 1m. The five largest tsunamis to impact the U.S. in terms of fatalities are shown in **Error! Reference source not found.**30.

Table 30: Five Largest Tsunamis to Impact the U.S. by Recorded Deaths (NOAA, 2014)

Year	Source Region	U.S. Deaths
1946	Unimak Island, Alaska	164
1918	Mona Passage, Puerto Rico	142
1964	Prince William Sound, Alaska	124
1845	South-East Alaska	100
1960	Chile	64

Note that the M9.0 1700 Cascadia subduction zone tsunami which affected large portions of the western coast of the United States does not have a reliable estimate of fatalities and could have severely impacted the native populations (Dunbar, P. K., & Weaver, C. S., 2008). Tsunamis earlier than 200 to 250 years ago impacting the U.S. have a lower likelihood of being present in the historical record or having an accurate number of reported deaths.

RMS Tsunami Scenario modelling

RMS has modeled the fatalities which would arise from three hypothetical tsunami incidents:

1. A tsunami similar to the M9.0 1700 Cascadia subduction zone tsunami
2. A tsunami similar to the 1946 Alaska tsunami
3. A tsunami similar to the 1960 Chile tsunami

As with the Japan tsunami scenario modelling, RMS has modeled these scenarios using its proprietary RMS Global Tsunami Scenario Catalog.

In each case the exposed population was estimated using the RMS U.S. Terrorism and Earthquake Human Exposure Database. For the purposes of the tsunami modeling, exposures at the building-level resolution were used where possible. In all other cases the RMS variable resolution grid (VRG) was used to derive VRG-level exposure data.

Scenarios within the Global Tsunami Scenario Catalog were generated in three sequential stages: Event Generation, Ocean Wave Propagation, and Coastal Inundation. In the Event Generation stage, RMS modeled the seafloor deformation based on the scenario event rupture and used this to estimate initial wave conditions in the near-field from the seafloor deformation. In the next stage, RMS modeled how these waves would propagate across the ocean, employing a numerical solver to approximate 2D shallow water wave equations over both the ocean and complex topography using a finite volume approach. The final stage of the scenario generation involved modelling the movement of water along the wet/dry interface allowing for variable land friction, based on information from the Global Land Cover Characteristics Database by the United States Geological Survey (USGS, 2000).

It should be noted that the generation of scenario events within the Global Tsunami Scenario Catalog does not include tidal dynamics. The model uses mean sea level as the baseline vertical datum.

RMS tested and validated the methodology used to model the three stage tsunami lifecycle against available ground truth observation data for several recent historical events. Coastal inundations were first modeled using published slip distributions for the historical events, where available. The numerical results were then compared to observed inundations during the actual event. Observation data were based on human eye-witness accounts or were instrumentally recorded (NOAA, 2013).

In order to assess the number of deaths from tsunami incidents in the U.S., RMS has followed the same approach to its modelling of the Japan tsunami scenarios. However, RMS has not assumed that the U.S. population will have time to evacuate to less affected areas. Tsunamis have not been responsible for a significant number of deaths in the U.S. and the country does not have a comparable early warning system in place capable of quickly and effectively warning the population of a near shore tsunami. Moreover, the U.S. population is less well-educated than the Japanese population on how to respond to the threat of a tsunami and we anticipate that affected civilians would take less effective action to protect themselves. This was observed in Hawaii during the Great Chilean earthquake of 1960 when, despite the tsunami warning system sounding, some residents chose to ignore the alert.

It is possible that in the aftermath of a significant tsunami incident there could be disruption to the provision of basic human necessities such as water, food and energy. This problem could be particularly acute in isolated areas such as some parts of Alaska and it is conceivable that these shortages might exacerbate the number of fatalities. Our modelling has not allowed for this risk.

U.S. Scenario 1: A tsunami similar to the M9.0 1700 Cascadia subduction zone tsunami

On 26 January 1700 a 9.0 magnitude earthquake originating from the Cascadia subduction zone caused a tsunami which inflicted damage across the Pacific. It is difficult to describe the impact of the tsunami on the U.S. due to a lack of historical records, but using modern simulations experts have estimated that a similar tsunami could produce waves as high as 80 to 100 feet in Oregon.

RMS has modeled the impact of a tsunami similar to the 1700 event. Areas affected by the flooding are marked in red, with thicker shading applied where the inundation depths are greater.



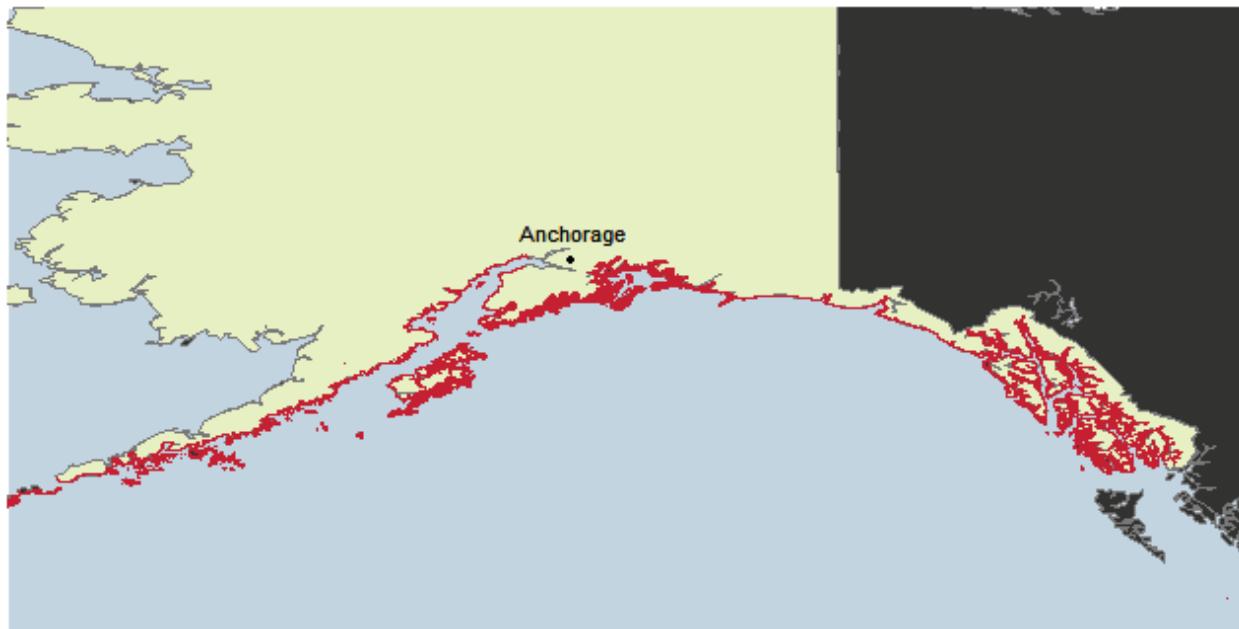
Our modelling predicts that there would be 8,000 deaths in this scenario.

U.S. Scenario 2: A tsunami similar to the 1946 Alaska tsunami

On 1 April 1946 a 7.4 magnitude earthquake originating from the Aleutian-Alaskan subduction zone caused a tsunami which inflicted damage on Hawaii and the west coast of the U.S.. The mainland of Alaska was shielded to some extent by the Aleutian Islands, which absorbed most of the impact of the tsunami. In Hawaii the tsunami struck less than five hours after the earthquake, with waves over 30 feet that inundated areas up to half a mile inland. Washington, Oregon and California were also hit by significant waves.

The 1946 tsunami was responsible for 164 deaths, marking it as the largest recorded tsunami incident in the U.S. by number of deaths.

RMS has modeled the impact of a tsunami similar to the 1946 event. Areas affected by the flooding are marked in red, with thicker shading applied where the inundation depths are greater.



Our modelling predicts that there would be 150 deaths in this scenario.

NON-MODELED EXCESS MORTALITY RISKS

This Risk Analysis focuses on those risks which RMS views as most likely to cause changes in mortality rates significant enough to impact the RPF. This section describes additional risks which have not been modeled in the RMS Risk Analysis Results.

Tsunami risk for France and the United States

Tsunamis are a series of waves generated by the displacement of a large volume of water by a large geologic disturbance (such as an earthquake, landslide, volcanic eruption, or meteorite impact). Typically these are associated with earthquake fault displacement on the interface of a subduction zone or in the over-riding plate, or from an underwater or sub-aerial landslide.

RMS has not modeled the impact of tsunamis on mortality in the United States or France as part of the RMS Risk Analysis Results.

The Risk Analysis in respect of Japan does include an allowance for the impact of tsunamis on mortality as part of the Residual Risk Model.

Additional details of potential tsunami scenarios in both Japan and the United States has been included for informational purposes only, and do not form part of the probabilistic RMS Risk Analysis Results.

Conventional War

Conventional warfare is conducted between two or more states engaged in open confrontation using weapons not forbidden by intergovernmental agreements (i.e., nuclear, biological, chemical). The number of deaths from a significant conventional war involving the United States, France or Japan could pose a significant risk. However, this type of prolonged large-scale engagements has decreased in frequency through recent times. RMS has not assessed the impact of conventional war on future mortality rates in the United States, France or Japan.

Nuclear War

A conflict in which nuclear weapons are used could lead to enough deaths to materially impact population mortality rates in the United States, France or Japan, especially if there is a nuclear strike on a major metropolitan area in the Covered Area. RMS has not assessed the impact of nuclear war on future mortality rates.

Meteorite Impact

Asteroids and comets are satellites of the Sun orbiting in the asteroid belt between Jupiter and Mars, and in the large eccentric orbits of the Oort Cloud and Kuiper belt on the outer fringes of the Solar System. Collision with the Earth would cause large scale disruption of the ecosphere and would kill a large fraction of the world's population. The probability of such an occurrence in the next century is estimated at 1-in-10,000 (Chapman & Morrison, 1994) and is not reflected in the RMS Risk Analysis Results . Furthermore, RMS has not modeled the risk of a smaller object directly striking a city in the Covered Area.

Other Risks

RMS has not modeled any other causes of extreme mortality.

Reporting Sources

France

Eurostat is the online resource where France (metropolitan) mortality rates by age are published, INSEE is the national agency that supplies data to Eurostat. Population data from Eurostat describes an estimate for the number of individuals with their habitual residence in France as at 1st January of each calendar year. From the perspective of reporting mortality, France (metropolitan) includes Corsica but excludes overseas departments. Death statistics are based on data from the civil register, which aggregates the deaths recorded by the registry service of each municipality within a calendar year.

The most recent calendar year of France mortality data released from Eurostat was 2012.

Japan

Death statistics from the Statistics Bureau of Japan (SBJ) are based on data from the Ministry of Health, Labour and Welfare, which aggregates the deaths recorded by each municipality within a calendar year.

Population data from the Statistics Bureau of Japan describes a time series of estimates for the number of individuals with their habitual residence in Japan. Estimates are made for 1st October of each year. The population is estimated by updating the count of the population according to the October 1, 2010 Census to allow for births, deaths and net migration. Data on the number of births and deaths is provided by the Ministry of Health, Labor and Welfare. The data on net migration is based on data from the Ministry of Justice.

Census and population estimates cover all persons and households usually residing in Japan. Foreigners residing in Japan are included. However, the following persons are excluded:

- Members of the foreign diplomatic corps, their suite and dependents
- Foreign military personnel, including both military corps and supporting civilians, and their dependents

The most recent calendar year of Japan mortality data released from the SBJ was 2012.

United States

Deaths in the United States are measured by the Centers for Disease Control and Prevention (CDC). The CDC also calculates mortality rates using its death records alongside the U.S. Census Bureau's (USCB) population estimate data. Underlying deaths data is processed by the CDC's National Center for Health Statistics. Mortality data for each calendar year is based on all death certificates filed in the 50 states and the District of Columbia during that calendar year. For example, the CDC's mortality data for the year 2010 is based on records of deaths that occurred during 2010 and were received as of April 12, 2012. Deaths data for the entire United States refer to events occurring within the United States. Data for geographic areas are categorized by place of residence. Mortality statistics for the United States exclude deaths of nonresidents of the United States. All data exclude fetal deaths.

Data for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas are included in tables showing data by state but are not included in U.S. totals.

Data from the USCB is used to measure the population in the United States. Population data from the USCB describes a time series of estimates of the resident population of the United States. The resident population includes all people currently residing in the United States. The detailed definition of the resident population from the U.S. Census Bureau as of November 2014 is as follows (United States Census Bureau, 2013):

All persons who are "usually resident" in a specified geographic area. The U.S. resident population includes all persons who usually reside in the 50 states and the District of Columbia, but excludes residents of the Commonwealth of Puerto Rico and the Island areas under U.S. sovereignty or jurisdiction (principally American Samoa, Guam, United States Virgin Islands, and the Commonwealth of the Northern Mariana Islands). In addition, the U.S. resident population excludes U.S. Armed Forces overseas and civilian U.S. citizens whose usual place of residence is outside the United States.

Population estimates are made for 1st July each year, except in years where census data is provided.

The most recent calendar year of mortality data provided by the CDC is 2013.

Bibliography

AAIB (Accidents investigations Branch Department of Trade and Industry UK) (1973) Report of the Public Enquiry into the Causes and Circumstances of the accident near Staines on 18 June 1972. Retrieved May 17, 2012, from:

[http://www\(aaib.gov.uk/cms_resources.cfm?file=4-1973%20G-ARPI.pdf](http://www(aaib.gov.uk/cms_resources.cfm?file=4-1973%20G-ARPI.pdf)

Anisimov, G. L., & Amoako, K. (2006). Treatment of plague: promising alternatives to antibiotics. *J Med Microbiol*, 55:1461-1475.

Ansart, S. et al. (2009). Mortality burden of the 1918-1919 influenza pandemic in Europe. *Influenza and Other Respiratory Viruses*, 3:99-106.

Armstrong G.L., et al. (1999). Trends in infectious disease mortality in the United States during the 20th century. *JAMA* , 281(1):61-66.

Bajekal, M., Scholes, S., Love, H., Hawkins, N., O'Flaherty, M., Raine, R., et al. (2012). Analysing Recent Socioeconomic Trends in Coronary Heart Disease Mortality in England, 2000-2007: A Population Modelling Study. *PLoS Medicine*

BBC. (2005, October 19). *The 'bird flu' that killed 40 million*. Retrieved September 14, 2009, from BBC News: <http://news.bbc.co.uk/2/hi/health/4350050.stm>

Beveridge, W. I. (1978). *Influenza: The Last Great Plague*. New York: Prodist.

Britten, N. (2009). *Swine flu: last pandemic claimed the lives of one million people*. Retrieved September 13, 2009, from Telegraph.co.uk: <http://www.telegraph.co.uk/health/swine-flu/5251543/Swine-flu-last-flu-pandemic-claimed-the-lives-of-one-million-people.html>

Britton, A., & McPherson, K. (2001). Mortality in England & Wales attributable to current alcohol consumption. *J Epidemiol Community Health* , 383-388.

Brundage, J. F., & Shanks, G. D. (2008). Deaths from bacterial pneumonia during 1918–19 influenza pandemic . *Emerg Infect Dis* , 14(8).

Cauchemez, S., Valleron, A., Boelle, P., Flahault, A., & Ferguson, N. M. (2008). Estimating the impact of school closure on influenza transmission from sentinel data. *Nature* , 452:750-754.

CDC. (2009b). *Antiviral Drug-Resistant Strains of Seasonal Influenza Virus*. Retrieved June 1, 2010, from CDC: <http://www.cdc.gov/flu/professionals/antivirals/resistance.htm>

CDC. (2010). CDC Estimates of 2009 H1N1 Influenza Cases, Hospitalizations and Deaths in the United States, April 2009-April 10,2010. Retrieved June 1, 2010, from CDC: http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm

CDC. (2010). *CDC WONDER database*. Retrieved from CDC: <http://wonder.cdc.gov/>

CDC. (2010a). *Fact Sheet: Variant Creutzfeldt-Jakob Disease*. Retrieved June 1, 2010, from CDC: http://www.cdc.gov/ncidod/dvrd/vcjdfactsheet_nvcjd.htm

CDC. (2009c). *Flu Vaccine Effectiveness: Questions and Answers for Health Professionals*. Retrieved June 1, 2010, from CDC: <http://www.cdc.gov/FLU/PROFESSIONALS/VACCINATION/effectivenessqa.htm>

CDC. (2009). HIST290 Death Rates for Selected Causes by 10-Year Age Groups, Race, and Sex: Death Registration States, 1900-32, and United States, 1933-98. Retrieved September 14, 2009, from National Center for Health Statistics: <http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs/hist290.htm>

CDC. (2007). *HIV/AIDS, Basic Statistics*. Retrieved June 1, 2010, from Centers for Disease Control and Prevention: <http://www.cdc.gov/hiv/topics/surveillance/basic.htm>

CDC. (2007). Key Facts About Avian Influenza (Bird Flu) and Avian Influenza A (H5N1) Virus. Retrieved from <http://www.cdc.gov/flu/avian/gen-info/facts.htm>

CDC. (2006). *Pandemic Flu:Key Facts*. Retrieved September 14, 2009, from Centers for Disease Control and Prevention: <http://www.cdc.gov/flu/pandemic/pdf/pandemicflufacts.pdf>

CDC. (2009a). *Vaccines & Immunizations, Basic and Common Questions: Why Immunize?* Retrieved June 1, 2010, from Centers for Disease Control and Prevention: <http://www.cdc.gov/vaccines/vac-gen/why.htm>

CDC (2012). *CDC WONDER database*. Available at: <http://wonder.cdc.gov/>

- Chen, H., Smith, G. J., & Li, K. S. (2006). Establishment of multiple sublineages of H5N1 influenza virus in Asia: Implications for pandemic control. *Proc Natl Acad Sci USA*, 103:2845-50.
- Cooper, B., Pitman, R., Edmunds, W., & Gay, N. (2006). Delaying the International Spread of Pandemic Influenza. *PLoS Med*, 3(6).
- Cutler, D.M. (2008). Are We Finally Winning the War on Cancer?. *J Econ Persp*, 22(4): 3-26.
- CRED. (2012). *CRED International Disasters Database*, Retrieved January 2012, from CRED: <http://www.emdat.be/>
- Dhara, V. R., & Dhara, R. (2002). The Union Carbide disaster in Bhopal: a review of health effects. *Arch Environ Health*, 57 (5), 391-404.
- Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2004). Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ*.
- Dunbar, P. K., & Weaver, C. S. (2008). U.S. States and Territories National Tsunami Hazard Assessment: Historical Record and Sources for Waves. NOAA/USGS. National Tsunami Hazard Mitigation Program.
- Dwight, R.H., Brinks, M.V., Sharavana Kumar, G., Semenza, J.C., Beach attendance and bathing rates for Southern California Beaches, Ocean and Coastal Management, 2007, 50:847-858
- Fiore, A.E. et al. (2007). Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 56:1-54.
- Flu.gov. (2007). *Community strategy for pandemic influenza mitigation*. Retrieved June 1, 2010, from <http://www.flu.gov/professional/community/commitigation.html>
- Forey, B., et al., International Smoking Statistics: A Collection of Historical Data from 30 Economically Developed Countries. Oxford: Oxford University Press, 2002.
- French Ministry of Work, Employment and Health (2011). French Influenza Pandemic Preparedness and Response plan.
- Gani, R., & Leach, S. (2001). Transmission potential of smallpox in contemporary populations. *Nature*, 414:748-752.
- Germann, T. C., Kadau, K., Longini, I. M., & Macken, C. A. (2006). Mitigation strategies for pandemic influenza in the United States. *PNAS*, 103(15): 5935-5940.
- Grossi, P., Watts, P., Boissonade, A. & Muir-Wood, R. (2008). Estimating Losses from Tsunami Risk: Focus on Southern California. 14th WCEEI, October 12-17, 2008.
- He, F., Nowson, C., & MacGregor, G. (2006). Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. *Lancet*, 320-326.
- Heart Protection Study Collaborative Group. (2002). MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomized placebo controlled trial. *Lancet*, 7-22.
- Human Mortality Database. (2010). Retrieved 2010, from Human Mortality Database: <http://www.mortality.org/>
- IAEA. (2005). Chernobyl's Legacy: Summary Report.
- IAEA. (2011). <http://www.iaea.org/newscenter/news/tsunamisupdate01.html>.
- IDSA. (2009). *Anthrax: Current, comprehensive information on pathogenesis, microbiology, epidemiology, diagnosis, treatment, and prophylaxis*. Retrieved June 1, 2010, from Infectious Disease Society of America: <http://www.cidrap.umn.edu/idsa/bt/anthrax/biofa>
- Iqbal, R., Anad S., Ounpuu S., et al. Dietary Patterns and the Risk of Acute Myocardial Infarction in 52 Countries: Results of the INTERHEART Study. *Circulation* (2008), 118:1929-1937
- Johnson, N. P., & Mueller, J. (2002). Updating the Accounts: Global Mortality of the 1918-1920 "Spanish" Influenza Pandemic. *Bull. Hist. Med.*, 76:105-115.
- Johnson H, Kovats RS, McGregor G, Stedman J, Gibbs M, Walton H (2005) The impact of the 2003 heat wave on daily mortality in England and Wales and the use of rapid weekly mortality estimates. *Eurosurveillance* 10:168-171
- Jones, K.E., Patel, N.G., Levy, M.A., et al. (2008). Global trends in emerging infectious diseases. *Nature*, 451:990-993.
- Jordan, E. (1927). *Epidemic Influenza: A Survey*. Chicago: American Medical Association.
- Kajitani, Y., Chang, S., and Tatano, H., (2013) Economic Impacts of the 2011 Tohoku-Oki Earthquake and Tsunami. *Earthquake Spectra*: March 2013, Vol. 29, No. S1, pp. S457-S478

Kelly, H., Carville, K., Grant, K., Jacoby, P., Tran, T., et al. . (2009). Estimation of Influenza Vaccine Effectiveness from Routine Surveillance Data. *PLoS ONE* , 4(3): e5079.

Kivimaki, M., Ferrie, J., Batty, G., Davey, S., Elovainio, M., Marmot, M., et al. (2008). Optimal form of operationalizing BMI in relation to all-cause and cause-specific mortality: the original Whitehall study. *Obesity* , 1926-1932.

Koshimura, S. et al. (2009). Developing fragility functions for tsunami damage estimation using numerical model and post-tsunami data from Banda Aceh, Indonesia. *Coastal Engineering Journal*, Vol. 51, No. 3 (2009) 243–273.

Lee, D., Artero, E., Sui, X., & Blair, S. (2010). Mortality trends in the general population: the importance of cardiorespiratory fitness. *J Psychopharmacol* , 27-35.

Lee, R., & Carter, L. R. (1992). Modeling and forecasting U.S. mortality. *Journal of the American Statistical Association* , 87(419), 659-671.

Luber, G and McGeehin, M (2008): "Climate Change and Extreme Heat Events", *Am J Prev Med* 35(5): 429-435.

Lyman, E.S. (2004). Impacts of a Terrorist Attack at Indian Point Nuclear Power Plant. Retrieved January 2012 from Union of Concerned Scientists: http://www.ucsusa.org/assets/documents/nuclear_power/indianpointhealthstudy.pdf

Lipsitch, M., et al. (2009). Managing and Reducing Uncertainty in an Emerging Influenza Pandemic. *NEJM* , 361:112-115.

Markel, H., Lipman, H. B., & Navarro, J. A. (2007). Nonpharmaceutical Interventions Implemented by U.S. Cities During the 1918-1919 Influenza Pandemic. *JAMA* , 298(6):644-654.

Martin, C., Taylor, P., & Potts, H. (2008). Construction of an odds model of coronary heart disease using published information: the Cardiovascular Health Improvement Model (CHIME). *BMC Medical Informatics and Decision Making* , 8:49.

Ministry of Health. (1919). Weekly Deaths from Influenza, Pneumonia, Bronchitis, Phthisis in London during the Epidemics of 1918-19. London: Ministry of Health.

Morens, D. M., Folkers, G. K., & Fauci, A. S. (2004). The challenge of emerging and re-emerging infectious diseases. *Nature* , 430: 242-249.

Morens, D.M., Taubenberger, J.K., Fauci, A.S. (2008). Predominant Role of Bacterial Pneumonia as a Cause of Death in Pandemic Influenza: Implications for Pandemic Influenza Preparedness. *J Infect Dis* , 198(7):962-970.

Murray, C. J., & Lopez, A. D. (1997). Global mortality, disability and the contribution of risk factors: Global burden of disease study. *Lancet* , 349: 1436-42.

Murray, C.J., Lopez, A.D., Chin, B., Feehan, D., Hill, K.H. (2006). Estimation of potential global pandemic influenza mortality on the basis of vital registry data from the 1918-20 pandemic: a quantitative analysis. *Lancet*. 2006 Dec 23;368(9554):2211-8.

NIAID. (2009). *Flu Vaccine Technologies*. Retrieved June 1, 2010, from National Institute of Allergy and Infectious Diseases: <http://www.niaid.nih.gov/topics/Flu/Research/vaccineResearch/Pages/Technologies.aspx>

NOAA. (2011). *NOAA/WDC Tsunami Event Database*. Retrieved June 2011, from NOAA: http://www.ngdc.noaa.gov/hazard/tsu_db.shtml

NOAA (2005). NOAA attributes recent increase in hurricane activity to naturally occurring multi-decadal climate variability. Retrieved June 2011, from:

<http://www.magazine.noaa.gov/stories/mag184.htm>.

Osterholm, M. T. (2005). Preparing for the next pandemic. *NEJM* , 352(18): 1839-1842.

Pebody, R. G., et al. (2010). Pandemic influenza A (H1N1) 2009 and mortality in the United Kingdom: Risk factors for death, April 2009 to March 2010. *Eurosurveillance* , 15(20):1-11.

Personius, S.F., and Nelson, A.R., compilers, 2005, Fault number 781, Cascadia subduction zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, <http://earthquakes.usgs.gov/regional/qfaults>, accessed 06/14/2011 10:49 AM.

Pietz, D. (2002). Engineering the State: The Huai River and Reconstruction in Nationalist China 1927–1937. New York and London: Routledge.

Presanis A.M., De Angelis D., Hagy A., Reed C., Riley S., et al . (2009). The Severity of Pandemic H1N1 Influenza in the United States, from April to July 2009: A Bayesian Analysis. *PLoS Medicine* , 6(12): e1000207. doi:10.1371/journal.pmed.1000207.

ProMED-mail. (2010, Jun 23). Measles – Africa (18): West, Southern. 20100623.2095.

- Rappaport, E. N., & Partagas, J. F. (1995). The Deadliest Atlantic Tropical Cyclones. *NOAA Technical Memorandum, NWS NHC-47*, 41, 1492-1994.
- Reichert, T.A., et al. (2001). The Japanese experience with vaccinating schoolchildren against influenza. *NEJM*, 344(12): 889-896.
- Reid, A. H., Taubenberger, J. K., & Fanning, T. G. (2004). Evidence of an absence: the genetic origins of the 1918 pandemic influenza virus. *Nat Rev Microbiology*, 2:909-14.
- Renshaw, A., & Haberman, S. (2006). A cohort-based extension to the Lee-Carter model for mortality reduction factors. *Insurance: Mathematics and Economics*, 38, 556-570
- Samb B., et al. (1995). Prophylactic use of antibiotics and reduced case fatality in measles infection. *Pediatr Infect Dis J*, 14(8): 695-6.
- SCSSC. (2005). The tsunami threat to California. State of California Seismic Safety Commission. http://www.seismic.ca.gov/pub/CSSC_05-03_Tsunami%20Findings.pdf
- Simonsen, L., Clarke, M. J., Schonberger, L. B., et al. (1998). Pandemic versus epidemic influenza mortality: a pattern of changing age distribution. *J Infect Dis*, 178:53-60.
- Stephens, H. W. (2003). *The Texas City disaster, 1947*. University of Texas Press.
- Taubenberger, J. K., & Morens, D. M. (2009). Pandemic Influenza—including a risk assessment of H5N1. *Rev Sci Tech*, 28(1):187-202.
- Taubenberger, J. K., Reid, A. H., Lourens, R. M., Wang, R., Jin, G., & Fanning, T. G. (2005). Characterization of the 1918 influenza virus polymerase genes. *Nature*, 438:889-893.
- Taubenberger, J., & Morens, D. (2006). 1918 influenza: the mother of all pandemics. *Emerging Infectious Diseases*, 12 (1).
- Thompson, W., Shay, D., Weintraub, E., Brammer, L., Bridges, C., & Cox, N. (2004). Influenza-Associated Hospitalizations in the United States. *JAMA*, Vol. 292, No. 11.
- Tilling, R. I. (1985). *Volcanoes*. Denver: USGS.
- U.S. Census Bureau. (2000). *U.S. Census Bureau*. Retrieved August 2009, from U.S. Census Bureau: <http://www.census.gov/main/www/cen2000.html>
- U.S. Census Bureau. (2010). *U.S. Census Bureau*. Retrieved from U.S. Census Bureau: www.census.gov
- U.S. Census Bureau. (2011). *U.S. Census Bureau*. Retrieved from U.S. Census Bureau: www.census.gov
- U.S. Department of Health and Human Services. (2009, September 1). *Pandemics and Pandemic Threats since 1900*. Retrieved September 15, 2009, from Flu.gov: <http://www.pandemicflu.gov/general/historicaloverview.html>
- USGS. (2012). Significant Landslide Events in the United States. Retrieved January 2012, from USGS: <http://landslides.usgs.gov/learning/significantls.php>
- Ulmer, J. B., Valley, U., & Rappuoli, R. (2006). Vaccine manufacturing: challenges and solutions. *Nature Biotechnology*, 24:1377-1383.
- Unal, B., Critchley, J. A., & Capewell, S. (2004). Explaining the decline in coronary heart disease mortality in England and Wales between 1981 and 2000. *Circulation*, 109:1101-1107.
- Viboud, C., Grais, R. F., Lafont, B. A., Miller, M. A., & Simonsen, L. (2005). Multinational Impact of the 1968 Hong Kong Influenza Pandemic: Evidence for a Smoldering Pandemic. *JID*, 233:233-248.
- Viboud, C., Tam, T., Fleming, D., Miller, M. A., & Simonsen, L. (2006). 1951 Influenza Epidemic, England and Wales, Canada, and the United States. *EID*, 12(4) 661-668.
- Wakefield, A., Murch, S., Anthony, A., et al. (1998). Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *Lancet*, 351 (9103).
- WHO. (2004). Disease and Injury Country Estimates, Global Burden of Disease. Retrieved from World Health Organization: http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/index.html
- WHO. (2009). Retrieved August 7, 2009, from World Health Organization: <http://www.who.int/mediacentre/factsheets/fs211/en/>
- WHO. (2012). WHO Mortality Database. Retrieved from <http://www.who.int/whosis/mort/download/en/>

- Willets, R. (2003). The cohort effect: Insights and explanations. Retrieved from <http://www.willets.co.uk>
- Wood, N. (2007a). Variations in City Exposure and Sensitivityto Tsunami Hazards in Oregon, USGS SIR 2007-5283, <http://pubs.usgs.gov/sir/2007/5283/>
- Wood, N. (2007b). Variations in Community Exposure and Sensitivity to Tsunami Hazards in the State of Hawaii, USGS SIR 2007-5208, <http://pubs.usgs.gov/sir/2007/5208/>
- Wood, N. (2008). Variations in Community Exposure and Sensitivity to Tsunami Hazards on the Open-Ocean and Strait of Juan de Fuca Coasts of Washington, USGS SIR 2008-5004, <http://pubs.usgs.gov/sir/2008/5004/>
- Wood, N., Ratliff, J., and Peters, J., (2013). Community exposure to tsunami hazards in California. U.S. Geological Survey Scientific Investigations Report 2012-5222, iv, 49 p. <http://pubs.usgs.gov/sir/2012/5222/sir2012-5222.pdf>
- Wood, N. (2014). Variations in population vulnerability to tectonic and landslide-related tsunami hazards in Alaska, Nat Hazards (2015) 75:1811–1831, <http://link.springer.com/article/10.1007/s11069-014-1399-6#page-1>
- Wu, J. T., Cowling, B. J., & Lau, E. (2010). School Closure and Mitigation of Pandemic (H1N1) 2009, Hong Kong. *Emerging Infectious Diseases*, 16(3).
- Xing, Z., & Cardona, C. (2009). Preexisting immunity to pandemic (H1N1) 2009 [letter]. *Emerging Infectious Diseases* 15(11).
- Zanchetti, A. (2010). Blood pressure targets of antihypertensive treatment: up and down the J-shaped curve. European Heart Journal , doi:10.1093/eurheartj/ehq281.
- Zolopa, A. R., Andersen, J., Komarow, L., Sanne, I., & Sanchez, A. (2009). Early Antiretroviral Therapy Reduces AIDS Progression/Death in Individuals with Acute Opportunistic Infections: A Multicenter Randomized Strategy Trial. *PLoS ONE* , 4(5): e5575.

Appendix A: RMS U.S. Earthquake Hazard Model Description

GENERAL DESCRIPTION OF EARTHQUAKES

Overview

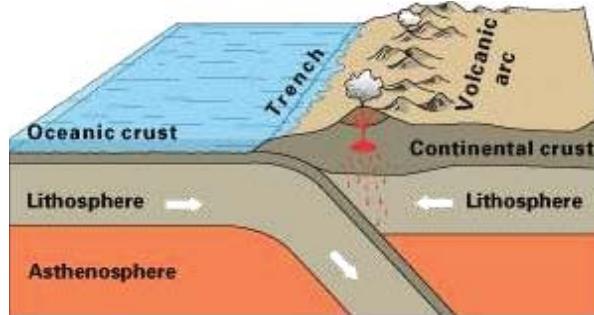
Earthquakes are characterized by rapid vibratory movements of the earth's surface. These movements, which can last from a few seconds to more than a minute, are caused by a sudden release of stress energy that has accumulated in the rigid outer shell of the earth, typically associated with the relative displacement of two sides of a planar fracture, or fault. The release of energy is transmitted as seismic waves that travel away from the source of the earthquake, both along the surface and through the earth. As the event magnitude becomes larger, the rupture area of the fault becomes larger, energy release increases, and vibrations last longer. The intensity of ground shaking decays as the waves move away from the source.

The strength and duration of earthquake ground shaking at a specific site depend on the size, location, and depth of the earthquake, as well as the soil characteristics of the site. Earthquakes can cause loss of life and extensive financial losses from direct shaking damage to buildings and their contents, as well as other losses such as business interruption losses associated with the disruption of business activities. Damage may be concentrated where there is a failure of supporting soils as associated with landslides and liquefaction (loss of strength of loosely-packed, water-saturated sediments due to ground shaking).

Earthquake Occurrence

The earth's rigid outer shell, or lithosphere, is divided into several rigid blocks called "tectonic plates", which are moving relative to each other, driven by slow motions in the underlying hot and viscous layer known as the asthenosphere, as illustrated in the figure below. The process of plate movement and plate interaction is known as "plate tectonics". The large majority of earthquakes occur along the boundaries of the plates, where the relative motion is concentrated on specific faults. In the repeated "seismic cycle", stress from plate motion slowly accumulates and then is suddenly released in an earthquake when the two sides of the fault experience rapid and permanent displacement.

Cross-Section Illustrating an Oceanic-Continental Plate Boundary



Measuring Earthquake Magnitude

Magnitude is the most common measure of an earthquake size. The oldest measure of magnitude is the so-called Richter Magnitude, which measures the amplitude of ground motion, recorded on a particular seismograph, at a particular distance from the earthquake. The Richter scale is a logarithmic scale, so each time the magnitude increases by one unit (e.g., 5 to 6 or 6 to 7), the amplitude of ground motion increases by a factor of 10. The Richter scale does not accurately measure large earthquakes and is no longer in broad use by the scientific community.

More recently, seismologists have developed an earthquake magnitude scale known as Moment Magnitude ("Moment Magnitude" or " M_w "). Moment Magnitude is an estimate of the total energy, or seismic moment, released in the earthquake. It can be estimated by geologists examining the geometry of a fault in the field, or by seismologists analyzing a seismogram. M_w can measure all earthquakes (large and small, near and distant) with the same scale and is more consistent than other definitions because it is linked to physical parameters of the rupture.

When instrumental recordings are available, such as for most earthquakes occurring in the 20th century, seismologists are able to directly calculate M_w or estimate it via empirical conversions from other magnitude scales. These conversions

relate “Richter” (“ M_L ”) or surface wave (“ M_s ”) magnitude to the M_w scale by comparing the relationships of more recent earthquakes measured with both the M_w and other such scales. In addition, for historical events occurring before the widespread use of seismographs, M_w can be estimated based on observations documented in the historical literature.

Hypocenter, Epicenter and Depth

The hypocenter is the point at which sudden displacement that generates an earthquake is initiated. The point on the surface of the earth, whether on land or on the ocean bed, directly above the hypocenter, is called the epicenter. The distance from the ground surface to the hypocenter is referred to as the depth of the earthquake. In most cases, a shallow earthquake will cause more damage to buildings and infrastructure than an event with the same Moment Magnitude at a greater depth. However, it is important to understand that while an earthquake rupture is initiated at the hypocenter, which is a single point on a fault, the fault rupture can propagate for tens to hundreds of kilometers from the epicenter.

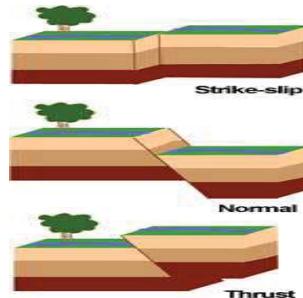
Rupture Length

This is the length of the fault segment that ruptures during an earthquake. Rupture length and earthquake energy are related in that the energy released in an earthquake (and thus its Moment Magnitude) is proportional to the area of the fault that moves in an earthquake. In the RMS U.S. Earthquake Model, rupture length has been modeled as a function of the Moment Magnitude of the event using published, empirical equations.

Fault Type

There are three types of faults: normal (dip-slip), thrust (reverse dip-slip) and strike slip, as shown in the figure below. The type of fault affects the radiation of seismic waves and thus the amplitude of ground motion.

Three Types of Fault Mechanism



Aftershocks and Foreshocks

Earthquake fore- and aftershocks are, respectively, earthquakes that precede or follow the primary earthquake of an earthquake sequence, generally occurring on a related section of the fault system to the primary earthquake. The RMS U.S. Earthquake Casualty Model treats simulated earthquake events as a single shock representative of all energy released from an earthquake event, inclusive of foreshocks, main shock, and aftershocks.

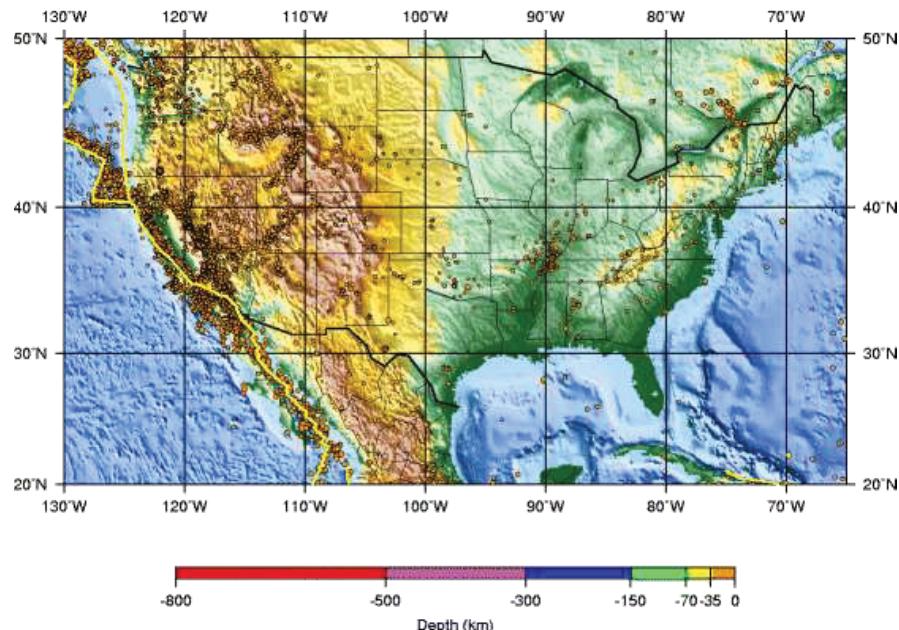
Earthquake History of the United States

The U.S. has a relatively short history of western settlement, but destructive earthquakes have been part of that history even prior to the founding of the nation. The 1755 Cape Ann earthquake (M~6) was an early example, causing moderate damage to the city of Boston. The three main shocks of the 1811-1812 New Madrid, Missouri earthquake sequence occurred at the frontier of settlement, but were felt throughout the eastern U.S. As the more seismically-active western states were settled, the frequency of societal loss increased due to massive subduction earthquakes in Alaska and a number of large earthquakes in California, most notably the 1906 earthquake that damaged and burned San Francisco.

