

# MOODY'S INVESTORS SERVICE

## SPECIAL COMMENT

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# Default and Recovery Rates for Project Finance Bank Loans, 1983-2013

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This Special Comment (the Study) is an update to the previous study published by Moody's Investors Service in March 2014 examining the default and recovery performance of unrated project finance bank loans. The Study is based on an updated and expanded aggregate data set (the Study Data Set) from a consortium of leading project finance lenders and investors (the Data Consortium). The Study Data Set includes 5,308 projects which account for some 60.6% of all project finance transactions originated globally during a 31 year period from 1 January 1983 to 31 December 2013. We find that:

- » The 10-year cumulative default rate for project finance bank loans is consistent with 10-year cumulative default rates for corporate issuers of low investment-grade credit quality. However, marginal default rates, the likelihood that a performing obligor at the start of a year will default in that year, are initially consistent with marginal default rates exhibited by high speculative-grade credits, but trend towards marginal default rates consistent with single-A category ratings by year 10 from financial close.
- » The 10-year cumulative default rate for the Study Data Set as a whole is lower than that for our previous study of March 2014, and continues to show a downward trend compared with 10-year cumulative default rates for our earlier studies.
- » Ultimate recovery rates for project finance bank loans average 80%. However the most likely ultimate recovery rate was 100% i.e., no economic loss, which occurs almost two thirds of the time.
- » Ultimate recovery rates for construction phase defaults are lower than ultimate recovery rates for operations phase defaults.
- » On average, ultimate recovery rates realised through work outs exceed recovery rates achieved through distressed sale exits.
- » Ultimate recovery rates for project finance loans appear to be substantially uncorrelated with certain factors which are key determinants of ultimate recovery rates for general corporate debt facilities – in particular, the legal jurisdiction of the defaulted company and default rates.
- » PFI/PPP<sup>1</sup> projects represent a discrete sub-sector within Project Finance with a lower default rate than the Study average and a similar average ultimate recovery rate to the Study average.

<sup>1</sup> Public Private Partnerships (PPPs), including projects procured under the UK Government's Private Finance Initiative (PFIs).

## 1. Introduction

The Study updates and expands the scope of research that we have previously published on the historical default and recovery performance of unrated project finance bank loans, most recently in March 2014. The data presented in this Study is sourced from the Data Consortium which is managed by Moody's Analytics. All analytics and statistics are compiled by Moody's Analytics on behalf of Moody's Investors Service (Moody's); all market and industry commentary has been prepared by Moody's. For further information see the [Notice re Data Consortium](#) on page 67 of this report.

We wish to acknowledge and thank each of the financial institutions in the Data Consortium for supporting and contributing to the Study. This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. The Study Data Set now comprises 5,308 projects, which account for 60.6% of all project finance transactions originated globally during a 31 year period from 1 January 1983 to 31 December 2013. The Study Data Set is substantially representative of industry-wide project finance activity by year of origination, by industry sector and by regional concentration.

The Study uses the Basel II<sup>2</sup> definition of default (BII).<sup>3</sup> Based on this definition the Study Data Set includes 382 projects for which at least one senior secured project finance bank loan has defaulted. Of these 382 defaulted projects, 212 have subsequently emerged from default.<sup>4</sup> The Study also compares the results based on Moody's definition of default (MDY), based on which the Study Data Set contains 331 defaults, of which 162 have subsequently emerged from default. We discuss the differences between these default definitions in section 4.2.

**Terminology:** In certain instances we use suffix notation to clarify whether information is presented based on the Basel II definition of default (BII) or Moody's definition of default (MDY).

The Study shows that project finance is a resilient class of specialised corporate lending. In particular, the Study shows that 10-year cumulative default rates for project finance bank loans are consistent with 10-year cumulative default rates for corporate issuers of low investment grade credit quality. However, the Study also shows that marginal annual default rates improve significantly over time, trending towards marginal default rates consistent with single-A category ratings by year 10 from financial close. This seasoning characteristic differentiates the behaviour of project finance bank loans from corporate bank loans.

The Study shows that ultimate recovery rates for project finance bank loans are similar to ultimate recovery rates for senior secured corporate bank loans, despite features such as high gearing and long tenor that are typical for project finance loans, but generally associated with higher risk corporate loans.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on [www.moodys.com](http://www.moodys.com) for the most updated credit rating action information and rating history.

While most project finance borrowers are highly leveraged, thinly capitalised special purpose vehicles with limited financial flexibility, project finance loans are structured to be both highly robust to a wide range of potentially severe risks, and also to minimise any post-default economic loss. The findings of the Study suggest that the risk allocation, structural features, underwriting disciplines and incentive structures which characterise the project finance asset class have proved effective. The results described in the Study are consistent with the results of our previous study of published in March 2014, although the results of studies based on different data sets will necessarily be different.

<sup>2</sup> "International Convergence of Capital Measurement and Capital Standards: A Revised Framework (Comprehensive Version: June 2006)" published by the Basel Committee on Banking Supervision at <http://www.bis.org/publ/bcbs128.htm> (the "Basel II Framework", or "Basel II")

<sup>3</sup> We reproduce the Basel II definition of default at Appendix B (Glossary)

<sup>4</sup> Emergence criteria are described more fully in Section 4.3 (Recovery Analysis).

We were delighted with the extensive feedback we have received in response to our previous research, and we look forward to publishing further research based on an expanded and updated data set.

While the Study reports on the historical performance of unrated project finance bank loans, we also highlight our Special Comment "[Infrastructure Default and Recovery Rates, 1983-2013](#)", which reports on the historical performance of Moody's-rated long-term infrastructure debt (see Appendix E).

## 2. Summary

We highlight and discuss below our key findings based on the Study Data Set:

- » The Study Data Set is 20% larger than that considered in our previous study published in March 2014, containing 883 additional projects and 52 more (BII) defaults. The results of the Study and the previous study are consistent.
- » As part of the Study, we derived historical default rates for project finance bank loans and compared these against historical default rates for corporate bond and loan issuers rated by Moody's.
  - The 10-year cumulative default rate for project finance bank loans is consistent with 10-year cumulative default rates for corporate issuers of low investment grade credit quality (see Exhibit 12).
  - The 10-year cumulative default rate for the Study Data Set as a whole is 6.4% (BII), lower than that for our previous study of 8.1% (BII). This fall continues a downward trend compared with 10-year cumulative default rates for our earlier studies. We comment further in section 7.1.1.
  - Marginal annual default rates for project finance bank loans are consistent with high speculative grade credit quality during an initial three year period following financial close, but fall significantly thereafter trending towards marginal default rates consistent with single-A category ratings by year 10 from financial close (see Exhibit 12.2). This characteristic of project finance bank loans is significantly different from the marginal annual default rates we have observed for corporate issuers, which are broadly stable for investment grade rating categories.
  - In our view, the initial three year period of elevated marginal default rates is strongly linked to construction phase risk and/or the commencement and ramp-up of operations, while the improvement in marginal default rates thereafter is associated with the maturity of project operations following the completion of initial construction works.
- » Ultimate recovery rates for project finance bank loans averaged 80.3% (BII) and 77.3% (MDY), however, the most likely ultimate recovery rate was 100% (BII) and (MDY) (see Exhibit 24).
  - Average ultimate recovery rates are broadly consistent across geographical regions. Similarly, average ultimate recovery rates are also broadly consistent for projects located in Organization for Economic Co-operation and Development (OECD) and non-OECD countries (see Exhibit 29).
  - Average ultimate recovery rates differ between industries. Average ultimate recovery rates by industry sector are disclosed within broad ranges in Exhibit 30 - more detailed information has been withheld at the request of the Data Consortium.
  - The average ultimate recovery rate (BII) for the Infrastructure industry sector lies within a range of 60%-80%, a deterioration compared with that of our previous study which was within a range of 80%-100%.
- » Ultimate recovery rates for construction phase defaults averaged 69.0% (BII) and 60.1% (MDY), somewhat lower than ultimate recovery rates for operations phase defaults which averaged 82.0% (BII) and 79.8% (MDY) (see Exhibit 31).

- » Average ultimate recovery rates realised through a work-out process of 80.3% (BII) and 77.3% (MDY) substantially exceed average recovery rates achieved through distressed sale exits 50.3% (BII) and 47.4% (MDY) (see Exhibit 24).
- » Average ultimate recovery rates for project finance bank loans emerging from default during 1999-2009 were in the range of 76.7%-100.0% (BII) and in the range of 71.6%-100.0% (MDY), but were substantially independent both of the economic cycle at default and the economic cycle at emergence throughout this period. Calendar years 2010-13 and calendar years prior to 1999 are excluded from this observation due to small sample sizes (see Exhibit 27), although we note that the average ultimate recovery rate (BII) of 29.4% for 2013 based on five projects that emerged from default appears to be unusually low.
  - In section 7.4.3 we highlight the stress affecting the Infrastructure industry sector<sup>5</sup> during 2009-13, as illustrated by 58 defaults (BII) reported during that period. However, only a few of these defaulted projects have emerged from default, and we will monitor the relationship between default rates and ultimate recovery rates in this industry sector with interest.
- » The Study Data Set contains 1,296 projects identified as PFI/PPP projects (see Appendix H). For the PFI/PPP sub-set:
  - The 10-year cumulative default rate (BII) is 3.9%. This is lower than the 10-year cumulative default rate (BII) for the Infrastructure industry sector of 4.5%, and substantially lower than the 10-year cumulative default rate (BII) for the Study of 6.4%.
  - Marginal annual default rates (BII) are broadly stable and are borderline investment grade for the initial 4 years post financial close, and decline thereafter to marginal annual default rates consistent with those of corporate issuers in the Baa ratings category or better (see Exhibit H7).
  - The average ultimate recovery rate is 81.5% (BII) and 74.8% (MDY), similar to average ultimate recovery rates of 80.3% (BII) and 77.3% (MDY) for the Study Data Set as a whole.
  - These results provide some evidence to support the view held by many market participants that PFI/PPP is a discrete sub-sector lying at the low-risk end of the project finance spectrum. We note, however, that these results should be interpreted with caution, since (1) there is some subjectivity in the classification of projects as PFI/PPP projects; and (2) the number of defaults is small.
- » The 10-year cumulative default rate for the Infrastructure industry sector is 4.5%, somewhat better than the Study average of 6.4%.
- » As part of the Study, we compare the recovery behaviour of project finance bank loans to the recovery behaviour of a data set comprising corporate bank loans (predominantly senior secured debt facilities) derived from Moody's Ultimate LGD Database.<sup>6</sup> The Study shows that ultimate recovery rates for project finance bank loans are broadly similar to ultimate recovery rates for senior secured corporate bank loans.<sup>7</sup> However, ultimate recovery rates for project finance loans appear to be substantially uncorrelated with certain factors which are key determinants of ultimate recovery rates for general corporate debt facilities – in particular, the legal jurisdiction of the defaulted company and default rates (see Appendix D).

<sup>5</sup> The Infrastructure industry sector comprises social and transportation infrastructure projects within the Study Data Set i.e. social and transportation infrastructure assets and services procured using project finance.

<sup>6</sup> Moody's proprietary database which contains information on over 4,900 defaulted loans and bonds taken from 1,000+ non-financial US corporations that initially defaulted between 1987 and 2013. The Corporate Bank Loan Data Set is described in Appendix D.

<sup>7</sup> As described in Appendix D, average ultimate recovery rates for defaulted senior secured corporate bank loans are substantially higher than average firm-wide ultimate recovery rates for defaulted companies.

### 3. Overview of the Project Finance industry

Project finance can be an efficient way to fund capital intensive and strategically important industries where underlying business risk is relatively stable and predictable. Project finance is often used to fund the development of energy, natural resource and social infrastructure assets, and the provision of associated public services.

The term "infrastructure" is often used in a broad sense to refer to strategically important, capital intensive assets, utilities, services and primary industries, fulfilling major economic and social needs. Such assets and services in an economy are typically characterised by robust or inelastic demand which underpin predictable and resilient long-term revenues.

Infrastructure investment is vital to support economic activity and growth, but it is also expensive and is not without risk. In a report published by the McKinsey Global Institute in January 2013,<sup>8</sup> McKinsey estimates that over \$57 trillion (stated in real terms, 2010) in infrastructure investment will be required over the 18-year period to 2030, in the areas of transport (road, rail, ports and airports), power, water and telecommunications. This amount is some 60% greater than the \$36 trillion spent globally on infrastructure over the previous 18 years. However, McKinsey's estimate excludes investments needed to address infrastructure maintenance backlogs and renewals, and investments needed to meet the wider development goals of emerging economies.

Exhibit 1 shows the population of all project finance transactions originated from 1 January 1983 – 31 December 2013, based on industry data provided by Thomson Reuters Project Finance International (the Industry Data Set).

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EXHIBIT 1

**Profile Of The Industry Data Set By Origination Year**

Year of Financial Close	Debt Raised (US\$ Billions)	Number of Projects
1983	3.7	28
1984	2.2	23
1985	1.3	10
1986	2.5	11
1987	11.0	16
1988	1.1	8
1989	0.6	5
1990	8.6	23
1991	8.5	31
1992	15.4	70
1993	26.2	118
1994	29.0	118
1995	23.3	156
1996	42.8	192
1997	67.4	281
1998	56.7	239
1999	72.4	239

<sup>8</sup> McKinsey Global Institute report "Infrastructure productivity: How to save \$1 trillion a year". The McKinsey report uses three different approaches to estimate global infrastructure investment needs to 2030, including consideration of previous assessments undertaken by the OECD and by the International Energy Agency (IEA).

## EXHIBIT 1

**Profile Of The Industry Data Set By Origination Year**

<b>Year of Financial Close</b>	<b>Debt Raised (US\$ Billions)</b>	<b>Number of Projects</b>
2000	110.9	450
2001	108.5	314
2002	62.2	298
2003	69.6	323
2004	117.8	471
2005	136.3	512
2006	183.8	552
2007	228.3	644
2008	251.2	714
2009	140.2	475
2010	213.9	620
2011	221.1	641
2012	206.3	581
2013	204.9	596
<b>Industry Total</b>	<b>\$2,627.5</b>	<b>8,759</b>

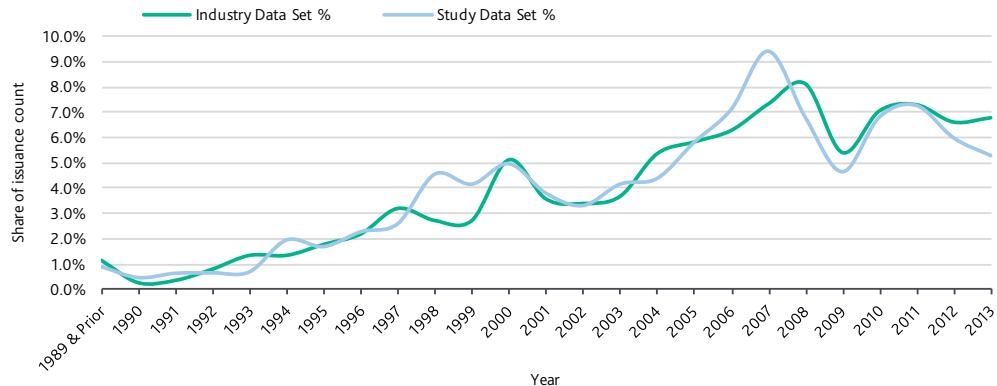
Note: For consistency with the Study Data Set, the Industry Data Set from Thomson Reuters references projects reaching financial close in the period 1 January 1983 – 31 December 2013.

The Study Data Set accounts for approximately 60.6% of the larger Thomson Reuters Industry Data Set from 1983-2013. Correlations between the two data sets are very high – correlation by year of origination is in excess of 93%, correlation by region is in excess of 88%, and correlation by industry sector is in excess of 99%. We conclude therefore that the Study Data Set is substantially representative of industry-wide project finance activity by year of origination, by industry sector and by regional concentration.

Differences in concentrations by year, region and industry are the result of the different client relationships, loan origination strategy, geographic focus and industry focus of each participant in the Data Consortium, as well potential differences in the classification of individual projects by year of origination, by industry and by region. For example, lenders providing information for the same project may not always be consistent in their classification of industry and region. Moreover, consortium participants that bought loan participations after financial close may have reported different origination dates from the date on which financial close occurred. Where possible, we have verified and corrected inconsistencies between data submitted by multiple lenders for the same project. However, we have not been able to cross-check data where that data was only submitted by a single lender.

Exhibit 2 compares the Study Data Set and the Thomson Reuters Industry Data Set by year of project origination.

**EXHIBIT 2**  
**Comparison Of Study Data Set And Industry Data Set By Year Of Project Origination**



The correlation between the two data sets by year of origination is over 93%. As discussed further in Sections 5.1 and 5.2 below, similar high correlations also exist between the regional concentrations and the industry concentrations of the two data sets.

### 3.1 Characteristics of Project Finance

Project finance refers to the financing of long-term infrastructure, industrial or public assets and services using limited recourse long-term debt raised by an enterprise operating in a focused line of business in accordance with contractual agreements. Principal and interest payments are made solely from cash flows generated by the enterprise. Projects are usually undertaken by special purpose vehicles (SPVs) that can only engage in the business of the project – the scope and duration of which is defined in the contractual arrangements entered into by the SPV. Projects are usually structured with recourse to the SPV's assets,<sup>9</sup> and with only limited recourse to the project sponsors' other assets which are therefore outside the scope of collateral available to secured debt providers in the event of the failure of the project.

Although project financing arrangements differ from project to project, some common features are usually present. For example, projects are usually financed with long-term debt (often greater than 20 years) and high leverage (debt/equity ratios often greater than 80:20). At the same time, however, project finance senior debt facilities are typically structured to be robust to potentially severe risks, including significant macroeconomic and performance stresses.

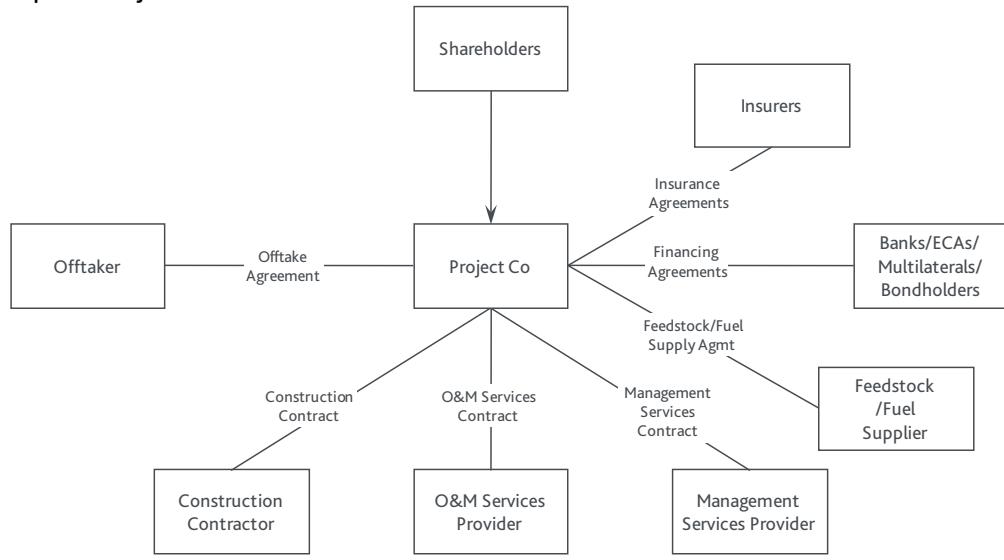
The Study Data Set comprises project finance bank loans which fall within the Basel II definition of Project Finance. For reference, we reproduce the Basel II definition of Project Finance at Appendix B (Glossary).

Exhibit 3 shows a simplified project structure. The contracts between the project company (Project Co) and parties such as the off-taker,<sup>10</sup> construction contractor, feedstock supplier, fuel supplier and other parties are structured to mitigate the risks retained by the project company itself.

<sup>9</sup> Including economic rights in relation to the contracts entered into by the SPV.

<sup>10</sup> The recipient of the end product of the project.

**EXHIBIT 3**  
**Simplified Project Structure**



We comment further in Appendix C (Overview of Project Finance Characteristics) on the typical features found in project finance transactions which mitigate default risk and loss given default.

## 4. Data and Methodology

### 4.1 Study Data Set

The data presented in this Study is sourced from the Data Consortium which is managed by Moody's Analytics. All analytics and statistics are compiled by Moody's Analytics on behalf of Moody's; all market and industry commentary has been prepared by Moody's. For further information see the [Notice re Data Consortium](#) on page 67 of this report.

The Study Data Set comprises 5,308 distinct projects originated between 1 January 1983 and 31 December 2013.

### 4.2 Default Analysis

The calculation of default rates is dependent on the definition of default adopted. At the request of the Data Consortium, the Study analyses the historical behaviour of project finance bank loans using the Basel II definition of default. For reference, we have also included comparable results based on our definition of default. We reproduce the Basel II definition of default as well as our definition of default in Appendix B (Glossary).

In broad terms, the Basel II definition of default not only captures the events which are included in our definition of default, but also captures a wider range of defaults, including circumstances in which the reporting bank considers that the obligor is unlikely to pay its credit obligations in full. For example, under the Basel II definition, defaulted credits would also include debt obligations where (1) the bank puts the credit obligation on non-accrued status; or (2) the bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.

