HYBRID SECURITIES

STRUCTURING, PRICING AND RISK ASSESSMENT

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Hybrid Securities

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First published 2016 by
PALGRAVE MACMILLAN

Palgrave Macmillan in the UK is an imprint of Macmillan Publishers Limited, registered in England, company number 785998, of Houndmills, Basingstoke, Hampshire RG21 6XS.

Palgrave Macmillan in the US is a division of St Martin's Press LLC, 175 Fifth Avenue, New York, NY 10010.

Palgrave Macmillan is the global academic imprint of the above companies and has companies and representatives throughout the world.

ISBN 978-1-349-88780-4 ISBN 978-1-137-58971-2 (eBook)
DOI 10.1007/978-1-137-58971-2

This book is printed on paper suitable for recycling and made from fully managed and sustained forest sources. Logging, pulping and manufacturing processes are expected to conform to the environmental regulations of the country of origin.

A catalogue record for this book is available from the British Library.

Library of Congress Cataloging-in-Publication Data

Names: Liberadzki, Kamil, author. | Liberadzki, Marcin, author.
Title: Hybrid securities : structuring, pricing and risk assessment / Kamil Liberadzki, Marcin Liberadzki.
Description: Houndmills, Basingstoke, Hampshire ; New York, NY : Palgrave Macmillan, 2015. | Includes bibliographical references.
Identifiers: LCCN 2015037078
Subjects: LCSH: Convertible securities.
Classification: LCC HG4652 .L53 2015 | DDC 332.64/57—dc23 LC record available at http://lccn.loc.gov/2015037078

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Preface

Hybrid securities combine features of both debt and equity. Where exactly they are situated in the debt–equity continuum is determined by their subordination, loss absorption, coupon deferral and perpetual nature. These equity-like characteristics allow them to be more loss absorbing and thus qualify as regulatory capital. This description reflects the character of hybrid financial instruments in the Basel II Capital Accord, but is not designed to meet the requirements of Additional Tier 1 (AT1) capital under the more recent, post-crisis, Basel III. The new generation of AT1 hybrids commonly referred to as contingent convertibles, or CoCos, embed a unique feature of contingent conversion into common equity or mandatory write-down of principal value. Contingent capital is the core of new capital accord and as such lies at the heart of this book.

The problems of the market performance of CoCos and their ability to absorb loss are crucial when assessing the capital requirements of Basel III. These instruments are undergoing rapid evolution, driven by a market necessity to introduce equity-like instruments that will act as loss absorbers instead of common equity. If there were no problems with raising common equity, AT1 instruments would not play such a significant role in Basel III. The market for CoCos is growing, as a growing number of financial institutions are unable to raise the required amount of equity and have to raise their own funds by means of hybrid capital. If these problems continue, the role of hybrids may become more prominent, as they may be considered as a replacement of common equity for the purpose of the next tiers of Basel III: counter-cyclical buffers, SIFI surcharges and so on. Hence, their importance for the financial system is already established, and they have potential for further growth. Simultaneously, these relatively new instruments are just testing the market, and some problems with their pricing model remain unsolved. Deferral risk is expressed in the credit spread of AT1 instruments, but there are still no structural methods to price them precisely. This study proposes a model for doing so.

Another important issue is contagion risk linked to AT1 hybrids. A hard lesson from the most recent financial crisis is that innovative financial instruments do not eliminate risk, but rather transfer it elsewhere. The complexity and interconnectedness of the credit derivatives market

has made this transfer a dangerous channel of transmitting price shocks to markets that had been considered to be diversified. It is of critical importance to assess the sensitivity of hybrid instruments to this. To date, no such assessment has yet been performed.

The equity-like flexibility that hybrids offer makes them attractive also for non-financial issuers. From the rating perspective, corporate hybrids may be treated to a certain extent as equity, thus not negatively affecting leverage ratios, while, if properly structured, the interest they pay is tax-deductible. These factors, combined with investors' appetite for high yields, are the main reasons behind their emergence.

In this book we have set out to prove that AT1 CoCos may decrease the probability of default and lower the cost of senior debt. The capital buffer they provide is designed to absorb losses, so they should also decrease the credit risk associated with senior debt. This combination of equity-like features will serve the following purposes: (i) perpetuity of hybrid instruments ensures stable, long-term financing that is highly unlikely to be called by the issuer in times of financial stress, as such an action would require a regulator's consent; (ii) coupon deferral means that payments attached to a hybrid are obviously junior to payments on senior debt; (iii) financial stress will trigger conversion or write-down of hybrid bonds before it does any harm to holders of senior bonds, and finally (iv) on a 'gone concern' basis, senior debt will be satisfied in the first place. Therefore, holders of senior debt will bear a lower risk than before the introduction of a hybrid into the issuers' balance sheet. This fact should be mirrored by (i) an increase of the senior debt market price right after the issue of hybrids is announced to the public and (ii) a decrease in the senior debt credit spread.

There is still a room for the modernization of AT1 hybrids, and for the proposal of some alternative hybrid instruments. One idea is to replace the regulatory capital trigger event of contingent conversion with a market-oriented trigger. This and other proposals are a consequent element of CoCos' evolution that adopts various elements of preceding hybrids: Basel II hybrids, conventional convertibles, but also so-called 'catastrophic bonds' developed by the insurance industry. When it comes to CoCos themselves, the convertibles into equity (issued by Lloyd's of London) were the actual pioneers and the principal write-down structure was developed later by Rabobank. In the meantime, while the Basel regulator was assessing the eligibility of CoCos for tier capital structure purposes, many different structures were proposed. This means that AT1 hybrid financial instruments are not 'artificial' instruments designed entirely by the Basel regulator: the globally applied Basel III framework

is used in financial engineering to structure AT1 hybrids for prudential capital requirements. This also means that observations of AT1 hybrids' market performance may give rise to modernization proposals and functional merits will be crucial when assessing these instruments.

Directly applicable Capital Requirements Regulation (CRR) has introduced CoCos, among other AT1 instruments, to legal systems of all EU member states. It must be remembered that CRR contingent conversion/write-down provisions and 'bail-in' provisions of the newly introduced Bank Recovery and Resolution Directive (BRRD) do overlap. That brings confusion about conversion mechanisms and points of non-viability.

When compared to traditional company law, which is heavily shaped by EU Directives, CoCos bring an abrupt turn away from the principle of shareholders' pre-emptive right to subscribe to new shares issued by a company. Until CRR and EU Second Capital Directive, this right was considered to be essential for the corporate structure as a tool to protect shareholders against dilution of their rights. Any provision of a company's statutes that would aim to exclude this right was forbidden. There should be little doubt that contingent conversion results in dilution of control. This fact raise essential questions: (i) on the relation between pre-emptive rights and issuance of CE CoCos, (ii) whether admission of CE CoCos to trading on an EEA regular market has the same consequences as admission of shares and conventional convertible bonds to such trading and, more generally, (iii) to what extent the corporate structure of financial institutions is unique when compared to a 'typical' joint-stock company, as it is shaped by *lex specialis*.

The complex nature of hybrid instruments calls for a high degree of investor protection. Low yields elsewhere encourage new investors to buy hybrids; it was the same with CDOs a decade ago. Then the question arises as to whether all investors are able to properly assess or manage the risks involved. First and foremost, these doubts regard retail clients. Uncertain loss-absorption hierarchy and complex conversion or coupon cancelation mechanisms may pose a risk beyond individuals' assessment capabilities.

Acknowledgments

During our studies on hybrid securities, we especially benefited from discussions and scientific cooperation with Prof. Piotr Jaworski. Our thanks are also due to Aimee Dibbens at Palgrave Macmillan for her enormous help.

1
The Definition of Hybrid Securities

1.1. Introduction

Hybrid securities are fixed income instruments that combine elements of shares and corporate bonds. They are considered to be placed somewhere in between debt and equity, or 'in the debt–equity continuum' as credit rating agencies name it. The exact place of each individual hybrid in such a continuum is determined based on each of its characteristics: maturity, subordination and character of coupon deferral. These criteria are commonly used by credit rating agencies to grant an equity credit of a given security. High equity credit marks an instrument that possesses greater loss-absorption capacity, as is typical for equity instruments. Hybrids are qualified as subordinated debt, which means that – in case of liquidation or winding-up of the issuer – they are ranked below all other debt but above equity.

Preferred shares and subordinated bonds (corporate hybrids) are the two most common types of hybrid securities. Preferred shares are equity instruments that – in case of an issuer's liquidation – are ranked junior to all debt but senior to the common equity of the issuer, while subordinated bonds are bonds structured to obtain certain features of capital instruments and rank pari passu with a firm's junior subordinated debt (and, therefore, senior to its preferred stock).

Convertible bonds are considered to be 'hybrid securities', though some doubts arise as regards the correctness of this classification. A convertible bond is a debt instrument, which – at the holder's option – may be converted into a capital instrument. One could therefore describe its nature as not 'hybrid' but rather 'transforming'. Of course, it is possible that at least one of the instruments embedded in a convertible bond structure will be a hybrid security. This may happen both for a

debt instrument and for the underlying capital instrument: a convertible bond may be equipped with some capital elements (like, say, perpetual maturity) and the underlying capital instrument may well be a preferred share. In such a case, the hybrid character of a convertible bond should not be questioned. Most frequently, however, a convertible instrument is a simple debt security (without any capital features) that can be converted into a simple equity security (without any debt features). Is such a conversion option sufficient to classify a convertible bond as a hybrid security? In legal terms, the correct answer would be to identify convertibles rather as equity-linked notes (Trapnell, 2010). The hybrid nature of convertibles is more visible in terms of financial analysis, where their pricing is affected by the performance of underlying equity. Besides, convertible bonds are given some special treatment by the financial regulator, which is quite similar to the approach applicable to equity instruments. This may be regarded as an argument *in favorem* the hybrid character of convertible bonds, despite the fact that tested with the aforementioned debt–equity continuum criteria, convertible bonds will be regarded simply as debt instruments.

It is quite the opposite when discussing a specific type of convertible bonds: contingent convertibles (CoCos). CoCos are subordinated hybrid securities with a fixed coupon and an automatic conversion provision. This provision enables banks to exchange bonds for common stock, subject to a breach of a conversion trigger set forth at the inception of the issuance of the bonds. In the event the conversion trigger is not breached, CoCo bonds remain as coupon-paying, normal subordinated debt securities to retire at maturity (unless they are perpetual bonds). A conversion is not an option at the discretion of a bondholder but is forced when regulatory capital fails to meet a predetermined level. This unique feature provides to the CoCo bonds the loss-absorption capacity on a going-concern basis, a regulatory goal that seems not to have been effectively implemented under the pre-crisis legal framework of tier-based capital structures. Thus, CoCo bonds provide buffer capital to a bank at a time of distress but before potential insolvency (i.e. on a going-concern basis). Of late, one must consider loss-absorption capability to constitute a fourth dimension of the debt–equity continuum and therefore CoCos may be regarded as hybrid securities. The use of CoCos for bank recovery and resolution purposes is a vital element of a Bank Recovery and Resolution Directive[1] (BRRD) legal framework and will be discussed in detail later in this book.[2]

A more extreme construction of loss absorption is designed in a write-down mechanism, where the occurrence of a predetermined event

(stress-related) automatically triggers a write-down of a bond's value. Such an automatic 'bail-in' executed in times of distress may rescue a bank from failure without a (heavily criticized) injection of taxpayer money into large financial institutions (bail-out). The burden of an institution's failure is imposed on the bondholders, but the institution may continue to operate, averting disruption of the financial system. One may say that this write-down mechanism is somehow similar to that embedded in so-called 'catastrophe bonds' (or simply 'CAT bonds'), which were originally designed by US reinsurers and were used to transfer to the insurance industry the risk of losses caused by natural disasters. The most recent developments in the structuring of CoCo bonds aim to reduce the severity of an automatic write-down of the bonds' principal value, facilitating the discretionary write-up of the bonds once the financial situation of the issuing bank is no longer distressed.

The last, and the youngest, of the hybrid instruments is the bail-in bond. This category of bond covers all debt instruments that may share the burden of financial institution losses. The manner in which bail-in and Coco bondholders are engaged in the loss-absorption process differs. Holders of CoCos are rewarded with higher coupon rates because of the greater exposure to risk, whereas in the case of bail-in bonds, bondholders (as those who provided financial institutions with funding that allowed them to lend money imprudently) should absorb losses before the loss burden is transferred to taxpayers, for the sake of financial market stability. While a CoCo bond provides loss absorption on a 'going-concern' basis (it is triggered when accounting parameters signalize that the institution is facing financial stress), a bail-in bond is a 'gone-concern' instrument, as loss absorption is triggered when the point of non-viability (PONV) that marks an institution's failure is reached. However, in section 7.3, it will be demonstrated that a bail-in trigger may be executed long before the soundness of a financial institution is questioned when the accounting triggers of a CoCo are set off.

1.2. Core features of hybrids

1.2.1. Financial and corporate hybrids

As already mentioned, each corporate issuer of debt may embed some equity features in the structure of an issued bond. Such bonds will fall into a broad category of corporate hybrids. It should be noted that once the hybrid market was developed, the terminology started to become more specific. Nowadays, the term 'corporate hybrids' refers only to

hybrids issued by corporations other than financial institutions, while hybrids issued by financial institutions are referred to as 'financial hybrids' or have more specific names that refer precisely to the balance sheet item to which they correspond. For example, if a bank intends to issue a hybrid bond that would meet the criteria of Additional Tier 1 (AT1) capital under Capital Requirements Regulation[3] and Directive[4] (CRR/CRD IV) package, it would be referred to not as a corporate hybrid but as an AT1 financial hybrid. For the purpose of this book, the term 'financial hybrids' is used only to describe hybrid securities issued by financial institutions in general, while individual hybrids will be referred to in a manner that identifies their place in the tier structure of capital.

1.2.2. Maturity

Maturity date of debt defines when the nominal value of a loan should be transferred back to the creditor. Common equity may be regarded as a 'perpetual' security, as it has no fixed maturity date. Corporate hybrids that have no fixed maturity date are referred to as undated or perpetual bonds (perpetuals). For example, a perpetual issued by the Lekdijk Bovendams water board in 1648 still continues to pay interest (Goetzmann and Rouwenhorst, 2005). Besides, bonds with a very long maturity (30 years and longer) are also considered to be hybrids, as they offer financing for a much longer period than the one usually assumed to constitute long-term financing (5–10 years). A common feature of many perpetuals and bonds with a very long scheduled contractual maturity is an issuer call option typically exercised five or ten years from the date of issuance. Market convention expects hybrids to be called on the first call date. Moreover, skipping the option is usually associated with negative consequences for the issuer: a higher interest rate (coupon step-up), a change of coupon payments from a fixed rate to a floating rate (fixed-to-float) or a change in the reference rate.[5] These create for an issuer an incentive to redeem instruments at the call date, thus making a hybrid less equity-like. It is worth noting that in regulated industries regulatory approval is required for an instrument to be called and that such approval would only be granted if it is replaced with a comparable equity-like instrument.[6]

1.2.3. Deferral

What regards a typical bond, any failure of the issuer to make scheduled coupon payments to investors results in his default, and investors are entitled to file for his bankruptcy. On the other hand, common equity instruments offer no scheduled payments, and the distribution

of dividends to shareholders is subject to the discretion of the company board or the decision taken at an annual general meeting (AGM) of shareholders. Therefore, a lack of dividend distribution does not constitute a default and does not give rise to any claims of shareholders (subject to special accumulation rights of holders of the preferreds, as discussed above). At times of financial stress, a company may just cancel all dividend payments to shareholders to steer clear of dangerous waters. Such a solution would obviously be of no help in the event of a bond coupon cancellation.

Hybrid securities offer the issuer the ability to avoid making coupon payments in periods of financial stress, which is a key equity-like feature of a corporate hybrid. Coupon payment may be suspended (cumulative deferral) or even canceled (non-cumulative deferral), without threat of default. In such a situation, bondholders, acting as company creditors, bear the costs of the company's difficult situation together with its beneficial owners – shareholders. Of course, hybrid holders must be protected against a situation where they would solely bear these costs. Dividend-blocker and dividend-pusher mechanisms address this threat by linking decisions on dividend and coupon distribution. In legal systems where decisions on dividend distribution are made not by management boards but by AGMs, the mechanism of look-back serves the same purpose.[7]

Another form of deferral is so-called Alternative Coupon Satisfaction Mechanism (ACSM). If the issuer is unable to pay coupons or dividends in cash it must satisfy hybrid holders by giving them common stock (or preference shares). Most ACSMs include a pledge by the issuer to attempt the market issuance of new equity (once or repeatedly) and to use the proceeds of any issuance to settle the applicable omitted coupon on the hybrid issue (Rawcliffe et al., 2008).

There may be two kinds of deferral: mandatory or optional, that is made at the discretion of the board. Distribution with optional non-cumulative deferral is the closest to dividend.[8] Mandatory deferral typically occurs only if the issuer is in such severe financial distress that the deferral covenant is triggered.

1.2.4. Loss absorption

1.2.4.1. Subordination (gone-concern basis)

In bankruptcy (on a gone-concern basis), hybrids rank between senior debt and common stock, in terms of the embedded right to receive distributions from the disposition of the firm's assets if the firm is liquidated. Thus, subordinated debt possesses a post-bankruptcy loss-absorption

capacity: such securities support higher recoveries for unsecured senior debt (or its equivalent) in a post-bankruptcy environment. In other words, loss absorption is triggered on a gone-concern basis. It was observed back in 2008 that – in some rare cases – a hybrid issued as senior debt may convert to preferred stock or common stock in the event of a bankruptcy or a wind-up (Rawcliffe et al., 2008). Pre-bankruptcy loss absorption is a unique feature of a hybrid bond.

When determining the ranking of debt, one must take into account not only the order in terms of seniority but also whether any of the debt is secured. If the debt is secured, it will rank above the senior debt, with regard to the collateral securing the bond. Therefore, assets used as collateral are exempted (ring-fenced) from the assets available for 'common' creditors: holders of senior unsecured bonds and holders of subordinated (junior) bonds. Only after secured debt is paid is the remaining collateral used to pay other obligations – in order of seniority. Hence, to some extent – to be more precise, to the extent of collateral – secured senior bonds may be referred to as a super-senior tranche of debt. In overall effect, such secured debt will generally weaken the recovery rate for other creditors. In the banking environment, secured debt plays an important role only in terms of covered bonds.

1.2.4.2. Contingent conversion (going-concern basis)

Loss absorption on a going-concern basis can be achieved primarily in two ways:

1. Conversion to a more deeply subordinated instrument upon the occurrence of a stress event (contingent conversion): As noted above, some hybrids contain mechanisms where a deeper level of subordination (including conversion to common equity) is triggered in a going-concern situation, that is, pre-bankruptcy. Not only does this confer a greater degree of loss absorption, it also potentially confers a greater degree of financial flexibility. For example, if a stress event triggers conversion of an instrument to common or preferred equity, then the converted status is equity, with the full financial flexibility that goes with that status. Another way of looking at this is to describe it as an exceptional form of deferability.
2. Write-down of the principal value of the hybrid bond: Hybrid securities may also include a feature that mandates the reduction in the principal value of a hybrid security as the value of assets is impaired. This forces the hybrid security to absorb loss while the corporation remains a going concern, without undergoing a bankruptcy or

> restructuring. The write-down reduces hybrid obligations outstanding on the balance sheet and offsets the decline in ordinary share capital caused by recognizing losses, thereby avoiding a technical bankruptcy.

Thus, the concept of pre-bankruptcy loss absorption establishes the fundament both for instruments converting into equity (CE CoCos) and for instruments that may suffer a principal write-down (PWD CoCos). These instruments may be discussed together, as they vary not in concept but in the manner by which the pre-bankruptcy loss absorption is achieved. Holders of CE CoCos must bear in mind that their bonds may be automatically converted into common shares of the underlying financial institution, while holders of PWD CoCos must take into account the possibility that a predetermined fraction of the face value of their investments will be written down. These hybrid instruments are issued by banks and no two CoCos are identical. The supply of such bonds appears closely related to the need of banks to fulfill capital requirements (Basel III/CRD IV). That, in turn, gives rise to a typical template of a CE CoCo and a PWD CoCo. The development of the AT1 market brings more and more standard features of both these instruments.

2
Evolution of Hybrids

2.1. Preferred shares

Preferred shares carry no voting rights. Instead, they offer regular income (on a fixed basis) and have priority over common equity in dividend payments. These characteristics are clearly mirrored by 'preferreds' in French law (*actions à dividende prioritaire sans droit de vote*) and German law (*Vorzugaktien*). Not all jurisdictions require all preferred shares to be stripped from voting rights, but this is the most common structure. Preferred shares in the United States are more similar to fixed income instruments, while preferred shares in continental Europe pay less attention to regularity of income. Such instruments are designed to give the investors extended share in annual company earnings (i.e. up to 150% of dividends on common stock).

The aforementioned regularity of income is subject to the decision of the company on profit distribution to the shareholders. The company may decide not to distribute such profit or may simply not gain a profit in a given financial year. In such a case, the lack of distribution for the holders of preferred shares will not trigger an immediate default event. Such a situation is similar to a non-cumulative coupon deferral[1] embedded in a corporate hybrid bond structure, where coupon cancellation will not give rise to any claims of bond holders toward the issuer. Preferred shares may be equipped with a cumulative dividend right: unpaid dividend will accumulate and it will have to be paid to holders of preferreds before any dividend may be distributed to holders of common equity. In such a case, the dividend distribution is not totally canceled but only deferred, which makes the situation similar to that of a corporate hybrid with a cumulative deferral (see section 1.2.3). It must be remembered that the terms of preferreds often grant affected security

holders the right to vote as a separate class to elect one or more directors if the firm fails to pay a stated number of consecutive dividends (Finnerty et al., 2011).

Another important debt-like feature of preferred shares is their seniority above the common stock in case of company liquidation and bankruptcy. That is why preferred shares are called a 'senior security'. Still, preferred shares are always ranked junior to all debt of the company.

One has to distinguish preferreds and French *titres participatifs*, which may be either fixed or floating income instruments. These equity instruments are stripped of voting rights, and also from other corporate rights of shareholders. On the other hand, the French Commercial Code aims to protect holders of such securities in a unique manner: they may form an association of security holders whose representative attends the general meeting of shareholders, but without a right to vote. In German law, *Genussscheine* instruments are to some extent similar to the aforementioned French securities. These instruments are deeply subordinated (senior only to common equity) and their coupon is not fixed, but is dependable on the company's annual profit. These characteristic are typical of equity instruments. However, *Genussscheine* give no voting rights. Therefore, they also fall within a category of mezzanine financing tools.

2.2. Perpetual bonds

Bonds that have a predetermined maturity date are referred to as 'perpetual bonds' (perpetuals) or undated bonds. These instruments remunerate the investor with a stream of cash that, in theory, may continue 'forever'. Here, 'forever' means cash flow payable as long as the issuer of a perpetual exists. In practice, perpetual bonds are also equipped with a call option granted to the issuer. If interest rates decline, it is economically rational for the issuer to call the perpetual and replace it with a new one that is basically cheaper because it is issued on lower interest rates. However, this does not mean that all perpetuals will be called: perpetual bonds issued in 1648 by water boards in the Netherlands (*Hoogheemraadschappern Lekdijk Bovendams*) are believed to be the oldest 'living' securities still paying interest (Goetzmann and Rouwenhorst, 2005).

The absence of a fixed maturity date makes perpetual bonds similar to common stock that is designed to 'live' as long as its issuer, and any stock redemptions are subject to restrictive conditions. Common equity has no scheduled maturity, and thus it poses no refinancing risk to the issuer in a time of financial stress. Perpetuity plays a crucial

role when the instrument is issued to fulfill the capital requirements imposed by financial regulator on credit institutions or insurers. It will be demonstrated that instruments issued for that matter are mostly required to be perpetual ones. Of course, issuers in the non-financial sector 'corporates' may also issue perpetual bonds in order to obtain access to long-term financing.

2.3. Subordinated bonds

Companies may issue subordinated 'junior' bonds that will entail higher default risk than conventional 'senior unsecured' bonds. Hence, investors will demand higher coupon payments as remuneration for enhanced risk. It is also possible to combine subordination with undated character of bonds – of course holders of subordinated perpetual bonds will be exposed to two extra risk factors: perpetuity and subordination. French law explicitly recognizes such securities, which are called *titres subordonnés à durée indéterminée*.

2.4. Convertible and exchangeable bonds

In essence, a convertible is debt (in the form of a note, debenture or bond) that can be converted by the holder within a predetermined period of time for common stock of the issuer (Bratton, 1984). Sometimes, it may also be a preferred stock convertible into common equity. Hence, convertible bonds fall within a broader group of convertible securities, which may also include equity instruments. In both cases, conversion ratio is fixed, which allows holders to determine the value of conversion option. As holders of convertible bonds are partially remunerated with conversion option, these instruments pay lower coupon when compared with straight debt of the same issuer. It is conversion option that determines a hybrid nature of a convertible. In terms of pricing, convertibles are bonds 'with upside' which means that they are exposed on upside performance of the underlying shares. It is believed that smaller and more speculative firms will more likely issue convertible bonds (or equity) to obtain financing, while larger firms will rather rely on debt issue (Billingsley et al., 1988).

One has to distinguish convertible bonds and exchangeable bonds. The main difference is that the first instruments may be converted into new shares of the same issuer, while the second may be exchanged into existing shares of a company other than the issuer of the bond. The underlying instrument of an exchangeable bond will be a 'basket' of already existing and listed securities (Danielova et al., 2010).

2.5. Reverse convertible bonds

An investor's option to convert a convertible bond into underlying share lies at the core of a conventional convertible bond, the conversion value of which is reflected by its lower coupon rate. Innovative financial markets soon developed another type of convertible, dubbed 'reverse convertibles', or 'RCs'. At the maturity date of such bonds, it is the issuer who has the option to redeem the bond for a cash settlement or deliver a predetermined number of underlying shares to investors. Hence, these instruments have higher coupons than plain vanilla bonds (Szymanowska et al., 2009). Higher coupons reflect the additional risk borne by investors, who are exposed to the negative performance of the underlying shares.

That downside characteristic could constitute some similarity with CoCos: holders of both these instruments would suffer losses in case an issuer faces financial stress. To some extent, we could even consider reverse convertibles as loss-absorbing instruments. However, we have to point out serious differences as well.

First of all, the underlying instrument of a typical RC will not be the instrument issued by the issuer of an RC. This means that the underlying instrument would instead be listed as the stock of a different company. This characteristic shows that RCs are more like exchangeable bonds, as discussed above. In fact, the underlying instrument of an RC may be commodities or index. This brings us to the conclusion that an RC issuer is not obliged to actually hold the underlying instrument. Hence, RCs should be regarded more like a structured finance product.

However, we may analyze a hypothetical, non-typical RC where the underlying instrument is a common stock of the RC issuer. Even in such a case, the RC issuer may convert debt into equity only at the maturity date, which means that until that date, the RC issuer is obligated to pay the coupon. Conversion into shares would bring relief for the issuer only in moments very close to the RCs maturity – bearing in mind the high coupon rate of RCs, we can conclude that in times of financial stress RCs would be mostly of no help to the issuer. On the contrary, CoCo trigger event occurs automatically, while distance to the trigger is reflected in the underlying common stock pricing. Negative performance of the CoCo issuer means that the capital ratio is approaching the trigger level.

2.6. Mandatory convertible bonds

Mandatory convertible bonds are equity-linked hybrid securities that fall within a special category of convertible bond or a special category of a

preferred stock. Hence, they may take various forms: PERCS (Preferred Equity Redemption Cumulative Stock), PEPS (Premium Equity Participating Securities) or DECS (Debt Exchangeable for Common Stock or Dividend Enhanced Convertible Securities) (Chemmanur et al., 2004). The common element of these instruments is that they pay higher coupons or fixed dividends than common stock for a certain number of years and then, on a pre-specified date, automatically convert to common equity. Conversion is inevitable (bonds are usually non-callable), so mandatory convertibles are subject to the full downside risk of the common stock. Besides, the conversion ratio depends on the price of the underlying stock, which is a unique characteristic of 'mandatories' when compared to 'conventional' convertibles. The conversion ratio decreases if the price of the underlying stock reaches a predetermined level. Therefore, these instruments have only partial participation in the upside potential of the underlying common stock (Ammann and Seiz, 2006).

Mandatory convertibles developed through the 1990s, forming a significant stake of all convertibles (Chemmanur et al., 2004). It is important to note that mandatories were not designed to act as regulatory capital and therefore they may be issued by corporations outside the financial industry. They are mostly used by highly leveraged companies to restructure their balance sheets. For example, in 2014, a mandatory convertible bond was issued by Fiat Chrysler Automobiles as a tool to reduce debt and obtain funds for investment plans.

For the purpose of this study, mandatory convertibles are interesting example of the evolution of the convertible bond: the conversion option is replaced with automatic, mandatory conversion, which is no longer dependent on the investor's will. However, it will be shown that the origins of the trigger event mechanism, which is a core feature of CoCo bonds, may be found elsewhere.

2.7. Catastrophe (CAT) bonds and Catastrophe Mortality (CATM) bonds

Property insurers are exposed to catastrophe risk, which is composed of losses from natural disasters – events that may not exactly be predicted but may cause serious financial losses. Reinsurance is the traditional model of diversification and transfer of catastrophe risk. However, the reinsurance model has its limitations, given that all losses resulting from natural disasters would have to be borne only by the insurance industry. In other words, reinsurers are not able to provide sufficient coverage. As a result, Catastrophe Bonds (or 'CAT' bonds)

were developed in the mid-1990s as a tool to transfer catastrophic risk. The mechanism of risk transfer is in the very core of the CAT bond structure. The provisions of such instruments specify in a very detailed manner the catastrophic 'trigger event' that will cause a write-down of the bond's nominal value. Therefore, if a certain natural disaster (say, an earthquake of a predetermined strength) occurs in a specified time and geographic area, losses suffered by the property insurer will be borne by holders of CAT bonds (Lee and Yu, 2007). In other words, CAT bonds are a tool of insurance risk securitization (Cummins, 2006), that has been influenced by credit institutions' management of liabilities. However, linking trigger events solely with natural catastrophes would leave investors in CAT bonds open to moral hazard exposure. Instead, this risk is mitigated by linking trigger event with industry loss indices (Lee and Yu, 2007), such as the Property Loss Services (PCS) loss index (Bauer and Kramer, 2015).

CAT Mortality Bonds (CATM Bonds) were the next innovation in CAT bonds issued by life (re)insurers. With CATM Bonds, the write-down trigger event does not depend on any underlying loss index, but on 'less artificial' events: the catastrophic evolution of death rates in a given population (Bauer and Kramer, 2015).

For purposes of this study, one must note the unique loss-absorption feature of CAT bonds upon the occurrence of a specified trigger event. To some extent, this mechanism may be regarded as a cornerstone of the contingent conversion mechanism embedded in the structure of a CoCo. When it comes to CoCos, the trigger event of a natural disaster is replaced by a capital ratio trigger,[2] but the underlying idea remains similar. This observation bring us to the conclusion that it is possible to trace the evolutionary path of the trigger event mechanism leading from the underlying loss index of CAT bonds to CATM bonds, which are triggered by an observable event in a natural population, to the capital ratio trigger of CoCos, and finally to bail-in bonds, which are subject to the discretionary decision of a resolution authority.

2.8. Basel I and Basel II capital instruments

Basel regulation of banks on a global basis started with the publication of Basel I (or Basel Capital Accord) in 1988 to be implemented from January 1992. Basel I dealt with minimum capital requirements against credit risk. It introduced the concept of risk-weighted assets (RWAs), against which banks were required to hold at least 8% capital.

Risk-weighting is a complex system in which some assets count less against capital requirements than others. Under the Basel system total RWA are defined as:

$$RWA = 12,5(OR + MR) + \sum_{I=1}^{N} W_i A_i$$

where:
OR – operational risk
MR – market risk
W – an asset risk weight
A – an asset

The purpose of capital requirement was to prevent internationally active banks from excessive risk exposure. Under Basel I, banks had to hold regulatory capital in the amount of 8% of their risk-weighted assets. A risk-weighting scheme has also been provided.

Basel I also introduced the concept of Tier 1, 2 and 3 of capital, where only Tier 1 fits the classical, strict definition of equity. Tier 1 capital (also referred to as 'core capital') consisted of common equity, reserves and non-cumulative preferred shares. Hybrid debt instruments and subordinated dated debt instruments may be eligible for Tier 2 (supplementary capital) purposes. These instruments should be qualified as 'mezzanine financing' (Mäntysaari, 2010).

The Basel II Accord followed Basel I and was released by the Basel Committee in June 2004. The Basel Committee expressly stated that 'Upper' Tier 2 (UT2) may consist of hybrid debt capital instruments – that is, '*a number of capital instruments which combine certain characteristics of equity and certain characteristics of debt. (. . .) where these instruments have close similarities to equity, in particular when they are able to support losses on an on-going basis without triggering liquidation, they may be included in supplementary capital (. . .)*'. What is more, certain categories of instruments were named as constituting 'hybrid' capital: perpetual preference shares carrying a cumulative fixed charge (a most obvious example of a hybrid), long-term preferred shares (Canada), *titres participatifs* and *titres subordonnés à durée indéterminée* (France), *Genussscheine* (Germany), perpetual debt instruments (UK) and finally US mandatory convertible debt instruments (Paragraph 49[xi] of the Basel II Accord). These instruments have been already discussed. To sum up, we may conclude that UT2 capital was formed of undated (perpetual) subordinated hybrids.

Qualifying criteria for UT2 capital instruments also were provided in Annex 1a of the Basel II Accord. The essential requirements for hybrid capital instruments are as follows: (i) unsecured, subordinated and fully paid up; (ii) no call option for bondholder or no call for issuer except where supervisory authority agrees; (iii) loss absorbing without bank being obliged to cease trading (unlike conventional subordinated debt), and finally (iv) 'although the capital instrument may carry an obligation to pay interest that cannot permanently be reduced or waived (unlike dividends on ordinary shareholders' equity), it should allow service obligations to be deferred (as with cumulative preference shares) where the profitability of the bank would not support payment'.

The last requirement on distribution required citation *in extenso*, as it will be shown that such an approach to coupon deferral finally resulted in severe consequences. Deferral of coupon payments was allowed only in a situation of financial stress that calls into question the bank's ability to remain profitable. In fact, distributions on hybrid UT2 instruments were left to the discretion of the financial institutions.

When designing Lower Tier 2 (LT2), the Basel Committee gave special attention to perpetual maturity of instruments and to their loss-absorbing ability. As a result, dated subordinated debt instruments, with maturity of over five years at issuance (or five years to the first call date) were allowed as supplementary elements of capital, but only subject to adequate amortization agreements (Paragraph 49[xii] Basel II Accord). Moreover, the amount of this dated Lower Tier 2 instruments was capped at 50% of the company' common equity items. LT2 instruments were not designed to absorb losses, so coupons were paid on a mandatory basis, provided that the institution had announced an annual profit.

Basel II also left it for decision of national regulators if a Tier 3 instruments are to be allowed. The sole purpose of such short-term subordinated debt was to allow a financial institution to meet a proportion of the capital requirements for market risk (Paragraph 49[xiii] Basel II Accord). Such instruments had to meet certain minimal conditions: (i) be unsecured, subordinated and fully paid up, (ii) have an original maturity of at least 2 years, (iii) no call except where supervisory authority agrees and (iv) lock-up clause prohibits any distribution (even repayment on maturity) which would result in breaching of minimum capital requirements by the institution (Paragraph 49[xiv] Basel II Accord).

2.9. Solvency I capital instruments

Under Solvency I, insurers are obliged to hold regulatory capital, calculated against their risk-weighted assets. At least half of that regulatory capital has to be held in the form of equity capital (consisting of common shares, retained earnings, etc.), while the rest of regulatory capital may take the form of subordinated debt. However, only up to 25% of Solvency I regulatory capital may be held in dated subordinated debt, while the rest of this capital must be in the form of perpetual instruments: equity (at least 50%) and perpetual hybrids.

2.10. Basel III capital instruments

The financial crisis of 2008–2009 has exposed the insufficiency of the Basel II capital structure, which was not able to preserve banks from bankruptcy. In practice, in many banks before the great financial crisis classical equity amounted to 1–3% only of RWAs. In the aftermath of the crisis, regulators set out to strengthen capital regulation. New Basel III capital requirements call for a minimum of 4.5% of RWA as core Tier 1. Basel III requires also a backstop 3% leverage ratio, defined as common equity to total assets, or more precisely total exposure taking into account off-balance sheet derivatives.

Most of the Basel II hybrid Tier 2 capital is being phased out now as it became too bond-like and was proven by the credit crunch to not be truly loss absorbing. In other words, Basel II Tier 2 instruments failed to absorb losses. It ranked senior to the Core Tier 1 instruments and had an entitlement to a fixed coupon. Coupons were discretionary but had to be paid if the bank made a profit or paid any ordinary dividend.[3] Most coupons were paid throughout the credit crisis unless there was some form of state involvement in the bank (Lally, 2013). In fact, lack of banks' willingness to defer coupons on UT2 hybrids (that would ruin their credit history) and lack of ability to defer coupons on LT2 subordinated debt led to necessity of bail-outs. One may say that restrictive provisions on deferral applicable for AT1 financial hybrids were forged to avoid repeat of this situation.

Financial institutions which strongly relied on Lower Tier 2 instruments had no tool to convert these instruments to more loss-absorbing ones. This observation is a cornerstone for the contingent conversion into common equity (Tier 1) that forms the footprint of Basel III. All the instruments eligible for Additional Tier 1 purposes (that has to a large extent replaced the Basel II UT2) must be subject to such contingent conversion.

Under Basel III, Tier 2 capital is no longer divided into 'Upper' and 'Lower'. It has been predicted in Germany that Tier 2 products will die out as Basel III implementation is phased in, because banks will be trying to build up Tier 1 reserves and sell off Tier 2 products. In light of that, a significant reduction in Tier 2 issuances across all countries implementing Basel, not just in Europe, is expected (McNulty, 2013; Euroweek, 2014).

Finally, Tier 3 instruments were abandoned and currently national regulators may not introduce them. However, it will be demonstrated that the very concept of Tier 3 instruments has not been totally abandoned. There is strong market demand to mitigate the uncertainty introduced by the discretionary contingent conversion trigger event, or 'regulatory trigger', defined in BRRD. The idea of Tier 3 regulatory capital is to identify the debt instruments that may be subject to the resolution mechanism provided by Tier 3 instruments and simultaneously identify the debt instruments that are beyond the scope of the mechanism.

2.11. Bail-in bonds

In 2013, when the first CoCos were already on the market,[4] regulators realized that in the case of the biggest financial institutions, CoCo mechanisms should be given a wider range to prove sufficient. In essence, the bondholders should bail-in a financial institution before it has to be bailed out at the expense of the taxpayers. Such an approach was successfully used during the Cyprus banking crisis of 2013. This experience led to the proposing of a bail-in bonds concept in BRRD – an instrument relatively similar to both CE and PWD CoCos. The main difference is that the CoCo's trigger is very mechanical and predetermined in terms of the issue of each hybrid. This enables investors to assess the fraction of face value that may be written down (or converted into equity), be it 100%, 75%, and so on. As a result, investors may quantify the write-down (or conversion) risk they are exposed to as holders of CoCos. It is quite different when it comes to bail-in bonds where write-down or conversion is not triggered automatically and its extent is not predetermined. Instead, competent supervisory authorities are granted discretionary power to start write-down or conversion and determine its exact scope. Hence, investors must be granted extra safeguards: not only deeper disclosure requirements, but also tools to ensure that any write-down will be engaged by competent authorities only after in-depth and prudent assessment of each individual case. A rule of 'no creditor worse off' plays a crucial role in that matter. Its purpose is to ensure that no creditor will suffer to a larger extent as a result of a bail-in than it would

in the course of a normal insolvency proceeding of a failed financial institution. Of course, this principle is very general and it definitely does not solve market uncertainty that replaces the 'too big to fail' confidence of creditors. Before the BRRD, bondholders of Globally Systemic Important Banks (G-SIBs) were sure that this systemic importance and necessity of preserving the stability of the financial system would force the regulators to bail-out G-SIBs rather than to let them go bankrupt. Such an approach was very safe for creditors, as losses were borne only by shareholders and taxpayers. The 'too big to fail' concept is being systematically abandoned, as bearing no losses by creditors looks very unfair in the eyes of society and regulators. Hence, even the principle of 'no creditor worse off' may not change the fact that the BRRD is very intent on bailing-in banks' liabilities rather than accepting any future bail-out. It should also be stressed that – contrary to directly applicable Capital Requirements Regulation (CRR) – bail-in bonds are regulated 'only' by a directive that has to be transposed to the national legal systems. Of course, this legislative approach leaves more space for some bias in final bail-in rules on a national level than on any directly applicable rules based on regulations. As a result, legal uncertainty may grow in the course of a BRRD transposition into national legal system of member states. In the end, even some regulatory arbitrage may be deemed as possible. Such a result would be highly undesirable, as the BRRD bail-in tool is designed explicitly for the resolution of financial institutions conducting cross-border or even pan-European banking activity, especially in the form of group or financial conglomerates. Any differences in the legal framework may be a serious obstacle to the proper functioning of this tool.

The general concept of bail-in bonds led to the introduction of Total Loss Absorption Capacity (TLAC) by the Financial Stability Board in 2014. Broadly speaking, the purpose of TLAC is to complement the Basel III capital requirements set out in CRR. To date, at the early stage of Basel III transposition, financial institutions are required only to hold capital equal to 8% of their RWA: 4.5% in Common Equity Tier 1 (CET1), 1.5% in AT1 and 2% in Tier 2 (T2) instruments. Since 2016, these 'basic' requirements will be supplemented by capital buffer requirements, set out in CRD IV Chapter 4. These buffers would be Capital Conservation Buffer (CCB), Counter-Cyclical Buffer (C-CB) and in case of G-SIBs also Systemically Important Financial Institutions (SIFIs) Surcharge. CCB will amount for 2.5% of RWA and will have to be entirely held in CET1 instruments. Any failure to meet this requirement will result in regulatory restrictions banning discretionary financial distributions (dividends and bonuses). The exact amount of C-CB

will be determined on a national level within 0% to 2.5% of RWA. Again, only common equity will be eligible for purposes of this requirement. Finally, once 'too big to fail' G-SIBs (or SIFIs) will be subject to an extra capital surcharge that initially was designed to range between 1% and 3.5%. As a result, by 2019 SIFIs would be required to hold CET1 capital, amounting to even 15.5% of their RWA. Common equity instruments would have to amount for between 7% and 9.5%, depending on the amount of C-CB. In case of SIFIs it would be between 8% and 13%, for SIFI Surcharge would also have to be composed exclusively of CET1 items.