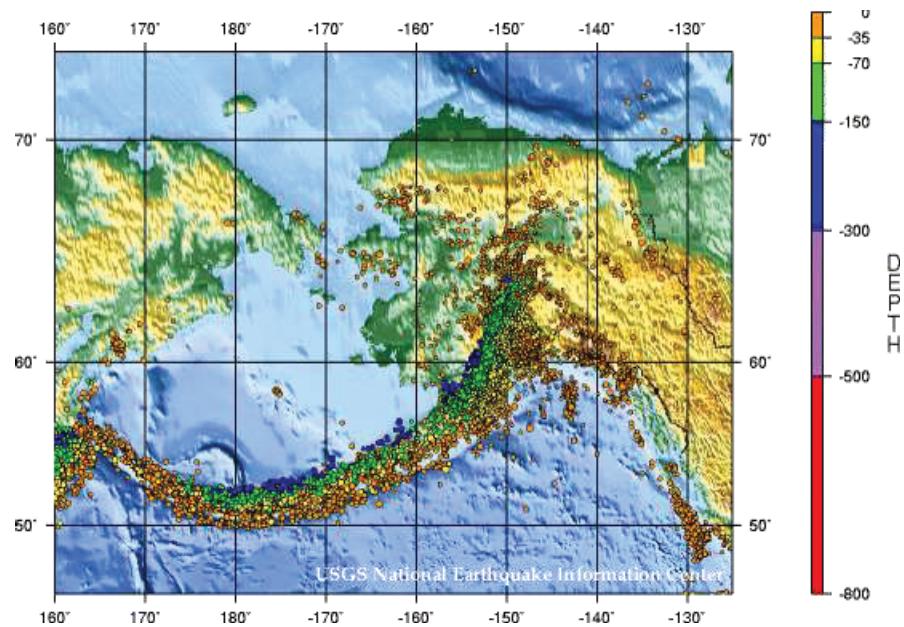
In the latter part of the twentieth century, California has seen major earthquakes including the San Fernando earthquake (1971), Imperial Valley earthquake (1979), Coalinga earthquake (1983), Loma Prieta earthquake (1989), and the Northridge earthquake (1994). The 2001 Nisqually earthquake beneath Washington's Puget Sound served to underscore that areas outside California are also prone to damaging events.

Earthquakes in the U.S. have been cataloged since the eighteenth century. The pattern of more recent event occurrence in the 48 contiguous states is shown in the figure below. The west is highly seismic. Moderate magnitude earthquakes occur occasionally in the east, and there are rare but potentially devastating large magnitude events in the central U.S. A moderate magnitude, but potentially damaging earthquake ($M_w < 5.5$) can be expected anywhere in the U.S. Earthquake frequency and magnitude varies from region to region. The complete picture of seismicity across the U.S. is represented in the RMS U.S. Earthquake Model. The following figures show the historical distribution of earthquakes in each region of the United States (Source: USGS National Earthquake Information Center).

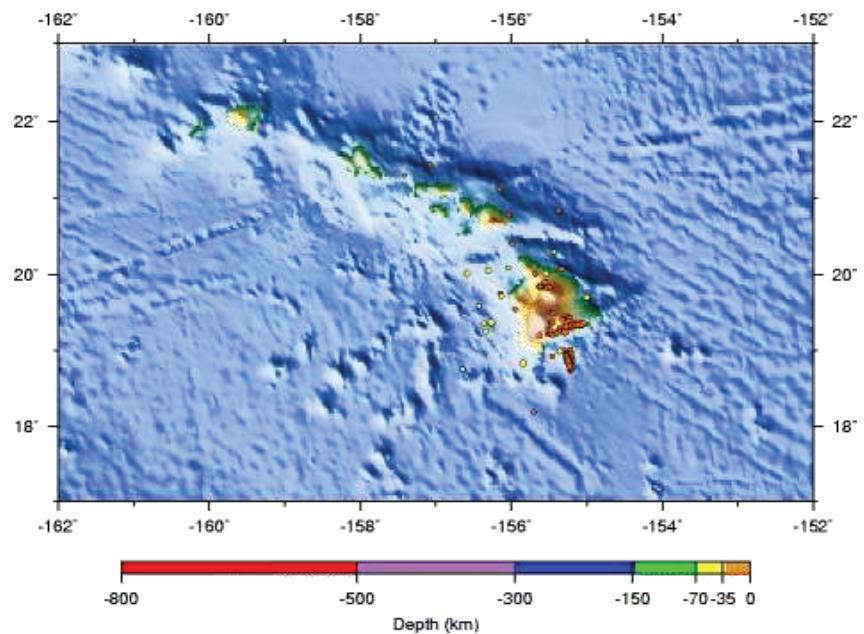
Distribution of Earthquakes in the Contiguous United States (1977-2005)



Distribution of Earthquakes in Alaska (1990-2000)



Distribution of Earthquakes in Hawaii (1990-2000)



The table below shows the 20 largest historical earthquakes in the continental United States (including Alaska and Hawaii), as reported by the USGS in 2014.

Largest Historical Earthquakes in the United States (USGS NEIC, 2014)

Rank	Location	State	Year	Moment Magnitude
1	Prince William Sound	Alaska	1964	9.2
2	Cascadia Subduction Zone	Washington (offshore)	1700	~9
3	Rat Islands	Alaska	1965	8.7
4	Andreanof Islands	Alaska	1957	8.6
5	East of Shumagin Islands	Alaska	1938	8.2
6	Unimak Islands	Alaska	1946	8.1
7	New Madrid	Missouri	1811	8.1
8	Yakutat Bay	Alaska	1899	8.0
9	New Madrid	Missouri	1812	~8
10	Near Cape Yakataga	Alaska	1899	7.9
11	Fort Tejon	California	1857	7.9
12	Ka'u District	Hawaii	1868	7.9
13	Little Sitkin Island	Alaska	2014	7.9
14	Gulf of Alaska	Alaska	1987	7.9
15	Denali National Park	Alaska	2002	7.9
16	Andreanof Islands	Alaska	1986	7.9
17	New Madrid	Missouri	1812	7.8
18	Imperial Valley	California	1892	7.8
19	San Francisco	California	1906	7.8
20	Rat Islands	Alaska	2003	7.8

Scope

The RMS U.S. Earthquake Casualty Model is based on the RMS Americas Earthquake Model Version 9.0, upgraded in 2009, which covers earthquakes occurring in all regions of North, Central and South America (Hawaii included). Casualties are estimated based on sources that are capable of causing ground motions in the contiguous United States, Alaska and Hawaii.

EARTHQUAKE MODELING

Stochastic Module

RMS believes that no single database of historical earthquakes for a given region can represent a comprehensive series of physically plausible events in terms of their magnitudes, locations, and return periods. Accordingly, the RMS U.S. Earthquake Model contains a stochastic module that simulates thousands of hypothetical seismic events within predefined earthquake sources. Each of these stochastic events is uniquely identified by its location, physical characteristics, and rate of occurrence.

The seismic sources comprise two fundamental components: a database of active faults and a series of area sources used to model smaller events not attributed to known faults (also known as *background seismicity*). The model assumes that the larger, more damaging events will occur on the known fault structures and that the more moderate events should be modeled with area sources, since their associated structures are too numerous to be individually characterized. Area sources are also used in regions where low activity rates or surficial cover make it difficult to identify fault-specific sources. This is the case for the majority of the modeled Canadian geography, as very few fault-specific sources are considered in the Geological Survey of Canada (GSC) model.

The event rates for the active fault sources are based primarily on slip rate data. Additionally, for some faults, paleoseismic investigations give detailed timing of past events and the recurrence intervals of these sources. For the area source, rates are based on smoothed historical seismicity as well as “floor” hazard levels (defined from tectonic environment) to account for catalog incompleteness where the seismic activity is low.

Seismic Sources: United States

The foundation of the seismic source models for the RMS U.S. Earthquake Model regions in the United States is a database of earthquake sources produced by the U.S. Geological Survey for use in the National Seismic Hazard Maps (Peterson, et al., 2008). For all earthquake regions in the contiguous U.S., the seismic source model is based on the 2008 version of the National Seismic Hazard Maps. Alaska and Hawaii were released separately by the USGS in 2007 (Wesson, Boyd, Mueller, Bufe, Frankel, & Peterson, 2007) and 1998 (Klein, Frankel, Mueller, Wesson, & Okubo, 2001), respectively, and the RMS source models are based on these publications.

Seismic Sources: Canada

The seismic source model for the RMS U.S. Earthquake Model regions in Canada is a hybrid, built on seismic hazard mapping projects by the Geological Survey of Canada (GSC) and the U.S. Geological Survey (USGS). Within Canada, the foundation of the model is the GSC 2003 hazard model (Adams & Halchuk, 2003).

Seismic Sources: Mexico

The seismic source model for the RMS U.S. Earthquake Model regions in Mexico consists of more than 13,000 sources, and is seamlessly integrated with the seismic source model for the U.S. to the north and seismic source model for Central America to the south.

Apart from the subduction zone, the majority of the Mexico source model consists of area sources due to limited published information on location, geometry, and slip rates of active faults in Mexico.

Event Magnitudes

The moment magnitude scale is used to define event magnitudes in the RMS U.S. Earthquake Model. This is the preferred scale used by the seismological community and is consistent with the ground motion relationships used in the stochastic event set.

In general, the larger, more damaging events are modeled on the known active faults for the U.S. and on dipping sources, representative of the subduction interfaces for the whole North America model. More moderate to small magnitude events are modeled with background seismicity area sources. The upper bounds for events on a given structure are estimated from fault dimensions, either the area or the length. The larger the area or length, the larger the events on a structure can be. The largest expected event on a fault is described as the characteristic magnitude.

Because there is uncertainty around the calculation of the characteristic magnitude, events that are slightly larger than the characteristic magnitude are also included in the stochastic event set. The largest event that can occur on a fault is referred to as the *maximum magnitude*. In most cases the rates for maximum magnitudes will be very small, because these events are

extreme in size and are very unlikely to occur. Events on the active faults are typically modeled as having a minimum magnitude of Mw6.5. Events on the interface sources generally have a minimum magnitude of around Mw7.0.

Upper limit magnitudes for the area sources are based on historical seismicity and regional characterization of the potential magnitudes that can be produced. Minimum magnitudes for the area sources are constrained by the limits of minimum ground motions that can produce significant loss. For the area sources, the typical minimum magnitude is usually between Mw5 and Mw5.5.

Logic Trees: Incorporation of Alternative Models

For many seismic sources in the United States and for some sources in Canada, there may be multiple rupture scenarios and associated characteristic magnitudes proposed by the scientific community. Logic trees are a tool for considering the different options and are used to incorporate alternative approaches within the model. Including these alternatives with appropriate weights allows the exceedance probability analysis to better capture the range of variability in losses. This technique is consistent with the methodologies used to develop the U.S. National Seismic Hazard Maps in the United States and the Canada National seismic Hazard Maps.

Key examples of logic trees include the modeling of alternate rupture scenarios on subduction zones (e.g., Cascadia and Alaska subduction zones), for the New Madrid seismic region in the eastern U.S. and for incorporating GSC's treatment of magnitude uncertainty.

For some Mexican subduction segments, multiple-segment rupture scenarios have been incorporated as alternative to the single-segment ruptures. These were included with very low weights to capture the possibility of multiple-segment ruptures in the subduction zone while acknowledging the low probability of occurrence.

Cascade Earthquakes

Cascade earthquakes occur when two or more adjacent faults rupture together. In general, cascade events are very rare, but when they do occur they impact a broader region and exhibit higher magnitudes than earthquakes produced by their component faults. Examples of historical cascade events include the 1906 San Francisco Earthquake and the Landers (1992) and Hector Mine (1999) earthquakes in Southern California.

The RMS U.S. Earthquake Model includes several cascade scenarios, with the majority occurring in California. A logic tree approach is used to weight the various possibilities of cascade events occurring.

Time-Dependent Recurrence Modeling

Time-dependent recurrence modeling is based on the observation that earthquakes occur in cycles. After a fault experiences an event, it takes time for the stress to build up again to cause the next event. If a significant period of time has passed in comparison to the return period for an event, then an event may have a higher probability of occurrence.

For a source to be modeled using time-dependent recurrence, detailed information about the timing of the last event and a well-defined recurrence interval are required. There are very few structures for which all of the necessary information has been confidently determined.

The RMS U.S. Earthquake Model includes time-dependent recurrence for a subset of the active faults in the seismic source model—namely, major fault systems in California. Time dependent recurrence is also used for the Wasatch Fault in Utah and for major structures in Alaska including the large Mega-Thrust sources.

Note that time-dependent recurrence has not been incorporated within the U.S. National Seismic Hazard Maps. These maps are used to develop building codes; for this reason, there can be no temporal variation within these maps. The numerical approaches used to determine time-dependent rates are consistent with other published USGS research on regional earthquake probabilities.

Seismic Activity in the California Region

California is one of the highest hazard states in the United States. This results from its tectonic setting on the boundary between the North American and Pacific plates. In California, this plate boundary is defined primarily by a series of major strike-slip fault systems. The San Andreas Fault accounts for the majority of the plate boundary motion, but other important strike-slip faults include the Hayward-Rodgers Creek and the Calaveras fault zones in northern California and the Whittier-Elsinore, San Jacinto, and Imperial fault zones in southern California.

The San Francisco Bay Area in northern California spans the plate boundary. As a result, the hazard for this region is primarily driven by major strike-slip fault systems. The most important drivers of seismic hazard include the San Andreas and Hayward-Rodgers Creek faults; the Calaveras and San Gregorio systems are also important players. Within the Bay Area there is a minor component of deformation perpendicular to the major faults, resulting in the generation of thrust faults.

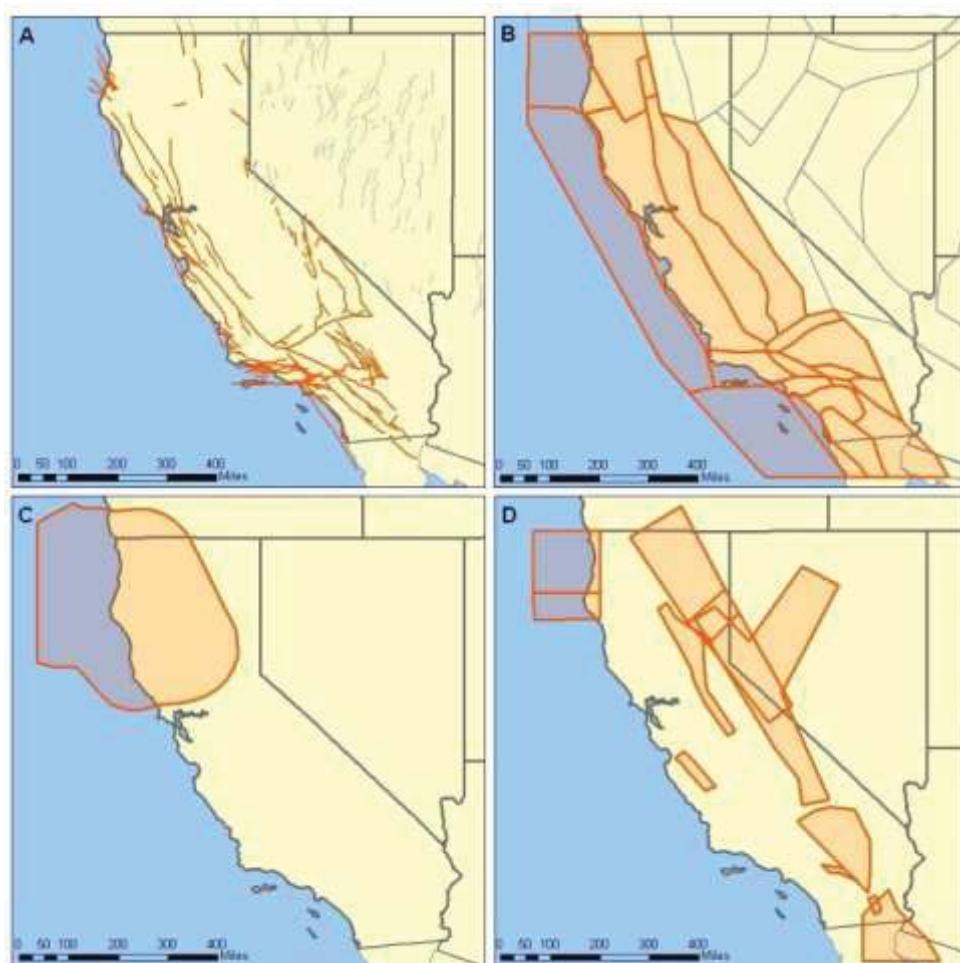
Important thrust structures considered are the Monte Vista-Shannon and Point Reyes faults, as well as the Great Valley thrust system along the eastern edge of the Central Valley.

The Los Angeles region resides just west of the plate boundary, delineated in this region by the southern San Andreas Fault. The seismic sources in Los Angeles are complicated by the fact that the San Andreas undergoes an east-west bend. This bend restricts the northeast-southwest motion along the plate boundary, resulting in a significant component of compression across the entire region. This compression is manifested by a series of thrust structures under the Los Angeles basin, as well as in the mountains to the north and west of the region. Key strike-slip structures in the Los Angeles area include the Newport-Inglewood, Santa Monica, and Palo Verdes fault systems. Key thrust structures include the Puente Hills and Elysian Park faults.

In California, there are a number of seismic sources that pose significant risk that do not lie on or directly adjacent to the plate boundary, but are the result of large-scale deformation across the plate boundary region that extends as far east as the Rocky Mountains. Examples of important sources off the plate boundary in eastern California include the Garlock and Owens Valley fault systems.

The California seismic source model includes an extensive database of active faults as well as complete statewide coverage with area sources to model background seismicity. The figure below shows the locations of the active faults and the regions covered by the area sources.

Seismic Source Model for California Earthquake Region



A: Active Faults; B: Area Source Coverage, C: Deep Sources, D: Special Zones

A-Type faults are major structures with high slip rates and with the largest characteristic magnitudes. The B-Type faults are less well understood systems with lower slip rates and generally smaller characteristic magnitudes. The Special Zones are regions of California where there are high activity rates or high deformation rates that accounted for separately from the smoothed historical seismicity. Deep sources model the intraslab seismicity under Northern California. The Area Sources

model the background seismicity based on the smooth historical seismicity. Note that the smoothed seismicity does not include any events associated with any of the other source types.

Seismic Activity in the Pacific Northwest Region

The majority of the seismic activity in the Pacific Northwest region is a consequence of the offshore Juan de Fuca plate being subducted beneath the North American plate, a tectonic collision referred to as the Cascadia subduction zone. Three different types of earthquakes can result:

- **Interface:** These are large thrust events along the contact between the Juan de Fuca and North American plate with potential magnitudes ranging up to Mw8-9. The location of an event hypocenter is most likely along the coast at a depth of 5-20 km, but the actual rupture area in an event could extend further inland and for hundreds of kilometers to the north and south. No large historical interface events have occurred, but tsunami records in Japan indicate a large event occurred in January 1700 and paleoseismic data suggest return periods of 400-600 years.
- **Intraslab:** The Juan de Fuca slab has a shape irregularity beneath the Puget Sound that results in fracturing within the plate itself. While these events are intermediate in depth (generally ~50 km), their proximity to the Seattle metropolitan region and the large area they can impact can result in significant damage. Intraslab earthquakes are also common in the Pacific Northwest.
- **Crustal:** Faults in the Pacific Northwest are generally less active than those in California by an order of magnitude (e.g., on-land faults with slip rates of 1 mm per year are virtually non-existent, and most are 0.2 mm per year or less³). Nonetheless, due to their shallow depths, they can generate very high local ground motions.

The figure below shows the locations of the active crustal faults and the regions covered by the area sources modeling interface, intraslab, and background seismicity.

Seismic Source Model for Pacific Northwest Earthquake Region



A: Active Faults and Cascadia Subduction Zone Sources; B: Area Source Coverage; C: Deep Intraslab Sources

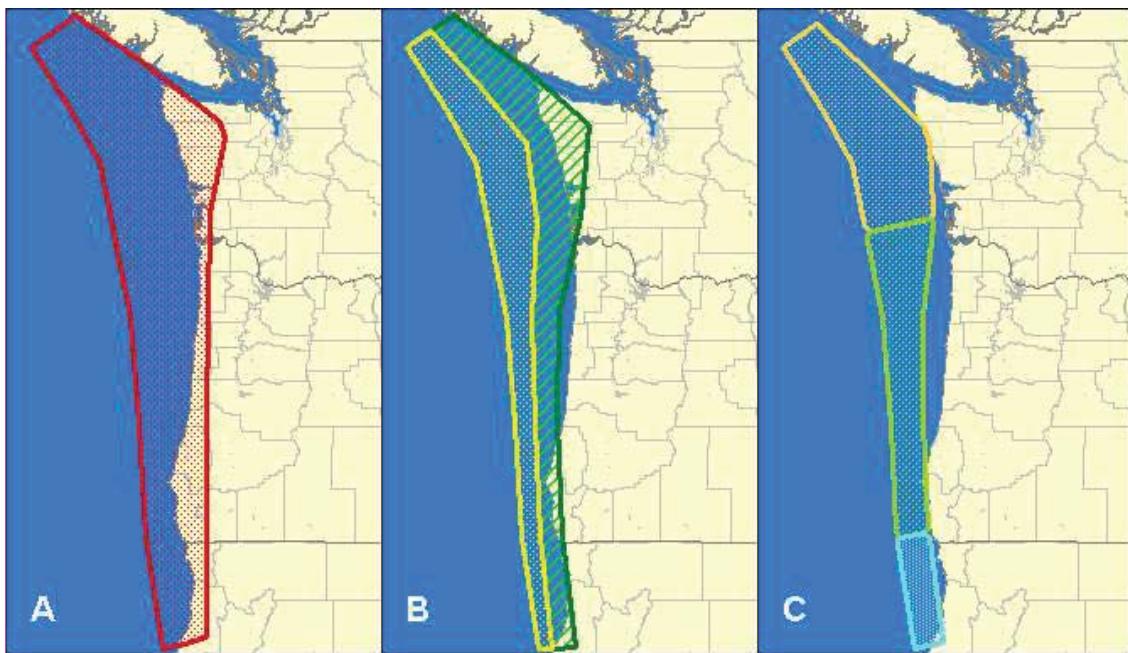
Cascadia Subduction Zone

Various models have been proposed to estimate the potential extent of a Cascadia earthquake. The two major factors are how deep along the interface an event will rupture, and whether it ruptures along the full length of the subduction zone at one time or ruptures along only a small portion of the zone. These combinations drive event magnitude and proximity to population centers. The branches on the logic tree follow the implementation from the USGS 2008 maps.

There are four models of down dip extent which are included in the model. Three of the models follow similar geometries which continue closer to the coast as they get deeper: Shallow, Medium and Deep. The last model has different source geometry and is referred to as the "30 km" model. The alternate geometries are shown in the figure below:

³For comparison, the San Andreas fault zone has a slip rate of 25-35 mm/yr and the Hayward fault has a slip rate of 7-9 mm/yr.

Source Models for the Cascadia Subduction Zone



A major question regarding the Cascadia Subduction Zone is whether it ruptures its entire 100 km length at one time or if rupture occurs in a piecewise fashion. Available paleoseismic data alone do not provide an answer to this question, but Japanese tsunami data indicate that the last event, in 1700 A.D., probably ruptured the entire subduction zone. Two options are considered: a single full rupture with magnitudes 8.8Mw, 9.0Mw and 9.2Mw, or three smaller ruptures modeled between 8.0Mw and 8.7Mw. Segment boundaries are varied for the smaller events for better event sampling.

The Seattle Fault

While the Seattle Fault poses significant risk to the Puget Sound region, it is poorly constrained. As a result this fault is modeled as three separate, roughly parallel sources, reflecting the identified strands of this structure. Recurrence is distributed across all three sources with similar rates of occurrence. Characteristic magnitudes vary slightly, as the segments increase in length from south to north.

Seismic Activity in Alaska

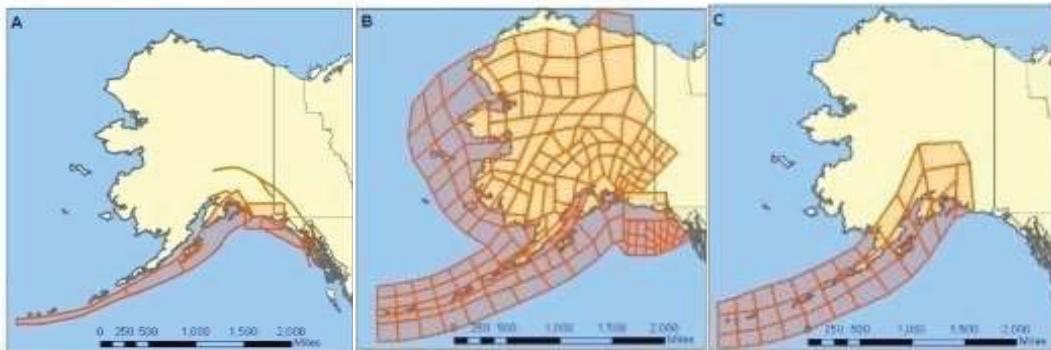
Lying along the plate boundary between the North American and Pacific plates, Alaska is a high seismic risk state in the U.S. The majority of the seismic activity in the Alaska region is a consequence of the Pacific Plate being subducted beneath the North American plate along the Alaska subduction zone. As in the Pacific Northwest, three different types of earthquakes can result:

- **Crustal:** Throughout southeastern Alaska, the North American and Pacific plate boundary is delineated by a series of major strike-slip faults that extend from coastal British Columbia to Central Alaska. The key structures in this region include the Queen Charlotte, Fairweather, and Denali faults. All of these structures have high activity and have experienced major earthquakes in historical time. The most recent of these was the magnitude 7.9 Denali National Park earthquake on November 3, 2002, which ruptured more than 300 km of the Denali Fault.
- **Interface:** These are large thrust events along the contact between the Pacific and North American plate, with potential characteristic magnitudes ranging from Mw8.5-Mw9.2. The location of an event hypocenter is expected to be along the coast at a depth of 20-50 km. Historically, several large subduction earthquakes have occurred along this boundary, including the 1964 Prince Edward Sound Earthquake (Mw9.2) and the 1957 Mw9.1 and 1965 Mw8.7 earthquakes off the coast of the Aleutian Islands.
- **Intraslab:** Along the Alaska Trench, the Pacific plate is being subducted beneath the North American plate. As it subducts, it experiences bending stresses that cause earthquakes within the Pacific Plate. These events occur at intermediate (50-80 km) depths. Within the Alaska model, these events are modeled with a set of sources referred to

as “deep.” Intraslab seismicity is relatively common in Alaska, but because of their moderate magnitudes (Mw 7.0), locations offshore and/or at great depths, they are not major contributors to the overall risk.

The figure below shows the coverage of the different types of sources.

Maps of Alaska Seismic Sources Model by Source Type



A: Crustal Faults and Interface or Subduction Zones; B: Crustal Seismicity Area Sources; C: Deep Intraslab Event Sources

Seismic Activity in Hawaii

Hawaii has the distinction of being home to the highest seismic risk area of any state in the U.S. The Hawaiian Islands lie in the middle of the Pacific Plate atop a series of active and inactive volcanoes. While the active volcanoes can produce damaging earthquakes, the bulk of the seismic risk in the region is more indirectly related to the volcanic history of the islands.

The islands were built up over millions of years by volcanic activity and are relatively unstable structures. The largest earthquake hazard is posed by gravity-induced sliding of the flanks of the volcanoes on the island of Hawaii. Within the RMS U.S. Earthquake Model, there are seismic sources to model these five flank zones. These sources have characteristic magnitudes that range from Mw7.0 – Mw7.5. In addition, one cascade source that ruptures three of the flank zones together (Kilauea South, Mauna Loa East, and Mauna Loa South) is included. This source has a characteristic magnitude of Mw8.2 and ruptured in 1868 as the Great Ka’u earthquake (as an Mw7.9).

In addition to the degradation of the islands, the upwelling of hot material beneath the Pacific Plate associated with the volcanic activity generates crustal stresses. The earthquakes that result from these stresses dominate the seismic hazard for the smaller islands to the north and west, such Oahu and Maui. Because these islands also host the bulk of the insured exposure, the volcanism-related events are drivers of the overall risk for the Hawaiian region.

While most of the seismic hazard is posed by shallow crustal events, deep earthquakes do occur beneath the Big Island. These events are related to a buildup of stresses underneath the island due to the intrusion of volcanic materials. These deep events do not typically cause extensive damage, but they occur frequently and are included in the model for completeness.

Within the Hawaii region of the RMS U.S. Earthquake Model, the flank zones are modeled as dipping planes, while the remaining seismic sources are modeled as area sources. The figure below shows the coverage of the seismic sources in Hawaii.

Seismic Source Model for Hawaii Earthquake

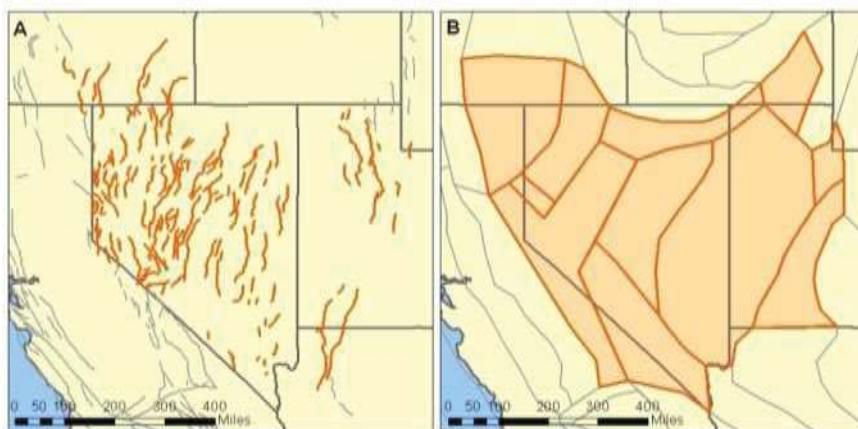


Left: Shallow Sources Including Flank Zones; Right: Deep Sources Beneath the Big Island

Seismic Activity in the Great Basin Region

The highest hazard zone in the Great Basin region is along the Wasatch fault system in the Salt Lake City area. This system runs along the west edge of the Wasatch Range and is the eastern limit of the deformation within the North American plate due to interactions with the Pacific plate. This fault system is made up of six fault segments with a characteristic magnitude range of Mw6.6 – Mw7.4.

Seismic Source Model for the Great Basin Region



A: Active Fault Sources; B: Area Sources Accounting for Background Seismicity

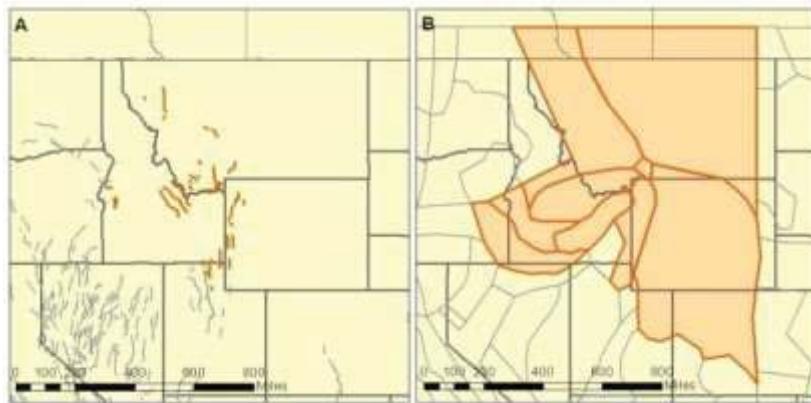
To capture the uncertainties around modeling events on the Wasatch faults system, the implementation includes logic tree branches for dip angle and characteristic uncertainty. In addition, the largest events on the Wasatch sources are modeled using the individual NGA relationships instead of the weighted average of the ground motion models.

For the rest of the region, the seismic risk is relatively low. The source model includes numerous faults, but the majority of these structures has very low slip rates and poses little risk to exposure concentrations. For faults with uncertain dip angles, alternate sources are included to model them at 40, 50 and 60 degrees.

Seismic Activity in the Northern Rockies Region

Seismicity in the states modeled by the Northern Rockies source model is generally low. The source model includes 97 fault sources; the majority of these structures have moderate characteristic magnitudes and low slip rates. There are three faults in Montana which have characteristic magnitudes in the Mw7.2-7.3 range: Hebgen-Red Canyon, Madison and Mission faults. For sources with uncertain dip, the source is modeled with a series of dip angles (40, 50 and 60 degrees) which are weighted evenly. Area sources are used to account for background seismicity.

Seismic Source Model for the Northern Rockies Region

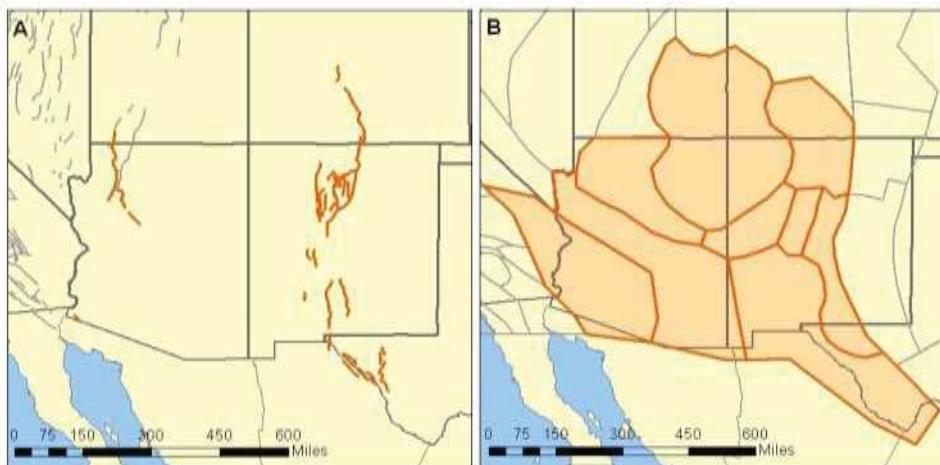


A: Active Fault Sources; B: Area Sources Accounting for Background Seismicity

Seismic Activity in the Southern Rockies Region

Seismicity in the states modeled by the Southern Rockies source model is generally low. The source model includes 146 fault sources, with the majority of these structures having moderate characteristic magnitudes and low slip rates. Of the fault sources, the important structures with characteristic magnitudes in the Mw7.4-7.5 range are the Hurricane and Sevier-Toroweap faults in Arizona, the Northern Sangre de Cristo fault in Colorado, and the Alamogordo, Picuris-Pecos and Southern Sangre de Cristo faults in New Mexico.

Seismic Source Model for the Southern Rockies Region



A: Active Fault Sources; B: Area Sources Accounting for Background Seismicity

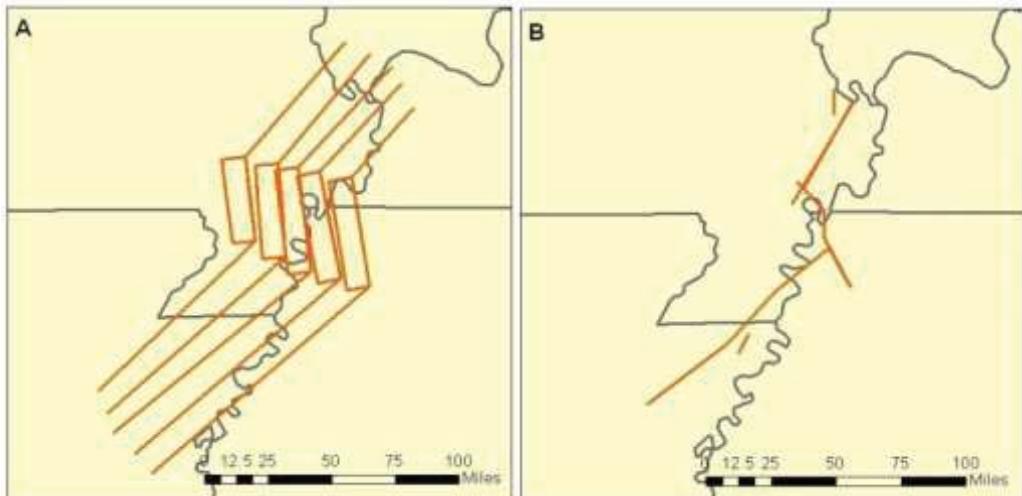
Seismic Activity in the New Madrid Region

The New Madrid source model is dominated by the New Madrid seismic zone (NMSZ). Underlying the sediments of the Mississippi Embayment at the juncture of Missouri, Kentucky, Tennessee, and Arkansas, the NMSZ was the source of earthquakes estimated at Mw7.5–Mw8.0 in the winter of 1811–1812; paleoseismic evidence suggests at least two other similar occurrences in the previous 900 years.

Outside of the New Madrid seismic zone, earthquake sources and their recurrence have been defined on the basis of smaller historical events. The most active of these is the Wabash Valley seismic zone in southern Indiana, which has experienced several earthquakes of Mw4.5 or greater since 1891.

Within the RMS source model, earthquake occurrence in the New Madrid seismic zone is accounted for using both fault-specific and area sources. Characteristic events are modeled on the fault-specific sources and events less than approximately Mw7.0 are distributed across the area sources used to model background seismicity levels.

Fault Sources in the New Madrid Region

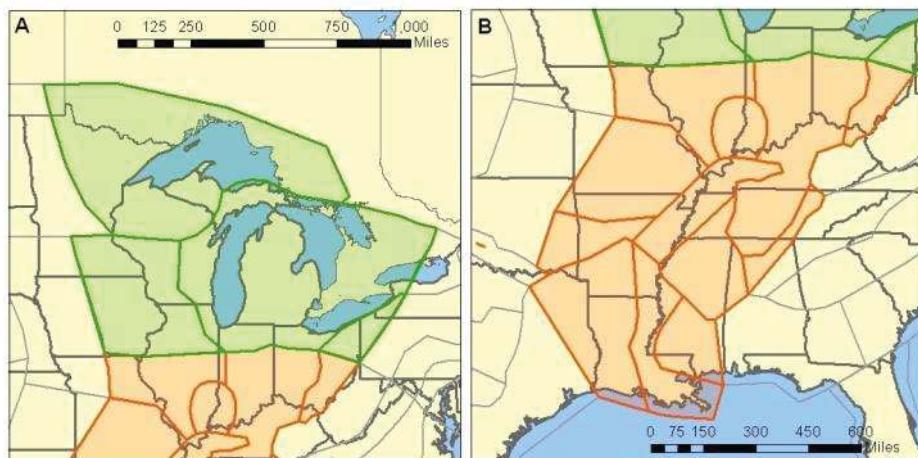


A: Pseudo-faults from the 2008 National Seismic Hazard Maps; B: Actual Fault Structures used for Historical Event Scenarios

Earthquakes similar to the 1811-1812 series are critical in assessing the risk in this region and have thus received a comprehensive treatment in the stochastic event set. Following the USGS 2008 model, these events are modeled on a set of five “pseudo-faults”. These sources are modeled for a series of magnitudes and with a suite of individual ground motion models. Recurrence is distributed across these sources following the logic tree set up by the USGS for the 2008 National Seismic Hazard Maps.