While the default of a single project finance debt facility necessarily occurs at the instrument level, we present default rate analysis in this Study on the basis of the number of projects for which at least one senior secured project finance bank loan has defaulted.<sup>11</sup> References in the Study to a "project default" should be construed accordingly.

The Basel II default date was used under the Basel II definition of default, whereas the actual payment default date was used under our definition of default. In some cases the Basel II default date was the same as the payment default date or bankruptcy date.

Based on the Basel II definition of default, the Study Data Set contains 382 distinct projects that defaulted (each a Default (BII)), comprising:

- » 131 Defaults (BII) still in the work-out process (each a Default In Work-Out (BII)).
- » 39 Defaults (BII) for which recoveries have been realised following a distressed sale of the relevant defaulted loan participation (each a Distressed Sale (BII)).
- » 212 Defaults (BII) for which recoveries have been realised following emergence from default<sup>12</sup> (each an Ultimate Recovery (BII)).

The default rates in the Study are calculated based on the entire population of 382 Defaults (BII), whereas the calculation of ultimate recovery rates are based on the population of 212 Ultimate Recoveries (BII).

The 131 Defaults In Work-Out (BII) are not included in the recovery analysis in the Study. However, as defaulted credits are resolved either through distressed sale exits or through emergence from default, we anticipate that additional information will be made available to us for inclusion in an expanded and updated data set.

Based on our definition of default, the Study Data Set contains 331 distinct projects that defaulted (each a Default (MDY)), comprising:

- » 135 Defaults (MDY) still in the work-out process (each a Default In Work-Out (MDY)).
- » 34 Defaults (MDY) for which recoveries have been realised following a distressed sale of the relevant defaulted loan participation (each a Distressed Sale (MDY)).
- » 162 Defaults (MDY) for which recoveries have been realised following emergence from default (each an Ultimate Recovery (MDY)).

The 135 Defaults In Work-Out (MDY) are not included in the recovery analysis in the Study.

#### 4.3 Recovery Analysis

The calculation of recovery rates is dependent on the definition of emergence from default adopted. The Study uses the definition of emergence from default set out below.

For the reasons set out at Section 4.3.1 below, recovery analysis is based on the assumption that all pari passu senior secured debt facilities for a single project would share the same average recovery rate. However, in validating this assumption we have evaluated recoveries on a facility level.

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<sup>11</sup> This avoids the potential distortion arising from the calculation of facility-weighted defaults rates, where the number of facilities per project is arbitrary. Furthermore, while a default would necessarily occur at the instrument level, under typical project finance intercreditor arrangements it is likely that the instrument level default (if unremedied or not waived) would lead to the cross-default of the other pari passu senior secured project finance debt facilities raised by that project borrower.

<sup>12</sup> Emergence criteria are described more fully in Section 4.3 (Recovery Analysis).

### Emergence From Default:

For a loan which has defaulted, emergence from default is deemed to occur following any of the events set out below:

- » Repayment of overdue interest
- » Restructuring with no subsequent default
- » Restructuring with the lender being taken out of the deal – for example, by repayment of the defaulted loan with no participation in a restructured debt facility
- » Material restructuring
- » Liquidation

Ultimate recovery values are determined for each loan which has emerged from default based on the emergence criteria listed above, calculated as at the last date on which cash was paid prior to default. Cash flows arising post default such as interest payments, principal repayments, other cash payments or receipts<sup>13</sup> or asset-value recoveries, but excluding recoveries under any guaranty arrangements, are discounted to the last date on which cash was paid prior to default at the pre-petition interest rate implicit in the loan at the time of its default. In some instances, for example for a loan which has emerged from default following the repayment of overdue interest, it is possible for a separate default to occur subsequent to emergence from the initial default. In such instances of serial default, only a single default is deemed to have occurred for which the ultimate recovery value is determined with reference to the initial default. The ultimate recovery rate for a loan which has emerged from default is determined by dividing the ultimate recovery value by the principal outstanding at the date of default.

The definition of emergence from default set out above specifically excludes exits which individual lenders may have executed via the distressed sale of relevant loan participations. Although distressed sales are a common exit route for lenders seeking early resolution of defaulted credits, the timing and value of such exits may differ significantly between lenders exiting from the same defaulted loan, and do not necessarily predict the loan's ultimate recovery value. The recovery value for a Distressed Sale (i.e., a distressed sale exit) is determined in a similar manner to that described above, including the disposal proceeds within post default cash flows. The recovery rate for a Distressed Sale is determined by dividing the recovery value by the principal outstanding at the date of default.

#### 4.3.1 Facility Level Recovery Analysis

Recovery analysis for the Study is based on the assumption that all senior secured project finance debt facilities for a single defaulted project would share the same ultimate recovery rate – and the Study Data Set has been conformed accordingly (see Section 4.4 below). However, Basel II requires that recovery analysis is undertaken for each defaulted facility.<sup>14</sup> We have therefore undertaken a facility level recovery analysis as part of the Study.

Exhibit 4 shows that for the Study Data Set, there is minimal difference between (1) the average ultimate recovery rate calculated on a project level basis; and (2) the average ultimate recovery rate calculated on a facility level basis.

<sup>13</sup> For example, other cash payments would include legal fees; other cash receipts would include default interest.

<sup>14</sup> See para 431 of the Basel II Framework (<http://www.bis.org/publ/bcbs128.htm>):

"431. Banks using the advanced IRB approach must also collect and store a complete history of data on the LGD and EAD estimates associated with each facility and the key data used to derive the estimate and the person/model responsible. Banks must also collect data on the estimated and realized LGDs and EADs associated with each defaulted facility. Banks that reflect the credit risk mitigating effects of guarantees/credit derivatives through LGD must retain data on the LGD of the facility before and after evaluation of the effects of the guarantee/credit derivative. Information about the components of loss or recovery for each defaulted exposure must be retained, such as amounts recovered, source of recovery (e.g., collateral, liquidation proceeds and guarantees), time period required for recovery, and administrative costs."

Exhibit 4 also shows that for the Study Data Set, there is minimal difference between (1) the average recovery rate for distressed sales calculated on a project level basis; and (2) the average recovery rate for distressed sales calculated on a facility level basis.

In the Study, therefore, we do not distinguish between project level and facility level ultimate recoveries nor project level and facility level distressed sales, other than in this Section 4.3.1.

The number of defaults of ECA-backed or ECA-insured facilities is de minimis, and is not statistically significant.

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**EXHIBIT 4**
**Comparison of Average Recovery Rates – Project Level vs. Facility Level Ultimate Recoveries and Distressed Sales**

	Basel II Definition of Default				Moody's Definition of Default			
	Ultimate Recoveries		Distressed Sales		Ultimate Recoveries		Distressed Sales	
	Project Level Recovery Analysis	Facility Level Recovery Analysis	Project Level Recovery Analysis	Facility Level Recovery Analysis	Project Level Recovery Analysis	Facility Level Recovery Analysis	Project Level Recovery Analysis	Facility Level Recovery Analysis
Number of Recoveries	212	358	39	53	162	294	34	44
Average Recovery Rate	80.3%	80.2%	50.3%	52.4%	77.3%	78.3%	47.4%	48.2%

#### 4.4 Data Cleansing

Each lender provided standardised information for each defaulted project loan, including key dates such as origination date, maturity date, default date, date of emergence (if appropriate) or date of exit via distressed sale (if appropriate). Further standardised information included the project's host country, industry sector, tranche name, seniority, collateral, origination amount and post-default cash flows.

Lenders also provided a detailed narrative to accompany their data submission for each project – including a description of the project, details of the default and its cause, and an explanation of the recovery process and outcome. This narrative was used to validate the data and as a basis to reconfirm the recovery values.

Project-specific data from each lender were cross-checked based on the project's name, industry, region and key dates. Where inconsistencies were identified, lenders were asked to reconfirm their data to ensure its accuracy and consistency. Where available, external sources of information were also used to validate project data.

Where a single defaulted project was reported both as a Distressed Sale (BII) and as an Ultimate Recovery (BII) by different lenders, we categorised the Default (BII) as an Ultimate Recovery (BII).

Where multiple lenders participated in the same defaulted loan, the relevant lenders reported very similar ultimate recoveries. The differences were mostly due to the timing of the emergence process or the recovery methodology<sup>15</sup> reported by each lender. In the small percentage of instances where different lenders reported different recovery values for the same project, we reviewed the project's narrative description to ensure that the timing and recovery methodology were correct, and reconfirmed the relevant data submitted by each lender. When working with historical data, specific details may not always be available and differences in data provided may be the result of different interpretations between lenders,

<sup>15</sup> For example, distressed restructuring, or restructuring without a loss (either extended maturity and or change in amortization). In certain instances, not all banks agreed that the maturity was extended or the amortization schedule changed.

such as when one lender reports an ultimate recovery and another lender reports the charge-off amount. We will continue to consult with the Data Consortium members and establish further refinements in data capture which will support more granular analysis.

#### 4.4.1 Excluded data

Loan details were reviewed to ensure that each debt facility met the Basel II definition of Project Finance. Loans which did not meet this definition were excluded from the Study Data Set. We reproduce the Basel II definition of Project Finance at Appendix B (Glossary).

Project loan defaults were reviewed to ensure that each loan default met the Basel II definition of default. Reported loan defaults which did not meet the Basel II definition of default were excluded.

Lenders were not requested to provide recovery information for Defaults In Work-Out (BII) – although such projects are excluded from the recovery analysis they are counted as Defaults in the default analysis.

In a small number of instances where a recovery rate for an Ultimate Recovery (BII) or Distressed Sale (BII) (as applicable) could not be determined due to insufficient information, that project was excluded from the recovery analysis. However, if such omissions can be addressed, we would anticipate including this data in a future study based on an expanded and updated data set.

Defaults of subordinated debt facilities were excluded from the recovery analysis.

We applied an analogous approach in relation to our review of each Default (MDY), Default in Work-Out (MDY), Distressed Sale (MDY) and Ultimate Recovery (MDY).

#### 4.5 Caveat – Limitations of small sample sizes

In the Study, we have investigated a number of different aspects of historical project finance default and recovery rates – for example, by segmenting our analysis of default and recovery rates by industry and by region. Necessarily, such segmented analysis is likely to lead to small sample sizes which lack the statistical robustness of larger sample sizes.

As noted previously, further expansion of the Study Data Set would provide greater statistical confidence to the results and observations presented, and would support more detailed granular analysis. We will continue with our efforts to expand the Data Consortium, and we look forward to publishing further research based on an expanded and updated data set. In the meantime, we would highlight that:

- » Results based on small sample sizes should be treated with caution, and
- » The inclusion of additional data will lead to different results in a future study, and it is possible that such differences may be material.

### 5. Distribution of Projects

#### 5.1 Distribution of Projects By Region

Exhibit 5 shows the regional distribution of all the projects in the Study Data Set, and compares this with the corresponding distribution of projects in the Industry Data Set.

The Study Data Set accounts for approximately 60.6% of the larger Industry Data Set from 1983 through 2013. The regional concentrations of the Study Data Set are similar to those of the Industry Data Set – the correlation between the regional concentrations of the two data sets is 88%. However, there are notable differences between the two data sets in their respective concentrations in South East Asia, North America

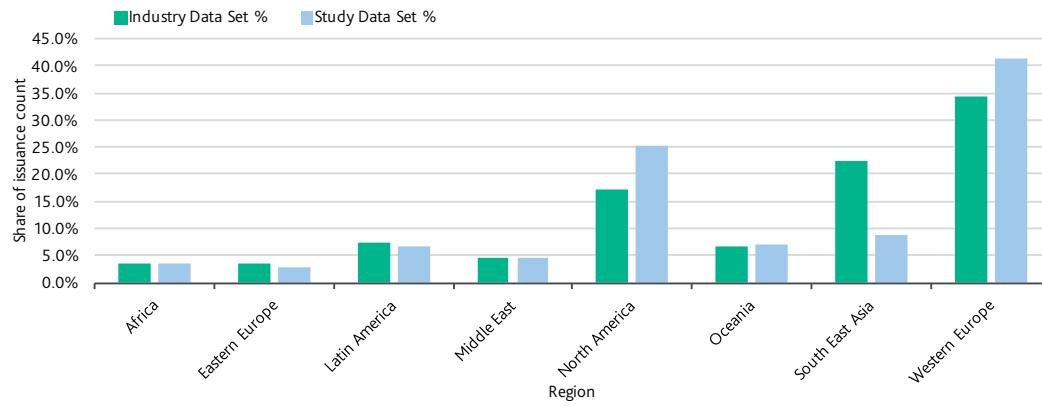
and Western Europe. It is likely that these differences are the result of the different client relationships, loan origination strategy and geographic focus of each participant in the Data Consortium, as well as the potential classification differences discussed in Section 3.

As the South East Asia region is under-represented in the Study Data Set, we are keen to encourage project finance lenders that are active in this region to participate in the Data Consortium.

**EXHIBIT 5  
Comparison of Study Data Set and Industry Data Set By Region**

Region	Industry Data Set	Industry Data Set %	Study Data Set	Study Data Set %
Africa	314	3.6%	184	3.5%
Eastern Europe	312	3.6%	146	2.8%
Latin America	655	7.5%	351	6.6%
Middle East	409	4.7%	252	4.7%
North America	1515	17.3%	1337	25.2%
Oceania	571	6.5%	365	6.9%
South East Asia	1972	22.5%	472	8.9%
Western Europe	3011	34.4%	2201	41.5%
<b>Total</b>	<b>8759</b>	<b>100.0%</b>	<b>5308</b>	<b>100.0%</b>

**EXHIBIT 6  
Comparison of Study Data Set and Industry Data Set By Region**



## 5.2 Distribution of Projects By Industry Sector

Exhibit 7 shows the industry sector distribution of all the projects in the Study Data Set, and compares this with the corresponding distribution of projects in the Industry Data Set. In our analysis of industry sectors the Infrastructure industry sector refers specifically to the sub-set of social and transportation infrastructure projects within the Study Data Set.

As noted previously, the Study Data Set accounts for approximately 60.6% of the larger Industry Data Set from 1983 through 2013. The industry concentrations of the Study Data Set are very similar to those of the Industry Data Set – the correlation between the industry concentrations of the two data sets is in excess of 99%. There are modest differences between the two data sets in their respective concentrations in the Infrastructure and Oil & Gas industry sectors. It is likely that these differences are the result of the different

client relationships, loan origination strategy and industrial focus of each participant in the Data Consortium, as well as the potential classification differences discussed in Section 3.

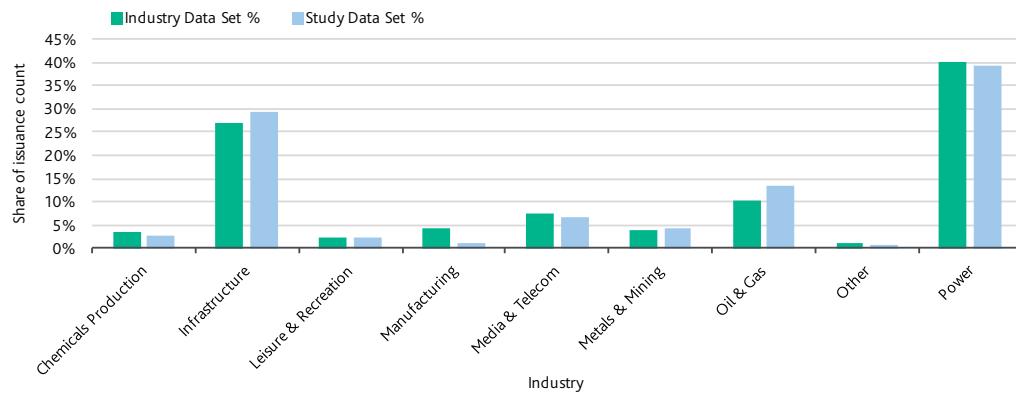
EXHIBIT 7

#### Comparison of Study Data Set and Industry Data Set by Industry Sector

Industry	Industry Data Set	Industry Data Set %	Study Data Set	Study Data Set %
Chemicals Production	293	3.3%	135	2.5%
Infrastructure	2347	26.8%	1563	29.4%
Leisure & Recreation	201	2.3%	120	2.3%
Manufacturing	362	4.1%	56	1.1%
Media & Telecom	665	7.6%	359	6.8%
Metals & Mining	357	4.1%	238	4.5%
Oil & Gas	916	10.5%	720	13.6%
Other	110	1.3%	34	0.6%
Power	3508	40.1%	2083	39.2%
<b>Total</b>	<b>8759</b>	<b>100.0%</b>	<b>5308</b>	<b>100.0%</b>

EXHIBIT 8

#### Comparison of Study Data Set and Industry Data Set by Industry Sector



## 6. Distribution of Defaults

### 6.1 Distribution of Defaults By Region

Exhibit 9 shows the regional distribution of the 382 Defaults (BII) in the Study Data Set. The three most significant regions are North America, Western Europe and Latin America, accounting for 78.0% of total Defaults (BII).

**EXHIBIT 9**  
**Distribution of Defaults by Region**

<b>Region</b>	<b>Basel II Definition of Default</b>		<b>Moody's Definition of Default</b>	
	<b>Defaults (BII)</b>	<b>Regional Concentration %</b>	<b>Defaults (MDY)</b>	<b>Regional Concentration %</b>
Africa	4	1.0%	2	0.6%
Eastern Europe	7	1.8%	7	2.1%
Latin America	52	13.6%	50	15.1%
Middle East	4	1.0%	4	1.2%
North America	132	34.6%	116	35.0%
Oceania	22	5.8%	21	6.3%
South East Asia	47	12.3%	44	13.3%
Western Europe	114	29.8%	87	26.3%
<b>Total</b>	<b>382</b>	<b>100.0%</b>	<b>331</b>	<b>100.0%</b>

## 6.2 Distribution of Defaults By Industry Sector

Exhibit 10 shows the industry sector distribution of the 382 Defaults (BII) in the Study Data Set. The three most significant industry sectors are Infrastructure, Oil & Gas and Power, accounting for 70.9% of total Defaults (BII).

**EXHIBIT 10**  
**Distribution of Defaults by Industry Sector**

<b>Industry</b>	<b>Basel II Definition of Default</b>		<b>Moody's Definition of Default</b>	
	<b>Defaults (BII)</b>	<b>Industry Sector Concentration %</b>	<b>Defaults (MDY)</b>	<b>Industry Sector Concentration %</b>
Chemicals Production	14	3.7%	14	4.2%
Infrastructure	82	21.5%	60	18.1%
Leisure & Recreation	10	2.6%	10	3.0%
Manufacturing	12	3.1%	12	3.6%
Media & Telecom	43	11.3%	40	12.1%
Metals & Mining	31	8.1%	28	8.5%
Oil & Gas	44	11.5%	41	12.4%
Other	1	0.3%	1	0.3%
Power	145	38.0%	125	37.8%
<b>Total</b>	<b>382</b>	<b>100.0%</b>	<b>331</b>	<b>100.0%</b>

## 7. Default Rate Analysis

### 7.1 Cohort Analysis: 1990 – 2013

Cumulative default rates are derived from monthly marginal default rates based on static pool cohorts which follow the default behaviour of the projects in each cohort, in annual intervals since financial close.

#### Cohort Analysis – Methodology

The cumulative default rate calculation methodology used by Moody's is a discrete-time approximation of the non-parametric continuous-time hazard rate approach. A static pool cohort is formed based on the number of active projects on January 1 of each year, and the default/survival status of the members of the cohort was tracked from 1990-2013.

The time horizon T for which we wish to measure a cumulative default rate is divided into years. Hence, the data is discrete in that the time to default is not measured continuously. In Exhibit 11, each cohort has N(0) active projects on January 1 of the initial cohort year with time intervals of t years thereafter labeled as years 1, 2, 3 etc.

Based on a monthly time interval, the marginal default rate (hazard rate) is the probability that a project that has survived in the cohort up to the beginning of a particular month will default by the end of that month. The marginal default rate is calculated as the ratio of defaults in that month to the number of surviving projects at the beginning of that month. Projects that have been repaid during that month are excluded from the count of survivors in subsequent time intervals.

Cumulative default rates for each cohort (as shown in Exhibits 11 and 11A) are derived from monthly marginal default rates for that cohort.

Average cumulative default rates for all cohorts 1990-2013 are derived from the weighted average marginal default rates from all the available cohort marginal default rates (1990-2013) – i.e., monthly marginal default rates are weighted by the relevant number of active projects at the start of year t for that cohort.

Average annual marginal default rates (1990-2013) are derived from average cumulative default rates (1990-2013).