This initial proposal was amended by FSB in November 2014 and detailed on February 2015. The amount of TLAC for SiFIs will rise and finally it will amount to 16–20% of risk-weighted assets. The FSB realizes that it is impossible for this new extra loss absorption amount to be composed from common equity instruments. Hence, at least 33% of TLAC will be long-term, unsecured bonds designed to create of capital buffer for 30 identified G-SIBs. The goal here is to ensure that G-SIBs have sufficient loss-absorbing capacity and are prepared for recapitalization, so their resolution will not cause taxpayers to rescue it for sake of the financial stability. It must be stressed that introduction of TLAC 'penalizes' traditional banking (retail and commercial banks) that build their financing mostly on deposits. To date, these requirements are still too imprecise and it is still undecided when it will start to apply, but 2019 is mentioned as one of possible dates as it is when CRR requirements will be fully loaded.

2.12. Comparison of different conversion into equity mechanisms

At first glance convertible (CB), reverse convertible (RC) and contingent convertible (CoCo) bonds are quite similar debt securities. All of them are based on a straight fixed coupon bond. All are additionally equipped with an equity conversion mechanism. Let us ignore at the moment a write-down, coupon deferral and bond call/put options (giving the right for the issuer/bondholder to initiate premature redemption at a predefined call price) and solely concentrate on the impact of different conversion mechanisms on the bond characteristics.

A convertible bond holder is entitled, at specified dates, to choose between converting into a fixed number of issuer's shares or not converting thus go on receiving CB coupons and principal. Equivalently the CB investor has got a two-element portfolio of a straight bullet bond and a

long call stock option. The option strike price is equal to future convertible bond value divided by the number of shares received at conversion.

Therefore the CB holder has a limited loss potential to straight bond value (called investment value), and an unlimited profit potential when the underlying shares price upsurges (see Figure 2.1 left hand exhibit).

The CoCo equity conversion is triggered automatically when the issuer's regulatory capital ratio (CET1 ratio – see section 5.5.3) drops below a specified level. In effect the bondholder receives a predetermined number of issuer's shares and the bond ceases to exist. The share price drop of say below a level of S^* would almost surely accompany this distress scenario. Therefore the CoCo holder has a position equivalent to holding a straight (dated or perpetual) bond and short put stock option (see section 16.5 on equity derivatives method). As a result, the CoCo value range is capped by the straight bond value and floored at zero (see Figure 2.1 right side exhibit), with strong sensitivity to underlying stock price downturn.[5]

Very similar conversion mechanism to CoCo is built into reverse convertible bond. This structured bond pays off interest and principal unless the underlying share price (or basket of selected stocks value) drops below a specified strike level at bonds maturity. If so, the RC bondholder receives payoff being exclusively an equivalent of the underlying shares depreciated value. As a result, the RC value versus the price of the underlying shares is practically identical to the one of the CoCo (Figure 2.1 right hand exhibit).

Structured products were a popular investment particularly in Germany and Switzerland where they accounted for 6–8% of all invested assets.

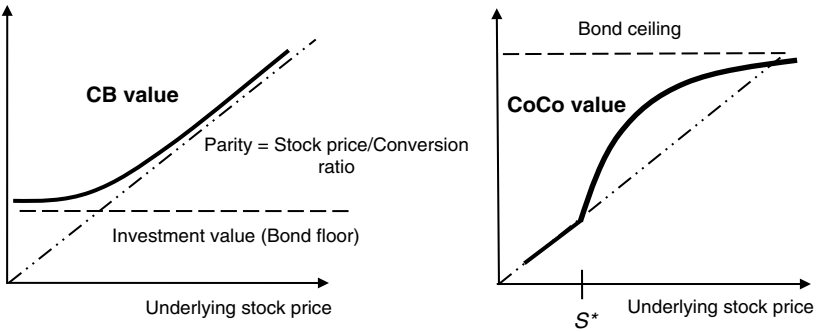


Figure 2.1 Theoretical value (prior to maturity) of a convertible bond (CB) and of a contingent convertible (CoCo) versus the price of the underlying share S^*

In the United States, the market growth used to be of around 30% annually (Rieger, 2012). There is no clear data on these instruments historical performance. As a structured note, the reverse convertibles were traded over the counter and marketed to selected individuals by some brokerage firms. In year 2010 according to Bloomberg, an average loss on sold in the United States in previous year 1481 reverse convertibles was 1%, while the S&P 500 stock index returned 8% and corporate bonds gained 11.1% (Faux, 2011). There were occasionally some rumors about the poor RCs performance and the structures were even named 'toxic investment'.

To sum up: a convertible bond offers investors the safety of fixed income security during distress periods and also profitability of equity at prosperous times.

On the contrary, CoCos and RCs are high-risk investments because of the short put option embedded. Thereby the risk should be set off by relatively higher coupon. There is a danger for the investors lured by high CoCos yields of a downward risk underestimation. A precipitous underlying stock price plummet may rapidly reduce a CoCo's value to zero.

2.13. Conclusions

Evolution of hybrid financial instruments shows how new generations of securities are based on developments of previous ones, adding new components to their structure. The family of hybrid securities is still growing, boosted by financial engineering of market participants and – interestingly – regulators. There is still a room for innovation. One of the most discussed problems is the nature of the conversion trigger in CoCo structure. To date, the capital ratio trigger dominates but alternative forms are still being analyzed.[6] Another example of creative approach is to embed a contingent conversion in the structure of a traditional convertible bond. Such instruments – issued for the first time by Bank of Cyprus in 2011 and dubbed as 'CoCoCos' – enable investors to participate in the positive performance of the underlying shares. On the other hand, the issuer is able to lower the coupon paid to investors as a compensation for the risk run by the investors. Holders of CoCoCos are still exposed to risk entailed to loss-absorbing instruments, but this risk is – to some extent – compensated by the value of conversion option they are granted. In other words, these CoCoCos possess the downside potential (typical for CoCos and absent in case of a conventional convertible bond) as well as the upside potential (typical for conventional convertible bond and absent in case of a 'simple' CoCo). That is why these instruments are also referred to as 'CoCo with Upside'.

3
Legal Framework for Financial Hybrids in the Banking Industry

3.1. Transposition of Basel III

Prudent capital requirements are set out in the CRD IV package – the fourth Capital Requirements Directive and Capital Requirements Regulation. These requirements are based on internationally accepted principles of Basel III. They preserve the level playing field inside the Single Market by achieving a Single Rule Book for all banks in the EU. Financial hybrids play an important role in the tier-based capital structure imposed by the CRD IV package, which will be examined in detail below.

3.2. Bank Resolution and Recovery Directive

Instruments for banks in distress are set out in the BRRD – the Bank Recovery and Resolution Directive. One of the two types of BRRD instruments provides for early intervention on a going-concern basis. The other type sets out a mechanism for shareholders and creditors to share the financial burden of a failed bank on gone-concern basis. Financial hybrids – CoCos and bail-in bonds in particular – address the issue of creditors' participation and therefore will be examined further in this study. The BRRD can be considered as complementing the CRD IV package. While already adopted capital requirements reduce the probability of a financial institution's failure, the BRRD shows how to deal with any failure that has occurred despite these requirements being in force. Here, the BRRD has two goals: to mitigate the impact on society of a financial institution's failure, and to minimize harm to the stability of the financial system.

3.3. Banking Union framework

3.3.1. Overview

The Banking Union aims to create a safer and sounder financial sector for the single European market. In order to achieve this goal, the European Commission (EC) proposed a number of initiatives, including stronger, more prudent capital reserve requirements, improved depositor protection and harmonized rules for managing failing banks. These measures constitute the three pillars of the Banking Union.

3.3.2. Single Supervisory Mechanism (SSM)

Since November 4, 2014, the European Central Bank (ECB) has been responsible for direct supervision of the 120 largest and most systemically important banks in the Eurozone. Other banks are left for national supervision, although in cooperation with the ECB. This new approach shows how regulators plan to manage the complexity and interconnectedness of the financial system: because supervision of the most complex institutions is completely beyond the competence of national regulators, the task is handed up to officials with the authority to manage financial institutions throughout the entire Eurozone. The character of these institutions makes supervisors operating on a national level virtually powerless when it comes to the protection of clients in times of financial stress. Moreover, even smaller banks in the Eurozone conduct business on a cross-border basis, so leaving them without supervision on a supranational, European level would be dangerous. Hence, the ECB participates in supervision over these banks as well.

3.3.3. Single Resolution Mechanism (SRM)

Starting from January 1, 2015, a new European authority, the Single Resolution Board (SRB), has been responsible for restoring failing banks to financial health. The main tasks of the SRB are (i) to assess banks' resolvability and adopt resolution plans; (ii) to adopt measures for early intervention; (iii) to set minimum requirement levels for own funds and eligible securities; (iv) to adopt resolution decisions and make a proper choice on the applicable resolution tool; (v) to write down or convert capital instruments; and (vi) cooperate with and instruct national resolution authorities. These tasks will be discussed further, but it should be pointed out that the SRM is a step ahead of the CRR on individual own funds, eligible liabilities requirements and write-downs or conversions of capital instruments. These areas are particularly important for the purpose of this study, as they directly address financial hybrids.

The purpose of the SRM is to complement the SSM and ensure that if a bank supervised by the ECB faces financial stress its resolution will be managed efficiently at the European level. Therefore, the division of competence between the SRB and national resolution authorities generally follows the aforementioned rules on supervision by the ECB and national supervisors. Efficiency is measured in terms of minimizing costs for taxpayers and the overall economy. This fact is worth remembering, as it mirrors the general approach of the new legal regime: a financial institution's shareholders and creditors will have to submit to the 'bail-in' of their investment before the financial burden of their bail-out is shifted to any taxpayers. The SRM regime applies to all banks in the Eurozone, and also to all banks in non-euro member states that opt to participate in the mechanism.

3.3.4. Single Resolution Fund (SRF)

The purpose of the Single Resolution Fund is to ensure that medium-term funding support is available when a failing bank is being restructured. An Inter-Governmental Agreement (IGA) signed by 26 member states on May 21, 2014 obliges all banks operating in the participating member states to transfer contributions to the SRF. The Fund is administrated by the SRB.

3.3.5. Banking Structural Reform

Another important level of the new legal regime is the separation of risky proprietary trading from the deposit-taking business of traditional banking if such trading has the potential to endanger financial stability. This approach represents a serious structural reform of the banking business. As this topic is not directly connected with hybrid securities, but to proprietary trading in general, it will not be discussed further in this study.

4
CRD IV Package Legal Framework

4.1. Overview

Under the CRD IV regulatory package, EU banks have to fulfill certain capital requirements, which are grouped *inter alia* as Tier 1 and Tier 2 financial instruments. Tier 1 instruments constitute the 'going-concern capital' of the financial institution, while Tier 2 instruments form the 'gone-concern capital'. This means that Tier 1 instruments may absorb losses of the institution on an ongoing basis, while Tier 2 instruments absorb losses when a financial institution becomes insolvent or faces liquidation. The core of this system is an instrument known as the Common Equity Tier 1 (CET1). A CET1 must be composed of the highest quality of capital and possess maximum loss-absorption capacity. CET1 instruments are mainly common shares and retained earnings, while hybrid bonds may be assigned to either the category of Additional Tier 1 (AT1) or that of Tier 2 (T2), provided that certain criteria are met. These criteria also may be classified in a manner reflecting the aforementioned dimensions of the debt–equity continuum (Figure 4.1).

4.2. Common Equity Tier 1 financial instruments

As previously mentioned, this top tier of a bank's own funds will be composed of the highest quality capital items: capital instruments, share premium accounts related to such capital instruments, retained earnings, reserve capital, other accumulated comprehensive income, additional reserves and funds for general banking risk (CRR Article 26[1]). To determine if a given financial instrument is eligible for CET1 purposes, its compliance with requirements laid down in CRR Article 28 and 29 must be analyzed. These requirements are comprehensive, and may be

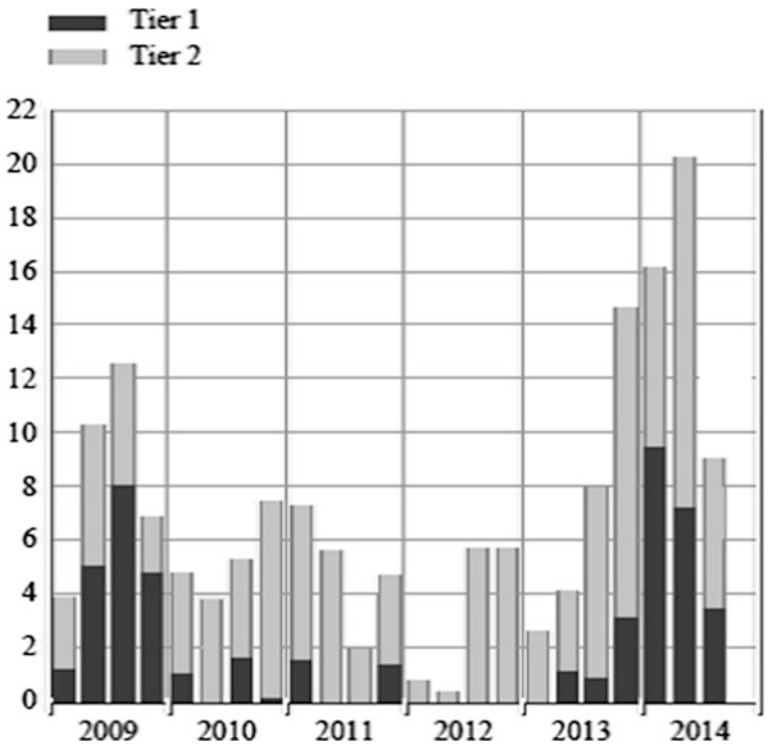


Figure 4.1 Issuance of subordinated debt by euro area banks (Q1 2009–Q3 2014, EUR billions)

Source: ECB (2014)

described as stipulating a core equity character of the instrument in every dimension discussed thus far: perpetual maturity, non-cumulative deferral, maximum subordination and loss absorption. Any CET1 instrument will have to be qualified as capital both in the meaning of EU law, the applicable accounting framework and the national insolvency law (CRR Article 28[1][c]), which generally excludes any hybrid bonds from this category. However, preference shares must be analyzed before they can be deemed eligible to be classified as CET1 instruments. Although preference shares do qualify as capital equity instruments, they do not meet the criteria of the maximum subordination. Pursuant to CRR Article 28(1)(i) and (j), CET1 instruments must absorb losses to the same degree and rank below all other claims in the event of insolvency or liquidation of the issuer. Therefore, CET1 instruments must create a homogeneous

category of items in terms of subordination. This requirement excludes preference shares from the CET1 category, as the privileged character of these instruments are expressed, inter alia, by their seniority over common shares. As a consequence, preference shares may only be qualified as AT1 financial instruments if they meet the requirements set out in CRR Article 52(1).

4.3. Deduction mechanism

In order to avoid the risk of contagion[1] in the highly interconnected financial system, a CRR has to provide a mechanism whereby the failure of one institution has a limited impact on the entire financial system. When assessing an institution's compliance with prudential capital requirements, one must look not only at its capital liabilities but also at assets it has invested in other financial institutions. Without any safeguard, the effect of one institution's failure would rapidly and inevitably spread to others. The purpose of prudential capital requirements is to reduce the risk of a bank's failure. The own-funds monitoring mechanism would be incomplete without considering the exposure risk raised by the failure of other banks. A given institution could seem well fortified in terms of own funds, but these strong walls would be illusory if the threat were to come from an unsecured direction, like unmonitored assets to which other institutions may be largely exposed. Any chain reaction in such a scenario would ruin the whole reason for the prudential capital requirements of Basel III and CRR. It must be stressed that the mitigation of contagion risk should be given special attention with regard to CoCos. To date, no CoCo issuer has deferred a CoCo coupon; neither has any contingent conversion write-down occurred. The first coupon deferral on an AT1 instrument will mark the coming of age of the CoCo market (Rabobank, 2015). In other words, the market will face a tough test with when the first coupon is deferred. According to recent surveys by the Royal Bank of Scotland (RBS), investors expect market prices to drop by around 9%. The first write-down conversion is expected to result in an even stronger drop of 15% (RBS, May 2014).

To address the problem of contagion risk, exposure to risk connected with other financial institutions is explicitly mentioned in the mechanism of deduction. The items that have to be deducted when calculating the CET1 amount are listed in CRR Article 36(1). Those items include losses for the current financial year, own CET1 instruments, and: (i) the applicable amount of direct, indirect and synthetic holdings by the institution of the CET1 instruments of financial sector entities, if the

institution has a significant investment in those entities (CRR Article 36[1][i]); and (ii) the question as to whether the institution has no significant investment in those entities (CRR Article 36[1][h]). Significant investment in a financial sector entity is defined in CRR Article 43 as: (i) ownership of at least 10% of CET1 instruments issued by a given financial entity; (ii) having close links with that entity and ownership of CET1 instruments, even if they amount to less than 10%; and finally (iii) ownership of CET1 instruments (even if they amount to less than 10%) and consolidation with that institution for financial reporting purposes – but not for any purposes related to the CRR framework. If any of these conditions are met, the deduction procedure is governed by CRR Article 45. If none of these conditions are met, the deduction procedure is subject to the provisions of CRR Article 46. The same principle applies to AT1 instruments (CRR Article 56 [c] and [d]) and T2 instruments (CRR Article 66 [c] and [d]). Again, calculations and time periods associated with the deduction mechanism are subject to detailed rules, and depend on whether there is a significant investment (CRR Articles 59 and 69) or if there is no investment (CRR Articles 60 and 70).

5
CRR Additional Tier 1 Financial Instruments

5.1. General remarks

Items categorized as AT1 instruments also serve the purpose of loss absorption on a going-concern basis. These items are capital instruments that meet conditions set out in CRR Article 52 and share premium accounts related to such instruments, as provided for in CRR Article 51. It is important to note that the goal of categorizing items in a Tier-based system is to the separation of those items: instruments qualified as AT1 items do not qualify to be designated as CET1 or T2 instruments.

The most obvious requirements that all AT1 instrument must meet provide that:

1. The instrument has to be issued and paid up (CRR Article 52[1][a]);
2. The instruments are not purchased by (i) the issuer or its subsidiaries, or (ii) by an undertaking in which the issuer has participation in the form of a direct or controlling ownership of at least 20% of the voting rights or capital of that undertaking (CRR Article 52[1][b]); and
3. The issuer does not directly or indirectly finance the purchase of the instruments (CRR Article 52[1][c]).

It is also very important to note that CRR Article 52(1)(p) explicitly states that AT1 instruments may be directly issued not only by the financial institution, but also by the so-called special purpose vehicle (SPV) which is concerned with the indirect issuance of own funds instruments. Such an entity would have to be consolidated under CRR provisions, and proceeds from the issue would have to be immediately made available to the institution. Regulation 241/2014 Article 24 prohibits more-favorable treatment of holders of instruments than holders of instruments issued directly by the bank.

5.2. Maturity

5.2.1. Requirements on maturity and avoidance of 'synthetic maturity'

AT1 hybrid bonds have to be perpetual (CRR Article 52[1][g]). Moreover, the provisions governing these instruments may not include any incentive for the issuer to redeem them. To specify the scope of this condition, the European Banking Authority (EBA) issued Regulatory Technical Standards (RTS) adopted by the EC as a Delegated Regulation 241/2014.[1] First, all the features that provide an expectation at the date of the instrument's issuance that the capital instrument is likely to be redeemed (Regulation 241/2014 Article 20[1]) have been specified as unacceptable incentives to redeem AT1 instruments. Furthermore, certain provisions have been identified as constituting an unacceptable expectation to redeem the AT1 instrument. These prohibited provisions, set out in Article 20(2), mainly constitute a call option combined with the negative consequence that the issuer cannot exercise the option. Coupon step-up is the most obvious example. Others include a requirement or an investor option to convert the instrument into a CET1 instrument; a change in a reference rate whereby the credit spread over the second reference rate is greater than the initial payment rate minus the swap rate and the future increase of the redemption amount. The last provision is also prohibited, as it constitutes an incentive to redeem when it refers to the remarketing option. Besides, any marketing of the instrument in a way that suggests to investors that the instrument will be called is prohibited because such a suggestion would constitute an incentive.

Current market experience shows how issuers have managed to introduce some ability to change the coupon rate in a way that is not considered to be a prohibited incentive to redeem the AT1 instrument. In 2014, Banco Santander, Deutsche Bank and Unicredit were among the financial institutions that successfully issued AT1 bonds. Accordingly, these instruments were described as 'no-step-up', 'fixed to reset' and 'fixed rate resettable', so in fact they embedded the same coupon rate reset mechanism after the first call date. The coupon rate is fixed during the first no-call period, which lasts at least five years. Then, if the bond is not redeemed, it is subject to reset and calculated as a 5-year mid-swap rate correlated to the currency of the issue and the initial credit spread. For example, Deutsche Bank's EUR AT1 instrument[2] has a fixed rate of 6%, which is the sum of the 5-year swap rate that at the date of pricing was 1.302% plus the initial credit spread of 4.698%. If Deutsche Bank skips call at the first call date, the coupon rate will be reset at the

value of the determined swap rate plus the credit spread. This reset will determine the coupon rate for the next five years, up to the next call date. Such a coupon rate reset mechanism does not constitute a fixed-to-floating change of coupon, and is not a step-up either. It is almost certain that the coupon's value will differ from the fixed rate of 6% after the reset, but at the issue date, investors will not be able to determine whether the rate will rise because the swap rate increases, or fall because it decreases. Thus, a coupon step-up may or may not happen. The coupon reset mechanism being described does not necessarily constitute an incentive to redeem the bond at the first call date, which does not constitute a synthetic maturity of the perpetual instrument. Therefore, such a construction is not prohibited.

5.2.2. Exercise of call option

Any call option may be exercised only at the sole discretion of the issuer, and not at the discretion of the investor (CRR Article 52[1][h]). Hence, hybrid securities qualified as AT1 capital instruments may be structured as a callable perpetual bond with a possible call at year 5 (CRR Article 52[1][i]). This format of hybrid is commonly referred to as a PerpNC5 security. Any such call, redemption or repurchase of instruments may not be exercised before five years after the date of the bond issuance. The very exercise of a call option by the issuer is also subject to detailed conditions set out by the CRR. The CET1, AT1 and T2 instruments may be called, redeemed or repurchased only if the issuer has been granted regulatory permission (CRR Article 77). The conditions that must be met to receive such a permission are set out explicitly: (i) redeemed AT1 instruments are subsequently replaced with own-funds instruments of equal or higher quality at terms that are sustainable for the income capacity of the institution or (ii) the issuer demonstrates to the satisfaction of the competent authority that such redemption would not violate the CRD IV requirements (CRR Article 78[1]). The sustainability requirement set forth in CRR Article 78(1)(a) *in fine* has been specified in the RTS. Pursuant to Regulation 241/2014 Article 27, sustainability is preserved if an assessment conducted by the competent authority concludes that the profitability of the institution remains sound, and there is no evidence of any negative change in that profitability after the requested replacement is performed. Moreover, such a 'no-worse off' perspective should take into account possible consequences at the date of the assessment and for the foreseeable future. Finally, the assessment examines the likelihood of the institution's remaining profitable if conditions of stress arise.

An exception from the mandatory no-call period of five years after the date of issuance is provided by (CRR Article 52[1][i]). The issuer may call, redeem or repurchase an AT1 financial instrument before that date only if he or she is permitted to do so by the competent authority. In this scenario, the conditions attached to the granting of such a permission are even tighter than those regarding a conventional call option exercise. The issuer must not only meet conditions specified in CRR Article 78(1) but also those set out in article 78(4)(a) or (b). These conditions are defined as a regulatory reclassification of instruments that would probably exclude them from own funds, or classify them as a lower quality form of own funds, provided that the competent authority considers such a reclassification to be sufficiently certain. The conditions also stipulate that the issuer could not have reasonably foreseen such a regulatory reclassification at the time of the instrument's issuance. Nor could the issuer predict material and unforeseeable changes in the applicable tax treatment of the instruments. These conditions are commonly referred to as a Regulatory Event or a Tax Event.

The application procedure for redemption of CET1, AT1 and T2 instruments is also subject to formal requirements set out in RTS. First of all, no announcement about redemption may be made before the institution obtains the approval of a competent authority (Regulation 241/2014 Article 28[1]). The application must be accompanied with information on (i) well-founded explanations of the rationale of the action applied for, (ii) capital requirements and buffers in at least a 3 year period, along with composition of own funds before and after the performance of the action applied for, as well as information on the action's impact on regulatory capital requirements, (iii) the action's impact on the institution's profitability, (iv) information on the risks to which the institution is or may be exposed, and whether the institution's own funds ensure coverage of such risks, taking into account stress tests and different scenarios, and (v) any other information considered necessary by the competent authority (Regulation 241/2014 Article 30[1]). A specific application time-frame is provided for in Regulation 241/2014 Article 31. The application may include a plan to carry out redemption or repurchase over a limited period of time for several capital instruments (Regulation 241/2014 Article 29[2]). In case of a repurchase for market-making purposes or employee remuneration program purposes, approval may be granted for a certain predetermined amount. The limitations of these amounts are set out in Regulation 241/2014 Article 29(3)(a) and (b).

5.3. Deferral

5.3.1. Distributable items

The most important feature of the AT1 instrument in the context of deferral is that distributions under these instruments may be paid out only from the distributable items: profits and reserves (CRR Article 52[1][l][i]). This feature makes such distributions very similar to dividends; they may be paid out only where there are certain funds for this purpose, and a lack of such funds simply results in the absence of a distribution, without any default on the part of the issuer. Even if there are funds that may be used for a coupon payment this does not guarantee that the payment will be made. The issuer of an AT1 eligible instrument has full discretion to cancel a coupon payment for an unlimited period of time and on a non-cumulative basis. Such a cancellation will not constitute the issuer's event of default, and no restriction will be imposed on an issuer who makes such a cancellation (CRR Article 52[1][l][iii] and [iv]). This means that the issuer may simply cancel the coupon payment, which significantly strengthens the equity-like character of the instrument. Neither investors nor shareholders have any claim against the issuer in that matter. It may seem that AT1 investors are in a worse position than shareholders, who may always try to nullify the decision to transfer the earnings to the company's reserve capital, instead of transferring it to the shareholders in the form of dividends. However, such an action is possible only in 'continental' legal systems, such as those of Germany or France, where decisions on dividend distribution are made during annual general meetings of shareholders (AGM).

Furthermore, the level of distributions, known as the coupon rate, may not be amended on the basis of the credit standing of the issuer or its parent company (CRR Article 52[1][l][iv]). Finally, cancellation of dividend distribution imposes no restriction on the institution (CRR Article 52[1][l][v]). The last requirement significantly limits the contractual freedom of counterparties – debt issuers and creditors – to shape their contractual relation.

5.3.2. Covenants

Covenants may be described as an additional issuer's obligations or as the rights of investors. Such covenants are not associated with common stocks. Therefore, the presence of covenants is a debt-like feature of a hybrid security, while its absence is an equity-like feature.

Such rights may constitute a protection of the hybrid holders, or may grant them the power to initiate the involuntary bankruptcy or winding-up of the issuer. Of course, this ability may not be permanent, and it comes into force only when it is triggered by the occurrence of certain default events that are explicitly specified in the hybrid's documentation.

The presence of covenants limits the hybrid's ability to achieve an equity credit ranking,[3] so it is important to define the permissible events of default that trigger the holder's right to demand payment from the issuer. According to Fitch's criteria regarding the debt–equity continuum, the presence of covenants disallows the categorization of a hybrid as a top class of superior, 'class E' equity content. There are, however, some covenants that do not block the hybrid from achieving a high equity class D content rating. Permissible events of default, triggering the covenant, are:

1. events of bankruptcy and liquidation,
2. failure to redeem the securities in the specified occasions,
3. failure to pay amounts due, which cannot be deferred because of the earlier application of all cumulative deferrals. All AT1 instruments embed non-cumulative deferral, so this last event of default will obviously not occur.

As mentioned above, covenants may constitute additional rights of investors, as compared to stock documentation. So-called positive covenants may also define the obligations of the issuer to undertake certain actions, while negative covenants bar the issuer from carrying out specific actions. Thus, the issuer may be obligated to provide a financial statement on a certain date, to maintain insurance, or, in the case of financial covenants, to carry out certain financial measures or achieve specific financial ratios. Violations of these covenants would constitute an event of default (Rawcliffe et al., 2008).

5.3.3. Dividend-stopper and dividend-pusher provisions versus look-back provisions

Even if the issuer is granted a deferral option, his ability to exercise it may be limited. The most common form of deferral constraints are dividend-stopper and dividend-blocker mechanisms, as well as look-back provisions, depending on the corporate governance system of a given legal system.

1. Dividend-stopper and dividend-pusher provisions.

The United States, United Kingdom and Australia have similar corporate governance systems in which dividend payment decisions are made by a management board. A board may be granted an option to propose making a dividend payment to shareholders, but it may also have full discretion to decide whether or not to make such a payment. Thus, a board may enter into an agreement with bondholders regarding the correlation between the distribution of the issuer's profit to its shareholders and the coupon payment. Such an agreement may take the form of a dividend stopper or dividend pusher.

The dividend-stopper provision states that when the exercise of the issuer's deferral option results in a cumulative deferral or a canceled, non-cumulative deferral coupon payment, a board loses the ability to pay the dividend to the shareholders. Therefore, a dividend stopper may be deemed a negative covenant in which the exercise of the deferral option is a trigger that prevents a dividend payment. The most investor-friendly structuring of an instrument would set a time for coupon payment shortly before a board decides whether to pay a dividend. The time element of such a structure would assure the bondholders that market conditions for distribution are the same for them as for equity holders.

The dividend-pusher mechanism obliges a board that makes a dividend distribution to pay the coupon to the bondholders. Therefore, it also may be deemed to be a negative covenant (undertaking not to perform coupon deferral), triggered by a decision on distribution to the shareholders. As this mechanism constitutes a mirror image of the previous one, its structure should be mirrored with respect to time, and the coupon payment date should be determined shortly after the board decides whether to pay a dividend.

It is clear that the rationale of both these provisions protects bondholders against the issuer's discretion on the grounds of deferral. Deferral has equity-like aspects while covenants should be considered as debt-like features that are meant to reduce the equity-like character of the instrument. Therefore, it is not particularly surprising that CRD IV banned both dividend stoppers and dividend pushers. Because the cancellation of distributions to bondholders by means of non-cumulative deferrals imposes no restrictions on the issuer (Article 53[l][v]), the dividend-stopper provision is nullified. In fact, on the grounds of that restriction, a dividend pusher is also impossible.

2. Look-back provisions.

In European corporate governance systems, decisions on dividend payments are vested in the competence of the AGM, which makes effective dividend-stopper provisions difficult to incorporate. If the board possesses no power to decide on dividends, it obviously may not enter into an agreement with bondholders that it will not decide to pay the dividend to the shareholders if the coupon is outstanding. All such decisions of the board would only have the force of a non-binding recommendation to the AGM, which gives the bondholders no real protection. Thus, the introduction of the look-back provision is necessary as a kind of equivalent to a dividend stopper.

Under the look-back provision, if a specific 'reference event' occurs in a specified period of time (the 'nominal duration'), a certain action may not be taken. The simplest look-back states that the option to defer a hybrid coupon may be exercised only if the company declines to make the dividend distribution that constitutes the reference event within a predefined number of months. Share repurchases or any other form of distribution to common shareholders are also frequently used as reference events. As the reference event is the AGM's decision on distribution to the shareholders, the period between the AGM and the coupon payment is all the more important. This period is referred to as the 'effective duration' of look-back. Of course, the probability of the issuer's financial stress (the reference event) rises along with the effective duration of the look-back. Therefore, the longer the effective duration of the look-back, the more the issuer's financial flexibility is constrained, which results in lower equity credit (Rawcliffe et al., 2008). Depending on the structure of the hybrid issue, the effective duration may be shorter, longer, or equivalent to the nominal duration.

5.3.4. Maximum distributable amount

In discussing coupon deferral, one must take into account that a financial institution that meets the combined buffer requirement (defined in CRD IV Article 128[6]) is prohibited from making a distribution on CET1 instruments that would result in breach of combined buffer requirement (CRD IV Article 141[1]). If an institution fails to meet that requirement, then payments on AT1 instruments are also prohibited (CRD IV Article 141[2][c]) until the institution calculates the Maximum Distributable Amount (MDA) and notifies the competent authority. As long as institution fails to meet or exceed its combined buffer requirement, it is prohibited from distributing more than the MDA. This prohibition applies, *inter alia*, to CET1 and AT1

instruments, but not to T2 instruments (CRD IV Article 141[3]). Of course, any distribution concerning instruments or obligations referred to in CRD IV Article 141(3) results in a reduction of the MDA. A detailed method of MDA calculation is set out in CRD IV Article 141(5).

5.3.5. Conclusions

The goal of the dividend pusher/stopper and look-back provisions seems obvious, as it aims to protect bondholders against a scenario in which they would have to bear the burden of loss absorption while shareholders bear no such burden. Dividend blockers and pushers ensure that shareholders will not be able to receive dividends unless the coupon is paid to bondholders. Bearing in mind the provisions of CRR Article 52(1)(l)(iii) and (v), one may conclude that the CRR respectively prohibits both the dividend pusher and the dividend stopper from being embedded in the AT1 instrument structure. Hence, while Basel III banned dividend pushers, European regulators went a step further and also banned dividend stoppers. The effect of the new regulation is that banks will have the ability to continue to pay common dividends even if the coupon on AT1 instruments is canceled (McNulty, 2013).

5.4. Subordination

In the event of the insolvency of the issuer, AT1 instruments rank below T2 instruments (CRR Article 52[1][d]), may not be secured, and may not be subject to a guarantee or any arrangement that would enhance their seniority (CRR Article 52[1][e]). In addition, AT1 instruments and may not be subject to any arrangement that enhances the seniority of the claim under the instruments in insolvency or liquidation (CRR Article 52[1][f]). This means that in the event of insolvency, holders of AT1 instruments will have their claims satisfied ahead of shareholders. However, the nature of CoCos may in some cases slightly complicate this capital hierarchy of loss absorption. For example, holders of CoCos will suffer losses ahead of equity holders when a 'high-trigger'[4] principal write-down CoCo is activated. This type of scenario is less likely with a low-trigger CoCo when equity holders already have suffered loss (ESMA, 2014).

It has to be determined whether the AT1 category may be composed of two classes of financial hybrids: bond-based and share-based. The first class would be bonds equipped with very strong equity-like features, while the second class would be preferred shares. An important point to note is that preferred shares would not rank below the bonds that meet AT1 eligibility criteria, but will rank pari passu instead.

Any differentiation between AT1 instruments in term of subordination was not intended by the legislator, as financial items of the same class should be coherent and rank pari passu.

However, it is rather unlikely that the same financial institution will issue both non-cumulative perpetual preferred shares and hybrid bonds to fulfill the AT1 capital requirements. In fact, mainly European financial institutions issue CoCos, while US financial institutions rely mostly on AT1 preferred shares.[5] The reason behind this relates to the tax treatment of CoCos and preferred shares. In Europe, interest on CoCos is generally tax deductible. When tax uncertainties concerning CoCos were resolved in 2013, the CoCo market bloomed. That capacity, making CoCos the 'cheapest equity', is founded on their bond form, and would not exist if preference shares were engaged. As a result, even Asian financial institutions have started to switch from preference shares to CoCos.

5.5. Contingent conversion and write-down

5.5.1. Introduction

It has been already mentioned that the contingent conversion feature is the unique aspect of CoCo financial instruments. As such, it causes much controversy. We have also discussed financial instruments that may be regarded as predecessors to CoCos in terms of the conversion of convertible bonds and mandatory write-downs of bond principle upon the occurrence of the trigger event with regard to CAT and CATM bonds. The next section will provide a more detailed study of how these components are blended in the anatomy of a CoCo bond, and how they serve as the foundation of a loss-absorbing capacity. The general regulatory concept behind the contingent conversion will also be discussed. In the next step, various concepts of trigger event will be briefly presented, with a special focus on the regulatory capital trigger, a concept that has prevailed and currently is an obligatory element of CoCo construction. Finally, we will analyze various forms of contingent conversion: conversion of debt into equity, principal write-off and temporary write-downs with write-ups.

5.5.2. Origins of CoCo instruments

The very idea of automatic conversion of distressed debt into equity to avoid the expense of bankruptcy and the cost of exchanges is not new. In debt exchange situations, bondholders surrender outstanding bonds in exchange for new bonds with significantly lower interest rates or principal amounts. As one possible contractual solution of that

problem, a new security called distress-contingent convertibles (DCCs) was proposed in 1991 to address the excessive costs of overleveraged US corporate issuers' junk bond defaults at that time (The Harvard Law Review Association, 1991). In the case of standard convertibles, bondholders will generally exercise their option only in good times, not in times of distress when the company desperately wishes to reduce its debt. DCCs would operate in reverse. Conversion would not occur at the holder's option as the stock price rises. Instead, DCC conversion would be automatic if the equity value falls below a certain threshold.

In section 2 we have discussed various types of hybrid securities and traced the evolution of the most controversial capacity of the CoCo: contingent conversion or contingent write-down. We have offered some suggestions concerning the very origins of such mechanisms, and discussed how their evolution finally brought CoCos into existence. Now, it is time to take a look at more recent events and issuances of securities that mark the birth of the CoCo market.

We mentioned that financial institutions had too much discretion in terms of deferral of payments on Basel II UT2 hybrids, and virtually had no legal tool to defer payments on Basel II LT2 subordinated debt. As a result, coupon deferral was not used for loss-absorption purposes, and Basel II Tier 2 instruments failed to absorb losses. Financial institutions faced the necessity of bail-outs and state aid. This aid came at a price: mandatory deferral of payments on hybrid, non-cumulative, preferred T1 shares and T2 instruments. However, Lloyds made an agreement with the UK government that such severe solutions will not be applied to those UT2 hybrid holders who agree to swap these bonds into new hybrids that can be converted to equity if financial stress occurs. Hence, the first CE CoCo (Lloyd's Enhanced Capital Notes) arose in late 2009 as a means of providing public aid to financial institutions, conditional upon coupon deferral on Basel II T2 hybrids. Simultaneously, the first investors in CoCos were holders of 'failed' hybrids who faced a threat of coupon deferral. The only way to avoid deferral was to swap Basel II hybrids into new ones that offered high coupon values but incorporated new loss-absorption tools contingent on conversion into equity. Hence, to some extent, they may have regarded this swap as some kind of 'lesser evil'.

An issue by Lloyd's of London's was followed in 2010 by Rabobank CoCos that introduced another innovation: capital ratio breaching. Breaching the capital ratio of 7% did not trigger conversion to equity (as Lloyd's ECNs provided for) but the write-down of 75% of the bond's principal value. The origins of such innovations are simple: Rabobank has no shares admitted to trading and therefore conversion to equity was not attractive to investors.

Table 5.1 Characteristics of the first CoCos issued

	Lloyd's	**Rabobank**		**Credit Suisse**	**ZKR**	**UBS**
	Enhanced Capital Note (ECN)	Senior Contingent Notes (SCN)	Hybrid Contingent Notes (HCN)	Buffer Capital Notes (BCN)	Tier 1 Subordinated Bonds	Tier 2 Subordinated Notes
Issue date	December 1, 2009	March 19, 2010	January 26, 2011	February l7, 2011	January 31, 2012	February 22, 2012
Maturity	9–22.5 years	10 years	Perpetual	30 years	Perpetual	10 years
First call date	Not callable	Not callable	From July 26, 2016	From August 24, 2016	From June 30, 2017	Callable only on February 22, 2017
Coupon	6.38%–16–125%	6.88%	8.375%; from July 26, 2016, onward (reset) every 5 year): US 5-year treas. benchmark + 6.425%	7.8759%; from August 24, 2016, onward (reset every five years): mid-market USD 5-year Libor swap rate + 5.22%	3.500%; from June 30, 2018, onward (reset every five years): mid-market CHF 5 year swap rate + 2.98%; deferrable at full discretion of the issuer	7.257%; from February 22, 2017, onward (one-time reset): mid-market USD 5-year swap rate + 6.06%
Trigger	Tier 1 ratio <5%	Equity capital ratio <7%	Equity capital ratio <8%	Tier 1 ratio <7%	Tier 1 ratio <7%	Tier 1 ratio <5%
Loss absorption	Equity conversion	Partial (75%) write-down	Full write-down	Equity conversion	Partial write-down	Full write-down

Source: Based on Buergi (2013)

After Rabobank's successful issue, which was oversubscribed two twice, many financial institutions issued CoCos even before the Basel III Accord of December 2011 made clear the eligibility requirements of AT1 and T2, long before the CRD IV package of June 2013 incorporated these requirements in European law. The market activity of issuers was driven by the urge to exploit market demand for high-yield instruments in an environment of extremely low interest rates. As a result, various types of CoCos emerged (see Table 5.1), and they were hardly comparable to the homogenous category of standard assets (Rabobank, 2015). When the Basel III and CRD IV packages brought clarity in terms of requirements, existing CoCos were classified as AT1 and T2 instruments. It may also be noted that issuers safeguarded themselves against regulatory risk connected with the changing regulatory environment: financial hybrids are equipped with a Regulatory Event clause. This mechanism enables the issuer to call the instrument long before its scheduled maturity, even during the no-call period, if the instrument stops being eligible for the regulatory capital purposes due to changes in the regulatory regime.

5.5.3. Trigger event

Upon the occurrence of the trigger event, the AT1 instrument shall be converted into a CET1 instrument, or its principal amount shall be written down (CRR Article 52[1][n]). Therefore, each AT1 debt instrument must be either a CE CoCo or a PWD CoCo, according to the choice made in the provisions regarding the instrument. The trigger event occurs when the CET1 capital ratio[6] falls below 5,125% or below some higher ratio, specified in the terms and conditions of the instruments (CRR Article 54[1][a]). Therefore, hitting the accounting, or 'capital ratio' trigger, results in the conversion of a hybrid into a predetermined number of shares in the case of the CE CoCo, or the trimming of its face value as with a PWD CoCo. Hence, Basel III attributes a matter of key importance to capital ratio as an indicator of the soundness of financial institution.

When it comes to standard convertibles, conversion is usually coupled to the stock price. In the case of CoCos, triggering may rely on various types of underlying values. These are usually classified into 3 groups: regulatory triggers, accounting triggers and market triggers (Buergi, 2013).