In the New Madrid region, there is a single fault modeled (Meers Fault) and complete coverage of area sources to model the background seismicity (cf. figure below).

Source Model for New Madrid, with the New Madrid Great Lakes (green area, A) and New Madrid Main (orange area, B) Regions



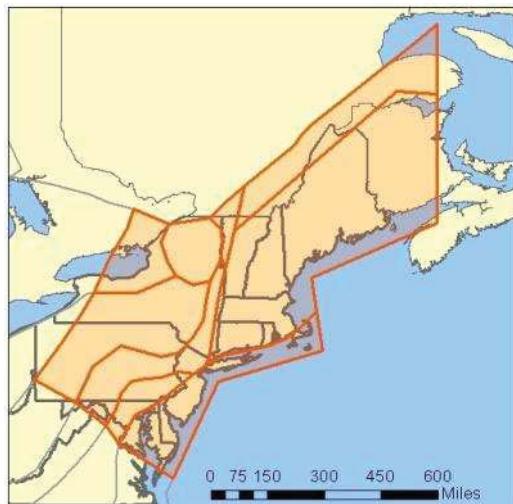
Seismic Activity in the Northeast Region

There have not been any seriously destructive historic events in the northeastern states to drive public awareness of potential risk, such as the 1811-1812 New Madrid or 1886 Charleston, South Carolina earthquakes elsewhere in the eastern U.S. This area has, however, experienced five events of Mw6.0 or greater in the past 400 years, including an estimated Mw7.0

in 1663. While located in Canada, these events have been felt in the U.S. The northern part of New York has had the highest rate of events in the northeastern states.

No fault-specific sources have been identified within the Northeast region; all seismicity is modeled with area sources. Seismic sources in the northeastern states are modeled purely on the basis of historical occurrence.

Seismic Source Model for the Northeast Region



Seismic Activity in the Southeast Region

As with the rest of the eastern U.S., seismicity in the southeastern states is relatively low and generally cannot be associated with specific faults. Two areas within the Southeast are notable for distinctly elevated rates of activity: the Charleston seismic zone and the East Tennessee seismic zone (ETSZ). The latter is primarily notable for its high rate of small earthquakes (<Mw4.0).

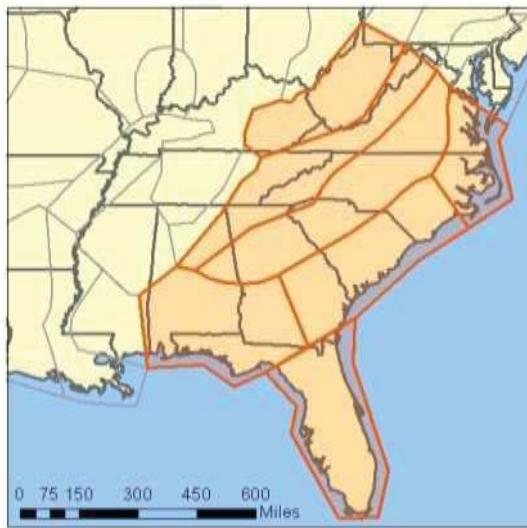
The most important historical event for the Southeast region was the Charleston, South Carolina earthquake of 1886. Estimated at between Mw6.9-7.3, it was felt across most of the eastern U.S. It remains an important benchmark in hazard modeling for stable continental regions; much of the eastern seaboard and Appalachia share a similar geologic history of extensional rifting.

The area around the 1886 event, the Charleston seismic zone, remains a region of elevated seismicity. In addition, paleoliquefaction studies along the South Carolina coast have unearthed evidence that similar large events have occurred in the past, with an average return period of approximately 550 years.

Within the RMS event set, characteristic events of the Charleston seismic zone are modeled using the logic tree approach of the USGS 2008 National Seismic Hazard Maps. Two characteristic sources are included, and as the specific location for the characteristic events is less constrained than for the NMSZ, area zones are used. The smaller of the two area sources (Narrow) represents the approximate location of the 1886 event. The larger (Broad) covers the area that paleoliquefaction studies suggest has historically experienced strong ground shaking.

The figure below shows the coverage of the seismic sources in the Southeast region.

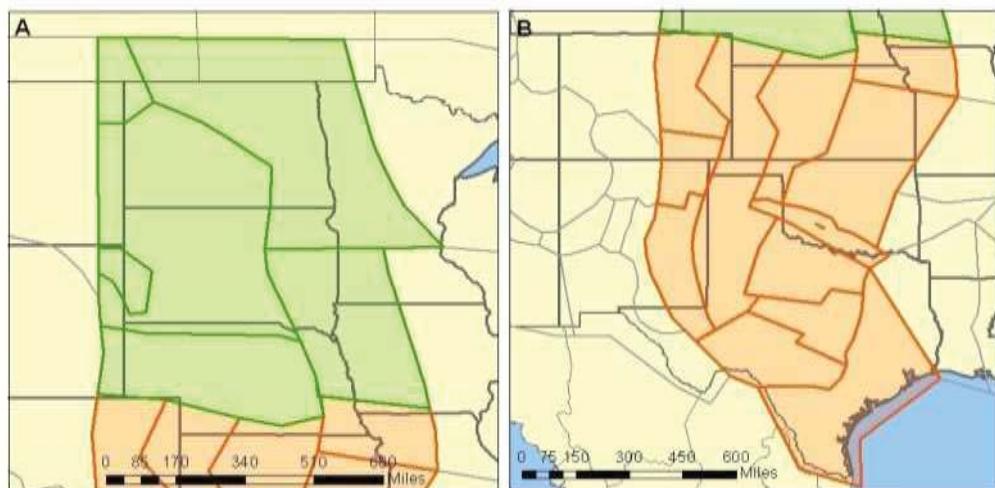
Seismic Source Model for the Southeast Region



Seismic Activity in the Midwest Region

Seismicity in the Great Plains states modeled by the Midwest source model is generally very low. Regions with activity rates above the minimum considered in the model are sparse. Only one fault-specific source is modeled: the Cheraw fault in eastern Colorado. Though the seismicity rates are low the area source coverage is complete to provide a comprehensive view of risk. The figure below shows the coverage of the seismic sources in the Midwest region.

Seismic Source Model for the Midwest

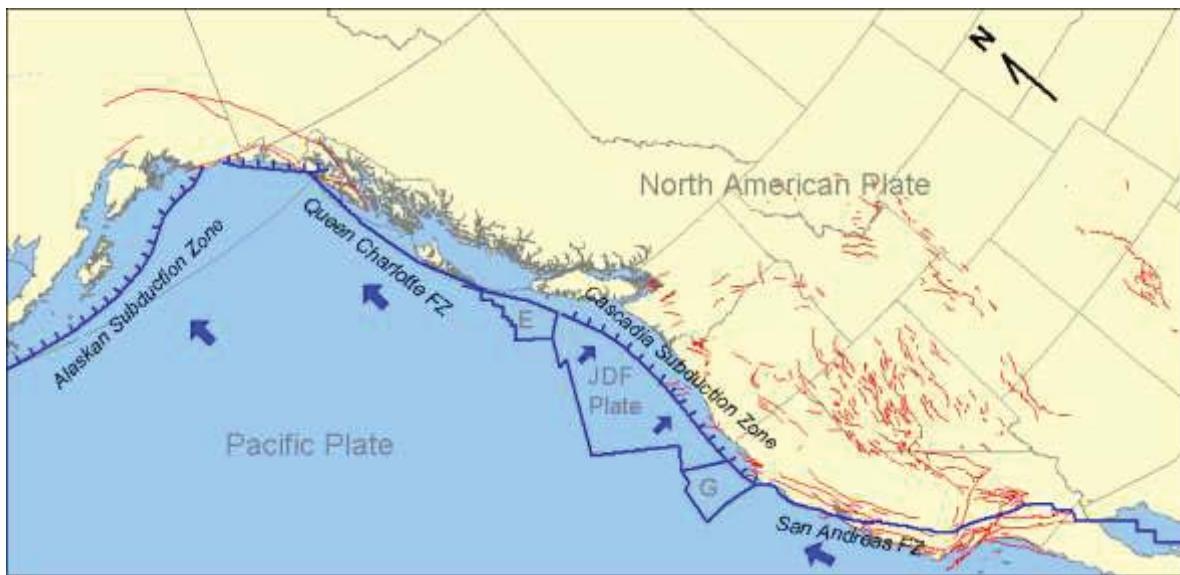


A: Midwest Dakotas; B: Midwest Southern Regions

Seismic Activity in the Western Canada Region

British Columbia lies along the edge of a major plate boundary, where the primary source of earthquakes is the interaction between the Pacific and North American plates. The figure below illustrates the plate boundary along the North American continental margin. The majority of the seismic activity in Oregon, Washington, and southwestern British Columbia is a consequence of the offshore Juan de Fuca plate being subducted beneath the North American plate, a tectonic collision referred to as the Cascadia subduction zone. Continuing north, the plate margin returns to a strike-slip boundary known as the Queen Charlotte fault. Finally, the Pacific plate is consumed beneath North America in the Alaskan subduction zone.

Major Tectonic Features of Western North America



In the figure above, the arrows show plate directions relative to North America. Red lines are fault-specific sources in the RMS U.S. Earthquake model.

Three different types of earthquakes impact exposure in the western Canada region:

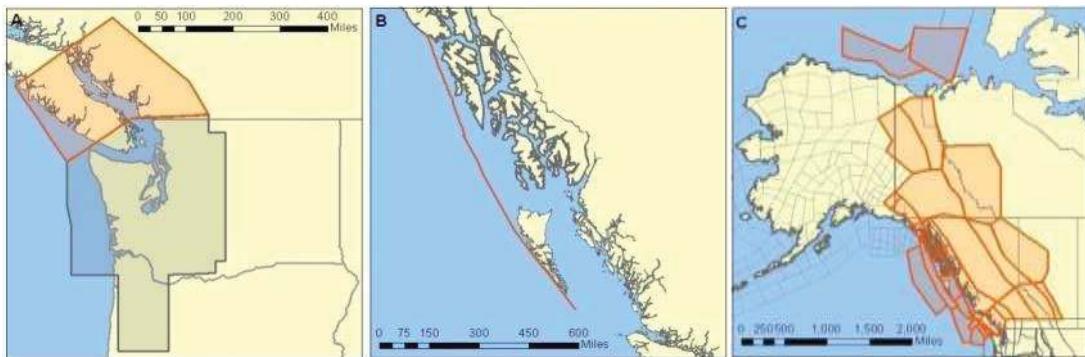
- **Interface:** These are large thrust events along the contact between the Juan de Fuca and North American plate, with potential magnitudes ranging from Mw8.0-9.0. The location of an event hypocenter is most likely along the coast at a depth of 5-20 km, but the actual rupture area in an event could extend further inland and for hundreds of kilometers to the north and south. No large historical interface events have occurred, but paleoseismic data suggest return periods on the order of 400-600 years. Large subduction events also occur northwest of British Columbia in Alaska, but these are unlikely to have a significant impact in Canada.
- **Intraslab:** The Juan de Fuca slab has an irregularity in its shape beneath the Puget Sound that results in fracturing within the plate itself. While these events are intermediate in depth (generally 30-70 km), they can result in significant damage when in proximity to high exposure concentrations. Intraslab earthquakes are common in the southern part of British Columbia. Beneath Seattle south of the U.S. border, return periods are between 25-35 years for events M6.5 and up. Rates of these events decrease away from the central Puget Sound, but are still possible near Victoria and Vancouver.
- **Crustal:** The Queen Charlotte fault west of British Columbia is similar to the San Andreas Fault system in California, with a slip rate of nearly 60 mm/yr and historical events of around Mw8.0. Fortunately, it is largely offshore and is located in a sparsely-populated part of the province. Faults in the Pacific Northwest and southern British Columbia are generally less active by orders of magnitude; on-land faults with slip rates of 1 mm per year are virtually non-existent, and most are 0.2mm per year or less.⁴ Nonetheless, due to their shallow depth they can generate very high local ground motions. Crustal event rates are low on land, but potential severity is high.

Although large thrust events along the Cascadia subduction zone have the potential to generate significant losses in southern British Columbia, these events are not included in the western Canada event set but instead are modeled as part of the Northwest region of the U.S. Similarly, subduction events generated to the northwest of British Columbia are modeled as part of the Alaska region.

Intraslab and crustal source zones impacting western Canada are modeled within the western Canada region of the RMS U.S. Earthquake Model and are shown in the figure below:

⁴ For comparison with major California faults, the San Andreas fault zone has a slip rate of 25-35 mm/yr and the Hayward fault 7-9 mm/yr.

Seismic Source Model for Western Canada and Surrounding Areas



A: Coverage of Intraslab Sources. B: Active Faults included in the Western Canada Model. C: Coverage of Area Sources

Seismic Activity in the Eastern Canada Region

The observed level of seismicity in eastern Canada is significantly lower than that in western Canada. Even though the historical record for earthquake activity is longer than in the west, eastern Canadian seismicity is less well defined due to its diffuse and infrequent occurrence.

All seismic sources in the eastern region are regional sources and are based on the source zones defined in the Geological Survey of Canada 2003 National Hazard Maps. These regional sources are divided into two types: concentrated seismicity zones and background sources.

Within eastern Canada, the majority of the seismicity is associated with a wide U-shaped zone extending from the Gulf of St. Lawrence, down the St. Lawrence River to the Québec-Ontario border, and continuing to the west and north towards James Bay. These earthquakes are thought to be associated with ancient faults, rifts or other structures that provide a zone of weakness in the crust for release of accumulated stress. This zone is modeled using a number of small seismic sources, which contain pockets of concentrated seismicity.

Diffuse seismicity is observed outside of this zone of concentrated sources. These earthquakes are modeled using background seismicity sources, which are very large and have very low seismicity rates.

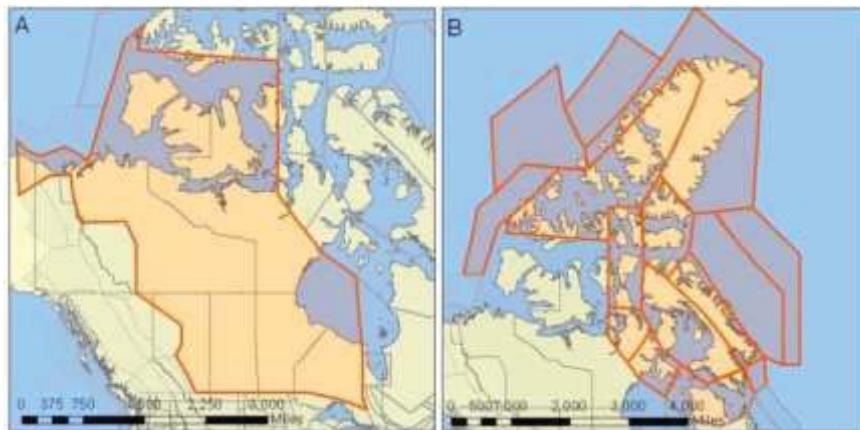
Seismic Source Model for the Eastern Canada Region (red) and Surrounding Areas (grey)



Seismic Activity in the Northern and Central Canada Region

The observed level of seismicity in Central Canada and most parts of Northern Canada is diffuse and very low. These earthquakes are modeled using background seismicity sources, which are very large and have very low seismicity rates. All seismic sources in the central and northern regions are regional sources and the sources in the northern region are based on the source zones defined in the Geological Survey of Canada 2003 National Hazard Maps.

Seismic Sources for the Central Canada Region (A) and for the Northern Canada Region (B)



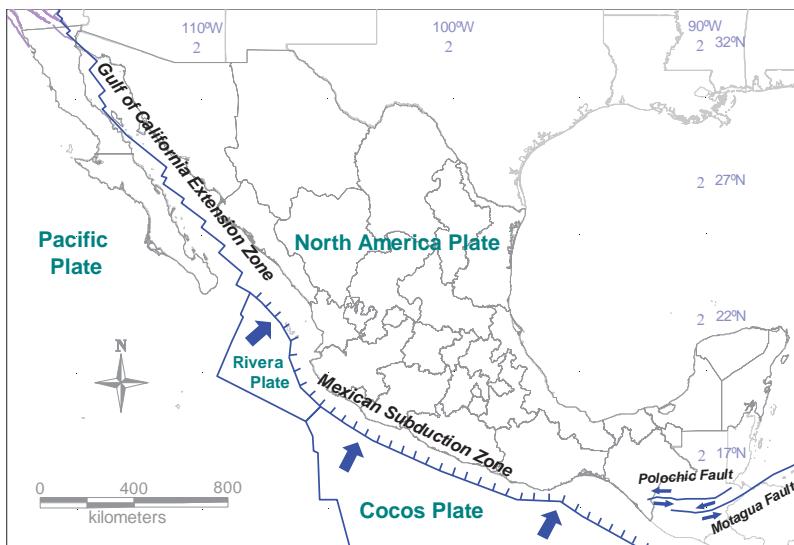
Seismic Activity in Mexico

The main tectonic feature in Mexico is the subduction zone off the Pacific coast of central and southern Mexico. Here, two oceanic plates (Rivera to the north and Cocos to the south) are subducting beneath the continental North America plate at varying rates (about 1.5 cm/yr in the north to about 6.5 cm/yr in the south).

The subduction zone creates three distinct types of earthquakes: 1) large thrust mechanism earthquakes along the subduction interface, 2) deep earthquakes within the subducting plates, 3) shallow crustal earthquakes within the overriding North America plate.

The subduction interface earthquakes are thrust mechanism events caused by the collision of the oceanic and continental plates, during which the oceanic plates sink beneath the continental plate due to their larger density, and the continental plate gets pushed up where these plates are locked. When this locked portion slips, the energy is typically released in large magnitude ($M_w \geq 7.0$) earthquakes. The subduction zone off Mexico's Pacific coast creates these earthquakes relatively frequently along the various segments of the subduction interface.

Major Tectonic Features of Mexico

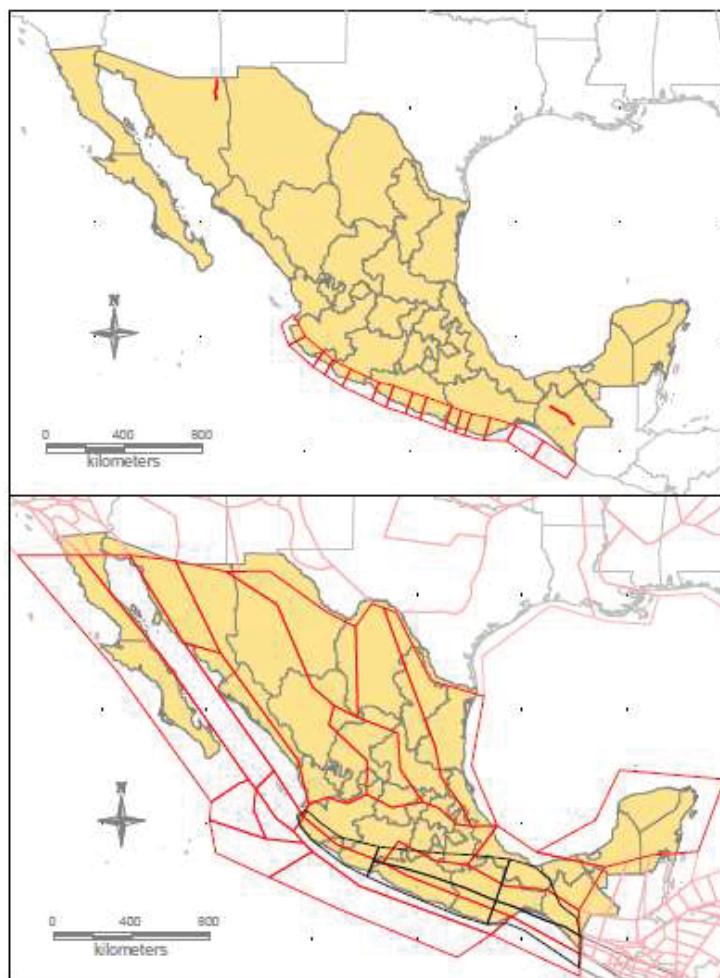


Three different types of earthquakes impact exposure near subduction zone in Mexico:

- **Interface:** These are large thrust events along the contact between the Rivera/Cocos plates and North America plate, with potential magnitudes ranging from Mw7.0 to Mw9.0. The location of an event hypocenter is most likely along the coast at a depth of 10-40 km, but the actual rupture area in an event could extend further inland and for hundreds of kilometers to the north and south. Many large historical interface events have occurred along many segments of the Mexican subduction zone; however a few segments have been identified as seismic gaps.
- **Intraslab:** The Rivera plate to the north, is the smaller of the two subducting plates, and is the source of intraslab earthquakes around Jalisco state. Cocos plate to the south accounts for the rest of the intraslab earthquakes in the Mexican subduction zone. While these events are intermediate in depth (generally 30-70 km), they can occur as far inland from the Pacific coast as Veracruz and result in significant damage when in proximity to high exposure concentrations such as Mexico City, Guadalajara, Puebla, and Veracruz.
- **Crustal:** The Gulf of California Extension Zone consists of a series of strike-slip faults bounding grabens formed by extension faults. This system is generally away from populated parts of Baja California to the west of the Gulf and Sonora to the east; however Mexicali is located on the northern extension of this system that links up with the San Andreas Fault System in the U.S. The Trans-Mexican Volcanic Belt (TMVB) includes a complex system of mainly strike-slip and normal faults. One of these faults near Acambay produced a Mw7.0 earthquake in 1912 with surface rupture. Small to moderate magnitude crustal earthquake activity is highest in Chiapas.

Subduction interface, intraslab and crustal area source zones impacting Mexico are shown in the figure below.

Seismic Source Model for Mexico and Surrounding Areas



Top: Subduction interface and fault sources included in the Mexico Model. Bottom: Crustal [red] and intraslab [black] area sources

HAZARD MODULE

The ground shaking hazard module in the RMS U.S. Earthquake Model includes two major elements: attenuation and geotechnical hazard data. Ground motion attenuation is the regional decay of shaking between an earthquake's epicenter and a building site. The available geotechnical hazard data determine how the regional ground shaking will be modified by the local conditions at the site.

General Attenuation Discussion

Ground shaking, the main component of earthquake hazard, is analyzed using standard earthquake engineering methodologies. For a given event on a specific earthquake source, the model analyzes the attenuation of seismic energy with distance to determine the level of ground shaking at a particular site.

The attenuation functions used for these calculations vary widely in different parts of the world because of differences in geologic and tectonic conditions that affect the transmission of seismic energy. For example, it has been observed that earthquakes in the eastern half of the continental U.S. are felt over much larger areas than events of similar magnitude west of the Rocky Mountains. This has been attributed to the older, thicker crust in the eastern U.S., which transmits ground shaking more efficiently. There are fewer significant events in the east from which to develop attenuation relationships, resulting in greater variability between attenuations in these areas.

The RMS U.S. Earthquake Model uses attenuation functions in standard practice for seismologic environments in North America. The modeled attenuations vary regionally and by source type (e.g., strike-slip, extensional, or thrust; shallow versus deep), considering weighted averages of published relationships. The 2008 USGS National Seismic Hazard Map Program (Peterson, et al., 2008) uses multiple attenuation functions to represent the ground motion estimates for each source and applies weights similar to a logic tree. The attenuation functions used in the RMS U.S. Earthquake Model are consistent with the functions used in the development of the USGS hazard maps. The ground motions are calculated from weighted averages of the multiple attenuation functions applicable to the event. However, for some important events (for example, the New Madrid Seismic Zone and San Andreas Fault System), the ground motion from multiple attenuation functions are calculated individually as separate events. When this happens, the event rate is distributed according to the weights assigned to the individual attenuation function.

Attenuation Parameters

The RMS U.S. Earthquake Model calculates ground shaking using one of three model parameters: spectral acceleration (Sa), peak ground acceleration (PGA), or Modified Mercalli Intensity (MMI).

Spectral acceleration

Spectral acceleration (Sa) represents the maximum response of a structure that is excited at the base by the ground motion input from an earthquake. It is a good index of hazard to buildings, and it is more closely related to the building behavior than peak ground motion parameters.

Spectral acceleration relationships are derived using the entire content of ground motion records and thus better represent the character of building response to shaking at a site, regardless of whether it is mostly a rapid, high-frequency shock, or a “rolling,” long-period motion.

The RMS U.S. Earthquake Model calculates spectral acceleration as a function of source (magnitude and rupture process) and site (distance, soil type). Within the output files, however, only the spectral response of the building is recorded, i.e., the acceleration at the predominant period of the building. In other words, a 15-story building will experience different ground motion intensity for a given earthquake than a 5-story building at exactly the same location.

All earthquake casualty losses are calculated from spectral acceleration hazard.

Local Site Conditions

Once ground shaking has been calculated, the models use a database of surficial geology to determine how ground shaking will be amplified at a given site. Similar databases of landslide and liquefaction susceptibility are also factored into loss calculations. Each of these factors modifies the regional effects of ground shaking calculated from the attenuation and contributes to the local variation in damage.

Soil and Related Factors

The “soil” parameter controls relative amplification of ground motion. While the class names suggest the most common types of geologic materials, the soil value is actually an index related to the shear-wave velocity (V_s) of the top 30 meters at a

site. This material property has been shown to correlate well with shaking amplification; lower V_s generally result in a larger ground motion than hard materials with a high velocity.

The actual degree of amplification is determined by the input ground motion and, for calculations using spectral response, the period of structure. It has been observed that the amplification of soil relative to rock is greatest when the actual shaking intensity is low; at high shaking amplitudes, such as those that occur near a fault, there may be very little difference in the level of shaking experienced.

Two other factors in the model can modify the ground shaking experienced by a building: long-period effects and basin effects.

While surficial materials are the largest contributors to site response, other factors can also have an impact. One such factor is a site's location in a deep sedimentary basin, especially when there is a significant contrast in shear wave velocity between the sediments and underlying bedrock. Basins can amplify shaking, particularly in the longer periods that affect tall buildings. Quantifying these impacts can be difficult, as they are strongly influenced by the three-dimensional properties of the basin.

Basin depth effects are modeled for the Los Angeles basin, the Seattle basin and the Mississippi Embayment in the Central U.S. Shaking amplification for sites in these areas is based on a combination of surficial soils and basin specific geotechnical studies.

Liquefaction and Landslide

Liquefaction and landslide are two forms of ground failure that can be triggered by strong shaking.

Liquefaction is the temporary transformation of a solid soil into a liquid state. It can occur when certain types of saturated, unconsolidated soils are subjected to repeated, cyclical vibration and therefore most commonly occurs during earthquakes.

Landslides are slope-related failures of earth materials. There are many possible triggers for landslides, the most common of which is saturation due to extended periods of rainfall. The cyclical ground shaking imparted by earthquakes can act as a catalyst for slopes near to failure, however, and thus can generate additional potential for loss.

In general, liquefaction and landslide susceptibilities are inversely correlated; landslides require some topographic contrast, while the areas of highest liquefaction tend to be flatlands⁵. Though uncommon, it is physically possible to have a site with high susceptibilities for both hazards, particularly if aggregate data resolutions are used. In these cases, damages for both are calculated and the higher loss contribution is used.

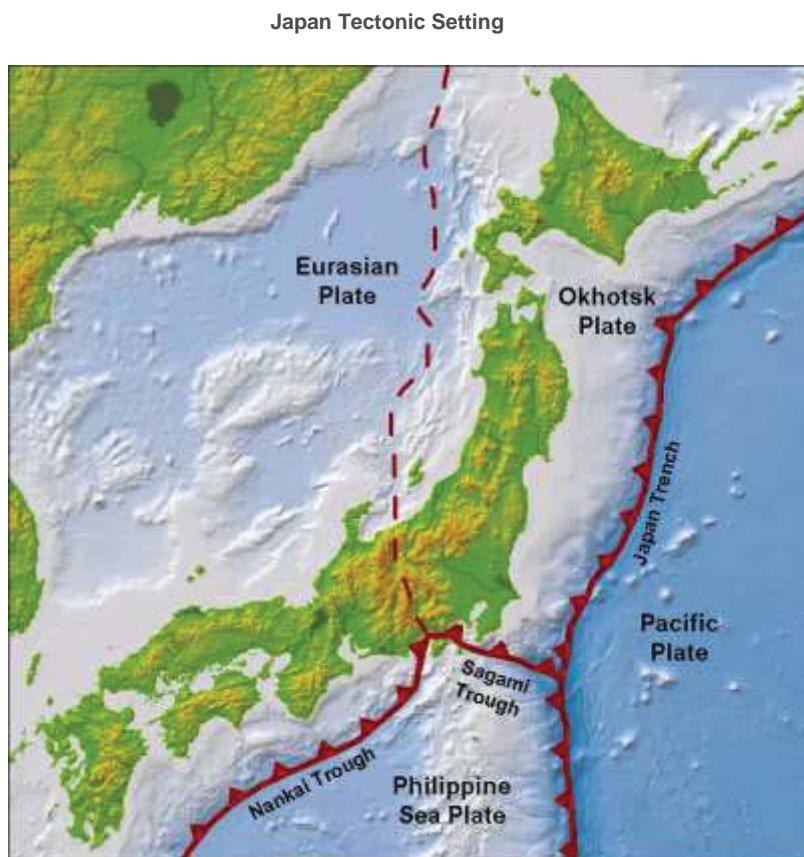
⁵ Lateral spreading occurs in flat lying materials and is technically a landslide, but this phenomenon falls into liquefaction for the purposes of RMS loss estimation.

Appendix B: RMS Japan Earthquake Hazard Model Description

OVERVIEW OF EARTHQUAKES IN JAPAN

Tectonic Setting

The Japanese Islands lie in one of the world's most seismically active areas. They span the boundary between the Eurasian Plate and the Okhotsk Plate, and are bounded to the east by the Pacific Plate and to the south by the Philippine Sea Plate. Subduction of the Pacific and Philippine Plates beneath the Eurasian Plate accounts for the majority of earthquakes in Japan, as well as for the extensive volcanism that created the Japan Islands.



Three major subduction-related boundaries, marked by deep oceanic trenches or troughs, define the tectonics for the region. The Sagami Trough occurs along the interface of the Pacific and Philippine Sea plates, the Nankai Trough occurs as a result of the Philippine Sea Plate subducting beneath the Eurasian Plate, and the Japan Trench is formed along the margin between the Okhotsk and Pacific plates. A diffuse offshore boundary exists between the Eurasia and Okhotsk plates and along the northwest coast of Honshu. The three boundary zones along the eastern coast of Japan have high earthquake activity rates and have historically produced very large, damaging earthquakes (e.g., the 1944 Tonankai and 1946 Nankai events along the Nankai Trough; the 1923 Great Kanto Earthquake along the Sagami Trough).

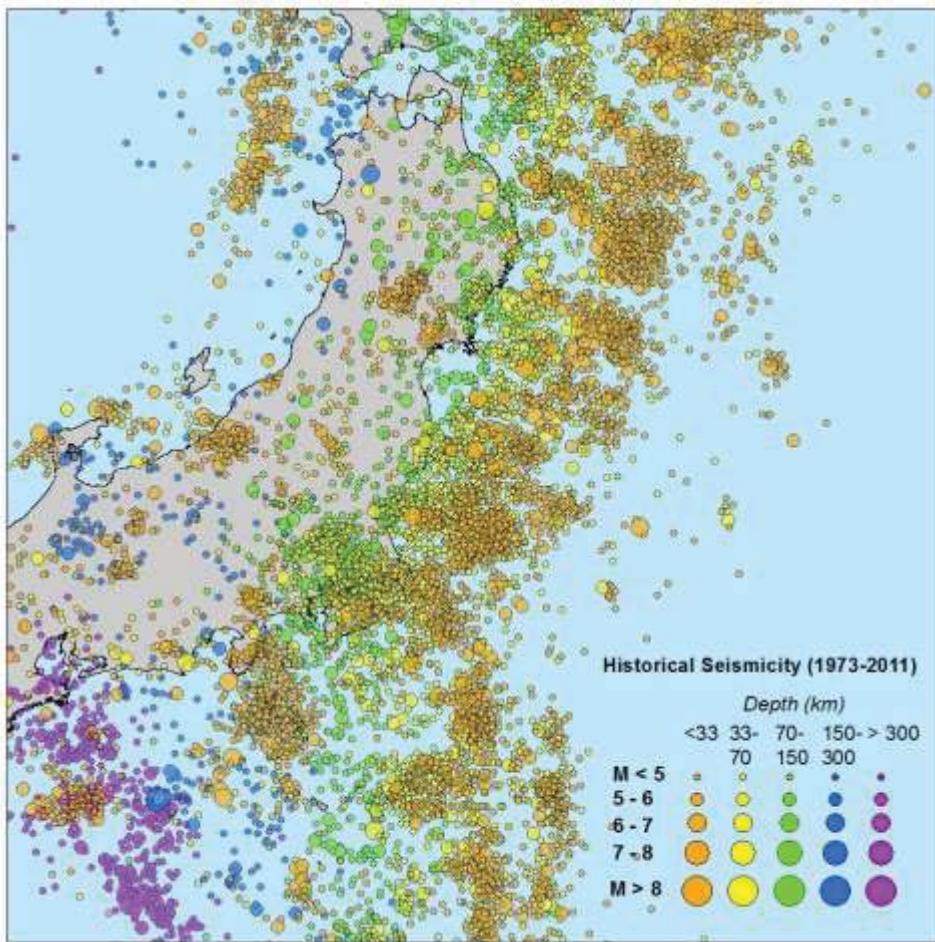
The Philippine Sea, Pacific, and Okhotsk plates converge under the Tokyo metropolitan area, resulting in a uniquely complicated tectonic environment. The convergence of the three plates creates seismic activity within and between the plates (termed "intraslab" and "interface" events, respectively), with the Okhotsk Plate overriding the Philippine Sea Plate, and the Pacific Plate dipping beneath both. There is a concentration of deeper moderate magnitude events ($M < 7.5$ at 15-100 km depth) in the region, referred to as Chokkagata ("directly beneath") events.

Shallow crustal earthquakes are also a common occurrence, due to compression across the plate boundaries being accommodated through faulting and folding within the overriding Eurasian Plate. As a result, there is an extensive system of

active faults within the Japan Islands. Shallow crustal events typically have smaller magnitudes and longer return periods than subduction earthquakes, but locally can drive the risk profile.

The following Figure is a map showing the epicenters of historical earthquakes in Japan (zoomed in on Northern Honshu). The size of the dots in the figure indicates the magnitude of the earthquake, and it is shaded according to the depth of the source.

Historical Seismicity 1973-2011 in Japan



Significant Earthquakes in Japan

Great Kanto Earthquake, 1923: The most destructive earthquake in Japanese history, both in terms of damage and loss of life, was the Great Kanto Earthquake of 1923. This event, with a magnitude of M7.9, is believed to have been centered on the Sagami trough in Tokyo Bay. More than 142,000 people were killed and the cities of Tokyo and Yokohama were badly damaged and consumed by a major conflagration. The fires that followed the earthquake caused most of the damage and subsequent loss of life.

Niigata Earthquake, 1964: The Niigata Earthquake of June 16, 1964 was the first well-documented example of the effects of liquefaction resulting from an event in a modern, urban environment. The event had a magnitude of M 7.6 and caused severe damage to many structures in Niigata that were built on loose, saturated soil. These included well-constructed buildings, bridges, highways, utilities, docks, refineries, and railways. The earthquake also triggered a tsunami that destroyed the port of Niigata.

Okushiri Earthquake, 1993: A notable example of an event from the Okhotsk Plate boundary was the Okushiri Earthquake on July 12, 1993. This event was measured as M7.6 and resulted in 231 deaths and about USD 1 billion total economic losses at the time of the event. The earthquake had an epicentral distance of approximately 80 km (50 miles) west of Hokkaido Island and was the largest to hit Japan in the previous 15 years. The bulk of the damage and loss of life occurred

on Okushiri, a small island southwest of Hokkaido. Located 48 km (30 miles) south of the epicenter, Okushiri was initially hit by the earthquake and then devastated by the subsequent tsunamis and fires. This island was also heavily damaged by tsunamis during the Okhotsk Plate boundary event in 1983.

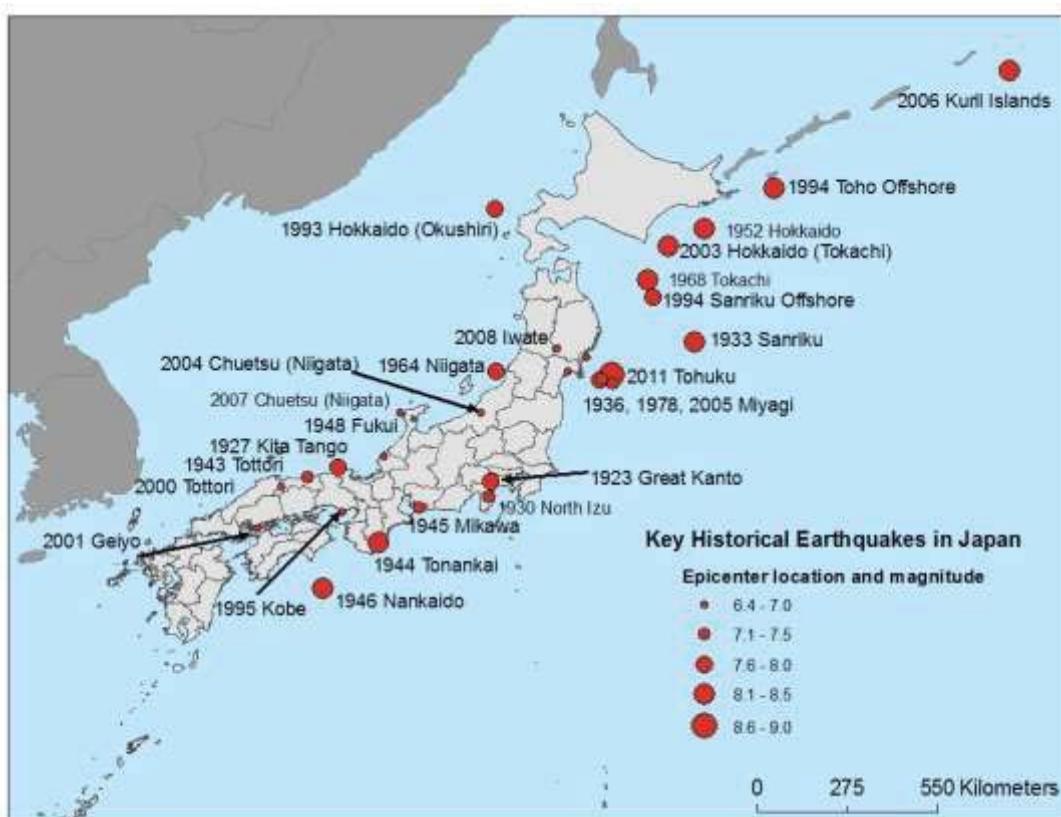
Kobe Earthquake, 1995: The Great Hanshin (Kobe) Earthquake, sometimes called the Kyogoken-Nanbu Earthquake, was a severe shallow crustal earthquake (M6.9), which struck the Kobe-Osaka metropolitan area on January 17, 1995. Over 5,000 people were reported killed, more than 26,000 injured, and 300,000 were left homeless. The total economic losses have been estimated to be in excess of USD 100 billion. While the epicenter was located about 20 km (12 miles) southwest of downtown Kobe, the rupture surface for the event actually extended beneath the city. The fact that the event was very shallow, that it ruptured through the downtown area, and that it sparked numerous fires, explains why the damage was so extensive in Kobe even though the magnitude was not as great as many less damaging events in Japan.