#### 7.1.1 Cumulative Default Rates

Exhibit 11 tabulates cumulative default rates (BII) for cohorts 1990-2013. For comparison purposes, we have included certain cumulative default rate data taken from our published research on default and recovery rates for corporate bond and loan issuers rated in the Baa and Ba rating categories.<sup>16</sup>

<sup>16</sup> See Moody's Special Comment: "[Corporate Default and Recovery Rates, 1920-2013](#)," February 2014

It is apparent that the 10-year cumulative default rate (BII) for the Study Data Set is consistent with 10-year cumulative default rates for corporate issuers of low investment grade credit quality.<sup>17</sup>

#### **Commentary on the decrease in 10-year cumulative defaults rate for this Study Data Set compared with those shown in our previous study**

As shown in Exhibits 11 and 11A, the 10-year cumulative default rate (BII) for the Study Data Set is 6.4% and the 10-year cumulative default rate (MDY) for the Study Data Set is 5.5%. In our previous study published in March 2014,<sup>18</sup> the 10-year cumulative default rate (BII) for that study data set was 8.1% and the 10-year cumulative default rate (MDY) was 6.6%.

The Study Data Set is 20% larger than that of our previous study with an additional 883 projects and 52 defaults. The sector composition and historical profile of these additions also impacts the calculation of 10-year cumulative default rates. The inclusion of additional data within an updated and expanded data set will necessarily lead to different results.

However, the decrease in 10-year cumulative default rates for this Study Data Set appears to reflect a combination of factors: (1) a fall in the number of defaults relative to the number of projects in the Study Data Set as illustrated by an improvement in the simple average default rate to 7.2% from 7.5% for the previous study; (2) an ageing of the project portfolio which is associated with lower default risk as projects season; and (3) a modest improvement representing approximately 0.4% of the difference between the 10-year cumulative default rate (BII) of 6.4% for the Study Data Set and that of 8.1% for the previous study, due to a slight change in our cohort analysis methodology (for consistency with the methodological approach that we apply across our all of our default research, we now analyse defaults and withdrawals on a monthly basis rather than on an annual basis).

We note that:

- » The three most significant industry sectors within the Study Data Set are Power, Infrastructure and Oil & Gas, representing respectively 39.2%, 29.4% and 13.6% (and 82.3% in aggregate) of the 5,308 projects in the Study Data Set.
- » 10-year cumulative default rates (BII) for the Power, Infrastructure and Oil & Gas industry sectors have improved compared without previous study. (Note: publication of Exhibit 18 has been withheld at the request of the Data Consortium)
- » Compared with our previous study, the simple average default rate (BII): has improved for the Power sector to 7.0% from 7.2%; has deteriorated for the Infrastructure industry sector to 5.2% from 5.1%; and has improved for the Oil & Gas sector to 6.1% from 6.7%.
- » The differences between (1) sector-specific movements in 10-year cumulative default rates, and (2) sector-specific movements in simple average default rates, illustrate the significance of the historical profile of project originations and defaults within the Study Data Set. For example, 85 of the 145 Defaults (BII) in the Power industry sector occurred between 2001-04, representing 22.3% of the total number of Defaults (BII) in the Study.

It is interesting to note that the fall in the 10-year cumulative default rate for the Study Data Set compared with that for our previous study continues a downward trend compared with 10-year cumulative default rates for our earlier studies. We look forward to publishing further analysis and commentary on this trend in a future report.

<sup>17</sup> The comparative 10-year cumulative default rate for the Baa3 rating category is 6.87% - see See Moody's Special Comment Exhibit 8, "[Annual Default Study: Corporate Default and Recovery Rates, 1920-2013](#)" February 2014, Exhibit 35 (Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2013)

<sup>18</sup> See Moody's Special Comment: "[Default and Recovery Rates for Project Finance Bank Loans, 1983-2012](#)," March 2014

Exhibit 11A tabulates cumulative default rates (MDY) for cohorts 1990-2013.

## EXHIBIT 11

**Cumulative Default Rates for Cohorts 1990 – 2013 (Basel II Definition of Default)**

<b>N(0) (Note 1)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>1990</b>	47	2.13%	2.13%	14.89%	14.89%	17.19%	26.53%	28.90%	28.90%	28.90%
<b>1991</b>	70	0.00%	8.57%	8.57%	11.59%	17.80%	20.97%	22.58%	22.58%	26.10%
<b>1992</b>	103	6.80%	7.77%	10.79%	14.89%	17.02%	18.11%	18.11%	20.54%	20.54%
<b>1993</b>	130	0.77%	3.14%	6.35%	8.85%	9.70%	10.58%	13.41%	13.41%	15.39%
<b>1994</b>	162	2.49%	5.66%	8.90%	10.24%	11.62%	14.55%	14.55%	17.66%	17.66%
<b>1995</b>	259	2.34%	5.11%	6.78%	9.31%	11.96%	11.96%	14.31%	16.23%	16.23%
<b>1996</b>	323	2.50%	5.11%	8.12%	10.93%	11.67%	14.32%	15.88%	15.88%	16.75%
<b>1997</b>	404	2.52%	6.67%	10.20%	11.35%	14.97%	18.78%	18.78%	19.52%	19.97%
<b>1998</b>	500	3.46%	7.08%	8.42%	11.96%	16.96%	17.49%	18.08%	18.47%	18.47%
<b>1999</b>	683	2.57%	3.88%	7.24%	12.54%	13.95%	14.65%	15.19%	15.19%	15.19%
<b>2000</b>	825	1.41%	4.90%	11.08%	13.03%	13.97%	14.83%	14.83%	14.83%	14.83%
<b>2001</b>	984	2.91%	10.52%	13.17%	14.03%	14.85%	15.05%	15.05%	15.05%	15.54%
<b>2002</b>	1036	7.52%	11.32%	12.54%	13.39%	13.73%	13.73%	13.73%	14.17%	14.39%
<b>2003</b>	1048	3.69%	5.03%	5.80%	6.25%	6.25%	6.44%	6.83%	7.03%	7.48%
<b>2004</b>	1111	1.42%	2.17%	2.68%	2.95%	3.11%	3.60%	3.94%	4.31%	4.31%
<b>2005</b>	1197	0.72%	1.14%	1.37%	1.75%	2.28%	2.56%	2.87%	3.21%	3.21%
<b>2006</b>	1313	0.41%	0.58%	1.08%	1.49%	1.83%	2.20%	2.59%	2.73%	
<b>2007</b>	1537	0.20%	0.80%	1.65%	2.57%	3.58%	4.19%	4.40%		
<b>2008</b>	1886	0.56%	1.95%	3.07%	4.23%	5.19%	5.75%			
<b>2009</b>	2089	1.37%	2.63%	3.67%	4.68%	5.50%				
<b>2010</b>	2165	1.14%	2.14%	3.10%	4.04%					
<b>2011</b>	2319	0.90%	1.98%	2.94%						
<b>2012</b>	2502	0.97%	2.02%							
<b>2013</b>	2507	1.03%								
<b>Cumulative Default Rate (BII) 1990-2013</b>	<b>1.58%</b>	<b>3.09%</b>	<b>4.24%</b>	<b>5.09%</b>	<b>5.69%</b>	<b>6.05%</b>	<b>6.22%</b>	<b>6.34%</b>	<b>6.41%</b>	<b>6.43%</b>
Moody's Baa (Note 2)	0.19%	0.55%	0.96%	1.42%	1.93%	2.45%	2.94%	3.44%	3.94%	4.50%
Moody's Ba (Note 2)	1.14%	3.27%	5.84%	8.58%	10.90%	13.04%	14.92%	16.72%	18.41%	20.10%

Notes:

- 1) N(0) represents the number of active projects as at January 1.
- 2) Comparative cumulative default rate data reproduced from Moody's Special Comment, "[Corporate Default and Recovery Rates 1920-2013](#)," (February 2014) – see Exhibit 34 (Average Cumulative Issuer-Weighted Global Default Rates by Letter Rating, 1983-2013)

## EXHIBIT 11A

**Cumulative Default Rates for Cohorts 1990 – 2013 (Moody's Definition of Default)**

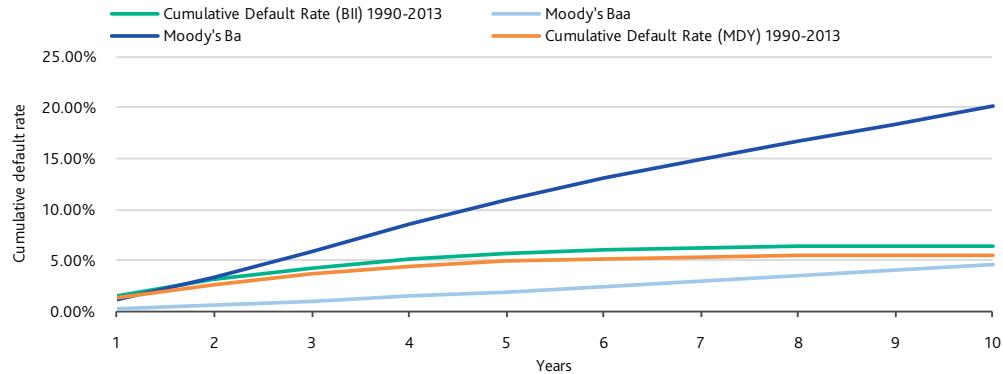
	N(0) (Note 1)	1	2	3	4	5	6	7	8	9	10
<b>1990</b>	47	2.13%	2.13%	14.89%	14.89%	17.19%	26.53%	28.90%	28.90%	28.90%	28.90%
<b>1991</b>	70	0.00%	8.57%	8.57%	11.59%	17.80%	20.97%	22.58%	22.58%	24.34%	24.34%
<b>1992</b>	103	6.80%	7.77%	10.79%	14.89%	17.02%	18.11%	18.11%	19.33%	19.33%	20.61%
<b>1993</b>	130	0.77%	3.14%	6.35%	8.85%	9.70%	9.70%	11.59%	11.59%	13.57%	13.57%
<b>1994</b>	162	2.49%	5.66%	8.90%	10.24%	10.94%	12.40%	12.40%	15.50%	15.50%	15.50%
<b>1995</b>	259	2.34%	5.11%	6.78%	8.46%	10.23%	10.23%	12.58%	14.49%	14.49%	15.03%
<b>1996</b>	323	2.50%	4.46%	6.80%	8.90%	9.64%	12.28%	13.84%	13.84%	14.27%	14.27%
<b>1997</b>	404	2.01%	5.12%	8.12%	9.27%	12.87%	16.66%	16.66%	17.03%	17.03%	17.03%
<b>1998</b>	502	2.63%	5.82%	7.16%	10.67%	15.63%	15.89%	16.19%	16.19%	16.19%	16.19%
<b>1999</b>	688	2.26%	3.55%	6.72%	11.96%	13.16%	13.62%	13.87%	13.87%	13.87%	13.87%
<b>2000</b>	832	1.40%	4.72%	10.69%	12.13%	12.87%	13.28%	13.28%	13.28%	13.28%	13.28%
<b>2001</b>	991	2.79%	9.98%	12.23%	12.94%	13.43%	13.61%	13.61%	13.61%	13.85%	14.10%
<b>2002</b>	1043	7.17%	10.61%	11.71%	12.12%	12.46%	12.46%	12.46%	12.88%	13.10%	13.35%
<b>2003</b>	1057	3.37%	4.47%	4.85%	5.29%	5.29%	5.48%	5.86%	6.05%	6.49%	6.49%
<b>2004</b>	1122	1.12%	1.55%	2.04%	2.31%	2.47%	2.95%	3.28%	3.65%	3.65%	3.65%
<b>2005</b>	1209	0.35%	0.77%	0.99%	1.24%	1.64%	2.05%	2.36%	2.69%	2.69%	
<b>2006</b>	1324	0.40%	0.58%	0.97%	1.28%	1.61%	1.97%	2.22%	2.37%		
<b>2007</b>	1547	0.13%	0.65%	1.34%	2.09%	2.91%	3.21%	3.53%			
<b>2008</b>	1895	0.50%	1.42%	2.40%	3.36%	3.94%	4.42%				
<b>2009</b>	2099	0.92%	2.12%	2.99%	3.61%	4.36%					
<b>2010</b>	2184	1.08%	1.92%	2.48%	3.34%						
<b>2011</b>	2336	0.72%	1.34%	2.24%							
<b>2012</b>	2521	0.58%	1.49%								
<b>2013</b>	2533	0.85%									
<b>Cumulative Default Rate (MDY) 1990-2013</b>	<b>1.35%</b>	<b>2.66%</b>	<b>3.66%</b>	<b>4.38%</b>	<b>4.89%</b>	<b>5.18%</b>	<b>5.33%</b>	<b>5.44%</b>	<b>5.49%</b>	<b>5.51%</b>	
Moody's Baa (Note 2)	0.19%	0.55%	0.96%	1.42%	1.93%	2.45%	2.94%	3.44%	3.94%	4.50%	
Moody's Ba (Note 2)	1.14%	3.27%	5.84%	8.58%	10.90%	13.04%	14.92%	16.72%	18.41%	20.10%	

Notes:

- 1) N(0) represents the number of active projects as at January 1.
- 2) Comparative cumulative default rate data reproduced from Moody's Special Comment, "[Corporate Default and Recovery Rates, 1920-2013](#)," (February 2014) – see Exhibit 34 (Average Cumulative Issuer-Weighted Global Default Rates by Letter Rating, 1983-2013)

Exhibit 12 charts the data presented in Exhibits 11 and 11A:

**EXHIBIT 12  
Cumulative Default Rates**



**7.1.2 Marginal Annual Default Rates**

Exhibit 12.1 tabulates marginal annual default rates for the Study Data Set based on cohorts 1990-2013. For comparison, we have included marginal annual default rate data derived from our published research on default and recovery rates for corporate bond and loan issuers rated in the single-A, Baa and Ba rating categories.<sup>19</sup>

- » It is apparent that marginal annual default rates (BII) for project finance bank loans average 1.4% per annum during an initial three year period following financial close, but fall significantly thereafter trending towards marginal default rates consistent with single-A category ratings by year 10 from financial close.
- » This characteristic of project finance bank loans is significantly different from the marginal annual default rates we have observed for corporate issuers, which are broadly stable.
- » In our view, the initial three year period of elevated marginal default rates is strongly linked to construction-phase risk and/or the commencement and ramp-up of operations, while the improvement in marginal default rates is associated with the maturity of project operations.

**EXHIBIT 12.1**

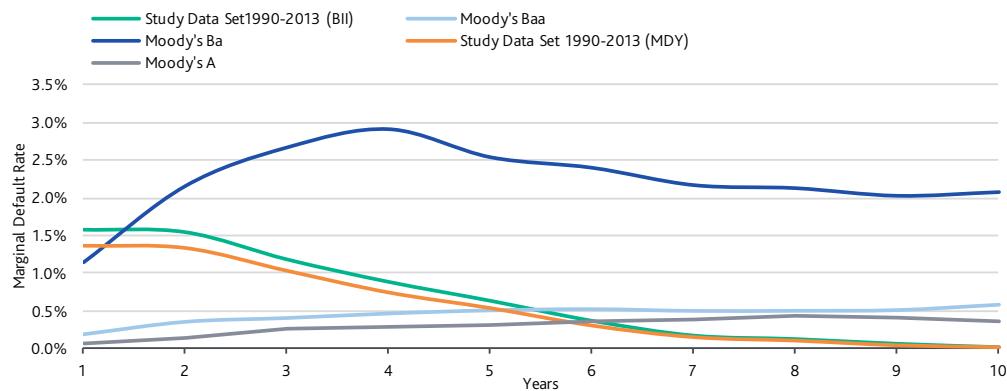
**Marginal Annual Default Rates**

Year	Marginal Annual Default Rate %				
	Study Data Set 1990-2013 (BII)	Study Data Set 1990-2013 (MDY)	Moody's A	Moody's Baa	Moody's Ba
1	1.58%	1.35%	0.07%	0.19%	1.14%
2	1.54%	1.33%	0.16%	0.36%	2.15%
3	1.18%	1.03%	0.28%	0.41%	2.67%
4	0.89%	0.74%	0.28%	0.47%	2.91%
5	0.64%	0.54%	0.32%	0.51%	2.54%
6	0.37%	0.31%	0.36%	0.53%	2.40%
7	0.18%	0.16%	0.39%	0.51%	2.16%
8	0.13%	0.11%	0.43%	0.51%	2.12%
9	0.07%	0.05%	0.42%	0.52%	2.02%
10	0.03%	0.03%	0.37%	0.59%	2.07%

<sup>19</sup> See Moody's Special Comment: "[Corporate Default and Recovery Rates, 1920-2013](#)," (February 2014)

Exhibit 12.2 charts the data presented in Exhibit 12.1:

**EXHIBIT 12.2**  
**Marginal Annual Default Rates**



## 7.2 Average Default Rates by Region

Exhibit 13 shows simple average default rates by region.

Caveat: The simple average default rates included in Exhibit 13 should be interpreted with caution, since (1) they do not reflect the risk profile of individual projects, which is likely to change based on time from origination; and (2) they do not reflect the time-weighted population of active projects exposed to default.

**EXHIBIT 13**

### Average Default Rates by Region

Region	Projects (Note 1)	Basel II Definition of Default		Moody's Definition of Default	
		Defaults (Note 2)	Average Default Rate %	Defaults (Note 3)	Average Default Rate %
Africa	184	4	2.2%	2	1.1%
Eastern Europe	146	7	4.8%	7	4.8%
Latin America	351	52	14.8%	50	14.2%
Middle East	252	4	1.6%	4	1.6%
North America	1337	132	9.9%	116	8.7%
Oceania	365	22	6.0%	21	5.8%
South East Asia	472	47	10.0%	44	9.3%
Western Europe	2201	114	5.2%	87	4.0%
<b>Total</b>	<b>5308</b>	<b>382</b>	<b>N/A</b>	<b>331</b>	<b>N/A</b>
<b>Average</b>	<b>N/A</b>	<b>N/A</b>	<b>7.2%</b>	<b>N/A</b>	<b>6.2%</b>

Notes:

- 1) Based on 5,308 projects
- 2) Based on 382 Defaults (BII)
- 3) Based on 331 Defaults (MDY)

It is apparent that simple average default rates calculated for the Study Data Set vary significantly by region – for example default rates for the Middle East, Africa and European regions are substantially lower than default rates for Latin America, North America and South East Asia.

Exhibits 14 and 14 A tabulate average cumulative default rates for cohorts 1990-2013, broken down by region. Due to the small size of the regional subsets, differences between regional and average cumulative default rates for the Study Data Set may be due to statistical variations.

Caveat: The cumulative default rates included in Exhibit 14 should be interpreted with caution, since in certain instances sample sizes are small and do not support statistically robust conclusions.

## EXHIBIT 14

**Cumulative Default Rates by Region for Cohorts 1990 – 2013 (Basel II Definition of Default)**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Africa	0.57%	1.20%	1.56%	1.75%	1.96%	2.18%	2.18%	2.18%	2.18%	2.18%
Eastern Europe	1.07%	2.27%	3.25%	4.13%	4.62%	4.62%	4.62%	4.62%	4.62%	4.62%
Latin America	3.86%	7.60%	10.37%	12.29%	13.49%	13.97%	14.09%	14.23%	14.23%	14.23%
Middle East	0.32%	0.66%	0.85%	0.95%	1.05%	1.05%	1.05%	1.05%	1.05%	1.05%
North America	2.39%	4.78%	6.58%	7.81%	8.83%	9.53%	9.94%	10.20%	10.40%	10.49%
Oceania	1.81%	3.60%	5.11%	6.34%	7.44%	8.04%	8.20%	8.20%	8.20%	8.20%
South East Asia	2.21%	4.38%	5.96%	7.12%	8.05%	8.47%	8.77%	9.00%	9.00%	9.00%
Western Europe	1.00%	1.92%	2.66%	3.26%	3.63%	3.85%	3.94%	4.03%	4.08%	4.09%
<b>Cumulative Default Rate (BII) 1990-2013</b>	<b>1.58%</b>	<b>3.09%</b>	<b>4.24%</b>	<b>5.09%</b>	<b>5.69%</b>	<b>6.05%</b>	<b>6.22%</b>	<b>6.34%</b>	<b>6.41%</b>	<b>6.43%</b>
Moody's Baa (Note 1)	0.19%	0.55%	0.96%	1.42%	1.93%	2.45%	2.94%	3.44%	3.94%	4.50%
Moody's Ba (Note 1)	1.14%	3.27%	5.84%	8.58%	10.90%	13.04%	14.92%	16.72%	18.41%	20.10%

Note:

- 1) Comparative cumulative default rate data reproduced from Moody's Special Comment, "[Corporate Default and Recovery Rates, 1920-2013](#)," (February 2014) – see Exhibit 34 (Average Cumulative Issuer-Weighted Global Default Rates by Letter Rating, 1983-2013)

## EXHIBIT 14A

**Cumulative Default Rates by Region for Cohorts 1990 – 2013 (Moody's Definition of Default)**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Africa	0.29%	0.61%	0.79%	0.79%	0.79%	0.79%	0.79%	0.79%	0.79%	0.79%
Eastern Europe	1.08%	2.30%	3.31%	4.22%	4.47%	4.47%	4.47%	4.47%	4.47%	4.47%
Latin America	3.66%	7.18%	9.90%	11.77%	12.95%	13.41%	13.54%	13.67%	13.67%	13.67%
Middle East	0.32%	0.66%	0.85%	0.95%	1.05%	1.05%	1.05%	1.05%	1.05%	1.05%
North America	2.08%	4.15%	5.72%	6.77%	7.63%	8.17%	8.54%	8.74%	8.88%	8.97%
Oceania	1.72%	3.41%	4.80%	5.90%	6.85%	7.30%	7.30%	7.30%	7.30%	7.30%
South East Asia	2.06%	4.06%	5.62%	6.77%	7.70%	8.11%	8.41%	8.64%	8.64%	8.64%
Western Europe	0.76%	1.47%	2.04%	2.48%	2.77%	2.97%	3.04%	3.12%	3.15%	3.17%
<b>Cumulative Default Rate (MDY) 1990-2013</b>	<b>1.35%</b>	<b>2.66%</b>	<b>3.66%</b>	<b>4.38%</b>	<b>4.89%</b>	<b>5.18%</b>	<b>5.33%</b>	<b>5.44%</b>	<b>5.49%</b>	<b>5.51%</b>
Moody's Baa (Note 1)	0.19%	0.55%	0.96%	1.42%	1.93%	2.45%	2.94%	3.44%	3.94%	4.50%
Moody's Ba (Note 1)	1.14%	3.27%	5.84%	8.58%	10.90%	13.04%	14.92%	16.72%	18.41%	20.10%

Note:

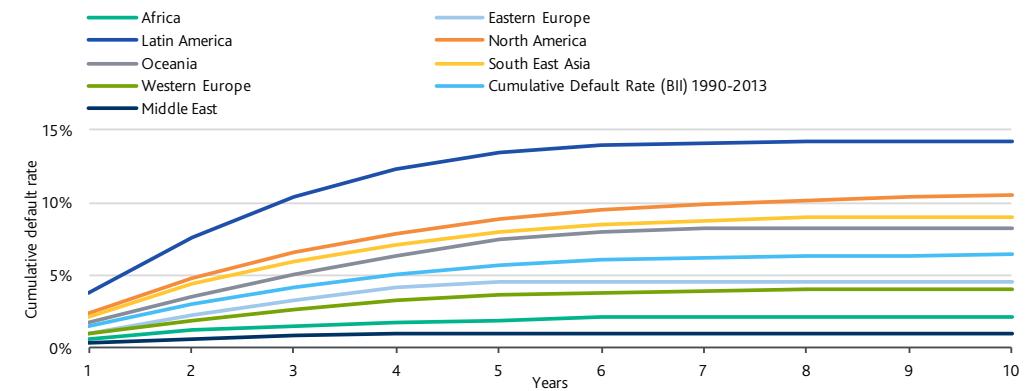
- 1) Comparative cumulative default rate data reproduced from Moody's Special Comment, "[Corporate Default and Recovery Rates, 1920-2013](#)," (February 2014) – see Exhibit 34 (Average Cumulative Issuer-Weighted Global Default Rates by Letter Rating, 1983-2013)

Exhibit 15 charts the data presented in Exhibit 14 i.e., cumulative default rates (BII) for each region.