In general, a conversion trigger based on capital ratios is believed to be most suitable. From the point of view of a CoCos' trigger analysis, the crucial issue is whether the Basel Tier I ratio concept provides a good enough indication of the solvency of the bank. As the financial literature points out, it is a very poor measure of bank safety due to the ability of

banks to use their internal models to adjust risk weights and use derivatives to engage in regulatory arbitrage. Blundell-Wignall et al. (2013) examined 22 US and European G-SIFIs. They came to the conclusion that the ease with which Tier 1 targets are achieved and exceeded is not mirrored in equity ratios. Some of the banks were weakly capitalized in equity, despite very high Tier 1 ratios. Furthermore, between 2006 and 2009, even banks thought to be in a distressed state never published Tier 1 ratios lower than 7% (Buergi, 2013). A. Haldane, the Bank of England's executive director for financial stability, observed that the ratio of 'risk-weighted' assets to total assets at major international banks shrank by almost half between 1993 and 2011 (*Business Wire*, 2014).[7] One should expect that if the conversion is triggered by a bank's regulatory capital, banks are likely to use every trick in the book to keep their official capital above the trigger point. Moreover, the discretionary nature of this trigger class makes it difficult to assess the probability of conversion. Thus, the pricing of the CET1 ratio triggered CoCos. To some extent, the solution may be to find a linear regression between regulatory ratio and book ratios, such as a leverage ratio,[8] as some authors do (Buergi, 2013).

Requiring banks to have more equity and less debt directly addresses the questions of the banks' solvency. When the financial crisis began in 2007, the equity of some of the major financial institutions worldwide was 2% or 3% of their total assets.[9] The fact that these margins of safety were so thin played a major role in the crisis. The evidence suggests that a simple leverage ratio strongly outperforms the complex risk-weighting approach of the CET1/RWA ratio (Blundell-Wignall and Roulet, 2013). Also in 2013, Demirguc-Kunt et al., found that during the crisis, the stock returns of large banks were more sensitive to the leverage ratio than the risk-adjusted capital ratio. Their explanation was that market participants viewed the risk adjustment under Basel rules as subject to manipulation or in any case, not reflective of the true risk in the case of large banks. They also found that the positive association with subsequent stock returns was stronger for higher quality capital (Tier 1 leverage and tangible common equity).

To sum up, the leverage ratio is a statistically significant predictor of bank failure, while Tier 1 risk-based ratios are not.

Accounting trigger calculations are based on book values. Before the great financial crisis, markets valued global banks at two or three times the book value of their equity. After the crisis, it was the other way around for many banks: today, most global banks are valued at a discount – many at a small fraction – of their equity book value (Haldane, 2012). Which information can be trusted more to assess the risk of insolvency?

Moreover, there are differences between the amounts reported under US accounting rules, the so-called generally accepted accounting principles (GAAP) and International Financial Reporting Standards (IFRS), which are used in the European Union. They concern mainly the treatment of derivatives. Under GAAP, derivative positions are not counted on the balance sheet because the bank can use netting agreements to eliminate them from both its assets and its liabilities, as if they did not matter to the bank's financial position. IFRS rules do not allow most of this netting. According to Admati and Hellwig (2013), JPMorgan Chase revealed in its official reports that its equity amounted to about 8% of its total assets as of December 31, 2011. However, if JPMorgan Chase used the same accounting rules as its European counterparts, this number would shrink to a mere 4.5%. The practice of netting that is allowed under US accounting rules for derivatives masks important risks. For example, in the final phase of the Bear Stearns crisis, the attempts of derivatives counterparties to close their positions or pass them to others played an important role and contributed to the run on the bank. Similar dynamics were observed in the case of Lehman Brothers (Admati and Hellwig, 2013).

The third group of CoCo triggers are market triggers. It has been recently proposed to replace the accounting trigger event of contingent conversion with a market-oriented trigger. Bulow and Klemperer (2015) explain that a drop in a share market price below the specified level can be monitored much more effectively than an accounting event can be monitored. The probability of such a drop may be assessed, and its risk quantified. This would help to develop a more precise and accurate model of the AT1 hybrid pricing model, which is a goal in itself. Moreover, such a decrease in a bank's share value reflects the drop of the value of its assets. In the event of such a drop in the shares' market price, contingent conversion would be applied only to due payments, while bondholders who claim to receive a coupon would be satisfied by banks' shares. Hence the name of another proposed instrument, Equity Recourse Notes (ERNs). Another advantage is that ERNs convert more gradually than CoCos. Conversions would be relatively small, because they would occur only when current payments are due on ERNs, and only for those ERNs that had been issued when the share price was at least four times above the current level (*Business Wire*, 2014). However, there are some fears surrounding the market triggers. The concern centers on their vulnerability to manipulation, and the notorious tendency of markets to become illiquid in critical situations (Buergi, 2013). What is more, a market value-based trigger could lead to conversion during

extreme market volatility, while the bank may have an extremely sound regulatory capital position.

Taken separately, each trigger system has its advantages and disadvantages for the bank and the investor. A natural solution would be to ensure that CoCo conversion or write-downs do not depend on a single trigger condition. The number of such multivariate trigger combinations is enormous. It can combine bank-specific characteristics with state-of-the-economy indicators to identify systemic risk (Spiegeleer et al., 2014) or to replace accounting or regulatory triggers with market triggers, to be fulfilled either simultaneously or on an if-or basis. At the beginning of twenty-first century, many different versions of contingent capital instruments were proposed, and some stand-alone financial contracts designed to achieve that result were created (Bolton and Samama, 2012). Back in 2009, even before Lloyd's had issued its 'ECNs',[10] a double-trigger hybrid security was proposed. The proposed hybrid would convert from debt to equity only if regulators declare that the financial system is facing a systemic crisis, or if a bank's covenants governing the hybrid's terms of issue are breached. We may call these 'macro' and 'micro' triggers. An analyzed proposal also aims to identify the covenant that would be the best 'micro' trigger, i.e. an indicator of a bank's financial soundness.

An important concern about CoCos is that they would all convert at once, which could become a panic-inducing event of its own. Therefore it is proposed that CoCo conversions be made in several incremental stages.

Another solution addressing the problem of automatic triggers is a contingent capital instrument in the form of so-called 'capital access bonds' (CABs) that give the issuer the unconstrained right to exercise the option to repay the bond in stock at any given time during the life of the bond. In other words, CABs are akin to a bank buying put options on its own equity at a predetermined strike price (Bolton and Samama, 2012).

5.5.4. Consequences of trigger event occurrence

The RTS sets out the exact procedures for how a financial institution's board should manage the occurrence of a trigger event scenario. First of all, Regulation 241/2014 Article 22(1) provides that if the CET1 ratio falls below the parameter set out in CRR Article 54(1), the management board shall determine without delay that the trigger event has occurred. It is important to note that this is the duty of the management board or any other relevant body of the institution. Furthermore, analyzed provisions emphasize that the obligation to convert hybrids or write-down their nominal value is irrevocable.

The next step is to determine the amount being subject to conversion or write-down. This amount should be determined as soon as possible but no later than 1 month after the occurrence of the trigger event has been determined (Regulation 241/2014 Article 22[2]). In this instance, no specific party is named to carry out that obligation. But it is understood that the same bodies will be tasked with determining the occurrence of a trigger event. Under Regulation 241/2014 Article 22(3), the competent authority may require that the maximum period of one month is reduced, if the authority assesses with sufficient certainty that this amount is established or determines that an immediate write-down conversion is needed. Provisions governing the CoCo may require an independent review of the amount that has to be converted or written down; such an independent review may also be demanded by the competent authority. In both cases, a management board or any other relevant body has to see to it that this is done immediately (Regulation 241/2014 Article 22[4]).

Any contingent conversion, whether of hybrid bonds or preferred shares, would have an impact on the structure of company ownership. Contingent conversion of bonds would result in the increase of share capital and the dilution of other shareholders' rights. On the contrary, contingent conversion of a preferred share would not result in an increase of the share capital, but the voting rights of other shareholders would still be diluted because the preferred shares are stripped from voting rights, so their conversion into common equity would inevitably result in the reappearance of such rights. Such a change would also have an impact on the distributions paid by the issuer as a dividend: there would no longer be any fixed income preference dividend payments.

5.5.5. 'High-trigger CoCos' versus 'low-trigger CoCos'

The previous section came to the conclusion that the accounting trigger set out in CRR Article 54(1)(a) is only the minimum requirement, and issuers may decide to model a CoCo with a higher-value contingent conversion trigger. Such an instrument has more loss-absorbing capacity, as is reflected by the higher risk of conversion borne by its holders. Hybrid bonds with embedded contingent conversion triggers on the 5,125% level are referred to as 'low-trigger CoCos', while those with a trigger of 7% or more are referred to as 'high-trigger CoCos'. Recent market performance of AT1 instruments revealed a tightening of the spreads between low-triggers and high-triggers. This is quite interesting, as one could consider low-triggers to be significantly less risk-exposed instruments. This first-glance approach explains the initial difference of spreads at

the dawn of the AT1 market. An explanation for this phenomenon of spread tightening is to be found on the ground of the BRRD. As will be shown in detail in section 7.3 below, SRB has wide discretion as to when the contingent conversion or write-down of AT1 instruments (and T2 instruments as well) should take place. Conditions for such action (i.e. the likelihood of institutional failure) bring one to the conclusion that if an institution faces financial stress, contingent conversion or write-down will be forced by the resolution authority under BRRD long before the CET1/RWA capital ratio falls below CRR levels, whether it be a high-trigger (>7.0%) or – especially – a low-trigger (5.125%). Thus, these parameters have lost much of their importance, which is mirrored by their pricing: both types are priced as high-triggers. In essence, under BRRD all AT1 hybrids may be deemed high-triggers. This fact brings market participants to the reasonable conclusion that low-triggers are mostly only of academic interest, and their market importance will soon vanish.

5.5.6. Conversion into equity (CE CoCo)

In considering a CE CoCo instrument, terms and conditions will have to specify the rate of conversion, the permitted amount of conversion and a range within which the instruments will convert into CET1 instruments. This requirement may give rise to some national legislation issues, as the rules governing contingent conversion will need to be established in national company laws governing the issue of convertible bonds. CoCo bonds can be structured to convert into either a fixed number of shares or a fixed value of shares, with varying pros and cons to the bondholders and the bank shareholders.[11]

As a result of conversion, CET1 amounts will increase by the amount of converted AT1 instruments. Of course, this dilutes the value of the instruments held by existing shareholders. Simultaneously, if the Tier 1 capital ratio falls below a minimum of 6%, under the provisions of (CRR Article 92[1][b]) the institution will have to issue new AT1 instruments to replace the converted ones.

5.5.7. Principal write-off

Another way to restore the CET1/RWA ratio is to perform a full or partial write-down of the AT1 face value. The purpose of the write-down requirement is loss absorption, so the write-down of a principal amount of AT1 hybrid bonds will result in its partial cancellation. Such an action will reduce the debt and boost the capitalization of the institution. That, in turn, will lead to the restoration of the CET1 capital ratio.

The write-down procedure is detailed in Regulation 241/2014 Article 21. This regulation applies on a *pro rata* basis to all holders of AT1 instruments that include a similar mechanism and an identical trigger event. This requirement clearly shows the difference between high-trigger and low-trigger bonds: the occurrence of a high trigger would only result in the write-down of high-trigger bonds, while holders of low-trigger bonds simultaneously suffer no loss.

A write-down may take various forms: a full write-down, a partial write-down and finally a staggered write-down. In the second case, the terms of the issue will have to specify the haircut ratio (in case of a full write-down, this ratio is obviously 100%). A staggered write-down was introduced for the first time by Zürcher Kantonalbank in 2012. This feature is more flexible: trigger events result in haircuts that occur in multiples of 25%, up to the point where the required capital is restored. Hence, upon the trigger event, the investor may lose 25%, 50%, 75% or finally even 100% of a CoCo's nominal value.

5.5.8. Temporary write-down

Although it is not explicitly expressed in the CRR, the RTS allows a write-down to be temporary (i.e. followed by a nominal value write-up). In fact, issuers quite frequently make use of this ability, as 15 of 16 PWD CoCo issues by European banks in 2014 incorporated temporary write-down mechanism instead of permanent ones. If a write-down is to be considered temporary, all detailed and rigorous requirements set out in Regulation 241/2014 Article 21(2) have to be met simultaneously: (i) distributions payable after a write-down shall be based on reduced amount of the principal; (ii) write-ups shall be based on final profits, that is, profits confirmed in a formal decision taken by the bank; (iii) any write-up or payment of coupons on the reduced amount of the principal may be initiated at the full discretion of the bank, and the bank may not be obligated to operate or accelerate a write-up under specific circumstances. These circumstances are set out in CoCos' terms of issue. The bank's discretion shall be subject to the following provisions: (iv) the write-up shall be operated on a pro rata basis among similar AT1 instruments that have been subject to a write-down; (v) the maximum amount of write-ups and coupon payments on the reduced amount of the principal is determined;[12] and finally (vi) the sum of any write-ups and coupon payments on the reduced amount of the principal shall be treated as a payment that results in the reduction of the CET1 and shall be subject to national laws transposing Article 141(2) of CRD IV, imposing restrictions on the Maximum Distributable Amount.[13]

Regulation 241/2014 Article 21(2)(e) sets out method of calculation of the maximum amount of write-ups and coupon payments on the reduced amount of the principal:

$$D = E \times \text{AT1/T1}$$

where:
D is maximum distribution (write-ups and payments of coupon)
E is profit of the institution
AT1 is the sum of the nominal amount of all AT1 instruments before write-down that were subject to a write-down
T1 is the total Tier 1 capital of the institution.

Pursuant to Regulation 241/2014 Article 21(3), this calculation shall be made at the moment when the write-up is operated. It should also be noted that Regulation 241/2014 Article 21(2)(d) stipulates that write-ups are to be operated on a pro rata basis among similar AT1 instruments that have been subject to write-downs. Hence, if the institution issues both write-down and temporary write-down CoCos, only the last ones would be subject to write-up. Table 5.2 presents the main characteristics of selected AT1 CoCo issues.

5.6. The rationale for issuing CoCos

A closer look into the mechanisms of contingent conversion and write-down enables us to formulate some conclusions:

1. Although the first PWD CoCo issued by Rabobank in 2010 emerged from a mere lack of ability to issue convertible bonds (resulting from non-listed character of its issuer), the CRR allows listed banks that constitute the overwhelming majority of CoCo issuers to issue PWD CoCos;
2. In June 2013, the CRR provided no suggestions on temporary write-downs and it clearly deemed write-downs as a permanent action, similar to contingent conversion into equity. However, write-ups were allowed in some European jurisdictions (Latham and Watkins, 2012). Finally, in January 2014, the RTS officially allowed for write-ups and regulated them, setting out detailed conditions, limits and calculation methods. Temporary write-downs immediately prevailed in the PWD CoCo structure, and since the RTS was published, virtually all PWD CoCo issues incorporate this type of write-down;
3. A typical, permanent write-down component of a CoCo systematically loses importance and share in the CoCo market. We have to note that it is a permanent PWD CoCo that is most similar to CAT bonds, which possessed no temporary write-down feature.

Table 5.2 Comparison of selected AT1 CoCos issues

Issuer	Currency	Size (mm)	Issue date	Coupon (%)	First call date	CET1 trigger	Loss absorption	Deferral
ACAFP	USD	1,250	September 18, 2014	6,625	September 23, 2019	5,125	Partial write-down	Yes
ACAFP	GBP	500	April 08, 2014	7,500	June 23, 2026	5,125	Partial write-down	Yes
ACAFP	USD	1,000	September 19, 2013	8,125	September 19, 2018	7,000	Equity conversion	Yes
BACR	USD	2,000	November 20, 2013	8,250	December 15, 2018	7,000	Equity conversion	Yes
BACR	EUR	1,000	December 10, 2013	8,000	December 15, 2020	7,000	Equity conversion	Yes
BBVASM	EUR	1,500	February 19, 2014	7,000	February 19, 2019	5,125	Equity conversion	Yes
BBVASM	USD	1,500	April 26, 2013	9,000	May 09, 2018	5,125	Equity conversion	Yes
BCHINA	CNY	39,940	October 23, 2014	6,750	October 23, 2019	5,125	Equity conversion	Yes
CS	USD	2,250	December 11, 2013	7,500	December 11, 2023	5,125	Full & permanent write-down	Yes
DANBNK	EUR	750	March 12, 2014	5,750	April 06, 2020	7,000	Temporary write-down	Yes
ICBCAS	EUR	15	December 10, 2014	6,000	December 10, 2021	5,125	Equity conversion	Yes
KBCBB	EUR	1,400	March 19, 2014	5,625	March 19, 2019	5,125	Partial & temporary write-down	Yes
LLOYDS	EUR	750	April 01, 2014	6,375	June 27, 2020	7,000	Equity conversion	Yes
LLOYDS	USD	1,675	April 07, 2014	7,500	June 27, 2024	7,000	Equity conversion	Yes
LLOYDS	GBP	1,481	April 01, 2014	7,000	June 27, 2019	7,000	Equity conversion	Yes

(*continued*)

Table 5.2 (Continued)

Issuer	Currency	Size (mm)	Issue date	Coupon (%)	First call date	CET1 trigger	Loss absorption	Deferral
SANTAN	EUR	1,500	March 12, 2014	6,250	March 12, 2019	5,125	Equity conversion	Yes
SANTAN	USD	1,500	May 19, 2014	6,375	May 19, 2019	5,125	Equity conversion	Yes
SOCGEN	EUR	1,000	April 07, 2014	6,750	April 07, 2021	5,125	Partial & temporary write-down	Yes
SOCGEN	USD	1,750	December 18, 2013	7,875	December 18, 2023	5,125	Partial & temporary write-down	Yes
UBS	EUR	1,000	February 19, 2015	5,750	February 19, 2022	5,125	Full write-down	Yes
UBS	USD	1,250	February 19, 2015	7,125	February 19, 2020	7,000	Full write-down	Yes
UBS	USD	1,250	February 19, 2015	7,000	February 19, 2025	5,125	Full write-down	Yes
UCGIM	EUR	1,000	September 10, 2014	6,750	September 10, 2021	5,125	Partial write-down	Yes
UCGIM	USD	1,250	April 03, 2014	8,000	June 03, 2024	5,125	Partial write-down	Yes

The CRR supplemented by the EBA's RTS established the legal regime that governs contingent convertible bonds. Analysis of this regime shows that regulation of this highly innovative, and highly controversial, concept is very detailed. However, that conclusion applies only to the CET1 ratio trigger embedded in the structure of a CoCo. However, one has to take into account that such a trigger event is not the only factor that may result in the contingent conversion or write-down of an AT1 bond. The CRR preamble explicitly states that '. . . all additional Tier 1 and Tier 2 instruments of an institution should be capable of being fully and permanently written down or converted fully into Common Equity Tier 1 capital at the point of non-viability of the institution. Necessary legislation to ensure that own funds instruments are subject to the additional loss-absorption mechanism should be incorporated into Union law as part of the requirements in relation to the recovery and resolution of institutions' (Recital 45). There is still room for a regulatory trigger that is regulated by the BRRD. This strongly emphasizes the interconnected nature of the CRD IV package and the BRRD. An in-depth analysis of contingent conversions and write-downs triggered by regulators will be presented in section 7 on the BRRD regime. However, it is quite obvious, even at this point, that the BRRD regulatory trigger has a strong impact on contingent conversion and write-downs under CRR. It has been already mentioned that the BRRD virtually put a hold on the low-trigger issuance of CoCos. It will be also demonstrated that this has a significant impact on Tier 2 instruments.

To discuss AT1 hybrids, one must in the first place answer the basic questions: why does a financial institution need a capital buffer and why cannot this buffer be composed of regular forms of equity, such as shares, reserves and retained earnings? In other words, why is it necessary to engage financial engineering and create highly complex and sophisticated financial instruments?

First of all, before the financial crisis, banks relied too much on debt financing. The reason for this is that the issuance of debt increases a financial institutions access to financial resources, but does not dilute the rights of shareholders, as does the issuance of equity. The appetite of banks' creditors for returns was relatively low when compared to equity because the failure of a bank was rather hypothetical and investors relied on a bail-out rather than bankruptcy. Besides, tax breaks for interest payments made debt financing even cheaper, as all coupon payments were tax deductible. All these features made debt financing a more effective source of capital in times of prosperity but not in times of crisis. Unlike equity, debt will not absorb losses: the coupon must be paid regardless

of the bank's financial condition, and the same holds true regarding the repayment of debt face value when the debt reaches maturity. The financial crisis has shown that a capital buffer is highly needed to absorb losses in a manner that will not force regulators to bail out banks with public money. That is why the Basel III Capital Accord sets new prudential capital requirements for banks. However, the new regime still allows for other instruments, not only genuine equity, to be included as bank capital. The Basel II Capital Accord also provided a Tier-based capital structure, and also introduced financial hybrids. Even so, this system has failed, and one of reasons for this failure was that no contingent conversion into common equity was embedded in these instruments.

An alternative to current regulation would be to raise capital to 20% or more. Recent empirical research supports this view (Haldane, 2012) and (Blundell-Wignall and Roulet, 2013). Bankers, in turn, argue against more capital. They explain that equity capital is expensive because shareholders require higher returns on capital than debt holders. Besides, banks have to generate a minimum Return on Equity (ROE) that will not be achievable if they have to increase capital (Admati and Hellwig, 2013). More equity reduces the ability of banks to lend money: banks will miss opportunities that would be attractive if they could fund themselves with more debt (Crouhy and Galai, 2015). According to Crouhy and Galai (1991) these arguments are false because (i) bank capital is not a cash reserve: both debt and equity can be used to make loans and other investments; (ii) required rates of return on debt and equity are not fixed and depend on the risk of the assets. ROE depends on the firm's leverage – the required ROE should be lower when there is more capital in the funding mix. But the overall cost of capital is not expected to change with the capital ratio under the Modigliani and Miller (M&M) theorem (Admati and Hellwig, 2013). M&M Proposition II shows that the expected cost of equity increases as a linear function of leverage to fully compensate shareholders for the additional financial risk. But the cost of equity will also increase as a function of the business risk for any given leverage ratio. If capital is expensive, as bankers suggest, and borrowing is cheap, why does this not also apply to other corporations? Why do non-banks not borrow more and economize on the supposedly expensive equity? (Admati and Hellwig, 2013). If we accept the M&M proposition of 1958, the capital structure is irrelevant for both the cost of capital and the value of the bank. Then the question arises as to whether banks are special firms to which M&M Proposition I does not apply. As Crouhy and Galai (2015) point out, banks are different because they benefit from subsidies and from underpriced guarantees that make

M&M propositions irrelevant. Banks can count on being bailed out by the government when they cannot pay back their debt. Then creditors do not worry much about banks defaulting and are willing to lend to them at lower interest rates. The costs of bank borrowing are then partly borne by taxpayers. It is not the tax argument that makes M&M irrelevant for banks, because their interest expenses are like any production cost for an industrial firm (Crouhy and Galai, 2015).

The increase of banks' equity to the level set in Basel III is an ambitious task that faces many challenges. Traditional ways to obtain equity may turn out to be insufficient: it may not be entirely done by the issue of new shares because of insufficient market demand and dilution problems, or retaining banks' earnings as reserves. Therefore, new financial instruments are necessary to increase the own funds of a bank and thus create a proper loss-absorbing capital buffer. What are the advantages of contingent capital over straight equity capital?

1. Contingent capital provides a form of buffer capital, like common stock but at a lesser cost. CoCo bonds are the most cost-effective recapitalization vehicle to provide buffer capital to a bank at a time of limited or no access to the capital markets due to its weakened capital position. Therefore it makes possible to recapitalize the bank from debt to equity without infusing new cash into the bank.
2. CoCos are even more than a capital buffer – PWD CoCos and their coupon deferral clauses with no dividend stopper shaped a mechanism of wealth transfer from bondholders to shareholders (Roggi et al., 2013). From this perspective, such CoCos may in fact be evaluated as being junior to equity. This creates an incentive for excessive risk-taking by bank shareholders and management and needs regulatory involvement (Berg and Kaserer, 2014).
3. Contingent capital may curb shareholder pressure on corporate managers for risk and leverage. Coffee (2011) proposes a legal structure of contingent capital to counterbalance equity shareholders. In this approach, the debt security would convert into a fixed return preferred stock with cumulative arrearages and significant voting rights. The interest of the new preferred stock would be limited and fixed, and thus aligned with the firm's debt holders. These preferred shareholders would be rationally risk-averse and could offset the voting power of risk-tolerant common shareholders, thereby disciplining them and deterring excessive risk-taking.
4. By setting a price for a contingent equity issue in advance, the issuer can reduce the Myers-Majluf effect of managers likely to issue new

equity when they have adverse private information suggesting that the market has over-valued the stock of the company (Bolton and Samama, 2012).

5. Contingent capital allows banks to avoid paying the extra cost of an equity issue. Instead, a bank purchases a capital line commitment – a sort of guarantee that is drawn only when necessary (Bolton and Samama, 2012).
6. Contingent capital replaces the bankruptcy process and thus does not depend on regulators properly exercising their resolution authority. During the great financial crisis governments injected capital to rescue from failure a select group of large banks commonly referred to as 'too big to fail' or systemically important financial institutions (SIFIs). The others were left to survive or fall on their own. CoCos can be designed to provide for remote government intervention and leave the fate of all banks to the domain of the capital markets.
7. It builds loss absorption into a firm's capital structure instead of drawing down funds from the bail-out fund, making the whole industry less exposed to contagion risk. Then the higher interest rate paid by the issuer on contingent capital may be deemed as an equivalent to a bank tax that offsets bail-out costs (Coffee, 2011).
8. As regard a bank's solvability, if we gauge the risk with a VaR measure assuming z significance level, issuing CoCos makes sense and improves solvability if these bonds are structured such that the probability of the triggering is higher than the alpha significance level. Otherwise, the influence of CoCo bonds on such quantified solvability remains neutral. The proposed model takes into account the influence of the relatively higher coupon of CoCo on solvability.[14]
9. Pure arithmetic proves that in the case of highly leveraged issuers, conversion or write-down radically improves the leverage ratio.

6
CRR Tier 2 Bonds

6.1. General remarks

Items that qualify as T2 financial instruments provide loss absorption as 'gone-concern capital' when the issuer is facing bankruptcy. Then, holders of such instruments will carry the burden of financial losses to a greater extent than other senior creditors. That is why T2 items constitute a category of own funds. Simultaneously, these instruments pose less equity-like features in terms of maturity and deferral. It is worth noting that T2 capital may consist of a broader list of items than AT1: subordinated loans are also potentially T2-eligible, and – to some extent and in specified circumstances – general credit risk adjustments, gross of tax effects or positive amounts and gross of tax effects resulting from the calculation of expected loss amounts (Article 62 CRR).

6.2. Maturity

Capital instruments and subordinated loans qualify as T2 instruments if they have an original maturity of at least five years (CRR Article 63[g]) and any call options are exercisable at the sole discretion of the issuer or debtor, as applicable, subject to conditions specified in Article 77 and Article 78(4) CRR. Thus, an investor may not be granted with a put option, nor be accorded the right to accelerate the future scheduled payment of interest or principal, except in the case of an insolvency or liquidation proceeding (CRR Article 63[l]). Again, provisions governing the instruments or subordinated loans may not include any incentive for their earlier redemption or repayment. It should be noted that the nature and scope of such an incentive is not specified further, and there are no EBA regulatory technical standards on this matter.

In particular, prohibited incentives set out in EC Delegated Regulation 241/2014 are applicable only for the purposes of AT1 instruments. Therefore, it remains unclear as to what extent one can rely on EBA findings regarding the nature and scope of AT1 instruments when structuring the T2 instrument. Generally speaking, it is questionable whether the provision qualified as a prohibited incentive with regard to an AT1 instrument. Indeed, it may be qualified in a different manner when contemplated with regard to a T2 instrument, as the nature and scope of discussed incentives seems to be homogenous for both instruments. On the other hand, the absence of detailed guidance from the EBA on this matter may imply that a more liberal approach is permitted when discussing T2 instruments. This question remains ambiguous and unresolved, and the only conclusion may be that there is a significant probability that provisions prohibited under the AT1 regime would also be prohibited under the T2 regime, but it is impossible to exclude any exemptions. Finally, indications with regard to possible call, redemption or repurchase of the instruments are also limited (CRR Article 63[j]–[k]).

6.3. Regulatory amortization of T2 financial instruments

The absence of a perpetual maturity requirement means that T2 instruments – and, of course, subordinated loans as well – will have a fixed maturity date. Therefore, the closer the maturity date is for a given item, the lesser the support for the calculation of the issuer's own funds. Here is where the CRR mechanism of amortization of T2 instruments or subordinated loans is put in place. Pursuant to Article 64, during the last five years of maturity only a calculated part of the nominal value of a given instrument is considered to be eligible for T2 purposes. The model of calculation is simple: the nominal amount is divided by number of calendar days in the period of said five last years of the instrument's maturity (that is, 1,826 or 1,827 calendar days), then multiplied by the number of remaining calendar days of contractual maturity. This means that in that period, the exact sum of own funds will be different each day. In case of a T2 bond or subordinated loan with a maturity of only five years (the minimum maturity permitted under the CRR Article 63[g]), the amortization mechanism will start its work on the very day of the bond issue. It is also important to note that any call mechanism is irrelevant for amortization purposes, as it may not be certain that such a call is exercised by the issuer. There is no place for 'synthetic maturity',

and that is why mechanism of amortization is not taken into account at all when it comes to AT1 financial instruments.

6.4. Deferral

T2 instruments are free of detailed requirements regarding optional deferral, similar to those applicable to AT1 instruments. It is particularly important to note that the source of distributions under T2 instruments or subordinated loans is not limited – as in the case of AT1 instruments – to 'distributable items' (see CRR Article 52[1][l] described in section 5.3.1 above).

Therefore, the issuer's optional deferral of payments may be on a cumulative basis, or there may even be no deferral option included at all. In that case, any delay in coupon payment would constitute an event of default. Such a structure is clearly less eligible for loss absorption, being more advantageous for the security holders. Again, coupon value may not be amended on the basis of the credit standing of the issuer – or its parent company (CRR Article 63[m]).

6.5. Subordination

In the event of the insolvency of the issuer, T2 instruments or subordinated loans rank below claims of all non-subordinated creditors (CRR Article 63[d]) and may be not secured, subject to a guarantee or any arrangement that would enhance its seniority (CRR Article 63[e]). However, high-trigger T2 CoCos may suffer losses not at the point of gone concern but conceivably in advance of lower-trigger AT1s and equity (ESMA, 2014).

6.6. Contingent conversion (write-down)

Instruments or subordinated loans that are eligible for T2 purposes are not required to be convertible on a contingent basis. There is also no obligation for the write-down clause. The absence of the conversion clause seems to be natural, given that list of possible T2 items is far broader than AT1 items and covers more items than financial instruments that could be potentially converted into CET1. Thus, all T2 instruments may be issued on an indirect basis, provided that the issuer (SPV) will be consolidated and proceeds will be immediately available to the financial institution (Article 63[n]). The same applies to subordinated loans raised indirectly.

Table 6.1 Comparison of selected T2 CoCos issues

Issuer	Currency	Size (mm)	Issue date	Coupon (%)	First call date	CET1 trigger	Loss absorption	Deferral
BACR	USD	3,000	November 21, 2012	7,625	November 21, 2022	7,000	Full & permanent write-down	No
BACR	EUR	1,000	April 10, 2013	7,750	April 10, 2018	7,000	Full & permanent write-down	No
CS	USD	2,000	February 24, 2011	7,875	August 24, 2016	7,000	Equity Conversion	No
CS	CHF	750	March 22, 2012	7,125	March 22, 2017	7,000	Equity conversion	No
CS	EUR	1,250	September18, 2013	5,750	September 18, 2020	5,000	Full & permanent write-down	No
UBS	CHF	2,000	February 22, 2012	7,250	February 22, 2017	5,000	Full & permanent write-down	No
UBS	USD	2,000	August 17, 2012	7,625	August 17, 2022	5,000	Full & permanent write-down	No
UBS	EUR	2,000	February 13, 2014	4,750	February 12, 2021	5,000	Full & permanent write-down	No
UBS	USD	2,500	May 15, 2014	5,125	May 15, 2024	5,000	Full & permanent write-down	No

Nevertheless, we may find many outstanding instruments labeled as 'Tier 2 CoCos'. Bearing in mind that the risk of contingent conversion affects pricing very negatively, we may exclude the possibility of a 'volunteered' introduction of a CoCo feature into the structure of a T2 bond. There are at least two possible answers that may explain this phenomenon. First of all, some of T2 CoCos were issued before publication of CRD IV or even before publication of Basel III. Instruments issued in a time of regulatory uncertainty and structured on the basis of draft standards have not been called by their issuers, simply because they met requirements of T2-eligibility, finally set out in BaseI III and CRR. Therefore, issuers have reached their goal of meeting capital requirements, and today they are still not able to replace these T2 CoCos with new Tier 2 bonds, stripped of a contingent conversion mechanism, because of a no-call period still pending. A contingent conversion mechanism is unnecessary because it is not required by the CRR. However, it may have been necessary at the time of issue, because it was required by national regulators providing financial institutions with public aid.[1]

There is also another explanation, applicable to recently issued Tier 2 CoCos. It seems that at least some of instruments dubbed on the market as Tier 2 CoCos actually have no contingent conversion mechanism incorporated in their structure. The nature of their 'contingency' springs from a different source than the CRR-eligible CET1 ratio trigger: they have a BRRD regulatory trigger. Prospectuses of some T2 instruments explicitly state that they may be converted into equity or written down, subject to the decision of a resolution authority under national legislation implementing the BRRD. It will be shown that the BRRD sets out similar treatment to AT1 and T2 instruments in terms of contingent conversion, as these two types of instruments suffer this action before senior debt. Leaving aside the precise terminology that would require us to call these instruments not 'Tier 2 CoCos' but rather 'bail-in bonds', this approach serves its purpose, as it brings investors' attention to the major risks connected to Tier 2 bonds: the risk of contingent conversion triggered by a regulator or a resolution authority.

Table 6.1 gives some overview of T2 CoCos parameters.

7
The Role of Hybrid Securities in the BRRD

7.1. Overview

7.1.1. Goals of BRRD

The BRRD is a cornerstone of the single European bank resolution mechanism. Such a mechanism is urgently needed, as financial institutions conduct their business on a cross-border or even a pan-European basis, while legislation of member states differs significantly on insolvency issues. Financial markets are highly integrated beyond national borders, so the failure of a financial institution will also have cross-border consequences. Therefore, the lack of harmonization in the field of bank resolution threatens the stability of financial markets – a condition that has been identified as essential for both the establishment and functioning of the internal market (BRRD Recital 4). The BRRD regime equips regulators or resolution authorities with tools, powers and measures that enable them to act both on going-concern and gone-concern bases. It is explicitly mentioned that governmental financial stabilization tools, including temporary public ownership, may be going-concern tools of last resort (BRRD Recital 8). It is also strongly emphasized that the use of tools and powers provided under the BRRD regime may affect the property rights of shareholders and jeopardize equal treatment of creditors. However, it must also be stressed that any difference in the treatment of creditors of the same class can be justified when such different treatment is carried out in the public interest, in a proportionate and non-discriminatory manner (BRRD Recital 13).

Recital 46 of the BRRD Preamble provides some guidance on the hierarchy of actions to be taken when dealing with a failing financial institution. First of all, winding-up through normal insolvency proceedings should be considered. If such a solution has a negative impact on

the stability of the financial system, resolution tools should be used to maintain the failing institution on a going-concern basis. As was mentioned above, the use of public funds to finance the implementation of resolution tools may only be considered as a last option. Hence, private funds must be used for that purpose to the maximum possible extent. This means that shareholders or creditors will have to bear the financial burden of a bank's resolution. The rights of shareholders may be affected by the sale of the institution to a private sector purchaser or by its merger with such a purchaser. The rights of creditors may be affected by a write-down of liabilities or the conversion of debt to equity.

7.1.2. Terminology and definitions

In terms of chronology, the BRRD comes after the CRD IV package, so it is logical that it also adopts its terminology and definitions. The coherence of the terminology of these legal acts is of crucial importance. The BRRD often refers directly to the terminology of the CRR as regards CET1, AT1 and T2 instruments (Article 2[1][62] BRRD). Besides, certain sections of BRRD rules (Chapter V of Title IV) refer to AT1 and T2 instruments collectively as 'relevant capital instruments'.

However, these two acts focus on different aspects of banking reform. As a matter of fact, these acts come from two different legal frameworks, as the CRR is not directly an element of the Banking Union. While the CRR establishes a tier-based structure of prudential capital requirements, the BRRD focuses rather on how this structure works in case of non-viability. The CRR provides a structure where both shareholders and some creditors who hold AT1 or T2 instruments may provide the financial institution with proceeds qualified as own funds, while the BRRD establishes the procedure of loss sharing between shareholders and creditors. As a result, the approaches of the CRR and the BRRD are different when it comes to tier-based capital structures: the main focus of the CRR is placed on pre-bankruptcy loss-absorption capacity. AT1 instruments are required to possess this capacity, in two possible and alternative manners: contingent conversion or write-down. Therefore, both CE CoCos and PWD CoCos form a category of AT1 instruments. Despite some slight differences that were observed above, these two types of AT1 instruments were treated in a very similar manner.

It is of key importance to determine whether the homogenous character of AT1 instruments is preserved under the BRRD. In fact, an analysis of definitions set out in the BRRD may give rise to some doubts in that regard. For the purposes of the BRRD, 'instruments of ownership' are 'shares, other instruments that confer ownership, instruments that

are convertible into or give the right to acquire shares or other instruments of ownership, and instruments representing interest in shares or instruments of ownership' (BRRD Article 2[1][61]). Therefore, AT1 instruments that contemplate a write-down mechanism (PWD CoCos) definitely fall outside the scope of 'instruments of ownership', in the absence of any conversion into shares or other instruments of ownership. When determining the scope of 'other instruments that confer ownership', the CET1 list provided by the EBA provides primary guidance. Therefore, it is necessary to answer the question of whether CE CoCos are indeed instruments that are convertible into, or that convey the right to acquire, shares or other ownership instruments.

A positive answer to that question would result in serious consequences; indeed, it would directly challenge the concept that AT1 instruments have a homogenous character. Pursuant to the definition set out in BRRD Article 2(1)(62), 'shareholders' means not only holders of shares, but also holders of 'other instruments of ownership' as defined in BRRD Article 2(1)(61). If so, then all holders of CE CoCos would have to be regarded as shareholders for the purposes of the BRRD, while holders of PWD CoCos would clearly not be regarded as shareholders. This is where the BRRD draws the line between equity and debt. Owners of instruments that may be converted into CET1 instruments will be treated as shareholders, while holders of instruments that may be subject to write-down, rather than contingent conversion, will be treated as creditors. Hence, for the purposes of the BRRD, holders of AT1 PWD CoCos issued by Deutsche Bank and Unicredit would be qualified as creditors, while holders of AT1 CE CoCos issued by Banco Santander would be qualified as shareholders. As will be demonstrated, this distinction refers only to the 'original' character of these instruments, not the character determined by measures taken by the resolution authority (SRB). When it comes to these actions, that original character may be changed, and not only holders of both CE and PWD CoCos, but almost all creditors may one day find themselves transformed into shareholders if the bail-in tool is exercised.[1]

The consequences of such differentiation are severe, for the BRRD tends to treat shareholders in a less favorable manner than creditors, especially when it comes to loss absorption. Leaving the literal meaning of BRRD definitions aside, we may ask if such a different approach to holders of CoCos is reasonable. The answer is very doubtful, given the similar roots of CE and PWD CoCos. Another solution to this dilemma may be that 'instruments that are convertible into . . . shares' are only these instruments that give its owners the right to exercise their conversion

option by converting their instruments into equity. In that regard, only conventional convertibles would be treated as shares, while the owners of those shares would be treated as shareholders. Accordingly, both PWD CoCos and CE CoCos would be beyond the scope of a 'share' in the meaning of BRRD rules. As a result, all owners of AT1 instruments would be creditors for the purposes of the BRRD regime. This approach may be justified by the fact that owners of conventional convertibles actually hope to turn their convertibles into equity, and agree that their loan will be remunerated with a lower coupon compared to the straight bond, but will instead be equipped with a conversion option.

A closer look at the term being analyzed shows that it quite obviously refers to two general categories of instruments: those convertible into shares and those that convey the right to acquire shares. This may support the thesis that incorporating a holder's right to convert or acquire shares is essential to qualify a security as an instrument of ownership and to qualify its holder as a shareholder. Emphasizing the conversion option of a bondholder as a reason for the special shareholder-like treatment of convertible bondholders seems to be marked even more explicitly in the Prospectus Directive.[2] Therefore, CoCos would be qualified as debt instruments, and its holders as creditors. Interestingly, the same idea would have to be applied to mandatory convertibles that automatically convert into equity after a predetermined period of time.[3] It must be said that holders of mandatories may be qualified as shareholders to the greatest extent. Unlike holders of CoCos, holders of mandatory convertibles actually agree that the debt instrument they hold will inevitably convert into equity.

We can see that the literal meaning of analyzed definitions may cause serious doubts, and makes it difficult to precisely determine the legal regime of CE CoCos under the BRRD. It would seem that BRRD definitions are too general to recognize different categories of convertibles, or even the difference between conventional conversion and contingent conversion. However, this observation need not be taken as a hard fact. Hence, the next sections will contemplate both interpretations of the analyzed definitions and the two alternative scenarios faced by CE CoCo holders who may be qualified as shareholders or as creditors.

7.2. Early intervention measures

Financial institutions must maintain recovery plans that set forth measures aimed at restoring their deteriorated financial position (BRRD Article 5). If it is likely in the near future that the financial position of

an institution will deteriorate to the extent that it affects the regulatory requirements on capital set out in CRR and CRD IV, the competent authority may, *inter alia*, require the management of the institution to implement measures set out in the recovery plan or to prepare a plan for negotiating the restructuring of the debt with some or all of its creditors (BRRD Article 27[1][e]). Any restructuring of debt under this Article is not linked to the contingent conversion or write-down of AT1 instruments, as these negotiations may be conducted only on a voluntary basis. Of course, possible future mandatory write-downs may be used by an institution as a point in these negotiations.

7.3. Resolution

7.3.1. General remarks

Resolution tools and measures may be applied by resolution authorities to the resolution objectives in a manner tailored to the individual circumstances of a given case. These objectives are: (i) to ensure the continuity of critical functions, (ii) to avoid a significantly negative impact on the financial system (in particular by preventing the contagion effect), (iii) to protect public funds by minimizing the use of extraordinary public financial support, (iv) to protect retail depositors and investors, and finally (v) to protect client funds and client assets. The resolution authority is also obliged to minimize the cost of resolution and allow for the destruction of value only when it is necessary to achieve these objectives (BRRD Article 31[1]–[2]).

The protection of investors and depositors, along with the treatment of public financial resources as a tool of last resort, clearly implies that shareholders and creditors would have to face losses in the event of a resolution. However, protection against the contagion effect will also have to be taken into account when determining the size of the losses that shareholders and creditors will have to bear. This is because the significant exposure of one institution to the risk connected with another institution would also increase the threat of contagion.