Niigata Ken Cheutsu Earthquake, 2004: The Niigata Ken Cheutsu Earthquake occurred on October 23, 2004. This event, centered in northwestern Honshu about 80 km south of Niigata City, measured M6.8 and caused an estimated 40 casualties, 3,000 injuries, and total economic losses of USD 40 billion. The most seriously affected areas were small towns and villages near Nagaoka, especially the village of Yamakoshi, the town of Kawaguchi, and the city of Tokamachi. Additionally, landslides and permanent ground deformations damaged roads, rail lines, and other lifelines, resulting in major economic disruption.

The Great East Japan Earthquake, 2011: This event, also known as the Tohoku Earthquake, was the most devastating event in Japan since the 1923 Great Kanto Earthquake. The M9.0 earthquake and resulting tsunami caused extensive damage throughout the northern part of the island of Honshu. The prefectures of Miyagi, Iwate and Fukushima were particularly severely impacted by both strong ground motions and extensive coastal damage due to the tsunami waves. The death toll from this event was 15,870 with over 2,800 people declared missing (as of late 2012). The economic impact of the disaster is still being assessed. One study by Kitanji et al (2013) estimated USD 211 billion of direct damage.

The map in the Figure below shows the epicenters of these and other significant earthquakes in Japan since 1923.

Map of the Epicenters of Large, Damaging Historical Earthquakes in Japan Since 1900



STOCHASTIC MODULE

RMS believes that no single database of historical earthquakes for a given region can represent a comprehensive series of physically plausible events in terms of their magnitudes, locations, and return periods. Accordingly, the RMS Japan Earthquake Model contains a stochastic module that simulates thousands of hypothetical seismic events within predefined earthquake sources. Each of these stochastic events is uniquely identified by its location, physical characteristics, and rate of occurrence.

Background

In 1998, RMS joined forces with Japan's leading geotechnical engineering firm, OYO Corporation, to form OYORMS. The latest model's representation of seismic risk was developed in partnership with OYORMS, with extensive review of the available literature and studies by the Japanese earthquake engineering community.

As part of the 2005 model development, RMS, with the assistance of external consultants, reviewed the historical catalog to ensure the highest possible level of completeness and accuracy. Sources for this catalog include datasets from the Japan Meteorological Agency (JMA), the Usami catalog, and the OYO catalog of damaging events. The catalog covers the period from 679AD to 2002 and contains more than 28,000 events of magnitude greater or equal to MJMA4.0.

In addition to this review of the historical catalog, RMS incorporated the latest seismic research from the Earthquake Research Committee (ERC). Under the guidance of a governmental organization established after the 1995 Kobe Earthquake, the ERC began to develop a series of seismic hazard maps for disaster planning and mitigation in Japan. Released in the spring of 2005, the Japan National Seismic Hazard Maps were a culmination of ten years of research on seismic sources and ground motion modeling, which incorporated the latest understanding of subduction zones, active faults, crustal zones, and intraslab seismicity zones.

Throughout the 2005 development of the RMS Japan Earthquake Model, RMS and OYORMS worked closely with members of the ERC to incorporate this research into the model. Separately, RMS experts developed parameters for event recurrence that were appropriate for modeling financial risk, including time-dependent and time-independent rates of earthquake recurrence.

Following the 2011 Great East Japan (Tohoku) Earthquake, RMS began research to re-characterize the seismic risk in Japan. As a result, the underlying seismic source model and the associated stochastic event rates in the RMS Japan Earthquake Model were updated to include:

- Addition of two subduction interface sources on the Japan Trench (Off Tohoku and Off Boso).
- Addition of large magnitude events (M8.8 to M9.2) on the Nankai Trough.
- New recurrence parameters for the subduction interface sources along the Japan Trench.
- Adjusted background seismicity rates in the Tohoku region (impacting background source zones) to account for observations of elevated seismicity following the 2011 event.

In addition, the RMS Japan Earthquake Model now includes an alternative long-term event rate set, reflecting the time-independent view of earthquake occurrence across Japan's seismic sources.

Earthquake Parameterization

Earthquake Intensity and Magnitude

Earthquake severity is commonly quantified in terms of intensity or magnitude.

The intensity is a measure of the damage generated by the earthquake and, therefore, varies geographically. The strongest intensity of an earthquake, occurring near its origin, is known as the epicentral intensity. Several intensity scales are used in different parts of the world: the Modified Mercalli Intensity (MMI) scale widely used in North America, the Medvedev-Sponheuer-Karnik (MSK) scale in Europe, and the Japan Meteorological Agency (JMA) scale in Japan.

The magnitude is a measure of the energy released by the earthquake. It is a fixed quantity. However, there are many definitions of magnitude scales according to the instrument used and the wave type measured. The most common scales are the local magnitude (ML), the surface wave magnitude (MS), the body wave magnitude (mb), the Japan Meteorological Agency magnitude (MJMA) and the moment magnitude (Mw or simply M).

The moment magnitude scale (M) is used to define event magnitudes in the RMS Japan Earthquake model. This is the preferred scale used by ERC and the U.S. Geological Survey (USGS) and is consistent with ground motion relationships used with the stochastic event set.

Earthquake Occurrence

The probability of an earthquake occurring within a specific time window is calculated using one of two recurrence models with the Japan Earthquake Model—time dependent or time independent (Poisson).

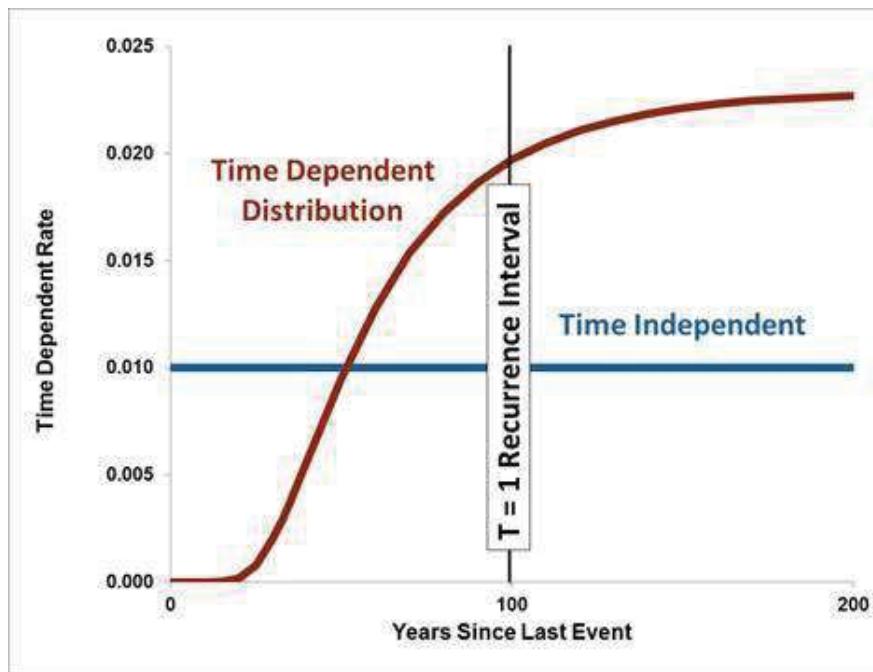
Time-Dependent Recurrence Model

Time-dependent recurrence modeling is based on observations that earthquakes occur in cycles. After a seismic source ruptures in an event, it takes time for the stress to build up again to cause another earthquake. If a significant period of time has passed in comparison to the return period for an event, then an event may have a higher probability of occurrence.

The time-dependent model distribution considers fault slip rate and the time since the last event in estimating the probability of future events (e.g., using the Brownian Passage Time (BPT) approach). This approach can result in modeled risk at a particular point in time being significantly different from the long-term average, as stress builds up and is released over the earthquake cycle.

Because the time dependent event rates vary with time, the RMS Japan Earthquake Model is implemented with five-year average time dependent rates to provide stability in event rates for risk management. For a source to be modeled using time-dependent recurrence, detailed information about the timing of the last event and a well-defined recurrence interval are required. The RMS Japan Earthquake Model includes time-dependent recurrence for the majority of the major crustal faults, as well as a significant subset of the subduction interface sources along the Kuril and Japan trenches, as well as the Sagami and Nankai troughs.

Comparison of Time Dependent Versus Time Independent Distribution for Earthquake Recurrence



Poisson Recurrence Model

The Poisson recurrence model, which assumes that seismic activity is constant through time, is a common way of representing the seismic activity of an earthquake source. The basic assumption of the Poisson model is that the parameters governing earthquake occurrence are independent of time and space. In other words, the model considers how often events occur on the average (average rate of occurrence) and treats the probability of future earthquakes as an independent parameter, without consideration for historical earthquakes.

This assumption is reasonable for small to moderate earthquakes. The input required for this model is the average rate of occurrence of each magnitude of interest.

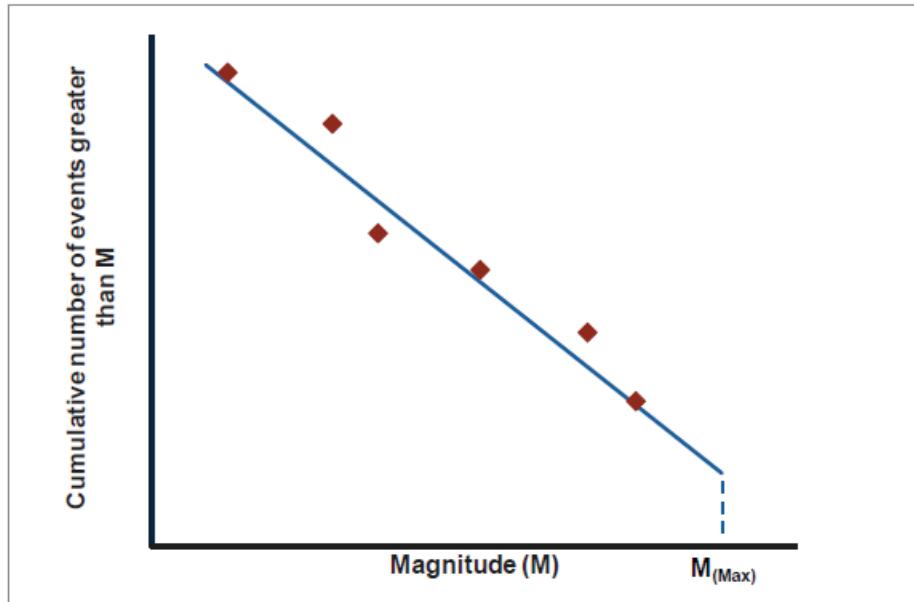
The average rate of occurrence of earthquakes is often estimated using an exponential distribution for earthquake magnitude (the ratio of the number of small events to the number of large events) expressed as a relationship between the frequency and magnitude of earthquakes.

This relationship, often described as the Gutenberg-Richter relationship, is mathematically represented by:

$$\ln(N) = \alpha + \beta M$$

where $\ln(N)$ is the natural logarithm of the cumulative number of events greater than or equal to magnitude M and α and β are based on a regression analysis. For each source, the constants α and β are obtained by regression analysis of the historical record of earthquakes. An example of a Gutenberg-Richter relationship is plotted in the following figure:

Example Gutenberg-Richter Relationship Magnitude(M) MMAX



A characteristic earthquake model is another method of estimating the average rate of recurrence. This method is applied to faults or regions that tend to generate earthquakes of approximately the same magnitude each time. The model assumes that seismic energy is released within a small magnitude range. The average rate is determined either from historical events or from geophysical information including fault slip rate and earthquake slip.

The average rate of occurrence determined either from the Gutenberg-Richter relationship or from the characteristic earthquake model can be used in the Poisson model.

For the Risk Analysis, the stochastic event rate set used reflects the RMS reference view of risk (RMS 11.4 JP Stochastic Event Rates). This reflects an annualized five-year view of recurrence for all time-dependent sources, which include most of the interface subduction zones and major faults. The remaining sources are modeled using long term event rates.

Seismic Sources

Seismic sources are geographical areas that have experienced seismic activity in the past and serve as potential sources of earthquakes in the future.

Seismic sources are delineated based on the homogeneity of seismic activity as well as geophysical features. This homogeneity requirement applies to the rate of occurrence of earthquakes, the magnitude distribution (the ratio of small events to moderate and large events), and the largest event the source is capable of generating (based on geophysical and geological considerations).

Historical earthquake catalogs are used to delineate a seismic source. However, whenever possible, factors such as fault slip rates and regional deformation rates are also considered.

Area and Line Sources

In RMS earthquake models, areas of potential future seismic activity are represented by line sources or area sources. Line sources are typically earthquake faults that can be defined either through visual evidence of a fault or through geophysical evidence of a fault. Line sources are geometrically defined by one or more line segments.

Area sources are defined as geographical areas in which earthquake activity is known but not located on known fault locations. Area sources are divided into zones within which earthquake activity can be treated as uniform. Area sources are modeled by a series of line sources of uniform seismicity distributed evenly within the area source. The total seismicity of the component line sources is equal to the seismicity of the entire area source. Area sources can be horizontal when the seismicity is located at constant depth or can be dipping to follow the dipping angle of a fault or a subduction zone.

A series of area sources, also known as background sources, are used to model smaller events not attributed to known faults. The model assumes that the larger, more damaging events will occur on the known fault structures and that the more moderate events should be modeled with background source zones, since their associated structures are too numerous to be individually characterized. Background sources are also used to model the lower magnitude activity within the subduction zones, modeling both interface and intraslab events.

Modeled Seismic Sources

RMS has defined 5,895 seismic sources capable of generating 26,921 earthquakes that could affect Japan. The categories of modeled seismicity for Japan are as follows:

- Shallow crustal sources model events within the shallow crust of the earth (depth < 25km) that makes up the Japan Islands. These sources are divided into three types:
 - Major faults model the 98 —precautionary fault systems within Japan identified by the Active Fault Research Group within the ERC. Within the model, these fault systems are modeled as 160 individual fault segments and 18 multi-segment sources (cascades). Dipping faults are modeled as dipping plane sources, and the rest are modeled as line sources.
 - Minor faults are additional fault systems that have been identified as active. In general, these faults are shorter in length, have lower characteristic magnitudes, and have longer return periods than the major faults. These 178 minor faults are modeled as line sources.
 - Crustal background sources model shallow events not attributed to the major or minor fault systems. These sources are modeled as area sources.
- Subduction zone sources model events that occur as a result of one tectonic plate being subducted under another. The model includes the following types of subduction zones events within the Japan Earthquake model:
 - Interface events are large, thrust events along the contact between the plate being subducted and the overriding plate. Subduction zone interface events are modeled by a set of dipping planes (dipping area sources) that follow the geometry of the interface between the plates.
 - Intraslab events are the result of bending stresses and phase transitions and occur within the plate itself. Intraslab events are modeled with dipping plane sources that follow the geometry of the subducting plate below the interface.
 - Backthrusting sources represent seismicity along the Japan Sea coast of northern Honshu. These events are thought to represent the initiation of a new subduction zone. These sources are modeled as dipping place sources.
 - Chokkagata sources model the complex tectonic setting resulting from the merging of the three tectonic plates in the Kanto region. Within this region, there are both interface and intraslab events. These sources are modeled as dipping planes that follow the intricate structure of the plate's interfaces. Following the 2011 Great East Japan (Tohoku) Earthquake, the rates associated with the Chokkagata interface sources were updated to account for the elevated seismicity observed in this region.
 - Background sources have been included to account for moderate magnitude interface and intraslab events. These sources are modeled using area sources. Following the 2011 Great East Japan (Tohoku) Earthquake, the rates associated with the subduction interface background sources along the eastern coast of Honshu were updated to account for the elevated seismicity observed in this region.
- Historical events are included in the model, using sources modeled with both line and dipping plane sources depending on the event rupture geometry.

Shallow Crustal Sources

Historically, shallow crustal events in Japan have been particularly damaging. They are the result of the accommodation of compression across the plate boundaries by the overriding plate. In northern Honshu, shallow crustal events are typically the result of compression and are buried, thrusting, and folding events. To the south, the shallow crustal events occur on surface-rupturing, strike-slip faults. Because they are typically shallow events, these earthquakes can result in extensive damage, even at lower magnitudes ($M < 7.0$). An example of a destructive shallow crustal earthquake was the Great Hanshin Earthquake that struck the Kobe-Osaka metropolitan area on January 17, 1995 ($M 6.9$).

Shallow crustal earthquakes in the Japan Earthquake model are modeled in two ways: with individual faults and with background sources. While active faults have been identified in Japan and studied in significant detail, they do not account for all the historical shallow seismicity. As a result, a crustal seismic hazard model based solely on the known active faults would be incomplete. For completeness, a suite of area sources (also referred to as background sources) has been included with rates based on smoothed historical seismicity. Crustal event rates are low, but potential severity is high due to high ground motions in the near field. Following the 2011 Great East Japan (Tohoku) Earthquake, the rates associated with the shallow crustal background sources along the eastern coast of Honshu were updated to account for the elevated seismicity observed in this region.

Shallow Crustal Faults

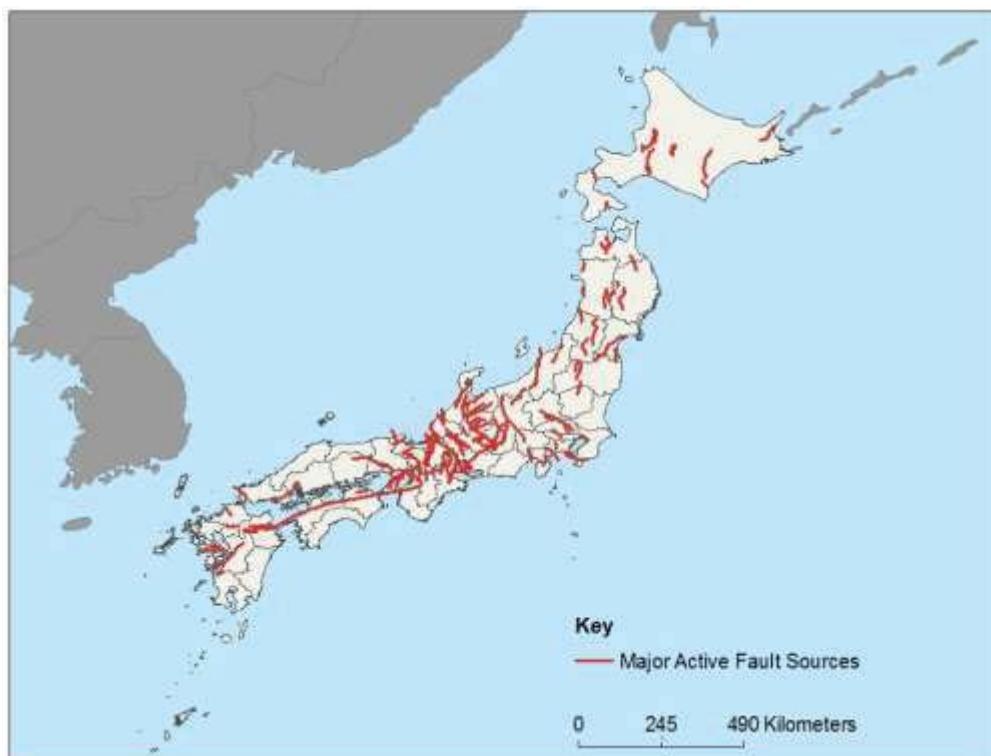
Despite the large size of the subduction events, for much of the country local higher hazard results from earthquakes occurring on shallow crustal faults. In particular, the central part of the island of Honshu (Aichi, Gifu, Fukui, Ishikawa, Kyoto, Nara, Osaka, Shiga, and Toyama prefectures) has a high concentration of active faults, associated with the southern extension of the Eurasian-Okhotsk Plate juncture.

Two datasets of active faults are included in the model and are based on the ERC National Seismic Hazard Maps source model. The first dataset includes the 98 – “precautionary” faults systems that are modeled at 160 individual major faults segments. Eighteen multi-segment sources are also included to model cascade events within the major fault systems. The second dataset is a database of minor faults that represent 178 individual sources not previously defined at precautionary but are considered to be active.

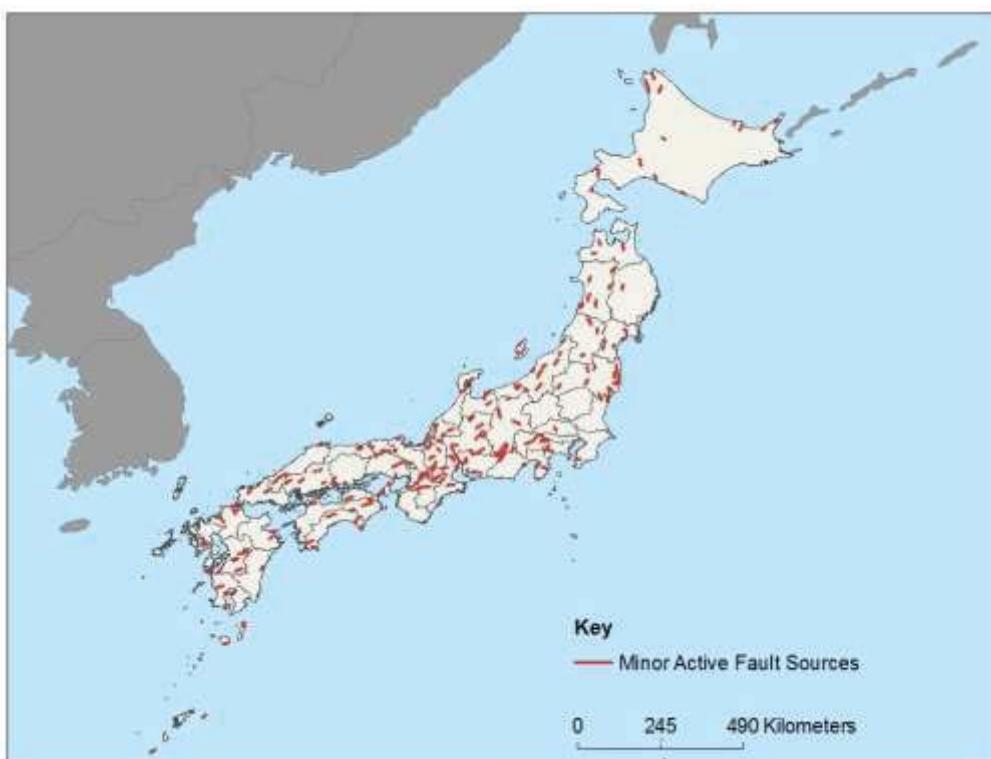
Characteristic magnitudes are based on fault length, historical events, or paleoseismic event magnitudes. Return periods for each source are based on slip rates and paleoseismic recurrence intervals. Two recurrence models are used for the active faults. For those sources where the timing of the last event can be determined, the fault is modeled with time dependent recurrence. Note that the time dependent recurrence modeling with the RMS Japan Earthquake Model is calculated as an average five-year rate. The remaining sources are modeled using a time independent (Poisson) recurrence model.

Major crustal faults and minor crustal faults included in the RMS Japan Earthquake model are shown in the Figures below.

Major Crustal Faults



Minor Crustal Faults



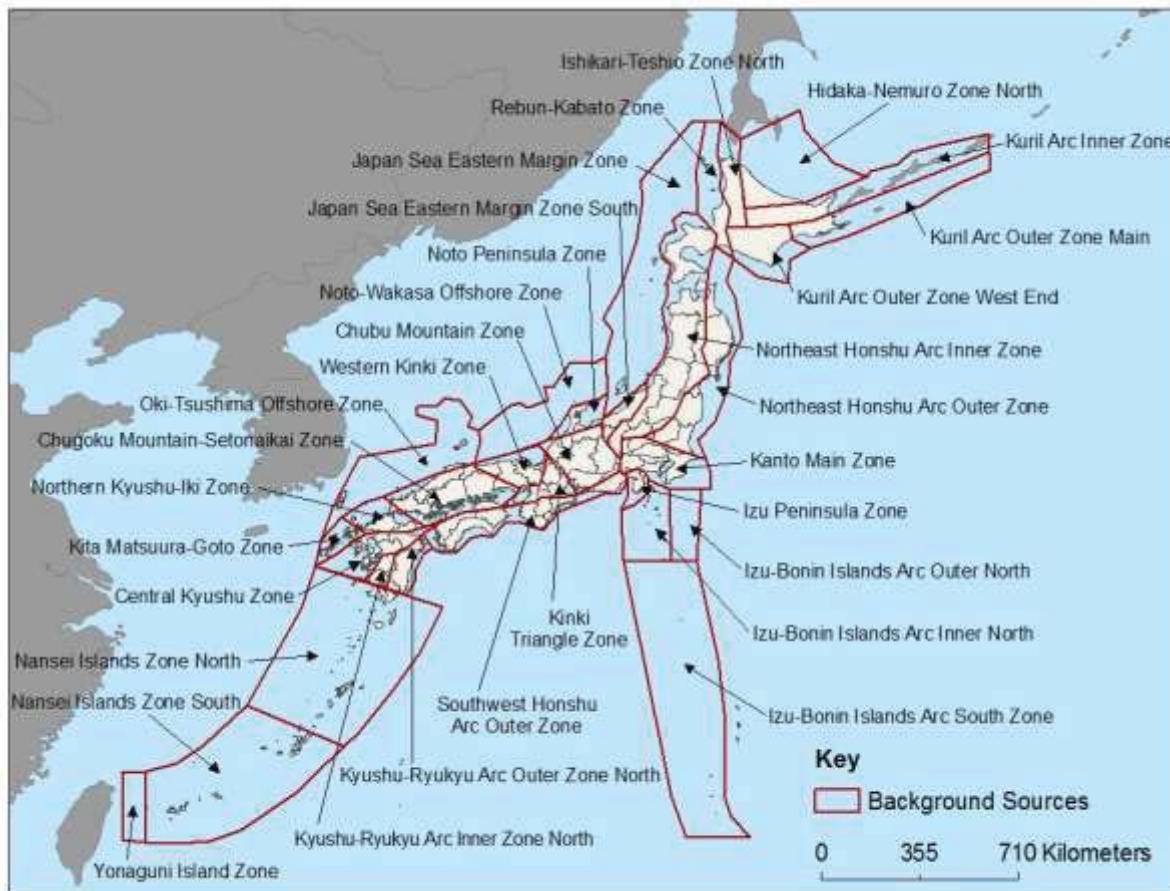
Shallow Crustal Background Sources

A significant amount of shallow seismic activity cannot be associated with the known crustal faults. To account for this activity, the Japan Earthquake model uses a series of area sources covering all of the Japan Islands and offshore regions. The sources are defined based on physiographic provinces and historical seismicity rate concentrations. The characteristic magnitude varies for each source based on the tectonics of the region and historical seismicity.

The recurrence rates are based on smoothed crustal seismicity methodology developed by the USGS and are calculated using the Gutenberg-Richter recurrence relationship. All sources follow the Poisson model of earthquake occurrence. Following the 2011 Great East Japan (Tohoku) Earthquake, the shallow crustal background sources along the eastern coast of Honshu were updated in the RMS Japan Earthquake Model to account for the elevated seismicity observed in this region. The two background sources impacted by this rate update were the Northeast Honshu Arc Outer Zone and the Kanto Main Zone. It should be noted that the impacts are spatially varying and therefore not uniform across these zones.

A total of 31 background seismicity zones are modeled using 3,125 individual seismic sources.

Map of Crustal Background Seismicity Zones Included in Japan Earthquake Model



Subduction Interface Sources

The largest and most frequent earthquakes occur in the subduction zones at the interface between tectonic plates. A total of 31 individual large subduction interface zone segments are included in the model.

Kuril and Japan Trenches

The Kuril and Japan trenches have been the source of repeated large earthquakes. In the northern part of Japan on the island of Hokkaido, the Kuril Trench is almost beneath the south-eastern coast. This situation results in very high hazard, but the region is sparsely populated relative to much of the country.

The most recent large magnitude event to occur along the Japan Trench was the 2011 Great East Japan Earthquake that triggered a very destructive tsunami along the eastern coast of Tohoku (the northern part of Honshu Island). While the epicenter for this event was off shore, the rupture zone extended to just beneath the coastline at 55 km depth. As a result, the event produced very strong ground motions in the Prefectures of Miyagi, Iwate and Fukushima. The most recent large event to occur along the Kuril Trench was an M8.1 on September 25, 2003. Because it was located 60 km from the Hokkaido coast, it caused little damage for an event of that size.

The Kuril and Japan trenches are modeled by a series of planes (area sources) dipping west/north-west from approximately 20 km to 60 km depth. Simultaneous occurrence of earthquakes on adjacent sources is considered for the Off Nemuro-Off Tokachi sources and for the Miyagi sequence. When two sources rupture at the same time they can either "couple" or "cascade". The coupling leads to two simultaneous earthquakes each associated with its own segment, while the cascading considers the rupture of both segments by a single larger event. The rate of activity of large events in both trenches is high enough to estimate the return period of these characteristic earthquakes and therefore treat their occurrence as time dependent. In the latest version of the Japan Earthquake model, two new Japan Trench sources were added to account events similar in size to the 2011 event (the "Off Tohoku" source), as well as for the possibility of interface events offshore from the Boso Peninsula (the "Off Boso" source). Smaller events along the Japan and Kuril trenches are treated as Poisson.

Nankai and Sagami Troughs

The Nankai and Sagami troughs are along the plate boundary between the Eurasian and Philippine Sea Plates. The Nankai Trough is produced by the west-north-westward motion of the Philippine Sea Plate as it is subducted beneath the Eurasian Plate. Along the Sagami Trough, the Philippine Sea and Eurasian plates are converging at an angle rather than head on, resulting in oblique subduction. Numerous large events have occurred along these troughs, causing extensive damage and loss of life.

The most destructive earthquake in Japanese history, both in terms of damage and loss of life, was the Great Kanto earthquake of 1923. This event, with a magnitude of M7.9, was centered on the Sagami Trough in the Tokyo Bay. The 1703 M8.1 earthquake was larger and located in the same general area. Today, a repeat of the 1703 earthquake would be more damaging than a repeat of the 1923 Great Kanto Earthquake.

Subduction earthquakes along the Nankai Trough have been extensively studied, illustrating a pattern of historically repetitive occurrence. Between the island of Shikoku and the Izu Peninsula, the Philippine Sea-Eurasian subduction zone appears to consistently rupture in three segments—Nankai, Tonankai and Tokai about once every 100 years on record back to 684. The ruptures have been correlated, either occurring simultaneously (e.g. M8.4 in 1707) or within a few days to a few years (e.g. Tonankai-Tokai M8.4, December 23, 1854 and Nankai the next day, M8.4). The most recent series took place in 1944 (Tonankai, M7.9) and 1946 (Nankai, M8.0) but did not rupture the Tokai segment. As a consequence, the Japanese have invested a great deal of time and expense toward the prediction of and the preparedness for this overdue event. Another school of thought maintains that it is not the first time the Tokai segment has not ruptured with the other segments (1498, 1605) and that it has never ruptured by itself. Therefore such event is not "overdue" and that it will only occur within the next sequence of Nankai earthquakes. The RMS Japan Earthquake model considers these two options with equal weight, together with the set of rupture permutations among the three segments. As described previously, when two segments rupture at the same time they can either "couple" or "cascade".

The Sagami and Nankai troughs are modeled by a series of shallow planes (area sources) dipping north for the Sagami trough and north-west for the Nankai trough from approximately 10 km to 30 km in depth. The Hyuganada source is dipping west from 10 km to 40 km in depth.

The rate of activity of large events in both trenches is high enough to estimate the return period of the characteristic earthquakes and therefore, treat their occurrence as time dependent. The earthquake occurrence on the Hyuganada source is modeled as Poisson.

Okhotsk Plate Boundary

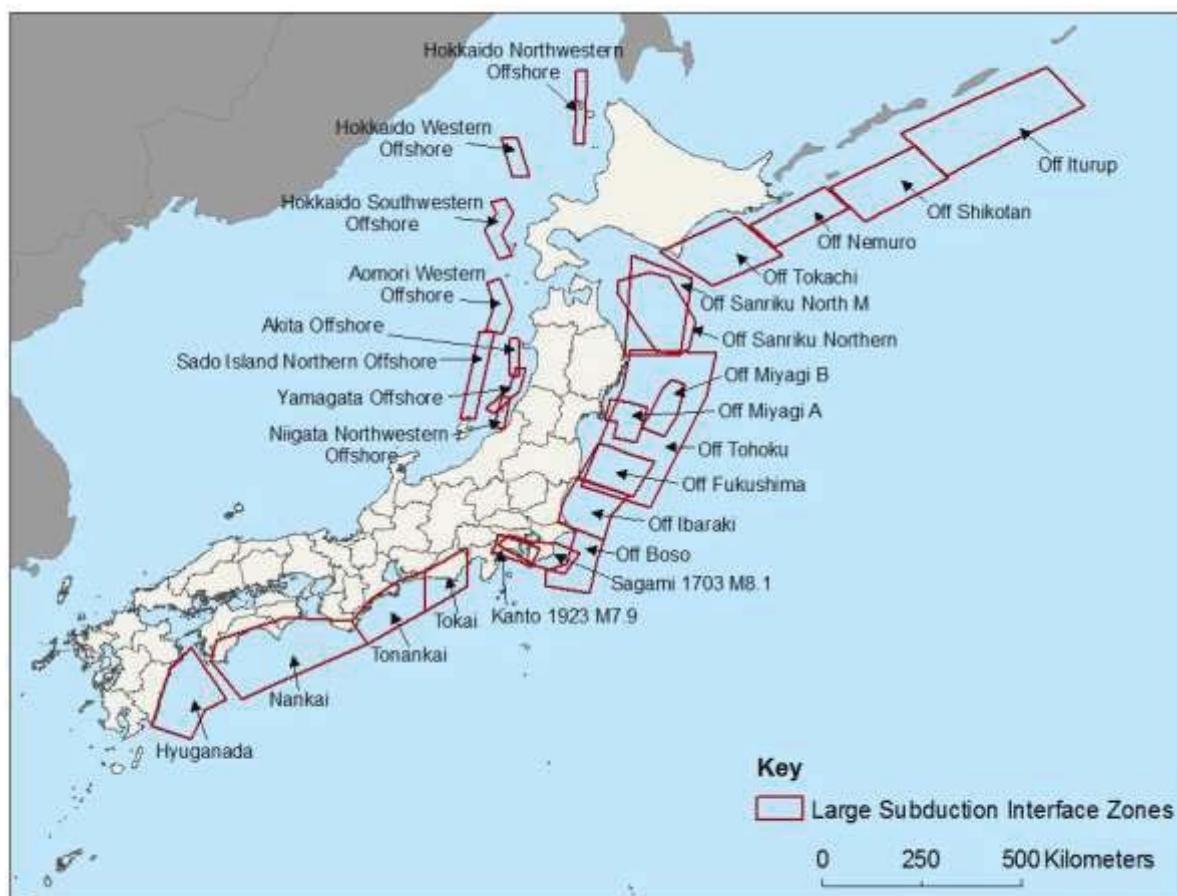
Large damaging earthquakes have also occurred along the western coast of Japan. The subduction plate boundary along the Japan Sea coast of northern Honshu and Hokkaido has been recognized only recently. It has been estimated that the subduction began roughly 1 million years ago. With a rate of 1 cm/yr, only 10 km of subduction has occurred to date.

Historically, there have been a number of large earthquakes (referred to as backthrusting events) associated with this plate boundary.

A notable example of an event of the Okhotsk Plate boundary was the M7.8 July 12, 1993 earthquake. This event resulted in 231 deaths and about \$1 billion total losses.

The sources in the Okhotsk Plate boundary are modeled as planes (area sources) dipping east or west from approximately 3 km to 20 km in depth. The earthquake occurrence is modeled as time dependent or Poisson based on the available information.

Map of Large Subduction Interface Zones Included in Japan Earthquake Model

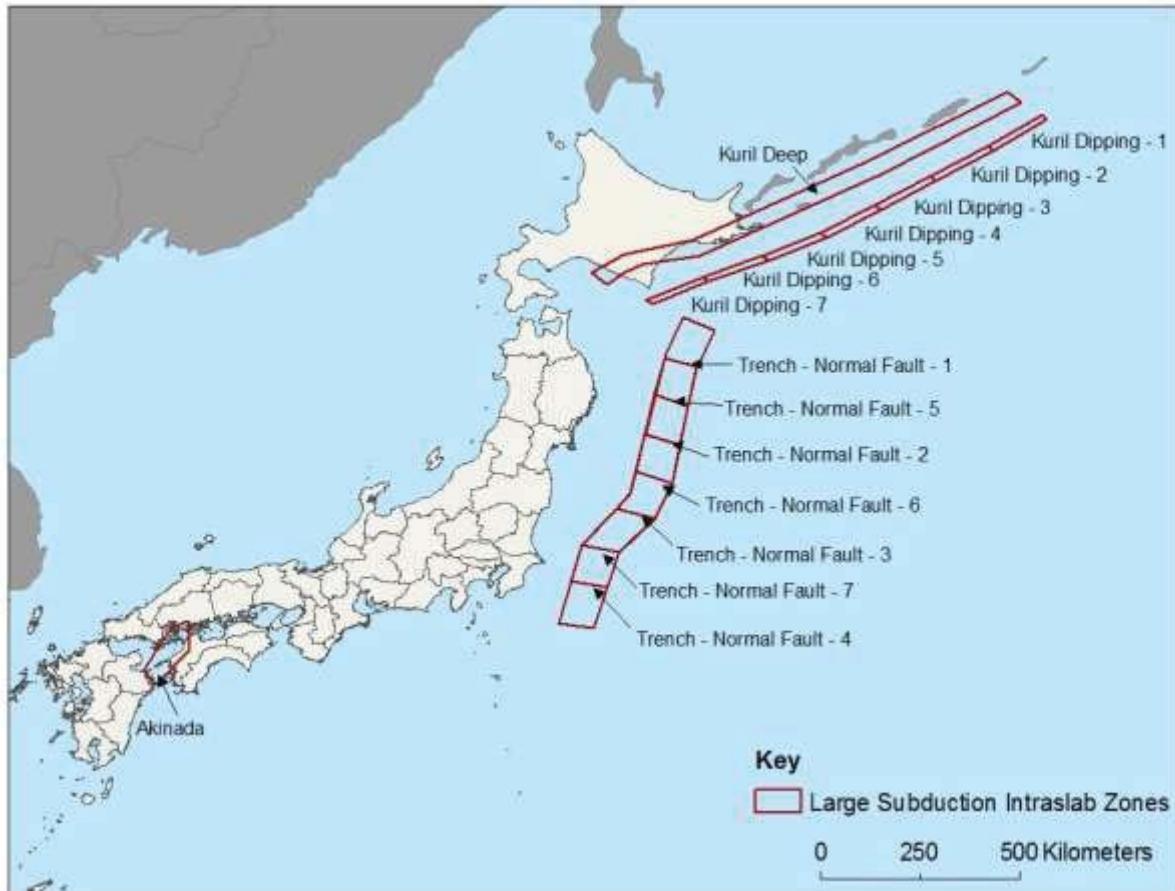


Subduction Intraslab Sources

Intraslab events occur within the subducting plate and are modeled using area sources. The Kuril deep source is horizontal at 100 km depth; the Kuril dipping source is modeled as a reverse faults dipping south-east from 20 km to 55 km in depth; the Trench-Normal Fault is modeled as a normal fault dipping west from 0 km to 70 km in depth; and the Akinada sources is dipping west from 35 km to 70 km in depth.