Latin America has very little history in years 1991-97 with a substantial number of defaults relative to the number of originated and active projects, and the cumulative default rates for the region reflect this distortion. We observe that the average time to default for projects in Latin America was 4.4 years (BII) prior to 1999 and 1.9 years (BII) from 1999 to 2013. This has significance because projects that default later in the life of the project have a greater impact on cumulative default rates than projects that default earlier in the project life.

Default history in Africa and the Middle East has been exceptionally low, with only eight defaults in the Study Data Set. For the Middle East region, against a background of regional geopolitical tensions exemplified by the Iran-Iraq war 1980-88, the Gulf War 1990-91, the invasion of Iraq in 2003, the wave of Arab Spring uprisings commencing 2011 and Israeli/Palestinian conflict, this outcome is highly notable.

**EXHIBIT 15**  
**Cumulative Default Rates (BII) by Region**



#### 7.2.1 Average Default Rate by OECD/Non-OECD Countries

Exhibit 16 shows simple average default rates by OECD/non-OECD countries. Exhibit 16 has been prepared on the basis of the 34 OECD member countries as at 31 December 2013 – the list of OECD members is included in Appendix B (Glossary)

Caveat: The simple average default rates included in Exhibit 16 should be interpreted with caution, since (1) they do not reflect the risk profile of individual projects, which is likely to change based on time from origination; and (2) they do not reflect the time-weighted population of active projects exposed to default.

**EXHIBIT 16**  
**Average Default Rates by OECD/Non-OECD Countries**

Region	Projects (Note 1)	Basel II Definition of Default		Moody's Definition of Default	
		Defaults (Note 2)	Average Default Rate %	Defaults (Note 3)	Average Default Rate %
OECD	4112	277	6.7%	233	5.7%
Non-OECD	1196	105	8.8%	98	8.2%
Total	5308	382	N/A	331	N/A
Average	N/A	N/A	7.2%	N/A	6.2%

Notes:

- 1) Based on 5,308 projects
- 2) Based on 382 Defaults (BII)
- 3) Based on 331 Defaults (MDY)

Exhibits 16.1 tabulates average cumulative default rates (BII) for cohorts 1990-2013, broken down by OECD/non-OECD countries.

## EXHIBIT 16.1

**Cumulative Default Rates by OECD/non-OECD Countries for Cohorts 1990 – 2013 (Basel II Definition of Default)**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
OECD	1.45%	2.84%	3.91%	4.71%	5.28%	5.64%	5.82%	5.94%	6.02%	6.05%
Non-OECD	2.05%	4.06%	5.49%	6.53%	7.27%	7.60%	7.75%	7.88%	7.88%	7.88%
<b>Cumulative Default Rate (BII) 1990-2013</b>	<b>1.58%</b>	<b>3.09%</b>	<b>4.24%</b>	<b>5.09%</b>	<b>5.69%</b>	<b>6.05%</b>	<b>6.22%</b>	<b>6.34%</b>	<b>6.41%</b>	<b>6.43%</b>
Moody's Baa (Note 1)	0.19%	0.55%	0.96%	1.42%	1.93%	2.45%	2.94%	3.44%	3.94%	4.50%
Moody's Ba (Note 1)	1.14%	3.27%	5.84%	8.58%	10.90%	13.04%	14.92%	16.72%	18.41%	20.10%

Note:

- 1) Comparative cumulative default rate data reproduced from Moody's Special Comment, "[Corporate Default and Recovery Rates 1920-2013](#)," (February 2014) – see Exhibit 34 (Average Cumulative Issuer-Weighted Global Default Rates by Letter Rating, 1983-2013)

Exhibit 16.2 charts the data presented in Exhibits 16.1:

## EXHIBIT 16.2

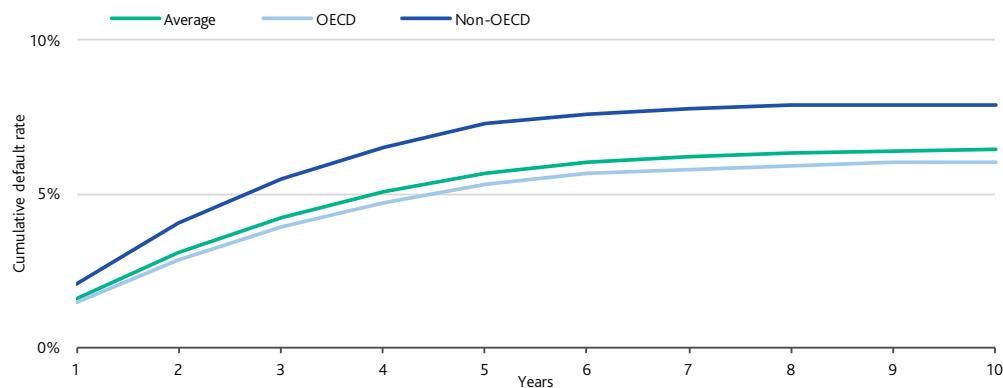
**Cumulative Default Rates (BII) by OECD/non-OECD Countries****7.3 Average Default Rate by Industry Sector**

Exhibit 17 shows simple average default rates by industry sector.

Caveat: The simple average default rates included in Exhibit 17 should be interpreted with caution, since (1) they do not reflect the risk profile of individual projects, which is likely to change based on time from origination; and (2) they do not reflect the time-weighted population of active projects exposed to default.

## EXHIBIT 17

**Average Default Rates by Industry Sector**

Industry	Projects (Note 1)	Basel II Definition of Default		Moody's Definition of Default	
		Defaults (Note 2)	Average Default Rate %	Defaults (Note 3)	Average Default Rate %
Chemicals Production	135	14	10.4%	14	10.4%
Infrastructure	1563	82	5.2%	60	3.8%
Leisure & Recreation	120	10	8.3%	10	8.3%
Manufacturing	56	12	21.4%	12	21.4%
Media & Telecom	359	43	12.0%	40	11.1%
Metals & Mining	238	31	13.0%	28	11.8%
Oil & Gas	720	44	6.1%	41	5.7%
Other	34	1	2.9%	1	2.9%
Power	2083	145	7.0%	125	6.0%
<b>Total</b>	<b>5308</b>	<b>382</b>	<b>N/A</b>	<b>331</b>	<b>N/A</b>
<b>Average</b>	<b>N/A</b>	<b>N/A</b>	<b>7.2%</b>	<b>N/A</b>	<b>6.2%</b>

Notes:

- 1) Based on 5,308 projects
- 2) Based on 382 Defaults (BII)
- 3) Based on 331 Defaults (MDY)

It is apparent that simple average default rates calculated for the Study Data Set vary significantly by industry – for example simple average default rates for the Infrastructure industry sector are substantially lower than simple average default rates for the Manufacturing industry sector.

**7.3.1 PFI/PPPs**

The Study Data Set contains 1,296 projects identified as PFI/PPP projects by the Data Consortium, many of which fall within the Infrastructure industry sector. We note, however, that there is some subjectivity in the classification of projects as PFI/PPPs. The Study Data Set contains 57 Defaults (BII) and 39 Defaults (MDY) of PFI/PPP projects, corresponding to simple average default rates of 4.4% (BII) and 3.0% (MDY).

The simple average default rates of 4.4% (BII) and 3.0% (MDY) for PFI/PPP projects are below the corresponding simple average default rates of 5.2% (BII) and 3.8% (MDY) for the Infrastructure industry sector, and are substantially below the simple average default rates of 7.2% (BII) and 6.2% (MDY) for the whole Study Data Set.

These results are also consistent with the view held by many PFI/PPP proponents that default risk for such projects is low, especially where project revenues are based on availability-based payment mechanisms as opposed to being exposed to market risk. We comment further on our analysis of PFI/PPP projects in Appendix H (Default and Recovery Analysis for PFI/PPP projects).

**7.3.2 Power**

The Power industry sector comprises 2,083 projects with 145 Defaults (BII) and 125 Defaults (MDY) in aggregate, corresponding to simple average default rates of 7.0% (BII) and 6.0% (MDY) respectively. However, we highlight a marked difference in default rates for US Power and Non-US Power.

Exhibit 17.1 shows simple average default rates within the Power industry sector, split by US Power and Non-US Power:

## EXHIBIT 17.1

**Average Default Rates within the Power Industry Sector – US/Non US**

Power	Projects (Note 1)	Basel II Definition of Default		Moody's Definition of Default	
		Defaults (Note 2)	Average Default Rate %	Defaults (Note 3)	Average Default Rate %
US Power	723	70	9.7%	60	8.3%
Non-US Power	1360	75	5.5%	65	4.8%
<b>Total Power</b>	<b>2083</b>	<b>145</b>	<b>7.0%</b>	<b>125</b>	<b>6.0%</b>
<b>Total Projects</b>	<b>5308</b>	<b>382</b>	<b>7.2%</b>	<b>331</b>	<b>6.2%</b>
<b>Concentration of Power</b>	<b>39.2%</b>	<b>38.0%</b>	N/A	<b>37.8%</b>	N/A

## Notes:

- 1) Based on 5,308 projects
- 2) Based on 382 Defaults (BII), of which 145 are Power Defaults
- 3) Based on 331 Defaults (MDY) of which 125 are Power Defaults

- » The US Power sub-sector comprises 723 projects with 70 Defaults (BII) and 60 Defaults (MDY), corresponding to simple average default rates of 9.7% (BII) and 8.3% (MDY), substantially higher than the simple average default rates of 7.2% (BII) and 6.2% (MDY) for the whole Study Data Set.
- » The Non-US Power sub-sector comprises 1,360 projects with 75 Defaults (BII) and 65 Defaults (MDY), corresponding to simple average default rates of 5.5% (BII) and 4.8% (MDY), substantially lower than US Power.

We comment further on default experience in the Power industry sector in Section 7.4 (Incidence of Defaults).

Exhibit 18 tabulates cumulative default rates (BII) between 1990-2013, broken down by industry sector. Exhibit 18A tabulates cumulative default rates (MDY) between 1990-2013, broken down by industry sector.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of Exhibits 18 and 18A has been withheld at the request of the Data Consortium.

Caveat: The chart of cumulative default rates shown in Exhibits 19 should be interpreted with caution, since in certain instances sample sizes are small and do not support statistically robust conclusions.

Exhibit 19 shows cumulative default rates (BII) by industry sector.

EXHIBIT 19

### Cumulative Default Rates (BII) by Industry sector

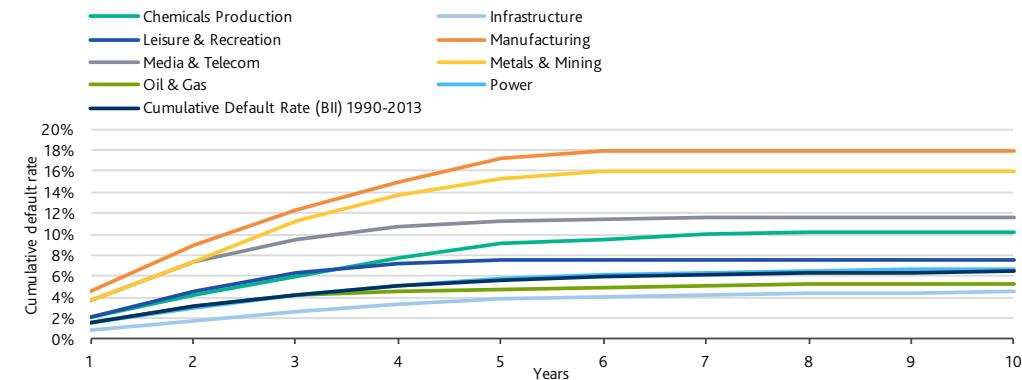


Exhibit 19 shows cumulative default rates (BII) for each industry sector. Most of the industry subsets flatten out after 5-6 years except for Chemicals Production and Media & Telecom. Chemicals Production flattens out after year 8. The default rate for Chemicals Production is distorted due to the low number of project defaults (there was 1 default before 1996 and an average of 1.5 defaults per year after 1996). Media & Telecom flattens out after year 6. Most of the Media & Telecom defaults occurred within the first four years; however, one project defaulted after 6 years. We anticipate that additional data will improve the statistical robustness of a future analysis based on an updated and expanded data set.

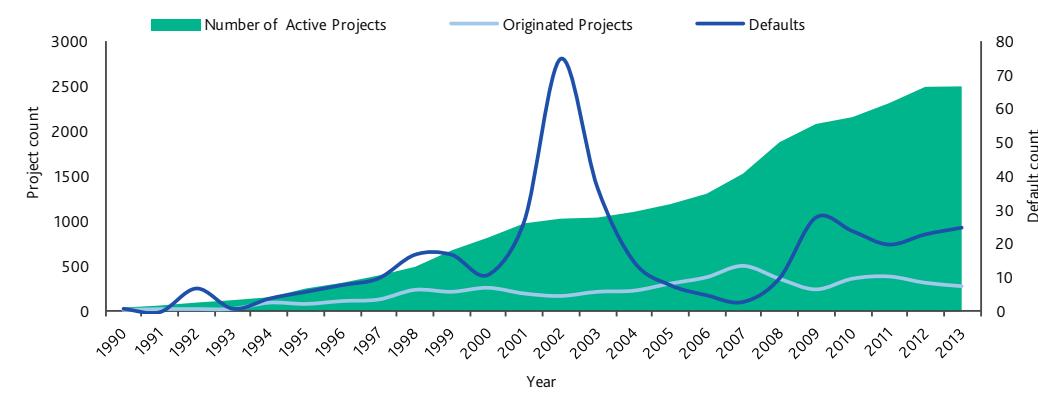
The 10-year cumulative default rate for the Infrastructure industry sector, which represents approximately 29% of the Study Data Set by number of projects, is 4.5%, better than the Study average of 6.4%. We comment further on the stress affecting the Infrastructure industry sector 2009-13 in section 7.4.3.

#### 7.4 Incidence of Defaults (Basel II Definition of Default)

Exhibit 20 shows the incidence of project loans originated, active loans as at January 1 in the relevant year, and the incidence of Defaults (BII).

EXHIBIT 20

### Incidence of projects originated, active and defaulted by year



Supporting data for Exhibit 20 is set out in Exhibit 21.

The incidence of Defaults (BII) spiked sharply in 2002 and 2003. This may be partially explained by the stress affecting the Power and Media & Telecom industry sectors between 2001-04 – we comment further in sections 7.4.1 and 7.4.2.

The Study shows that the incidence of Defaults (BII) in 2013 continued at a similar elevated level to that observed each year from 2009-12. We comment further on the sectoral breakdown of Defaults (BII) in section 7.4.3 below.

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EXHIBIT 21

**Supporting Data for Exhibit 20**

Year of Origination	Originated Projects	Basel II Definition of Default		Moody's Definition of Default	
		Number of Active Projects	Defaults	Number of Active Projects	Defaults
1989 and prior	47				
1990	24	47	1	47	1
1991	33	70	0	70	0
1992	34	103	7	103	7
1993	36	130	1	130	1
1994	103	162	4	162	4
1995	89	259	6	259	6
1996	120	323	8	323	8
1997	137	404	10	404	8
1998	241	500	17	502	13
1999	220	683	17	688	15
2000	263	825	11	832	11
2001	201	984	27	991	26
2002	175	1036	75	1043	72
2003	220	1048	37	1057	34
2004	232	1111	15	1122	12
2005	308	1197	8	1209	4
2006	377	1313	5	1324	5
2007	499	1537	3	1547	2
2008	360	1886	10	1895	9
2009	246	2089	28	2099	19
2010	361	2165	24	2184	23
2011	385	2319	20	2336	16
2012	317	2502	23	2521	14
2013	280	2507	25	2533	21
<b>Total</b>	<b>5308</b>	<b>N/A</b>	<b>382</b>	<b>N/A</b>	<b>331</b>

Note:

(1) The number of active projects is stated as at January 1 of the relevant year

#### 7.4.1 Incidence of Defaults within certain industry sectors (Basel II Definition of Default).

Exhibit 22 shows the incidence of Defaults (BII) for the following industry sectors: (1) Power, (2) Media & Telecom, (3) Infrastructure and (4) Other; and illustrates their respective contributions to aggregate Defaults (BII).

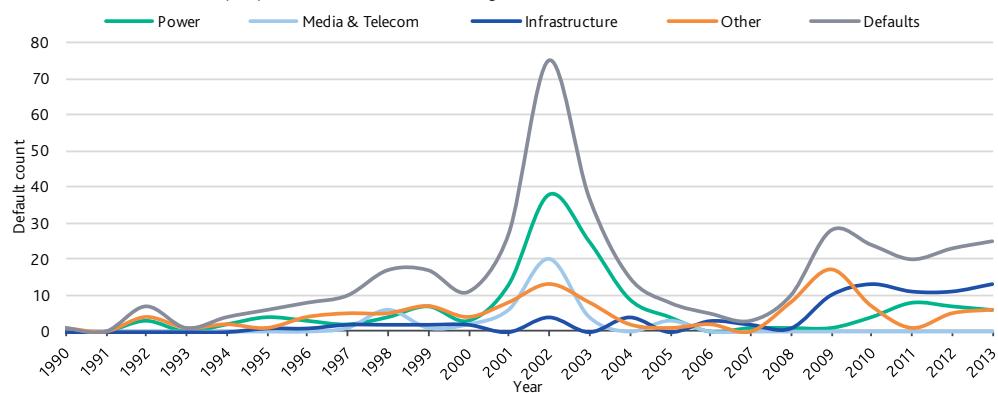
It is apparent from Exhibit 22 that the spike in Defaults (BII) in 2002/3 was substantially due to stress affecting the Power and Media & Telecom industry sectors.

Supporting data for Exhibit 22 is tabulated in Exhibit 23

However, Exhibit 22 also shows an increased incidence of Defaults (BII) in 2008-13. As discussed in section 7.4.3 below it is apparent that Defaults (BII) occurring in 2008-13 were concentrated in the Oil & Gas, Infrastructure and Power industry sectors.

EXHIBIT 22

#### Incidence of Defaults (BII) within certain industry sectors



#### 7.4.2 Incidence of Defaults 2001-2004 (Basel II Definition of Default)

Exhibit 23 shows that of the 145 Defaults (BII) in the Power industry sector, 85 occurred between 2001-04 representing 22.3% of all 382 Defaults in the Study Data Set. Exhibit 23 also shows that of the 43 Defaults (BII) in the Media and Telecom industry sector, 30 occurred between 2001-03 representing 7.9% of all 382 Defaults (BII) in the Study Data Set.