The resolution authority applies resolution tools and exercises its resolution powers only if all detailed conditions set out in BRRD Article 32 or 33 are met, depending on the character of the financial institution. Generally speaking, these conditions are met when it has been determined by a competent authority that an institution (or its parent consolidated undertaking, if applicable) is failing or is likely to fail, and relevant circumstances, e.g. the timing of the individual case, leave no

room for any alternative private sector measures, in which case a resolution action is necessary and in the public interest. Necessary, that is, for the achievement of objectives set out in BRRD Article 31 that would not be met by the winding-up of an institution in a normal insolvency proceeding. Measures to determine whether an institution is failing or is likely to fail are detailed further in BRRD Article 32(4).

BRRD Article 34 delineates the order of the loss-sharing 'rating' in a similar manner as BRRD Recital 46, and also provides some detailed regulations applicable to that matter. The shareholders of the institution will bear the first losses, as a result of the application of resolution tools or the exercise of resolution powers by the competent authority, and the creditors will bear losses afterward. Any non-equitable treatment of creditors of the same class must be provided for in the Directive, and no creditor should incur greater losses than in the course of a normal insolvency proceeding. Again, holders of PWD CoCos may seem to be in a safer position than the holders of CE CoCos, as there is no risk that they will be qualified as shareholders.

Before any resolution power to write-down or convert relevant capital instruments according to the definition set forth in BRRD Article 2(1)(74) – AT1 or T2 instrument, the resolution authorities shall ensure that an independent person conducts a fair, prudent and realistic valuation of the institution under resolution. Such a person must be independent both from any public authority (including the SRB) and from the institution itself. The purpose of the valuation is to determine whether the conditions for resolution, write-down, or conversion of capital instruments are met. Furthermore, if the write-down or conversion of a relevant capital instrument is applied, this valuation shall determine the extent of the cancellation or corresponding dilution of shares or other instruments of ownership, as well as the extent of the write-down or conversion of such instruments. The same purpose is served when the bail-in tool is applied: it determines the extent of the write-down or conversion of eligible liabilities.

This brings us to the crucial conclusion that 'relevant capital instruments' – AT1 and T2 instruments – are not the only instruments that may be converted to equity or written down under BRRD regulations. The definition of a 'bail-in tool' must be recalled now: the tool is a mechanism for effecting the exercise by a resolution authority of the write-down provisions and the application of conversion powers in relation to liabilities of an institution under resolution in accordance with Article 43 (Article 2[1][57] BRRD). The scope of the bail-in tool is described in various sections of Article 44: a write-down or

conversion may not be conducted, inter alia, on (a) covered deposits, (b) secured liabilities (including covered bonds), and liabilities in the form of financial instruments used for hedging purposes, which form an integral part of the cover pool and which are secured in a way similar to covered bonds under the national law, (c) liabilities to institutions, excluding entities that are part of the same group, with an original maturity of less than seven days, (d) liabilities to employees and to crucial commercial or trade creditors. Therefore, when it comes to financial instruments, it appears that only secured liabilities are beyond the scope of the bail-in tool. That clearly corresponds to the prohibition of AT1 or T2 instruments to be secured, as set forth by the CRR.[4] In other words, AT1 or T2 instruments face contingent conversion to equity or write-down if an accounting trigger event occurs. The BRRD will focus on regulatory triggers in the same manner described in CRR Recital 45.[5]

A bail-in tool has a broader scope of options than the write-down of AT1 or T2 instruments. Correspondingly, bail-in bonds have a broader scope than AT1 CoCos and T2 instruments. This conclusion is strongly backed by an analysis of the BRRD Title IV 'Resolution' structure: the procedures for the exercise of the bail-in tool are set out in Section 5 ('Bail-in tool') of Chapter IV ('Resolution tools'), while write-down or conversion of relevant capital instruments is regulated in the separate Chapter V ('Write down of capital instruments'). However, when exercised, the bail-in tool also applies to AT1 and T2 instruments. It is explicitly affirmed in Article 59(1) that the power to write-down or convert relevant capital instruments like CET1 instruments or AT1 and T2 hybrids may be exercised either independently of or in combination with the resolution action.

Therefore, the next sections of this study must bring both the analysis of the global bail-in mechanism (the bail-in tool) and the mechanism limited to AT1 and T2 instruments – the write-down of capital instruments. It should be remembered that these mechanisms are similar to a large extent, and for the sake of simplicity, it is far easier to depict an independent write-down first, and later place it in the broader context of a bail-in tool. Furthermore, national legislation implementing the bail-in tool will start to apply from January 1, 2016 at the latest, while other measures of the BRRD, including the write-down of capital instruments, should already be implemented in member states' laws that have been in force since January 1, 2015 (Article 130). For these two reasons, the independent exercise of a capital instrument write-down shall be analyzed first.

7.3.2. Write-down of capital instruments

7.3.2.1. Personal scope of financial institutions covered by the write-down mechanism

Pursuant to BRRD Article 59(2), resolution authorities shall have the power to write-down or convert relevant capital instruments, that is, AT1 and T2 hybrids, into shares or other instruments of ownership of institutions and entities referred to in Article 1(1)(b)–(d). To determine the personal scope of a write-down, one needs to go back to BRRD Article 1(1), which defines the institutions covered by the regulation under the Directive. To sum up, that personal scope will include following entities established in EU:

1. Financial holding companies (defined in BRRD Article 2[1][9]), mixed financial holding companies (defined in BRRD Article 2[1][10]) and mixed-activity holding companies (defined in BRRD Article 2[1][11]);
2. Parent financial holding companies in a member state (defined in BRRD Article 2[1][12]), EU parent financial holding companies (defined in BRRD Article 2[1][13]), parent mixed financial holding in a member state (defined in BRRD Article 2[1][14]), and EU parent mixed financial holding companies (defined in BRRD Article 2[1][15]); and
3. Institutions established in the EU that are subsidiaries of the aforementioned entities, financial institutions or investment firms, provided that they are covered by the supervision of the parent undertaking on a consolidated basis in accordance with CRR Articles 6–17.

It is unnecessary to analyze the details and personal scope of every definition. But it is sufficient to state what type of entities will not be covered by the discussed powers of the resolution authorities: financial institutions established in EU that are not subsidiaries of the aforementioned entities and their branches established outside the EU, that are generally covered by the BRRD. This conclusion explicitly results from the very aim of the BRRD, which is to deal with financial conglomerates whose failure may cause the contagion effect to spread through the financial system in a cross-border, even pan-European manner. Financial institutions that are not financial conglomerates, namely small family-owned banks or otherwise closely-held banks, are also subjects of concern in BRRD policy, but under another regime, (BRRD Article 32 and 33). The absence of capital instruments and write-down mechanisms with regard to such independent financial institutions is an example of

the varied approach that may be taken with different types of financial institutions. For example, institutions referred to in BRRD Article 1(1)(a) are covered by the CRR regime, so any contingent conversion of its AT1 will take place only under the CRR mechanism. Some T2 instruments may also incorporate contingent conversion mechanisms set off by a CET1 ratio trigger, although this is not required under CRR.[6]

7.3.2.2. Conditions of a write-down or conversion

Pursuant to BRRD Article 59(3), resolution authorities exercise their write-down or conversion power when one or more of the following circumstances apply: (i) it has been determined that conditions for resolution specified in Articles 32 and 33 have been met but no resolution action has been taken yet; (ii) it has been determined that unless these powers are exercised the institution (or its parent undertaking) will no longer be viable; (iii) where the relevant capital instruments are issued by a subsidiary to meet CRR capital requirements, it has been jointly determined by the competent authorities (for the consolidating supervisor and the subsidiary) that unless these powers are exercised the group will no longer be viable; (iv) where the relevant capital instruments are issued by the parent undertaking for purposes of CRR own funds requirements, and it has been determined by the competent authority that unless these powers are exercised the group will no longer be viable, and finally (v) extraordinary public financial support is required by the institution except for any situation set out in the BRRD Article 32(4)(d)(iii).

First of all, some clarification must be made with regard to condition (i), where both BRRD Article 32 and 33 are referred to. This may cause some problems of interpretation, as BRRD Article 32 governs the resolution tool applicable to independent financial institutions (BRRD Article 1[1][a]) that are outside the scope of the write-down or conversion power, which applies only to financial institutions or entities listed in BRRD Article 1(1)(b)–2(d). Such a reference should not be deemed as an attempt to apply this mechanism to an independent institution. The reason behind this rather misleading formulation is that Article 33, which governs the resolution tool for institutions covered by write-down and conversion mechanisms, actually refers to the catalog already provided in BRRD Article 32, and introduces only the necessary changes, rather than providing a catalog of eligible conditions. Thus, the conditions for the resolution tool for institutions covered by write-down or conversion mechanisms are in fact listed in the provisions contained in BRRD Articles 32 and 33.

It should not go unnoticed that BRRD Article 59(3)(c) refers not to the catalog of entities set out in BRRD Article 1(1)(b), (c) and (d) but to the group defined in Article 2(26) as a parent undertaking and its subsidiaries. Simultaneously, the subsidiary is defined by reference to a definition provided in the Directive 83/349/EEC and repeated throughout European legislation. That includes BRRD Article 4(1)(16) of the CRR, where it has been affirmed that subsidiaries of subsidiaries also are to be considered as a subsidiary of the top undertaking. The purpose of such a reference is to cover not only hybrids issued directly by financial institutions themselves, but also by consolidated SPVs, which are not financial institutions. Here, the regulator is clearly aware of the scheme whereby an SPV is created for the purpose of bonds issued on the Euromarket.

Infringement of the viability of the institution or group is the central condition of BRRD Article 59(3), and therefore it is subject to further, more detailed regulation in BRRD Article 59(4), which is quite similar to the regulations set out in BRRD Article 32. The main difference between the conditions set out in BRRD Article 32 and in BRRD Article 59(4) is that the latter refers to the entity on a parent (group) level, so consolidation issues must be considered. Furthermore, BRRD Article 59(6) explicitly states that a group should be deemed as failing or as likely to fail if there are objective elements to determine that it will infringe its consolidated prudential requirements under the CRR regime. Such infringement may be caused by incurred losses that will consume all or a significant amount of its own funds, but also by other circumstances. It is noticeable that while the CoCo's trigger event is precisely parameterized and conversion is automatic, in the case of bail-in criteria it is the regulators who decide when the time has come. The all-or-nothing nature of that decision could make them reluctant to pull the trigger.

Another special provision addressing the issue of AT1 or T2 hybrids held by a subsidiary is provided in BRRD Article 59(7): any write-down or conversion of such instruments may not be conducted to a greater extent or on worse terms than equally ranked capital instruments that have been written down or converted at the level of the parent undertaking of the group. The purpose of this provision is to safeguard the consolidated nature of the group for the purposes of the CRR and BRRD, and also to protect the holders of hybrids issued indirectly by the parent undertaking (that is, by an SPV which is not a financial institution). In other words, hybrids issued by a subsidiary SPV will rank pari passu with those issued by the parent undertaking, not only in terms of subordination, but also in terms of write-downs and conversion.

7.3.2.3. Mechanism of a write-down or conversion

According to BRRD Article 60(1), the normal priority of claims in an insolvency proceeding shall be the principal exercising the referenced power: CET1 instruments are reduced firstly in proportion to the losses incurred and to the extent to their capacity. Hence, this reduction may be to zero, if the amount of losses is higher than the amount or capacity of the own funds of the CET1. The resolution authority takes one or both of the actions provided for in BRRD Article 47(1): (i) it cancels existing shares or other instruments of ownership, or transfers them to bailed-in creditors; or (ii) it dilutes the existing shareholders and holders of other ownership instruments as a result of the conversion into shares or other instruments of ownership of (a) AT1 or T2 hybrids or (b) eligible liabilities. The conversion scenario is possible only when valuation carried out under BRRD Article 36 demonstrates that the institution has positive net value.

In the next step, if the reduction of the CET1 to zero does not completely resolve the problem and the objectives of BRRD Article 31 have yet to be achieved, the principal amount of the AT1 is either written down, converted to a CET1, or both. Again, the write-down or conversion is conducted to the extent of the capacity of the instruments; therefore, a write-down to zero or a conversion of the entire principal amount may be exercised. It is explicitly affirmed that the bottom line is the lower of (i) the extent required to achieve objectives of BRRD Article 31, and (ii) the extent of the capacity of the AT1 instrument. It is striking that AT1 instruments may be written down, or converted, or both. In the end, the same write-down or conversion is performed with regard to T2 instruments.

First of all, we must note that ability to perform a partial conversion and a partial write-down reflects how the BRRD regime prevails over the CRR regime when a conversion is carried out. In essence, it seems to be of minor importance whether a certain AT1 hybrid is structured for the purpose of a CRR, a CE CoCo or a PWD CoCo, because the resolution authority may chose a conversion or write-down tool on a discretionary basis. Thus, a PWD CoCo may be converted regardless the accounting trigger event set out in terms of the issue, or written down, or partly converted and partly written down. Of course, the same applies to a CE CoCo. This means that even write-down hybrid bonds issued by a credit institution indirectly (via an SPV) may be converted into CET1 shares of the financial institution. Bearing in mind the conclusions reached by the CRR regarding the non-eligibility of an indirect issue scheme for the purpose of CoCo issuance, it must be said that the

BRRD goes even further than the CRR in terms of the creation of new hybrids. Simultaneously, the certainty of the conclusion regarding the non-eligibility of a CE CoCo's indirect issuance by an SPV is somehow weakened, as the BRRD's goal is to absorb creditors' losses, regardless of any intermediary SPV involved in the debt issuance.

This 'going-up' structure of capital may work where the former Basel II Tier structure failed. In Basel II, T2 capital and non-deferrable coupons were absorbing losses only on a gone-concern basis, so in times of financial stress, even if a bank possessed significant stock of subordinated debt in T2, it had to issue new equity to remain solvent anyway. The BRRD aims to remedy this by placing all own funds on the 'in-line' of loss absorption. Losses will be consumed by CET1 items in the first, but subsequently AT1 holders will be next in line, as their instruments may be converted to CET1 instruments or simply written down. If their investment also has to be used to absorb losses, T2 instruments may come into play and also be converted into CET1 instruments.

At this point, we must answer an important question: what happens after the institution has to face losses? After the AT1 items (or, if necessary, AT1 items and T2 items) replace the CET1 items (that have fully absorbed losses but in exchange been reduced to zero), the tier or tiers may be left undercapitalized or even absolutely empty of any financial items. Without any remedy for such a situation, there would be little improvement under BRRD: T2 instruments would be capable of absorbing losses on a going-concern basis, but in practice such absorption could work only once, and the institution would be left in poor capital condition, without the required amount of own funds in place. To address the problem of inadequate own funds after the write-down or conversion of relevant capital instruments, BRRD Article 63(1)(i) equips resolution authorities with the resolution power to request the management of a financial institution to issue new shares, other ownership instruments or other capital instruments, including preference shares and contingent convertible instruments. It is explicitly reaffirmed that both preferred shares and CoCos may be categorized as AT1 instruments.

7.4. Bail-in tool

7.4.1. Minimum requirements for own funds and eligible liabilities

At all times, financial institutions must meet minimum requirements with respect to own funds and eligible liabilities, as determined by the

resolution authority on an individual basis (BRRD Article 45[1]). This very fact may be surprising, as these requirements may have seemed to be an exclusive domain of the CRR. To move forward, the interoperation between own funds requirements under BRRD and CRR must be examined.

First, however, we must look into another unexpected aspect of the BRRD: 'eligible liabilities', an autonomous term of the BRRD that is absent under the CRR. We see that this new class, or new tier, of instruments is intended to play a significant role in the reform of a bank's capital structure. These eligible liabilities are instruments (i) that are fully paid up, (ii) that are not owed to, secured by or guaranteed by the institution itself, (iii) whose purchase was not funded directly or indirectly by the institution, (iv) that have remaining maturity of at least one year, (v) that do not arise from a derivative and (vi) that do not arise from certain privileged deposits (BRRD Article 45[4]). These eligible liabilities are believed to form the so-called Tier 3. It should be stressed that the aforementioned eligibility criteria do not provide for any exceptional features like subordination or deferral, so there is a little chance that any Tier 3 hybrid will be created as a result of implementation by the BRRD. As a matter of fact, all typical unsecured bonds, both subordinated and senior, are eligible to be used for bail-in purposes. They are 'bail-inable', provided that they meet the conditions mentioned above. The most important condition here seems to be the remaining maturity of at least one year. This condition may lead to the creation of a debt issue pipeline designed to replace bonds that will soon lose their eligibility – that is, their maturity will be shorter than one year – with new bonds. The manner by which the remaining maturity is calculated is crucially important. And in fact, it is not as easy as it seems. Contrary to AT1 and T2 instruments, eligible liabilities may incorporate a put option. If so, BRRD Article 45(4) *in fine* explicitly states that the maturity date of that liability shall be the first date on which the put option arises. The provision being analyzed here invokes generic 'right to early reimbursement' that is conferred upon the owner of the liability. Hence, it may include not only a put option but also acceleration covenants and so on. It would certainly be helpful if the EBA were to provide regulatory technical standards specifying the nature of the right to early reimbursement, just as it did with 'incentives to redeem'. This provision applies only to rights conferred to the holder, so an issuer's call option should be irrelevant with respect to the calculation of a of maturity date. Bearing in mind the comments on T2 bonds, we must also underscore the importance of bond amortization for the purpose of eligibility. To date,

no provision of the BRRD provides a mechanism of amortization resembling the one set out in CRR Article 64.

When determining the minimum requirement of own funds and eligible liabilities, the resolution authority, after consulting the competent authority, should take into account at least the following criteria:

(a) the need to ensure that these funds, eligible for the purpose of bail-in power, will be sufficient to resolve the institution;
(b) the need to ensure that eligible liabilities will prove sufficient if the bail-in tool is to be used, such that the CET1 ratio could be restored to the required level that is necessary to sustain sufficient market confidence in the institution;
(c) the need to ensure that if the resolution plan anticipates that certain classes of eligible liabilities may be excluded from the bail-in, then other eligible liabilities of the institution will prove sufficient to achieve the goal described in point (b);
(d) the size, the business model, the funding model and the risk profile of the institution;
(e) the extent to which the Deposit Guarantee Scheme could contribute to the financing of resolution (BRRD Article 109);
(f) the extent to which the failure of a given institution would have adverse effects on financial stability, including contagion to other institutions, due to its interconnectedness with other institutions or with the broader financial system.

These criteria certainly require some clarification, which was provided by the EBA in the form of regulatory technical standards issued on July 3, 2015 (BRRD Article 45[2]). The last point seems to be very general; therefore, supplementing it with technical content is of crucial importance. How can the importance of a given institution to the financial system be assessed, and how can the risk of contagion linked with that institution be evaluated? The Basel Committee has identified several factors for assessing the systemic importance of a given financial institution: size, complexity, interconnectedness, global reach, cross-jurisdictional activity and the absence of readily available substitutes for the financial infrastructure it provides. The Financial Stability Board also relies on size, complexity, cross-border activity and substitutability when making its own assessments. These established criteria are likely to create a foundation for the EBA's own methodology of assessment.

It should also be noted that these criteria are non-exhaustive, and that member states may provide for additional criteria to assess an

institution's importance in the broader financial system. The requirement being analyzed generally does not apply to specialized mortgage institutions that obtain funding by means of covered bond issues and are not allowed to receive deposits. This exemption is associated with the fact that covered bonds (and other secured debt) are excluded from exercising the mechanism of the bail-in tool.

7.4.2. Sequence of loss absorption

Pursuant to BRRD Article 47(1)(a), shares or other instruments of ownership may be canceled or transferred to bailed-in creditors. In addition, as a result of a bail-in, relevant AT1 and T2 capital instruments may be converted into shares or other instruments of ownership (BRRD Article 47[1][b]). This may happen only if a valuation has proved that the institution has a positive net value. If this condition is met, the resolution authority may also implement both these actions. It is very important to note that conversion may also be performed with regard to AT1 instruments that embed write-down instead of contingent conversion, as well T2 instruments that are not required to incorporate contingent conversion mechanisms. Perhaps more importantly, this action may also be performed with regard to eligible liabilities (BRRD Article 63[1][f]).

The sequence of reduction – that is, write-down or conversion – is set out in BRRD Article 48, wherein the first losses are absorbed by CET1 items, while the subsequent losses are absorbed by AT1 and T2 items, until the required reduction is complete. However, the bail-in tool has a wider scope than the write-down or conversion of AT1 and T2 instruments, and if these own fund items are insufficient to restore the viability of the institution, the resolution authority will proceed with the reduction of subordinated debt that is not AT1 or T2. Here, the hierarchy of normal insolvency proceedings applies. In the end, even if the reduction of the principal amount of such subordinated debt is not enough, the resolution authority may reduce the rest of the eligible liabilities using the same normal hierarchy of claims. These two final steps address the so-called Tier 3. Losses have to be absorbed equally among financial instruments of the same rank.

Before the last class of eligible liabilities may be reduced, the resolution authority shall first reduce instruments embedded with contingent conversion or write-down provisions on the occasion of the occurrence of any event that impacts the financial situation, solvency or levels of the institution's own funds. Of course, this principal applies only when such instruments have not been already reduced (BRRD Article 48[3]). Legislators are clearly aware of the difficulties that may arise in practice,

as provisions of the BRRD will postpone any contingent conversion or write-down mechanism of the CRR. Therefore, the EBA is expected to issue, by January 3, 2016, guidance for any interpretation of the interrelationship between the provisions of the BRRD and those of the CRR and the CRD IV (BRRD Article 48[6]).

It appears that this requirement follows the CRR mechanism of deductions from given tiers. As previously mentioned, the institution must deduct, for example, from its AT1 amount, the entire value of its AT1 instruments of other financial institutions. This requirement is designed explicitly to address the contagion effect and may discourage financial institutions from engaging in proprietary trading on instruments of other financial institutions over the long-term. To some extent, the deduction mechanism may lead to a loosening of the tight interconnectedness of the financial system. In essence, the more financial equity and financial hybrids that number among the assets of a financial institution, the more equity or financial hybrids this financial institution has to issue in order to meet the prudential capital requirements.

Such a consequence may occur someday, but right now the complexity of the financial system and its exposure to contagion risk is an undisputed fact that regulators have to deal with. As deduction mechanisms require deep insight into the assets of the financial institution, this assessment seems to require a monitoring of shareholders and the structure of the creditors, or some similar tool, to assess the institution's interconnectedness. EBA guidelines on this issue are critically important, as they may have a long-term impact on the evolution of links between the financial institutions that form the web of the global financial system. As a matter of fact, the BRRD aims to assess the systemic importance of all financial institutions. Banks labeled as some sort of Systemically Important Financial Institution will have to bear the additional cost of super-prudential capital requirements: capital buffers set out in CRD IV. On the other end of the scale, institutions whose systemic importance is least significant will only have to fulfill the CRR requirements. All entities in between will have to face some additional requirements on non-capital subordinated debt, which is expected to constitute a so-called Tier 3[7] and TLAC-eligible senior debt. Market participants see the bail-in tool as a 'nuclear option', and look forward to the introduction of some clarity as to what exactly eligible liabilities are meant to be. That should not be a surprise, for the creation of a new 'bail-inable' class of assets – non-capital subordinated debt and TLAC-eligible senior bonds – would finally determine which assets are not bail-inable and are therefore safe from harm.

To sum up, the bail-in tool is the key element of the BRRD regime. It demonstrates that when it comes to most important financial institutions, CRR capital requirements determine only the capital floor, and not the capital ceiling. In essence, objective and universal Basel III requirements enforced by the CRR are called a 'Pillar 1', while requirements on TLAC are 'Pillar 2' – subjective and individually assessed.

8
Hybrid Securities Issued by Insurers

8.1. General remarks

Under the Solvency II Directive,[1] EU insurers are required to maintain a specific level of capital which is categorized into levels or 'tiers': so-called high quality capital (T1), good quality capital (T2) and finally Tier 3 (T3), which can be described as low quality capital. The concept of tiers is similar to the CRD IV/CRR. Both the CRD IV/CRR and Solvency II classify financial instruments into specified tiers based on the valuation of their pre-bankruptcy and post-bankruptcy loss-absorption features. Loss absorption on a going-concern basis is achieved primarily through dividend cancellation in the absence of profit and profit reserves. The same effect brings about non-cumulative coupon deferral in the case of hybrid securities. Another loss-absorbing feature is the conversion of hybrids into common equity or a partial, if not full, write-down of their principal value. In case of insolvency, senior bonds rank before subordinated bonds. Common equity, in turn, has the lowest recovery rate.

Under Article 82 of Commission Delegated Regulation (EU) 2015/35,[2] 50% of all eligible own funds will need to consist of Tier 1 capital to cover the Solvency Capital Requirement (SCR). Thereof, up to 20% of an insurer's total eligible own funds can consist of 'high quality' hybrid instruments. Surplus funding from high quality hybrid issues above the 20% level may be classified as Ancillary T2. The remainder of own funds may consist of T2 capital, including subordinated debt, which is defined as dated or undated bonds. Up to 15% of own funds may consist of Tier 3 capital. At the same time, common shares and reserves must cover at least 80% of Minimum Capital Requirements (MCR). The remainder is to be covered by T1 and T2 instruments. Figure 8.1 illustrates these considerations.

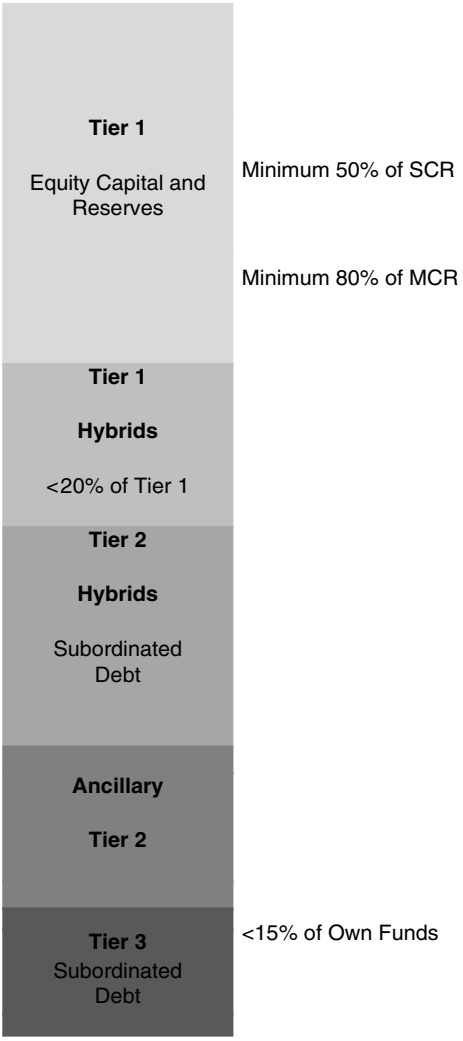


Figure 8.1 Hybrid structuring under Solvency II

8.2. Tier 1 hybrid securities

Under Solvency II, the category of AT1 does not exist, and Tier 1 may consist only of items that are available (or may be called up on demand[3]) to absorb losses on a going-concern basis, as well as in the case of the insurer's winding-up. Such features constitute permanent availability for the purposes of loss absorption (Solvency II Article 93[1][a]).

Another feature of a Solvency II Tier 1 item is subordination (Solvency II Article 93[1][b]). The structuring of Solvency II optimized hybrid instruments is currently based on Regulation (EU) 2015/35. This regulation describes the undated, perpetual character of T1 hybrids. Redemption or repayment is only allowed after 5 years at the earliest, and is subject to prior supervisory approval. Security should also be free from requirements or incentives to redeem the nominal sum (Article 71[1][g] and [i], Reg. (EU) 2015/35), so no step-up provision is allowed. Repayment and redemption is subject to supervisory approval. In addition, the item must provide for the suspension of repayment or redemption in the event of non-compliance with the SCR, or if repayment or redemption would lead to such non-compliance (Article 71[1][j] Reg. [EU] 2015/35). On breach of the SCR, coupon cancellation is mandatory. Interest deferral is fully discretionary at all times to cancel distribution for an unlimited period and on a non-cumulative basis. Interest is payable only from distributable items. The loss-absorption mechanism consists of conversion into equity or write-down. The trigger event is a significant breach of the SCR, defined as the earlier of the following events: (i) eligible own funds covering the SCR are equal to or less than the 75% of the SCR, (ii) eligible own funds covering the SCR are equal to or less than the MCR, (iii) a breach of the SCR is not resolved within three months (Article 71[8], Reg. [EU] 2015/35). Dividend pushers and stoppers are not allowed.

8.3. Tier 2 and Tier 3 hybrid securities

Hybrid securities may be classified as basic own funds in T2 where they meet the condition of subordination (which will be discussed in detail in below). Such securities are 'undated' (i.e. perpetual) or have 'sufficient duration' laid down in Solvency II Article 93(2) of at least 10 years (Article 73[1][c] Reg. [EU] 2015/35). The feature of full loss absorption is not necessary, as it is attributable only for T1 instruments (Solvency II Article 94[2]). Ancillary own-funds instruments may be classified as T2 items if they meet the same conditions as specified for T1 items (Solvency II Article 94[2]), whereas instruments which do not fall under T1 or T2 shall be classified in T3 (Solvency II Article 94[3]). Any redemption of the Solvency II T2 instrument's principal amount may be performed only with prior regulatory approval. T2 Solvency II hybrid securities must be equipped with a mandatory coupon deferral on breach of SCR. In other words, the item must provide for the suspension of repayment or redemption in the event of non-compliance with the SCR or if repayment or

redemption would lead to such non-compliance. Deferred coupons are settled on a cumulative basis.

For the purposes of Solvency II subordination of a financial instrument, an 'item' is defined as its full availability to absorb losses in the case of winding-up, where its repayment is refused to the holder until all other obligations, including insurance and reinsurance obligations toward policy holders and beneficiaries of insurance and reinsurance contracts have been met (Solvency II Article 93[1][b]). The interesting thing is that, pursuant to the Solvency II Article 93(2), an assessment of the item's possession of the subordination feature also requires a consideration of its duration, in the same manner with which it considers its permanent availability for loss-absorption purposes. Thus, Solvency II recognizes maturity as a feature of subordination, which may be explained by the unique characteristic of the insurance business: that is, the long-dated obligations of the insurers. Another factor that has to be taken into account when assessing the instrument's subordination features are the absence of incentives to redeem, the absence of mandatory servicing costs and a lack of encumbrances (Solvency II Article 93[2][a]–[c]).

As mentioned above, the permanent availability and subordination of the instrument are features essential for its classification as T1 and Ancillary T2, provided that conditions set out in Solvency II Article 93(2)

Table 8.1 Main characteristics of the EUR 500 million subordinated 30NC10 hybrids issued by Vienna Insurance Group

Issuer	**Vienna Insurance Group**
S&P rating	A–
Size	EUR 500 million
Status	Direct, unsecured and subordinated
Maturity	October 09, 2043
First call date	October 09, 2023
Coupon	Fixed to floating (incl. 100bps step-up)
Coupon payment	Annual for fixed coupon, quarterly for floating
Interest deferral	Optional and mandatory on breach of regulatory capital requirements/regulatory intervention
Payment of arrears	Cumulative
Dividend pusher	12 months look-back period
Redemption conditions	A Tax Event, an Accounting Event, a Rating Events (from year 5) or a Regulatory Event, subject to approval by the regulator and no Solvency Event

are met. In case of T2, subordination and Article 93(2) conditions are the sole criteria of classification, while permanent availability of the instrument is not required. If these conditions are not met, the instrument shall be classified as a T3. T2 instruments are unsecured, subordinated to policyholders and non-subordinated creditors (Article 73[1][a] Reg. [EU] 2015/35).

T2 hybrids are callable after 5 years at the earliest. The call exercise is subject to prior supervisory approval. Unlike for T1 instruments, moderate step-up (100 bp[4]) is allowed for T2 items, after 10 years at the earliest (Article 73[4] Reg. [EU] 2015/35). There is also the possibility of a dividend pusher/stopper.

As an example of an existing Tier 2 structure, let us consider the following bond: on October 1, 2013, Vienna Insurance Group (VIG) launched a Euro dated 30NC10[5] subordinated transaction. The transaction was structured to comply with existing Solvency I insurance regulations and with expected future insurance regulations for Tier 2 capital (Solvency II) and S&P intermediate equity credit requirements. The parameters of the security are collected in Table 8.1.

9
Corporate Hybrids

9.1. Characteristics of corporate hybrids

While hybrids are an important part of the regulated capital of banks and insurers, corporations are free from regulatory constraints in deciding about their capital structures. Hybrid securities are attractive to corporations because they offer flexibility without diluting share capital – a cost-effective alternative to issuing equity since coupon payments are generally tax deductible and dividends are not. Unlike financial hybrids, corporate hybrids usually are not convertible into equity, so a company can issue them without risking dilution of equity stakes held by existing shareholders. Common features of European corporate hybrid issuances are:

- Cumulative coupon deferral with a dividend pusher/stopper;[1]
- Long tenors or no maturity date at all. There are moderate incentives to redeem;
- Certain call options with call dates that typically take effect 5 or 10 years after the date of issuance. The securities are typically valued in the market on the assumption that an issuer will redeem them on the first call date;[2]
- Subordination;
- The absence of a conversion/principal write-down mechanism, which is a feature of financial hybrids.

Tables 9.1 and 9.2 present sample European corporate hybrid structures.

In general, the more equity-like the structure, the higher the equity credit assigned by the rating agencies. Equity credit is an analytical concept that places a hybrid on the exact point of the debt–equity continuum according to the strength of its equity characteristics. Fitch

Table 9.1 Comparison of existing corporate hybrid securities

Issuer	**Centrica plc**	
Ticker	XS1216020161	XS1216019585
Expected rating (S&P/Moody's)	BBB/Baa3	BBB/Baa3
Size	€750 million	£450 million
Status	Direct, unsecured and subordinated	Direct, unsecured and subordinated
Issue date	April 10, 2015	April 10, 2015
Maturity	April 10, 2076	April 10, 2075
Call provisions	From April 10, 2021	From April 10, 2025
Coupon	3% until April 10, 2021 268.7bp + 5Y MS* after April 10, 2021 293.7bp + 5Y MS* after April 10, 2026 368.7bp + 5Y MS* after April 10, 2041	5,250% until April 10, 2025 386.1bp + 5Y MS* after April 10, 2025 461.1bp + 5Y MS* after April 10, 2045
Coupon payment	Annually	Semi-annually
Interest deferral	Optional	Optional
Settlement of deferred coupons	Cumulative, compounded	Cumulative, compounded
Redemption conditions	A Rating Methodology Event, a Tax Deductibility Event, a Substantial Repurchase Event, a Withholding Tax Event, a Change of Control	A Rating Methodology Event, a Tax Deductibility Event, a Substantial Repurchase Event, a Withholding Tax Event, a Change of Control

*MS – Mid-Swap rate

Source: Prospectus

enumerates a spectrum of five classes; Moody's has five baskets. At one extreme there is class/basket A, which is 0% equity and 100% debt; at the other extreme there is class/basket E, which is 100% equity and 0% debt. Rating agencies usually treat such notes as a half-debt, half-equity (class/basket C). This categorization is important, because hybrids assigned high equity credit allow the issuer to raise capital without increasing its leverage. Higher leverage pulls down a firm's credit rating and pushes up the interest rates on its future debt issuances.

By contrast, from a corporate taxation perspective, it is better for an issuer that the instrument is classified as interest-generating debt rather than dividend-generating equity. The interest on debt capital is tax deductible, while the return on equity capital is not.

Table 9.2 Comparison of existing corporate hybrid securities

Issuer	**Volkswagen AG**	
Ticker	XS0968913268	XS1206541366
Expected rating (S&P/Moody's)	BBB/Baa2	BBB+/Baa1
Size	€1.25bn	€1.4bn
Status	Unsecured and subordinated	Unsecured and subordinated
Issue date	September 04, 2013	March 20, 2015
Maturity	Perpetual	Perpetual
Call provisions	From September 04, 2018	From March 20, 2030
Coupon	3,875% until September 04, 2018 270bp + 5Y MS* after September 04, 2018 (no step-up) 295bp + 5Y MS after September 04, 2023 (incl. 25bps step-up) 370bp + 5Y MS after September 04, 2038 (incl. 75bps step-up)	3.50% until March 20, 2030 306bp + 15Y MS after March 20, 2030 (incl. 25bps step-up) 381bp + 15Y MS after March 20, 2050 (incl. 75bps step-up)
Coupon payment	Annually	Annually
Interest deferral	Optional	Optional
Settlement of deferred coupons	Cumulative, not compounded	Cumulative, not compounded
Dividend pusher	Yes	Yes
Redemption conditions	A Rating Event, an Accounting Event, a Tax Deductibility Event, a Gross-up Event	A Rating Event, an Accounting Event, a Tax Deductibility Event, a Gross-up Event

*MS – Mid-Swap rate

Source: Prospectus

A concise evaluation of strengths, weaknesses, opportunities and threats is presented in Table 9.3.

The first corporate hybrids were issued around 2003. The dominant issuers were utilities like EDF and Vattenfall, and high quality issuers such as Michelin, Bayer, Linde and Siemens. After the slump in 2008, when this class of asset nearly disappeared, hybrid issuances by non-financial European companies totaled nearly $46 billion in 2014 (Sui-Jim Ho, 2015), up from $36.6 billion in 2013 (Dealogic).

Table 9.3 SWOT analysis of hybrids

For an issuer	For a hybrid holder
Strengths	
• Flexibility of equity without shareholder dilution • In default provides protection to senior creditors and improves the latter's recovery prospects • Stable source of long-term funding for healthy companies • Does not raise debt-to-equity ratios, thus protects the issuer's credit rating • Right to make earlier prepayments • Recovery rate of senior debt grows, which reduces its cost • May be tax deductible	• Gives higher interest than senior debt • A call provision with incentives to redeem constitutes a debt-like 'effective maturity'
Weaknesses	
• Higher cost than senior debt	• Equity-like instrument does not give corporate rights embedded in share • Lack of equities' value upside potential
Opportunities	
• Reduction of cost of debt when issuer call option is embedded	• Issuers do not make deferral in the absence of financial distress
Threats	
• Too large a share of hybrids reduces effectiveness of assets financed	• Long-term deferral in case of financial stress • No right to exempt bankruptcy • Possibility of executing hybrid calls when issuer is in good condition • Possibility of non-executing hybrid calls when issuer is in distress (extension risk)

Source: Own evaluation

The most prominent issues in the first quarter of 2015 were: French oil company Total (€5 billion), Volkswagen (€2.5 billion),[3] UK utility company Centrica (€1.3 billion)[4] and Air France-KLM.

The next section presents a less common reason behind the decision to issue hybrids, and offers the example of a certain transaction involving the use of so-called PECS hybrid securities.

9.2. Monetizing treasury shares of MOL through issue of perpetual exchangeable bonds via Magnolia Finance Limited ('Transaction')

9.2.1. Background of the Transaction

The underlying aim of the Transaction was to enable the MOL Group, a Hungarian oil and gas company, to acquire its treasury shares, which were owned by APV Rt., the Hungarian State Privatisation and Holding Company (APV).

Before the Transaction, APV held 11.7% of MOL's registered capital and intended to sell it. The influence of APV over MOL was secured via a 'golden share' provision in the MOL statutes, so APV was free to divest a large package of MOL shares and use the proceeds for the purposes of the Hungarian State. However, the marketing of such a significant package would have a negative impact on the price formation, which was an outcome unintended by MOL shareholders and MOL itself.[5] Therefore, MOL has been identified as a convenient buyer of MOL shares held by the APV. However, two obstacles had to be removed: MOL had to acquire financing for the Transaction and – more importantly – had to decrease the number of the treasury shares that it had already held. By the end of 2005, MOL held treasury shares representing 6.9% of its registered capital, and under Hungarian law it could possess no more than 10% of treasury shares. Therefore, it could only purchase from the State treasury shares representing 3.1% of its registered capital, which was far below APV's goal. The obvious choice here would be to sell treasury shares on the market and use the proceeds to purchase treasury shares from APV, but such a significant sale would also create the risk of a price fall. Besides, the proceeds from the sale of 6.9% of MOL's registered capital would not be sufficient to finance the acquisition of 10% of MOL's registered capital.

Instead, the Transaction enabled MOL to:

(i) acquire approximately €567 million (the net value of the proceeds) in long-term perpetual financing,
(ii) remove the treasury shares representing 5.58% of registered capital from its books without selling them on the market, and
(iii) obtain around €128 million in cash by selling to BNP Paribas the rest of the treasury shares, which represented 1.3% of registered capital. Such a transaction was not significant enough to have a negative impact on price formation.

Table 9.4 Shareholder structure (%) and treasury shares

Shareholder groups	31 December 2004	30 June 2005	30 September 2005	31 December 2005	31 March 2006	30 June 2006
Foreign investors (mainly institutional)	56.0	56.6	58.3	58.2	58.6	57.5
OMV	10.0	10.0	10.0	10.0	10.0	10.0
Slovbena, Slovintegra	8.0	7.3	6.9	0.0	0.0	0.0
BNP Paribas	0.0	0.0	0.0	6.9	7.0	8.6
Magnolia	0.0	0.0	0.0	0.0	5.5	5.5
APV Rt. (Hungarian State Privatisation and Holding Company)	11.8	11.8	11.7	11.7	11.7	1.7
Domestic institutional investors	5.7	4.7	3.3	4.0	3.9	4.9
Domestic private investors	3.6	3.0	3.0	2.4	2.0	1.8
MOL Rt. (treasury shares)	4.9	6.6	6.8	6.8	1.3	10.0

Source: MOL Group 2006 First Half and Second Quarter Preliminary Results, Appendix VIII, p. 16.

In the overall effect of the Transaction, MOL successfully obtained financing via operations on treasury shares and acquired shares representing its 10% from the Hungarian Treasury of the State. Proceeds from the sale of shares representing 6.9% of MOL's share capital were used to finance the purchase of shares representing 10% of MOL from APV and covered about 81% of the transaction price.

9.2.2. Pre-Transaction arrangements

On December 1, 2005, MOL signed a call option agreement with APV ('Call Option Agreement'), under which MOL was entitled to purchase 10,898,525 'A' Series MOL shares representing 10% of MOL's registered capital owned by APV during two option periods, between December 10 and 30, 2005, and between May 1 and October 27, 2006. During the first option period, MOL was entitled to exercise its option right for the maximum 3,269,558 'A' Series MOL shares (representing 3% of MOL's registered capital), while in the second option period the option right could be exercised for all shares. If the option were exercised, the purchase price to be

paid was to be the higher of the weighted average price of MOL shares for 90 trading days on the Budapest Stock Exchange prior to the signing or the exercise of the option. For MOL, exercising the call option meant undertaking selling restrictions on shares purchased until December 31, 2015.

MOL did not exercise its option to acquire the first tranche of shares in the first period set out in the Call Option Agreement.