Earthquake occurrence on these sources follows the Poisson model.

Large Subduction Intraslab Zones in Japan Earthquake Model



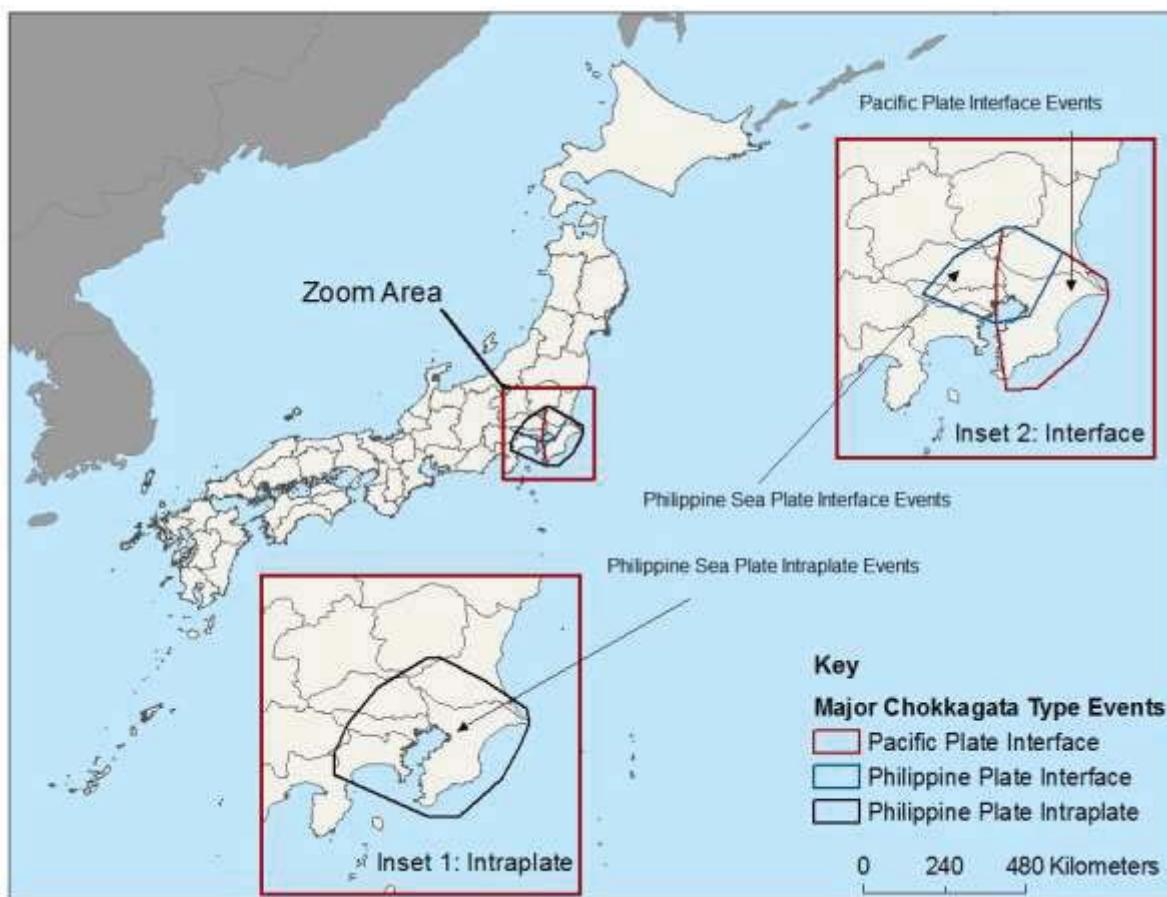
Chokkagata Sources

In the Kanto region, the collision between the three tectonic plates leads to the complex tectonic setting of two interface regions on top of each other: the Okhotsk Plate overriding the Philippine Sea Plate, and the Pacific Plate dipping beneath both. This region, resulting in "Chokkagata" events ("directly beneath" in Japanese), has generated 5 destructive events over the last 400 years, the most destructive being the M7.1 Ansei Edo Earthquake that extensively damaged Tokyo in 1855. The most recent large event occurred in 1894.

There is much scientific debate regarding the seismic activity of this region, mainly due to the devastation a repeat of the 1855 Ansei Edo Earthquake would generate. In the last 400 years, there seems to have been a correlation in the activity of the region with the occurrence of very large events in the Sagami Trough (M8.1 event in 1703 and M7.9 in 1923), the activity building up during the century preceding the event and going dormant afterwards. At the present time, there is not sufficient information to introduce such cycle or other time dependency feature in a model. Therefore, Chokkagata events are treated as Poisson events.

Because of the uncertainty in earthquake recurrence in this region, the occurrence of large events (M6.7 to M7.4) is determined from the weighted average of two models: one assuming the seismicity to be uniform over the whole region and estimated based on instrumental seismicity (more recent than 1875), and the other assuming the seismicity to be more concentrated around damaging events and based on 400 years of activity. These events are assumed to occur on three sources: the Pacific Plate interface, the Philippine Sea Plate interface, and the Philippine Sea intraplate.

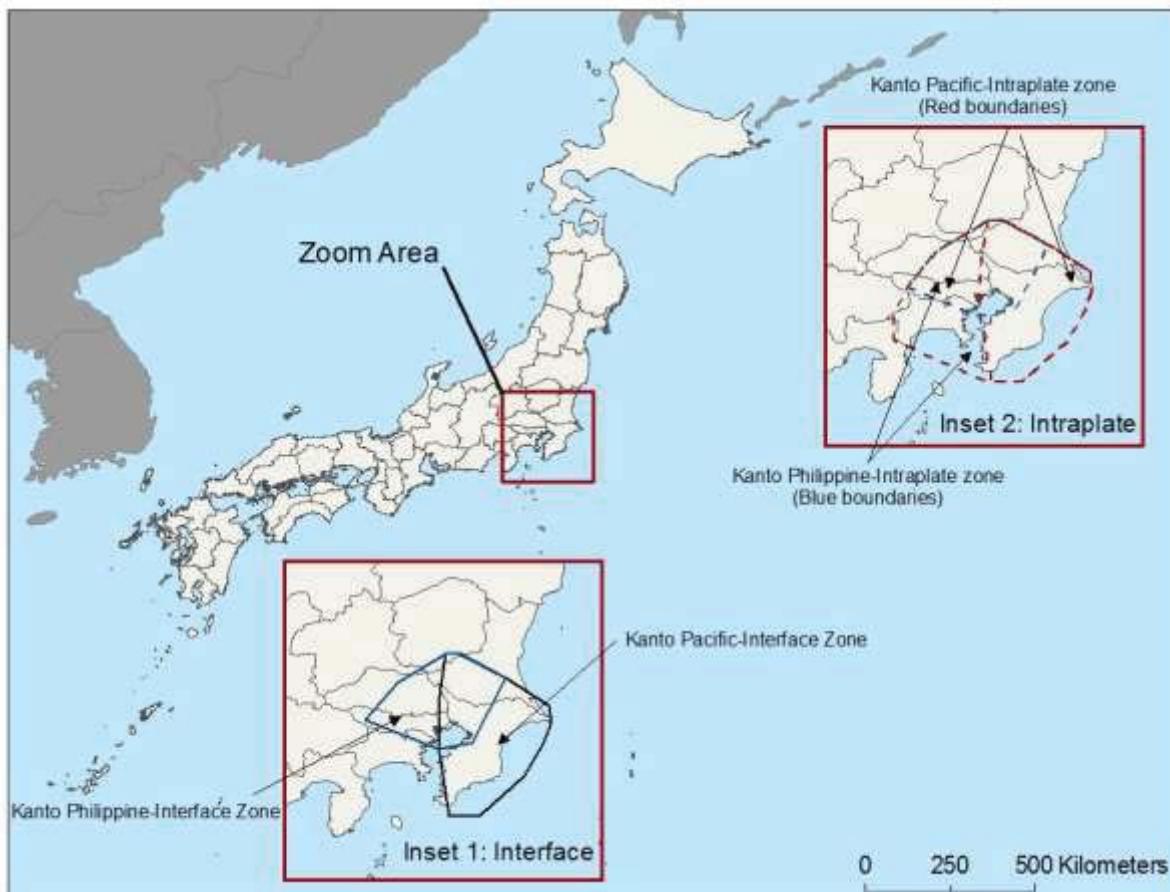
Sources Generating Major Chokkagata Events (Insets 1 and 2 Illustrate Intraplate and Interface Sources, Respectively)



In addition to the major Chokkagata events, background source zones are included, determined directly from the historical catalog using the standard smoothing process (see background seismicity section). These events are assumed to occur on four sources. The Philippine Sea intraplate source is located 10 km below the Philippine interface, while the Pacific intraplate is located 30 km below the Pacific interface. These depths have been determined from historical activity as reported in the catalog.

Following the 2011 Tohoku Event, the event rates for the Chokkagata interface sources were recalculated to account for the elevated seismicity rates across this region. The Chokkagata interface sources impacted were the Chokkagata-Pacific Interface, Chokkagata-Philippines Interface, Kanto Pacific - Interface and Kanto Philippine - Interface zones. It should be noted that the impacts are spatially varying and therefore not uniform across these zones.

Background Zones for Chokkagata Events (Insets 1 and 2 Illustrate Interface and Intraplate Zones, Respectively)



Subduction Background Zones

The subduction background seismicity is treated in a manner similar to the shallow crustal background seismicity. The seismicity that is not accounted for by the main subduction sources is modeled by sources that cover most of the subduction interfaces. The sources are defined based on physiographic provinces and rate concentrations. The characteristic magnitude varies for each source is based on the tectonics of the region and the historical seismicity.

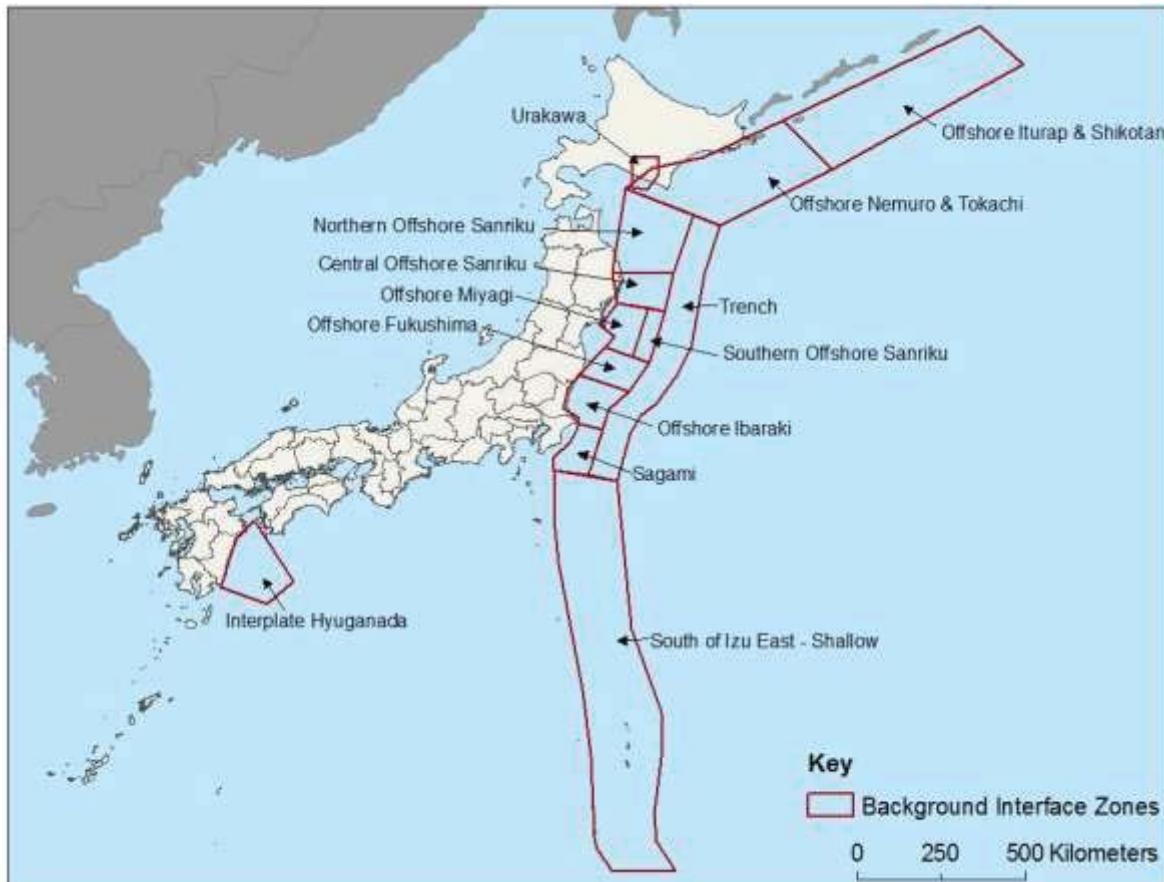
The recurrence rates are based on smoothed crustal seismicity that follow the USGS National Hazard Mapping approach and are calculated using the Gutenberg-Richter recurrence relationship. The rates are calculated together for the interface and intraslab events and then separated between the two regions based on historical activity. All sources follow the Poisson model of earthquake occurrence.

Subduction Interface Background Sources

The interface background sources are modeled by a series of areas sources that follow the dipping to the interface surface.

Following the 2011 Tohoku event, the event rates for the subduction interface background zones in the epicentral region were recalculated to account for the elevated seismicity after the event. The subduction interface background zones impacted were the Northern Offshore Sanriku-Interface, Trench-Interface, Central Offshore Sanriku-Interface, Southern Offshore Sanriku-Interface, Offshore Miyagi-Interface, Offshore Fukushima-Interface, Offshore Ibaraki-Interface and Sagami-Interface zones.

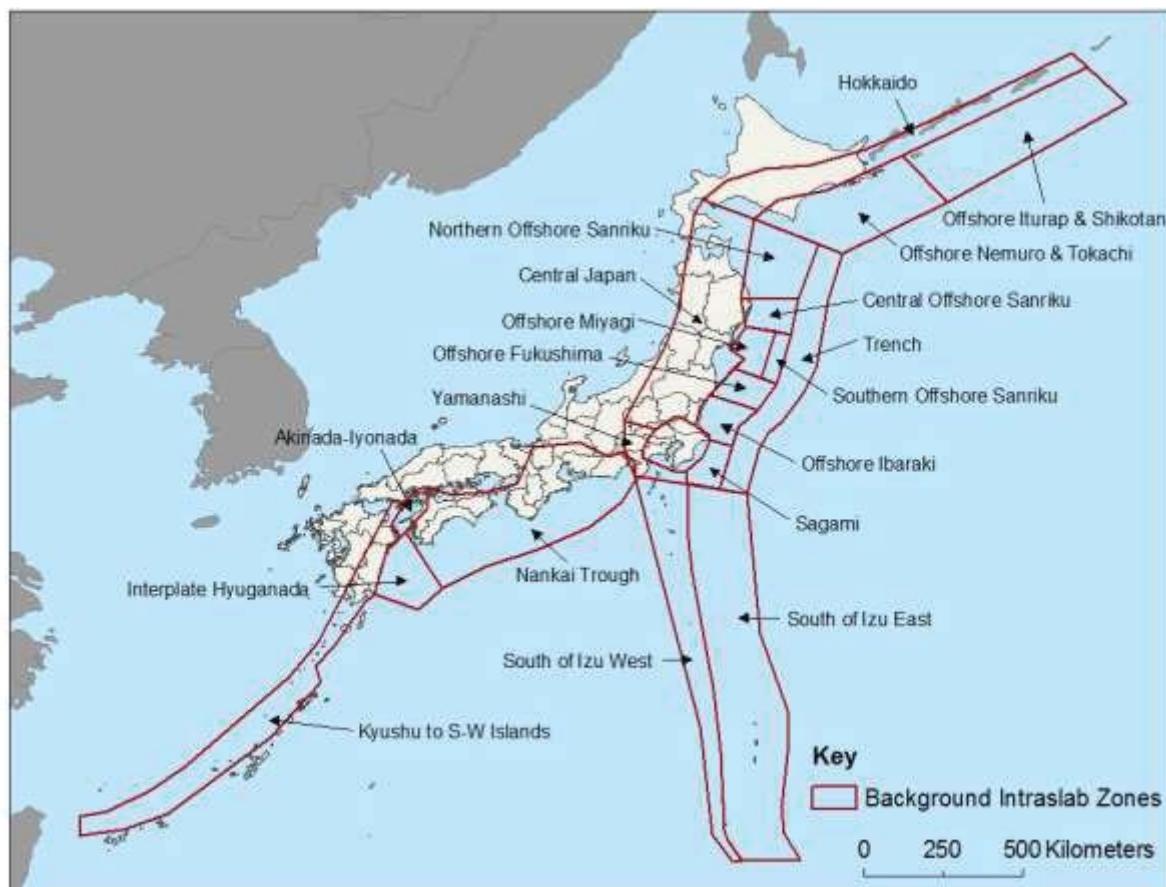
Subduction Interface Background Zones



Subduction Intraslab Background Sources

The intraslab background sources are modeled by a series of area sources that follow the dipping to the interface surface but are located between 10km and 30km below the interface surface based on historical seismicity.

Subduction Intraslab Background Zones



HAZARD MODULE

The Hazard Module calculates the amount of ground motion at a particular site for every stochastic event. The amount of ground motion is the most important driver of damage.

The ground shaking hazard module in the Japan Earthquake model includes two major elements: attenuation and geotechnical hazard data. Ground motion attenuation involves the regional decay of shaking between an earthquake and a site. The available geotechnical hazard data determine how the regional ground shaking will be modified by the local conditions at the site.

Ground Motion Attenuation

Ground shaking, the most significant component of earthquake hazard, is analyzed using standard earthquake engineering methodologies. For a given event on a specific earthquake source, the model analyzes the attenuation of seismic energy with distance to determine the level of ground shaking at a particular site.

The RMS Japan Earthquake Model uses attenuation functions in standard practice for seismologic environments in Japan. The modeled attenuations vary by type of seismic source (e.g. shallow crustal, subduction interface, and deep intraslab) to reflect the characteristics of the ground motion generated by each of these seismic sources. The attenuation relationships used are based on equally weighted combinations of attenuation relationships derived from Japanese or worldwide recorded data. Equations recommended by the authors that are appropriate for each fault rupture type are used. The PGAs and Spectral accelerations from the attenuation equations were also adjusted to a common ground reference.

Attenuation Parameters

The RMS Japan Earthquake Model calculates ground shaking using one of three model parameters: spectral acceleration (Sa), peak ground acceleration (PGA), or Modified Mercalli Intensity (MMI).

Spectral Acceleration (Sa)

Spectral acceleration (Sa) represents the maximum response of a structure that is excited at the base by the ground motion input from an earthquake. Sa is a good index of hazard to buildings, and it is more closely related to the building behavior than peak ground motion parameters.

Sa relationships are derived using the entire content of ground motion records and thus better represent the character of building response to shaking at a site, whether it is mostly a rapid, high-frequency shock or –rolling long-period motion

RMS Japan Earthquake Model calculates Sa as a function of source (magnitude and rupture process) and site (distance, soil type). Within the output files, however, only the spectral response of the building is recorded, i.e. the acceleration at the predominant period of the building. In other words, a 15-story building will demonstrate a different ground motion for a given earthquake than a 5-story building at exactly the same location. For additional details, see the Vulnerability Module section.

Peak Ground Acceleration (PGA)

Peak ground acceleration is the maximum value observed from an accelerograph recording in an earthquake. It is a subset of spectral acceleration, being equivalent to the shaking for a very short, very stiff structure (zero-second period), and is much more one-dimensional in how it relates to building performance. Because it is a value derived readily from ground motion records, however, there is a much larger global dataset of PGA available than for Sa and until recently this has been reflected in the availability of empirical attenuations.

Peak ground acceleration is converted into MMI for use in the Vulnerability Module. These conversions generally consider one or more of the following factors: event magnitude, distance, soil type, and/or earthquake type. These factors mimic some of the observed variations in MMI, effects that are more explicitly captured through Sa.

Modified Mercalli Intensity (MMI)

The Modified Mercalli Intensity scale is a subjective measure of an earthquake's effects. It is traditionally reported in Roman numerals and ranges from I (not felt) to XII (total destruction).

None of the primary attenuations in the Japan Earthquake model considers MMI as their direct output. Other ground motion parameters may be converted to MMI for use in the Vulnerability Module, however.

Geotechnical Hazard Data

Once ground shaking has been calculated, the model uses a database of surficial geology to determine how ground shaking will be amplified at a given site. A similar database of liquefaction susceptibility is also factored into loss calculations.

Each of these modifies the regional effects of ground shaking calculated from the attenuation and contributes to the local variation in damage.

Soil and Related Factors

The soil parameter in the RMS Japan Earthquake Model controls relative amplification of ground motion. While the class names suggest the most common types of geologic materials, the soil value is actually an index related to the shear-wave velocity (V_s) of the top 30 meters at a site. This material property has been shown to correlate well with shaking amplification; lower V_s generally results in a larger ground motion than hard materials with a high velocity. General descriptions that correspond to the RMS soil classes are provided in the Table below:

RMS Soil Classifications

RMS Class Name	Description
Unknown	Unknown soil classification.
Rock	Hard to firm rock.
Rock / Soft Rock	(Intermediate classification).
Soft Rock	Gravelly soils to weak or weathered rock.
Soft Rock / Stiff Soil	(Intermediate classification).
Stiff Soil	Stiff clay and sandy soils.
Stiff Soil / Soft Soil	(Intermediate classification).
Soft Soil	Soft soils and non-engineered artificial fill.

The actual degree of amplification is determined by the input ground motion and, for calculations using spectral response, the period of concern. It has been observed that the amplification on soil relative to rock is greatest when the actual shaking intensity is low; at high shaking amplitudes, such as one might see near a fault, there may be little difference in the level of shaking that is experienced.

Long period effects in the model can occur for buildings taller than eight stories on poor soil during large (M7.0), distant (>50km) events. The model adds to the site intensity under these conditions, up to a maximum of one unit. This is an empirically derived factor for MMI-based damage calculations, which approximates observed effects that are treated explicitly in the spectral response approach. Long-period effects are implemented throughout the Japan Earthquake model, but analyses using spectral response would not include this modifier.

Liquefaction and Landslide

Liquefaction and landslide are two forms of ground failure that can be triggered by strong ground shaking. They are treated separately in loss calculations, but have fundamentally similar implementations in the model. In the RMS Japan Earthquake Model, liquefaction data is available, but landslide data is not.

Liquefaction is the temporary transformation of a solid soil into a liquid state. It can occur when certain types of saturated, unconsolidated soils are subjected to repeated, cyclical vibration and therefore most commonly occurs during earthquakes. General descriptions that correspond to the RMS liquefaction susceptibilities are given in the Table below:

RMS Liquefaction Susceptibilities

RMS Class Name	Description
Unknown	Unknown Liquefaction classification.
Very Low	Rock; very stiff or cohesive clays; sediments older than Pleistocene; sites with deep water table.
Very Low / Low	(Intermediate classification).
Low	Holocene to Pleistocene (11 ka to 1.6Ma) alluvial fan deposits.
Low / Moderate	(Intermediate classification).
Moderate	Modern alluvial fan deposits.
Moderate / High	(Intermediate classification).
High	Modern flood plain or beach ridge deposits.

Landslides are slope-related failures of earth materials. There are many possible triggers for landslides, the most common of which is saturation due to extended periods of rainfall. The cyclical ground shaking created by earthquakes can act as a catalyst for slopes near failure, however, and thus can generate additional potential for loss.

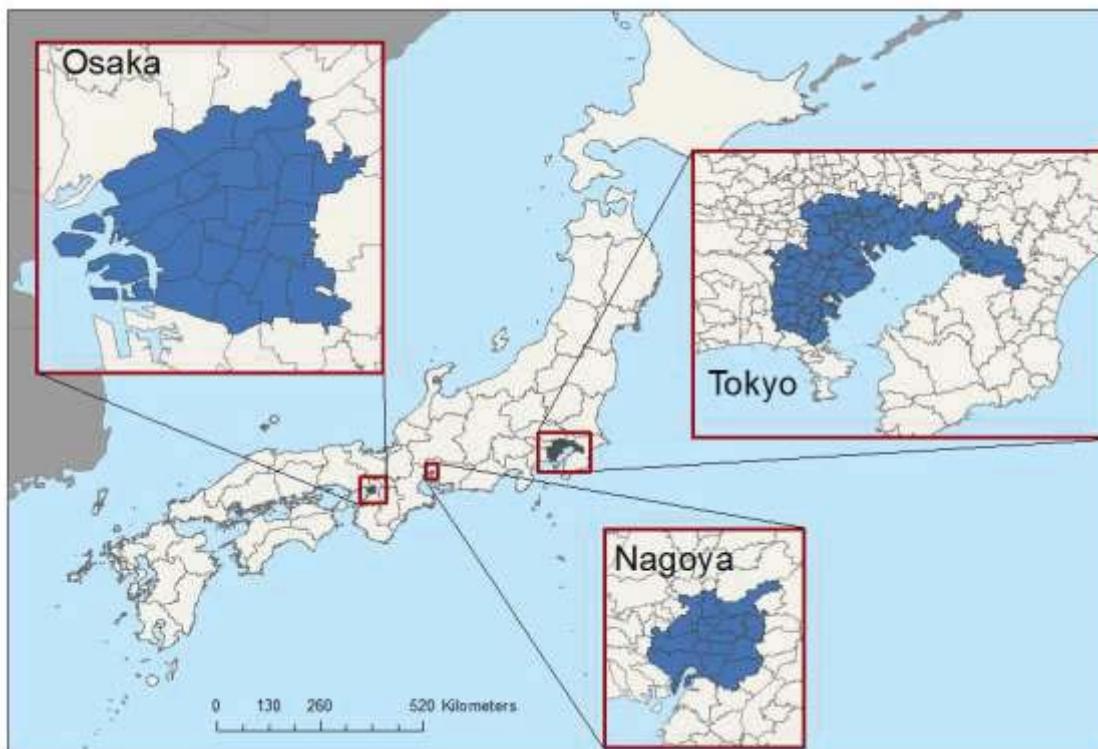
Both landslide and liquefaction add to the damage for a site if they occur, independent of structure type. This damage is contingent on certain triggering conditions at the location during an event. These conditions include both the shaking at the site and magnitude of the earthquake; because the duration of shaking for larger earthquakes is longer, the absolute acceleration value required is not as great. If triggering conditions are met, damage is calculated based on a triggering shaking intensity and site susceptibility.

Data Coverage and Resolution

The Japan Earthquake model provides soil and liquefaction data at different hazard match levels as described below. Landslide data is not available. However, if the user assigns a landslide susceptibility value to the location, the effect of landslide is included in the loss calculations.

- **High Resolution:** Soil, liquefaction, and landslide data is not available in high-resolution form. For locations geocoded at the coordinate level, the hazard information is extracted from the VRG database.
- **Variable Resolution Grid (VRG):** Soil and liquefaction information are available at three resolutions: 100-meters, 500-meters, and 1-kilometer.
 - Soil and liquefaction information at the 1-km resolution level is available nationwide. 100-meter soil and liquefaction information is available for selected locations in the Tokyo, Osaka, and Nagoya regions. Locations geocoded at the coordinate level will extract the 100-meter if available. Otherwise, the 1-km data is used.
 - The 500-meter resolution information represents the average of the 100-meter data. This resolution is used by locations geocoded at the postal code level where the 100-meter data is defined to reflect the size of Postal Codes and the variation of geotechnical information within Postal Codes.
- **City/Ward:** Soil and liquefaction information at this level are available countrywide.
- **Prefecture (County):** Aggregate soil and liquefaction information at this level are available countrywide. However, this data is already incorporated in the calculation of the aggregate hazard data.
- **CRESTA Zone:** Aggregate soil and liquefaction data at this level is not available for the 2007 vintage CRESTA zones. However, this data is already incorporated in the calculation of the aggregate hazard data.

Areas in the Region of Tokyo, Osaka, and Nagoya (blue areas) for which 100-meter Soil and Liquefaction Data Are Available



VULNERABILITY MODULE

The Vulnerability Module of the Japan Earthquake model calculates the amount of building damage from a given level of ground motion. This section discusses the major elements of the Vulnerability Module:

- Vulnerability functions for building damage and contents damage
- Vulnerability classifications
 - Construction class
 - Occupancy class
 - Year of construction
 - Number of stories
- Seismic zones
- Secondary characteristics
- Building inventory data

Spectral Response Approach to Vulnerability Modeling

RMS was the first modeling firm to use the performance-based engineering framework developed at the Pacific Earthquake Engineering Research (PEER) Center of the United States to estimate vulnerability. This methodology, known as spectral response (Sa) modeling, was first released in 2003 in the RMS U.S. and Canada Earthquake models. RMS is using this approach to estimate damage from actual building response to ground motions for its global suite of earthquake modeling regions including Japan.

The spectral response methodology comprises the following steps:

- 1) The set of earthquake ground motions from past events is selected. These ground motions are grouped based on the distance to the source and soil conditions. The spectral acceleration of these ground motions are prepared for further refinement by reviewing the shape of spectra, amplitude, and frequency content.
- 2) The effects of distance and soil amplification are considered for the complete range of frequencies on the amplitude and shape of spectral acceleration. The proposed soil amplification is based on the analytical soil study and calibration with the actual recorded ground motion on soil sites.
- 3) The structural model of buildings is analyzed using the ground motions selected in step 1. The structural responses, which are lateral deformation and inter story drift, are evaluated for these ground motions.
- 4) The structural deformation measured as inter-story drift is converted to a damage ratio using the drift limitation provided by FEMA and other research and experimental studies. These damage functions are calibrated with damage and insurance loss claim data that RMS has collected over the years.

Japan Vulnerability

Building Code History in Japan

The primary basis for defining design and construction quality for the existing and new inventory of building stock is the building code in force at the date of construction. Japan has the longest history of seismic design codes of any country in the world.

Following the 1891 Nobi Earthquake, the Seismic Disaster Prevention Committee was established by the Japanese government to lead seismic design in Japan. The first building code, the Urban Building Law Enforcement in 1919, introduced allowable stress design with a base shear coefficient of 0.1. The 1923 Great Kanto earthquake led to a more substantial seismic code that addressed engineering aspects of design and was mandatory in several major Japanese cities. Neither of these codes was implemented nationally, however.

In 1950, Japan issued its first countrywide, mandatory seismic code, which specified long-term and short-term allowable stress design procedures and a seismic coefficient of 0.20. Japan issues revisions to the seismic codes on a regular basis every few years, as well as following significant earthquake events. For example, following the 1968 Tokachi-Oki Earthquake, major revisions were issued in 1970 and 1971 to improve the ductility capacity of steel and concrete construction.

Japan issued a landmark code in 1981—the first in the world to require that designers examine collapse mechanisms in buildings. Building designers worldwide recognized this feature as a significant improvement in the reliability of

earthquake-resistant construction, even before the 1995 Great Hanshin (Kobe) Earthquake. These advances, combined with the fact that Japan has since 1950 required earthquake design forces 40% greater than those required in California, lead to the conclusion that most buildings in Japan are equal to or more resistant to earthquakes than similar buildings in the U.S. The vulnerability functions in the RMS Japan Earthquake model reflect these observations.

However, the Kobe event illustrated several shortcomings of the building code, which Japan's central government and engineering community moved quickly to address, adopting several new laws and key code amendments in the first years after the earthquake. Design requirements to prevent soft story failures were reviewed and revised. The detailing, material strength, and hardware requirements, as well as the foundation and shear wall design for wooden buildings have also been significantly improved. Moreover, to enhance overall construction quality, interim construction inspections are now required for all new buildings, in addition to the construction completion inspections that were enforced prior to 1998. And, as of late 1995, all pre-1981 buildings in public use must have a seismic evaluation; retrofits are required if needed.

In recent years, Japan's engineering community has moved away from safety-based design guidelines in favor of performance-based designs, and the revision in 2000 introduced a performance based design and capacity spectrum method in addition to the existing design procedures. However, since this revision was not intended to improve structural performance itself, the seismic performance of buildings to comply with the new code is considered to be equal to or slightly better than buildings designed according to the 1981 building code.

Vulnerability Functions

Building Structure

Ground motion depends on many parameters, including magnitude, distance to major faults, soil type, building height, and construction quality. Therefore, the measure of ground motion (S_a) is directly dependent on height and construction class. In this approach, the estimation of vulnerability (the measure of the amount of damage caused to a property) is closely tied to the measure of hazard (the severity of ground shaking caused by an earthquake). The probability of the structure reaching a certain damage threshold is tied to both the magnitude and frequency content of the ground motion as well as the characteristics of the building. These building characteristics include the structural lateral system, building height, and building material. The maximum relative displacement between stories (inter-story drift) is used to measure the amount of damage a building would sustain during an earthquake. Extensive analytical modeling and insurance claims data were used to develop vulnerability functions by construction class.

Building Contents

The performance of building contents depends on the type of contents, ground motion intensity, and the building damage after an earthquake. The spectral response methodology enables differentiation of damageability to drift-sensitive contents (tall buildings) and acceleration-sensitive contents (short buildings). Extensive analytical modeling and damage data—in particular from the 1995 Kobe Earthquake—were used to develop vulnerability functions by construction class.

Damage Data from Earthquakes

Data from earthquakes is used to calibrate vulnerability functions. A significant amount of damage data to calibrate vulnerability estimates has been derived from recent major earthquakes, including the 1995 Great Hanshin (Kobe) Earthquake, the 2000 Tottori West Earthquake, the 2001 Geijo Earthquake, the 2003 Miyagi Offshore and Miyagi North earthquakes, and the 2004 Niigata Chuetsu Earthquake. In particular, an extensive amount of data from the 1995 Great Hanshin (Kobe) Earthquake about building damage was surveyed and compiled by several governmental and academic organizations.

Data Requirements for Using the Spectral Response Approach

To take advantage of the spectral response approach to damage estimation, the location must be geocoded to an address match of city/ward or higher resolution. The spectral response approach applies to almost all combinations of construction class, height, and occupancy.

Vulnerability Classifications

The accuracy of an earthquake damage evaluation is directly related to the precision with which buildings are described. The desired information for classifying structures includes:

- Construction class
- Occupancy class
- Year of construction
- Number of stories

Not all of this information is required to run an analysis; however the uncertainty associated with loss estimates increases with the amount of unknown information for the exposure being analyzed. In addition, the location of a structure as it relates to a seismic zone in Japan is important for damage estimation.

The RMS building classification system is the recommended scheme for defining building construction types in the Japan Earthquake model. The Japan Earthquake model includes vulnerability functions for 20 building classes and additional subclasses.

Occupancy type is used to compute losses for time element coverage (e.g., business interruption). When full information about the structure is not known, the occupancy can be used to infer likely parameters, such as construction class.

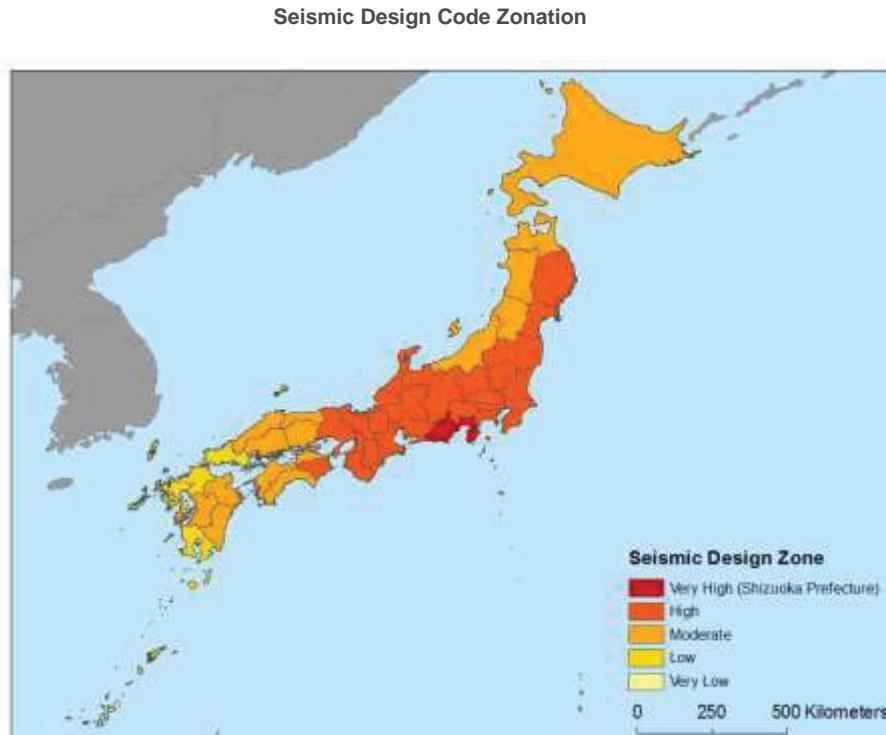
The vulnerability of construction changes when seismic codes are updated or when significant changes occur in construction practices. To reflect improvements in design standards and construction practice in Japan, the RMS Japan Earthquake model uses benchmark years to differentiate levels of earthquake vulnerability. Benchmark years are based on dates when significant building code revisions were adopted, as well as following large scale worldwide earthquake events when lessons were learned regarding seismic design. Major national seismic design code implementations made in 1950, 1971, 1981, and 2000 are the most significant dates affecting earthquake vulnerability in Japan.

The 1995 Great Hanshin (Kobe) Earthquake, which caused severe damage, dramatically revealed the benefits of earthquake resistant design. Generally, buildings constructed prior to 1971 were heavily damaged, with older buildings being largely demolished; those constructed after 1981 showed little damage. Consequently, the Japan Earthquake model uses 1971 and 1981 as benchmark years for assessing earthquake vulnerability. Structures built prior to 1971 are modeled as more damageable than those constructed during between 1971 and 1980. Structures built in 1981 or after are considered the least vulnerable. Since the revision in 2000 was designed to have somewhat similar seismic performance with the 1981 building code, the vulnerability of buildings designed after 2000 is considered to be equal to or slightly better than those to comply with the 1981 code. However, as described previously in Building Code History in Japan, it should be noted that several important code improvements have been enforced since the 1995 Great Hanshin Earthquake.

Building height is one of the key parameters used in the spectral response approach to damage estimation. The Japan Earthquake model supports four building height ranges in addition to Unknown 1-3, 4-7, 8-14, and 15 or more stories.

Seismic Zones

There are five seismic design codes for Japan: four national seismic design zones identified in the Japan seismic code, plus an additional regional design guideline for the Shizuoka Prefecture.



Secondary modifiers are available to modify building vulnerability based on specific known attributes of a structure. Secondary modifiers impact loss by scaling the basic vulnerability curves upward or downward. The magnitude of this scaling depends on how the modifier interacts with other information about the location—the construction type, the coverage, and the presence or absence of other secondary modifiers.

Secondary Peril: Fire Following Earthquake (FFEQ)

Fire can be a significant hazard in major metropolitan regions following an earthquake large enough to cause widespread building collapse and damage to gas lines and/or electrical wiring. The Japan Earthquake model is capable of estimating fire following losses throughout the country at the City/Ward level. The FFEQ model is based on the precompiled results of a large number of simulations performed in a time-stepping simulation tool designed to estimate fire losses.