In relation to the stress affecting the Power industry sector during 2001-04, we observe:

- » As noted in Exhibit 17.1, the Power industry sector comprises 2,083 projects and 145 Defaults (BII), corresponding to a simple average default rate of 7.0%.
- » The analysis at Exhibit 17.1 shows that simple average default rates for US Power have been markedly higher than for non-US Power over the period of the Study:

- The US Power sub-sector comprises 723 projects, and 70 Defaults (BII), corresponding to a simple average default rate of 9.7%, somewhat higher than the simple average default rate of 7.2% for the whole Study Data Set.
  - The Non-US Power sub-sector comprises 1,360 projects and 75 Defaults (BII), corresponding to a simple average default rate of 5.5%, somewhat lower than the simple average default rate of 7.2% for the whole Study Data Set.
- » However, further analysis of the incidence of Defaults (BII) in the US Power and non-US Power sub-sectors show that the concentration of defaults between 2001-04 is very high, particularly for non-US Power:
- The 70 Defaults (BII) in the US Power sub-sector represent 18.3% of all 382 Defaults (BII) in the Study Data Set. Out of these 70 Defaults (BII), 40 occurred between 2001-04, representing 10.5 % of all 382 Defaults (BII) in the Study Data Set, and 57.1% of all Defaults (BII) in the US Power sub-sector.
  - The 75 Defaults (BII) in the Non-US Power sub-sector represent 19.6% of all 382 Defaults (BII) in the Study Data Set. Out of these 75 Defaults (BII), 45 occurred between 2001-04, representing 11.8% of all 382 Defaults (BII) in the Study Data Set, and 60.0% of all Defaults (BII) in the non-US Power sub-sector.

Exhibit 23 tabulates supporting data for Exhibit 22.

## EXHIBIT 23

## Supporting Data for Exhibit 22 – Defaults split by Power, Media &amp; Telco, Infrastructure and Other

Year of Default	Basel II Definition of Default					Moody's Definition of Default				
	Power	Media & Telecom	Infrastructure	Other	Defaults	Power	Media & Telecom	Infrastructure	Other	Defaults
1990	0	0	0	1	1	0	0	0	1	1
1991	0	0	0	0	0	0	0	0	0	0
1992	3	0	0	4	7	3	0	0	4	7
1993	0	0	0	1	1	0	0	0	1	1
1994	2	0	0	2	4	2	0	0	2	4
1995	4	0	1	1	6	4	0	1	1	6
1996	3	0	1	4	8	3	0	1	4	8
1997	2	1	2	5	10	1	1	2	4	8
1998	4	6	2	5	17	3	4	1	5	13
1999	7	1	2	7	17	6	1	1	7	15
2000	3	2	2	4	11	3	2	2	4	11
2001	13	6	0	8	27	12	6	0	8	26
2002	38	20	4	13	75	35	20	4	13	72
2003	25	4	0	8	37	23	4	0	7	34
2004	9	0	4	2	15	7	0	3	2	12
2005	4	3	0	1	8	1	2	0	1	4
2006	0	0	3	2	5	0	0	3	2	5
2007	1	0	2	0	3	0	0	2	0	2
2008	1	0	1	8	10	1	0	0	8	9
2009	1	0	10	17	28	1	0	4	14	19
2010	4	0	13	7	24	5	0	11	7	23
2011	8	0	11	1	20	5	0	9	2	16
2012	7	0	11	5	23	3	0	6	5	14
2013	6	0	13	6	25	7	0	10	4	21
<b>Total</b>	<b>145</b>	<b>43</b>	<b>82</b>	<b>112</b>	<b>382</b>	<b>125</b>	<b>40</b>	<b>60</b>	<b>106</b>	<b>331</b>

Notes:

- 1) 2008 Other includes 6 Oil & Gas Defaults (BII)
- 2) 2009 Other includes 12 Oil & Gas Defaults (BII)
- 3) 2010 Other includes 4 Oil & Gas Defaults (BII)

#### 7.4.3 Incidence of Defaults 2008-2013 (Basel II Definition of Default)

Exhibit 23.1 shows the breakdown of Defaults during 2008-13, split by the following industry sectors: (1) Oil & Gas, (2) Infrastructure, (3) Power and (4) Other.

In relation to the stress affecting the Oil & Gas industry sector between 2008-13 we observe:

- » The Study Data Set contains 44 Defaults (BII) in the Oil & Gas industry sector, representing 11.5% of all 382 Defaults (BII) in the Study Data Set.
- » Out of these 44 Defaults (BII), 22 occurred between 2008-10, representing 50.0% of all Defaults (BII) in the Oil & Gas industry sector.

In relation to the stress affecting the Infrastructure industry sector between 2009-13 we observe:

- » The Study Data Set contains 82 Defaults (BII) in the Infrastructure industry sector, representing 21.5% of all 382 Defaults (BII) in the Study Data Set. 58 of these Defaults (BII) occurred between 2009-13.
- » Out of the 58 Defaults that occurred in the Infrastructure industry sector between 2009-13:
  - 37 were transportation projects, primarily underutilised toll roads
  - 12 were ports projects
- » Based on Moody's definition of default there were 40 Defaults (MDY) that occurred in the Infrastructure industry sector between 2009-13, about 30% fewer than the 58 Defaults (BII) during the same period based on the Basel II definition of default. In broad terms, the Basel II definition of default not only captures the events which are included in our definition of default, but also captures a wider range of defaults, including circumstances in which the reporting lender considers that the obligor is unlikely to pay its credit obligations in full. For example, under the Basel II definition, defaulted credits would also include debt obligations where (1) the bank puts the credit obligation on non-accrued status; or (2) the bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality.

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EXHIBIT 23.1

**Defaults occurring 2008-2013 split by Oil & Gas, Infrastructure, Power and Other**

Year of Default	Basel II Definition of Default					Moody's Definition of Default				
	Oil & Gas	Infra	Power	Other	Defaults	Oil & Gas	Infra	Power	Other	Defaults
2008	6	1	1	2	10	6	0	1	2	9
2009	12	10	1	5	28	9	4	1	5	19
2010	4	13	4	3	24	4	11	5	3	23
2011	1	11	8	0	20	2	9	5	0	16
2012	1	11	7	4	23	1	6	3	4	14
2013	2	13	6	4	25	2	10	7	2	21
Total	<b>26</b>	<b>59</b>	<b>27</b>	<b>18</b>	<b>130</b>	<b>24</b>	<b>40</b>	<b>22</b>	<b>16</b>	<b>102</b>

## 8. Recovery Analysis

### 8.1 Distribution of Ultimate Recovery Rates

Exhibit 24 tabulates the distribution of recovery rates for Ultimate Recoveries and Distressed Sales in the Study Data Set:

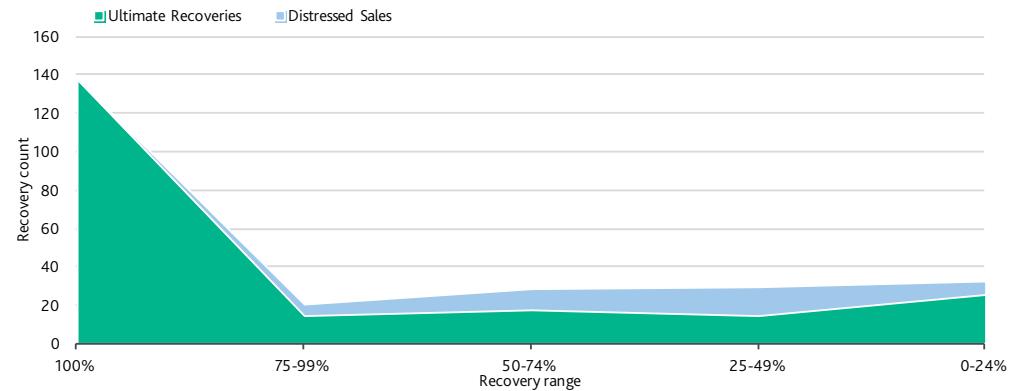
- » The average recovery rate for Ultimate Recoveries of 80.3% (BII) and 77.3% (MDY), exceeds the average recovery rate for Distressed Sales of 50.3% (BII) and 47.4% (MDY). There are many reasons why an individual lender may choose to exit from a defaulted loan exposure via a distressed sale rather than participate in a work out – see Section 8.8 (Cash-out or Work-out) for further comment.
- » The majority of Ultimate Recoveries, 65.1% (BII) and 62.3% (MDY), were fully restructured or repaid with no economic loss calculated on a Net Present Value basis, as described in section 4.3.
- » Just 34.9% (BII) and 37.7% (MDY) of Ultimate Recoveries experienced an economic loss calculated on a Net Present Value basis, with average ultimate recovery rates for these projects of 43.6% (BII) and 39.7% (MDY).

EXHIBIT 24  
Distribution of Recovery Rates

Recovery Rates	Basel II Definition of Default		Moody's Definition of Default	
	Ultimate Recoveries	Distressed Sales	Ultimate Recoveries	Distressed Sales
100%	138		101	
75-99%	15	6	10	4
50-74%	18	11	14	10
25-49%	15	15	13	13
0-24%	26	7	24	7
<b>Total</b>	<b>212</b>	<b>39</b>	<b>162</b>	<b>34</b>
<b>Average recovery rate</b>	<b>80.3%</b>	<b>50.3%</b>	<b>77.3%</b>	<b>47.4%</b>
<hr/>				
% of projects fully restructured without loss	65.1%	0.0%	62.3%	0.0%
Average recovery rate for projects experiencing a loss	43.6%	50.3%	39.7%	47.4%

Exhibit 25 charts the distribution of recovery rate data presented in Exhibit 24 based on the Basel II definition of default.

EXHIBIT 25  
Distribution of Recovery Rates (BII)



The distribution of recovery rates for Ultimate Recoveries shows a higher proportion of transactions at either end of the recovery spectrum, which is consistent with our observations of ultimate recovery rates for corporate loans.

The Study Data Set also includes a significant number of Ultimate Recoveries with ultimate recovery rates in the 0%-24% range which points to a bimodal distribution of recovery rates which we have also observed as a feature of corporate loan ultimate recoveries. For project finance loans, very low ultimate recovery rates might be indicative of project abandonment, or perhaps the occurrence of extreme loss scenarios originally assessed as low probability.

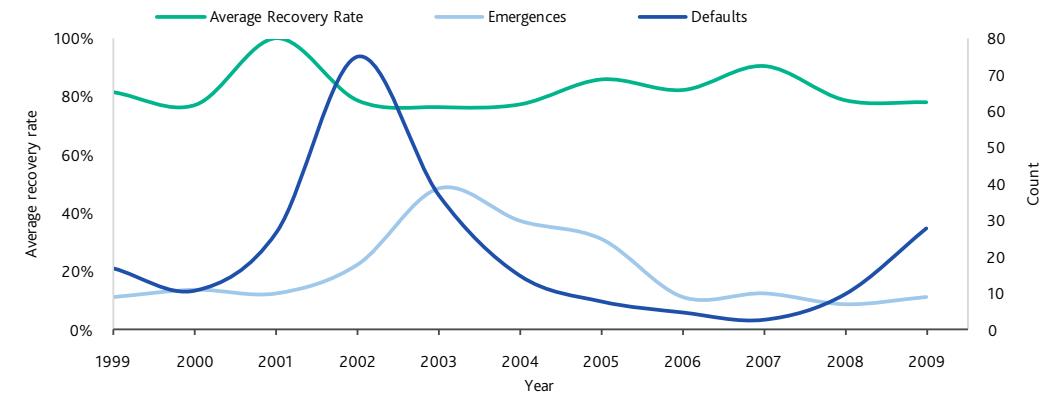
## 8.2 Ultimate Recoveries by year of emergence (Basel II Definition of Default)

Exhibit 26 displays average ultimate recovery rates for Ultimate Recoveries (BII) by year of emergence from default.

- » Average ultimate recovery rates for project finance bank loans emerging from default between 1999-2009 were in the range of 76.7%-100.0% (BII) and 71.6%-100.0% (MDY), but were substantially independent both of the economic cycle at default and the economic cycle at emergence throughout this period. Calendar years 2010-13 and calendar years prior to 1999 are excluded from this observation on the basis that the number of projects emerging from default in each of those years is relatively small, although the average ultimate recovery rate (BII) of 29.4% for 2013 (see Exhibit 27) based on five projects that emerged from default appears to be unusually low..
- » This observation contrasts with Moody's research on corporate loans and bonds which has previously found that ultimate recovery rates for defaulted corporate debt facilities are negatively correlated with default rates (i.e., ultimate recovery rates fall as default rates rise).<sup>20</sup>
- » In section 7.4.3 above we highlighted the stress affecting the Infrastructure industry sector between 2009-13, as illustrated by the 58 Defaults (BII) reported during that period. Only a few of these defaulted projects have emerged from default, and we will monitor the relationship between default rates and ultimate recovery rates in this sector with interest.

EXHIBIT 26

### Average Recovery Rates for Ultimate Recoveries (BII) by Year of Emergence



<sup>20</sup> See Moody's Special Comment: "[Syndicated Bank Loans: 2008 Default Review and 2009 Outlook](#)," March 2009

Exhibit 27 tabulates average recovery rates for Ultimate Recoveries by year of emergence, and shows the number of Emergences and Defaults in each year

As noted above, the average ultimate recovery rate (BII) of 29.4% for 2013 appears to be unusually low. This result is based on five projects that emerged from default - two power projects, two infrastructure projects (one of which was reported as a 100% loss) and an oil & gas project (reported as a 100% loss). The underlying data does not suggest an emerging trend, and hence seems to be an unusual outcome. We note that any recoveries on the two projects reported as 100% losses would improve the average ultimate recovery rate.

## EXHIBIT 27

**Average Recovery Rates for Ultimate Recoveries by Year of Emergence**

Year of Emergence	Basel II Definition of Default		Moody's Definition of Default		
	Average Recovery Rate (Note 1)	Emergences	Defaults	Study Data Set Average Recovery Rate	Count of Emergences
1990			1		1
1991			0		0
1992	73.5%	2	7	73.5%	2
1993	100.0%	1	1	100.0%	1
1994	100.0%	2	4	100.0%	2
1995	92.0%	1	6	92.0%	1
1996	61.6%	4	8	61.6%	4
1997	79.1%	4	10	72.2%	3
1998	72.3%	1	17		13
1999	81.6%	9	17	72.1%	4
2000	77.4%	11	11	83.0%	10
2001	100.0%	10	27	100.0%	8
2002	78.9%	18	75	71.6%	13
2003	76.7%	39	37	72.6%	31
2004	77.6%	30	15	74.7%	25
2005	86.0%	25	8	83.9%	18
2006	82.4%	9	5	77.4%	7
2007	90.6%	10	3	86.5%	7
2008	79.0%	7	10	75.5%	6
2009	78.3%	9	28	72.1%	7
2010	100.0%	4	24	100.0%	3
2011	81.8%	5	20	81.8%	5
2012	86.0%	6	23	57.9%	2
2013	29.4%	5	25	36.5%	3
	<b>80.3%</b>	<b>212</b>	<b>382</b>	<b>77.3%</b>	<b>162</b>
					331

## Notes:

- 1) Based on 212 Ultimate Recoveries (BII)
- 2) Based on 162 Ultimate Recoveries (MDY)

### 8.3 Distribution of certain Defaults and Ultimate Recoveries by region

Exhibit 28 tabulates certain Defaults and Ultimate Recoveries by region. It should be noted that some regions have small sample sizes and the results presented in the Study may change significantly as the Study Data Set is expanded and updated.

EXHIBIT 28

#### Distribution of certain Defaults and Ultimate Recoveries by region

Region	Basel II Definition of Default				Moody's Definition of Default					
	Defaults	Average Years to Default	Defaults (Note 1)	Average Ultimate Recovery Rate (Note 1)	Average Years to Emergence (Note 1)	Defaults	Average Years to Default	Defaults (Note 2)	Average Ultimate Recovery Rate (Note 2)	Average Years to Emergence (Note 2)
Africa	4	3.1	1	32.0%	7.1	2	2.3	1	32.0%	7.1
Eastern Europe	7	3.4	3	100.0%	2.0	7	3.4	3	100.0%	2.0
Latin America	52	3.0	24	86.3%	2.4	50	3.1	20	83.5%	2.6
Middle East	4	3.2	3	100.0%	1.8	4	3.2	3	100.0%	1.8
North America	132	3.8	77	78.0%	2.1	116	3.8	55	75.8%	2.1
Oceania	22	3.6	13	85.2%	2.0	21	3.4	11	82.5%	1.9
South East Asia	47	3.5	36	79.9%	3.1	44	3.6	30	77.9%	3.0
Western Europe	114	3.8	55	78.8%	1.9	87	3.9	39	71.8%	2.0
<b>Grand Total</b>	<b>382</b>	<b>3.6</b>	<b>212</b>	<b>80.3%</b>	<b>2.2</b>	<b>331</b>	<b>3.6</b>	<b>162</b>	<b>77.3%</b>	<b>2.3</b>

Notes:

- 1) Based on 212 Ultimate Recoveries (BII)
- 2) Based on 162 Ultimate Recoveries (MDY)

Based on the Basel II definition of default:

- » The data shows a broad consistency of average ultimate recovery rates between Latin America, North America, South East Asia and Western Europe, representing a total of 192 out of 212 Ultimate Recoveries (BII) lying in the range of 78.0%-86.3%. Other regions have sample sizes which are too small to support statistically robust conclusions about average ultimate recovery rates in each of those regions.
- » The data also shows some variation of average years to default for Latin America, North America, South East Asia and Western Europe, lying in the range of 3.0 to 3.8 years. Other regions have sample sizes which are too small to support statistically robust conclusions about average years to default in each of those regions.
- » The data shows a marked variation of average years to emergence from default by region. For Latin America, North America, South East Asia and Western Europe, average years to emergence from default lie in the range of 1.9 to 3.1 years. There appears to be a difference between average years to emergence from default (1) for North America (2.1 years) and Western Europe (1.9 years); and (2) for regions which include a number of developing countries, for example Latin America (2.4 years) and South East Asia (3.1 years). This difference may be due to differences in institutional structures and legal process between these regions. Other regions have sample sizes which are too small to support statistically robust conclusions about average years to emergence from default in each of those regions.

### 8.3.1 Distribution of certain Defaults and Ultimate Recoveries by OECD/non-OECD countries

Exhibit 29 tabulates certain Defaults and Ultimate Recoveries by OECD/non-OECD countries. Exhibit 29 has been prepared on the basis of the 34 OECD member countries as at 31 December 2013 – the list of OECD members is included in Appendix B (Glossary)

EXHIBIT 29

#### Distribution of certain Defaults and Ultimate Recoveries by OECD/non-OECD countries

Region	Basel II Definition of Default					Moody's Definition of Default				
	Defaults	Average Years to Default	Defaults (Note 1)	Average Ultimate Recovery Rate (Note 1)	Average Years to Emergence (Note 1)	Defaults	Average Years to Default	Defaults (Note 2)	Average Ultimate Recovery Rate (Note 2)	Average Years to Emergence (Note 2)
OECD	277	3.8	150	80.1%	2.0	233	3.8	110	76.8%	2.1
NON-OECD	105	3.3	62	80.9%	2.9	98	3.3	52	78.3%	2.9
<b>Grand Total</b>	<b>382</b>	<b>3.6</b>	<b>212</b>	<b>80.3%</b>	<b>2.2</b>	<b>331</b>	<b>3.6</b>	<b>162</b>	<b>77.3%</b>	<b>2.3</b>

Notes:

- 1) Based on 212 Ultimate Recoveries (BII)
- 2) Based on 162 Ultimate Recoveries (MDY)

Based on the Basel II definition of default:

- » The data shows a slightly longer average time to default for projects located in OECD countries compared with non-OECD countries.
- » The data indicates a broad consistency of average ultimate recovery rates between OECD and non-OECD countries. This result points to the effectiveness of the structural features which characterise project finance and mitigate LGD, particularly in emerging market transactions.
- » However, the data shows a marked difference between average years to emergence from default for OECD countries (2.0 years) and non-OECD countries (2.9 years). As noted above, this result points to differences in institutional structures and legal process between developed and developing countries.

#### 8.4 Distribution of certain Defaults and Ultimate Recoveries by industry

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of certain analysis within this section has been withheld at the request of the Data Consortium.

Exhibit 30 shows average recovery rates for Ultimate Recoveries (BII) by industry sector. It should be noted that some industry sectors have small sample sizes and the results presented in the Study may change significantly when the Study Data Set is expanded and updated.