On March 13, 2006 MOL sold 6,007,479 MOL 'A' Series shares to Magnolia Finance Limited, which has a registered seat in Jersey[6] ('Magnolia', 'Share Purchase Agreement'). Consideration for MOL shares amounted to €449,248,187. Proceeds from the Transaction were used for that purpose. No date of payment was in the Magnolia Prospectus, but information from the Magnolia Financial Statement for 2013 and the MOL Financial Statement for 2006 shows that it was paid on March 20, 2006.

On March 13, 2006 MOL entered into a subordinated swap agreement with Magnolia ('Swap Agreement'). Under the Swap Agreement, MOL was obliged to pay Magnolia amounts generally reflecting the payments to holders of perpetual exchangeable bonds that Magnolia intended to issue, while Magnolia was obliged to make 'certain payments' to MOL and to grant MOL a call option to buy-back any of the MOL shares sold to Magnolia under the Share Purchase Agreement, at current market value, after March 20, 2016. Details of the Swap Agreement were not disclosed in the Magnolia Prospectus, but information from Magnolia's financial statement for 2013 and MOL's financial statement for 2006 shows that said 'certain payment' amounted to €127,769,344 paid on March 20, 2006. The subordinated character of swap payments from MOL to Magnolia means that in case of MOL's liquidation, Magnolia would be satisfied after the senior creditors of MOL. Furthermore, MOL would be entitled to defer swap payments to Magnolia or settle these deferred payments through Alternative Swap Payment Satisfaction Mechanisms:

- *Share Deferred Swap Amount Satisfaction* – instead of cash, MOL transfers treasury shares to Magnolia. These treasury shares do not increase the initial amount of MOL shares to be exchanged for Perpetual Exchangeable Capital Securities (PECS) but are sold by Magnolia, and proceeds from the sale are used to satisfy the PECS holders. Such Share Swap Payment Satisfaction of Deferred Amounts is limited by a certain Share Satisfaction Limit.
- *Notional Increase Payment Satisfaction triggers the Payment in Kind Payment Satisfaction of PECS* – their principal amount is increased accordingly, but by no more than 25%. The amount of underlying shares remains stable, so such an increase of the principal amount of PECS results in a reduction of the Exchange Ratio.

9.2.3. Structure of the Transaction

Table 9.5 Issue of PECS

Issuer	Magnolia Finance Limited with registered seat in Jersey ('Magnolia'), with share capital £2 divided into two ordinary shares of £1 each, held by two nominee shareholders on behalf of Mourant & Co. Trustees Limited as share trustee. MOL has no share in capital but benefits from the call option in relation to entire share capital. Magnolia is not a subsidiary of MOL but is fully consolidated for financial reporting purposes as a Special Purpose Entity.[a]
Closing date	March 20, 2006
Underlying instrument	6,007,479 'A' Series MOL shares, listed on Budapest Stock Exchange (BSE) representing about 5.58% of MOL capital. Shares' value at closing date: Hungarian Forints (HUF) 20,440 per share. Initially, MOL obtained €449,248,187 from Magnolia under the share purchase agreement concluded on the closing date ('SPA'). The number of shares was not subject to any changes, and the fair value of these 6,007,479 MOL shares was €292,621,256 at the end of 2013.[b]
Interest rate	From March 20, 2006, to March 20, 2016 – 4% per annum (p.a.), paid quarterly Afterward, March 20, 2016 – EURIBOR + 5.50% p.a., paid quarterly
Issuer call option	Discretionary call option, exercisable by Magnolia from March 20, 2016
Holder exchange option	Exercisable from March 20, 2011, to March 20, 2016 ('Exchange Period') and in case of call option execution by the Issuer – may be settled in cash by the Issuer ('Cash Settlement Notice')
Exchange rate	HUF 26,670 per share
Coupon deferral	Any deferral of MOL payments under the Swap Agreement triggers the deferral of payments to PECS holders. As a result, distribution of profits by Magnolia and MOL are also restricted (dividend blocker). If Magnolia is satisfied through Alternative Swap Payment Satisfaction Mechanisms then it (i) uses the proceeds to satisfy the PECS holders or (ii) increases the nominal value of PECS to satisfy PECS holders.
Extraordinary risk factor relating to Magnolia	Structural risk (special purpose vehicle, limited resources, unsecured obligations, limited recourse, non-petition and subordination). Limited recourse means that recourse of PECS holders is limited to the assets of Magnolia (that is, MOL shares) and therefore they are not entitled to file for insolvency proceedings if aggregate proceeds from disinvestment in MOL shares are insufficient to repay the principal amount of PECS.

Table 9.5 (Continued)

Extraordinary risk factor relating to PECS	(i) Perpetual, subordinated, no right of redemption for PECS holders, (ii) Coupon payments may be deferred and satisfied by way of Share Swap Payment Satisfaction (SSPS) and Payment in Kind Payment Satisfaction (PIKPS), and, if certain limits on SSPS and PIKPS are reached with respect to an Interest Period, further Deferred Amounts outstanding or arising during that Interest Period will be deemed to be satisfied, (iii) Magnolia relies solely on payments from MOL under the Swap Agreement to fund payments with respect to PECS.

Sources: [a]MOL Financial Statement 2006, p. 90.
[b]Magnolia Finance Limited 2013 Financial Statement, p. 13.

The described structure may be regarded as based on US trust-preferred securities, where a trust is formed by the issuer and possess only one asset: junior subordinated debenture of the issuer. Periodic interest paid on the debenture by the issuer is used by the trust to pay periodic dividends on the trust's preferred securities to the investors. This long-dated preferred stock is structured to achieve income tax deductibility for the interest payments in case the debt is issued to a conduit that issues the preferred stock to investors. In the MOL case analyzed above, however, unique conditions had to be taken into account that significantly affected the final structure of the Transaction.

First of all, the trust was not to possess MOL's junior debenture, but only its shares, as the transfer of treasury shares was the primary goal of the Transaction. Therefore, the trust could not have been formed by MOL, for in this case there would be no transfer of treasury shares at all: MOL would have held treasury shares indirectly. Therefore, treasury shares were transferred to an SPV independent from MOL, and held on a trust basis by anonymous shareholders who were also independent from MOL. These anonymous shareholders could file claims for all assets of the SPV (i.e. MOL treasury shares) under the call option.

Treasury shares were the sole asset of the SPV, so a natural choice was to replace issuance of the preferred stock by SPV with issuance of an exchangeable bond, where the underlying instrument was MOL treasury shares. Proceeds from the issue of exchangeable bonds would serve as remuneration for MOL treasury shares. However, it should be remembered that proceeds from the issue of bonds were in this case higher than the value of treasury shares transferred to SPV under the Share Purchase

Agreement, so a legal title to transfer the surplus to MOL must have been put in place. Simultaneously, cash flows for the bondholders had to come from MOL, as SPV was to serve only as an intermediary. Therefore, the Swap Agreement was constructed in place of a debenture in a US trust-preferred security structure, with the same economic effect: proceeds from the issue were transferred to MOL under the Share Purchase Agreement and Swap Agreement at the closing of the Transaction, while cash flow necessary for coupon satisfaction by SPV was obtained from MOL under the Swap Agreement. The US structure used subordinated debenture, so its replacement was also subordinated: MOL would satisfy the claims of the SPV under the Swap Agreement only after all senior creditors were satisfied. Here lies the heart of the subordinated character of PECS.

Another significant aspect of the bonds analyzed above is their perpetual maturity. This may be explained by reference to a US trust-preferred security structure, where the instrument is perpetual. What is more important, the analyzed structure embeds the synthetic maturity of a perpetual instrument. In fact, there are more than one such maturities. Broadly speaking, the perpetual maturity of PECS may be divided into three stages:

1. from March 20, 2006, to March 20, 2011, PECS may not be called by Magnolia, nor exchanged by PECS holders;
2. from March 20, 2011, to March 20, 2016 ('Exchange Period') PECS may be exchanged at the option of PECS holders for MOL treasury shares, but the exchange may be settled in cash at the option of Magnolia;
3. after March 20, 2016, PECS may be called by Magnolia and also the underlying shares may be repurchased by MOL.

Therefore, the first possible termination of the PECS may happen five years after the issue by means of exchange into MOL treasury shares. Such an exchange is economically rational if the market price of the underlying share is higher than the exchange price set out in the conditions of the issue. The price formation of MOL shares shows that PECS holders are very unlikely to exercise the Holder exchange option. The exchange price is fixed at HUF 26,670, while the maximum value of underlying shares since the beginning of the Exchange Period was around HUF 25,000 in 2011 and is consequently decreasing: from the beginning of 2014 it has dropped from HUF 14,500 to HUF 12,500 (Figure 9.1).

On the contrary, the end of the Exchange Period seems to be a far more realistic date of PECS' death – this time through redemption by Magnolia. From March 20, 2016 Magnolia is entitled to redeem PECS

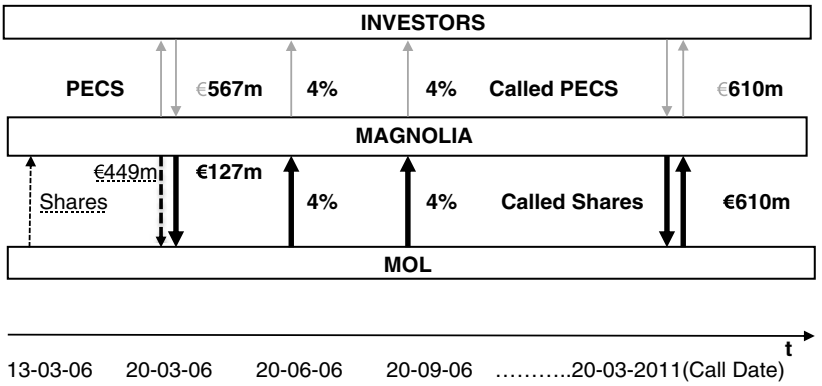


Figure 9.1 Transfers during no-call period: under PECS issue, under Shares Purchase Agreement and under Swap Agreement

at a nominal value, and from that date on, the coupon of the bond changes from a fixed (4% p.a.) to a floating (EURIBOR 3M + 5.5%[7]). Such a serious coupon step-up makes further existence of the PECS less attractive to MOL, so it is very likely that MOL will decide to redeem the PECS on that date. Simultaneously, the call option embedded in the Swap Agreement entitles MOL to repurchase treasury shares from Magnolia, and this option is exercisable from March 20, 2016. Therefore, it is expected that MOL will provide Magnolia with sources to redeem the PECS by means of share repurchase under the call option. Of course, the market price of MOL shares dropped significantly since the execution of the transaction, so proceeds from the transaction of shares repurchased by MOL will be not sufficient to finance the PECS redemption. However, the Swap Agreement sets out a mechanism applicable in that scenario: if the share price is less than €101.54 per on the day of repurchase, then MOL is obliged to pay the difference. The amount of €101.54 is equal to the value of the PECS issue (€610 m) divided by the number of shares transferred to Magnolia under the Share Purchase Agreement (6,007,479). Therefore, the position of PECS holders is secured: MOL will have to provide financing for redemption of PECS on March 20, 2016, or will have to pay a higher coupon from that date forward.

On the other hand, one must remember that the floating rate after the coupon step-up has been determined in a different interest rate environment. In March 2006 EURIBOR 3M was 2.82%, so a step-up corresponding to the one set out in the PECS conditions would actually double the coupon value (8.32% against 4%). Today, EURIBOR 3M

is only 0.0810%, so the contemplated coupon step-up would cause less harm to MOL. Of course, the value of the coupon would rise, but it would be still be lower than the coupon paid on senior unsecured bonds issued recently by MOL: €750 million on a 7-year senior bond issued in 2010 (5.875%) and a $500 million 10-year senior bond issued in 2012 (6.25%).

Finally, another unique feature of PECS must be taken into account: an additional coupon consisting of an MOL dividend. Treasury shares transferred to Magnolia are taken into account when considering the distribution of profits to shareholders. These profits are further distributed to PECS holders pro rata to their amount of PECS. This additional coupon may be regarded as paid on a non-cumulative basis (MOL has full discretion when distributing profit to its shareholders) and its value is not determined – it is set out by MOL each year. Therefore, the value of the additional coupon should be added to the coupon of 4% set out in the prospectus in order to calculate the final coupon paid by PECS. This value, however, is unknown, so it may be calculated only *ex post* on an individual basis with regard to each year. For example, in 2013 Magnolia's expense on the 'ordinary' coupon was €24.4 million (€610 million × 4%), and €9.34 million on an additional coupon. Therefore, the final value of the PECS coupon was higher than the 'nominal' value of 4%.

9.2.4. Post-Transaction arrangements

Following the Transaction, MOL held treasury shares representing about 1.3% of its registered capital. On April 11, 2006, MOL sold 1,404,217 Series 'A' shares to BNP on the BSE at a price of HUF 24,350 per share. The transaction amounted to HUF 34.2 billion (€129 million). Following that transaction, MOL owned only 578 Series 'C' MOL shares in the treasury, so its influence in MOL was close to zero.

On May 8, 2006, MOL exercised the call option under the Call Option Agreement and purchased 10,898,525 Series 'A' MOL shares from APV. The transaction was settled on the BSE on 29 May at a price of HUF 21,760 per share. The transaction amounted to HUF 237.1 billion (€908.4 m). Following that transaction, MOL owned 10,898,525 Series 'A' MOL shares in the treasury and 578 Series 'C' MOL shares, representing 10% of MOL's registered capital, which is the maximum amount permitted under Hungarian law. Eventually APV's stake in Magnolia dropped to 1.73%.

In November–December 2006, APV sold 1,893,424 'A' series MOL ordinary shares, representing 1.73% of MOL's share capital, in a domestic

public offering and a stock exchange auction at an average price of HUF 21,592 per share. After closing the transaction, APV kept one voting preference share and one ordinary share.

The underlying goal of the Transaction had been fulfilled.

9.2.5. Consequences and possible scenarios

- *Accounting* – MOL is entitled under the Swap Agreement to a call option to repurchase the treasury shares sold to Magnolia. The call option must be revaluated each year as a derivative financial instrument. A drop in the market value of underlying shares triggers a drop in the value of the derivative, and is shown in the financial statements of MOL.
- *Corporate* – Treasury shares are off limits when calculating voting rights and distributions to shareholders. Therefore, an increase in the number of treasury shares increases the final amount of a distribution to a shareholder. The Transaction enabled MOL to acquire the maximum number of treasury shares, thus maximizing shareholder profits.
- *Refinancing* – Will MOL call treasury shares at March 2016? The current number of treasury shares possessed by MOL is only 2.6%, so execution of a call option is permitted. As has already been demonstrated, it would maximize the profit of shareholders, as the final amount of distribution per shareholder would be increased. There are at least four possible scenarios:

  1. Magnolia will call PECS and MOL will have enough funds to finance this transaction;
  2. Magnolia will call PECS and MOL will refinance the transaction through the issue of a perpetual bond, similar to PECS but not exchangeable for MOL shares;
  3. Magnolia will call PECS and MOL will refinance the transaction through the issue of senior bonds;
  4. Magnolia will not call PECS and will pay a step-up coupon (EURIBOR 3M + 5.5%) and an additional coupon (dividends).

9.2.6. Securities lending

Shortly after the Transaction, MOL again bought back its own shares using a much less sophisticated mechanism to retain ownership of a number of its own shares within legal limits. A particular form of keeping assets away from the reach of the acquirer is the use of securities lending to keep shares in friendly hands. Such methods include the 'soft parking' strategy and lending to friendly investors. The soft parking

strategy is based on the use of the target company's own shares. The target company can lend its own shares to a friendly investor and hedge its risk by a swap agreement (Mäntysaari, 2010). MOL used the soft parking strategy when it defended itself against a hostile takeover by OMV, an Austrian oil and gas company. MOL could keep on buying its own shares regardless of the 10% cap,[8] because it lent most of its purchases to two Hungarian banks. Because a borrower of shares becomes a shareholder with full voting rights, the banks were free to use their shares to vote as they pleased. However, they had agreed not to sell them to a third party.

10
Issuing Hybrids

10.1. Decision of a competent corporate body

At the very beginning of CoCo issuance, all corporate consents will have to be granted. Without a doubt, it would be the management board's role to point out the necessity of raising regulatory capital. The detailed course of action will vary depending on national laws on corporate governance. Generally, we may recognize three scenarios: (i) the management board may solely decide to launch the issue, (ii) the management board will have to gain the supervisory board's approval, and (iii) the management board will have to gain shareholders' approval, by means of a general meeting resolution. The first scenario is most likely to happen in case of UK/US companies, where management boards have a lot of discretion on conducting their companies' business. In fact, these systems of corporate governance make no distinction between a management board and a supervisory board (two-tier board structure), incorporating a single (one-tier) board structure. In such a board, executive members are accountable for company management, while non-executive members are responsible for supervision (Mäntysaari, 2010). The second scenario is also very likely to happen in companies with a two-tier board structure, if the explicit consent of the supervisory board is required by provisions of national banking law or corporate law. In general, financial institutions in continental Europe will most probably have to gain shareholders' approval.

These scenarios are, however, very broad, and to discuss them in detail is beyond the scope of this study. Finally, we need to emphasize that all corporate governance systems give shareholders varying degrees of freedom with regard to determining the competencies of certain corporate bodies in the company statute. Some competencies are granted

to certain bodies by means of *ius cogens* – binding provisions of corporate law that may not be changed by shareholders. Other competencies are granted only by means of *ius dispositivi* – default rules that may be changed by shareholders. Therefore, the way each financial institution determines the exact corporate process of a CoCo issuance depends on its corporate governance system and company statutes.

10.2. Pre-emption right

The pre-emption right of shareholders to subscribe to shares of new issue in proportion to their stake in the company's registered capital is one of basic rights of shareholders. To be protected against dilution of their corporate rights (i.e. voting right, dividend claims, etc.), shareholders are equipped with the option to subscribe to new shares. European company law is very restrictive on that matter, and joint-stock companies in all EU member states must be governed by national corporate law in a manner that safeguards this right. In particular, the pre-emption right may not be generally excluded from company statues, and its exclusion has to be made on each individual issue, by means of resolutions taken at a meeting of shareholders. Usually, national company law requires such a resolution to be valid only when backed by some qualified majority of votes (i.e. 75%). Hence, the offering of new shares to a new shareholder versus a cash contribution would always require such a resolution to be taken. This matter has the most significant importance in the case of public offerings.

With regard to CRR, we have to say that the general regime of EU company law (*lex generali*) is waived by contingent conversion to equity mechanism (*lex speciali*). CRR explicitly sets out that conversion of CE CoCos is automatic and there is no room for any pre-emptive option for existing shareholders to acquire shares of new issue (resulting from the conversion). Hence, the CE CoCo mechanism is exempted from the pre-emptive right application. At present Pennacchi et al. (2014) propose a new form of contingent convertible: a call option enhanced reverse convertible (COERC) that would convert into new shares (just like CE CoCos), but existing shareholders would have the option to buy these shares at the bond's par value.

One may try to justify the exemption of the pre-emption right by saying that the by the time the CET1 ratio trigger is set off when a financial institution is weak and stressed, that shareholders simply will not be interested in executing their pre-emptive right, but this may not always be the case. In fact, it is believed that shareholders sometimes will be

more motivated to avoid CE trigger events than PWD trigger events, because they will be generally afraid of the dilution of their corporate rights, which – in the extreme scenario – may result in losing control of the financial institution. Besides, the pre-emption right is a marketable financial instrument. One solution would be to require the resolution of a CE CoCo issue to be supplemented with a resolution on the exclusion of the pre-emption rights of shareholders with regard to possible conversion of these CoCos into equity. However, taking into account the BRRD's contingent conversion provision, we would have to require such a resolution to be taken also with regard to all 'relevant capital instruments': PWD CoCos and even T2 financial instruments.[1] It seems that this dilemma has to be resolved on the basis of each nation's corporate law.

10.3. Admission to trading

Once all the relevant corporate bodies of the financial institution give their consent to a CoCo issue (and after the lawyers clear up all the uncertainty regarding the exclusion of pre-emption rights), the prospective issuer may start to structure the CoCo transaction. This process requires involvement of specialized consultants, legal firms and investment banks. A detailed discussion of this process is beyond the scope of this study. However, we have to emphasize the importance of one particular choice that will have to be made while preparing an issuance. Each issuer will have to decide whether to allow CoCos to be traded on a stock exchange (listed). The choice of a trading venue will have very serious consequences, both for the process of CoCo issuance, and in terms of the ongoing obligations of the issuer.

There are many factors that have to be taken into account when deciding on this matter. One of them is certainly the time factor: some types of offerings are exempted from requirement to produce a prospectus,[2] so the transaction may take place in a short time. If there are some especially good market conditions (momentum), the issuer will be tempted to make use of them, instead of waiting as the time-consuming process of prospectus approval is underway. This may be the case when discussing CoCo issuance: targeted investors are highly sophisticated institutional investors, and there is no need to discuss the issue with retail investors who are part of the general public. On the other hand, some of these investors may be required (by binding provisions of law or internal policy) to invest their financial resources only in listed securities. Identifying target investors is therefore of key importance, as their

preferences will indicate if the prospectus has to be published for the purpose of admitting CoCos to trading on a stock exchange.

Not surprisingly, taxes are another important factor in these considerations. If a CoCo is listed on a 'recognized stock exchange' (*inter alia*, London Main Market, London Professional Securities Market [PSM], Luxembourg Main Market, Luxembourg Euro MTF Market, Channel Islands Stock Exchange [CISX], New York Stock Exchange, etc.), UK issuers will be able to make use of the 'quoted Eurobond exemption' and pay the coupon on the CoCo free of withholding tax.

Other factors – fees and ongoing payment obligations – will depend on the nature of the trading venue, which is a European Economic Area (EEA) regulated market or a 'stock regulated market' (usually being a multilateral trading facility, MTF[3]). Admission of a CoCo to trading on an EEA regulated market will result in various obligations for the issuer (ongoing disclosure, dealing with inside information, and so on) that will be briefly discussed in the next sections. Some of the recognized stock exchanges are not regulated markets (*inter alia*, the London Stock Exchange's Professional Securities Market [PSM] and the Luxembourg Euro MTF Market), and therefore admission to trading in such a market will not require approval of the prospectus by the competent authority under the provisions of the Prospectus Directive. However, this does not mean that listing on such a trading venue will be free of ongoing obligations (in particular, ongoing disclosure). Such obligations will be based on the internal rules of each stock exchange and are rather less restrictive than the ones addressed to EEA regulated market issuers. Nevertheless, European securities law tends to treat trading on MTFs (and, recently, other trading venues as well) in the same manner as trading on a regular market. The next sections will present some basic guidance regarding issuers' obligations arising from the admission of financial hybrids to trading on an EEA regulated market or an MTF, as well as basic rules applying to such trading.

11
Public Offering and Admission to Trading

11.1. Overview

Obtaining information about the goods the one is about to acquire is necessary for each buyer to make a reasonable decision on the offer and its price. This applies also to all securities, including – of course – hybrids. Investors will require a written presentation on the terms of the security, the business and prospects of its issuer, and any risks attached to the security. In case of the latest generation of financial hybrid instruments being discussed, proper description of the risk attached to the security will be of key importance.

Such a presentation will be required for the first time when the issuer decides to offer the securities to the public or to admit them to trading on an EEA regular market. This obligation of the issuer regards initial disclosure, because no such disclosure was required before. In case of financial hybrids issuers, we may generally exclude scenarios where financial hybrids are the very first security offered to the public to be admitted to trading on an EEA market. All relevant financial institutions have some securities admitted to trading, at least on some of the most important debt markets (London or Luxembourg). Nevertheless, a prospectus will have to be prepared, although it will be easier, as its preparation will mostly require only an update of a previous Prospectus Directive (PD)-compliant prospectus.[1]

Of course, this one-time disclosure does not settle the matter of proper information for the investors entirely. The situation of the issuer, its business and prospects change with time, and so does the risk involved in investment. In case of financial hybrids, this risk can be measured from the financial fundaments of the issuer and – in case of AT1 instruments being subject to a CET1 ratio trigger – by 'distance to trigger'. Therefore, to enable investors to determine the changing price, the issuer must

provide disclosures on an ongoing basis. Any information on changes in the issuer's situation that have a significant effect on the market price of securities must be disclosed to the market promptly. These regulatory concepts are explicitly set out in PD Recitals 18 and 19.

However, the disclosure obligations must be weighted: they must be sufficient to provide protection for investors but they also must have some limitations. There is no enterprise in the market which would be willing to disclose all information determining its value. The reason is that such disclosure would become available not only to investors, but to competitors as well. Such unlimited disclosure may have a negative impact for investors, as competitors would use it to weaken the business advantages of the issuer and the final effect would be a decline in the value of the issued securities. Another factor which must be taken into account when determining what the issuer should disclose is the very purpose of the disclose obligation: enabling investors to determine the security price. This may happen only on the basis of the facts that are important, which may get hidden in a mass of unimportant details. Therefore, for the purposes of investors' analysis, disclosure documents should be short, clear and comprehensive. This leads to another difficulty: to be 'comprehensive', a disclosure need to include all information necessary to determine the price of the security. It is quite obvious that determining what information is necessary for that purpose and what is not is a gray area. The issuers may not want to expose themselves on a severe liability or breach any disclosure requirements, so they would rather sacrifice the document's clarity and brevity to provide comprehensive information.

11.2. Scope of the Prospectus Directive

Pursuant to Article 1 of the PD, its purpose is to harmonize requirements for the drawing up, approval and distributions of the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market situated or operating within a member state (PD Article 1). The key elements determining the scope of the Directives are defined in Article 2:

- 'Securities' means transferable securities as defined by Directive 93/22/EEC Article 1(4), with the exemption of money market instruments defined by Article 1(5) of the said act, having a maturity of less than 12 months (PD Article 2[1][a]). This means that the Directive is to govern: shares in companies (and other securities equivalent

to such) as well as bonds and other forms of securitized debt which are negotiable on a capital market, and any other securities normally dealt in giving the right to acquire any such transferable securities by subscription or exchange or giving rise to cash settlement, except for the instruments of payment. Further conclusions are that the Prospectus Directive does not apply to offers of non-transferable securities (Burn, 2010), and that it sets the 12 month maturity period as a borderline for its application to the money-market instruments. Given the perpetual maturity of AT1 CoCos and fact that T2 hybrids are required to have a maturity of at least 5 years, we may conclude that these instruments are governed by the provisions of the PD, as they obviously qualify as 'securities'.

- Defining the 'offer of securities to the public' is of crucial importance. Pursuant to PD Article 2(1)(d) it means a communication, directly or through financial intermediaries, to persons in any form and by any means, presenting sufficient information on the terms of the offer and the securities to be offered, so as to enable an investor to decide to purchase or subscribe to these securities.
- Just as with 'securities', the definition of a 'regulated market' is also taken from Directive 93/22/EEC. Therefore, the main characteristics of a 'regulated market' are regular trade, the rules of this trade are governed by the regulations issued by a competent authority, and these rules impose reporting and transparency requirements compliant with the EU standards laid down pursuant to Directive 93/22/EEC Articles 20 and 21. It is also worth remembering that member states should provide a list of regular markets, so even if a given market meets the aforementioned criteria, it may not be considered a 'regulated market' unless a member state confirms it.

Besides, PD Article 1(2) sets a list of issuers or issues which fall outside the scope of the Directive. For the purpose of bond legislation analysis, the most important exemptions would be: non-equity securities issued by a member state, its regional or local authorities, public international bodies of which at least one member is a member states, the ECB or the central banks of member states, securities (both equity and non-equity ones) unconditionally and irrevocably guaranteed by a member state or its regional or local authorities and, finally, non-equity securities covered by a deposit guarantee scheme under Directive 94/19/EEC. Also all offers with a total consideration below €5 million (calculated over 12 months) will fall out of the scope of the Directive. The last important exemption is for non-equity securities issued in a continuous or

repeated manner by a credit institution, provided that (i) the total consideration of the offer, calculated over a period of 12 months, is less than €75 million, (ii) the securities are not subordinated, convertible or exchangeable and (iii) they do not give the right to subscribe or acquire other types of securities and are not linked to a derivative instrument. It must be also stressed that in most of these cases the issuer or the person asking for admission to trading on a regulated market may submit themselves voluntarily to the PD regime (PD Article 1[3]).

None of these exemptions will refer to the CRR financial hybrids discussed. It will be demonstrated in section 11.3 that for the purpose of the PD, these instruments fall within the category of non-equity instruments. Again, some doubts may arise as to whether CE CoCos should be qualified as convertible debt. It is beyond any doubt, however, that all financial hybrids must be subordinated instruments.

11.3. Financial hybrids as 'non-equity securities'

Under the PD, securities may be either equity or non-equity. 'Equity securities' are defined as '*shares and other transferable securities equivalent to shares in companies, as well as any other type of transferable securities giving the right to acquire any of the aforementioned securities as a consequence of their being converted or the rights conferred by them being exercised* (. . .)'. 'Non-equity securities' are simply all securities that are not 'equity securities'. Again, we must remember the discussion on treatment of CE CoCos under BRRD.[2] Although the PD is not able to recognize CE CoCos (merely because of chronology), its meaning is clear: debt instruments that incorporate the holder's option ('the right') to acquire equity or convert to equity, should be treated as equity securities. Therefore, there is no room for any doubt that CE CoCos – free of such a mechanism – should be treated as non-equity securities. As a result, all CRR hybrids are such instruments for the purpose of PD. However, it will be demonstrated that CoCos, as so-called 'derivative securities', are subject to a special disclosure regime.[3]

11.4. Obligation to publish a prospectus

This obligation is a crucial requirement imposed on an issuer who offers securities to the public (PD Article 3[1]) or asks for them to be admitted to trading on a regulated market (PD Article 3[3]). Production of a prospectus will always be an expensive and time-consuming requirement, so without it the costs of transaction are reduced and transactions may be

closed faster. It is necessary to examine when the issuer of debt securities may be exempted from the obligation to publish a prospectus. The obligation shall not apply to types of offer set out in PD Article 3(2):

(a) *Offers addressed solely to 'qualified investors'*, defined in PD Article 2(1)(e), who may well be referred to as 'professionals' (Casey and Lannoo, 2005). This exemption is used frequently, as the Eurobond market is predominantly an institutional investor market, although some European jurisdictions (like Germany) have well-developed domestic retail markets (Trapnell, 2010). What is particularly interesting is that the UK's Financial Conduct Authority has already executed its temporary product intervention measures and prohibited CoCos to be sold to retail investors, with effect until October 1, 2015 (FCA, 2014).
(b) *Offers addressed to fewer than 150 persons per Member State, other than qualified investors*.
(c) *Offers addressed to investors whose investment is of at least €100,000*.
(d) *Offers of securities whose denomination per unit is of at least €100,000*. This exemption, although formally applicable both to equity and debt (non-equity) securities, would have a lot more importance when it comes to debt securities, which may frequently have denominations of such amounts. On the contrary, equity securities usually have a significantly lower denomination to attract 'true retail' investors. CRR financial hybrids (and AT1 CoCos in particular) are designed to attract most sophisticated, qualified (professional) investors, and therefore it seems that this exemption would be the one most frequently used when issuing hybrids (provided, of course, that no admission to trading on a regulated market is applied for).
(e) *Offers of securities with a total consideration of less than €100,000* (calculated over a period of 12 months).

It must be remembered that if any offering under these exemptions is subject to a subsequent resale, PD Article 3(2) requires this resale to be regarded as a separate offer for the purposes of determination if it constitutes a public offering within the meaning of PD Article 2(1)(d). It is also explicitly set out that the placement of securities through financial intermediaries will also require the publication of a prospectus, unless any of the exemptions set out in PD Article 5(2)(a)–(e) apply. These rules are necessary, for without them, issuers could easily circumvent the obligation to publish a prospectus by offering the securities to less than 150 underwriters or dealers. The PD recognizes the nature of 'retail cascades' and financial intermediaries involved in it, so it 'passes through' these

intermediaries, focusing on the number of final investors and not the number of intermediaries, which is irrelevant when determining the appropriate investor protection level.

To determine the final scope of the obligation to publish a prospectus, one would also have to take into account all of the exemptions set out in PD Article 4. This Article contains a list of exemptions from the subject obligation with regard to its second trigger, admission to trading on a regulated market. However, these exemptions either regard 'shares' explicitly or refer to securities offered in connection with takeovers by means of an exchange offer, with a merger securities to be allotted in motivation programs. For the purpose of an offering of hybrid debt securities, these exemptions would not apply, so their further examination may be omitted.

As a result, we may conclude that issuer of financial hybrids is granted an opportunity to carry out the transaction as a private placement and be not obliged to produce a prospectus, while admission to trading on regulated market would always require compliance with that obligation.

11.5. Stand-alone issue versus debt program

A unique feature of debt securities is that they may be issued not only on a stand-alone basis (like equity securities do) but also under the offering program: a plan which permits the issuance of non-equity securities, including warrants in any form, having a similar type and/or class, in a continuous or repeated manner during a specified issuing period (PD Article 2[1][k]). This definition refers to (non-equity) '*securities issued in a continuous or repeated manner*' that are defined as issues on tap or at least two separate issues of securities of a similar type and/or class over a period of 12 months (PD Article 2[1][l]). Under Basel II, hybrid capital instruments were among the most frequent examples of stand-alone issues, along with convertible and exchangeable bonds that were qualified as 'equity securities'. However, financial institutions also have developed programs enabling them to issue Basel II hybrids (Trapnell, 2010). Again, it must be taken into account that Basel II hybrids were not CoCos, so there were no doubt as to whether they may be qualified as non-equity securities (as in case of convertibles and exchangeable bonds).

11.6. Responsibility attached to prospectus

One of the regulatory purposes of the Prospectus Directive, expressed in Recital (10) is to '*ensure investor protection and market efficiency*'. In order

to make this protection reliable, PD Article 6(1) imposes an obligation on member states to ensure that at least the issuer or its administrative, management or supervisory bodies, as well as the offeror, the person asking for admission to trading on a regulated market or the guarantor are held responsible for the information given in a prospectus. Measures to avoid any anonymity are in place, as persons responsible shall be clearly identified in the prospectus by their names and functions. These persons, either natural or legal, shall include in the prospectus declarations that to the best of their knowledge, the information contained in the prospectus is in accordance with facts and that the prospectus makes no omission likely to affect its import. Furthermore, member states are obliged to ensure that their laws, regulation and administrative provisions on civil liability apply to persons responsible for the information given in a prospectus.

Reference to the national regulations on civil liability leaves no doubt that there is no attempt to impose a harmonized regime of civil liability under the Prospectus Directive. As a result, the cross-border offerings are linked with a risk of a multijurisdictional litigation in case of errors (or just allegations of errors) in the prospectus. Costs of such litigation may be considerable as well as time-consuming for the issuer and financial intermediaries involved (Burn, 2010). Pursuant to PD Article 6(3), the only exemption from this severe liability is granted to claims arising from investment decisions undertaken solely on the basis of the summary of the prospectus.

When discussing financial hybrids, one may make an attempt to identify areas of prospectuses that should be prepared with particular care. Quite obviously, it would be areas of specific risks attached to AT1 instruments: perpetuity, deferral and subordination (the last two are applicable to T2 instruments also). Furthermore, contingent conversion risk will have to be disclosed to the public. To assess this risk of a CET1 ratio trigger occurrence, investors must be given precise information on the current capital ratio of the issuer. Besides, risk attached to special treatment of AT1 and T2 instruments (relevant capital instruments) in the BRRD bail-in tool also has to be disclosed as some sort of unique regulatory risk.

11.7. Disclosure requirements

11.7.1. Basic disclosure standard

The Prospectus Directive provides three levels of provisions governing the content of the prospectus and scope of information required to be

disclosed. The first level provision establishes a broad and generic disclosure standard (Burn, 2010): all information necessary to enable investors to make an informed assessment of the assets and liabilities, financial position, profit and losses, and prospects of the issuer (or any guarantor), and of the rights attached to securities contemplated in the prospectus. The scope of information should take into account the particular nature of the issuer or of the contemplated securities, and the information itself should be presented in '*an easily analyzable and comprehensible form*' (PD Article 5[1]). In the context of financial hybrids, the scope of information should reflect both the nature of the financial institution and – even more importantly – the hybrid nature of the issued instruments and their specific risks, mentioned in section 11.7.2.

11.7.2. Criteria of requirements differentiation

It is rather obvious that the aforementioned standard is only a template which will require further detailed requirements that are less generalized and that reflect the nature of the securities contemplated in the prospectus. First of all, these requirements will differ on the type of securities: the main distinction here is, of course, between equity and non-equity securities. However, a closer look at this provision reveals the existence of a third category: '*securities which have a similar economic rationale,* (with equity securities) *notably derivative securities*' (PD Article 7[2][a]). This class of securities is not defined in the Prospectus Directive, but Prospectus Regulation[4] (PR) Recital 11 helpfully states that '*some debt securities such as structured bonds incorporate certain elements of a derivative security, therefore additional disclosure requirements related to the derivative component in the interest payment should be included in the securities note schedule for debt securities*'. Therefore, securities that incorporate a derivative should be recognized as 'derivative securities' and their specific nature should be reflected in the specific scope of disclosure requirements. According to European Securities and Markets Authority (ESMA) draft guidelines on complex securities and structured deposits, issued for the purpose of MiFID II,[5] CoCos should be considered as incorporating a derivative (mostly because of EC or PWD mechanisms). Hence, all AT1 CoCos will be governed by the PD legal regime applicable to derivative securities. The same will apply to T2 instruments voluntarily structured as CoCos, while 'conventional' T2 instruments, not incorporating CE or PWD mechanisms will be governed by PD provisions applicable to non-equity securities.

As mentioned above, the obligation to publish a prospectus will apply to (i) the admission of the debt securities to trading on a regulated market and/or (ii) the offer to the public of debt securities which have a

denomination of less than €100,000. This regime, referred to as a 'retail offering', imposes a restrictive investor protection. On the contrary, a 'wholesale offering' will not require the publication of a prospectus. The wholesale offering regime will apply where (i) there is no request for admission of the debt securities to trading on a regulated market and (ii) debt securities which have a denomination of at least €100,000 are offered to the public. Therefore, every admission of debt securities to trading on a regulated market will require compliance with the retail offering regime, while the regime of the public offerings will vary depending on whether the denomination of the issued debt security is less than €100,000 (retail offerings) or not (wholesale offerings). Actually, one can also distinguish a third regime, applicable to debt securities with a denomination below €1,000, which is slightly more restrictive than even the retail offering regime. Finally, some offerings may be regarded as placed somehow in between the retail and wholesale regime: where (i) admission of the debt securities to trading on a regulated market is requested but (ii) debt securities have a denomination of at least €100,000. In such case, the retail regime will generally apply, but it will be less stringent with regard to the summary of a prospectus. Taking into account the typical denomination of financial hybrids (at least €100,000) and the fact that they are usually listed on regulated markets, one may point out that these instruments will be governed by this last regime.

A third distinction as to the detailed scope of prospectus is based on whether it contemplates a single, stand-alone issue or an offering program (PD Article 7[2][c]). The last distinction regards a special type of non-equity securities issued by a financial institution in a continuous or repeated manner. These securities are 'plain vanilla': not subordinated, convertible, exchangeable, subject to subscription or acquisition rights or linked to derivative instrument (PD Article 7[2][d]). It goes without saying that this regime will not apply to any of the financial hybrids discussed.

As a result, in most cases the detailed scope of minimum disclosure requirements related to the issue of financial hybrids will be set out in PR Annex IV (debt and derivative securities registration document) or Annex XII (securities note for derivative securities).

11.7.3. Financial information contained in prospectus

The importance of financial information is rather obvious, and all issuers have to provide investors with some financial information for the purpose of a debt issue. The importance of financial information provided by an issuer of financial hybrids is even more striking, in particular for

the purposes of 'distance to trigger' assessment. The detailed scope of that information will vary, depending on the offering regime and on the country of the issuers' incorporation.

Virtually all CRR hybrid offerings cover admission to trading on a regulated market and therefore fall within the scope of retail offerings (with the slight liberalization of prospectus summary requirements mentioned earlier). Hence, the issuer will have to provide (usually by means of incorporation by reference) audited historical financial information covering the last two financial years, together with audit reports for each year (PR Annex IV [13] and Annex IX [11]). The financial information must be as current as possible, so the last year of audited financial information included in the prospectus may not be older than 18 months from the date of the prospectus (PR Annex IV [13.4] and Annex IX [11.4]).

Another factor determining the nature of the financial information included in the prospectus is whether the issuer is incorporated in a EU member state or in a 'third country'. IAS Regulation will be applied to EU issuers, and so the financial information will have to be prepared and audited in accordance with international accounting standards (IAS or IFRS).

Many financial institutions from third countries decide to list their Basel III financial hybrids on the most recognized debt markets – London and Luxembourg. This results in the need to comply with European securities laws, in this particular case with the retail offering regime. In such cases, the relevant financial information would have to be prepared in accordance with IAS/IFRS or equivalent standards of the third country, while in case of wholesale offerings, it may also be prepared in accordance with the national accounting standards of the third country, even if they are not equivalent to IAS/IFRS. However, the differences between these standards and IAS/IFRS must be explicitly stated in the prospectus, as specified in the PR Annex IX (11.1). Of course, this raises the very important question of when national accounting standards (General Accepted Accounting Principles or GAAP) of the third country may be considered equivalent to IAS/IFRS.

12
Regular and Timely Ongoing Disclosure

12.1. Overview

The previous chapter demonstrated how the information provided under the Prospectus Directive is used to determine the risk connected with offered securities and, consequently, their price. Only if investors possess such information will they be able to make a decision on the purchase of securities. Once investors purchase a financial hybrid, the issuer raises regulatory capital. With that, the role of the primary market in the process of raising capital is done. Some investors may be willing to keep the debt securities on their accounts until the securities mature (or, in case of perpetual hybrids, until the first call date), collecting coupon payments and waiting for the principal to be repaid (called). However, it would be impossible to raise capital without granting investors the ability to sell their securities. The existence of the secondary market is necessary for the effective operation of the primary market. That is especially true when discussing the equity market, because debt securities are traditionally considered more of a buy and hold investment, so the debt market is less liquid than the equity market. In the case of financial hybrids, recent RBS surveys demonstrate that the liquidity of the instrument is also taken into account by investors. However, we need to note that CoCo investors pay relatively little attention to past volatility of liquidity. Instead, they tend to focus on (i) the fundamentals of the issuing financial institution, (ii) the distance from the trigger point and (iii) the risk of coupon deferral and type of conversion (RBS, May 2014).

Although the issuer's CoCo operations in the secondary market bring no monetary benefit to the issuing bank, the issuer will be obliged to provide investors with information enabling them to determine the price of CoCos on an ongoing basis. Only if such a facility is established

can trade be pursued constantly while the secondary market plays its role, increasing the efficiency of the primary market.