The fire following model uses the same stochastic event set as the earthquake Hazard Module. For each stochastic event and each City/Ward, the PGA calculated in the earthquake Hazard Module is used with the Fire Loss Index to determine the percent burnt area of the City/Ward. The model assumes that a building is either spared by the fire or consumed (partial losses are assumed minimal). This assumption is consistent with historical conflagrations in which most buildings are totally destroyed. In this context, the percent burnt area can be interpreted as the probability of any building in the City/Ward being burned down at a specified level of ground shaking.

In the Japan Earthquake model, the FFEQ losses are based on Fire Loss Indices (FLIs) precompiled outside the model. FLIs are defined as the probability that a site will undergo complete fire loss for a given peak ground acceleration (PGA) at the site. FLIs have been derived for each geographic unit based on the inventory within that unit. This is required because the vulnerability of a site to fire-related loss is dependent both on the characteristics of the site itself and those of the surrounding buildings and infrastructure. FLIs are automatically mapped within the model based on the geocoded location and specified construction and occupancy characteristics of each site.

Given that the probability a building will burn down is known, the FFEQ model uses the binomial approach to estimate the mean fire loss and its associated uncertainty.

APPENDIX C – RMS RISK ANALYSIS RESULTS

RISK ANALYSIS METHODOLOGY

RMS undertook an analysis to estimate the probability of mortality rates causing various Mortality Index Values in the Covered Area. In addition to modeling the future trend in mortality (“**Modeled Baseline Mortality**”), RMS estimated the probability of disease, terrorism, earthquake events and eight statistically modeled perils causing excess mortality in the Covered Area for each Class of Notes (“**Disease Event Modeled Excess Mortality Rates**”, “**Terrorism Event Modeled Excess Mortality Rates**”, “**Earthquake Event Modeled Excess Mortality Rates**” and “**Residual Risk Excess Mortality Rates**” respectively and collectively, “**Modeled Excess Mortality Rates**”).

RMS applied the predefined weights for each age/gender cohort (“**Index Weights**”) to the Modeled Excess Mortality Rates for each event to calculate the “**Modeled Excess Mortality Index Values**” and to the Modeled Baseline Mortality to calculate “**Modeled Baseline Mortality Index Values**”. These were combined to generate the probabilistic distribution of “**Modeled Mortality Index Values**” in the Covered Area for each Class of Notes.

RMS believes infectious disease, terrorism, earthquake and statistically modeled perils to be the principal drivers of excess mortality risk, and as such any contribution from other causes is considered *de minimis* for the purpose of this report.

Disease Event Modeled Excess Mortality RatesOff

The primary output of the RMS Infectious Disease Model is stochastic event excess mortality rates in specific ages. These are mapped to the age/gender cohorts for France, the U.S. and Japan, yielding Disease Event Modeled Excess Mortality Rates for each Country. The age-bands modeled for this transaction are each five years wide, corresponding to the age-bands used for the Index Weights.

Terrorism Event Modeled Excess Mortality Rates

1. The RMS Probabilistic Terrorism Model was applied to the RMS France and U.S. Human Exposure Databases, yielding an average number of deaths and the associated standard deviation for each stochastic terrorism attack by region (“**Terrorism Event Modeled Deaths**”). Attack multiplicity was included in all analyses by multiplying the number of fatalities by the average multiplicity by attack mode.
2. The Terrorism Event Modeled Deaths were divided between age/gender cohorts by region, according to the ratios defined in the specifications of the applicable Human Exposure Database, to yield the event’s number of deaths by age/gender cohort and region (“**Terrorism Event Modeled Deaths By Demographic**”).
3. Terrorism Event Modeled Excess Mortality Rates were calculated by dividing the Terrorism Event Modeled Deaths By Demographic by the population of each age/gender cohort (obtained from the Human Exposure Database) in each region, followed by summing over all regions.

Earthquake Event Modeled Excess Mortality Rates

1. The RMS Earthquake Casualty Model was applied to the RMS U.S. and Japan Human Exposure Databases, yielding an average number of deaths and the associated standard deviation for each stochastic earthquake event by region (“**Earthquake Event Modeled Deaths**”). The analysis considered the maximum daytime population, which reflects the peak concentration of people at risk. Secondary uncertainty in the number of deaths was captured in the analysis.
2. The Earthquake Event Modeled Deaths were divided between age/gender cohorts by region, according to the ratios defined in the specifications of the applicable Human Exposure Database, to yield the event’s number of deaths by age/gender cohort and region (“**Earthquake Event Modeled Deaths By Demographic**”).
3. Earthquake Event Modeled Excess Mortality Rates were calculated by dividing the Earthquake Event Modeled Deaths By Demographic by the population of each age/gender cohort (obtained from the Human Exposure Database) in each region, followed by summing over all regions.

Residual Risk Excess Mortality Rates

1. The RMS Residual Risk Model represents excess mortality from residual risks at a country level. Specifically, the model accounts for losses from storms, floods, extreme temperatures, accidents, mass movements, wildfires and volcanic eruptions in France, the U.S and Japan. In addition, the Japan Residual Risk Model also includes an allowance for additional mortality from tsunamis.
2. Excess mortality rates from the RMS Residual Risk Model are added to the baseline mortality and excess mortality from other perils to yield the overall modeled mortality rate for each Country.

Using the formula defined for the calculation of the Mortality Index (see section “Calculation of Aggregate Percentage”), the Index Weights were multiplied by the Modeled Excess Mortality Rates and summed to yield Modeled Excess Mortality Index Values by Country.

SIMULATION METHODOLOGY

RMS determined the probabilities of attachment, exhaustion and expected loss of principal, for each Class of Notes, using Monte Carlo simulation. The Modeled Baseline Mortality, Modeled Excess Mortality Index Values, and the event frequency distribution for each peril (disease, terrorism, earthquake and residual) were inputs to the procedure, which consists of the following steps:

1. The number of simulated earthquake, terrorism and emerging infectious disease event occurrences in a simulated Risk Period and allocated to start on a specific Calendar Year is determined based on a Poisson frequency distribution, and the number of influenza disease event occurrences in a simulated Risk Period and allocated to start on a specific Calendar Year is determined based on a Binomial frequency distribution, consistent with the RMS Earthquake Casualty Model, RMS Probabilistic Terrorism Model and RMS Infectious Disease Model methodologies.
2. For each Country and each simulated Calendar Year ($t = 1$ to 5) in each simulated Risk Period, a Residual Risk Excess Mortality Rate is simulated using the Residual Risk Model.
3. For each Country and each simulated Calendar Year ($t = 1$ to 5) in each simulated Risk Period and the Index Reference Year ($t = 0$), a Modeled Baseline Mortality Index Value is simulated from the RMS Longevity Model.
4. For each simulated Calendar Year ($t = 1$ to 5) in each simulated Risk Period, RMS has calculated the Disease Event Modeled Excess Mortality Rates assuming that all fatalities caused by that modeled disease event (if any) occurred within the simulated starting Calendar Year and the consecutive Calendar Year, consistent with the Infectious Disease Model methodology.
5. For all simulated earthquake and terrorism excess mortality modeled events (if any) in each simulated Risk Period, the corresponding Event Excess Modeled Index Values are added to the Modeled Baseline Mortality Index Value for the simulated Calendar Year in which they occurred.
6. For each simulated Calendar Year and for every simulated Risk Period, a Modeled Mortality Index Value is calculated according to the Mortality Index Value formula (see section “Calculation of Aggregate Percentage”) (“**Simulated Country Index Values**”).
7. For each simulated Calendar Year and for every simulated Risk Period, the Aggregate Percentage is calculated using the Simulated Country Index Values (see section “Calculation of Aggregate Percentage”) and the reduction in principal over the simulated Risk Period, if any, is calculated.
8. The simulation procedure is repeated for five million simulated Risk Periods to determine the relevant probability and expected loss statistics of each Class of Notes, providing annualized loss statistics with a sampling error not greater than 1 basis point.

The summary of results from these procedures are presented in the following sections. They are for informational purposes only and are not a prediction of future loss experience of each Class of Notes. The actual loss of each Class of Notes can and will vary significantly.

CALCULATION OF AGGREGATE PERCENTAGE

Upon receipt of an Event Notice for any Class of Notes, the Calculation Agent will, with Sufficient Data available at the time, calculate Mortality Index Values and Annual Country Percentages for all Countries in the Covered Area and for all applicable Calendar Years to determine whether a Mortality Event has occurred and, if applicable, the corresponding Aggregate Percentage with respect to such Class, according to the following steps:

1. Identify the applicable Reporting Source for each Country: Eurostat (France), the U.S. Centers for Disease Control and Prevention (United States), or the Statistics Bureau of Japan, Ministry of Internal Affairs and Communications (Japan), or in each case, any successor reporting source publishing substantially similar data. As of the date of this analysis, the current definition of territory according to the respective Reporting Source¹ for each Country is as follows:
 - a. France: Mainland metropolitan France and Corsica excluding Departments d'Outre Mer (DOM) and Territories d'Outre Mer (TOM).
 - b. Japan: The territory of the country of Japan.
 - c. United States: The fifty states of the United States of America and the District of Columbia.
2. Obtain Sufficient Data for a given Calendar Year and Country, as set out below:
 - a. From, but excluding, the last day of a Calendar Year to and including the last day of the 24-month period following the end of such Calendar Year:
 - i. Data for each Calendar Year and not indicated by the applicable Reporting Source as preliminary or equivalently labeled preliminary Data (such Data being referred to as Final Data).
 - ii. Data available and indicated by the applicable Reporting Source as preliminary or equivalently labeled preliminary Data (such Data being referred to as Preliminary Data).
 - b. From, but excluding, the last day of the 24-month period following the end of a Calendar Year to and including the Final Extended Redemption Date: Final Data, Preliminary Data or Alternative Data; for these purposes, where Final Data or Preliminary Data is not available from the applicable Reporting Source and the Calculation Agent can identify equivalent Data from a publicly available alternative source using substantially similar data collection, review, calculation and reporting procedures, if any, in accordance with the procedures specified in the Calculation Agent Agreement, such Data will be Alternative Data.
 - c. For purposes of calculating any Mortality Index Value, during any period described in clauses (a)(i), (a)(ii) and (b) above, Data will be used to the extent available and in the following priority, where applicable: *first*, Final Data; *second*, Preliminary Data; and *third*, Alternative Data.

For each Country, and each Calendar Year, if the Country is Reported, the Calculation Agent shall proceed to Step 3; if the Country is Unreported, the Calculation Agent shall skip to Step 9, and the Annual Country Percentage shall be set to 0% for such Country in such Calendar Year.

A Calendar Year is any calendar year within the Risk Period and is referenced by t as follows in Table 1 below:

Table 1: Calendar Years

t	Calendar year
1	2015
2	2016
3	2017
4	2018
5	2019

3. For each Country, and each relevant Calendar Year the Calculation Agent will:
 - a. Identify the Mortality Rates (population death rate per 100,000 for each age/gender cohort), as published by the applicable Reporting Source; or
 - b. In the absence of such publication, the Calculation Agent shall calculate, for each age/gender cohort, the applicable Mortality Rate by dividing the actual reported number of Deaths in each age/gender cohort, for all causes, as published by the applicable Reporting Source by the corresponding Population as of the middle of the year. If Population as of the middle of the year is not available, the Calculation Agent may use, in this order of priority:

¹ Please refer to the Risk Factors section of this OC for potential changes to the territory of each Country.

- i. Population as of a time of year other than the middle of the year shall be linearly interpolated to provide an estimate of the Population as of the middle of the year by additionally using the Population for the immediately preceding or immediately following Calendar Year, as applicable; or
 - ii. If Population Data for one or more age groups in a particular Calendar Year are Incomplete Data but such Population Data for the immediately preceding Calendar Year are available, then such Population Data will be used instead of such Incomplete Data.
4. For a given Calendar Year t and Country C , the Mortality Index, Index_t^C , is calculated as:

$$\text{Index}_t^C = \sum_{\text{All } x} (\beta_{m,x}^C q_{m,x,t}^C + \beta_{f,x}^C q_{f,x,t}^C)$$

Where:

$\beta_{m,x}^C$ is the Index Weight applied to the Mortality Rate for males of age group x in Country C as specified in section “Age/Gender Cohort Index Weights”;

$\beta_{f,x}^C$ is the Index Weight applied to the Mortality Rate for females of age group x in Country C as specified in section “Age/Gender Cohort Index Weights”;

$q_{m,x,t}^C$ is the Mortality Rate for males of age group x for Country C in Calendar Year t ; and

$q_{f,x,t}^C$ is the Mortality Rate for females of age group x for Country C in Calendar Year t .

5. For a given Calendar Year t and Country C , the Reference Index Value, RIV_t^C , is determined as follows:

$$RIV_t^C = \text{Index}_{\text{Index Reference Year}+t-1}^C$$

provided that the foregoing result is subject to a cap of $RIV_{t-1}^C \times 101.9\%$ and a floor of $RIV_{t-1}^C \times 98.1\%$ when $t \geq 2$.

The Index Reference Year is the Calendar Year 2014.

6. For a given Calendar Year t and Country C , the Mortality Index Value, MIV_t^C , is calculated as:

$$\text{a. for } t = 1: MIV_t^C = \frac{\text{Index}_t^C}{RIV_t^C}$$

$$\text{b. for } t \geq 2: MIV_t^C = \frac{\text{Index}_t^C}{\min(RIV_t^C, RIV_{t-1}^C)}$$

7. For a given Calendar Year t , Country C , and Class of Notes N , the Trigger Level, $TL_{t,N}^C$, and Trigger Reduction Amount, $TRA_{t,N}^C$, are calculated as follows:

The Trigger Level, $TL_{t,N}^C$, is calculated as:

$$\text{a. for } 1 \leq t \leq 4: TL_{t,N}^C = ITL_N^C - TRA_{t,N}^C$$

$$\text{b. for } t = 5:$$

$$\text{i. For the Class A Notes (N = A): } TL_{5,A}^C = \min(ITL_A^C - TRA_{5,A}^C, DL_A^C)$$

$$\text{ii. For the Class B Notes (N = B): } TL_{5,B}^C = ITL_B^C - TRA_{5,B}^C$$

provided that the foregoing results are subject to a floor of 100%.

Where:

ITL_N^C is the Initial Trigger Level for Country C and Class of Notes N ;

DL_A^C is the Class A Dropdown Level for Country C and the Class A Notes; and

$TRA_{t,N}^C$ is the Trigger Reduction Amount for Calendar Year t , Country C , and Class of Notes N .

The Trigger Reduction Amount, $TRA_{t,N}^C$, is the amount by which the Trigger Level for such Class for Calendar Year t is reduced due to the Mortality Index Value for such Country in the Calendar Year $t - 1$ exceeding 100%, up to the Trigger Level for such Country for Calendar Year $t - 1$. The Trigger Reduction Amount is calculated as:

$$\text{a. for } t = 1: TRA_{t,N}^C = 0\%$$

$$\text{b. for } t \geq 2: TRA_{t,N}^C = \min(MIV_{t-1}^C, TL_{t-1,N}^C) - 100\%; \text{ provided, that the foregoing result is subject to a floor of 0\%.}$$

8. For a given Country C , Class of Notes N , and Calendar Year t , where $t \geq 2$, the Exhaustion Level is calculated as:

- a. for $t \geq 2$: $Exhaustion\ Level_{t,N}^C = TL_{t,N}^C + Exhaustion\ Level_{1,N}^C - ITL_N^C$
9. For a given Calendar Year t , and Class of Notes N , the Annual Country Percentage for each Country C is calculated as:

$$Annual\ Country\ Percentage_{t,N}^C = \left(\frac{MIV_t^C - TL_{t,N}^C}{Exhaustion\ Level_{t,N}^C - TL_{t,N}^C} \right)$$

The Annual Country Percentage is expressed as a percentage and is subject to a cap of 100% and a floor of 0%.

The Annual Country Percentage for any given Calendar Year, Class and Country will be calculated using the latest Data available as of the date such calculation is performed.

10. The Aggregate Percentage for each Class of Notes and as of any date of determination, is calculated as the lesser of (i) the sum of the Annual Country Percentages across all Countries for all Calendar Years and (ii) 100%.
11. Determine the Event Payment for each Class of Notes and as of any Payment Date, which will be equal to (i) the Original Principal Amount of such Class *multiplied by* (ii) a percentage equal to (a) the Aggregate Percentage as of such Payment Date *minus* (b) the Aggregate Percentage as of the immediately preceding Payment Date. For the avoidance of doubt, an Event Payment may be positive or negative.
12. If the Calculation Agent has received an Event Notice in respect of a Class of Notes, the Calculation Agent will issue an Event Report to the Issuer and the Counterparty, with a copy to the Indenture Trustee, the Paying Agent and the Note Registrar, no later than the fifteenth (15th) Business Day prior to the first Payment Date after the date the applicable Event Notice is issued; *provided* that, if such Event Notice is issued less than thirty (30) Business Days prior to a Payment Date, the Initial Event Reporting Date will be the fifteenth (15th) Business Day prior to the Payment Date immediately succeeding such Payment Date; *provided, further*, that if such Event Notice is issued less than thirty (30) Business Days but more than twenty-two (22) Business Days prior to the applicable Redemption Date, the Calculation Agent will be required to submit the Initial Event Report no later than three (3) Business Days prior to such Redemption Date.

Thereafter, the Calculation Agent shall continue to issue an Event Report for each applicable Country and Calendar Year at least fifteen (15) Business Days prior to each subsequent Payment Date until and including the first Payment Date on which the Final Data for all applicable Countries and Calendar Years is included in an Event Report, in each case using the most recent Sufficient Data available at the time of preparation of such Event Report; *provided*, that (i) the Calculation Agent shall not be required to provide an Event Report with respect to a subsequent Payment Date, unless on or before the thirtieth (30th) Business Day prior to the applicable subsequent Payment Date, new or revised Sufficient Data has been reported by the Reporting Source in addition to the Data on which the most recent prior Event Report was based; and (ii) in the case of the Final Extended Redemption Date, the applicable Subsequent Event Reporting Date will be three (3) Business Days prior to the Final Extended Redemption Date.

Each Event Report will include a reasonably detailed description of any Basis Changes applicable to such Event Report.

AGE/GENDER COHORT INDEX WEIGHTS

Table 2, Table 3 and Table 4 below display the Index Weights for each age/gender cohort by Country.

Table 2: Index Weights by Gender and Age Cohort for France

Age	Index Weight	
	Male	Female
5-9	0.0%	0.0%
10-14	0.0%	0.0%
15-19	0.1%	0.1%
20-24	0.4%	0.0%
25-29	4.2%	4.7%
30-34	4.6%	4.5%
35-39	11.3%	6.1%
40-44	11.5%	6.6%
45-49	8.3%	3.9%
50-54	8.9%	4.0%
55-59	6.3%	2.8%
60-64	6.5%	3.1%
65-69	0.8%	0.4%

Age	Index Weight	
	Male	Female
70-74	0.6%	0.3%
75-79	0.0%	0.0%
80-84	0.0%	0.0%
Total	63.5%	36.5%

Table 3: Index Weights by Gender and Age Cohort for Japan

Age	Index Weight	
	Male	Female
5-9	0.1%	0.1%
10-14	0.1%	0.1%
15-19	0.6%	0.3%
20-24	0.5%	0.4%
25-29	3.5%	1.7%
30-34	4.0%	1.8%
35-39	9.5%	3.2%
40-44	11.2%	3.7%
45-49	9.6%	3.5%
50-54	8.7%	3.2%
55-59	7.1%	3.4%
60-64	8.1%	4.2%
65-69	2.7%	1.8%
70-74	2.4%	1.7%
75-79	0.9%	0.7%
80-84	0.6%	0.6%
Total	69.6%	30.4%

Table 4: Index Weights by Gender and Age Cohort for the United States

Age	Index Weight	
	Male	Female
5-9	0.2%	0.1%
10-14	0.2%	0.2%
15-19	0.3%	0.2%
20-24	0.2%	0.2%
25-29	1.8%	1.8%
30-34	1.7%	1.6%
35-39	5.7%	3.9%
40-44	6.5%	4.0%
45-49	8.2%	3.3%
50-54	9.7%	3.8%
55-59	9.2%	3.3%
60-64	9.3%	3.2%
65-69	6.3%	1.9%
70-74	5.0%	1.5%
75-79	2.8%	1.1%
80-84	2.0%	0.8%
Total	69.1%	30.9%

SUMMARY OF MODELED LOSSES TO EACH CLASS OF NOTES

RMS determined the probabilities of attachment, exhaustion and expected loss of principal with respect to the Initial Trigger Levels, Class A Dropdown Levels and Exhaustion Levels ($t = 1$) for each Country and Class of Notes as displayed in Table 5 and Table 6:

Table 5: Initial Trigger Levels, Class A Dropdown Levels and Exhaustion Levels ($t = 1$) for the Class A Notes

	Initial Trigger Level	Class A Dropdown Level	Exhaustion Level ($t = 1$)
France	116.0%	110.00%	152.7%
Japan	116.0%	110.00%	140.8%
United States	108.0%	106.00%	120.4%

Table 6: Initial Trigger Levels and Exhaustion Levels ($t = 1$) for the Class B Notes

	Initial Trigger Level	Exhaustion Level ($t = 1$)
France	108.1%	116.0%
Japan	108.2%	116.0%
United States	104.1%	108.0%

Table 7 below shows the modeled expected loss to each Class of Notes with corresponding probabilities of having a non-zero loss level (“Attachment Probability”) and having a full principal payout amount (“Exhaustion Probability”). The probabilities are presented on an annualized basis, which represents the cumulative probabilities across the entire Risk Period for each Class of Notes divided by five.

Table 7: Annualized Modeled Loss Probabilities for the Class A and Class B Notes

	Class A Notes	Class B Notes
Attachment Probability	1.06%	1.79%
Expected Loss	0.64%	1.33%
Exhaustion Probability	0.44%	1.04%

Table 8 and Table 9 show the modeled cumulative Attachment Probability, Expected Loss and Exhaustion Probability for each Class of Notes at the end of each Calendar Year. Note that the cumulative probabilities displayed below for a Calendar Year are equal to the sum of probabilities for all Calendar Years up to and including such Calendar Year. The annualized metrics are calculated as the cumulative probabilities across the entire Risk Period divided by five.

Table 8: Cumulative Modeled Loss Probabilities for the Class A Notes by Calendar Year

	2015	2016	2017	2018	2019	Annualized
Attachment Probability	0.73%	1.86%	2.94%	3.96%	5.29%	1.06%
Expected Loss	0.44%	1.12%	1.79%	2.43%	3.21%	0.64%
Exhaustion Probability	0.30%	0.76%	1.22%	1.67%	2.19%	0.44%

Table 9: Cumulative Modeled Loss Probabilities for the Class B Notes by Calendar Year

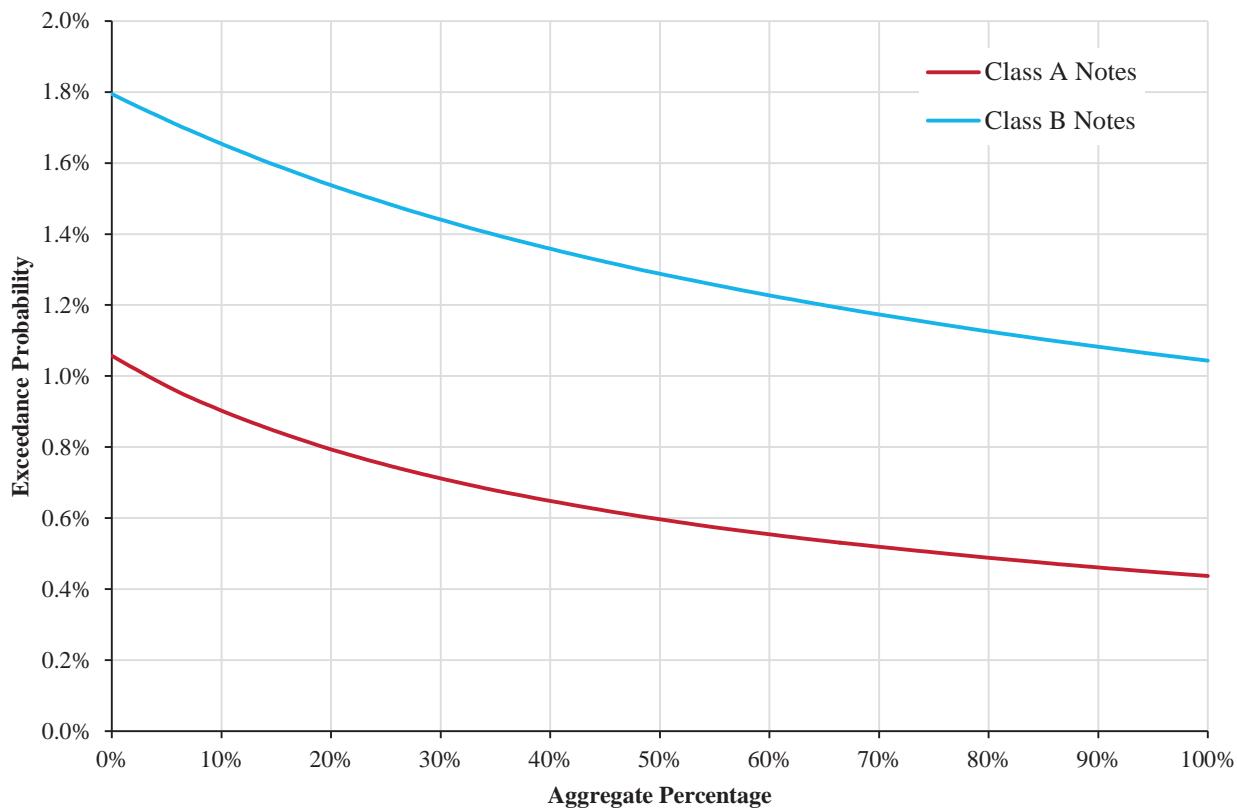
	2015	2016	2017	2018	2019	Annualized
Attachment Probability	1.38%	3.68%	5.61%	7.34%	8.97%	1.79%
Expected Loss	1.01%	2.60%	4.04%	5.37%	6.65%	1.33%
Exhaustion Probability	0.78%	1.97%	3.10%	4.18%	5.22%	1.04%

Table 10 and Figure 1 below show the modeled Aggregate Percentage exceedance probabilities for each Class of Notes, displayed as percentages of the Original Principal Amount.

Table 10: Annualized Modeled Loss Exceedance Probabilities for the Class A Notes and Class B Notes

Aggregate Percentage	Class A Notes	Class B Notes
100%	0.44%	1.04%
80%	0.49%	1.13%
60%	0.55%	1.23%
40%	0.65%	1.36%
20%	0.79%	1.54%
0%	1.06%	1.79%

Figure 1: Annualized Modeled Loss Exceedance Probability Curves for each Class of Notes



In order to illustrate the severity of events required to trigger each Class of Notes, RMS estimated the number of excess deaths resulting from a Mortality Event for such Class using two types of Mortality Event casualty profiles. For both scenarios, calculations using the Initial Trigger Level assume that the deaths occur during the second Calendar Year (2016) of the Risk Period. Calculations using the Class A Dropdown Level assume that the deaths occur in the final Calendar Year (2019) of the Risk Period. The mean Modeled Baseline Mortality Index for 2014 is used as the Reference Index Value throughout and the Deaths are rounded to the nearest one hundred.

Table 11 and Table 12 below display the results for the two modeled casualty profiles. The constant profile assumes that a Mortality Event causes identical excess mortality rates across all age/gender cohorts. The proportional profile assumes that the excess mortality rates resulting from a Mortality Event occur in proportion to the Modeled Baseline Mortality Rates in each age/gender cohort for 2014.

Table 11: Estimated Number of Deaths Resulting from a Mortality Event for the Class A Notes

	Initial Trigger Level	Constant Profile Deaths	Proportional Profile Deaths	Class A Dropdown Level	Constant Profile Deaths	Proportional Profile Deaths
France	116.0%	32,400	89,000	110.0%	20,200	55,600
Japan	116.0%	89,200	192,100	110.0%	55,700	120,000
United States	108.0%	247,600	201,400	106.0%	185,700	151,000

Table 12: Estimated Number of Deaths Resulting from a Mortality Event for the Class B Notes

	Initial Trigger Level	Constant Profile Deaths	Proportional Profile Deaths
France	108.1%	16,400	45,000
Japan	108.2%	45,700	98,400
United States	104.1%	126,900	103,200

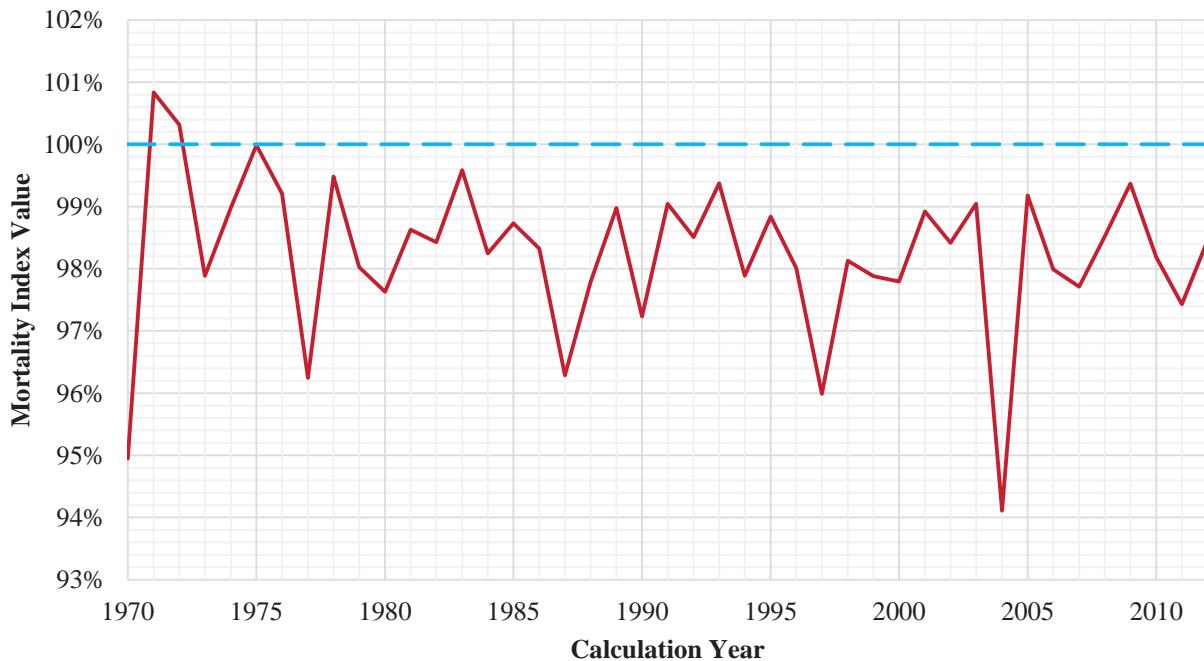
BASELINE MORTALITY

Historical

Figure 2, Figure 3 and Figure 4 below represent the historical Mortality Index Values for the past 40 years by Country, assuming no constraint has been applied to the Reference Index Value. Each Mortality Index Value has been calculated assuming the denominator is the minimum Mortality Index in the 2 years prior to the calculation year.

In France, only two years have an index value greater than 100%, with a maximum index value of 100.8% in 1971. This adverse Mortality Index Value is driven by an increase in mortality rates in 1971 by approximately 0.84%. This is a consequence of the lower mortality experienced in 1970, directly after the 1968-1969 influenza A (H3N2) pandemic season, with deaths markedly affecting the 45-64 age groups, and resulting in the observed behaviour in Mortality Index Value. A Mortality Index Value of 100.8% in the RMS Longevity Model corresponds to a return period of approximately 1 in 16 years, based on the second Calendar Year.

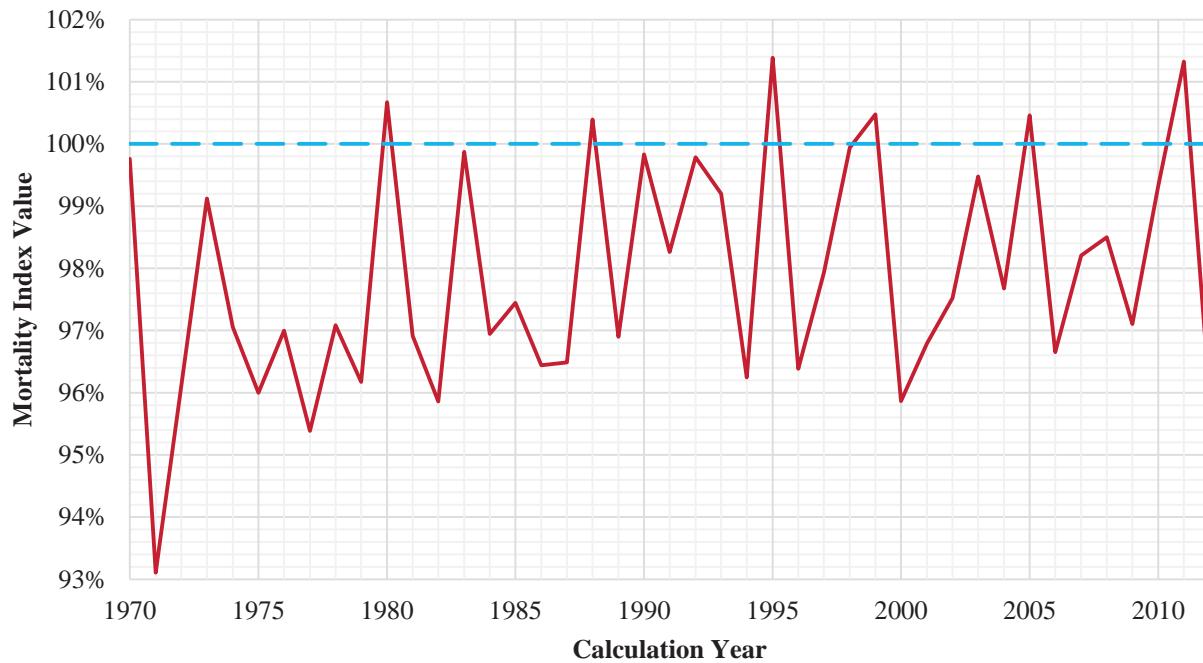
Figure 2: Historical Mortality Index Values with no Reference Index Value Constraint – France



In Japan, six years have an index value greater than 100%, with a maximum index value of 101.4% in 1995. This adverse Mortality Index Value is driven by an increase in mortality rates in 1995 by approximately 1.39%. This is due in part to the additional mortality caused by the 1995 Great Hanshin Earthquake (commonly referred to as Kobe), which resulted in an estimated 6,400 deaths. A Mortality Index Value of 101.4% in the RMS Longevity Model corresponds to a return period of approximately 1 in 20 years, based on the second Calendar Year.

The second largest historical Mortality Index Value in the period examined is 101.3%, observed in 2011. This is due in part to the estimated 18,475 additional deaths resulting from the 2011 Tohoku Earthquake and Tsunami event.

Figure 3: Historical Mortality Index Values with no Reference Index Value Constraint – Japan



In the United States, four years have an index value greater than 100%, with a maximum index value of 101.3% in 1993. This adverse Mortality Index Value is driven by an increase in mortality rates in 1993 by approximately 1.29%. The largest increase in age-adjusted mortality rate (9.5%) was observed for human immunodeficiency virus (HIV) infection; this rate was the highest ever recorded for HIV infection at the time. A Mortality Index Value of 101.3% in the RMS Longevity Model corresponds to a return period of approximately 1 in 200 years, based on the second Calendar Year. Some of this elevated mortality is likely attributable to annual volatility as well.

Figure 4: Historical Mortality Index Values with no Reference Index Value Constraint – United States

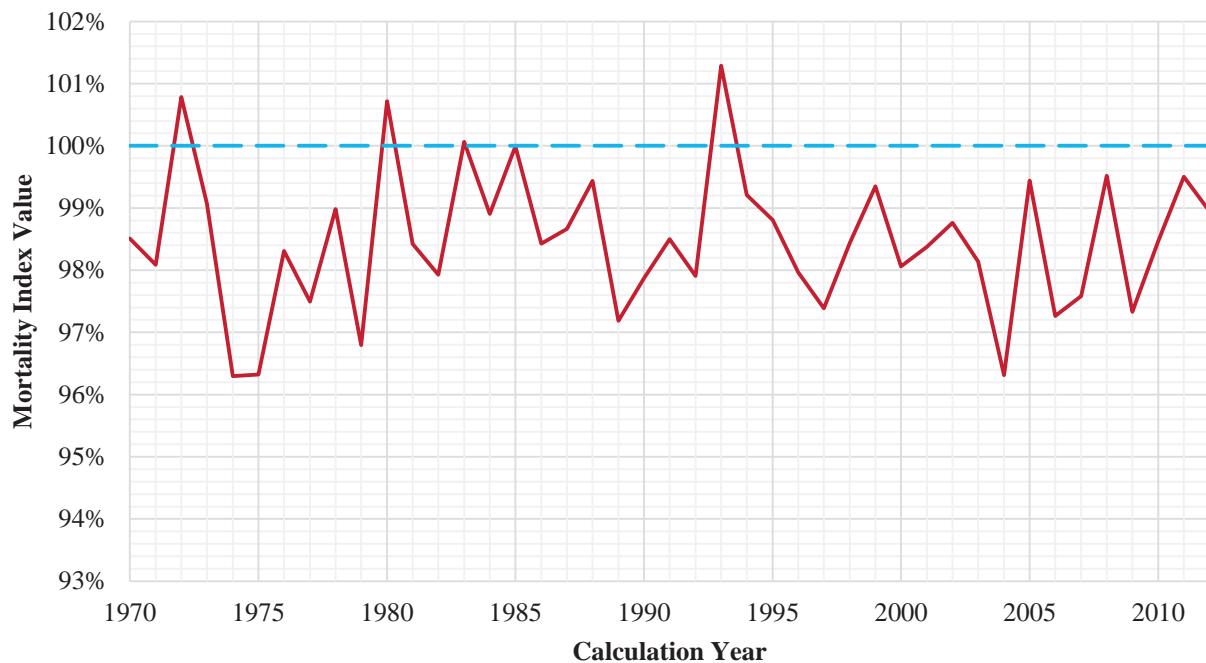


Figure 5, Figure 6 and Figure 7 further display the impacts of applying the Reference Index Value constraint to historical data by Country. 2006 was used as the Initial Reference Year allowing for the modeling of the Mortality Index Values over 6 years using recent final historical data.