## EXHIBIT 30

**Average Recovery Rates for Ultimate Recoveries (BII) - by Industry Sector**

Industry	Average Recovery				
	0%-20%	20%-40%	40%-60%	60%-80%	80%-100%
Chemicals Production					✓
Infrastructure				✓	
Leisure & Recreation				✓	
Manufacturing			✓		
Media & Telecom				✓	
Metals & Mining				✓	
Oil & Gas				✓	
Power					✓

Based on the Basel II definition of default:

- » Average ultimate recovery rates differ between industry sectors. Average ultimate recovery rates are disclosed by industry sector within broad ranges - more detailed information has been withheld at the request of the Data Consortium.
- » The average ultimate recovery rate (BII) for the Infrastructure industry sector lies within a range of 60%-80%, a deterioration compared with that of our previous study which was within a range of 80%-100%.
- » The average ultimate recovery rate (BII) for the Manufacturing industry sector lies within a range of 40%-60%, a deterioration compared with that of our previous study which was within a range of 60%-80%.
- » The data shows a divergence of average years to default between industry sectors (ignoring a single Default (BII) in "Other") within a range of 2.5 to 4.5 years. It is perhaps unsurprising that the average time to default differs by industry, since (1) we would expect to observe some consistency of bankable risk appetite and transaction features within each industry sector; but (2) we would also expect to see heterogeneous risk exposures and divergence of transaction features across different industries, which reflect the specific characteristics of each industry.
- » The data also shows a divergence of average years to emergence from default between industry sectors for Chemicals Production, Infrastructure, Manufacturing, Media & Telecom, Metals & Mining, Oil & Gas, and Power, within a range of 1.4 to 3.7 years. For the reasons noted above, we would expect to observe some differences across industry sectors. Other industry sectors have sample sizes which are too small to support statistically robust conclusions about average years to emergence in each of those industries.

#### 8.4.1 PFI/PPPs

The Study Data Set contains 1,296 projects identified as PFI/PPP projects by the Data Consortium, many of which fall within the Infrastructure industry sector. We note, however, that there is some subjectivity in the classification of projects as PFI/PPPs.

- » The Study Data Set contains 57 Defaults (BII) and 39 Defaults (MDY) in the PFI/PPP sub-sector
- » The Study Data Set contains 15 Ultimate Recoveries (BII) and 11 Ultimate Recoveries (MDY) in the PFI/PPP sub-sector

We comment further on our analysis of the PFI/PPP sub-sector in Appendix H (Default and Recovery Analysis for PFI/PPP projects).

### 8.5 Distribution of certain Defaults and Ultimate Recoveries by construction/operations phase

Exhibit 31 tabulates certain Defaults and Ultimate Recoveries based on whether a loan default occurred during the relevant project's construction or operations phase i.e., whether the default occurred before or after project completion. The Basel II default date was used in the analysis to calculate years to default for projects under the Basel II definition of default; whereas the actual payment default date was used to calculate years to default under the Moody's definition of default.

Exhibit 31

#### Distribution of Defaults and Ultimate Recoveries by project phase

Project Phase	Basel II Definition of Default				Moody's Definition of Default					
	Defaults (Note 1)	Average Years to Default (Note 1)	Defaults (Note 2)	Average Ultimate Recovery Rate (Note 2)	Average Years to Emergence (Note 2)	Defaults (Note 3)	Average Years to Default (Note 3)	Defaults (Note 4)	Average Ultimate Recovery Rate (Note 4)	Average Years to Emergence (Note 4)
Construction	51	2.7	22	69.0%	2.3	43	2.7	17	60.1%	2.4
Operations	330	3.8	189	82.0%	2.2	287	3.8	144	79.8%	2.3
<b>Grand Total</b>	<b>381</b>	<b>3.6</b>	<b>211</b>	<b>80.6%</b>	<b>2.2</b>	<b>330</b>	<b>3.6</b>	<b>161</b>	<b>77.7%</b>	<b>2.3</b>

##### Notes:

- 1) Based on 381 Defaults (BII), corresponding to 211 Ultimate Recoveries (BII), 39 Distressed Sales (BII) and 131 Defaults in Work-Out (BII)
- 2) Based on 211 Ultimate Recoveries (BII)
- 3) Based on 330 Defaults (MDY), corresponding to 161 Ultimate Recoveries (MDY), 34 Distressed Sales (MDY) and 135 Defaults in Work-Out (MDY)
- 4) Based on 161 Ultimate Recoveries (MDY)

- » The data shows a material difference between (1) the average ultimate recovery rate for construction phase defaults of 69.0% (BII) and 60.1% (MDY); and (2) the average ultimate recovery rate for operations phase defaults of 82.0% (BII) and 79.8% (MDY). It is interesting to note that project finance lenders typically seek loan margins which are higher during the construction phase compared to during early stage operations i.e., sector banks often price-in incremental risk during a project's construction phase.
- » The data shows a difference between (1) the average years to default for construction phase defaults of 2.7 years (BII) and 2.7 years (MDY); and (2) the average years to default for operations phase defaults of 3.8 years (BII) and 3.8 years (MDY). In theory, we would expect construction phase defaults to cluster around key construction milestones and/or completion dates which is when success or failure becomes apparent. Moreover, this may explain why the average years to default for construction phase defaults (2.7 years (BII) and 2.7 years (MDY)) is consistent with construction programmes which are often scheduled to complete within 2-4 years from financial close. However, the average years to default for projects in operations (3.8 years (BII) and 3.8 years (MDY)) is surprisingly short. It is possible that some projects are scraping through construction completion and then defaulting, potentially for reasons related to poor execution of the construction phase, technical or environmental problems. It is also possible that other projects subject to demand or volume risk may have defaulted where actual demand or volume levels are materially below projected levels. We include preliminary analysis of causes of default in Appendix J.
- » The data also shows a similarity between the average years to emergence for construction phase Defaults (BII) of 2.3 years and operations phase Defaults (BII) of 2.2 years. These results do not entirely align with our expectation that a work out process following a construction phase default would likely be more complex and take longer than a work out process following an operations phase default. It is interesting to note that the Study Data Set contains several construction phase projects that defaulted just prior to commercial operations and were subsequently restructured within a very short time frame. These incidents have lowered the average time to emergence for construction phase Defaults.

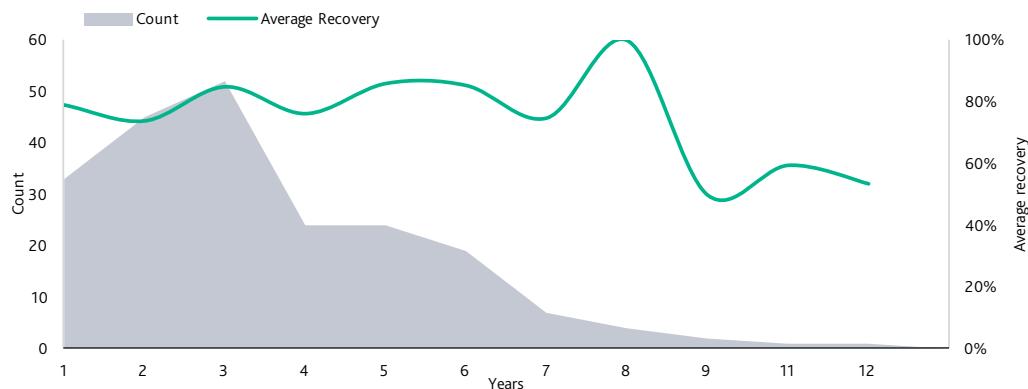
## 8.6 Average ultimate recovery rates by number of years to default (Basel II Definition of Default)

Exhibit 32 charts average ultimate recovery rates for the 212 Ultimate Recoveries (BII) by time to default.

Contrary to our previous study which had suggested that average ultimate recovery rates were higher for projects that default later in the project life cycle, the Study Data Set shows no discernable relationship between average ultimate recovery rates and when the defaults occurred. In making this observation, we have ignored certain Defaults (BII) occurring eight or more years after project origination, since sample sizes are too small to support statistically robust conclusions about average ultimate recovery rates in those years.

EXHIBIT 32

### Average ultimate recovery rates by number of years to default (Basel II Definition of Default)



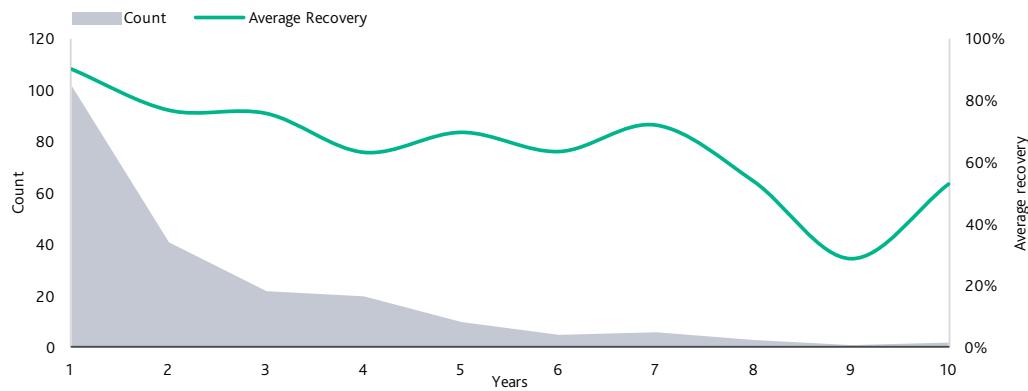
## 8.7 Average ultimate recovery rates by number of years to emergence (Basel II Definition of Default)

Exhibit 33 charts average ultimate recovery rates for the 212 Ultimate Recoveries (BII) by time to emergence from default.

The data indicates that average ultimate recovery rates are lower for project finance bank loans that take longer to emerge from default. However the results shown in Exhibit 33 should be interpreted with caution where the number of loans emerging from default after  $t$  years spent in default are low (i.e., for  $t \geq 8$  years)

EXHIBIT 33

### Average ultimate recovery rate by number of years to emergence (Basel II Definition of Default)



### 8.8 Cash-out or Work-out?

A key conclusion for the Study Data Set is that the average recovery rate for Ultimate Recoveries of 80.3% (BII) and 77.3% (MDY) exceeds the average recovery rate for Distressed Sales of 50.3% (BII) and 47.4% (MDY) (see Exhibit 24).

Hence the data shows that when a lender chooses to realise recoveries from a defaulted loan via a distressed sale, the average economic loss is likely to be substantially greater than if the lender "worked-out" the defaulted loan.

This result is not unexpected since we have observed similar results for corporate bank loans. Indeed, our Ultimate LCD Database shows that ultimate recoveries for loans exceeded the corresponding trading price 30 days after default in most cases. However, there are many reasons why an individual lender may choose to exit from a defaulted loan exposure via a distressed sale rather than participate in a work out. For example:

- » Risk aversion: The work out process carries a number of risks and uncertainties for lenders, including:
  - Uncertainty over the timing of emergence from default following a work-out
  - Uncertainty over the timing and amount of ultimate recovery cash flows
  - Potential exposure to incremental costs or cash calls
  - Potential exposure to liability following assumption of control of a defaulted project
  - Portfolio exposure limits may constrain a lender's ability to work-out multiple defaults simultaneously
- » Resource intensive nature of work-outs:
  - The cost of deploying suitably experienced staff to monitor and participate in a work-out process can be considerable
  - The consumption of senior management and credit oversight time may also be a significant burden
- » Preferences: Time-value of money; cash flow and accounting impact
  - Based on an analysis of the likely ultimate recovery prospects and risks, the lender may view a prospective bidder's price as attractive
  - An exit from a defaulted loan position via a distressed sale will accelerate cash flow recoveries, compared to a work-out process. As indicated in Section 8.3, for the Study Data Set, the average time to emergence from default for Ultimate Recoveries (BII) is 2.2 years, although the timeframe for emergence from default may vary significantly between projects
  - The decision to exit from a defaulted loan position via a distressed sale will almost certainly result in a different P&L impact compared to a work-out process. The significance of this differential P&L impact will depend on the individual lender's circumstances. However, it may give rise to a preference for either exiting via immediate distressed sale or deferring such a decision and continuing with the work-out process

## 9. Further analysis of time to default and time to emergence by industry

In this section we further examine the relationship between time to default and time to emergence by industry sector.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## 10. Exposure at Default

Exposure at Default (EAD) is calculated as the ratio of the amount outstanding at the time of default, to the committed exposure at the time of default.

The average EAD for the Study Data Set is 76.4% (BII). Approximately 21% of the observations had an EAD of 100%.

Exhibit 42 tabulates Exposure at Default by region

EXHIBIT 42

### Regional Analysis of Exposure at Default

Region	Basel II Definition of Default		Moody's Definition of Default	
	Defaults (Note 1)	EAD	Defaults (Note 2)	EAD
Africa	1	100.0%	1	100.0%
Eastern Europe	3	88.1%	3	88.1%
Latin America	24	64.6%	20	62.8%
Middle East	3	93.5%	3	93.5%
North America	77	77.7%	55	78.1%
Oceania	13	73.6%	11	73.6%
South East Asia	36	78.4%	30	78.9%
Western Europe	55	77.2%	39	76.3%
<b>Grand Total</b>	<b>212</b>	<b>76.4%</b>	<b>162</b>	<b>76.2%</b>

Notes:

- 1) The data presented above is based on 212 Ultimate Recoveries (BII)
- 2) The data presented above is based on 162 Ultimate Recoveries (MDY)

Exhibit 43 tabulates Exposure at Default by industry

EXHIBIT 43

### Industry Analysis of Exposure at Default

Industry	Basel II Definition of Default		Moody's Definition of Default	
	Defaults (Note 1)	EAD	Defaults (Note 2)	EAD
Chemicals Production	10	75.2%	9	72.4%
Infrastructure	23	79.4%	16	76.4%
Leisure & Recreation	3	100.0%	3	100.0%
Manufacturing	10	65.6%	9	65.6%
Media & Telecom	35	62.0%	26	64.5%
Metals & Mining	19	81.2%	18	81.8%
Oil & Gas	22	74.2%	18	72.9%
Power	90	81.2%	63	81.4%
<b>Grand Total</b>	<b>212</b>	<b>76.4%</b>	<b>162</b>	<b>76.2%</b>

Notes:

- 1) The data presented above is based on 212 Ultimate Recoveries (BII)
- 2) The data presented above is based on 162 Ultimate Recoveries (MDY)

## Appendices

- » Appendix A: Summary and List of Ultimate Recoveries
- » Appendix B: Glossary
- » Appendix C: Overview of Project Finance Characteristics
- » Appendix D: Comparison of LGD behaviour of Project Finance and Corporate Loans
- » Appendix E: Comments on certain aspects of Moody's research
- » Appendix F: Potential scope of work for follow-on research
- » Appendix G: Default and Recovery Analysis for Power projects
- » Appendix H: Default and Recovery Analysis for PFI/PPP projects
- » Appendix I: The Impact of Causes of Default on Default and Recovery Experience
- » Appendix J: The Impact of Market Risk on Default and Recovery Experience
- » Appendix K: The Impact of Project Size on Default and Recovery Experience
- » Appendix L: Expected Loss

## Appendix A: Summary and List of Ultimate Recoveries

In this section we summarise average ultimate recovery rates and number of Ultimate Recoveries (BII) by region and by industry sector.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## Appendix B: Glossary

Basel II or Basel II Framework	"International Convergence of Capital Measurement and Capital Standards: A Revised Framework (Comprehensive Version: June 2006)" published by the Basel Committee on Banking Supervision at <a href="http://www.bis.org/publ/bcbs128.htm">http://www.bis.org/publ/bcbs128.htm</a> .
Corporate Bank Loan Data Set	A data set of corporate bank loans (predominantly senior secured) derived from Moody's Ultimate LGD Database, as further described in Appendix D (Comparison of LGD behaviour of Project Finance and Corporate Loans).
Cumulative Default Rates	Cumulative default rates are calculated from the weighted average marginal default rates (hazard rates) for all cohorts, based on the methodology described in Section 7.1 (Cohort Analysis: 1990-2013).
Data Consortium	A consortium of leading project finance lenders and investors that provide historical portfolio and credit loss data to Moody's Analytics for the purpose of creating an aggregate data set. For further information see the <a href="#">Notice re Data Consortium</a> on page 67.
Default (BII)	<p>A default based on the Basel II definition of default. We include below, relevant extracts from the Basel II Framework:</p> <p><i>452 A default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place.</i></p> <ul style="list-style-type: none"> <li>» <i>The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realizing security (if held).</i></li> <li>» <i>The obligor is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings.</i></li> </ul> <p><i>453. The elements to be taken as indications of unlikelihood to pay include:</i></p> <ul style="list-style-type: none"> <li>» <i>The bank puts the credit obligation on non-accrued status.</i></li> <li>» <i>The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.</i></li> <li>» <i>The bank sells the credit obligation at a material credit-related economic loss.</i></li> <li>» <i>The bank consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.</i></li> <li>» <i>The bank has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group.</i></li> <li>» <i>The obligor has sought or has been placed in bankruptcy or similar protection where this would avoid or delay repayment of the credit obligation to the banking group.</i></li> </ul>
Default (MDY)	<p>A default based on Moody's definition of default. As discussed further in Appendix E (Comments on certain aspects of Moody's research), Moody's definition of default includes four types of credit events:</p> <ul style="list-style-type: none"> <li>» A missed or delayed disbursement of a contractually-obligated interest or principal payment (excluding missed payments cured within a contractually allowed grace period), as defined in credit agreements and indentures;</li> <li>» A bankruptcy filing or legal receivership by the debt issuer or obligor that will likely cause a miss or delay in future contractually-obligated debt service payments;</li> <li>» A distressed exchange whereby 1) an obligor offers creditors a new or restructured debt, or a new package of securities, cash or assets that amount to a diminished financial obligation relative to the original obligation and 2) the exchange has the effect of allowing the obligor to avoid a bankruptcy or payment default in the future; or</li> <li>» A change in the payment terms of a credit agreement or indenture imposed by the sovereign that results in a diminished financial obligation, such as a forced currency re-denomination (imposed by the debtor, himself, or his sovereign) or a forced change in some other aspect of the original promise, such as indexation or maturity.</li> </ul> <p>Moody's definition of default does not include so-called "technical defaults," such as maximum leverage or minimum debt coverage violations, unless the obligor fails to cure the violation and fails to honor the resulting debt acceleration which may be required. Also excluded are payments owed on long-term debt obligations which are missed due to purely technical or administrative errors which are 1) not related to the ability or willingness to make the payments and 2) are cured in very short order (typically, 1-2 business days). Finally, in select instances based on the facts and circumstances, missed payments on financial contracts or claims may be excluded if they are the result of legal disputes regarding the validity of those claims.</p>
Default In Work-Out (BII)	A Default (BII) still in the work-out process.
Default In Work-Out (MDY)	A Default (MDY) still in the work-out process.
Distressed Sale (BII)	A Default (BII) for which a recovery has been realised following a distressed sale of a defaulted loan participation.
Distressed Sale (MDY)	A Default (MDY) for which a recovery has been realised following a distressed sale of a defaulted loan participation.

Emergence From Default	For a loan which has defaulted, emergence from default is deemed to occur following any of the events set out below: <ul style="list-style-type: none"> <li>» Repayment of overdue interest.</li> <li>» Restructuring with no subsequent default.</li> <li>» Restructuring with lender being taken out of the deal – for example, by repayment of the defaulted loan with no participation in a restructured debt facility.</li> <li>» Material restructuring.</li> <li>» Liquidation.</li> </ul>
EAD	Exposure at Default is calculated as the ratio of the amount outstanding at the time of default, to the committed exposure at the time of default.
Industry Data Set	The population of all project finance bank loans originated from 1 January 1983 – 31 December 2013, based on industry data provided by Thomson Reuters Project Finance International.
Marginal Default Rate	The marginal default rate (hazard rate) is the ratio of the number of project defaults in a specific time period divided by the number of projects exposed to the risk of default at the beginning of that time period. For the purposes of this Study, marginal default rates have been calculated on a monthly basis.
Moody's Ultimate LGD Database	Moody's proprietary database which contains information on over 4,900 defaulted loans and bonds taken from over 1,000 non-financial US corporations that initially defaulted between 1987 and 2013.
OECD	Organization for Economic Co-operation and Development. There are currently 34 OECD member countries: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.  Four countries joined the OECD in 2010: Chile joined on May 7, 2010; Slovenia joined on July 21, 2010; Israel joined on September 7, 2010; and Estonia joined on 9 December, 2010. Prior to the new joiners in 2010, the most recent joiner had been the Slovak Republic which joined the OECD on 14 December 2000.  The analyses at Exhibit 16 (Average Default Rates by OECD/Non-OECD countries) and Exhibit 29 (Distribution of certain Defaults and Ultimate Recoveries by OECD/Non-OECD countries) have been prepared based on the 34 OECD member countries as at 31 December 2013.
PFI	A public sector procurement structured under the UK Government's Private Finance Initiative.
Project Finance	We reproduce below the Basel II definition of Project Finance:  <p><i>218 In general, a corporate exposure is defined as a debt obligation of a corporation, partnership, or proprietorship. Banks are permitted to distinguish separately exposures to small- and medium-sized entities (SME), as defined in paragraph 273.</i></p> <p><i>219 Within the corporate asset class, five sub-classes of specialized lending (SL) are identified. Such lending possesses all the following characteristics, either in legal form or economic substance:</i></p> <ul style="list-style-type: none"> <li>» <i>The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;</i></li> <li>» <i>The borrowing entity has little or no other material assets or activities, and therefore little or no independent capacity to repay the obligation, apart from the income that it receives from the asset(s) being financed;</i></li> <li>» <i>The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and</i></li> <li>» <i>As a result of the preceding factors, the primary source of repayment of the obligation is the income generated by the asset(s), rather than the independent capacity of a broader commercial enterprise.</i></li> </ul> <p><i>220. The five sub-classes of specialized lending are project finance, object finance, commodities finance, income-producing real estate, and high-volatility commercial real estate. Each of these sub-classes is defined below.</i></p> <p><i>Project finance</i></p> <p><i>221. Project finance (PF) is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex and expensive installations that might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements.</i></p> <p><i>222. In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output, such as the electricity sold by a power plant. The borrower is usually an SPE that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well established, diversified, credit-worthy, contractually obligated end user for repayment, it is considered a secured exposure to that end-user...."</i></p>
PPP	A public sector procurement structured as a Public Private Partnership.