For this purpose, regular reports must be provided by the issuer, especially financial statements. It is of crucial importance not only to assure the market on what information will be disclosed by the issuer, but also to assure it that this information will be presented in the proper form. In other words, an unconsolidated stream of information will do investors no good as they will be unable to analyze it. Therefore, information for investors must be consolidated.

The Transparency Directive establishes a mechanism of reporting on a regular, 'routine' basis. The vital importance of disclosure to the market requires the disclosure regime to be consistent and efficient. Efficiency may be achieved only when any event that may affect the market price of the security is disclosed to the market immediately. Therefore, this 'disclosure continuum' also requires a third element: disclosure of price-determining events occurring after the publication of a prospectus on a non-routine basis – information that cannot be publicly disclosed. This third element, regarding a timely ongoing disclosure (or 'ad hoc' disclosure) regime is regulated under Directive 2003/6/EC (Market Abuse Directive or MAD).

12.2. Transparency Directive

12.2.1. Financial reports

The Transparency Directive[1] (TD) establishes requirements on periodic and ongoing information about issuers whose securities are already admitted to trading on a regulated market situated or operating within a member state (TD Article 1[1]). That means that the Transparency Directive applies to securities defined in the Market in Financial Instruments Directive[2] (MiFID), including debt securities and equity securities (MiFID Article 4[1][18]), but not money-market instruments (TD Article 2[1][a]). Financial hybrids also fall within the broad category of 'securities' under MiFiD. Therefore, issuers of financial hybrids will be obliged to make public their annual financial reports (TD Article 4[1]). Moreover, issuers of shares and debt securities are also obliged to publish semi-annual financial reports (TD Article 5[1]). However, a closer analysis of the TD's definition of 'debt securities' yields surprising results. For the purposes of the Transparency Directive, debt securities are defined as '*bonds or other forms of transferable securitized debt, with the exception of securities which are equivalent to shares in companies or which, if converted or if the rights conferred by them are exercised, give rise a right to acquire shares*

or securities equivalent to shares' (TD Article 2[1][b]). Such a narrow definition of debt securities means that issuers of convertible debt securities admitted to trading on the regulated market are not obliged to publish semi-annual financial reports. However, it is very unlikely that the issuer of listed convertibles has no shares already listed on an EEA regulated market, so these issuers are obliged to publish semi-annual reports anyhow. It seems that this conclusion would also apply to CoCo issuers, as virtually all CoCo issuers are listed companies.

However, this conclusion will not apply to issuers of convertibles from third-country locations that have shares admitted to trading on a regulated market, when that market is their national one, not an EEA regulated market. This may be the case when discussing CoCos, as a number of financial institutions listed on the non-EEA regulated market admit CoCos to trading on the EEA regulated market. Therefore, questions as to whether CoCos fall within the definition of 'debt securities' set out in TD Article 2(1)(b) have to be answered. For simplicity reasons, we assume that all such instruments will incorporate a contingent conversion mechanism as required by Basel III.

First, we must address the question of CE CoCos, being subject to a regulatory capital trigger under the CRR. Here, we have to stress that 'convertible exempt' from the definition of debt securities applies only to instruments that '*give rise to right to acquire shares or securities equivalent to shares*'. In the case of a CE CoCo, there is obviously no such right for a bondholder: conversion is contingent and occurs automatically. In other words, the holder of a CoCo is not involved in the process of contingent conversion. Bearing in mind that no exemption may be interpreted extensively (*exceptiones non sunt extendendae*), we may conclude that CE CoCos are not exempted from the category of 'debt securities' under the analyzed definition.

The same applies to PWD AT1 CoCos and T2 instruments that may be subject to contingent conversion under BRRD. Financial hybrids issued by third-country issuers will most likely be subject to some national tool equivalent (or something similar) to the BRRD's bail-in tool. As a result, these instruments will be subject to regulatory conversion by a competent authority, such as the non-EEA resolution authority equivalent body, and such conversions will take place regardless of any consent of the bondholders. In other words, holders of CoCos will not be granted any 'option' or 'right' to convert their CoCo to common shares.

Hence, CoCo issuers who have their shares admitted to the regulated EEA market will have to publish both annual and semi-annual financial reports, while those who have not will be required to publish only annual reports.

12.2.2. Ongoing information

The issuer of debt securities admitted to trading on a regulated market shall ensure that all holders of debt securities ranking pari passu are given equal treatment with respect to all the rights attaching to those debt securities (TD Article 18[1]). The issuer must also ensure that holders of debt securities have all the facilities and information to exercise their rights, including voting at meetings of holders through electronic means (TD Article 18[2]). Holders must also be able to exercise their rights by proxy and be given any information concerning the place, time and agenda of meetings of debt securities holders (as well as other material facts, such as payment of interest and so on). The meeting may take place in any member state, provided that the denomination per unit of the debt securities whose holders are to be invited to a meeting amounts to at least €100,000 (TD Article 18[3]). When choosing the venue of the meeting, the issuer will have to remember that the meeting may take place only in member states where facilities and information necessary to enable holders of debt securities to exercise their rights are made available under national law.

12.2.3. Regulated information

The Transparency Directive sets out requirements regarding disclosure of 'regulated information', defined in TD Article 2(1)(k) as '*all information which the issuer (or any other person who has applied for the admission of securities to trading on a regulated market without the issuer's consent) is required to disclose under Transparency Directive, Article 6 of the Market Abuse Directive or under the laws, regulations and or administrative provisions adopted by the Member State under TD Article 3(1)*'. Member states shall ensure that any individual referred to in the definition of 'regulated information' is obliged to disclose such information '*in a manner ensuring fast access to such information on a non-discriminatory basis and makes it available to the officially appointed mechanism (. . .)*', without any charge to investors (TD Article 21[1]). Member states are also obliged under TD Article 21(2) to ensure that there is at least one such officially appointed mechanism for the central storage of regulated information, that should comply with minimum quality standards of security, certainty as to the information source, time recording and easy access by the end issuers (i.e. investors). The Commission shall specify these minimum standards, as well as the minimum standards for the dissemination of regulated information by the issuer.

These requirements have an even wider scope with regard to third-country issuers, where the competent authority of the 'home member

state' is required under TD Article 23(3) to ensure that information disclosed in a third country, '*which may be of importance to the public of the Community*' is disclosed in the aforementioned manner, even if such information is not 'regulated information' within the meaning of TD Article 2(1)(k).

12.3. Market Abuse Directive

The core regulation on 'keeping the market clean' is contained in the Market Abuse Directive and its implementing measures. The primary aim of that regulation package is investor protection, while establishment of uniform, timely ongoing disclosure requirements is believed to be only a secondary aim. However, it is virtually impossible to protect investors against unlawful use of inside information without establishing clear rules on the disclosure of such information. Detailed discussion about the requirements regarding dealing with inside information is beyond the scope of this study. We assume that most of the CoCo issuers have their shares or debt instruments listed on the EEA regulated market, so they are subject to that regime already.

13
Financial Intermediation

13.1. Overview

Legislation on protection of investors against wrongful actions of financial intermediaries is considered to be one of the most important elements of EU securities law. Central to this protection are requirements and rules of conduct set out in Market in Financial Instruments Directive (MiFID). The main objectives of MiFID are to increase consumer protection, transparency and competition in financial services, to raise the effectiveness of regulatory cooperation and to establish a regulation based on principles of conduct (Skinner, 2007). In order to achieve these goals, MiFID brought 'maximum harmonization' to the markets, closing all the loopholes that were left open under the previous legal regime, which concentrated on rule of 'minimum harmonization and mutual recognition'.

As a part of its reaction to the financial crisis of 2008, which exposed weaknesses in the transparency of financial markets, the EC decided to review MiFID. The new regulatory regime aimed to establish uniform requirements for transactions in markets for financial instruments. The goal of the 'single rule book' was to eliminate inconsistencies between national legislation of member states and eliminate opportunities for regulatory arbitrage. The necessity of uniformity requires the use of a directly applicable legal act – an EC regulation – that will establish a single set of rules for all institutions, enhancing legal certainty and decreasing regulatory complexity. The MiFID regime emphasized the necessity of transparency with regard to trading in shares, but left other markets outside the scope of some transparency requirements. The financial crisis shows the necessity of introducing an appropriate level of transparency in markets for bonds, structured finance products (including asset-backed securities) and derivatives, in order to help the valuation of products

and support greater efficiencies in the price-formation process (Markets in Financial Instruments Regulation[1] (MiFIR) Recital 15). Although CoCos are not explicitly mentioned, it will be demonstrated that financial hybrids are among the complex debt instruments the EC considers as requiring special treatment in the context of trading and investor protection.

The new regime should also address the proper regulation of all organized venues of trade, including trading systems that were not adequately regulated under MiFID. MiFIR and MiFID II were published in the Official Journal of the EU on June 12, 2014. MiFID II[2] rules should be transposed into national legal systems by January 3, 2017,[3] on which day MiFIR will also take effect. Delegated acts are to be adopted by the EC in 2015, similar to the final regulatory technical standards sent by ESMA in September 2015 to the EC for endorsement. ESMA has also to submit implementing technical standards in 2016.

Both MiFID and MiFID II/MiFIR cover broad regulatory areas that significantly exceed the subject matter of this study. Hence, the following sections will briefly discuss only those topics that are particularly relevant in the context of financial hybrids trading.

13.2. MiFID

13.2.1. Scope of MiFID

Broadly speaking, MiFID had to establish a comprehensive regulatory regime governing the execution of transaction in financial instruments irrespective of the trading methods used to conclude those transactions (MiFID Recital 5). These trading methods are mainly the trading venue on which trading is executed. One of the most significant changes introduced by MiFID was bringing an end to the 'concentration rule' and imposing some level of regulation on trading platforms that are not regulated markets. MiFID recognized two types of such platforms: MTFs and 'systematic internalizers' (SI). MTF is a multilateral system operated by a market operator, which brings together buying and selling interests in accordance with non-discretionary rules (MiFID Article 4[1][13]). Imposing regulations on MTFs had particular importance for trading in debt. The pre-MiFID 'concentration rule' applied only to trading in equity, so there were no obstacles to the development of markets for trading in debt, usually run by the stock exchanges (often by those which were regulated markets themselves) on the basis of internal regulations imposed by those stock exchanges. Proper functioning of these 'stock regulated markets' and increasing number of off-exchange trading in equity securities has led to the abolishment of the 'concentration

rule' in exchange for imposing some level of regulation on 'stock regulated markets'. Under MiFID, such markets may trade in equity and debt securities, provided that their market makers comply with requirements set out for MTFs.[4]

Systematic internalizers are investment firms which, on an organized, frequent and systematic basis, deal on their own accounts by executing client orders outside a regulated market or an MTF (MiFID Article 4[1][7]). Many traders and brokers have omitted trading in regulated markets simply by off-exchange trading in their own book of business. In fact, these investment firms (usually investment banks) were market makers themselves in the process of OTC internalization: they held large blocks of trading instruments internally and traded them 'internally' with their clients. The regulator did not supervise such trading, and banks had more discretionary powers on the terms of the trade: they could simply provide better prices for their preferred clients. Imposing regulation on such internalized trading in equity was one of the core attempts of MiFID, and it was investment banks that were to be affected by this regulation (Skinner, 2007).

13.2.2. Financial hybrids under MiFID

Trading in 'transferable securities' is the main subject of MiFID, provided that such trading takes place on one of the aforementioned trading venues. 'Transferable securities' are defined very broadly as those classes of securities that are negotiable on the capital market, with the exception of instruments of payment (MiFID Article 4[18]). This definitions also provides some examples of such securities: (i) shares in companies and other securities equivalent to shares in companies, partnerships or other entities, and depositary receipts in respect of shares, (ii) bonds or other forms of securitized debt, including depositary receipts in respect of such securities and finally (iii) any other securities giving the right to acquire or sell any such transferable securities or giving rise to cash settlement determined by reference to transferable securities, currencies, interest rates or yields, commodities, or other indices or measures. We may classify these categories as shares, debt securities and securities that embed a derivative. Again, we have to note that some doubt may arise as to whether CoCos would qualify as 'simple' debt securities or rather as securities that embed a derivative. The latter option would certainly apply to 'conventional' securities, while CoCos lack the element of 'right to acquire or sell' an underlying instrument (common equity of issuer). However, it must be remembered that the definition of 'transferable securities' was set out before the development of financial hybrids

and simply does not recognize such complex instruments as CoCos. It has already been mentioned that recent ESMA guidelines consider the CoCo as an excessively complex financial instrument that embeds a derivative. Taking into account the very purpose of MiFID, we have to conclude that it would be counterintuitive to qualify a 'conventional' convertible security as a more complex, derivative-like instrument than a CoCo only because of the definitions that were set out before the first CoCos prototypes were issued.

13.2.3. Client classification under MiFID

Investment firms are obliged to perform a 'client classification' at the very starting point of a business, according to MiFID Article 19(5). The outcome of this assessment, which may be described as suitability testing or appropriateness testing, will determine the rules of conduct that investment clients must comply with during any business with that particular client. This approach is a consequence of the presumption that investors may be divided into some generalized types, and those who fall within one type have more sophisticated knowledge of the financial market than the others. Therefore, various investors require various levels of protection in the market.

MiFID rules classify a customer as a 'professional client', a 'retail client' or an 'eligible counterparty'. Professional clients are specifically listed in the MiFID. These are financial firms, hedge funds and corporate entities that meet at least two of three financial criteria: (i) net turnover of €40 million, (ii) total assets of €20 million and (iii) own funds of €2 million (MiFID Annex 2). These clients possess the experience, knowledge and expertise to make investment decisions on their own and to properly assess the risk associated with those decisions. Retail clients are clients that are not professional clients (MiFID Article 4[1][12]). Eligible counterparties are a subset of professional clients, which comprise various financial institutions and central government public bodies (MiFID Article 24[2]). Every eligible counterparty is subsequently a professional client, while only some professional clients are subsequently eligible counterparties, and under no condition may a retail client be an eligible counterparty. These categories are only an attempt to generalize the investors, and may be subject to changes between an investment firm and its client. Requiring fixed business relations could have counterproductive effects and therefore necessitates some flexibility. A mutual agreement is a cornerstone of this flexibility. No client is allowed to make a decision on change of category on its own. On the other hand, a professional client may request investment firms to re-classify him as a

retail one (opt-down), while a retail client may 'opt up' to a professional client status, provided that certain conditions are met. The same applies to the 'opt-downs' of professional clients and eligible counterparties. An eligible counterparty may also ask to be treated as a retail investor, but the reverse request is impossible: a retail client may not be treated as an eligible counterparty even on its request.

The above-described categorization is important in the context of trading in CoCos. It has already been mentioned that the FCA temporarily banned any offering of CoCos to retail investors, and currently it seems that this prohibition will be made permanent. Here, we have to stress that the determination of client categories by means of an 'appropriateness test' may be omitted by an investment firm, provided that conditions set out in MiFID Article 19(6) are met. However, application of this provision is explicitly excluded in case of 'bonds and securitized debt that embed a derivative'. If 'conventional' convertibles are to be deemed as such, then certainly 'contingent' convertibles should also be qualified as bonds that embed a derivative.

13.2.4. Conclusions

In the most common cases, CoCos are admitted to trading on an EEA regulated market or MTF (stock regulated exchange), and therefore, financial intermediaries involved in such trading will have to comply with MiFID rules. Taking into account the FCA prohibition on offering CoCos to retail investors, and warnings on the risks involved in CoCo investment issued by ESMA, one may expect that only professional investors and eligible counterparties will be investors in CoCos. This thesis is actually backed by market evidence, which shows that investment funds and hedge funds, together with financial institutions, account for more than 95% of CoCo investors (RBS, April 2014).

We will look at some of the general requirements that financial intermediaries will have to meet during CoCo trading. First of all, financial intermediaries need to act honestly, fairly and professionally, while working to represent the best interests of their clients (MiFID Article 19[1]). This requirement is supplemented with more detailed rules when necessary, such as inducement practices (Directive 2006/73/EC Article 26) and, in case of an investment firm, carrying out portfolio management and reception and transmission of client orders (Directive 2006/73/EC Article 45). In these cases, particular actions conducted by investment firms are explicitly presumed to be unfair, not honest and against the best interests of their clients. Information provided by investment firms to clients must be fair, clear and not misleading, while marketing

communication must be clearly identified as such (MiFID Article 19[2], Directive 2006/73/EC Article 27). Under MiFID Article 19(3), investment firms will have to provide clients appropriate information on, inter alia, financial instruments, proposed investment strategies and costs and associated charges. This should include appropriate guidance and warnings about associated risk that would enable the client to make investment decisions on an informed basis. It seems that the last requirement will have the most significant influence in the matter of CoCo trading. In addition, portfolio managers and financial advisers will have to conduct a 'suitability test' (MiFID Article 19[4]) while firms providing investment services will have to undergo an 'appropriateness test'. The aim of these tests is to obtain information on clients' financial knowledge and experience in the investment field and to recommend suitable investment services and financial instruments. It has already been discussed that CoCos should be exempted from the general allowance for the omission of the 'appropriateness test'.

Finally, when executing orders from clients, investment firms are required to take all reasonable steps to obtain the best possible result for the client in terms of price, costs, speed and other consideration relevant to the execution of the order to the client (MiFID Article 21[1]). This requirement is dubbed the 'best execution' requirement. Finally, MiFID Article 18 requires the establishment of special policies to avoid any conflicts of interest between the firm and the client; certain situations that are considered such conflicts of interest are defined in Directive 2006/73/EC Article 21.

13.3. MiFID II/MiFIR

13.3.1. Scope and subject matter

In general, MiFID II applies to investment firms, market operators, data-reporting service providers and third-country firms providing investment services or performing investment activity through the establishment of a branch in the EU (MiFID II Article 1[1]). MiFIR applies to investment firms authorized under MiFID II and to credit institutions authorized under Directive 2013/36/EU, providing investment services and/or performing investment activities, and to market operators of all trading venues they operate (MiFIR Article 1[2]). Exemptions from the scope of the MiFID II application are set out in MiFID II Article 2, UCITS[5] being the most notable one among them.

MiFID II governs the (i) authorization and operating conditions for investment firms, (ii) provision of investment services or activities

provided by third-country firms, (iii) authorization and operation of regulated markets, (iv) authorization and operation of data-reporting service providers and (v) supervision, cooperation and enforcement by competent authorities (MiFID Article 1[2]). For its part, MiFIR governs the (i) disclosure of trade data to the public (regulatory transparency requirements), (ii) reporting of transactions to competent authorities and (iii) supervisory measures on product intervention and positions as well as provisions governing the operation of third-country investment firms (MiFIR Article 1).

13.3.2. Financial hybrids under MiFID II/MiFIR

MiFIR/MiFID II does not precisely define categories of equity securities and debt securities, although the term 'debt instruments' is used in the definition of 'sovereign issuer' (MiFID II Article 4[1][60]). Simultaneously, the definition of 'transferable securities' set out in MiFID II Article 4(1)(44) is the same as the MiFID definition. What is particularly important is that MiFIR distinguishes separate regimes of transparency for equity and non-equity instruments. Although none of these categories is attributed with a legal definition, elements that fall into these categories are defined. Equity instruments are shares, depositary receipts, ETFs, certificates and other similar financial instruments (MiFIR Article 3), while non-equity instruments are bonds, structured finance products, emission allowances and derivatives (MiFIR Article 8). Structured finance products means those securities created to securitize and transfer the credit risk associated with a pool of financial assets entitling the security holder to receive regular payments that depend on the cash flow from the underlying assets (MiFIR Article 2[1][28]). On the basis of these definitions, we may conclude that bonds and any asset-backed securities will be treated as non-equity instruments for the purpose of regulatory transparency requirements of MiFIR. This conclusion also applies to convertible or exchangeable bonds, because the current legal regime provides no special rules for such bonds and thus such instruments must be treated as bonds.

Financial hybrids may not be so easy to qualify for MiFIR purposes, as it is not clear whether these instruments are equity or non-equity instruments. This is because 'certificates' (mentioned in the MiFID Article 3 as equity instruments) are defined as securities which 'in case of repayment of investment by the issuer are ranked above shares but below unsecured bond instruments and other similar instruments' (MiFIR Article 2[1][27]). This definition is unclear, as there may be at least two instruments that in terms of subordination are ranked between

shares and unsecured bonds: preferred shares and subordinated debt. Preferred shares shall without any doubt qualify as equity instruments, either shares or certificates. Subsequently, subordinated debt instruments shall be qualified as other instruments 'similar' to 'unsecured bond instruments' and therefore it should constitute a non-equity instrument. This conclusion is supported by ESMA, which recognizes only two types of instruments falling within the category of certificates (Spanish *Participaciones preferentes* and German *Genussscheine*), neither of them being subordinated debt instruments (ESMA, May 2014).

ESMA explicitly recognizes the uniqueness of CoCos, originating from various elements of a financial hybrid construction (and not only from subordination, as in the case of certificates). MiFID II Article 25(10) requires ESMA to develop, by January 3, 2016, guidelines for the assessment of those debt instruments that incorporate a structure which makes it difficult for the client to understand the risk involved. So far, the ESMA has formulated draft guidelines for consultation (ESMA, 2015). The purpose of this mandate is to determine which instruments may not be exempted from the obligatory 'appropriateness test' before being offered to clients. MiFID II follows a scheme applicable under MiFID, allowing investment firms to provide order-handling services (reception and transmission of orders, as well as execution of orders on behalf of clients) without performing the appropriateness test. In addition to certain other conditions, MiFID II Article 25(4) requires that such services relate to specific types of products – usually termed 'non-complex' – including bonds and other forms of securitized debt admitted to trading on a regulated market or on an equivalent third-country market or on an MTF, excluding those that embed a derivative or incorporate a structure which makes it difficult for the client to understand the risk involved (Article 25[4][a][ii]). Hence, to avoid any doubt on the scope and application of 'appropriateness test' requirements, ESMA was appointed to produce regulatory guidance. ESMA (2015) classifies both CoCos and callable bonds (together with convertibles and exchangeable bonds) as 'complex' debt instruments because they 'embed a derivative'. Separately, ESMA (2015) sets out types of debt instruments that are deemed to be 'complex' by virtue of 'structure making it difficult for the client to understand the risk'. These are, *inter alia*: (i) subordinated debt instruments, (ii) 'debt instruments with issuer discretion',[6] (iii) perpetual bonds, and (iv) debt instruments structured in a way that may not provide for a full repayment of the principal amount. 'Issuer discretion', emphasized by ESMA in (ii), addresses instruments where under the terms and conditions an

issuer enjoys the right to modify significantly the cash flows related to the security, for example the payment of interest (regardless of whether or not it may be deemed to embed a derivative). The latter category is exemplified by ESMA as a *de facto* PWD CoCo mechanism. It is not clear, however, whether BRRD bail-in eligible bonds belong to this category.

It seems that this classification of CoCos is congruous with ESMA's earlier assessment of risk associated with investing in CoCos (ESMA, 2014), where the following risks were identified:

- Trigger level risk, associated with CET1 ratio trigger volatility;
- Coupon cancellation (i.e. non-cumulative deferral with no dividend stoppers/pushers);
- Capital structure inversion risk: as ESMA explains, contrary to classic capital hierarchy, CoCo investors may suffer a loss of capital when equity holders do not;[7]
- Call extension risk: the investor may not receive return of principal if expected on call date or indeed at any date;
- Unknown risk: the structure of the instruments is innovative yet untested;
- Yield/valuation risk. According to ESMA 'Yield has been a primary reason this asset class has attracted strong demand, yet it remains unclear whether investors . . . have fully considered the risk of conversion or, . . . coupon cancellation'.

With regard to CoCos, bank regulatory incentives partially clash with investor protection concerns. ESMA uses CoCos as an example of instruments being suitable only for a narrow target market under the MiFID II regime. The 2012 Liikanen Report to the European Commission on banking sector reforms strongly supported banks being required to issue bail-in instruments such as CoCos. To limit the interconnectedness of the banking system, it also recommended that these bail-in instruments be held by non-bank institutional investors, explicitly singling out life insurance companies as such investors alongside investment funds (Sui-Jim, 2015).

As a result, we find that even definitions drafted after the final versions of Basel III (or even CRD IV's package and the BRRD) were submitted failed to specify a legal regime applicable to CoCos. In fact, legal regimes that provide different treatment to equity and non-equity instruments still are unable to deal with contingent conversion mechanism (either triggered by breaching of capital ratio or by a regulator). There is still not enough certainty as to which legal regime should be applicable to financial hybrids (both AT1 and T2 instruments). It has already been mentioned

that PD criteria of a conversion option is not a solution, as it would result in the application of more stringent requirements of equity for conventional convertibles and less stringent requirements of debt (non-equity) for contingent convertibles. Unfortunately, we may say the same about MiFIR criteria of subordination. Financial hybrids are subject to contingent conversion mechanisms (a 'going-concern' tool of loss absorption), which makes subordination (a 'gone-concern' tool of loss absorption) less relevant. In fact, AT1 financial hybrids may even suffer losses before CET1 instruments: dividend pushers and dividend stoppers are prohibited under the CRR,[8] so it is possible for financial institutions to defer coupon payments on an AT1 CoCo and simultaneously make dividend distributions on common shares. Therefore, one may say that AT1 CoCos may be ranked junior even to common equity, at least when it comes to deferral of payments.

Taking into account these conclusions and very restrictive comments of regulators (ESMA and FCA) on risk connected with investing in CoCos, we would rather qualify financial hybrids as equity instruments, at least for MiFID purposes.

In August 2014 the Great Britain Financial Conduct Authority (FCA) restricted the retail distribution of CoCos to sophisticated or high net worth investors. According to the FCA, 'CoCos are risky, highly complex financial instruments. The FCA believes they are unlikely to be appropriate for ordinary retail investors' (Selby, 2014). The FCA warned that investors might be drawn in by the 'high headline returns' available through CoCos but might find coupon payments 'extremely difficult' to properly assess because of the transition from debt to equity (Morris, 2014).

13.3.3. Investment firms' obligations in general

As with the current MiFID I regime, investment firms will have to act honestly, fairly and professionally in accordance with the best interests of their clients. Detailed principles on, *inter alia*, information, advice and independent advice will also be generally similar to the present ones (MiFID II Article 24). Investment firms will be required to implement procedures and arrangements for prompt, fair and expeditious execution of client orders (MiFID II Article 28[1]), subject to a further EC delegated act on the conditions and nature of such procedures and arrangements (MiFID II Article 28[3][a]). Compliance with these rules should be monitored by investment firms or market operators operating an MTF or OTF[9] (MiFID II Article 31).

No material changes to the client classification process will be implemented under MiFID II, save that municipalities and local public authorities will be treated as retail clients, but they will still be able to ask for

treatment as professional clients upon request. General principles on the 'best execution' requirement of MiFID prevail in MiFID II, and will not be discussed in detail.

Investment firms will be required to take all appropriate steps to identify and to prevent conflicts of interest between themselves and their clients or between one client and another. Where the risk of damage caused by such conflicts may not be prevented with reasonable certainty, clients should be clearly informed about the nature of the conflict, its sources, and the steps taken to mitigate this risk before undertaking business on their behalf (MiFID II Article 23). This requirement will be detailed further, as the EC shall be empowered to adopt a delegated act to (i) define steps that should be taken identify, prevent, manage and disclose conflicts of interest and (ii) establish the proper criteria for determining the types of conflicts that may damage the interests of clients (or potential ones).

13.3.4. Regulatory transparency requirements

Under MiFID, pre- and post-trade transparency requirements applied only to trading in shares. MiFIR extends this obligation to trading in non-equity instruments (MiFIR Article 8–11), although the regime for trading in equity instruments (MiFIR Article 3–7) is still more rigorous. Generally speaking, these requirements consist of pre-trade and post-trade requirements. Further discussion of that issue is beyond the scope of this study.

13.3.5. Transaction reporting

Transactions executed by investment firms in financial instruments (i) admitted to trading or having traded on a trading venue (or for which a request for admission to trading has been made), (ii) where the underlying instrument is a financial instrument traded on a trading venue and (iii) where the underlying instrument is an index or a basket composed of a financial instruments traded on a trading venue should be reported to the competent authority, with complete and accurate details, as quickly as possible but no later than the close of the following working day (MiFIR Article 26[1]–[2]). The reports shall, in particular, include details of the names and numbers of the financial instruments, dates and times of execution, transaction prices, a designation to identify the clients on whose behalf that transaction has been executed and a designation to identify the persons and computer algorithms responsible for the investment decision and execution of the transaction (MiFIR Article 26[3]). Moreover, all relevant data relating to all orders and all transactions carried out in financial instruments by investment firms should be kept at the disposal of the competent authority for five years (MiFIR Article 25[1]).

The same obligation is imposed on the operator of a trading venue (MiFIR Article 25[2]).

13.3.6. Supervisory measures – product intervention

It has already been mentioned that both ESMA and FCA make use of their supervisory measures (including product intervention by FCA) with regard to CoCos. Therefore, these supervisory measures require some discussion, as it is very likely that CoCos will be subject to the frequent attention of both European and national competent authorities accountable for the protection of investors in the financial markets.

ESMA and the competent authorities shall monitor the market for financial instruments which are marketed, distributed or sold in the EU. Monitoring by ESMA is EU-wide, while competent authorities of member states monitor their local markets (MiFIR Article 39[1][3]). Suspension or removal of financial instruments from trading on a trading venue may also be enforced by the operator of this trading venue. Such competence is granted both to operators of MTFs and OTFs (MiFID II Article 32) and to operators of the regulated market (MiFID II Article 52).

MiFIR introduces new powers of competent authorities to prohibit or restrict in or from their member states (i) the marketing, distribution or sale of certain financial instruments or financial instruments with certain specified features and (ii) a type of financial activity or practice (MiFIR Article 42[1]). The competent authority may take action only if certain conditions are met, with respect to investor protection, proportionality and proper consultation (MiFIR Article 42[2]). Besides, ESMA must be provided with details of the proposed action prior to any intervention (MiFIR Article 42[3]). However, in exceptional cases, the competent authority may also act on a provisional basis with no less than 24 hours' notice, before the action is intended to take effect, to all other competent authorities and ESMA (MiFIR Article 42[4]).

Leaving only ESMA with the duty to monitor the market and without any effective powers to combat threats observed in the course of this monitoring would be highly ineffective and constitute only a facade of investor protection. Therefore, ESMA is equipped with an explicit mechanism to intervene in the market through temporary prohibition or restriction of (i) marketing, distribution or sale of certain financial instruments or financial instruments with specified features and (ii) a type of financial activity or practice (MiFIR Article 40[1]). The decision of ESMA on prohibition or restriction may also specify the circumstances where it applies, or specify the exemptions.

Of course, this extraordinary power of ESMA is subject to the need to fulfill a number of specific conditions, which reflect the extraordinary

nature of this competence (MiFIR Recital 29). Decisions on intervention may be made only if certain conditions are fulfilled on a cumulative basis: (i) the proposed intervention addresses a significant investor protection concern or a threat to the orderly functioning and integrity of financial markets (or commodity markets) or to the stability of the whole or a part of the financial system in the EU, (ii) regulatory requirements under EU law applicable to the relevant financial instrument (or activity) do not address the threat and finally (iii) a competent authority or authorities have not taken action to address the threat or the actions that have been taken do not adequately address the threat (MiFIR Article 40[2]). Besides, the EC is authorized under MiFIR Article 40(1) to adopt delegated legal acts that would specify criteria and factors that have to be taken into account by ESMA in determining when this condition is fulfilled. This criteria shall include (i) the degree of complexity of a financial instrument and the relation to the type of client to whom it is marketed and sold, (ii) the size or the notional value of an issuance of financial instruments, (iii) the degree of innovation of a financial instrument, an activity or practice and (iv) the leverage a financial instrument or practice provides.

Given these conditions, we may describe ESMA's intervention powers as a measure of last resort, applicable only in case of serious threat to the fundamental values of the financial market – a threat that cannot be resolved by means of ordinary legal measures, and competent authorities of member states are not able (or not willing) to solve it. That approach is justified, as it would be the competent authorities of particular member states that should have observed this threat and taken adequate action to address it.

Final decisions in this matter are subject to further consideration. ESMA must ensure that its proposed action (i) does not have a detrimental effect on the efficiency of the financial markets or on investors that is disproportionate to the benefits of the action and (ii) does not create a risk of regulatory arbitrage. An analysis of these conditions leads to interesting conclusions. First, the proportionality of an action being taken is emphasized as being of crucial importance. The EC is aware that any intervention will be detrimental to the efficiency of the financial markets and that any intervention will affect the investors who currently hold the financial instruments in question. ESMA is obliged to calculate whether the threat associated with its proposed action will be proportional to the threat associated with the problem this action aims to address. In the end it may be the case that there is no possible action that would address the threat in a proportional manner. Then, ESMA should withhold any action, being unable to ensure proportionality of

the proposed action. The second is an object lesson about the negative aspects of regulatory arbitrage, as a source of market fragmentation. The creation of a single market implies cross-border transactions and financial instruments being admitted to trading venues in various member states. ESMA intervention may affect these various trading venues in different ways, and it may create a risk of market fragmentation by opening the door to regulatory arbitrage attempts. Imposing this obligation clearly shows that in the view of the EC, even investor protection, guarding the integrity of the financial markets or maintaining the stability of the financial system may not justify actions creating a risk of market fragmentation.

Furthermore, prior to taking any decision on intervention, ESMA shall notify the competent authorities of the action it proposes (MiFIR Article 40[4]). Action by ESMA is a measure of last resort, applicable only in cases of 'failure' on the part of competent authorities of member states to address the threat adequately; therefore, ESMA will have to inform these particular authorities about their 'failure'. One cannot exclude the possibility that such action will motivate this authority to take more determined actions. It seems that in such cases where the competent authority declares that it will take adequate actions to address the threat ESMA should also withhold any actions. Of course, the situation may be more complicated where ESMA and the member state competent authorities differ in their opinions, if the authority is equipped in any measure that may adequately address the threat or where ESMA has to inform more than one competent authority and these authorities will differ in their opinions. Notice of any decision on intervention must be published by ESMA on its website, together with details of any prohibition or restriction and specification of time after the publication of the notice from which the measure will take effect (MiFIR Article 40[5]). The prohibition or restriction will not have a retroactive effect and will only apply to actions taken after a given measure takes effect. It must be said that MiFIR does not specify any minimum period of time between the publication of notice and the taking effect of the ESMA measure. This approach seems reasonable, for this period may differ for different cases and will have to be determined by ESMA itself. On the contrary, MiFIR sets out a maximum default period of the very prohibition or restriction: ESMA is obliged to review these measures at 'appropriate intervals' and at least once every three months. If ESMA does not renew the prohibition or restriction for three months, it expires after that three-month period (MiFIR Article 40[6]).

14
Non-EEA CoCos

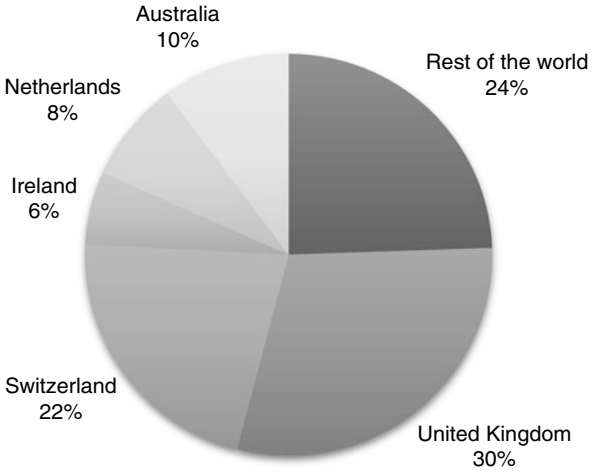
14.1. Overview

Financial hybrids issued by EEA financial institutions in order to meet Basel III capital requirements are the main subject of this study. These instruments, regulated in detail under CRR and BRRD, were discussed in previous chapters. However, we need to exceed the scope of our study and also focus on the financial hybrids, issued by 'third', that is, non-EEA, countries' issuers for the same purposes of Basel III regulatory capital. The reason behind such study is that almost all CoCos (or 'Tier 2 CoCos'[1]) will be listed on Euromarket, and we need to assume that these bonds will be listed on an EEA regulated market or a 'stock regulated market' (MTF or OTF).[2] Therefore, institutional investors will be able to invest also in non-EEA financial hybrids. This is why at least a brief discussion of that matter is required.

To a large extent, non-EEA financial hybrids will be similar to EEA financial hybrids. The minimum requirements that make CoCos eligible as Basel III regulatory capital are regulated by the globally applicable Basel III accord. However, countries implementing Basel III have discretion to impose some additional requirements, with regard to regulatory capital and to requirements which have to be met by financial hybrids eligible to be classified under the regime that governs regulatory capital. We may call this practice 'gold-plating'. We have already mentioned one example of such a regulatory initiative: 'dividend stoppers' are allowed under Basel III, but forbidden under CRR (Figure 14.1).[3]

In the next sections, we will briefly present the main regulatory areas where differences between EEA and non-EEA financial hybrids arise. Interestingly, regulators have the power to force write-offs or conversion into equity at PONV in the case of both AT1 and T2 instruments, so all

(a)



(b)

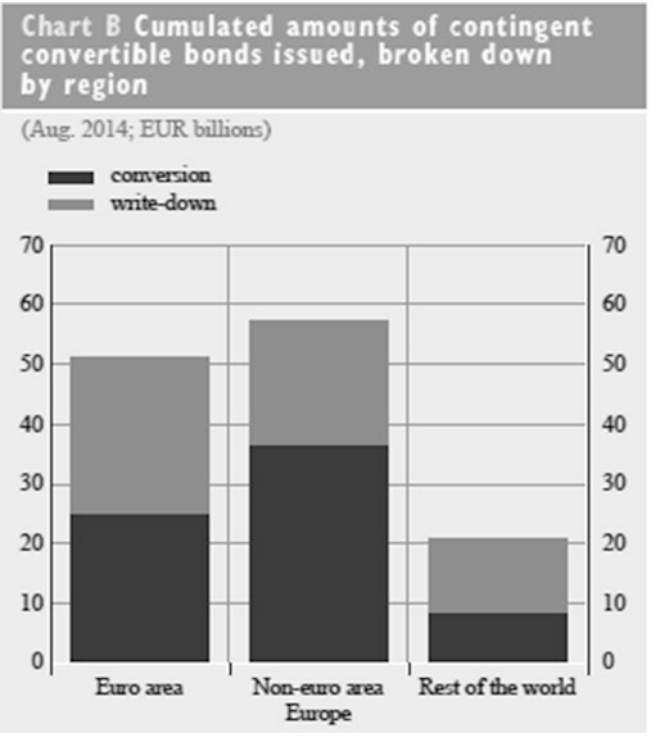


Figure 14.1 The structure of CoCo issue as for the second quarter of 2013 by nationality of issuing bank (a) and by region as for August 2014 (b)

Source: (a) Based on data from Avdijev et al. (2013); (b) Based on data from ECB (2014)

Basel III countries have developed (or are currently developing) legislation to the same effect as the BRRD. We may assume that this will be a major area of differentiation between legal systems: even in EEA, regulatory conversion (write-down) is regulated 'only' in a Directive. It means that we will probably find that EEA uses different solutions to fulfill Basel III requirements. In Switzerland, we will show that this legal system also used 'gold-plating' when determining higher capital standards for financial institutions. We will briefly discuss the case of the United States, where CoCos are generally underdeveloped. We will also briefly examine the legal regime for CoCos in China and Brazil – new issuers of CoCos on the Euromarket. Finally, we will pay some attention to so-called *Sukuk* CoCos issued by Islamic financial institutions that abide by the laws of *Shariah*. It should be noted that Islamic finance requires special solutions, especially in the case of CoCos.

14.2 Switzerland

The Swiss regulator (FINMA) presents a very conservative approach to regulatory capital requirements, imposing extra-prudential obligations on Swiss Systematically Important Financial Institutions (SIFIs). These institutions (Credit Suisse, UBS and Zürcher Kantonalbank) are required to hold up to 19% of Total Loss Absorbing Capital, where 10% of the capital must be CET1 instruments. Up to 9% of risk-weighted assets (RWA) may be held in AT1 and T2 instruments, but a conservation buffer equal to 3% of RWA must be complemented with high-triggering CoCos (7% trigger), while another 6% of RWA must be held in low-triggering CoCos (5% trigger) (Rochet, 2014). It must be noted that T2 CoCos issued by Swiss SIFIs may be eligible as regulatory capital only if they incorporate accounting contingent conversion provisions for high and low write-down triggers. For the purpose of this book, this requirement (dubbed – along with other extra-prudential requirements – as 'Swiss finish') is perhaps the most important unique feature of Swiss law on financial hybrids. However, these requirements are addressed only to SIFIs, while FINMA's Capital Adequacy Ordinance, implementing Basel III, addresses no 'gold-plating' rules to other financial institutions.

Some differences will result from Swiss companies' legal approach to participation certificates (*Genussscheine*). These non-voting and non-preferred securities may be qualified as CET1 instrument. However, under FINMA Circular 2013/1, two types of equity shares, common stock and participation securities, may be simultaneously qualified as CET1 instruments only when they have equal loss-absorbing capacity. Moreover, if a financial institution has its common stock listed on a

specified type of trading venue, only that listed common stock will be eligible as CET1. Shares that may not be qualified as CET1 instruments may be qualified as AT1 instruments or even T2 instruments, provided that Basel III criteria are met. These criteria were implemented in a manner similar to Swiss regulations. Therefore, a Swiss AT1 CoCo will have to be fully paid-in PerpNC5 (perpetual, no-call 5)[4] with a capital ratio trigger at 5.125% and a regulatory trigger at PONV. Again, any repurchase of the instrument will have to be approved by FINMA, provided that there is sufficient capital to carry out the repurchase, or the instrument will be replaced by an equal one in terms of loss absorption. Coupon payments have to be fully discretionary, on a non-cumulative basis, and may not be increased because of an issuer's credit risk fluctuations. The CRR does not apply to Swiss CoCos, so they may incorporate a dividend blocker mechanism or, more probably, a look-back provision with the same effect. This makes Swiss banks' issues slightly more attractive as one way in which some CoCo issuers have attempted to comfort investors over the prospects of being treated equally to equity, or even subordinated, is by the use of those clauses. Last but not least, AT1 (and T2) CoCo payments are tax deductible and – on a temporary basis until the end of 2016 – exempted from withholding tax.

T2 instruments are not required to incorporate an accounting contingent conversion write-down trigger, so their 'going-concern' loss-absorption capacity may be based solely on a PONV regulatory trigger. However, it is worth mentioning once again that T2 CoCos issued by SIFIs will have to incorporate low-trigger or high-trigger accounting contingent conversion.