Figure 5: Constrained and Unconstrained Historical Mortality Index Values – France

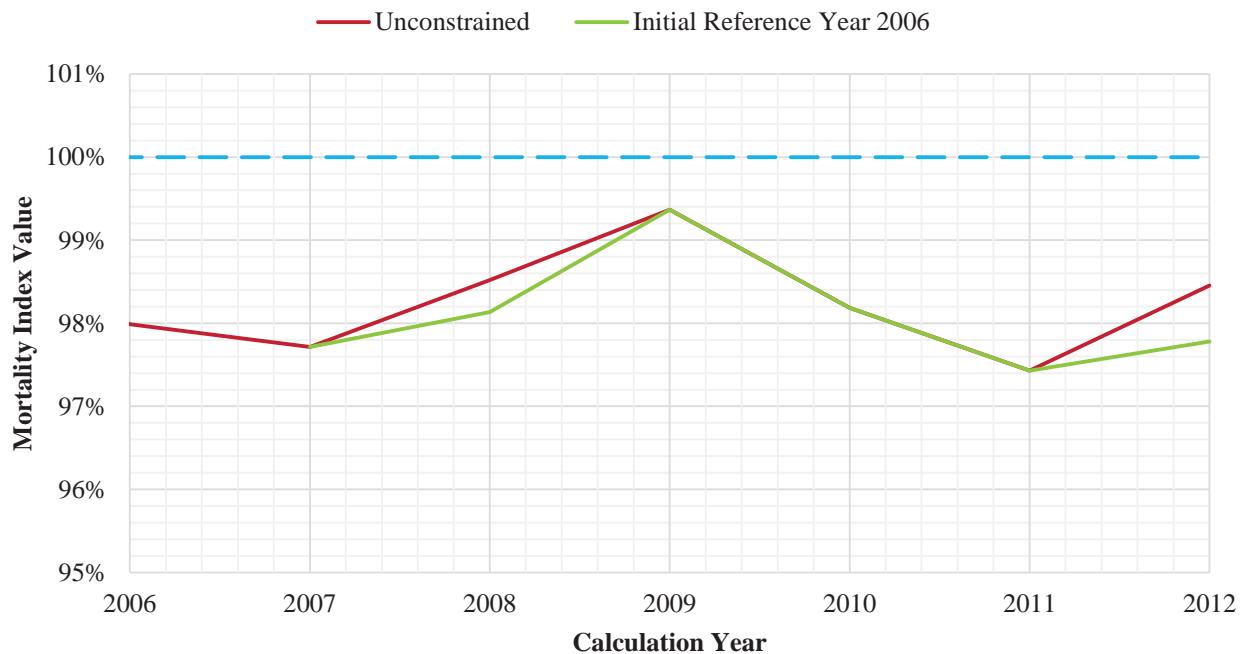


Figure 6: Constrained and Unconstrained Historical Mortality Index Values – Japan

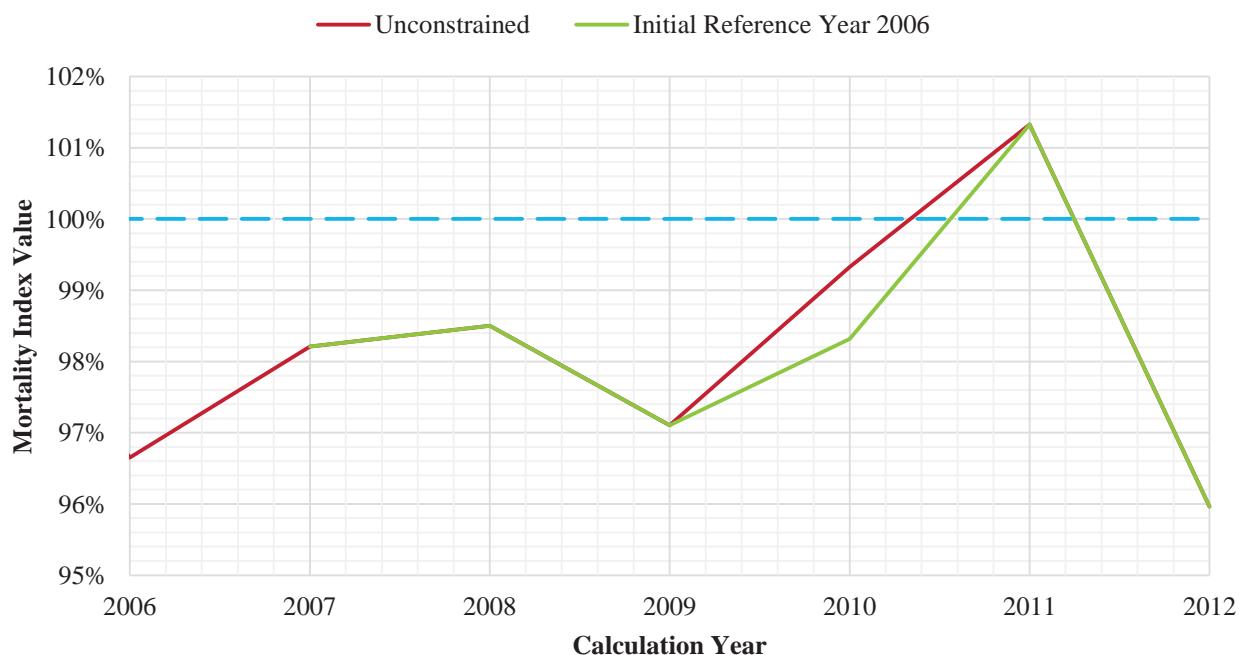
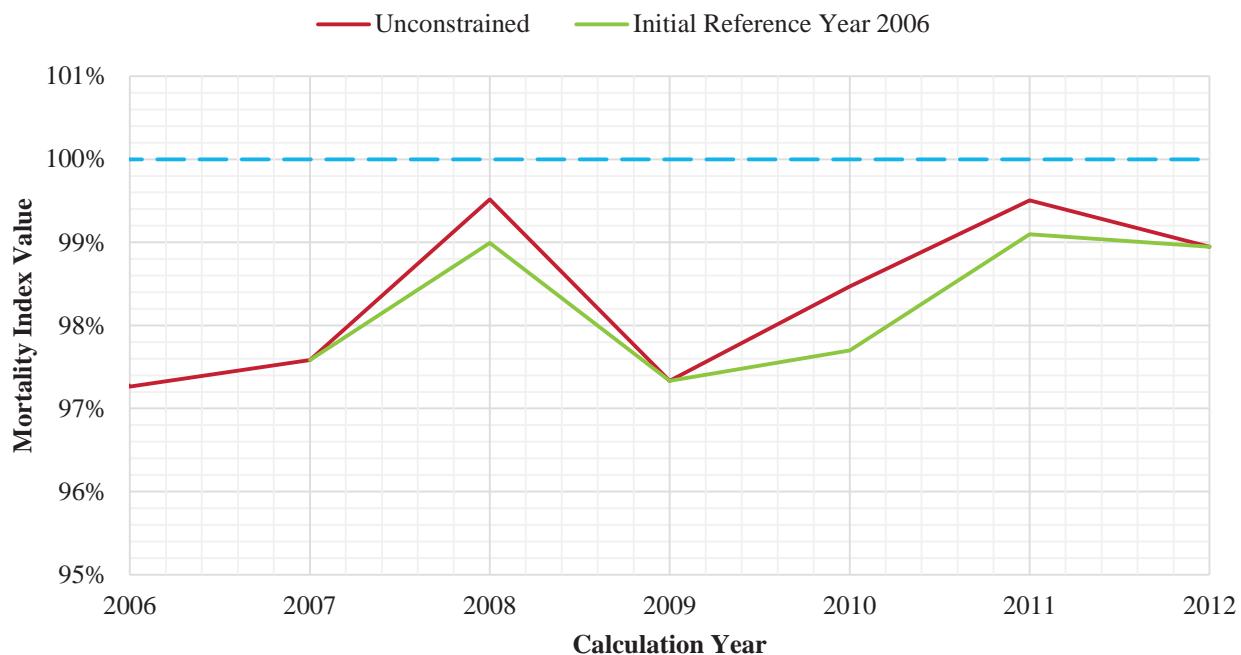


Figure 7: Constrained and Unconstrained Historical Mortality Index Values – United States



Modeled

Using the RMS Longevity Model, the Mortality Index was simulated for each Calendar Year in the Risk Period. Figure 8, Figure 9 and Figure 10 represent the historical Mortality Index, using data from the Reporting Sources, as well as the mean Mortality Index for each Calendar Year from the RMS Longevity Model for each Country. Shaded regions around the mean trend lines represent the decile regions for the Mortality Index distribution. These decile regions represent a combination of all sources of uncertainty in the RMS Longevity Model, described more fully on page B-5 of this Risk Analysis. The observed volatility in the historical data, resulting from variability in the death count, is represented by the uncertainty distribution around the modeled mean mortality rates.

The RMS Longevity Model forecasts a reduction in Baseline Mortality over time. The average annual improvement in modeled Mortality Index over the Risk Period for each Country is shown in Table 13:

Table 13: Modeled Annual Average Mortality Index Improvement Rate

Average Annual Mortality Index Improvement Rate ²	
France	1.80%
Japan	1.81%
United States	1.59%

² Calculated as the average annual mortality improvement for each simulated Risk Period based solely on the RMS Longevity Model.

Figure 8: Baseline Modeled Mean and Historical Mortality Rates – France

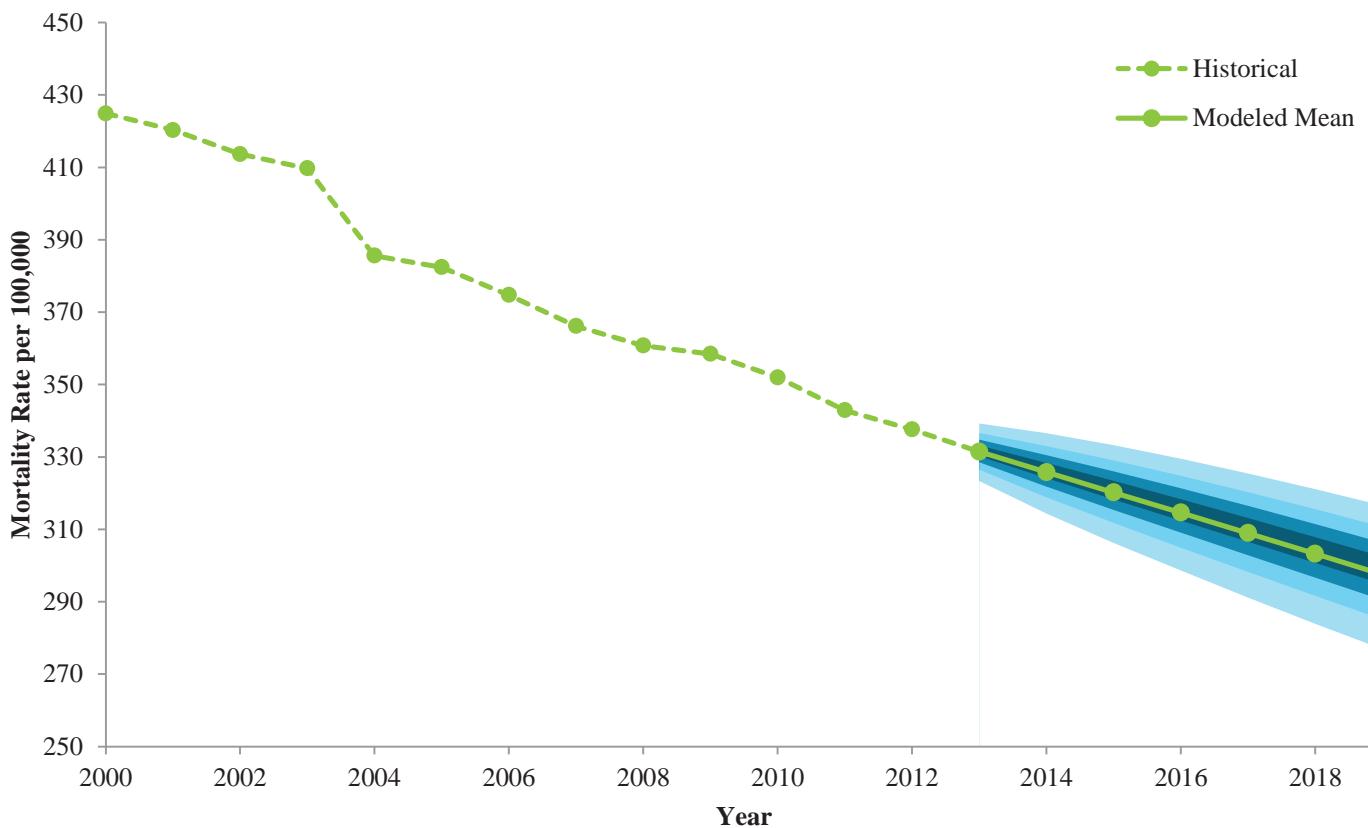


Figure 9: Baseline Modeled Mean and Historical Mortality Rates – Japan

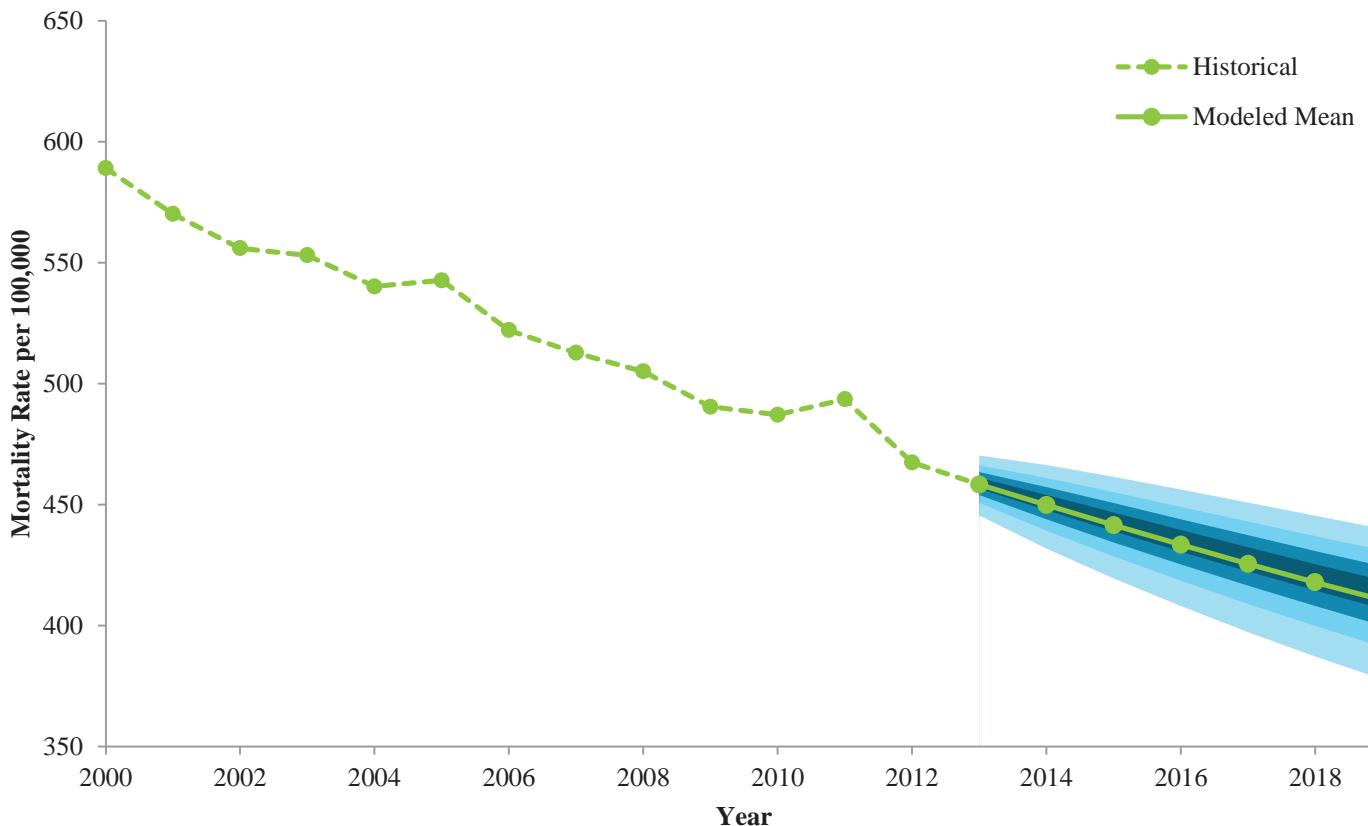
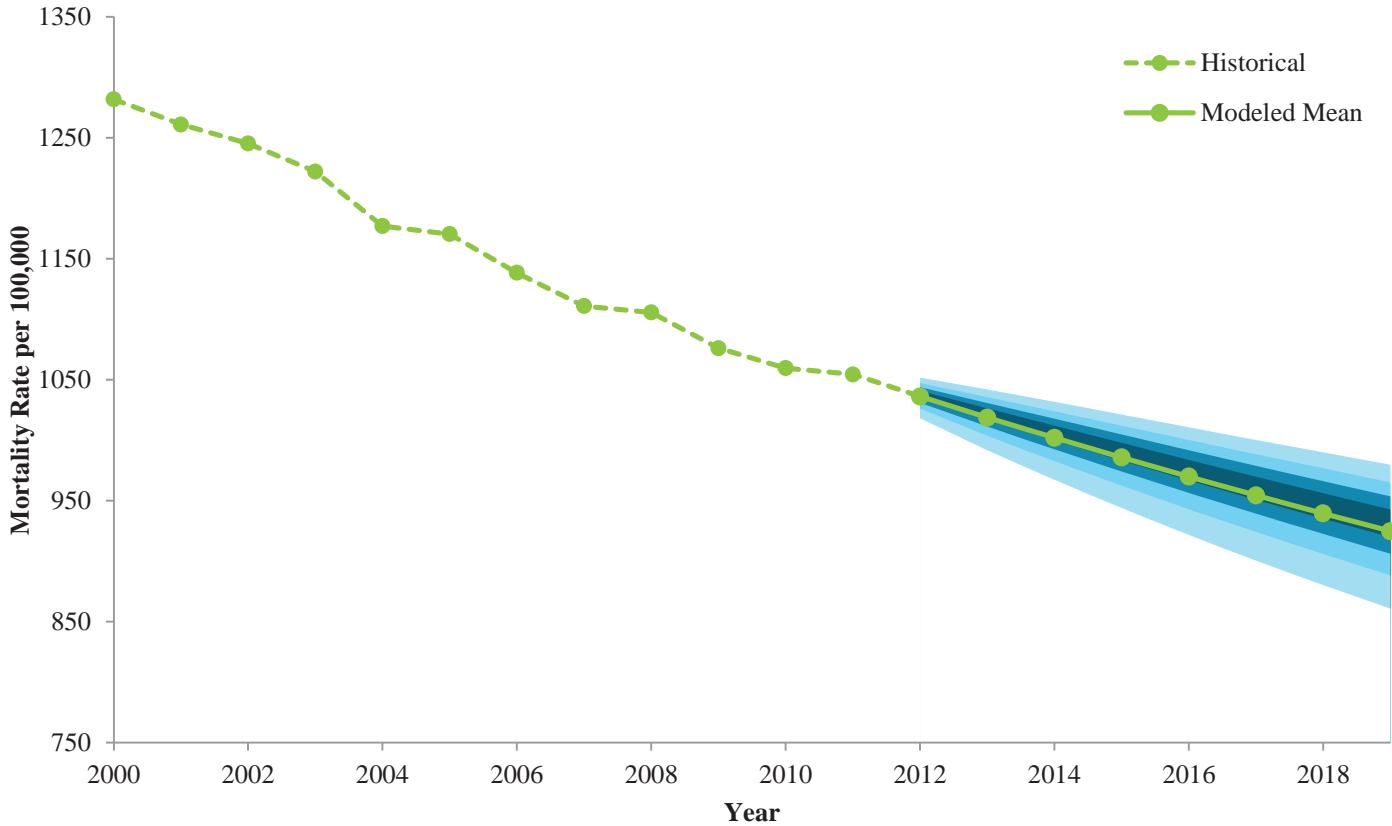


Figure 10: Baseline Modeled Mean and Historical Mortality Rates – United States



Results

RMS used the RMS Longevity Model to estimate exceedance probabilities of various Modeled Mortality Index Values as a result of fluctuations in the baseline mortality only. Table 14, Table 15 and Table 16 display exceedance probabilities by Country and Calendar Year obtained via the simulation of five million Risk Periods.

Table 14: Baseline Model Mortality Index Value Exceedance Probabilities for France

Exceedance Probability	2015	2016	2017	2018	2019
0.05%	105.7%	106.5%	106.1%	105.3%	104.7%
0.10%	104.8%	105.5%	105.0%	104.3%	103.8%
0.50%	103.2%	103.4%	102.9%	102.6%	102.2%
1.00%	102.5%	102.7%	102.3%	101.9%	101.6%
2.00%	101.9%	102.0%	101.6%	101.3%	101.0%
5.00%	101.1%	101.1%	100.7%	100.5%	100.2%
10.00%	100.5%	100.3%	100.0%	99.8%	99.6%
50.00%	98.4%	98.0%	97.6%	97.3%	96.9%
Mean	98.3%	97.8%	97.3%	96.8%	96.4%
Standard Deviation	1.8%	2.3%	2.5%	2.8%	3.1%
Maximum	119.9%	129.3%	124.1%	121.4%	122.9%
Minimum	74.5%	72.1%	68.1%	65.2%	64.6%

Table 15: Baseline Model Mortality Index Value Exceedance Probabilities for Japan

Exceedance Probability	2015	2016	2017	2018	2019
0.05%	108.7%	110.4%	109.6%	108.9%	108.2%
0.10%	107.1%	108.4%	107.6%	107.0%	106.5%
0.50%	104.3%	104.8%	104.2%	103.8%	103.5%
1.00%	103.4%	103.6%	103.1%	102.7%	102.5%
2.00%	102.5%	102.6%	102.1%	101.9%	101.7%
5.00%	101.4%	101.3%	101.0%	100.8%	100.7%
10.00%	100.6%	100.5%	100.2%	100.0%	99.9%
50.00%	98.3%	97.8%	97.4%	97.2%	97.0%
Mean	98.1%	97.6%	97.0%	96.6%	96.3%
Standard Deviation	2.2%	2.7%	3.1%	3.4%	3.7%
Maximum	143.5%	174.2%	260.8%	226.6%	310.5%
Minimum	61.3%	53.8%	43.6%	41.3%	46.1%

Table 16: Baseline Model Mortality Index Value Exceedance Probabilities for the United States

Exceedance Probability	2015	2016	2017	2018	2019
0.05%	103.0%	103.0%	102.5%	102.3%	102.1%
0.10%	102.4%	102.4%	102.0%	101.8%	101.7%
0.50%	101.4%	101.3%	101.1%	101.0%	100.9%
1.00%	101.0%	100.9%	100.7%	100.7%	100.6%
2.00%	100.6%	100.5%	100.4%	100.4%	100.3%
5.00%	100.2%	100.1%	100.0%	99.9%	99.9%
10.00%	99.8%	99.7%	99.6%	99.6%	99.6%
50.00%	98.5%	98.3%	98.2%	98.1%	98.1%
Mean	98.4%	98.0%	97.8%	97.6%	97.5%
Standard Deviation	1.3%	1.6%	1.9%	2.1%	2.3%
Maximum	110.9%	108.9%	110.8%	119.1%	114.9%
Minimum	83.1%	76.0%	72.9%	67.1%	62.6%

MODELED MORTALITY INDEX VALUE ANNUAL EXCEEDANCE PROBABILITY CURVES

Figure 11, Figure 12 and Figure 13 below represent the annualized probabilities of exceeding various Modeled Mortality Index Values by peril and Country and include Modeled Baseline Mortality rates for each Country derived from the RMS Longevity Model. These metrics are calculated as the probabilities of exceeding various Mortality Index Values across the entire Risk Period, for each Country, divided by five.

Table 17, Table 19 and Table 21 display the exceedance probabilities associated with these curves by peril and Country. Table 18, Table 20, and Table 22 display the annualized all peril exceedance probabilities for the Initial Trigger Levels, Exhaustion Levels and Class A Dropdown Levels by Country. Since the Trigger Level may be reduced to a level below the Initial Trigger Level when $t > 1$, the annualised probabilities of attachment are greater than the Initial Trigger Level exceedance probabilities for each Country.

Figure 11: Annualized Modeled Mortality Index Value Exceedance Probability Curves by Peril – France

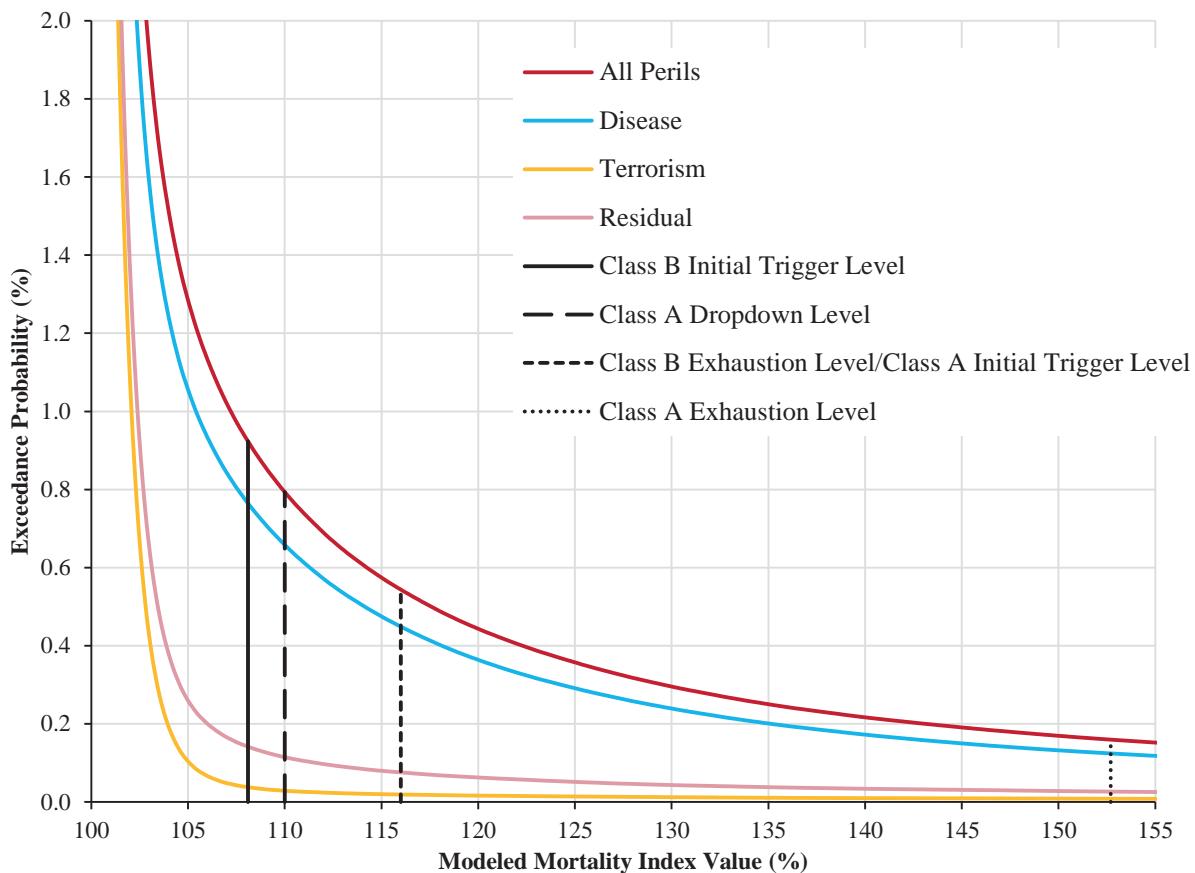


Table 17: Annualized Modeled Mortality Index Value Exceedance Probabilities by Peril - France

Exceedance Probability	All Perils	Disease	Terrorism	Residual
0.05%	262.8%	220.6%	106.9%	125.8%
0.10%	180.2%	163.4%	105.1%	111.6%
0.50%	117.6%	114.1%	102.8%	103.4%
1.00%	107.2%	105.4%	102.1%	102.4%
2.00%	102.8%	102.4%	101.4%	101.6%
5.00%	100.9%	100.8%	100.4%	100.5%
10.00%	99.8%	99.7%	99.5%	99.6%

Table 18: Annualized All Peril Modeled Mortality Index Value Exceedance Probabilities for Key Levels - France

Level	Mortality Index Value	Exceedance Probability
Class B Initial Trigger Level	108.1%	0.92%
Class A Dropdown Level	110.0%	0.79%
Class B Exhaustion Level / Class A Initial Trigger Level	116.0%	0.54%
Class A Exhaustion Level	152.7%	0.16%

Figure 12: Annualized Modeled Mortality Index Value Exceedance Probability Curves by Peril - Japan

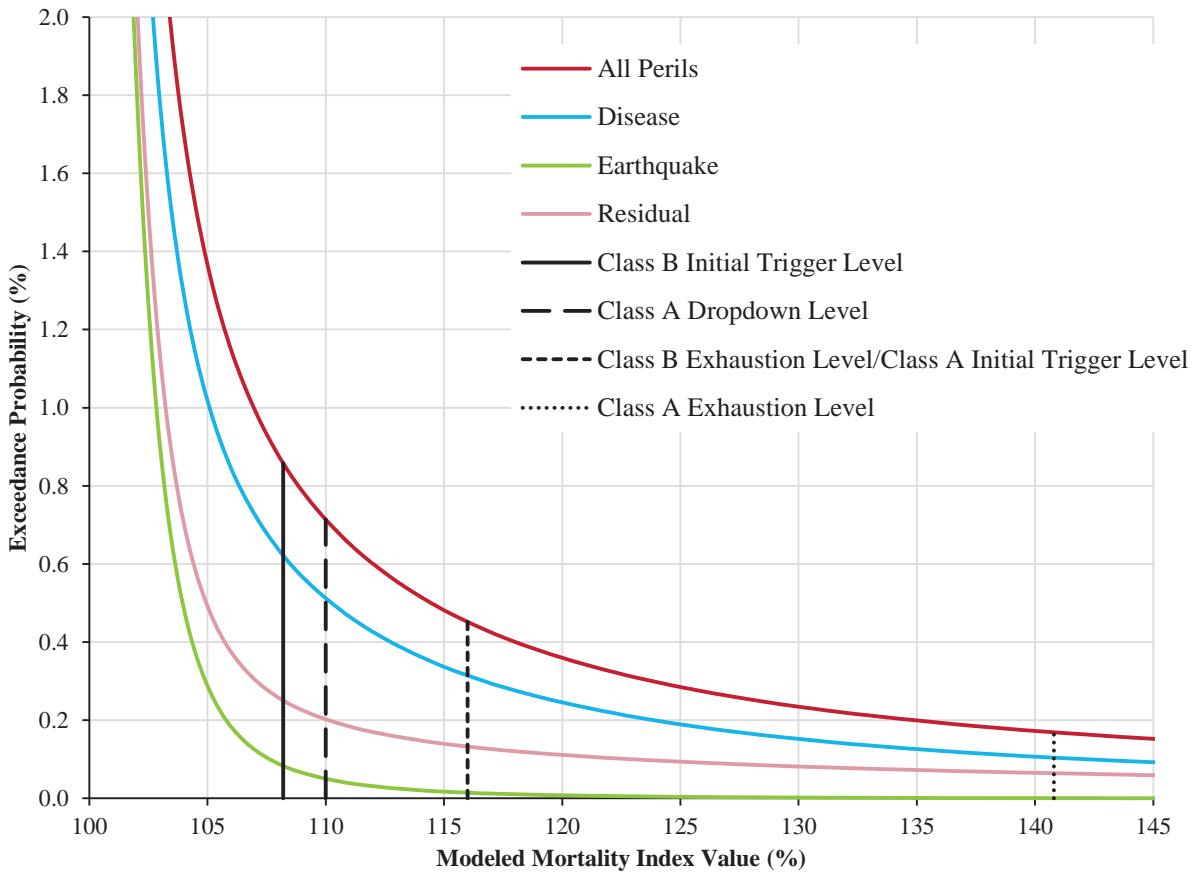


Table 19: Annualized Modeled Mortality Index Value Exceedance Probabilities by Peril - Japan

Exceedance Probability	All Perils	Disease	Earthquake	Residual
0.05%	263.3%	179.6%	110.0%	156.1%
0.10%	169.1%	142.2%	107.6%	123.0%
0.50%	114.5%	110.2%	103.9%	104.9%
1.00%	107.0%	105.1%	102.8%	103.2%
2.00%	103.4%	102.7%	101.9%	102.0%
5.00%	101.2%	100.9%	100.7%	100.7%
10.00%	99.9%	99.8%	99.6%	99.6%

Table 20: Annualized All Peril Modeled Mortality Index Value Exceedance Probabilities for Key Levels - Japan

Level	Mortality Index Value	Exceedance Probability
Class B Initial Trigger Level	108.2%	0.86%
Class A Dropdown Level	110.0%	0.71%
Class B Exhaustion Level / Class A Initial Trigger Level	116.0%	0.45%
Class A Exhaustion Level	140.8%	0.17%

Figure 13: Annualized Modeled Mortality Index Value Exceedance Probability Curves by Peril – United States

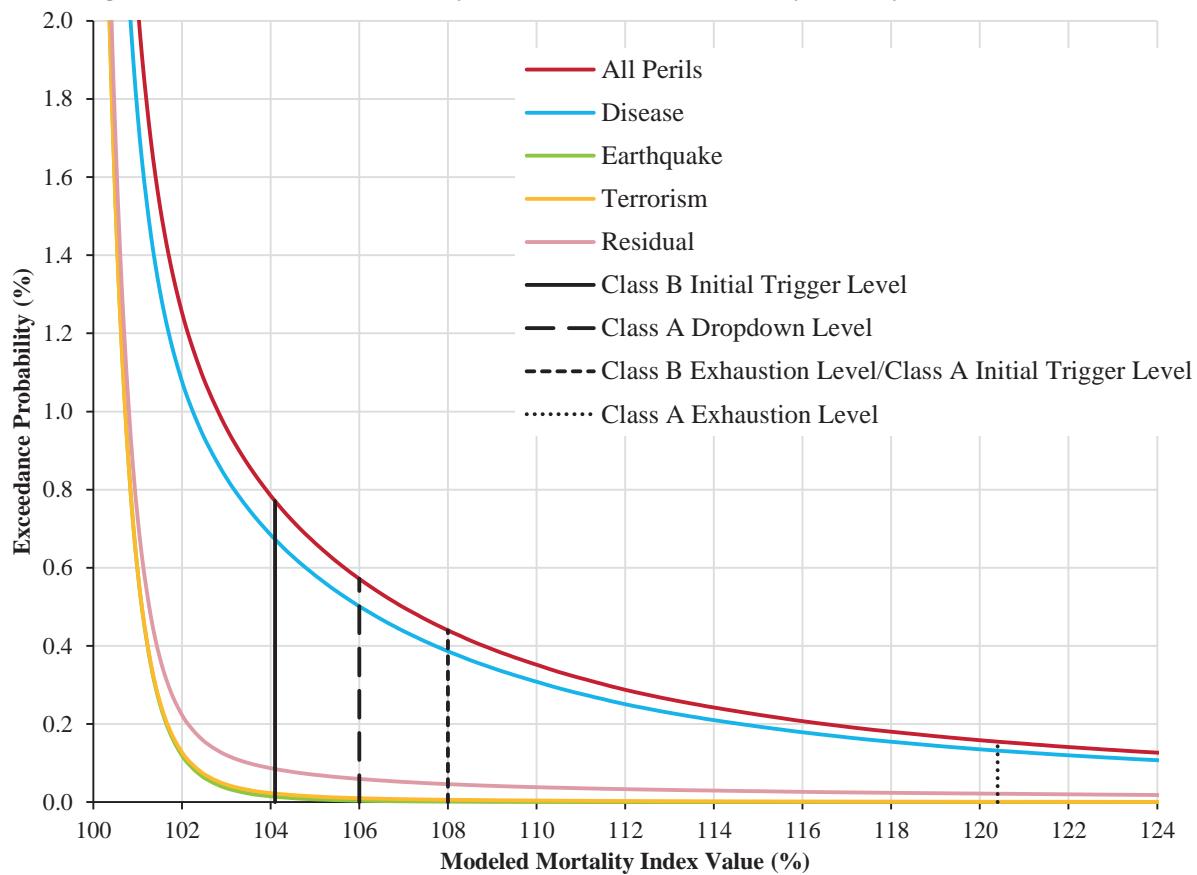


Table 21: Annualized Modeled Mortality Index Value Exceedance Probabilities by Peril - United States

Exceedance Probability	All Perils	Disease	Earthquake	Terrorism	Residual
0.05%	156.7%	146.3%	102.7%	102.9%	107.3%
0.10%	129.2%	125.4%	102.1%	102.2%	103.5%
0.50%	107.0%	106.0%	101.1%	101.1%	101.3%
1.00%	102.8%	102.2%	100.7%	100.7%	100.8%
2.00%	101.0%	100.8%	100.4%	100.4%	100.4%
5.00%	100.1%	100.0%	99.9%	99.9%	99.9%
10.00%	99.5%	99.5%	99.4%	99.4%	99.4%

Table 22: Annualized All Peril Modeled Mortality Index Value Exceedance Probabilities for Key Levels - United States

Level	Mortality Index Value	Exceedance Probability
Class B Initial Trigger Level	104.1%	0.77%
Class A Dropdown Level	106.0%	0.57%
Class B Exhaustion Level / Class A Initial Trigger Level	108.0%	0.44%
Class A Exhaustion Level	120.4%	0.15%

Table 23 and Table 24 display the contribution to expected loss for each peril and Country and the breakdowns are displayed as a percentage of the total expected loss for each Class of Notes.

Table 23: Contribution to Modeled Expected Loss by Peril and Country for the Class A Notes

	Disease	Terrorism	Earthquake	Residual	Total ³
France	27.5%	1.9%	0.0%	7.0%	36.4%
Japan	18.3%	0.0%	0.6%	14.9%	33.8%
United States	24.7%	0.4%	0.1%	4.7%	29.8%
Total	70.5%	2.3%	0.6%	26.6%	100.0%

Table 24: Contribution to Modeled Expected Loss by Peril and Country for the Class B Notes

	Disease	Terrorism	Earthquake	Residual	Total
France	28.8%	1.7%	0.0%	7.6%	38.1%
Japan	19.0%	0.0%	1.7%	14.1%	34.8%
United States	22.6%	0.5%	0.2%	3.7%	27.0%
Total	70.5%	2.3%	1.9%	25.3%	100.0%

For the peril of disease and for each Class of Notes, RMS performed an analysis to determine the breakdown of expected loss between influenza and emerging infectious disease events. Results are expressed in Table 25 and Table 26 as percentages of the modeled expected loss contributed by disease events for such Class.

Table 25: Contribution to Disease Modeled Expected Loss by Event Type and Country for the Class A Notes

	Influenza	Emerging Infectious Disease	Total
France	28.5%	10.6%	39.1%
Japan	17.3%	8.6%	26.0%
United States	24.0%	11.0%	35.0%
Total	69.8%	30.2%	100.0%

³ Totals may not sum due to rounding.

Table 26: Contribution to Disease Modeled Expected Loss by Event Type and Country for the Class B Notes

	Influenza	Emerging Infectious Disease	Total
France	32.7%	8.2%	40.9%
Japan	20.7%	6.3%	26.9%
United States	18.7%	13.4%	32.1%
Total	72.1%	27.9%	100.0%

For each Class of Notes, RMS performed an analysis to determine the breakdown of expected loss by Calendar Year. Results are expressed in Table 27 and Table 28 as percentages of the total expected loss for each Class of Notes. The implementation of the Class A Dropdown Level can be seen to lead to a higher contribution to modeled expected loss in 2019 for the Class A Notes, relative to the previous Calendar Years.

Table 27: Contribution to Modeled Expected Loss by Calendar Year and Country for the Class A Notes

	2015	2016	2017	2018	2019	Total
France	4.8%	7.8%	7.6%	7.3%	8.8%	36.4%
Japan	4.9%	7.1%	6.8%	6.6%	8.3%	33.8%
United States	4.0%	6.4%	6.3%	6.2%	7.0%	29.8%
Total	13.7%	21.2%	20.7%	20.2%	24.1%	100.0%

Table 28: Contribution to Modeled Expected Loss by Calendar Year and Country for the Class B Notes

	2015	2016	2017	2018	2019	Total
France	5.7%	8.9%	8.4%	7.8%	7.4%	38.1%
Japan	5.3%	8.9%	7.5%	6.8%	6.5%	34.8%
United States	4.2%	6.0%	5.7%	5.6%	5.4%	27.0%
Total	15.2%	23.9%	21.7%	20.1%	19.2%	100.0%

RMS performed an analysis to determine the probabilities of attachment, exhaustion and expected loss of principal by Country for each Class of Notes as displayed in Table 29 and Table 30. The risk metrics are presented on an annualized basis, which represents the cumulative probabilities across the entire Risk Period for each Class of Notes divided by five. All risk metrics for each Country are calculated based on the assumption that there is no loss contribution from any other Country during the Risk Period simulation.