Study Data Set	The aggregated data set for the Study, based on data provided by the Data Consortium. The Study Data Set includes 5,308 projects which account for some 60.6% of all project finance bank loans originated globally during a period from 1 January 1983 to 31 December 2013.
Ultimate Recovery (BII)	A Default (BII) for which recoveries have been realised following Emergence From Default, as defined above.
Ultimate Recovery (MDY)	A Default (MDY) for which recoveries have been realised following Emergence From Default, as defined above.

## Appendix C: Overview of Project Finance Characteristics

The Study shows that project finance is a resilient class of specialised corporate lending. In particular, the Study shows that the 10-year cumulative default rate for projects finance bank loans is consistent with 10-year cumulative default rates for corporate issuers of low investment grade credit quality. The Study also shows that marginal annual default rates improve significantly over time – in particular, marginal annual default rates are consistent with high speculative grade credit quality during an initial three year period following financial close, but fall significantly thereafter trending towards marginal default rates consistent with single-A category ratings by year 10 from financial close.

The Study shows that ultimate recovery rates for the project finance asset class have been consistently high over time, across regions, and across industry sectors (although the variation of ultimate recovery rates by industry sector is marked), and that ultimate recovery rates for project finance bank loans are similar to ultimate recovery rates for senior secured corporate bank loans. This observation is despite features such as high gearing and long tenors that are typical for project finance loans, but generally associated with higher risk corporate loans.

While most project finance borrowers are highly leveraged, thinly capitalised special purpose vehicles with limited financial flexibility, project finance loans are structured to be both highly robust to a wide range of potentially severe risks, and also to minimise any post-default economic loss. The findings of the Study suggest that the risk allocation, structural features, underwriting disciplines and incentive structures which characterise the project finance asset class have proved effective. We highlight a number of these features below, and discuss their significance in minimising default risk and loss given default.

### Typical characteristics which mitigate default risk

- » Construction risk substantially transferred to a construction contractor through a bespoke turnkey construction contract to deliver a functional asset within an agreed timetable, to a fixed budget, and to meet required performance parameters. Contractor performance risk is typically mitigated through an appropriate incentive structure within the construction contract, including provisions for liquidated damages. Contractor counterparty credit risk would be mitigated as necessary by financial support instruments such as Bank L/Cs, or other performance support instruments.
- » Predictable, resilient revenue stream over the long term, especially where revenue risk is transferred through an offtake contract which mitigates Project Co's exposure to price risk and demand risk.
- » Detailed appraisal of whole life operating & maintenance costs, and periodic capital maintenance expenditures.
- » Covenant structure which controls the scope of the project, underpinning a predictable trajectory for the business of Project Co such that the business cannot evolve outside its pre-agreed core scope.
- » Protective forward-looking covenants, reserving mechanisms, cash traps and other structural features which mitigate liquidity risk – i.e., Project Co's ability to withstand transient cash flow strain. Project finance transactions are ideally structured to avoid refinancing risk by raising all necessary funding at an initial financial close – however, market tolerance of refinancing risk has evolved differently across different geographical markets.
- » Detailed due diligence by lenders' advisors – e.g., technical advisors, market consultants, legal advisors, insurance advisors, accounting & tax advisors, and/or other advisors as relevant. All concerns raised by lenders' advisors to be addressed to lenders' satisfaction.

- » Preparation of a detailed financial model based on lenders' base case assumptions and evaluation of the project's resilience to severe downside stress scenarios. The financial model and designated sensitivities would typically be subject to audit prior to financial close.
- » Detailed appraisal by lenders of all aspects of the project, and negotiation of key terms where relevant to ensure that key risks are identified, allocated and mitigated such that residual risk is within acceptable parameters – i.e., bankable.
- » Pro-active monitoring by agents, representatives and/or advisors acting on behalf of senior lenders. The scope of information provision by Project Co and monitoring oversight is typically greater than for traditional corporate borrowers. Enhanced reporting and monitoring controls may be triggered by poor technical performance, or weak cash flows.

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#### **Typical characteristics which mitigate loss given default**

- » Senior secured lenders benefit from first ranking security interests over all material assets, including contractual rights and intellectual property held by Project Co. Such security interests would generally be perfected on or before financial close – i.e., legal, valid, binding and enforceable
- » Step-in regime (i.e., step-in, cure, and step-out rights) pre-agreed with Project Co's key contractual counterparties to provide senior secured lenders with appropriate rights and sufficient time to remedy a default by Project Co. Threshold covenants may be triggered before senior lenders actually incur any economic loss.
- » Pre-agreed intercreditor arrangements, including decision-making and voting procedures which establish senior lender control rights up-front.
- » Structural mitigation of the risk that other creditor claimants might emerge during a bankruptcy or administration process to challenge pre-agreed intercreditor rights and security interests.
- » Strategic or essential nature of the project which underpins the project's ongoing profitable operation (although it might well be the case that while a defaulted project is profitable at the operating level it may be unable to meet its debt service obligations in full).
- » The project's structure creates incentives for the various stakeholders to mitigate economic loss following a default.

## Appendix D: Comparison of LGD behaviour of Project Finance and Corporate Loans

We compared corporate bank loan LGD data from our Ultimate LGD Database to the results of the LGD analysis for the Study Data Set.

The corporate recovery data set (the Corporate Bank Loan Data Set) was created using Moody's Ultimate LGD Database, which contains information on over 4,900 defaulted loans and bonds taken from over 1,000 non-financial US corporations that initially defaulted between 1987-2013. Of these defaulted instruments, over 2,000 were defaulted bank loans – and 1,764 of these loans were senior secured. It should be noted that the average ultimate recovery rate for the instruments below represents the average ultimate recovery rate for defaulted debt – it does not represent the average firm-wide ultimate recovery rate for defaulted companies which would be substantially lower.<sup>21</sup>

The results compare as follows:<sup>22</sup>

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### EXHIBIT D1

#### Ultimate Recovery Rates by debt class - Moody's Ultimate LGD Database

Lien Position	Emergence Year			Default Year		
	2013	2012	1987-2013	2013	2012	1987-2013
Loans	73.3%	91.7%	80.3%	81.3%	77.2%	80.3%
<b>Bonds</b>						
Senior Secured Bonds	67.5%	63.6%	63.5%	n.a.	71.2%	63.5%
Senior Unsecured Bonds <sup>1</sup>	4.5%	36.0%	48.1%	n.a.	39.3%	48.1%
Subordinated Bonds <sup>2</sup>	0.0%	9.2%	28.2%	n.a.	13.5%	28.2%

Notes:

- 1) 2013's senior unsecured bond recovery rate is based on five observations.
- 2) Includes senior subordinated, subordinated, and junior subordinated bonds. 2013's subordinated bond recovery rate is based on one observation

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### EXHIBIT D2

#### Ultimate Recovery Rates – Corporate Bank Loan Data Set compared to the Study Data Set

Data Set	Average Recovery	Standard Deviation
Corporate Bank Loan Data Set (All Loans)	80.3%	30.6%
Corporate Bank Loan Data Set (Senior Secured Loans)	84.8%	26.3%
Study Data Set (Basel II Definition Of Default)	80.3%	32.9%
Study Data Set (Moody's II Definition Of Default)	77.3%	34.9%

The senior secured loans within the Corporate Bank Loan Data Set averaged a recovery of 84.8% (versus 80.3% for all loans) between 1987-2013 so it would appear that the average ultimate recovery rates for project finance bank loans and for senior secured corporate bank loans are similar.

However, the Study shows that ultimate recovery rates for project finance loans are substantially uncorrelated with a number of factors which are key determinants of ultimate recovery rates for corporate debt facilities:

<sup>21</sup> As stated in Moody's Special Comment "[Lessons from 1,000 Corporate Defaults](#)" November 2011, for 1988-2011, the average firm-wide ultimate recovery rate for defaulted companies was 54.5%

<sup>22</sup> See Moody's Special Comment Exhibit 8, "[Annual Default Study: Corporate Default and Recovery Rates, 1920-2013](#)" February 2014

- » We have stated in previous research on corporate debt that two of the most important variables in determining recovery rates of defaulted debt are the legal jurisdiction of a defaulted company and its debt structure. We comment below on the influence of these factors on ultimate recovery rates for both data sets
- » We also discuss below an additional factor which appears to be emerging as a further significant factor affecting recovery rates for defaulted corporate debt: type of default
- » We have stated in previous research on corporate debt that default rates are negatively correlated with recovery rates. We comment further below on the correlation of default rates and recovery rates

### **Impact of legal jurisdiction**

Although the legal jurisdiction of a defaulted company is an important determinant of recovery rates for corporate debt, the results of the Study suggest that the legal jurisdiction of a project's host country is not a key determinant of recovery rates for project finance bank loans. For project finance transactions, project documentation and onshore security arrangements will typically be governed by local law, while finance documentation and offshore security arrangements will typically be governed by New York law or English law. Exhibit 28 (Distribution of certain Defaults and Ultimate Recoveries by region) shows a broad consistency of average ultimate recovery rates (BII) for Latin America, North America, South East Asia and Western Europe (representing a total of 192 out of 212 Ultimate Recoveries (BII) lying in the range of 78.0%-86.3%). Furthermore, Exhibit 29 (Distribution of certain Defaults and Ultimate Recoveries by OECD/non-OECD countries) shows that average ultimate recovery rates (BII) for OECD and non-OECD countries are similar, at 80.1% and 80.9%, respectively.

### **Impact of debt structure**

While debt structure is an important determinant of recovery rates for corporate debt, for the reasons set out below it is less significant for project finance transactions.

The 2,074 loans in the Corporate Bank Loan Data Set have an average "debt cushion" (debt contractually subordinated to the bank debt as a percentage of total debt) of 46.1%. This debt cushion enhances average ultimate recovery rates for senior lenders to corporates to levels similar to average ultimate recovery rates for the Study Data Set.

The importance of debt structure in determining recovery rates for corporate debt was emphasised in Moody's Special Comment "[Lessons from 1000 Corporate Defaults](#)" published in November 2011:

*"The average firm-wide recovery for the entire database of 1,000 defaults was 54.5%. Around that figure is a wide range of average instrument-level recoveries, from 80.4% for bank debt to 28.8% for subordinated bonds. This clearly illustrates the significance of an instrument's location in a company's capital structure and the amount of subordinated debt beneath it that can take first losses."*

At its simplest, the funding structure for a project finance transaction will comprise one or more pari passu senior secured debt facilities and sponsor equity. For complex international project financings, pari passu senior secured debt facilities might be raised from a number of different sources (e.g., commercial banks, one or more export credit agencies, and/or a project bond). Potentially, subordinated secured debt facilities might also be raised from third-party funders. Although sponsor funding might also be provided in the form of deeply subordinated unsecured debt rather than in the form of share capital, such debt facilities would generally be regarded as quasi-equity. Hence, typical project finance transactions would have no more than two layers of debt at most – i.e., senior secured debt facilities and third-party subordinated secured debt facilities.

Where third-party subordinated secured debt is raised, intercreditor arrangements are typically such that the security interests and intercreditor rights of subordinated secured funders are deeply subordinated and these creditors should not be able to materially or adversely impact the ability of senior secured creditors to enforce their first ranking security interests and exercise their own intercreditor rights. Accordingly, the presence of third-party deeply subordinated debt should not materially impact on the project's senior secured debt capacity, nor should it materially affect the default and recovery experience of senior secured lenders. In other words, third-party subordinated debt in project finance transactions typically provides no beneficial debt cushion to senior secured funders. We note, however, that the presence of subordinated debt on terms which are less than deeply subordinated may actually increase default risk and erode recovery performance for senior secured lenders.

### Impact of Default Type

Moody's definition of default includes the following types of default events:

- » A missed or delayed disbursement of a contractually-obligated interest or principal payment (excluding missed payments cured within a contractually allowed grace period), as defined in credit agreements and indentures;
- » A bankruptcy filing or legal receivership by the debt issuer or obligor that will likely cause a miss or delay in future contractually-obligated debt service payments;
- » A distressed exchange whereby 1) an obligor offers creditors a new or restructured debt, or a new package of securities, cash or assets that amount to a diminished financial obligation relative to the original obligation and (2) the exchange has the effect of allowing the obligor to avoid a bankruptcy or payment default in the future; or
- » A change in the payment terms of a credit agreement or indenture imposed by the sovereign that results in a diminished financial obligation, such as a forced currency re-denomination (imposed by the debtor, himself, or his sovereign) or a forced change in some other aspect of the original promise, such as indexation or maturity.

Moody's definition of default does not include so-called "technical defaults," such as maximum leverage or minimum debt coverage violations, unless the obligor fails to cure the violation and fails to honor the resulting debt acceleration which may be required. Also excluded are payments owed on long-term debt obligations which are missed due to purely technical or administrative errors which are (1) not related to the ability or willingness to make the payments; and (2) are cured in very short order (typically, 1-2 business days). Finally, in select instances based on the facts and circumstances, missed payments on financial contracts or claims may be excluded if they are the result of legal disputes regarding the validity of those claims.

In our Special Comment "[After Black Swans, Now What?](#)" published in May 2010 we commented:

*"Distressed exchanges and prepackaged bankruptcies tend to produce higher corporate-level recoveries than other types of defaults. Syndicated project finance where less than half of the defaults in the bank group data are bankruptcies is an example of an asset class with a long history of employing distressed exchanges and other restructurings, as opposed to regular bankruptcy, and it has enjoyed recovery rates as good as, if not stronger than, those seen in syndicated corporate finance. In the corporate arena, we're seeing more non-traditional Chapter 11 defaults executed by private equity. In fact, a little more than half of U.S. non-financial corporate defaults in 2009 had the involvement of private equity owners, and these defaulted sponsored transactions had a higher incidence of distressed exchanges and prepackaged bankruptcies than the defaults of companies without private equity backing. We can assume this behavior will continue as long as it can be demonstrated that both the sponsors and the holders of senior debt benefit more than they would from a traditional bankruptcy".*

This development in corporate lending is already hard-wired into project finance transactions, as discussed in Appendix C (Overview of Project Finance Characteristics). For example, the following features are examples of key creditor protections/characteristics typically structured into project finance transactions, which facilitate the proactive management of defaulted credits by senior creditors seeking to maximise their recoveries:

- » Senior secured lenders benefit from first ranking security interests over all material assets, including contractual rights and intellectual property held by Project Co. Such security interests would generally be perfected on or before financial close – i.e., legal, valid, binding and enforceable
- » Step-in regime (i.e., step-in, cure, and step-out rights) pre-agreed with Project Co's key contractual counterparties to provide senior secured lenders with appropriate rights and sufficient time to remedy a default by Project Co
- » Pre-agreed intercreditor arrangements, including decision-making and voting procedures which establish senior lender control rights up-front
- » Structural mitigation of the risk that other creditor claimants might emerge during a bankruptcy or administration process to challenge pre-agreed intercreditor rights and security interests
- » Strategic or essential nature of the project underpins the project's ongoing profitable operation (although a project which is profitable at the operating level may not be able to meet its debt service obligations in full)

We followed up on our observations of May 2010 with the following commentary included in our Special Comment "[Lessons from 25 Years of Chapter 22](#)" published in December 2012:

*"While Chapter 22s (a Chapter 11 bankruptcy filing followed by another Chapter 11 filing) were most prevalent between 1988 and 2011, during the Great Recession the most prevalent re-default scenario was a distressed exchange followed by a Chapter 11 filing. If these distressed exchanges were preemptive efforts by private equity owners or company managements to control the default process and maximise owners' equity, they did not work. This gives us early evidence that at least some distressed exchanges during the Great Recession did not provide sufficient capital restructuring, and raises the specter of re-defaults among companies that defaulted for the first time during the crisis."*

## Correlation of Default Rates and Recovery Rates

In Moody's Special Comment: "[Syndicated Bank Loans: 2008 Default Review and 2009 Outlook](#)," March 2009, we note that default rates for corporate bank loans are negatively correlated with recovery rates.<sup>23</sup>

For the Study Data Set, ultimate recovery rates appear to be substantially independent of both the economic cycle at default and the economic cycle at emergence. In particular, Exhibit 26 (Average recovery rates for Ultimate Recoveries (BII) by year of emergence) shows that average ultimate recovery rates for project finance bank loans emerging from default between 1999-2009 were in the range of 76.7%-100.0% (BII), but were substantially independent both of the economic cycle at default and the economic cycle at emergence throughout this period. Calendar years 2010-13 and calendar years prior to 1999 are excluded from this observation on the basis that the number of projects emerging from default in each of these years is too small to support a statistically robust conclusion about average ultimate recovery rates.

## Summary

The average ultimate recovery rates for project finance bank loans and for senior secured corporate bank loans are similar. However, further review suggests that the two asset classes rely on different means to achieve robust recovery rates. While corporate lenders rely predominantly on debt cushion, project finance lenders focus on the proactive management of defaulted credits, facilitated by comprehensive creditor-friendly structural features which are a key characteristic of project finance.

We summarise key points of comparison below, but would observe that our analysis shows that project finance is a resilient class of specialised corporate lending, displaying high ultimate recovery rates which are substantially uncorrelated with a number of factors that are key determinants of ultimate recovery rates for general corporate debt facilities:

- » Our research on corporate debt has previously found that the legal jurisdiction of a defaulted company is an important determinant of ultimate recovery rates for defaulted debt. The results of the Study suggest that the legal jurisdiction of a project's host country is not a key determinant of ultimate recovery rates for project finance bank loans.
- » Our research on corporate debt has previously found that the debt structure of corporate loans (i.e., the presence of debt contractually subordinated to senior lenders) is an important determinant of ultimate recovery rates for defaulted senior loans to corporate borrowers. For project finance loans, we consider that the credit quality of senior secured project finance loans is typically structured to be substantially independent of the presence (or absence) of deeply subordinated debt.
- » Our research on corporate debt has found that negotiated restructurings following a corporate default tend to produce higher ultimate higher recovery rates than a regular bankruptcy. This behaviour, facilitated by creditor-friendly structural features, is already prevalent in project finance.
- » Our research on corporate debt has previously found that ultimate recovery rates are negatively correlated with default rates. For the Study Data Set, ultimate recovery rates appear to be substantially independent of both the economic cycle at default and the economic cycle at emergence.

<sup>23</sup> The relationship between default rates and recovery rates on corporate debt facilities has been in Moody's research, as well as external research. A negative correlation between default rates and recovery rates is consistent with the hypothesis that a larger supply of defaulted debt depresses the ultimate recovery and the prices of such defaulted debt. For further background discussion, see Moody's Special Comment [Syndicated Bank Loans: 2008 Default Review and 2009 Outlook](#)," March 2009.

## Appendix E: Comments on certain aspects of Moody's research

### Default Rate Calculations

The default analysis undertaken in the Study is based on the Basel II definition of default. In addition, the Study also provides comparable results based on Moody's definition of default. Moody's standard definition of default differs from the Basel II definition of default. We set out below Moody's definition of default, and comment on the impact of applying Moody's default definition on the results and observations described within this Study.

#### Moody's Definition of Default

Moody's definition of default is applicable only to debt or debt-like obligations (e.g., swap agreements). Four events constitute a debt default under Moody's definition:

- » A missed or delayed disbursement of a contractually-obligated interest or principal payment (excluding missed payments cured within a contractually allowed grace period), as defined in credit agreements and indentures;
- » A bankruptcy filing or legal receivership by the debt issuer or obligor that will likely cause a miss or delay in future contractually-obligated debt service payments;
- » A distressed exchange whereby (1) an obligor offers creditors a new or restructured debt, or a new package of securities, cash or assets that amount to a diminished financial obligation relative to the original obligation; and (2) the exchange has the effect of allowing the obligor to avoid a bankruptcy or payment default in the future; or
- » A change in the payment terms of a credit agreement or indenture imposed by the sovereign that results in a diminished financial obligation, such as a forced currency re-denomination (imposed by the debtor, himself, or his sovereign) or a forced change in some other aspect of the original promise, such as indexation or maturity.

Moody's definition of default does not include so-called "technical defaults," such as maximum leverage or minimum debt coverage violations, unless the obligor fails to cure the violation and fails to honor the resulting debt acceleration which may be required. Also excluded are payments owed on long-term debt obligations which are missed due to purely technical or administrative errors which are (1) not related to the ability or willingness to make the payments; and (2) are cured in very short order (typically, 1-2 business days). Finally, in select instances based on the facts and circumstances, missed payments on financial contracts or claims may be excluded if they are the result of legal disputes regarding the validity of those claims.