14.3. The United States

It has been already mentioned that while European financial institutions issue CoCos, the US financial institutions rely more on AT1 preferred stock. US banks do not issue CoCos merely because the Federal Reserve favors 'old-fashioned' preference stock as an instrument of regulatory capital. First of all, these shares are perpetual. They may not be redeemed by the issuer for ten years and their coupons are deferrable on a non-cumulative basis. It is worth mentioning that they are issued not by financial institutions directly, but rather by the holding companies that oversee banking groups. Along with traditional preferred stock, there are various types of structures involving preferred shares that may be used for regulatory capital purposes, including trust-preferred securities and hybrid capital securities, structured as junior subordinated debentures issued directly or through a trust (Finnerty et al., 2011).

US tax treatment of CoCos and preferred shares must be taken into account as well. The approach of US tax laws is different from that of the tax laws in Europe, and a CoCo issued by a US financial institution would benefit from the tax deductibility of interest only if there is no 'high' likelihood that it will be converted to equity (Pennacchi et al., 2014).

14.4. China

Basel III was followed by wide reforms in the banking industry of the People's Republic of China (PRC), including, the imposition of more stringent capital adequacy, leverage, liquidity and loan-loss provisioning requirements. Capital adequacy is governed by Capital Management Rules (CMR) issued by the Chinese regulator (the Central Bank of the Republic of China, or CBRC) on April 27, 2011. Those rules took effect on January 1, 2013. Commercial banks in the PRC are categorized under CMR into four levels of capital adequacy. They are also attributed with different regulatory capital requirements. The lowest, first-level, requirements concern the CET1 Capital Adequacy Ratio (5%), the T1 Capital Adequacy Ratio (6%) and the Capital Adequacy Ratio (8%). Hence, we see a room for AT1 instruments of up to 1% RWA and for T2 instruments of up to 2%. Compared to Basel III requirements (CET1 of 4.5% and AT1 of 1.5% RWA), the CBRC's approach is slightly more conservative (CET1 of 5% and AT1 of 1% RWA). Hence, Chinese banks will be able to rely less on AT1 CoCos than EEA financial institutions.

14.5. Brazil and Australia

Basel III requirements were implemented in the Brazilian legal system by the National Monetary Council (Conselho Monetário Nacional, or CMN) under the authority of Resolutions No. 4192/2013 and 4279/2013. Generally speaking, the first of these two resolutions governs similar subject matter as the CRD IV package regarding prudential capital requirements, while the second one is similar to the provisions of the BRRD. Pursuant to CMN Resolution 4192/2013, the AT1 shall be permanently written down if CET1 capital ratio falls below the level of 5.125% of the RWA of the bank. Moreover, CMN Resolution No. 4279/2013 empowers the Brazilian Central Bank with the discretionary power to write down or convert bonds into equity for the sake of the stability of the financial system. This last power applies, just like the Basel III Accord, both to AT1 and T2 CoCos.

Australia's CoCos market has developed independently of other developed jurisdictions. Convertibility has been a common feature of hybrids in Australia. The only new aspect surrounding the equity conversion in Australia was the mandatory nature of the non-viability trigger and the introduction of mandatory conversion into Tier 2 instruments (Lee, 2014). Partial write-down or conversion has been a feature of most offerings since the Australian Prudential Regulatory Authority (APRA) published the full Basel III prudential requirements. To protect investors, APRA has mandated an equity conversion price floor of 20% set by reference to the market price of the shares when the notes were originally issued (Lee, 2014).

14.6. Basel III-compliant *Sukuk*

14.6.1. *Sukuk* construction in general

In response to Basel III, the Islamic Financial Services Board (IFSB) released an IFSB-15 guidance in December. The purpose of the guidance is to implement Basel III requirements in a manner that will suit the special challenges of Islamic financial institutions (IFIs). In fact, IFIs have to face unique challenges when complying with increased capital requirements. Financial hybrids are the core element of this challenge, because their structuring as Shariah-compliant instruments requires a great deal of regulatory creativity.

Before discussing IFSB-approved financial hybrids, we have to present some basics of Islamic finance. Shariah law explicitly prohibits some activities that are the basis of modern finance: interest (*riba*), gambling or any game of chance (*maisir*) and uncertainty in business transaction (*gharar*). First of all, Shariah law does not consider money to be an asset but vies it only as a tool used to measure the value of an asset. As one may receive an income only on some kind of asset, there may be no interest on money, because it would constitute creation of money from money. Such practice, named *riba* (literally meaning 'addition' or 'growth'), is forbidden. It refers to the premium that must be paid by the borrower to the lender, together with the principal value of the loan, as a condition of the loan itself or condition of loan maturity extension. Therefore, *riba* has three elements: (i) loan, (ii) premium resulting from lapse of time, and (iii) necessity to pay the premium in order to be given a loan. Interest is believed to contain all these three elements (Iqbal and Molyneux, 2005). Therefore, conventional banking is rejected by Shariah law because it is based on interest, while IFIs are

based on a Shariah – consistent Profit and Loss Sharing (PLS) system. It goes without saying that conventional trade in debt, including bond issues, is also prohibited.

One solution to this problem is financial instruments structured in a similar way as covered bonds or conventional asset-backed securities (ABS). These instruments are called *sukuk*, which means a financial paper certifying its holders' entitlement to some financial claims. It is interesting to note that the word 'check' is derived from the Arabic term *sakk*, the singular form of *sukuk*. According to an official definition published by The Shari'a Board of the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), '*Investment Sukuk are certificates of equal value representing undivided shares in the ownership of tangible assets, usufructs and services or (in the ownership of) the assets of particular projects or special investment activity*' (AAOIFI, 2008). In short, investors in *sukuk* must be given the underlying asset in exchange for the invested amount of money. The amount distributable to investors (*sukuk* holders) will be regarded not as interest on money but as profit on the underlying assets.

There are various types of *sukuk*, reflecting various types of underlying assets that may be 'securitized' in that form. When discussing financial hybrids, three types of *sukuk* are particularly relevant: *musharakah sukuk*, *mudharabah sukuk* and *wakalah sukuk*. In practice, other forms of *sukuk* are also used as financial hybrids, provided that IFSB-15 requirements are met.

14.6.2. *Musharakah Sukuk*

Musharakah sukuk is a type of investment sukuk representing ownership of *musharakah* equity. It is founded on the *musharakah* agreement, where the issuer and the originator (owner of the underlying asset) engage in an investment activity. This activity also must be Shariah-compliant and conducted in accordance with a business plan (being an appendix to *musharakah* agreement). The agreement sets out terms governing how the profits received on this joint venture will be distributed between the originator and the issuer. If the issuer sells *musharakah sukuk* to investors, they will be able to participate in these profits on agreed terms. Such investment is Shariah-compliant, even though the existence of the underlying tangible asset is questionable.

According to IFSB-15, perpetual *musharakah sukuk* may be AT1 components, together with preferred stock. However, some jurisdictions (like Malaysia) recognize preferred stock as the only AT1 instrument that is compliant with Shariah law.

14.6.3. *Mudharabah Sukuk*

This type of *sukuk* is founded on a partnership contract, where the issuer invites the investors to participate in the undertaking by providing financial contributions. *Sukuk* is issued to certify the investors' financial engagement and to inform them about the amount of expected return. This return may not be guaranteed by the issuer, and the issuer also may not guarantee the return of the loan's principal value – under the partnership contract, investors will participate in losses pro rata. However, a third party may provide such a guarantee. This third party may be the entity who oversees the issuer, who acts as an SPV.

According to IFSB-15, *mudharabah sukuk* may be Tier 2 instruments, provided that they have a maturity of at least five years.

14.6.4. *Wakalah Sukuk*

The last type of *sukuk* to be discussed in this study is *wakalah sukuk,* in which one group of investors entrusts the other party to act on its behalf. Hence, it forms some kind of agency agreement, where the investors (principal) appoint the issuer (agent) to invest the provided funds in a pool of assets or investments. The issuer manages this investment on behalf of the investors for a specified period of time. Again, any profit (agreed by the issuer and the investors) is believed to be generated not by the money but by the assets or investments managed by the issuer.

According to IFSB-15, *wakalah sukuk* may be Tier 2 instruments provided that they have a maturity of at least five years.

15
Bonds Credit Risk Modeling

15.1. Introduction

In analyzing defaultable corporate bonds, one may generally classify their pricing models into structural and intensity models.

In a structural model, a default results from the change in value of the issuer's assets (Merton, 1974). By applying the widely used Black–Scholes stock option pricing formula, the credit spread as well as the issuer's default probability may be estimated. The calculation requires further inputs: the issuer's leverage level, the maturity and seniority of the debt and, indirectly, assets market value volatility (Giang and Liang, 2012). When the market value of assets drops below some definite threshold, there is a default. This threshold is usually determined by the nominal debt value. Of course, there are many variations on this theory, either by modifying the threshold specification (Black and Cox, 1976) or by adding another process, for example, stochastic interest rates (Longstaff and Schwartz, 1995).

Intensity models ignore the endogenous factors causing default (Duffie and Singleton, 1999), instead using external inputs, mainly default intensity (Jarrow and Turnbull, 1995) or credit spread. It is a useful approach for those hybrids whose main characteristics suddenly change upon a distress event. CoCos are the chief examples for this hybrid bonds category. Prices are strictly related to the issuer's financial condition and, simultaneously, to default intensity.

15.2. Bond pricing – stochastic approach

Whenever we price a bond or a contingent claim with a payoff depending on future interest rates, it is advisable to use a model delivering an

idea of how these rates evolve over time. Callability features and the coupon revaluation mechanism known as 'fix to float' make a payoff of modern hybrid instruments vulnerable to future reference interest rates.

While pricing straight bonds with a fixed coupon, one needs a model giving some theoretical background for the shape of the term structure of interest rates. Among such models are the so-called *short rate models*, which translate short-term interest rate dynamics into the evolution of the whole term structure of interest rates.

Let $V(t)$ denote the future value at t of 1 currency unit deposited at moment 0 to a risk-free bank account. Assuming continuous interest capitalization and taking on the interest rate for a very short time period, called *short rate* (r_t),[1] the following exponential function will be applied:

$$V(t) = \exp \int_0^t r_s ds.$$

The short rate may be a stochastic process; however, in simpler models, it remains deterministic or even fixed (here the Black–Scholes option pricing formula is a good example).

Let us price a unit zero coupon bond, that is, a bond that in T years from now pays off \$1 in cash. According to the law of one price, an investor may either buy the bond or invest in a bank account:

$$B(0,T) = E\varphi\left(\frac{1}{V(T)}\right),$$

where $E\varphi$ is a symbol for the expected value in probabilistic pricing measure φ (often called in finance a *martingale measure*). Since the interest rate and the bank deposit future value evolve over time, at $t < T$ we use the conditional expected value with respect to filtration F_t:

$$B(t,T) = E\varphi\left(\frac{1}{V(T)} \middle| F_t\right).$$

The filtration F_t is a probabilistic sigma-field, here interpreted as a set of all information available up to the moment t.

If a fixed interest rate δ was used instead, the price of a zero coupon bond redeeming \$1 at maturity would simply be

$$B(t,T) = \frac{1}{V(T)} = \exp(-t \times \delta).$$

If the price $B(t, T)$ is directly quoted on the market, then the output δ rate is tantamount to the bond internal rate of return (IRR) and called the *yield to maturity* (YTM).

The *short rate models* treat r_t as a stochastic process. Among the stochastic process specifications for the short rate with an application to bond pricing, the one of Vasicek (1977) is widely used:

$$dr_t = (a - br_t)dt + \sigma dW_t, \tag{15.1}$$

where
dt – "infinitely" short time period,
dr_t – a short rate increment after dt,
a, b, σ – fixed model parameters, and
dW_t – the Wiener process increment.[2]

Equation (15.1) is an example of a differential equation with an additional component σdW_t called *white noise*. Such a combination is known as *stochastic differential equation*, or *SDE* (more details about SDEs are provided in section 16.2.3). If equation (15.1) is calibrated to the current market term structure of interest rates, then the model holds good for martingale probabilistic measure (the initial r_0 is given, and we estimate the values of the fixed parameters a, b, σ, where a/b is interpreted as the long-term equilibrium interest rate and σ is an interest rate volatility).

15.3. Credit spreads

Credit spread is one of the most direct signals received from fixed income markets about an individual security's credit risk pricing. However, this spread over risk-free government securities or swap yields does not refer exclusively to the credit risk (issuer's solvability or seniority grade of evaluated security).

When it comes to the credit spread of an entity categorized to the i-th credit risk class (e.g. credit rating – see section 15.4.3), evaluated at present moment $t_0 = 0$ for the cash flow stream payable at $t > 0$, the following notation will be applied:

$B_i(t)$ – discount factor for the i-th credit category payoff received at $t > 0$;
$S_i(t)$ – additive credit spread for the i-th credit category payoff received at $t > 0$, $S_i(t) > 0$;
$T_i(t)$ – multiplicative credit spread, $T_i(t) > 1$.[3]

Noticeably for the reference (risk-free) bond we assume that $S_0(t) = 0$ and $T_0(t) = 1$.

Additive spread increases the value of the risk-free discount factor $B_0(t)$ by an additional $S_i(t)$:

$$B_i(t) = B_0(t) + S_i(t)$$

while multiplicative spread increases the $B_i(t)$ value $T_i(t)$-fold:

$$B_i(t) = B_0(t) \times T_i(t).$$

By recalculating the discount factor into effective annual continuously compounded risk-free rate $R_i^C(t)$ the multiplicative spread becomes an additive one:

$$R_i^C(t) = R_0^C(t) + t_i^C(t).$$

Note that the $t_i^C(t)$ is a credit spread expresses as an interest rate.

The relation between credit spreads $S_i(t)$, $T_i(t)$, $t_i^C(t)$ and each $t > 0$ is called the term structure of credit spreads. It is extracted for each *i* credit risk category.

Credit spreads are always quoted relative to reference discount factors or their equivalent yields. If the reference values are extracted from swaps or treasury bonds, then they are Z-spreads (*zero volatility spreads*). However, the spreads relative to treasuries are called T-spreads.

Figure 15.1 illustrates an evolution of the credit spread of the perpetual fixed-to-float hybrid bond issued by Scottish and Southern Energy plc (SSE). The detailed characteristics of this bond are presented in Table 15.1.

Table 15.1 The fixed-to-float SSE hybrid bond features

Issuer	**SSE PLC**
ISIN code	XS0829351690
Maturity	Perpetual
Interest	5.625% until October 01, 2017, 5Y USD Swap rate + 4.813% until October 01, 2022, 5Y USD Swap rate + 5.063% until October 01, 2037, then 5Y USD Swap rate + 5.813%
Coupon frequency	Semi-annually
Par value	1000 USD
Day count convention	30/360 ISDA

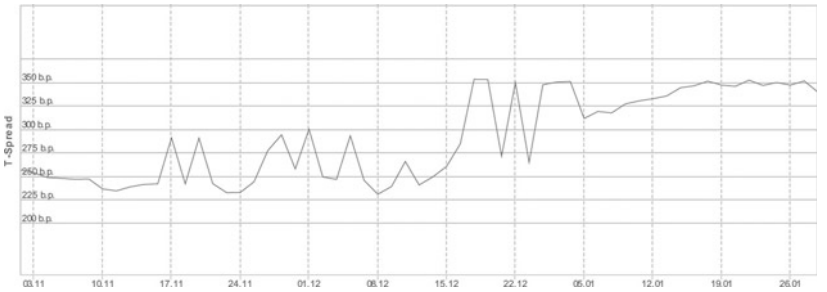


Figure 15.1 The SSE bond (see Table 15.1 for the characteristics) T-spread evolution in the period 4Q 2014–1Q 2015

Source: cbonds.com data

It is difficult to judge credit risks by just comparing the credit spreads for different issues. This is because multiple options are usually embedded into hybrids (call option, contingent conversion or write-down, coupon deferral), which do affect the spread.

In the case of perpetuals with built-in options, the YTM spread is calculated only accounting for fixed coupons up to the first call date and the bond nominal value.

As an example we will estimate the yield for a selected AT1 CoCo on July 29, 2015. The bond was issued by Société Générale on September 6, 2013. Since it is classified as an AT1 security, this CoCo is perpetual. The first call date was set on November 29, 2018. This fix-to-float bond initially pays off a fixed semi-annual coupon of 8.25% p.a. and a variable one equal to 5Y USD swap rate plus a margin of 6.394 pp (see Table 15.2). Since the bond is callable, the yield will be calculated on the *yield to call* (YTC) basis.

Table 15.2 The Société Générale AT1 CoCo characteristics

Issuer	**Société Générale**
ISIN code	XS0867614595
Maturity	Perpetual
Interest	Fix-to-float: 8.25% until November 29, 2018, then 5Y USD Swap + 6.394%
Coupon frequency	Semi-annually
Par value	1000 USD
Day count convention	30/360 ISDA
Loss absorption	Write-down

Table 15.3 Cash flow schedule of the Société Générale AT1 CoCo from February 17, 2015, until the first call date

Coupon date	Payoff (USD)
November 29, 2015	41,25
May 29, 2016	41,25
November 29, 2016	41,25
May 29, 2017	41,25
November 29, 2017	41,25
May 29, 2018	41,25
November 29, 2018	1041,25

Source: Own study

Beforehand one must map bond cash flow beginning from the pricing day up to the first call date as in Table 15.3 (note the first coupon odd period). The net price (excluding accrued interest) was 106, 70% of par, which makes a gross (dirty) price equal to 108, 17% of face value (including 1.41% accrued interest).

The cash flow scheduled in Table 15.3 is an input for the bond YTC calculation: the final result is YTC = 6.05% annually. This yield will be quoted as a spread by deducting the YTM of relevant government securities or the YTM extracted from the benchmark swap curve.

Generally speaking, credit spread is the bond investors' reward for all kinds of risks embedded over the risk of treasury securities. Credit spread itself may be decomposed into (i) credit spread due to default (S_d) and (ii) credit risk premium S_γ (non-default spreads) (Elton et al., 2001).

The S_d component compensates for the corporate bond probability of default (*PD*) taking the recovery rate (*R*) into consideration. The following formula may determine its break-even value for the debt of *T* year's maturity:

$$S_d = -\frac{1}{T}\ln[1-(PD_T(1-R))].$$

S_γ is a premium for credit risk other than default compensation. It covers all remaining risks like liquidity risk or tax risk. What is more, credit spread is influenced by business cycle and issuers' overall quality, not to mention the degree of risk aversion at the market (Greenwood and Hanson, 2013).

In Table 15.4 we find evidence that when it comes bonds included in the Citi Broad Investment Grade (BIG) bond index and High Yield Indexes the credit spreads of 4.5 duration bonds for the period 1994–2010 were dominated by the non-default spread component (Citigroup, 2011).

Table 15.4 Average default probabilities (PD), credit spreads, credit spreads due to default and credit risk premiums by credit rating category, 1994–2010

	AAA	**AA+**	**AA**	**AA–**	**A+**	**A**	**A**	**BBB+**	**BBB**	**BBB–**	**BB+**	**BB**	**BB–**	**B+**	**B**	**B–**	**CCC+**
4.5 year implied PD	0.3%	0.3%	0.4%	0.5%	0.6%	0.7%	0.9%	1.0%	1.3%	1.6%	1.9%	2.3%	2.7%	3.8%	5.7%	8.2%	11.8%
Average spread (bp)	70	87	88	104	113	122	137	160	178	223	326	366	383	438	511	588	891
Spread due to default (bp)	1	4	5	6	8	9	11	14	17	21	25	30	36	51	77	113	164
Non-default spread (bp)	69	82	83	98	10	112	126	146	161	201	301	336	347	386	433	476	727

Source: Benzschawel and Assing (2012)

15.4. The probability of default

15.4.1. Overview

Credit default swaps (CDSs) and asset swaps are among those instruments that enable directly quoting the probability of default relating to a specified issuer or a debt issue. They deliver clear messages on the market's view about the individual default probability. Simultaneously CDS credit spreads are directly market-quoted. Arbitrage free pricing must respect for the relation between asset swap spread, CDS spread, and bonds spread and thus between credit spread and the probability of default.

The rating migration approach tries to use statistical analysis based on the relatively large sample in order to discover the probability of rating change over a defined time horizon. The default probability estimation here however does not have to be consistent with the market one because of no direct arbitrage opportunities. The rating migration model is more appropriate for risk estimation of large debt instruments portfolios, which may be especially of high value for internal risk officers.

There are many empirical studies searching for regression between credit spreads and default probabilities, well exemplified by Altman's (1968) discrimination analysis. These findings, undoubtedly of high empirical value, do not provide us with a satisfactory theoretical background and therefore lack precision as far as a single issuer default probability estimation is concerned. To sum up, the statistical/econometrical analysis of past data uncovers rather general relations within whole industry branches of different geographical regions.

15.4.2. Default probability and default intensity

It is difficult to express mathematically and quantify an individual credit risk. Rare events with high degree of occurrence over a longer period of time can be modeled by Poisson process. The Poisson process value at the moment t with the intensity parameter $\lambda > 0$ will by denoted by N_t.

The process increment $N_t - N_s$ over the time period $t - s$, $0 \le s \le t$, is Poisson distributed with the intensity $\lambda \times (t - s)$. The Poisson distribution is a jump distribution of a random variable X with a probability of k rare events occurrence, $k = 0, 1, 2, \ldots$, given by

$$P(X = k) = \frac{\lambda^k}{k!} e^{-\lambda}. \tag{15.2}$$

It is a jump stochastic process with the leap size equal to 1 – each bounce is equal to a modeled incident (e.g. default). Figure 15.2 illustrates two Poisson process trajectories for a fixed intensity parameter value.

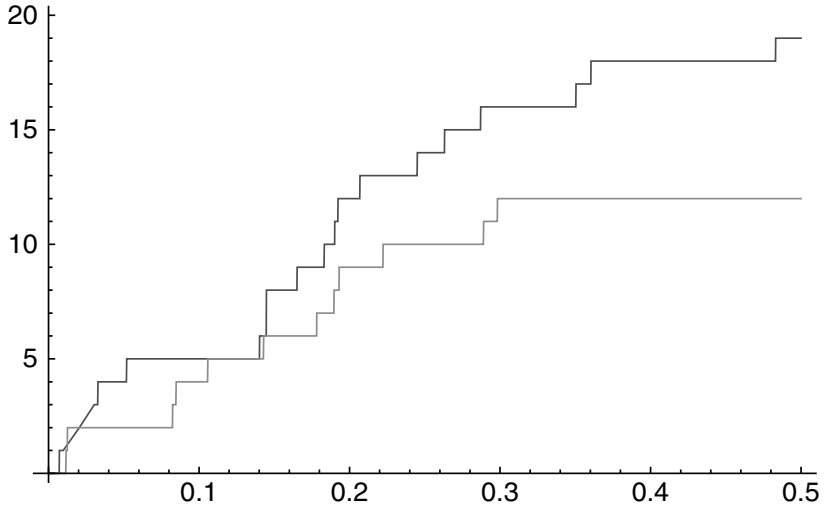


Figure 15.2 Two Poisson process realizations with a fixed intensity parameter value

Let us denote by τ a time period after the Poisson distributed event happens for the first time. The probability that the event will not happen until t is exponentially distributed:

$$P(\tau > t) = e^{-\lambda t}. \tag{15.3}$$

Now let PV stand for the present value (at $t_0 = 0$) of a 1 currency unit ($1) due in a year's time. In case of creditor's default there is no payoff (the *recovery rate* is equal 0).

If τ denotes now the future lifetime of a company, then the τ cumulative distribution $PD(t)$ is interpreted as the probability of default at t:

$$PD(t) = P(\tau \le t) = 1 - P(\tau > t) = 1 - Q(t),$$

where $Q(t)$ is a survival function.

According to equation (15.3), a survival function may take the form of an exponential one. In this context the λ parameter is interpreted as *default intensity*. Hence the default probability function looks like the following:

$$PD(t) = 1 - e^{\lambda t}, \quad \text{while} \quad t \ge 0 \quad \text{and} \quad \lambda > 0.$$

Assuming a debtor to remain solvent at the present moment we get: $PD(0) = 0$.

The pricing of defaultable cash flow streams will be demonstrated with the following example. Let the defaultable perpetual bond coupons C_t be paid at the beginning of each consecutive year t, $t = 0, 1, 2, \ldots$:

$$C_0 = C_1 = C_2 = \cdots = 1.$$

The recovery rate is equal to 0. Then the expected value of the n-th coupon payment is equal to

$$E(C_n) = 1 \times P(n-1 < T) = 1 - PD(n-1) = Q(n-1).$$

Discounting all the expected payoffs using a fixed rate r, we may value a defaultable unit perpetual annuity (it is a series of \$1 payoffs received regularly each year). The expected present value of a perpetual unit cash flow stream (*risky present value* or RPV) is given by

$$RPV_0^{\infty} = (1 + PD(0)) + \frac{Q(1)}{1+r} + \frac{Q(2)}{(1+r)^2} + \ldots = \sum_{t=0}^{\infty} \frac{Q(t)}{(1+r)^t}. \qquad (15.4)$$

This toy model would be computationally easier if we switched to a continuously compounded interest rate equivalent to the discretely compounded r: $\delta = \ln(1 + r)$.

Hence we get:

$$RPV = \sum_{t=0}^{\infty} e^{-\lambda t} e^{-\delta t} = \frac{1}{1 - e^{-(\delta+\lambda)}}. \qquad (15.5)$$

Equation (15.5) illustrates an important feature of default intensity which behaves exactly like an interest rate credit spread. Indeed there should be a direct relationship between the probability of default and credit spread values (this relationship will be shown in section 15.4.3).

If we allow the deterministic default intensity parameter to change, for the time interval $0 \le t \le t_1$ we use λ_1, so that the survival function becomes

$$Q(t) = e^{-\lambda_1 t}. \qquad (15.6)$$

For the consecutive time period $t_1 \le t \le t_2$ the default intensity changes into λ_2, so that

$$Q(t) = e^{-\lambda_1 t - \lambda_2 (t - t_1)}. \qquad (15.7)$$

Now let us switch back to continuous time t. To make a model more realistic (but much more challenging), the default intensity is made a stochastic process. Therefore the expected value of a survival function in a martingale probabilistic measure φ (i.e. the stochastic model for default intensity evolution is calibrated to market quotations) is equal to

$$Q(t) = E\varphi\left(\exp\left(-\int_0^t \lambda_u du\right)\right). \tag{15.8}$$

Since the default intensity may work analogically to interest rates (as was shown in equation 15.5), one may specify the dynamics of default intensity as a process consisting of drift component and stochastic white noise. However, the interest rate process as described in equation (15.1) is not suitable for default intensity evolution because it allows for negative values.

Here the Cox Ingersoll Ross CIR mean-reversion square root process might be more useful (Cox et al., 1985):

$$d\lambda_t = a(b - \lambda_t)dt + \sigma\sqrt{\lambda_t}dW_t. \tag{15.9}$$

The underlying default intensity tends to pursuit a mean value of b. The more distracted the default intensity is, the more it tends to revert to its mean at an increasing pace. The mean-reversion speed is scaled by the parameter value a. dW_t stands for a Wiener process increment (normally distributed with a 0 mean and variance proportional to time increase dt) responsible for process random distractions from the mean value. The default intensity volatility parameter σ scales this distraction. The CIR process excludes default intensity negative values.

15.4.3. Determining the CDS spread and implied default probability

Credit derivatives can be defined as arrangements that allow one party (protection buyer or originator) to transfer the credit risk of a reference asset, which it may or may not own, to one or more other parties (the protection sellers). Credit derivatives are usually triggered on the occurrence of so-called *credit event*. What constitutes a credit event is defined specifically in the credit derivative contract. Credit derivatives may be paid out under both technical and actual defaults. A technical default refers to the delay in timely payment of an obligor, which does not have to be necessarily a prelude to actual default, but may be caused by operational reasons or short-term cash shortage.

The following events may be specified as a credit event between counterparties (Choudhry, 2008): (i) a downgrade in S&P and/or Moody's and/or Fitch credit rating below a specified grade; (ii) financial or debt restructuring; (iii) bankruptcy or insolvency of the reference asset obligor; (iv) default on payment obligation; (v) technical default; and (vi) a change in credit spread payable by the obligor.

The International Swaps and Derivatives Association (ISDA, 2003) delivers its own definition of credit events: Bankruptcy, Failure to Pay, Obligation Acceleration, Obligation Default, Repudiation/Moratorium or Restructuring.

A CDS is a bilateral transaction resulting in a risk transfer from a CDS protection buyer to a CDS protection seller. In exchange, the CDS seller receives a premium periodically. This premium is expressed as basis points of a CDS notional value.

Figure 15.3 exhibits a mechanism of a CDS contract. The entity A is a protection buyer, and it pays regularly to B (protection seller) a specified spread (premium). CDS is triggered in case a credit event on the reference issuer C occurs: B then pays a pre-arranged amount to A.

A CDS price at t is defined as a contract net present value and calculated as follows:

$$\text{CDS}_{\text{PRICE},t} = \text{Credit Leg}_t - \text{Premium Leg}_t, \tag{15.10}$$

where

Credit Leg_t – expected present value of a credit leg cash flow estimated at t and

Premium Leg_t – expected present value of a premium leg cash flow estimated at t.

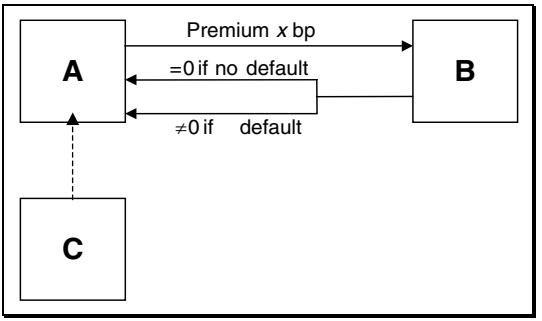


Figure 15.3 Credit Default Swap

Source: Martellini, Priaulet and Priaulet (2003)

CDS consists of two "legs": the premium leg cash flows are paid at regular time intervals unless a credit event happens. Credit leg payoff is effected only when triggered by the occurrence of a credit event.

Let us consider a CDS contract starting at $t_0 = 0$ with a maturity at T. The reference asset default is driven by the Poisson process with a stochastic default intensity λ_t, $t \in \langle 0; T \rangle$.

Taking the CDS spread equal to S with a par value of N into consideration, the expected premium leg present value in a martingale probabilistic measure φ is (Chen et al., 2012)

$$\text{Premium Leg}_{t_0} = N \times E\varphi\left[S\int_0^T \exp\left(-\int_0^{t+s} (r_u + \lambda_u)du\right)ds \right]. \quad (15.11)$$

Stochastic rates and default intensities require the implementation of a rather complicated and not easy to calibrate model.

To be more practical, one needs to simplify the valuation procedure by accepting a fixed interest rate and default intensity. Another simplifying assumption is a discrete-time model: if we set the pricing moment at $t_0 = 0$ so the premium payments effect at t_i: $0 < t_1 < t_2 < \ldots < t_n = T$, with respect to annual time basis (the ACTUAL/360 or 30/360 day count convention).

The *risky present value of basis point* (RPV01) of a CDS premium is the expected present value of the premium payoff series per 1 basis point of a nominal value:

$$\text{RPV01}_{t_0} = \sum_{i=0}^{n} B(t_i)\Delta(t_{i-1}, t_i)Q(t_i), \quad (15.12)$$

where $B(t)$ denotes the discount factor and $Q(t)$ is an exponential survival function as in equation (15.6).

Premium leg pricing is a product of a CDS notional (N), annual CDS spread (S) and the value of RPV01:

$$\text{Premium Leg}_{t_0} = N \times S \times \text{RPV01}_{t_0}. \quad (15.13)$$

Should a default occur in the odd period, then the CDS seller receives an accrued premium.

If the recovery rate (R) remains unchanged, the expected present value of a credit leg is given by the formula

$$\text{Credit Leg}_{t_0} = N \times E\varphi\left[(1-R)\int_0^T \lambda_S \exp\left(-\int_0^S (r_u + \lambda_u)du\right)ds \right]. \quad (15.14)$$

In a discrete-time model the time interval is divided into a definite number of periods, so that a default may take place only at each *i*-th moment $z_j : z_0 = 0 < z_1 < \ldots < z_m = T$. Adding an assumption on the fixed value of interest rates and CDS spread, we obtain

$$\begin{aligned}\text{Credit Leg}_{t_0} &= N\int_0^T B(s)(1-R)dQ(s) \\ &\approx N(1-R)\sum_{j=1}^{\mathrm{m}} B(z_j)(Q(z_{j-1}) - Q(z_j)).\end{aligned} \tag{15.15}$$

If we put the market CDS spreads into the CDS pricing equations we get the *mark-to-market* (MtM) CDS price:

$$\text{MtM} = N \times (S_p - S_C) \times \text{RPV01}, \tag{15.16}$$

where
N – CDS notional,
S_C – initial CDS spread (when CDS was concluded), and
S_p – actual (market) CDS spread.

Fair-priced CDS is a zero-cost one; that is, the present values of both CDS "legs" are equal (the CDS net present value is zero). This pricing rule is more or less respected when the CDS transaction is initially concluded (not to forget about "friction" costs, bid offer spread, dealer's margin). As the time goes by, the current market CDS spread quotation distracts from the initial *fair* value. Accounting for this, the market spread (15.16) should rather be quoted in a *par spread* (S_p) convention. Such a par spread is market spread equivalent so that CDS becomes again a zero-cost transaction (CDS net present value with no accrued interest becomes equal to 0).

Linking together equations (15.10), (15.13) and (15.15), and assuming that there is no accrued interest (default and CDS pricing may materialize only at the same, specified moments), the par spread should be calculated as follows:

$$\begin{aligned}S_p &= \frac{(1-R)\sum_{i=1}^{n} B(t_i)[Q(t_{i-1}) - Q(t_i)]}{\sum_{i=1}^{n} B(t_i)\Delta(t_{i-1}, t_i)Q(t_i)} \\ &= \frac{-(1-R)\int_0^T B(s)\frac{dQ(s)}{ds}ds}{\int_0^T B(s)Q(s)ds} \rightarrow S_p = (1-R)\lambda.\end{aligned} \tag{15.17}$$

The final relationship between the CDS par spread, recovery rate and default intensity is extremely useful for credit risk analysis and is known as the *credit triangle*.

Empirical studies show evidence of a high degree of correlation between default probability *PD* and credit spread. However, even a high value of R^2 determination coefficient does not deliver enough precise forecast on a default rate. Regarding year 2003 data, for instance, for all the significantly high values of R^2 determination coefficient, the observed default ratio was 5.2% against the forecasted 9.1% (Benzschawel and Assing, 2012).

The CDS spread quotations referring to the specified credit risk category with different maturities enable for using bootstrapping technique and thus extracting default probability curve (assigning specific default probabilities to their maturities). In other words, this curve is a graph of the function $PD(t)$. Since the PD is an exponential function, one may find a unique λ for specific maturities, thus obtaining the term structure of default intensities. There is a robust interpolation methodology for an exponential probability of default function, including exponential splines (Vasicek and Fong, 1982). Spline parameters are estimated by minimizing the sum of squared errors between the market price of sample defaultable bonds or CDS contracts and their theoretical model price (Berd, 2010).

Basically, CDS spreads mirror expected loss on reference bonds given the default intensity and the recovery rate. In theory, those CDS spreads should be equal to reference bond credit spreads. The distraction of CDS spreads from reference bonds credit spreads is called a *bond basis* (Pianeti et al., 2012). The bond basis of value zero excludes arbitrage opportunities; otherwise, arbitrage may be applicable (see also: Figure 15.4).

In practice, however, a negative bond basis for BBB and lower rated issuers has been observed since 2007 and a moderately positive one for high credit rated entities (Amadei et al., 2011).

Non-zero bond basis results from market imperfections and the obvious liquidity difference between CDS and their reference bond markets, not to mention the CDS counterparty risk (Pianeti et al., 2012).

15.4.4. Determining credit spreads using asset swap data

A CDS premium, analogous to corporate bonds credit spreads, depends on a set of already-mentioned factors. Altogether they are a combination of micro- and macroeconomic factors including default probability, issuer's profitability, issuer's debt and liquidity ratios, asset prices volatility, business cycle, risk-free interest rate and finally yield curve slope (De Wit, 2006).

At specific circumstances buying an asset swap brings the same net effect as selling a CDS contract. If so, than the Rule of No Arbitrage should enforce equivalent spreads for CDSs and asset swaps.

An asset swap transaction is used for synthetic creation of a defaultable bond.

The following example will illustrate the asset swap mechanism: Let us consider a fixed coupon bond available, say with a coupon of F and price P_0. There are n coupons left to maturity paid at $t_1 < t_2 < \ldots < t_n = T$. An investor who expects a short-term interest rate increase may decide to swap fixed interest rates into variable coupon payments equal to LIBOR plus a spread (S_{AS}). Pursuing his strategy, the investor buys the bond from the asset swap dealer at par and at the same time buys an asset swap. He is obliged to pay a fixed coupon of an underlying bond to the asset swap dealer and in exchange receives LIBOR plus the asset swap spread S_{AS}.

To calculate an asset swap spread one has to solve the following equation:

$$P_0 = 100 + AS_0,$$

where AS_0 is an asset swap net present value at $t_0 = 0$.

Equivalently,

$$P_t = 100 + 100 \times \left[F \sum_{i=1}^{n} B(t_i) - \sum_{j=1}^{m} \left(f(0; t_{j-1}; t_j) + S_{AS} \right) (t_j - t_{j-1}) B(t_j) \right], \quad (15.18)$$

where $f(0; t_1; t_2)$ is an implied forward interest rate set at t_0 regarding the transaction starting at t_1 with a maturity of $(t_2 - t_1)$. As in the previous section, $B(t)$ denotes a discount factor.

Finally we get

$$S_{AS} = \frac{\left[100 \times F \sum_{i=1}^{n} B(t_i) \right] + 100 \times B(T) - P_0}{100 \times \sum_{j=1}^{m} (t_j - t_{j-1}) B(t_j)}.$$

The nominator of the asset swap spread equation is a price difference between the bond cash flows discounted with the interbank rates (reflecting the asset swap dealer's risk) and the actual bond price. For high credit risk bonds, asset swap margins become relatively high.

At Figure 15.4 the no arbitrage relations between asset swap, CDS spread and financing cost is shown in a no bid offer spread and no dealer margin environment. In this case, an asset swap transaction was decomposed into a defaultable bond purchase at par from the asset swap dealer and interest rate swap (IRS) transaction, where the IRS variable leg is increased by the asset swap spread. Unless the asset swap spread is equal to the CDS spread, there is no arbitrage opportunity.

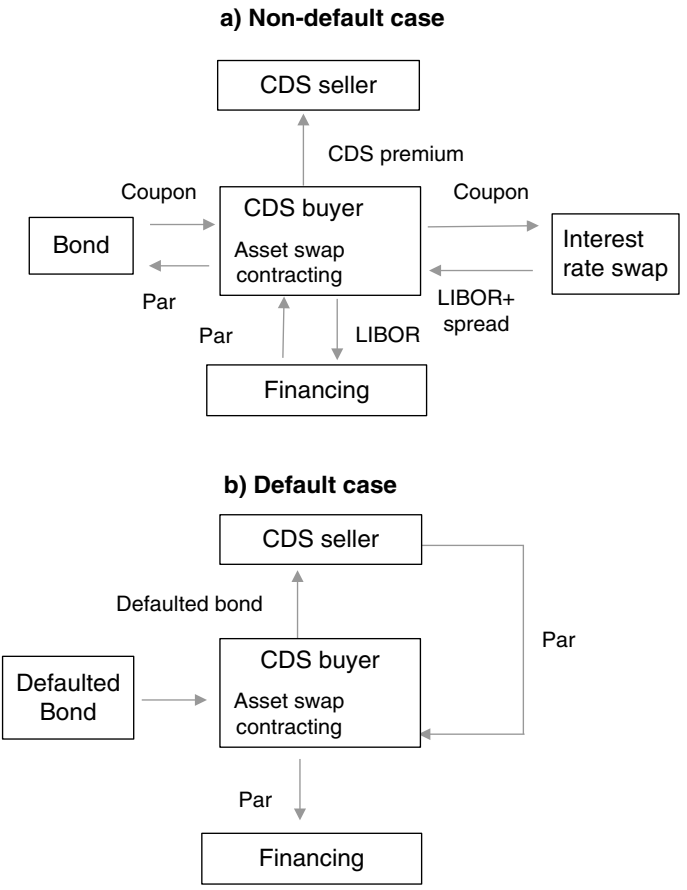


Figure 15.4 Model relationship between asset swap spread, CDS spread and bond loan cost with respect to the (a) non-default case and (b) default case
Source: De Wit (2006)

One may refinance bond acquisition by entering into a *repurchase* (repo) agreement or by simply borrowing the bond. Bond borrowing or a repo enables bond position shortening that is analogous to buying a CDS. According to US market research (Asquith et al., 2010), within a certain time period over 55% of bond series being borrowed were simultaneously a reference security for credit default swaps. Without a doubt, being a reference for CDSs makes bonds more attractive as repo or bond borrowing collateral.

15.4.5. Probability of default estimation using rating migration model

The rating may refer either to the issuer alone or to the specified debt securities issue. The rating grades may be either delivered by an outside entity (mostly by specialized rating agency like Moody's, Standard & Poor's or Fitch) or may be worked out by the investor's internal risk department.

Within the rating migration approach we assume the change of rating to be a Markov process (D'Amico, 2009). We may denote rating grades either alphabetically (A, B, C or D, where D = default; see Table 15.5) or numerically (1, 2, 3 or 4, where 4 = default).