Table 29: Annualized Risk Metrics by Country for the Class A Notes

	Attachment Probability	Expected Loss	Exhaustion Probability
France	0.67%	0.36%	0.20%
Japan	0.59%	0.34%	0.21%
United States	0.53%	0.31%	0.19%
Combined	1.06%	0.64%	0.44%

Table 30: Annualized Risk Metrics by Country for the Class B Notes

	Attachment Probability	Expected Loss	Exhaustion Probability
France	1.05%	0.80%	0.63%
Japan	1.07%	0.75%	0.55%
United States	0.85%	0.65%	0.50%
Combined	1.79%	1.33%	1.04%

ILLUSTRATIVE HISTORICAL EVENTS RESULTS

RMS gathered historical mortality data from a variety of sources to illustrate the impact of certain historical events on each Class of Notes, the results of which are displayed in Table 31 below.

All event excess mortality rates caused by multi-year events (e.g. pandemics and wars) are normalized to a two-year period and are divided by twice the preceding year's Baseline Mortality to yield an estimate of the event severity despite the varying duration of events. *This approach differs from the calculation of the Mortality Index Value:* should any similar event occur in the future, the Mortality Index Value shall be calculated according to the Mortality Index Value formula.

For single-year events (e.g. earthquakes, tsunamis, hurricanes and terrorist attacks), excess mortality rates are divided by the preceding year's Baseline Mortality to yield an estimate of the event severity comparable with the multi-year calculation.

Table 31: Excess Mortality Calculations for Historical Events
Estimated Magnitude to Reach Initial Trigger Level for each Class of Notes

Scenario	<i>Estimated Magnitude Multiple to Reach Initial Trigger Level</i>		<i>Estimated Aggregate Percentage</i>	
	<i>Class A Notes</i>	<i>Class B Notes</i>	<i>Class A Notes</i>	<i>Class B Notes</i>
1918 Influenza Pandemic	0.5	0.2	94%	100%
1957 Influenza Pandemic	2.5	1.2	0%	0%
1968 Influenza Pandemic	4.5	2.3	0%	0%
AIDS (1987)	5.6	2.9	0%	0%
World War I	0.13	0.06	100%	100%
World War II	0.6	0.3	60%	100%
Great San Francisco Earthquake (1906)	69.7	35.7	0%	0%
Galveston Hurricane (1900)	23.3	11.9	0%	0%
Hurricane Katrina (2005)	107.4	55.0	0%	0%
September 11th (2001)	73.5	37.7	0%	0%
Korean War	54.6	28.0	0%	0%
Vietnam War	20.0	10.3	0%	0%
Great Kanto Earthquake (1923)	1.9	1.0	0%	3%
Tohoku Earthquake and Tsunami (2011)	6.4	3.3	0%	0%
2003 European heat wave	14.0	7.1	0%	0%

Index values for the 1918, 1957 and 1968 influenza pandemics are estimated using the demographic distribution of deaths in the United States applied to reported deaths in the literature for France and Japan. Sources: (Johnson, 2002), (Viboud C.G., 2005), (Viboud C.T., 2006), (Reichert, 2001), (Ansart et al., 2009).

Index values for the AIDS pandemic were calculated using an estimated 847 deaths in France and 16,488 deaths in the U.S. in 1987. Prior to 1987 AIDS related deaths were not recorded accurately given the lack of information on the pandemic at the time. Ensuing annual increments in the number of AIDS related deaths during the peak pandemic period (1987 to 1995) are between 3,782 and 6,810 deaths in the U.S. and less than 700 deaths in France. 84% of fatalities are assumed to be male and the highest concentration of deaths occurs in the 25-44 age range. Sources: (AVERT, 2010), (CDC, 2009), (WHO, 2010).

Index values for World War I were calculated based on reported military fatalities for France and the U.S. averaged over a two-year period. Sources: (Winter, 1977), (Commonwealth War Graves Commission, 2008), (Congressional Research Service, 2008) (Huber, 1931).

World War II statistics are based on estimated military deaths assuming a demographic distribution representative of enlisted U.S. personnel. In addition in France, civilian deaths from bombardments, land fighting and Holocaust victims were included assuming a demographic distribution representative of the France general population. Total France and Japan deaths were calculated over the six year period 1939-1945 and averaged over a two-year period. Total U.S. deaths were calculated over the four year period 1941-1945 and averaged over a two-year period. Sources: (U.S. Navy, 2006), (Bureau of Naval Personnel, 1964), (Congressional Research Service, 2008), (Dower, 1986), (Commonwealth War Graves Commission, 2008), (France Ministry of Defense, 2015), (Frumkin, 1951).

The 1906 Great San Francisco Earthquake event values assume that the demographic distribution of deaths is proportionate to the underlying population at the time of the event. Fatalities are estimated to be 3,000. Source: (USGS, 2009).

The 1900 Galveston Hurricane total number of fatalities is estimated at 8,000 and are assumed to have followed the same demographic distribution as the underlying population at the time of the event. Source: (Clarence Ousley, 1900).

Hurricane Katrina values are based on an estimated 1,836 fatalities of which 53% are men. The age distribution of fatalities is extrapolated from 693 published deaths in metropolitan New Orleans, Louisiana with 80% of deaths in the 50+ age range. Sources: (Louisiana Department of Health and Hospitals, 2006), (Times-Picayune, 2006).

The September 11, 2001 attacks numbers are based on an estimated 2,669 U.S. casualties (excludes 329 foreign nationals). The age distribution of all fatalities was estimated using the listed ages of a subset of 2,127 casualties. Male-to-female casualty ratio is approximately 3 to 1. Sources: (CDC, 2002), (Mumford, 2010), (CNN, 2001).

Korean War statistics include military deaths only, weighted within the 15-64 male age range based on published fatalities in the U.S. by age cohort and U.S. population data. Source: (The National Archives, 2008).

Vietnam War statistics include military deaths only, weighted within the 15-64 male age range based on published fatalities in the U.S. by age cohort and U.S. population data. Total deaths were averaged over the two worst years of 1968 and 1969. Source: (The National Archives, 2007).

The 1923 Great Kanto Earthquake values assume that the demographic distribution of deaths in Japan is proportionate to the underlying population at the time of the event. Differences between the historical and modeled historical results for this event are mainly driven by changes in construction quality in building inventory. Fatalities are estimated to be 142,800. Source: (USGS, 2010).

The 2011 Tohoku Earthquake and Tsunami values are based on an estimated 18,475 deaths. The age distribution of fatalities is extrapolated from a CATDAT situation report, with over 50% of the deaths in the 65+ age range. Sources: (National Police Agency of Japan, 2015), (Earthquake-Report.com, 2012).

The 2003 European heat wave values are based on an estimated 14,800 deaths in France (source). The age distribution of fatalities is extrapolated from a subset of 768 excess deaths in Paris (source) with 80% of deaths in the 75+ age range. Sources: (Hemon D, Jougl E. 2004), (Florence Canoui-Poitaine et al, April 2007).

ILLUSTRATIVE HISTORICAL MODELED EVENTS

RMS performed a series of historical disease and earthquake analyses to illustrate the impact of certain modeled historical events on each Class of Notes, should these events reoccur during the first Calendar Year of the Risk Period. Historical events are represented in the RMS Models by a collection of parameters selected by RMS to be representative of the events, and they are not intended to provide a precise re-enactment of the historical experience. Disease events were selected on the basis of their transmissibility and lethality characteristics (ignoring any human intervention), and earthquake events were chosen based on fault structure and magnitude. Deaths due to tsunami are not taken into account through the Earthquake Models, which cover only deaths due to ground shaking and fire following. The Terrorism Models do not contain any historical events.

For each historical event, RMS calculated the ratio of the number of excess fatalities caused by the event to the mean 2014 Baseline Mortality rates derived from the RMS Longevity Model (Modeled Excess Mortality Index Value). The Modeled Excess Mortality Index Values and corresponding modeled Aggregate Percentage for each event and each Class of Notes displayed in Table 32 below do not consider changes in Baseline Mortality.

Table 32: Modeled Excess Mortality Index Values for Selected Historical Events

Peril	Historical Event	Modeled Excess Mortality Index Value ⁴			Aggregate Percentage	
		France	Japan	United States	Class A Notes	Class B Notes
Disease	1793 Yellow Fever	32.4%	22.9%	11.0%	97.0%	100.0%
	1918-1919 Spanish Influenza (Bacterial) / 1918-1919 Spanish Influenza (Viral) ⁵	22.5% / 56.3%	14.2% / 35.6%	8.1% / 20.2%	18.3% / 100.0%	100.0% / 100.0%
	1957-1958 Asian Influenza	4.5%	3.6%	2.5%	0.0%	0.0%
	1968-1969 Hong Kong Influenza	1.3%	1.0%	0.7%	0.0%	0.0%
	2009 H1N1 Influenza	1.1%	0.6%	0.4%	0.0%	0.0%
Earthquake	1811-1812 New Madrid Sequence	-	-	0.3%	0.0%	0.0%
	1886 Charleston Earthquake	-	-	0.2%	0.0%	0.0%
	1906 San Francisco Earthquake	-	-	0.1%	0.0%	0.0%
	1994 Northridge Earthquake	-	-	0.0%	0.0%	0.0%
	1891 Nobi Earthquake	-	1.6%	-	0.0%	0.0%
	1923 Great Kanto Earthquake	-	3.7%	-	0.0%	0.0%
	2011 Tohoku Earthquake	-	0.1%	-	0.0%	0.0%

⁴ The Modeled Excess Mortality Index Value represents the increase in mortality due to the event without taking into account fluctuations in Baseline Mortality

⁵ There is an ongoing discussion in the scientific community on the primary mechanism for deaths during the 1918-1919 pandemic. Research has challenged the view that fatalities were caused by viral pneumonia/acute respiratory distress syndrome due to a hypervirulent influenza strain and suggested that they might have been caused by secondary bacterial infections. RMS has therefore modeled this event using two distinct set of assumptions and calculated the corresponding index values in each case.

ILLUSTRATIVE STOCHASTIC MODELED EVENTS

Table 33 below contains Modeled Excess Mortality Index Values for certain illustrative stochastic events. For the peril of disease ‘Flu’ denotes an influenza event and ‘EID’ denotes an emerging infectious disease event. Events are assumed to have occurred during the first Calendar Year of the Risk Period, with calculations based on the mean 2014 Baseline Mortality rates derived from the RMS Longevity Model. The minimum return across all affected Countries is also displayed, based on the Modeled Mortality Index Value annual exceedance probability curves.

Table 33: Modeled Excess Mortality Index Values for Selected Stochastic Events

Peril	Stochastic Event Description	Minimum Return Period	Modeled Excess Mortality Index Value			Aggregate Percentage	
			France	Japan	United States	Class A Notes	Class B Notes
Disease	EID: Highly transmissible viral hemorrhagic fever with no vaccine or treatments	89,503	6088.6%	4326.4%	2058.7%	100.0%	100.0%
	Flu: Highly transmissible H5N1 like virus with no vaccine or treatments	7,874	844.1%	705.7%	430.7%	100.0%	100.0%
	EID: Virulent measles-like virus with moderately effective vaccine	1,056	110.5%	73.4%	42.3%	100.0%	100.0%
	Flu: Higher transmissibility and lower virulence than 1918 with 50% vaccine coverage	244	27.9%	17.5%	10.1%	55.1%	100.0%
	EID: Transmissible Tuberculosis with an effective vaccine	125	13.6%	8.7%	5.0%	0.0%	99.6%
	EID: Illness similar to mumps with an effective vaccine	45	4.7%	3.1%	1.9%	0.0%	0.0%
	Flu: Extremely transmissible Tamiflu resistant flu with lower than seasonal virulence and excellent vaccine coverage	23	1.8%	1.4%	1.0%	0.0%	0.0%
Earthquake	EID: SARS-like virus	14	0.8%	0.5%	0.3%	0.0%	0.0%
	Northeast Background Source (NY) Magnitude 7.7 Event	250	-	-	8.8%	6.3%	100.0%
	Southeast Florida Background Magnitude 6.0 Event	80	-	-	1.9%	0.0%	0.0%
	New Madrid Full Rupture (West Fault) Magnitude 8.0 Event	49	-	-	0.9%	0.0%	0.0%
	Pacific Northwest Full Rupture Magnitude 9.2 Event	25	-	-	0.3%	0.0%	0.0%
	California 1868 Hayward Magnitude 7.0 Event	20	-	-	0.0%	0.0%	0.0%
	Tokai - Tonankai - Nankai (Subduction Large) Magnitude 8.7 Event	41	-	2.8%	-	0.0%	0.0%
	Uemachi Fault Zone Magnitude 7.2 Event	34	-	2.2%	-	0.0%	0.0%
	Kanto Main Zone (Shallow Background) Magnitude 7.2 Event	26	-	1.6%	-	0.0%	0.0%
	Kinki Triangle Zone (Shallow Background) Magnitude 7.4 Event	24	-	1.6%	-	0.0%	0.0%
Terrorism	Chubu Mountain Zone (Shallow Background) Magnitude 7.6 Event	17	-	0.9%	-	0.0%	0.0%
	Paris, Anthrax (75kg)	2,281	187.7%	-	-	100.0%	100.0%
	Paris, Nuclear Bomb (5 Kiloton)	614	51.8%	-	-	97.5%	100.0%
	Paris, Tour Areva (10 Ton Bomb)	87	5.9%	-	-	0.0%	0.0%
	Paris, Sarin Gas (1,000kg, outdoor release)	57	3.3%	-	-	0.0%	0.0%
	Paris, Tour Gan, Aircraft Impact	18	0.7%	-	-	0.0%	0.0%
	Paris, Tour Total, Conflagration (9,000-gallon gasoline tanker)	16	0.5%	-	-	0.0%	0.0%
	New York City, Nuclear Bomb (5 Kiloton)	447	-	-	14.9%	55.9%	100.0%
	New York City, Anthrax (75kg)	370	-	-	12.7%	37.8%	100.0%
	Seattle, Nuclear Bomb (5 Kiloton)	165	-	-	5.6%	0.0%	38.4%
	New York Stock Exchange (10 Ton Bomb)	31	-	-	0.4%	0.0%	0.0%
	Chicago, Willis Tower, Aircraft Impact	20	-	-	0.1%	0.0%	0.0%
	Los Angeles, Hazmat Sabotage (90 Tons of Chlorine Gas from Hijacked Railcar)	20	-	-	0.0%	0.0%	0.0%

ILLUSTRATIVE TSUNAMI SCENARIOS

Table 34 below contains Modeled Excess Mortality Index Values for certain illustrative tsunami scenarios. The RMS Global Tsunami Scenario Model is not used in the stochastic simulation methodology, but these scenarios provides additional context on the impact of potential tsunami

scenarios. Where scenarios are based on historical scenarios, they are not intended to provide a precise re-enactment of the historical experience, but rather use a collection of parameters selected by RMS to be representative of the scenarios. Scenarios are assumed to have occurred during the first Calendar Year of the Risk Period, with calculations based on the 2014 Baseline Mortality rates derived from the RMS Longevity Model.

Table 34: Modeled Excess Mortality Index Values for Selected Tsunami Scenarios

Peril	Tsunami Scenario	Modeled Excess Mortality Index Value			Aggregate Percentage	
		France	Japan	United States	Class A Notes	Class B Notes
Tsunami	Magnitude 9.0 1700 Cascadia subduction zone tsunami	-	-	0.30%	0.0%	0.0%
	1946 Alaska tsunami	-	-	0.00%	0.0%	0.0%
	2011 Tohoku earthquake and tsunami	-	3.00%	-	0.0%	0.0%
	Magnitude 9.0 earthquake originating from the Nankai Trough	-	8.70%	-	0.0%	7.0%
	Magnitude 9.0 earthquake originating from the Ryukyu Trench	-	3.10%	-	0.0%	0.0%

EXAMPLE MODELED RISK PERIOD SIMULATIONS

Table 35, Table 36 and Table 37 below contain Modeled Mortality Index Values and Annual Country Percentages for certain example modelled Risk Period simulations for each Country. In each modeled Calendar Year, the peril components contributing to the Modeled Mortality Index are identified, and the Annual Country Percentage (if any) is shown.

Table 35: Mortality Index Value Calculations for Example Modeled Risk Period Simulations - France

Index Reference Year		Calendar Year 1		Calendar Year 2		Calendar Year 3		Calendar Year 4		Calendar Year 5	
Example 1 - Class A											
Mortality Index Contributions		Baseline 319	Baseline 321	Baseline 313	Baseline Influenza 63	Baseline 306	Baseline 305	Baseline 305	Baseline 302		
Mortality Index Reference Index Value		319	321	376	339	305	305	305	302		
TRA Trigger Level	Mortality Index Value Exhaustion Level		0.0% 116.0%	100.6% 152.7%	0.6% 115.4%	117.9% 152.1%	15.4% 100.6%	105.6% 137.3%	0.6% 115.4%	93.2% 152.1%	0.0% 110.0%
Annual Country Percentage					6.8%		13.6%				
Example 2 - Class A											
Mortality Index Contributions		Baseline 324	Baseline 316	Baseline 313	Baseline EID 127	Baseline 305	Baseline 308	Baseline 308	Baseline 307		
Mortality Index Reference Index Value		324	316	313	432	305	356	356	307		
TRA Trigger Level	Mortality Index Value Exhaustion Level		0.0% 116.0%	97.5% 152.7%	0.0% 116.0%	98.5% 152.7%	0.0% 116.0%	138.0% 152.7%	16.0% 100.0%	113.7% 136.7%	0.0% 110.0%
Annual Country Percentage						60.0%		37.4%			
Example 3 - Class B											
Mortality Index Contributions		Baseline 324	Baseline 314	Baseline Terrorism 83	Baseline 308	Baseline 304	Baseline 295	Baseline 295	Baseline 289		
Mortality Index Reference Index Value		324	314	391	304	295	295	295	289		
TRA Trigger Level	Mortality Index Value Exhaustion Level		0.0% 108.1%	96.9% 116.0%	0.0% 108.1%	123.0% 116.0%	8.1% 100.0%	95.6% 107.9%	0.0% 108.1%	92.8% 116.0%	0.0% 108.1%
Annual Country Percentage				100.0%							

Table 36: Mortality Index Value Calculations for Example Modeled Risk Period Simulations – Japan

		Index Reference Year		Calendar Year 1		Calendar Year 2		Calendar Year 3		Calendar Year 4		Calendar Year 5	
Example 1 - Class A													
Mortality Index Contributions		Baseline	447	Baseline	441	Baseline	428	Baseline	417	Baseline	410	Baseline	402
EID						EID	120	EID	30				
Earthquake						Earthquake	10						
Mortality Index			447		441		558		447		410		402
Reference Index Value					447		441		449		447		439
TRA	Mortality Index Value			0.0%	98.7%	0.0%	126.5%	16.0%	101.4%	0.0%	91.7%	0.0%	91.7%
Trigger Level	Exhaustion Level			116.0%	140.8%	116.0%	140.8%	100.0%	124.8%	116.0%	140.8%	110.0%	134.8%
Annual Country Percentage							42.5%		5.5%				
Example 2 - Class A													
Mortality Index Contributions		Baseline	457	Baseline	440	Baseline	427	Baseline	414	Baseline	419	Baseline	394
Earthquake				Earthquake	1			Earthquake	5			Influenza	129
Mortality Index			457		441		427		419		419		523
Reference Index Value					457		448		440		431		423
TRA	Mortality Index Value			0.0%	96.5%	0.0%	95.2%	0.0%	95.3%	0.0%	97.1%	0.0%	123.6%
Trigger Level	Exhaustion Level			116.0%	140.8%	116.0%	140.8%	116.0%	140.8%	116.0%	140.8%	110.0%	134.8%
Annual Country Percentage													54.7%
Example 3 - Class B													
Mortality Index Contributions		Baseline	466	Baseline	467	Baseline	462	Baseline	452	Baseline	450	Baseline	444
Earthquake				Earthquake	1	Residual	114	Earthquake	2				
Mortality Index			466		467		463		566		452		444
Reference Index Value					466		467		463		472		463
TRA	Mortality Index Value			0.0%	100.2%	0.2%	99.4%	0.0%	122.2%	8.2%	97.6%	0.0%	95.9%
Trigger Level	Exhaustion Level			108.2%	116.0%	108.0%	115.8%	108.2%	116.0%	100.0%	107.8%	108.2%	116.0%
Annual Country Percentage									100.0%				

Table 37: Mortality Index Value Calculations for Example Modeled Risk Period Simulations – United States

Index Reference Year		Calendar Year 1		Calendar Year 2		Calendar Year 3		Calendar Year 4		Calendar Year 5	
Example 1 - Class A											
Mortality Index Contributions	Baseline	936	Baseline EID	922 95	Baseline EID	933 254	Baseline	876	Baseline	836	Baseline
				Residual		10					822
Mortality Index		936		1,017		1,197		876		836	
Reference Index Value				936		954		972		953	
TRA	Mortality Index Value		0.0%	108.7%	8.0%	127.9%	0.0%	91.8%	0.0%	87.7%	0.0%
Trigger Level	Exhaustion Level		108.0%	120.4%	100.0%	112.4%	108.0%	120.4%	108.0%	120.4%	106.0%
Annual Country Percentage				5.3%		100.0%					
Example 2 - Class A											
Mortality Index Contributions	Baseline	1,011	Baseline	1,002	Baseline	1,004	Baseline	982	Baseline	966	Baseline
											Influenza
											949
Mortality Index		1,011		1,002		1,004		982		966	
Reference Index Value				1,011		1,002		1,004		985	
TRA	Mortality Index Value		0.0%	99.1%	0.0%	100.2%	0.2%	98.0%	0.0%	98.1%	0.0%
Trigger Level	Exhaustion Level		108.0%	120.4%	108.0%	120.4%	107.8%	120.2%	108.0%	120.4%	106.0%
Annual Country Percentage											21.5%
Example 3 - Class B											
Mortality Index Contributions	Baseline	975	Baseline Influenza	969 26	Baseline Influenza	937 79	Baseline	920	Baseline	911	Baseline
					Earthquake	3				Terrorism	1
											901
Mortality Index		975		995		1,019		920		912	
Reference Index Value				975		994		1,012		993	
TRA	Mortality Index Value		0.0%	102.1%	2.1%	104.5%	2.0%	92.6%	0.0%	91.8%	0.0%
Trigger Level	Exhaustion Level		104.1%	108.0%	102.0%	105.9%	102.1%	106.0%	104.1%	108.0%	104.1%
Annual Country Percentage						63.2%					

BASELINE IMPROVEMENT SENSITIVITY ANALYSIS

In order to test the sensitivity of results to the average annual mortality improvement forecasted by the RMS Longevity Model, RMS analyzed each Class of Notes using the RMS Longevity Model with the annual mortality improvement trend parameters for each Country reduced by a set of percentages. Reducing the annual mortality improvement only has an impact on the mortality trend and does not affect other modeled components of baseline mortality (please refer to B-5 for details). As such a 50% reduction in the annual mortality improvement will not necessarily lead to a 50% reduction in the mean mortality improvement. Table 38 below displays the Mean Mortality Improvement by Country for each of the sensitivity scenarios.

Table 38: Mean Mortality Improvement Levels

Mean Mortality Improvement					
Model Default	10% Reduction	15% Reduction	25% Reduction	50% Reduction	
France	1.80%	1.64%	1.56%	1.40%	0.97%
Japan	1.81%	1.67%	1.60%	1.45%	1.07%
United States	1.59%	1.45%	1.37%	1.23%	0.84%

The annualized risk metrics for each sensitivity analysis are displayed in Table 39 and Table 40 below obtained via the simulation of one million Risk Periods. These metrics are calculated as the cumulative probabilities across the entire Risk Period, for each Class of Notes, divided by five.

It can be seen that for the attachment probabilities for the Class B Notes do not strictly increase as the annual mortality improvement trend parameters are reduced as might be anticipated. This is because the reduction in the trend parameters causes a small additional reduction in the modeled baseline volatility, and this has a directionally different effect on the attachment probabilities. This is only observed for the higher risk Class B Notes, where the baseline makes a more significant contribution to the attachment probabilities.

Table 39: Baseline Sensitivity Analyses – Class A Notes

		<i>Mortality Improvement Reduction</i>				
		<i>Default</i>	<i>10%</i>	<i>15%</i>	<i>25%</i>	<i>50%</i>
Attachment Probability		1.06%	1.07%	1.07%	1.08%	1.12%
Expected Loss		0.64%	0.65%	0.65%	0.66%	0.68%
Exhaustion Probability		0.44%	0.44%	0.45%	0.45%	0.46%

Table 40: Baseline Sensitivity Analyses – Class B Notes

		<i>Mortality Improvement Reduction</i>				
		<i>Default</i>	<i>10%</i>	<i>15%</i>	<i>25%</i>	<i>50%</i>
Attachment Probability		1.79%	1.77%	1.76%	1.74%	1.75%
Expected Loss		1.33%	1.33%	1.33%	1.33%	1.37%
Exhaustion Probability		1.04%	1.05%	1.06%	1.07%	1.11%

SUPPLEMENTAL DATA FILE

The following materials are included in a supplemental data file (“**Data File**”):

- A table containing the Index Weights for each Country.
- A table containing the annualized EP curve for each Country.
- A calculation tool containing example Annual Country Percentage calculations for each Country and Class of Notes.

BIBLIOGRAPHY

- Ansart et al. (April 2009). *Mortality burden of the 1918–1919 influenza pandemic in Europe*. Influenza and Other Respiratory Viruses 3(3), 99–106.
- Bureau of Naval Personnel. (1964). *Annual Report, Navy and Marine Corps Military Personnel Statistics*. Washington, DC: Bureau of Naval Personnel.
- CDC. (2009, February 26). *Basic Statistics, Statistics and Surveillance, Topics, CDC HIV/AIDS*. Retrieved September 16, 2009, from CDC (Centers for Disease Control and Prevention): <http://www.cdc.gov/hiv/topics/surveillance/basic.htm>
- CDC. (2015). Population and mortality data 1968-2012. Retrieved from Centers for Disease Control and Prevention WONDER: <http://wonder.cdc.gov/cmf-icd10.html>
- CDC. (2002, September 11). *Deaths in World Trade Center Terrorist Attacks --- New York City, 2001*. Retrieved from MMWR: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm51SPa6.htm>
- Clarence Ousley, e. (1900). *Galveston in 1900*. Atlanta, Georgia: Chase.
- CNN. (2001). *CNN.com - September 11 Memorial*. Retrieved September 16, 2009, from CNN.com: <http://www.cnn.com/SPECIALS/2001/memorial/lists/by-name/index.html>
- Commonwealth War Graves Commission. (2008). *Commonwealth War Graves Commission 2007-2008*. CWGC.
- Congressional Research Service. (2008). *American War and Military Operations Casualties: Lists and Statistics*. Washington, D.C.: Congressional Research Service.
- Dower, J. W. (1986). *War Without Mercy*.
- Earthquake-Report.com. (March 10, 2012). *One Year Summary of Losses in the Japanese Earthquake/Tsunami of March 11th 2011*. Retrieved March 2015, from <http://earthquake-report.com/2012/03/10/japan-366-days-after-the-quake-19000-lives-lost-1-2-million-buildings-damaged-574-billion>
- Eurostat. (2015). *Population on 1 January by age and sex 1960-2014*. Retrieved from: <http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-data/>
- Florence Canouï-Poitrine, Emmanuelle Cadot, Alfred Spira. (April 2007). *Excess deaths during the August 2003 heat wave in Paris, France*. Revue d'Epidémiologie et de Santé Publique, Elsevier Masson SAS, 2005, 54 (2), pp.127-35. <10.1019/200601173>. <inserm-00107355>
- France Ministry of Defense (2015). *Mémoire des hommes*. Retrieved March 2015 from <http://www.memoiredeshommes.sga.defense.gouv.fr/en/article.php?laref=101>
- Frumkin, Gregory (1951). *Population Changes in Europe Since 1939*. Geneva pp. 60–65
- Hemon D, Jougl E. (2004) *Surmortalité liée à la canicule d'août 2003*. Retrieved March 2015 from the French National Institute of Health and Medical Research at <http://www.inserm.fr/>
- Huber, Michel (1931). *La Population de la France pendant la guerre*. Paris.
- Johnson, N. P. (2002). *Updating the Accounts: Global Mortality of the 1918-1920 "Spanish" Influenza Pandemic*. Bull. Hist. Med. , 76:105-115.
- Louisiana Department of Health and Hospitals. (2006, August 2). *Hurricane Katrina - Reports of Missing and Deceased*. Retrieved September 1, 2010, from Louisiana Department of Health and Hospitals: <http://www.dhh.louisiana.gov/offices/page.asp?ID=192&Detail=5248>
- Mumford. (2010). *Victims of the World Trade Center Attack, listed by age*. Retrieved August 2010, from <http://www.albany.edu/mumford/wtc/age.htm>
- National Police Agency of Japan. (March 11, 2015). *Damage Situation and Police Countermeasures associated with 2011 Tohoku district – off the Pacific Ocean Earthquake*. Retrieved March 2015, from http://www.npa.go.jp/archive/keibi/biki/higajijokyo_e.pdf

- Reichert, T. E. (2001). *The Japanese experience with vaccinating schoolchildren against influenza*. NEJM , 344(12): 889-896.
- Statistics Bureau. (2015). *Result of the Population Estimates 1920-2013*. Retrieved from Official Statistics of Japan: <http://www.stat.go.jp/english/data/jinsui/2.htm>
- The National Archives. (2008, April 29). *Access to Archival Databases, Korean War Extract Data File*. Retrieved August 2010, from Archives.gov: <http://aad.archives.gov/aad/fielded-search.jsp?dt=2352&ccat=WR27&tf=F&bc=,sl>
- The National Archives. (2007). *Statistical information about casualties of the Vietnam War*. Retrieved August 2010, from Archives.gov: <http://www.archives.gov/research/vietnam-war/casualty-statistics.html>
- Times-Picayune. (2006, 2 16). *An Alphabetical Index of Deaths in Metro New-Orleans LA*. Retrieved September 1, 2010, from Jefferson Genealogical Society: <http://www.jgs25.com/obits/D-KATRINA-JGS.htm>
- US Navy. (2006, May 18). *US Navy Personnel in World War II: Service and Casualty Statistics*. Retrieved September 16, 2009, from US Navy: http://www.history.navy.mil/library/online/ww2_statistics.htm
- USGS. (2009, June 25). *The Great San Francisco Earthquake*. Retrieved September 16, 2009, from USGS: <http://earthquake.usgs.gov/regional/nca/1906/18april/index.php>
- USGS. (2010). *Historic Earthquakes: Kanto (Kwanto), Japan, 1923 September 01*. Retrieved September 1, 2010, from http://earthquake.usgs.gov/earthquakes/world/events/1923_09_01.php
- Viboud, C. G. (2005). *Multinational Impact of the 1968 Hong Kong Influenza Pandemic: Evidence for a Smoldering Pandemic*. JID, 233-248.
- Viboud, C. T. (2006). *1957 Influenza Epidemic, England and Wales, Canada, and the United States*. EID , 12(4) 661-668.
- WHO. (2010). *Deaths Among Aids Cases*. Retrieved August 2010, from CISID, World Health Organization: <http://data.euro.who.int/CISID/>
- Winter, J. (1977, November). *Britain's 'Lost Generation' of the First World War*. Population Studies, Vol.31, No.3, pp. 449-466.

APPENDIX D
REQUEST FOR INFORMATION FORM

Benu Capital Limited
6th Floor, Pinnacle 2, Eastpoint Business Park
Dublin 3, Ireland, Ireland
Telephone: +353(1)680-6000
Facsimile: + +353(1)680-6050
Email: corporate.services@db.com
Attn: The Directors

[Date]

Pursuant to Benu Capital Limited's (the "Issuer") Offering Circular, dated April 21, 2015 relating to the Class A Principal At-Risk Variable Rate Notes due January 8, 2020 ("Class A Notes") and the Class B Principal At-Risk Variable Rate Notes due January 8, 2020 (the "Class B Notes" and, collectively with the Class A Notes, the "Notes", and each of the Class A Notes and Class B Notes, a "Class of Notes" or "Class"), requests for access to Available Information and Rule 144A Information by a Noteholder or a prospective purchaser (which is also a permitted transferee) may be made in writing by submitting this Request for Information Form to the Issuer. Capitalized terms used and not otherwise defined herein shall have the respective meanings set forth in the Offering Circular.

The undersigned hereby requests the Issuer to provide a password and instructions for accessing the IntraLinks®, Inc. website which is maintained in connection with the Notes (or any other website which may be maintained for such purposes).

In order to receive such information, please provide:

Name of Noteholder (entity): _____

Name of Contact Person: _____

E-mail Address: _____

Mailing Address: _____

Phone Number: _____

The undersigned hereby certifies that it: (i) is a Noteholder of any Class of Notes or a prospective purchaser of such Class; (ii) is a Qualified Institutional Buyer that, with respect to a U.S. Person, is a Qualified Purchaser; (iii) is a Qualified Eligible Person, (iv) a resident of and purchasing such Notes in, and will hold such Notes in, a Permitted U.S. Jurisdiction or a Permitted Non-U.S. Jurisdiction; and (iv) hereby agrees to provide any such forms, certifications or other information that is requested by the Issuer (a) to permit the Issuer to make payments without, or at a reduced rate of, withholding or deduction for or on account of any tax imposed by any jurisdiction or (b) to enable the Issuer to qualify for an exemption from, or a reduced rate of, withholding or deduction for or on account of any tax imposed by any jurisdiction with respect to any payments received by the Issuer.

Any signatory hereof hereby agrees on behalf of the Noteholder or the relevant prospective purchaser of such Notes (i) not to disclose any information included in such secured website to third parties other than as required by applicable law, including federal and state securities laws, or after the Issuance Date in connection with the potential resale of the Notes to a prospective purchaser that meets the investor criteria set forth in the Offering Circular, nor use such information for any purpose other than an analysis of an investment in the Notes and (ii) not to disclose the password to third parties.

[NOTEHOLDER]

By: _____
Name: _____
Title: _____

APPENDIX E

RMS DATA FILE

Additional information prepared by RMS has been provided to investors as an electronic file (“**RMS Data File**”) but does not form part of this Offering Circular. The information in the RMS Data File must be considered together with the “*RMS Expert Risk Analysis Methodology*” set forth in Appendix B and the “*RMS Expert Risk Analysis Results*” set forth in Appendix C. Accordingly, you should review the information in the RMS Data File together with this Offering Circular. All of the information contained in the RMS Data File is subject to the same limitations and qualifications, including the disclaimers and Risk Factors, as the information set forth in this Offering Circular. You are strongly urged to read this Offering Circular in its entirety before reading the RMS Data File. To the extent there is any discrepancy between the information in the RMS Data File, on one hand, and this Offering Circular, on the other hand, the information in this Offering Circular will prevail. Accordingly, in no event should information in the RMS Data File be relied on in making an investment decision.

The RMS Data File contains three Microsoft Excel sheets which set forth the (i) Index Weights by age/gender cohort; (ii) the exceedance probability (EP) data; and (iii) a calculation tool (collectively, the “**RMS Data File Information**”).

Microsoft Excel is a registered trademark of the Microsoft Corporation.

Investors are advised that the RMS Data File Information is provided for illustrative purposes only and you should make your own determinations and calculations before making any investment decision. In particular, you should not rely on the RMS Data File Information as an indication of the likelihood of a Principal Reduction following the occurrence of one or more Mortality Events or for any reason in connection with any decision to purchase or sell any security, including without limitation the Notes.

You should note the following in particular: only the procedures implemented by the Calculation Agent to calculate, among other things, any Annual Country Percentage as described in this Offering Circular and pursuant to the Calculation Agent Agreement will be binding. The information contained in the RMS Data File includes RMS’s proprietary information and may not be shared with, or used by, any third party other than the intended recipient. Any reproduction or distribution of RMS’s proprietary data, in whole or in part, and any disclosure of its contents or use of any information therein for any purpose other than considering an investment in the Notes is prohibited.

WITHOUT PREJUDICE TO THE ISSUER’S RESPONSIBILITY STATEMENT WITH RESPECT TO THIS OFFERING CIRCULAR, THE RMS DATA FILE INFORMATION IS PROVIDED “AS IS” AND THE ISSUER, RMS, THE COUNTERPARTY, THE INITIAL PURCHASERS AND THEIR RESPECTIVE AFFILIATES DISCLAIM ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, WITH RESPECT TO THE RMS DATA FILE INFORMATION, INCLUDING BUT NOT LIMITED TO, WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NONE OF THE ISSUER, RMS, THE COUNTERPARTY, THE INITIAL PURCHASERS OR THEIR RESPECTIVE AFFILIATES SHALL BE LIABLE WHATSOEVER FOR ANY BUSINESS DECISION BASED ON THE RMS DATA FILE INFORMATION. IN NO EVENT SHALL THE ISSUER, RMS, THE COUNTERPARTY, THE INITIAL PURCHASERS OR THEIR RESPECTIVE AFFILIATES BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING FROM THE USE OF THE RMS DATA FILE INFORMATION.

ISSUER

Benu Capital Limited
6th Floor, Pinnacle 2, Eastpoint Business Park,
Dublin 3 Ireland

COUNTERPARTY

AXA Global Life
40, rue du Colisée
75008 Paris
France

INDENTURE TRUSTEE

The Bank of New York Mellon,
acting through its London branch
One Canada Square
London E14 5AL
United Kingdom

CALCULATION AGENT

Risk Management Solutions, Inc.
7575 Gateway Boulevard
Newark, California 94560
United States of America

MANAGER

Deutsche International Corporate Services (Ireland)
Limited
6th Floor, Pinnacle 2, Eastpoint Business Park,
Dublin 3 Ireland

NOTE REGISTRAR

The Bank of New York Mellon (Luxembourg) S.A.
Vertigo Building – Polaris
2-4 rue Eugène Ruppert
L-2453 Luxembourg

PAYING AGENT

The Bank of New York Mellon,
acting through its London branch
One Canada Square
London E14 5AL
United Kingdom

IRISH LISTING AGENT

Walkers Listing & Support Services Limited
17/19 Sir John Rogerson's Quay
Dublin 2
Ireland

AUDITOR

Mazars
Harcourt Centre, Block 3, Harcourt Road
Dublin 2
Ireland

LEGAL ADVISORS

To the Issuer

As to New York and English Law:
Willkie Farr & Gallagher LLP
787 Seventh Avenue
New York, NY 10019
United States of America

To the Issuer

As to Irish Law:
Walkers Ireland
17/19 Sir John Rogerson's Quay
Dublin 2
Ireland

To the Initial Purchasers

As to New York and English Law:
Cadwalader, Wickersham & Taft LLP
Dashwood House
69 Old Broad Street
London EC2M 1QS
United Kingdom

Benu Capital Limited

€135,000,000 Class A Principal At-Risk Variable Rate Notes due January 8, 2020
€150,000,000 Class B Principal At-Risk Variable Rate Notes due January 8, 2020

OFFERING CIRCULAR

APRIL 24, 2015

**Lead Structuring Agent and
Joint Bookrunner**

Swiss Re Capital Markets

**Co-Structuring Agent
and Joint Bookrunner**

Natixis

Joint Bookrunners

Aon Benfield Securities, Inc.

BNP Paribas