#### Basel II Definition of Default

We reproduce the Basel II definition of default at Appendix B (Glossary). In broad terms, the Basel II definition of default not only captures the events which are included in Moody's definition of default, but also captures a wider range of defaults, including circumstances in which the reporting bank considers that the obligor is unlikely to pay its credit obligations in full. For example, under the Basel II definition, defaulted credits would also include debt obligations where:

- » The bank puts the credit obligation on non-accrued status
- » The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure

In theory therefore, the number of defaults reported under the Basel II definition might differ materially from the number of defaults considered to have occurred under Moody's definition of default.

### Impact: Moody's default definition vs. Basel II default definition

As described at Section 4.4 above, we reviewed the individual circumstances of each reported loan default against the Basel II definition of default and Moody's definition of default.

Results based on the Basel II definition of default and comparative results based on Moody's definition of default have been included throughout the Study.

In summary:

- » The Study Data Set contains 382 Defaults (BII) and 331 Defaults (MDY)
  - Cumulative default rates under the Basel II definition of default are slightly higher than comparative cumulative default rates calculated under Moody's definition of default (see Exhibit 12)
  - Marginal default rates for under the Basel II definition of default are slightly higher than comparative marginal default rates calculated under Moody's definition of default (see Exhibit 12.2)
- » The Study Data Set contains 212 Ultimate Recoveries (BII) and 162 Ultimate Recoveries (MDY)
  - The average ultimate recovery rate under the Basel II definition of default (80.3%) is slightly higher than the average ultimate recovery rate under Moody's definition of default (77.3%) (see Exhibit 24)
- » The results summarised above are directionally consistent with the fact that the Basel II definition of default is broader than Moody's definition of default. We would expect the Basel II definition of default to result in a greater number of defaults with a higher average ultimate recovery rate, than under Moody's definition of default

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### Recovery Rate Calculations

The calculation of recovery rates in the Study is dependent on the definition of emergence from default. The definition of emergence from default used in the Study has been adopted at the request of the Data Consortium.

We highlight that the determination of recovery rates in Moody's Special Comment "[Default and Recovery Rates for Project Finance Debts, 1992-2008](#)," published in November 2009 is based on 30-day post-default trading prices rather than ultimate recovery values. The use of post-default trading prices to measure recovery parallels common practice in the credit default swaps market. In our view, recovery rates measured in this way are most relevant for bond investors who liquidate their holdings shortly after default as often required by their portfolio governance rules or their own investment objectives.

We contrast this with the focus on ultimate recovery rates in the Study, and highlight the material difference between average recovery rates for recoveries for Ultimate Recoveries and Distressed Sales – Section 8.1 (Distribution of Ultimate Recovery Rates) refers.

We comment further on the predictive content of 30 day post-default trading prices as measures of ultimate recovery in our Special Comment: "[Trading Prices as Predictors of Ultimate Corporate Recovery Rates](#)," published in March 2012.

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### Implications for the calibration of Moody's sector ratings

- » Our ratings represent a rank-ordering of creditworthiness, or expected loss – which is a function of the probability of default and the expected severity of loss given a default. The Study provides evidence of the default and recovery performance of a large sample of project finance debt obligations over an extended period. We consider the results of the Study to be insightful in the context of enhancing the

accuracy and calibration of our own ratings. However, as we assess the potential impact of the Study's results on our ratings, we are also mindful of the following considerations:

- » The standard deviation of the Study Data Set's ultimate recovery rates is 32.9% (BII) and 34.9% (MDY) i.e., relatively large
- » For consistency with our recovery research and findings for other sectors, Moody's will consider distressed sales as well as ultimate recoveries
- » Behavioural drivers for bank lenders tend to differ from those of bond investors
- » The past doesn't necessarily predict the future because default rates and recovery rates may change over time. For example, there may be changes to exogenous risk factors such as legal framework and market environment, and to endogenous variables such as project characteristics and structural features

We also note that tenors of 20-30 years (or longer) are common within project finance, especially PFI/PPP. While the time period covered by the Study is long relative to most corporate loans, it is short relative to the typical tenor for project finance loans, with many loans within the Study Data Set yet to reach final maturity. This limits our ability to assess any changes in default or recovery which may emerge as these loans reach maturity, since exposure to lifecycle risk and costs, or risks in meeting minimum handback requirements, may be significant.

#### **Special Comment "Infrastructure Default and Recovery Rates, 1983-2013"**

We highlight our Special Comment: "[Infrastructure Default and Recovery Rates, 1983-2013](#)," May 2014 which reported on the historical performance of long-term infrastructure debt (including project finance debt) rated by Moody's.

*"This is Moody's second report on the historical credit performance of Moody's-rated longterm infrastructure debt. The study covers the 1983-2013 period and examines rating transition rates, cumulative default rates, recovery rates and rating accuracy measures of rated securities in the infrastructure sector. Moody's currently rates \$3.5 trillion of infrastructure securities, comprising \$2.7 trillion of debt and preferred stock issued by corporate infrastructure and project finance entities and \$0.8 trillion of infrastructure debt issued by US municipal entities. We find that:*

- » *On average over the study period, the vast majority of infrastructure ratings are investment-grade, and in particular they are concentrated in the single-A range; in contrast only half of non-financial corporate (NFC) ratings are investment-grade.*
- » *For much of the study period, total infrastructure ratings, especially for US municipal infrastructure, have been more stable than those of NFC issuers. Rating volatility in the US municipal infrastructure sector has been about one fifth the level exhibited by NFC issuers, while in corporate infrastructure it has been about two thirds the level of NFCs.*
- » *Compared with like-rated NFC issuers, corporate infrastructure senior unsecured debt securities have broadly similar credit risk profiles by like-rating category, with the exception of the Ba category.*
- » *Single-A credit loss rates for corporate infrastructure senior unsecured debt and NFC issuers are very similar: A-rated corporate infrastructure debt securities have slightly higher default rates but lower losses given default than those of NFC issuers.*
- » *Default rates for Baa-rated corporate infrastructure senior unsecured debts are very similar to Baa-rated NFC issuers. However, recoveries have historically been better, and total credit loss rates for corporate infrastructure have been about 30% lower than those of NFC issuers, although in absolute terms they are of the same order of magnitude, indicating overall comparability in performance.*

- » For Ba-rated corporate infrastructure senior unsecured debt, both credit loss and default rates are lower than for NFC issuers.
- » Moody's infrastructure ratings have been modestly more accurate in distinguishing defaulters from non-defaulters than Moody's NFC ratings. Over the study period, the typical infrastructure defaulter carried a lower rating than 94% of all other infrastructure ratings one year in advance of default, whereas the typical NFC defaulter carried a lower rating than 86% of all other NFC ratings.<sup>2</sup> This result was primarily driven by the better performance of US municipal infrastructure, as the typical corporate infrastructure defaulter carried a lower rating than 89% of all other corporate infrastructure ratings, a figure very similar to that of the typical NFC defaulter."

### **Special Comment "Default and Recovery Rates for Project Finance Bank Loans, 1983–2011 Addendum"**

We also highlight our Special Comment: "[Default and Recovery Rates for Project Finance Bank Loans, 1983–2011 Addendum](#)", October 2013 which published additional information about the performance of infrastructure projects (based on a broader definition of the Infrastructure industry sector):

*"This Special Comment (the "Addendum") is an addendum to Moody's study published in February 2013 examining the default and recovery performance of unrated project finance bank loans (the "Study"<sup>24</sup>). The Study is based on aggregate data (the "Study Data Set") from a consortium of leading sector lenders, comprising 4,067 projects that account for some 53.6% of all project finance transactions originated globally during a 28 year period from January 1, 1983 to December 31, 2011. This Addendum publishes additional information about the performance of infrastructure projects (based on a broad definition of infrastructure, "Broad Infrastructure"<sup>25</sup>), subsets of that universe of projects comprised of those with availability-based revenues and PFI/PPP3 projects, and the overlap of those two subsets.*

We highlight our key findings below:

- » For Availability-Based projects and Availability-Based PFI/PPP projects:
  - Marginal default rates (the likelihood that a performing obligor at the start of a year will default in that year) are consistently low over time from financial close.
  - Marginal default rates in Europe, OECD countries and worldwide are comparable to marginal default rates for issuers rated higher than Baa3 at all durations from financial close.
- » For Broad Infrastructure projects and PFI/PPP projects:
  - Marginal default rates tend to decline over time from financial close.
  - Marginal default rates for PFI/PPP projects in Europe, OECD countries and worldwide are border-line investment-grade for the initial year following financial close, and are comparable to marginal default rates for issuers rated Baa3 or higher thereafter.
  - Marginal default rates for Broad Infrastructure projects in Europe, OECD countries and worldwide are border-line investment-grade for the first four years following financial close, and are comparable to marginal default rates for issuers rated Baa3 or higher thereafter.
  - Marginal default rates in Europe are lower than marginal default rates in OECD countries; and both are lower than marginal default rates worldwide.
- » For Broad Infrastructure projects, PFI/PPP projects, Availability-Based projects, and Availability-Based PFI/PPP projects:
  - Average ultimate recovery rates are better than the average ultimate recovery rate of 80.3% for the entire Study Data Set."

<sup>24</sup> See Moody's Special Comment: "[Default and Recovery Rates for Project Finance Bank Loans, 1983–2011](#)", February 2013.

<sup>25</sup> "Broad Infrastructure" comprises those projects categorised as Infrastructure projects, to which we added Power Transmission and Distribution projects from the study data set for our Special Comment: "[Default and Recovery Rates for Project Finance Bank Loans, 1983–2011](#)", February 2013

## Appendix F: Potential scope of work for follow-on research

We look forward to publishing further research based on an expanded and updated data set. However, we note that the results of a future study based on a different data set will necessarily be different.

The following list indicates the potential scope of work for follow-on research:

- » Further analysis of the impact of economic cycle on default and recovery experience
- » Further analysis of the impact of jurisdiction on default and recovery experience
- » Further analysis of facility level recoveries
- » Default and recovery analysis for ECA or ECA-insured facilities
- » Default and recovery analysis for projects in certain regions, such as the countries within the Gulf Cooperation Council region
- » Analysis of 15-year, 20-year cumulative default rates
- » Analysis of default and recovery performance over different time intervals

## Appendix G: Default and Recovery Analysis for Power projects

In this appendix we examine historic default and recovery behaviour for key sub-sectors within the Power industry sector, including Renewable Power Generation.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## Appendix H: Default and Recovery Analysis for PFI/PPP projects

In this appendix we examine historic default and recovery behaviour for PFI/PPP projects within the Study Data Set.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of certain analysis within this section has been withheld at the request of the Data Consortium.

Caveat: The observations noted below for projects identified as PFI/PPP projects should be interpreted with caution, since (1) there is some subjectivity in the classification of projects as PFI/PPPs; and (2) the number of defaults is relatively small.

The Study Data Set contains 1,296 projects identified as PFI/PPP projects with 57 Defaults (BII), 15 Ultimate Recoveries (BII) and 3 Distressed Sales (BII).

- » The 10-year cumulative default rate (BII) is 3.9%, which is consistent with 10-year cumulative default rates for corporate issuers in the Baa ratings category.<sup>26</sup>
- » The 10-year cumulative default rate (BII) of 3.9% is lower than the 10-year cumulative default rate (BII) for the Infrastructure industry sector of 4.5%, and substantially lower than the 10-year cumulative default rate (BII) for the Study of 6.4% (see Exhibit 19).
- » Marginal annual default rates (BII) are broadly stable and are borderline investment grade for the initial 4 years post financial close, and decline thereafter to marginal annual default rates consistent with those of corporate issuers in the Baa ratings category or better (see Exhibit H7).
- » The average ultimate recovery rate is 81.5% (BII) and falls within a range from 0%-100% with a standard deviation of 31.2%. The average ultimate recovery rate for the PFI/PPP sub-sector is similar to the average ultimate recovery rate of 80.3% (BII) for the full Study Data Set.
- » All 15 recoveries were in the Infrastructure industry sector, specifically roads, rail, healthcare, education and civil defense – 9 of the recoveries were in Western Europe, 2 in Oceania, 1 in Eastern Europe, 1 in North America and 2 in South East Asia.
- » These results provide some evidence to support the view held by many market participants that PFI/PPP is a discrete sub-sector lying at the low-risk end of the project finance spectrum.

<sup>26</sup> The comparative 10-year cumulative default rate for the Baa3 rating category is 6.87% - see See Moody's Special Comment Exhibit 8, "[Annual Default Study: Corporate Default and Recovery Rates, 1920-2013](#)" February 2014, Exhibit 35 (Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2013)

Exhibit H5 charts cumulative default rates for the PFI/PPP sub-set within the Study Data Set:

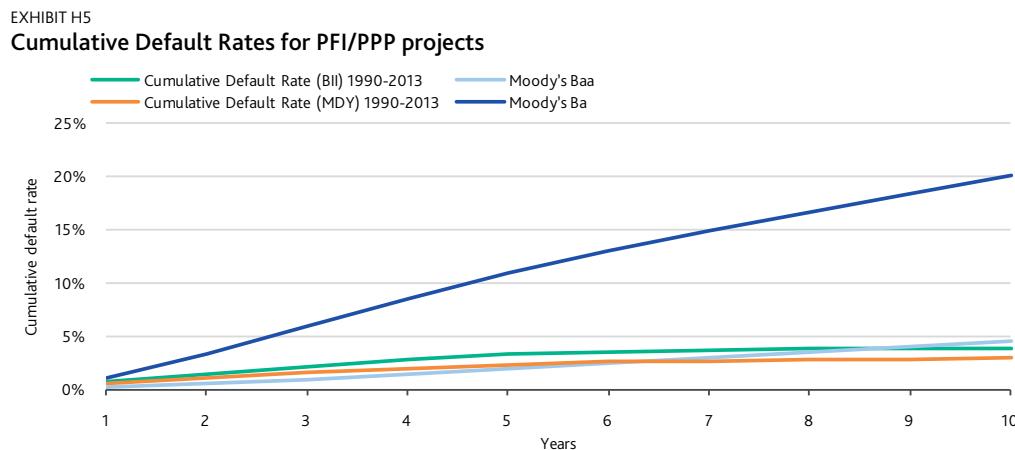
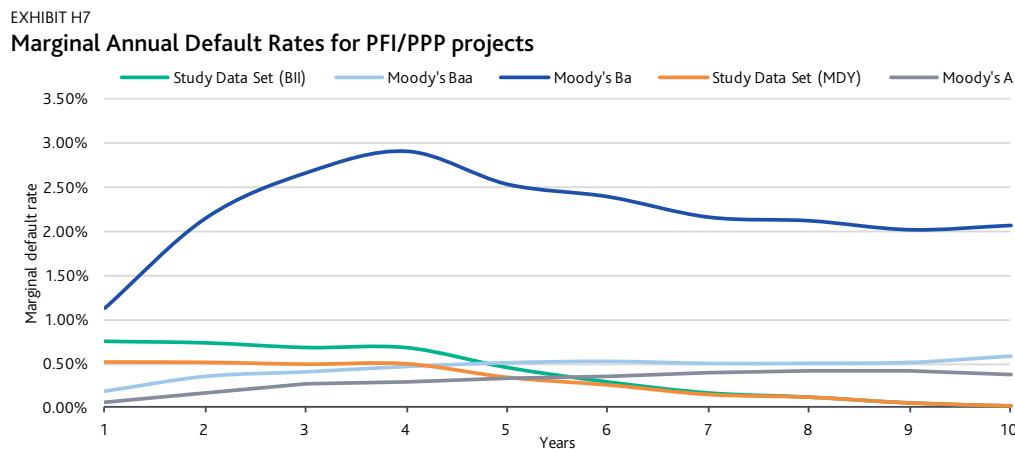


Exhibit H7 charts marginal annual default rates for the sub-set of PFI/PPP projects within the Study Data Set. For comparison, we have included marginal annual default rate data derived from Moody's published research on default and recovery rates for corporate bond and loan issuers rated in the single-A, Baa and Ba rating categories.<sup>27</sup>



<sup>27</sup> See Moody's Special Comment: "[Corporate Default and Recovery Rates, 1920-2013](#)," (February 2014)

## Appendix I: The Impact of Causes of Default on Default and Recovery Experience

In this appendix we examine the impact of causes of default on default and recovery experience.

Data was analysed to determine the primary cause of default and categorised into the following categories:

1. Defaults primarily due to construction risk:  
Includes defaults caused by construction schedule delays, construction cost overruns, delays in the commencement of operations, failure to complete construction works to achieve minimum acceptance criteria, construction contractor default or non-performance, or the failure or inadequacy of financial or performance supports intended to mitigate construction risk.
2. Defaults primarily due to counterparty credit or performance risk:  
Includes defaults caused by default or non-performance of key counterparty obligors under principal project contracts erg offtake agreement, fuel supply agreement, feedstock supply agreement, maintenance agreement, sponsor support agreement. Excludes construction-related defaults categorised at #1 above.
3. Defaults primarily due to market risk:  
Includes defaults caused by adverse variances in price and volume assumptions e.g., lower than expected output commodity prices; higher than expected input commodity prices; or lower than projected traffic volumes/demand/usage/patronage.
4. Defaults primarily due to operational performance risk:  
Includes defaults caused by weak operational performance, cost overruns or technical problems during the operations phase. For the purpose of this analysis, we also include in this category, defaults arising from reserves risk (e.g., in relation to an oil & gas production project) or resource risk (e.g., in relation to a wind power project).
5. Defaults primarily due to country risk:  
Includes defaults caused by currency transfer or convertibility constraints, local currency devaluation, expropriation, imposition of discriminatory taxation or regulation, contract repudiation by a sovereign entity, political force majeure, or war & civil disturbance.
6. Other causes of default:  
Defaults for reasons other than categories 1-5 above.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## Appendix J: The Impact of Market Risk on Default and Recovery Experience

In this appendix we examine the impact of the components of market risk on default and recovery experience.

Defaults primarily due to market risk include defaults caused by adverse variances in price and volume assumptions e.g., lower-than-expected output commodity prices; higher than expected input commodity prices; or lower than projected traffic volumes/demand/usage/patronage.

Defaults due to market risk were further analysed by Price Risk and Volume/Demand Risk.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## Appendix K: The Impact of Project Size on Default and Recovery Experience

In this appendix we examine the impact of project size on default and recovery experience.

In our analysis project size has been determined with reference to total senior secured debt plus equity and converted to US Dollars as of the date of the loan origination.

This Special Comment is an abridged version of a more comprehensive study undertaken using data provided by the Data Consortium. Publication of this section has been withheld at the request of the Data Consortium.

## Appendix L: Expected Loss

In this appendix we report on expected losses and expected loss rates.

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## Moody's Related Research

### Cross-Sector Rating Methodology:

- » [Moody's Approach to Evaluating Distressed Exchanges, March 2009 \(115337\)](#)

### Special Comments:

- » [Default and Recovery Rates for Project Finance Bank Loans, 1983–2013, March 2014 \(165655\)](#)
- » [Annual Default Study: Corporate Default and Recovery Rates, 1920-2013, February 2014 \(165331\)](#)
- » [Infrastructure Default and Recovery Rates, 1983-2013, May 2014 \(168013\)](#)
- » [Default and Recovery Rates for Project Finance Bank Loans, 1983–2011 Addendum, October 2013 \(158288\)](#)
- » [US Corporate Default and Recoveries: Lessons from 25 Years of 'Chapter 22', December 2012 \(147863\)](#)
- » [Trading Prices as Predictors of Ultimate Corporate Recovery Rates, March 2012 \(139896\)](#)
- » [Moody's Ultimate Recovery Database: Lessons from 1,000 Corporate Defaults, November 2011 \(137405\)](#)
- » [Hard Data for Hard Times, July 2010 \(126338\)](#)
- » [After Black Swans, Now What?, May 2010 \(124964\)](#)
- » [Default and Recovery Rates for Project Finance Debts, 1992-2008, November 2009 \(120845\)](#)
- » [Syndicated Bank Loans: 2008 Default Review and 2009 Outlook, March 2009 \(115212\)](#)
- » [Determinants of Recovery Rates on Defaulted Bonds and Loans for North American Corporate Issuers, 1983-2003, December 2004 \(90593\)](#)

To access any of these reports, click on the entry above. Note that these references are current as of the date of publication of this report and that more recent reports may be available. All research may not be available to all clients.

## Acknowledgement

Moody's wishes to thank Project Finance International and its parent company Thomson Reuters for their assistance in making their database records available to create the Industry Data Set referenced herein. In particular, Moody's would like to thank Ewelina Jarecka, Thomson Reuters for her assistance in compiling and analyzing the Industry Data Set.

## Notice re Data Consortium

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For questions about the Moody's Analytics Project Finance Data Consortium or the data in this report, please contact Kevin Kelhoffer, Director - Data Strategy, Moody's Analytics (+1 212 553 7252; [kevin.kelhoffer@moodys.com](mailto:kevin.kelhoffer@moodys.com)). For all other questions and inquiries please contact the author(s) cited in this report.

Moody's Analytics would be pleased to hear from other banks or financial institutions that may be interested in participating in the Data Consortium.

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