If, for instance, X_t names the issuer or labels specified bonds issued at time t, the conditional probability of sustaining the rating at A level may be written down as follows (see also Figure 15.5):

$$P\left(X_t = A / X_{t-1} = A\right) = p_{11}.$$

Table 15.5 The rating scale

Moody's	Standard & Poor's/Fitch	Credit quality
Aaa	AAA	
Aa1/Aa2/Aa3	AA+/AA/AA–	*Investment Grade*
A1/A2/A3	A+/A/A–	
Baa1/Baa2/Baa3	BBB+/BBB/BBB–	
Ba1/Ba2/Ba3	BB+/BB/BB–	
B1/B2/B3	B+/B/B–	*Non-investment Grade/Speculative*
Caa1/Caa/Caa3	CCC+/CCC/CCC–	*Grade/Junk Grade*
Ca	CC	
	C	
C	D	

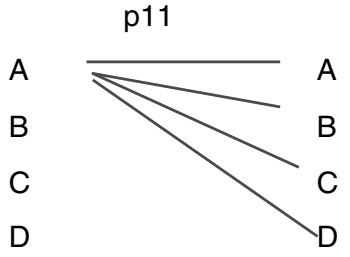


Figure 15.5 Rating transition probability

It is more convenient to write down the transition probabilities in matrix form, where $n \times n$ dimension matrix M (n – the number of rating grades) comprises transition probabilities from state i to state j (m_{ij}):

$$m_{ij}(t) = P\left(X_t = j / X_{t-1} = i\right).$$

Assuming furthermore that the probability of escaping from default is equal to zero (Gagliardini and Gourierox, 2005), we specify

$$M = \begin{pmatrix} p_{11} & p_{12} & \cdots & \\ p_{21} & p_{22} & \cdots & \\ \vdots & & & \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

One-period migration probability vector (p) is a product of the initial probability vector and the transition matrix:

$$\begin{matrix} t-1 & & t \\ \begin{pmatrix} p_1 \\ \vdots \\ p_n \end{pmatrix}^T & \times M = & \begin{pmatrix} p_1 \\ \vdots \\ p_n \end{pmatrix}^T \end{matrix} \tag{15.19}$$

If p is an eigenvector of M, then the subsequent transitions would result from multiplying by the power of eigenvalue ξ:

$$p \to \xi p \to \xi^2 p \to \xi^3 p \cdots$$

Since the vector p is the probability distribution for X_t, using Jordan theorem we may prove that in case of fixed M matrix, the probability of no default after k steps is equal to ξ_1^k, where ξ_1 is the largest eigenvector of M with the value less than 1:

$$\forall p \quad X_t \sim p \Rightarrow P(X_{t+k} \neq D) = \xi_1^k.$$

The model enables calculating the value at risk, for instance: if the issue is rated at A level, the rating probability distribution after k steps equals

$$\begin{pmatrix} 1 & 0 & \cdots & 0 \end{pmatrix} \times M^k.$$

The presented approach may be adjusted to the hybrid bond characteristics. Provided that the bond is initially rated at BBB+, the rating enhancement to, say, A will result in a call prepayment. If the rating drops to C, then the deferral feature comes out. Considering the call feature, the transition matrix M will be upgraded as follows:

$$M = \begin{pmatrix} 1 & 0 & \cdots & 0 \\ p_{21} & p_{22} & \cdots & \\ \vdots & & & \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Monte Carlo cash flow simulation using the upgraded M matrix will generate the expected cash flow for hybrid accounting for the (i) call option and (ii) deferral clause.

The drawback of the rating migration methodology is the need for providing (or calculating) rating transition probabilities.

16
Contingent Convertible Bonds Pricing

16.1. Introduction

CoCo pricing models correspond generally with the taxonomy of the defaultable bond pricing models (see section 15.1). With respect to the division between structural (Penacchi, 2011) and intensity approaches (market implied models), the latter category includes *credit derivatives* and *equity derivatives* models (De Spiegeleer and Schoutens, 2012).

CoCos are complicated securities, so an applicable model seems to be a trade-off between (Wilkens and Bethke, 2014)

(a) the capability of capturing numerous CoCo characteristics (deferrals, callability, coupon revaluation);
(b) realistic assessment of trigger event dynamics and probability; and
(c) the simplicity to calibrate the model-to-market data and quote model parameters.

It seems that the structural models excel as far as the first criterion is concerned, while credit derivatives and equity derivatives approaches are relatively better in the third aspect.

16.2. Assets dynamics modeling

16.2.1. Overview

A CoCo bond payoff depends on future values of the risk-weighted assets (RWA) ratio. Since there is a correlation between the issuer's RWA ratio and its leverage ratio,[1] one may find a correlation of the RWA ratio with two other variables: the market value and the share price of the issuer's assets. The crucial part of the analysis is specifying the dynamics

model for these variables. In this aspect, models applied in financial theory for stock price evolution are commonly used. Chronologically, continuous time models were the first models to be introduced. Their drawback is that they require an understanding of quite an advanced stochastic calculus, but they may reward the user with elegant closed-form expressions.

Discrete-time models usually yield similar results, but are mathematically much simpler and therefore accessible to those with basic math skills. Using a typical spreadsheet, it is possible to solve for the CoCo price numerically.

If the reader does not use the Monte Carlo simulation or does not wish to get involved into a complicated mathematics, he may skip over the next two sections (16.2.2 and 16.2.3) and go directly to section 16.2.4.

16.2.2. The Itō stochastic integral

The Itō differential equations and Itō stochastic integrals, which are fundamental concepts for modern stochastic calculus, are described in this book based on Sobczyk (1991).

Let us consider here an integral of the form

$$I(\Phi) = \int_a^b \Phi(t,\gamma)dW(t,\gamma). \tag{16.1}$$

Let $I(\Phi)$ denote, for instance, the value change of an investment portfolio that consisted of Lloyd's shares over the time interval $(b - a)$. The component $dW(t,\gamma)$ is a Wiener process increment (so-called white noise). It might be interpreted, referring to our Lloyd's example, as share price changes while $\Phi(t,\gamma)$ is a stochastic process modeling the number of shares in the portfolio. t is a deterministic time and γ denotes some random event.

If $\Phi(t)$ is a continuous deterministic differentiable function of t (and does not depend on γ) we may apply the integration by parts:

$$\int_a^b \Phi(t)\, dW(t,\gamma) = \Phi(b)W(b,\gamma) - \Phi(a)W(a,\gamma) - \int_a^b \Phi'(t)W(t,\gamma)dt.$$

In a general sense, when W and Φ are not mutually independent, then equation (16.1) has to be defined in a specific way. The proper solution for such an integral was proposed by the Japanese mathematician Kiyoshi Itō.

According to Itō, $\Phi(t,\gamma)$ should be characterized by non-anticipative dependence on $W(t,\gamma)$ – translating into our example: the investor does

Figure 16.1 The step function approximating Φ
Source: Own study

not shape his portfolio structure based on future information. The random function $\Phi(t,\gamma)$ depends solely on past and present Wiener process realization.

According to the Itō solution, function Φ may be approximated by the step function $\Phi(t,\gamma) = \Phi(t_i,\gamma)$ for $t \in [t_i;t_{i+1}]$ so that the time interval [*a*, b] is divided as follows: $a = t_1 < t_2 \ldots < t_n = b$. For the calculation we choose the initial point of each time interval section (see Figure 16.1).

In such a case we define Itō stochastic integral in the following way:

$$\int_a^b \Phi(t,\gamma)dW(t) = \sum_{i=1}^{n} \Phi(t_i,\gamma)\left[W(t_{i+1}) - W(t_i)\right].$$

The component $W(t_{i+1}) - W(t_i)$ is a Wiener increment with the expected value of 0 and the variance equal to time interval. As $n \to \infty$ the sequence

$$\int_a^b \Phi_n(t,\gamma)\, dW(t,\gamma)$$

is convergent in probability. The limit is called the Itō stochastic integral of a step function $\Phi(t,\gamma)$ and is denoted by $I(\Phi)$ as in equation (16.1).

16.2.3. The Itō differential equation: a single- and multidimensional case

The concept of Itō integral helps in solving Itō differential equations. If $X(t)$ is a stochastic process and the functions $a(t)$ and $b(t)$ exist, so that for any t_1 and t_2 they satisfy the equation

$$X(t_2) - X(t_1) = \int_{t_1}^{t_2} a(t)dt + \int_{t_1}^{t_2} b(t)dW(t), \tag{16.2}$$

then $X(t)$ has a stochastic differential $dX(t)$:

$$dX(t) = a(t)dt + b(t)dW(t). \tag{16.3}$$

The following is a stochastic differential of function composition $f(t,X(t))$:

$$df(t,X(t)) = \left[\frac{\partial f}{\partial t}(t,X(t)) + a(t)\frac{\partial f}{\partial x}(t,X(t)) + \frac{1}{2}b^2(t)\frac{\partial^2 f}{\partial x^2}(t,X(t))\right]dt + \frac{\partial f}{\partial x}(t,X(t))b(t)dW(t). \quad (16.4)$$

The interesting point here is that comparing the Itō differential to classic differential calculus of combined functions, an additional component appears:

$$\frac{1}{2}b^2(t)\frac{\partial^2 f}{\partial x^2}(t,X(t))dt.$$

Example 1

Let us consider a stochastic process described by the following stochastic differential equation:

$$dX(t) = X(t)\mu dt + X(t)\sigma dW(t).$$

The function $b(t)$ applied in equation (16.3) here equals $X(t)\sigma$ while $X(t) \geq 0$. Drift μ and volatility σ parameters are constant.

Assuming the combined function $Y(t) = \ln X(t)$, we may simplify equation (16.4):

$$df(X_t) = f'(X_t)dX_t + \frac{1}{2}f''(X_t)b^2dt.$$

Going back to our example we get

$$dY(t) = \frac{1}{X(t)} \times (X(t)\mu dt + X(t)\sigma dW(t)) - \frac{1}{2}\sigma^2 dt = \left(\mu - \frac{1}{2}\sigma^2\right) + \sigma dW(t)_t.$$

Change of the process within the period [0, t] equals

$$Y_t = Y_0 + \int_0^t \left(\mu - \frac{1}{2}\sigma^2\right)ds + \int_0^t \sigma dW(s),$$

hence

$$Y_t = Y_0 + \left(\mu - \frac{1}{2}\sigma^2\right)t + \sigma W(t).$$

Finally, the value increment of $X(t)$ process is

$$\begin{aligned} X(t) = e^{Y_t} &= \exp\left(Y_0 + \left(\mu - \frac{1}{2}\sigma^2\right)t + \sigma W(t)\right) \\ &= X(0) \times \exp\left(\left(\mu - \frac{1}{2}\sigma^2\right)t + \sigma W(t)\right). \end{aligned} \tag{16.5}$$

Equation (16.5) is useful while applying Monte Carlo simulation of share process evolution. The Monte Carlo approach is based on simulating numerous paths for random variables (like share prices or interest rates). Therefore, one may determine the expected payoff value of a hybrid instrument (CoCo) being an average output of the simulation. Discounting this expected payoff we get the theoretical price of a contingent debt security. The specification of asset value increments as in equation (16.5) may be useful for pricing contingent convertibles, since this asset dynamics comply with the Black–Scholes share options pricing approach, thus enabling easier calibration of the model-to-market prices. During this process we change the coefficient μ into a risk-free rate.

Analogically to equation (16.2) we get the m-dimensional Itō integral

$$\boldsymbol{X}(t_2) - \boldsymbol{X}(t_1) = \int_{t_1}^{t_2} \boldsymbol{A}(t)dt + \int_{t_1}^{t_2} \boldsymbol{B}(t)d\boldsymbol{W}(t), \tag{16.6}$$

where vector $\boldsymbol{W}(t)$ stands for an n-dimensional Wiener process, $\boldsymbol{A}(t)$ is an m-dimensional vector and $\boldsymbol{B}(t)$ is an $(m \times n)$ matrix.

The $\boldsymbol{X}(t)$ process has a following stochastic differential $d\boldsymbol{X}(t)$:

$$d\boldsymbol{X}(t) = \boldsymbol{A}(t)dt + \boldsymbol{B}(t)d\boldsymbol{W}(t).$$

Example 2

Let us take on share price dynamics as in the previous example. This time we consider a two-dimensional case; for instance, we model an

evolution of share prices (further denoted as asset 1) and the interest rate or credit spread (asset 2):

$$dX_1(t) = X_1(t)\mu_1 dt + X_1(t)\sigma_1 dW_1(t)$$
$$dX_2(t) = X_2(t)\mu_2 dt + X_2(t)\sigma_2 dW_2(t).$$

Note that for the interest rate dynamics we may use the Vasicek specification (equation 15.1). It is useful to simulate correlated Wiener processes as both random variables are usually not independent. To achieve this effect, the Cholesky decomposition will be applied. Interdependence between the variables is captured by ϱ, the Pearson correlation coefficient. For computational simplicity let us assume the time increment dt = 1 time unit (Figure 16.2).

By generating an initial vector of uncorrelated coordinates, we get

$$\varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix} \sim N\left(0, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\right).$$

The ultimate goal is to get the vector of 2 correlated random variables:

$$dW = \begin{bmatrix} dW_1 \\ dW_2 \end{bmatrix} \sim N\left(0, \begin{pmatrix} 1 & \varrho \\ \varrho & 1 \end{pmatrix}\right),$$

being a product of vector ε and transformation matrix $A = \begin{pmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{pmatrix}$:

$$dW = A \circ \varepsilon. \tag{16.7}$$

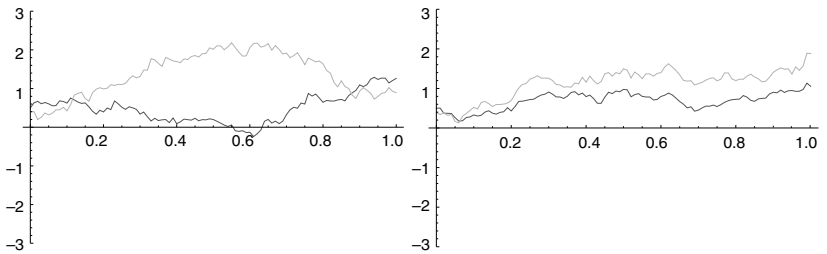


Figure 16.2 Uncorrelated Wiener process (left-hand illustration) and a correlated one with the positive correlation coefficient ϱ (right-hand illustration)

Source: Own study

The Cholesky transformation is a procedure for decomposition of a symmetric positive definite correlation matrix $\sum = \begin{pmatrix} 1 & \varrho \\ \varrho & 1 \end{pmatrix}$ into product of $\sum = A \circ A^T$, where A is a triangular matrix and A^T is its transposition:

$$\begin{pmatrix} 1 & \varrho \\ \varrho & 1 \end{pmatrix} = \begin{pmatrix} a_{11} & 0 \\ a_{21} & a_{22} \end{pmatrix} \circ \begin{pmatrix} a_{11} & a_{21} \\ 0 & a_{22} \end{pmatrix}.$$

Hence we get the matrix A coefficients:

$$\begin{aligned} 1 &= a_{11}^2 && \Rightarrow \quad a_{11} = 1 \\ \varrho &= a_{11} a_{21} && \Rightarrow \quad a_{21} = \varrho \\ 1 &= a_{21}^2 + a_{22}^2 && \Rightarrow \quad a_{21} = \sqrt{1 - \varrho^2}\,. \end{aligned}$$

Applying retrieved matrix A coefficient values and multiplying matrices according to equation (16.7) we get the following results:

$$\begin{aligned} dW_1 &= \varepsilon_1 \\ dW_2 &= \varrho \varepsilon_1 + \sqrt{1 - \varrho^2}\,\varepsilon_2. \end{aligned} \tag{16.8}$$

Referring to Itō theorem (equation 16.5) the value increase for the *i*-th asset within the single time period $dt = 1$ is

$$X_i(t+1) = X_i(t) \exp\left(\mu_i - \frac{1}{2}\sigma_i^2 + \sigma_i dW_i \right) \text{ for } i \in \{1.2\}.$$

Substituting dW_i with the values from equation (16.8), we obtain correlated process increments.

16.2.4. Discrete time asset dynamics modeling

Modeling asset dynamics with a continuous time requires the knowledge of stochastic calculus elements (see section 16.2.2). A discrete-time model employs only basic mathematical apparatus while retaining acceptable pricing accuracy at the same time.

Assuming we model an evolution of common stock price (S) with no dividends payment, we divide the time period (0; t) into discrete intervals Δt. At each time interval, or step, the stock price follows a binomial process: it may either go up or decrease. At the first step the initial value S may increase to $u \times S$ with probability of p_u; alternatively it may drop with the probability of $p_d = p_u - 1$ reaching the value of $d \times S$ (see Figure 16.3). The u and d coefficients determine the upsurge and downturn levels, respectively, while u, $d > 0$; $u > 1$ and $d < 1$.

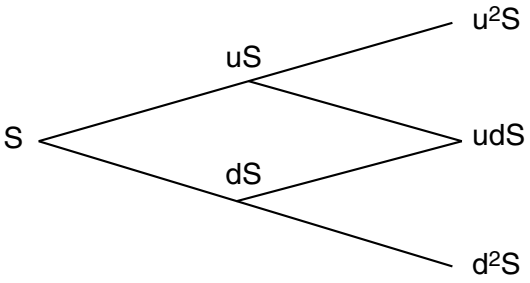


Figure 16.3 Binomial process of stock price

If there is a deposit and credit market with the risk-free interest rate r, what is the relation between r, d and u? On an arbitrage-free market, the following must hold: $d \leq 1 + r \leq u$, otherwise no one would buy shares with a return upside potential less than the risk-free rate; similarly, no one would purchase a risk-free bond if d would make a stock return to outperform the yield r.

According to the well-known binomial model specification of Cox et al. (1979), the u and d coefficients are equal to

$$\begin{aligned} u &= \exp\left(\sigma\sqrt{\Delta t}\right) \\ d &= \exp\left(-\sigma\sqrt{\Delta t}\right), \end{aligned} \tag{16.9}$$

where σ stands for fixed stock log-return volatility. Within the binomial approach the stock price tree is calibrated to market quotations; as a result, we obtain the market probability measure (also called a martingale measure) by setting for the values of p_u and p_d.

$$\begin{aligned} p_u &= \frac{e^{r\Delta t} - d}{u - d} \\ p_d &= \frac{u - e^{r\Delta t}}{u - d}. \end{aligned} \tag{16.10}$$

As far as the trinomial model is concerned, at each node of the tree the initial stock price may increase, decrease or stay unchanged (see Figure 16.4) with the probabilities p_u, p_d and p_m, respectively.

The formulas for upsurge and downturn coefficients as well as for a martingale measure are (Bolton and Samama, 2012)

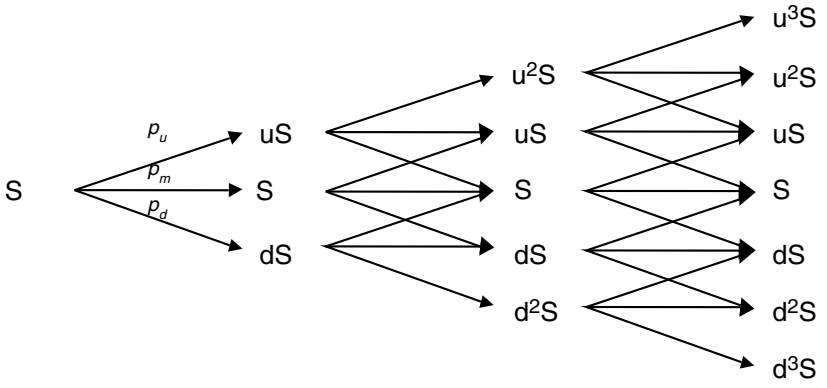


Figure 16.4 The three-step trinomial model geometry
Source: Bolton and Samama (2012)

$$u = e^{\sigma\sqrt{2\Delta t}}, \quad d = e^{-\sigma\sqrt{2\Delta t}}, \quad p_u = \left(\frac{e^{\frac{r\Delta t}{2}} - e^{\frac{-\sigma\sqrt{\Delta t}}{2}}}{e^{\frac{\sigma\sqrt{\Delta t}}{2}} - e^{\frac{-\sigma\sqrt{\Delta t}}{2}}} \right)^2, \quad p_d = \left(\frac{e^{\frac{\sigma\sqrt{\Delta t}}{2}} - e^{\frac{r\sqrt{\Delta t}}{2}}}{e^{\frac{\sigma\sqrt{\Delta t}}{2}} - e^{\frac{-\sigma\sqrt{\Delta t}}{2}}} \right)^2,$$

whereas $p_m = 1 - p_u - p_d$.

16.3. CoCo pricing with a binomial model

The binomial model is able to capture CoCo conversion and write-down features, as well as bond callability. However, the model works well only as a single factor model; adding additional stochastic variable (like interest rates or credit spreads) increases computational and calibration complexity. In such a case the Monte Carlo simulation would be more appropriate (see section 16.2.3).

The model presented in this chapter, specified according to Buergi (2013), is a simplified approach. However, it illustrates well an idea lying behind the pricing of CoCos.

Let us now refer to the CoCo pricing structural approach (for more about the structural approach, see Chapter 17). In the following notation, A is the market value of an issuer's assets (also called *welfare*), D is the nominal value of debt including the CoCo's par value and E is the market value for equity. The difference $A - D$ reflects the market value of equity.

As has already been mentioned earlier in this book (see section 16.2.1), we will further assume that the conversion is not directly triggered by the CET1 ratio. Instead, the *equity ratio* (*er*) will be used, with respect to nearly linear interdependence observed between CET1 and *er*:

$$er = \frac{E}{A} = \frac{A - D}{A}. \tag{16.11}$$

The pricing (martingale) probability measure will be set up using a calibrated binomial CRR model.

The initial asset value is $A = 100$. The nominal equity (represented by 1 share) is equal to 10, the debt consists of 80 notional of senior debt and 10 par value of CoCos. Forced conversion will take effect whenever the *er* ratio drops below 5%. On conversion, the CoCo owner will get 1 new issued share, and therefore will control over 50% of the issuer's equity. The CoCo bond pays a 5% fixed coupon annually, and the maturity is 2 years.

At conversion, the bond holder is forced to accept delivery of C_r shares and therefore give up bonds of N principal. The embedded purchase price is the conversion price C_{purchase} of the CoCo bond:

$$C_p = \frac{N}{C_r}. \tag{16.12}$$

Unlike the conversion ratio for traditional convertible bonds, wherein the bonds are converted into a fixed number of shares of common stock, CoCo bonds can be structured to convert into either a fixed number of shares or a fixed value of shares, with varying pros and cons to the bondholders and the bank shareholders.

For example, a fixed-share conversion ratio established at issuance of the bond would be less dilutive to the existing shareholders of the bank, but also of less value to CoCo bondholders. As a result, the bank may have to compensate the bondholders with a higher coupon as the tradeoff. On the other hand, a fixed-value (equal to the bond par value, premium or discount to par value) conversion ratio, based on the-then market value of the bank shares at conversion, could be significantly dilutive to shareholders, but more appealing to the bondholders in preserving their bond value. Therefore, the bondholders would require a lower risk premium in terms of the bond coupon, a tradeoff benefit to the bank. It would appear that conversion at par value would be more adequate from the perspectives of both the bank and the investor.

Initial *er* ratio (as formulated in equation 16.11) value equals (100 – 90)/100 = 10%. It is time to introduce the asset market value dynamics,

which will drive the evolution of the *er* coefficient playing the role of the trigger. The four-period binominal model will utilized with $\Delta t = 0.5$. The annual continuously compounded risk-free interest rate is 3%, the credit spread is 0.5% and finally the 5.1% asset return volatility enables calculation of the asset-tree parameters: $p_u = 70.05\%$; $p_d = 29.95\%$; $u = 1.0367$; $d = 0.9646$. Figure 16.5 shows the binomial evolution of assets and *er* ratio. At every knot of the binomial tree, the bottom number reflects

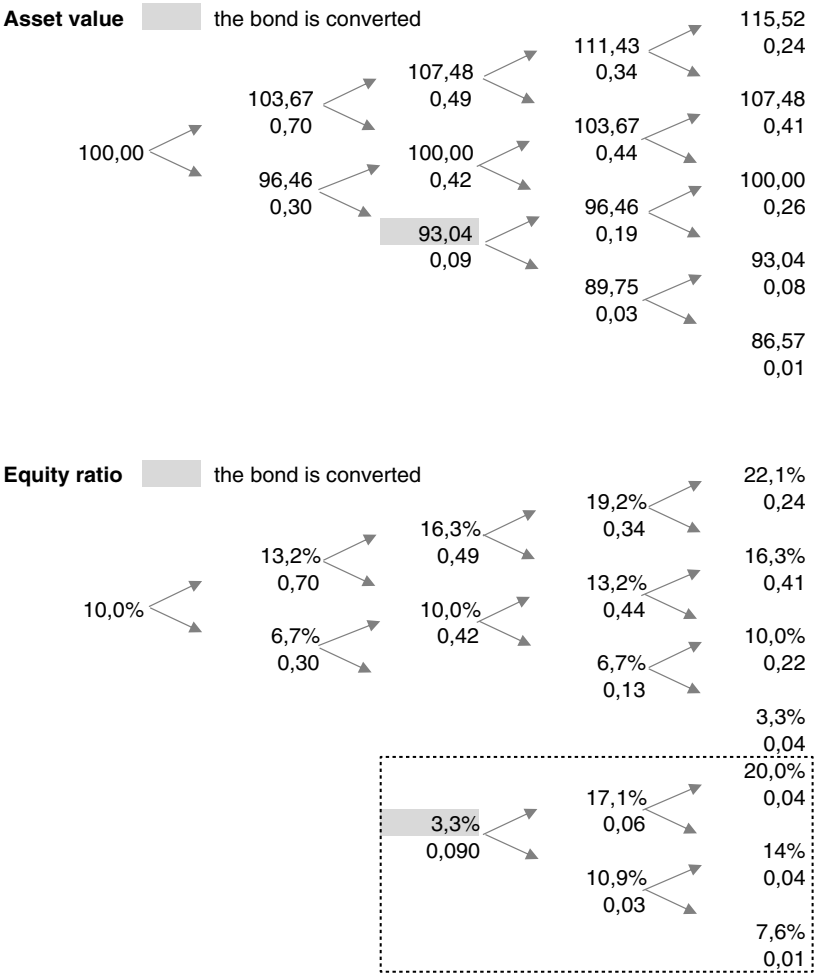


Figure 16.5 Asset value binomial process (top) and equity ratio binomial process (bottom)

Source: Own study

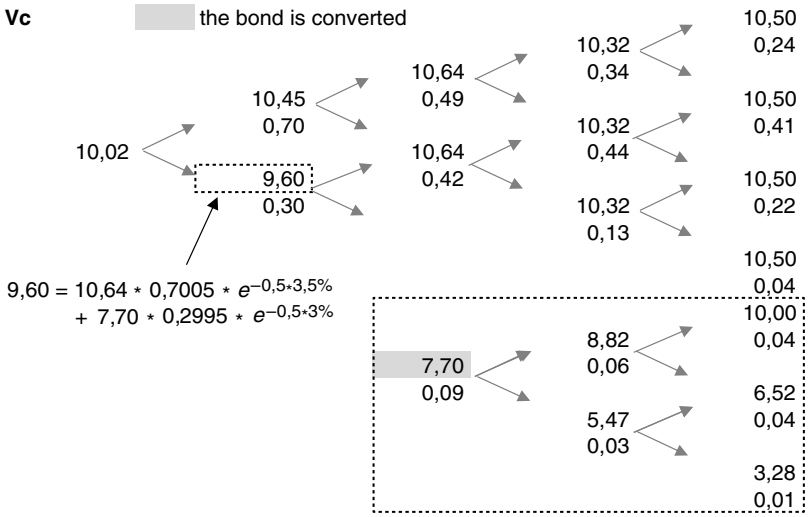


Figure 16.6 Binomial tree for the CoCo bond value
Source: Own study

the probability of reaching each selected point. If the asset value drops to 93.04 then it triggers conversion (*er* ratio drops below 5% threshold: *er* = 93.04 – 90/93.04 = 3.03%). The conversion brings persistent recovery for the *er* value because the nominal debt reduction is 10.

Translating the *er* evolution into the CoCo's present value (V_C), one has to determine the value/payoff of the bond at each node of the binomial tree. If not converted, the bond pays off 10.5 (face value of 10 adding 5% of last coupon) at maturity. Otherwise the contingent convertible is worth half of the issuer's market capitalization: $A - D/2$. Using a backward induction technique, we determine the contract's value at the end nodes of the tree, then discount this expected value by the risk-free interest rate (in case of conversion) or by the risk-free interest rate plus the credit spread if the CoCo has not been triggered.

The valuation mechanism will be illustrated in the following example: in Figure 16.5 we can see that at maturity the assets may take on a value of 100 with a 26% probability. This is tantamount to 10% equity ratio if the CoCo remains untriggered (22% probability) or *er* = 20% in case of conversion (4% probability). Let us switch now to the value process (Figure 16.5). With the probability 91% (= 24% + 41% + 22% + 4%), the CoCo will mature untriggered and will be redeemed at 105% of nominal

or with the 9% (= 4% + 4% + 1%) will already have been converted at maturity.

As far as present value calculation is concerned, we use the risk-free rate for discounting an equity value and the risk-free rate plus the credit spread while discounting the debt component (compare with Figure 16.6).

16.4. Credit derivatives method

In previous chapters the relationship between default intensity λ and default probability has been described. Equation (15.17) in Chapter 15 is a *credit triangle*, being just an approximated relationship between credit spread, default intensity and recovery rate. Note that this conjunction was derived by taking on fixed interest rates and default intensities.

The credit derivatives method forged by De Spiegeleer and Schoutens (2012) uses this relation to approximate a CoCo's value.

Keeping up to CoCo terminology, the link between CoCo bond credit spread (s_{CoCo}), recovery rate (R_{CoCo}), the trigger intensity λ_{trigger} satisfies the following equation:

$$s_{\text{CoCo}} = (1 - R_{\text{CoCo}}) \times \lambda_{\text{trigger}}. \tag{16.13}$$

CoCo triggering results in either conversion into shares or a CoCo principal write-down.

If C_p denotes the CoCo conversion price, C_r is the number of shares the bond is converted into (see equation 16.12), while S^* is a market share price at conversion.

Hence in case of conversion the CoCo holder will incur a loss of

$$\text{loss}_{\text{CoCo}} = N - C_r S^* = N\left(1 - \frac{S^*}{C_p}\right) = N(1 - R_{\text{CoCo}}). \tag{16.14}$$

Note that the S^*/C_p quotient is tantamount to the CoCo recovery rate. The recovery rate strictly depends on the write-down degree: for instance, if a CoCo principal is written down 100%, then $R_{\text{CoCo}} = 0$.

The next step is an approximation of the trigger intensity. The catalog of possible trigger events has already been presented in detail.[2] Among them is a forced conversion at a regulatory authority's discretion. It is impossible to properly assess the real probability of such an event. Similar problems crop up while specifying a process for the CET1 ratio, which is a typical accountancy-type coefficient. To avoid confusion caused by these immeasurable random variables, it is the issuer's share price (S) which is

a proxy for trigger events, with a CoCo being triggered when it reaches the specified threshold share price level S^*. To put it simply, the level S^* corresponds to the value of the underlying share at the moment when the CET1 ratio fails to stay above the minimum trigger level.

The probability (p) of hitting the S^* barrier within the lifetime T of a contingent convertible is

$$p = \Phi\left(\frac{\log\left(\frac{S^*}{S}\right) - \mu T}{\sigma\sqrt{T}}\right) + \left(\frac{S^*}{S}\right)^{2\mu/\sigma^2} \Phi\left(\frac{\log\left(\frac{S^*}{S}\right) + \mu T}{\sigma\sqrt{T}}\right), \tag{16.15}$$

where

$$\mu = r - q - \frac{\sigma^2}{2},$$

q: continuous dividend yield,
r: continuously compounded risk-free interest rate,
σ: stock return volatility,
T: maturity of the contingent convertible (in years),
S: current market CoCo issuer's stock price,
$\Phi(x)$ – cumulative distribution function of normal distribution random variable (X), hence the probability of the random variable being larger or equal x: $P(x \leq X)$.

This formula stems directly from the widely used Black–Scholes approach for barrier equity option pricing. Therefore the Black–Scholes assumption on share price geometric Brownian motion process with fixed drift μ and volatility σ parameters is valid.

At this point one may calculate the CoCo trigger intensity using the following formula:

$$\lambda_{\text{trigger}} = -\frac{\log(1-p)}{T}. \tag{16.16}$$

Substituting the right side of this equation into equation (16.14), one gets the formula for the CoCo spread:

$$s_{\text{CoCo}} = -\frac{\log(1-p)}{T} \times \left(1 - \frac{S^*}{C_p}\right). \tag{16.17}$$

Employing the Black–Scholes approach and using threshold share price as an equivalent trigger event provide many practical advantages for

CoCo market participants. By reversing the formula in equation (16.15) one gets an implied threshold share price S^*_{impl}. This is a market estimation of the share price level triggering CoCo conversion or a write-down, or both.

A very new idea proposed for CoCo pricing by De Spiegeleer et al. (2015a) is to get back to CET1 dynamics modeling and then to apply similar pricing methodology as described in this section using the barrier-option pricing approach. To remain consistent with the Black–Scholes framework, the CET1 ratio evolution is modeled as a continuous geometric Brownian motion in the absence of any drift:

$$\frac{d\text{CET1}_t}{\text{CET1}t_t} = \sigma_{\text{CET1}} dW_t,$$

where the dW_t stands for Wiener process increment and σ_{CET1} is a CET1 volatility.

The probability p^* that the ratio hits a trigger during time horizon T is equal to

$$p^* = \Phi\left(\frac{\log\left(\frac{\text{Trigger}}{\text{CET1}}\right) + \frac{\sigma^2_{\text{CET1}}}{2}T}{\sigma_{\text{CET1}}\sqrt{T}}\right) + \left(\frac{\text{Trigger}}{\text{CET1}}\right)^{-1} \Phi\left(\frac{\log\left(\frac{\text{Trigger}}{\text{CET1}}\right) - \frac{\sigma^2_{\text{CET1}}}{2}T}{\sigma_{\text{CET1}}\sqrt{T}}\right) \tag{16.18}$$

with the notation retained as in equation (16.15), completed by

Trigger – CET1 Trigger level,
σ_{CET1} – volatility of the CET1 ratio,
CET1 – current CET1 ratio.

Starting with the CoCo price – or the equivalent spread quotation using equations (16.17) and (16.18) – we get implied CET1 volatility: $\sigma^{\text{implied}}_{\text{CET1}}$. Computation becomes easier in case of full write-down CoCos, as the recovery ratio is then equal to 0. When it comes to CoCos with equity conversion, the recovery ratio value must be approximated using a share-price-based S^* trigger.

According to De Spiegeleer et al. (2015a), it is an efficient way to obtain an implied level for the CET1 volatility. The numerical results show how different contingent convertibles issued by the same bank and sharing

a similar contractual CET1 trigger have almost identical implied CET1 volatility levels.

The distance to trigger is the number of CET1 standard deviations (volatilities) from the trigger level. Its estimation may allow for the comparison between Tier 1 and Tier 2 CoCos and help to determine a coupon cancellation trigger, which is an implied CET1 level below which the CoCo issuer will not pay out a coupon.

16.5. Equity derivatives method

The *equity derivatives* model is another market-based approach proposed by De Spiegeleer and Schoutens (2012). Starting with CDS spreads, CoCo price and share price together with their implied volatilities market quotations, we solve for the threshold stock price value (S^*), corresponding with the issuer's CET1 ratio trigger level.

A CoCo is decomposed into a straight corporate bond with components of exotic stock options. The embedded straight bond pays off regularly k coupons of c_i at t_i moments and nominal value N at maturity T. The CoCo issuer's share price value drop below the S^* barrier triggers a contingent conversion, and the bondholders lose their claim to receiving bond coupons and nominal. This is equivalent to a short position in a series of binary down-and-in barrier options expiring at consecutive moments where the CoCo coupons and nominal are due. At forced conversion, the bondholder receives C_r shares, which is in fact a binary asset-or-nothing down-and-in option (De Spiegeleer et al., 2015b).

The following is the formula for CoCo pricing:

$$\begin{aligned} P = {} & \text{straight corporate bond} - N \text{ binary down-and-in options} \\ & - \sum_i c_i \times \text{binary down-and-in} + C_r \\ & \times \text{binary asset-or-nothing down-and-in stock option.} \end{aligned}$$

Using a binary stock option Black–Scholes pricing methodology (as given by Haug, 2007), we finally get

$$\begin{aligned} P = {} & N \exp(-r(T-t)) + \sum_{i=1}^{k} c_i \exp(-r(t_i - t)) \\ & - N \exp(-r(T-t)) \left[\Phi\left(-x_1 + \sigma\sqrt{T-t}\right) + (S^*/S)^{2\lambda-2} \Phi\left(y_1 - \sigma\sqrt{T-t}\right) \right] \\ & - \sum_i c_i \exp(-r(t_i - t)) \left[\Phi\left(-x_{1i} + \sigma\sqrt{t_i - t}\right) + (S^*/S)^{2\lambda-2} \Phi\left(y_{1i} - \sigma\sqrt{t_i - t}\right) \right] \\ & + C_r \times S^* \left[\left(\frac{S^*}{S}\right)^{a+b} \Phi(z) + \left(\frac{S^*}{S}\right)^{a-b} \Phi\left(z - 2b\sigma\sqrt{T-t}\right) \right], \end{aligned}$$

where:

q: continuous dividend yield,
r: continuously compounded risk-free interest rate,
σ: stock return volatility,
$T - t$: maturity of the contingent convertible (in years),
S: current market CoCo issuer's stock price,
$\Phi(x)$ – cumulative distribution function of a normal standard distribution, hence the probability of the random variable X being larger or equal x: $P(x \leq X)$,

with

$$z = \frac{\log(S^*/S)}{\sigma\sqrt{T-t}} + b\sigma\sqrt{T-t} \qquad x_1 = \frac{\log(S/S^*)}{\sigma\sqrt{T-t}} + \lambda\sigma\sqrt{T-t}$$

$$a = \frac{r - q - \frac{1}{2}\sigma^2}{\sigma^2} \qquad y_1 = \frac{\log(S^*/S)}{\sigma\sqrt{T-t}} + \lambda\sigma\sqrt{T-t}$$

$$b = \frac{\sqrt{\left(r - q - \frac{1}{2}\sigma^2\right)^2 + 2r\sigma^2}}{\sigma^2} \qquad x_{1i} = \frac{\log(S/S^*)}{\sigma\sqrt{t_i - t}} + \lambda\sigma\sqrt{t_i - t}$$

$$\lambda = \frac{r - q + \sigma^2/2}{\sigma^2} \qquad y_{1i} = \frac{\log(S^*/S)}{\sigma\sqrt{t_i - t}} + \lambda\sigma\sqrt{t_i - t}.$$

Assuming a full write-down CoCo, then the C_r value is 0.

16.6. The Deutsche Bank CoCo's pricing – a case study

The Deutsche Bank AG executed two transactions to issue AT1 notes with a total volume of €4.7 billion, one in May and one in November 2014. These transactions materially completed the overall targeted volume of approximately €5 billion of CRR/CRD 4 compliant Additional Tier 1 capital which was planned to be issued by the end of 2015.[3]

- On May 20, 2014, Deutsche Bank AG issued undated CoCos with an equivalent value of €3.5 billion. The offering consisted of three tranches: a €1.75 billion tranche with a coupon of 6%, a $1.25 billion tranche with a coupon of 6.25% and a £650 million tranche with a coupon of 7.125%. All tranches were priced at an issue price of par (100%) or greater. The denominations of the individual notes were €100,000, $200,000 and £100,000, respectively.

The AT1 notes take the form of participatory notes with temporary write-down at a trigger level of 5.125% phase-in Common Equity Tier 1 capital ratio.[4] Upon the occurrence of a trigger event, a write-down shall be effected *pro rata* with all other Additional Tier 1 instruments. For this purpose, the total amount of the write-downs shall be equal to the amount required to fully restore the CET1 ratio of the issuer.

The CoCos were issued with attached warrants, excluding shareholders' pre-emptive rights. Each AT1 CoCo carried one warrant, entitling the owner to purchase one common share in Deutsche Bank AG. Warrants to subscribe for a total of 30,250 shares from all three tranches, which had originally been attached to the notes, were detached by an initial subscriber. The warrants expired in the fourth quarter of 2014 and had not been exercised.

The bank has the right, in its sole discretion, to cancel all or part of any payment of interest, including (but not limited to) if such cancellation is necessary to prevent the bank's Common Equity Tier 1 capital ratio from falling below 5.125%.

- On November 18, 2014, Deutsche Bank placed undated Additional Tier 1 Notes with a principal amount of $1.5 billion (€1.2 billion equivalent). As with the AT1 Notes issued in May 2014, the securities are subject to a write-down provision if Deutsche Bank's Common Equity Tier 1 capital ratio (under the phase in rules) falls below 5.125% and are subject to other loss-absorption features pursuant to the applicable capital rules. The AT1 notes did not have attached warrants.

Further analysis will refer to the euro-denominated tranche of Deutsche Bank's first CoCo issuance of May 2014. Table 16.1 contains the already-mentioned bond characteristics as well as a price quotation as of July 28, 2015. We will calculate the implied trigger S^{*}_{impl} complying with the credit derivatives and equity derivatives valuation models.

Both methods are based on the assumption that there is strong interdependency between an issuer's stock price and the CET1 ratio. One may use the Black–Scholes approach to assess the implied value of the stock price level triggering a CoCo.

The following inputs on July 28, 2015 are required: dividend yield = 2%; Deutsche Bank stock price volatility = 38%; risk-free interest rate = 1.58%; Deutsche Bank stock price = €30; CDS spread = 89.15; CDS Recovery Rate = 40%.

Table 16.1 The Deutsche Bank AT1 EUR denominated CoCo bond characteristics on July 28, 2015

Issuer	**Deutsche Bank AG**
ISIN	DE000DB7XHP3
Coupon	6.00%
First call date	April 30, 2020
Issue date	May 20, 2014
Pricing date	July 28, 2015
Par value	EUR 100,000
Bond price (clean)	98.98
Accrued interest	1.51
Bond price (dirty)	101.48
Issue size	1,750,000,000

Source: Own study

The yield to call (YTC) of the bond was 442 basis points (asset swap spread). Applying the credit derivatives method, the implied trigger $S^{*}_{\text{implCD}} = 6.45$ EUR while the equity derivatives method yields the output of $S^{*}_{\text{implED}} = 5.33$ EUR. It means that according to this estimation, the Deutsche Bank CoCo bond may be triggered if the issuer's share price drops by more than two times during its annual volatility (measured by return standard deviation). Through this perspective, one should view both the models as producing very similar results.

17
Structural Model for Corporate Hybrid Valuation

The structural approach enables pricing subordinated tranches of debt and therefore will be applied in this chapter. The model presented here was specified by Jaworski, Liberadzki and Liberadzki (2015b).

Valuation of a hybrid instrument is a complicated task. First of all there is an overwhelming lack of data to calibrate properly the stochastic model. Therefore one has to base one's conclusions on simplified models which are not robust enough to produce reasonable approximations.

To familiarize the reader with the complexity of the problem, we present in this section a simplified approach to estimating the price of a hybrid bond based only on the following input data:

- the price, nominal value and coupons of the senior bonds;
- the nominal value of the hybrid bond and its deferrable coupons;
- the nominal value of the emission of both the senior and hybrid bonds;
- the yield to maturity of the government bonds; and
- the market capitalization of the issuer of the bonds.

Furthermore, we assume that all three types of bonds are fixed-rate bonds. In the following section, we will restrict ourselves to hybrid instruments such that:

- the repayment of the capital has a subordinate status and
- the coupons are deferrable; in case of distress, the payments of coupons may be ceased.

To value a hybrid instrument one has to split it into three components and price each of them separately. The main component is the

subordinated payment at the day of maturity. The other two are the deferrable payments of coupons prior to maturity and the right of the issuer to pay back the debt before the maturity.

Subordinated debt (also known as subordinated loan, subordinated bond, subordinated debenture or junior debt) is a debt which ranks after other debts, that is, has a subordinate status, should a company fall into liquidation or bankruptcy.

Subordinated loans typically have a higher yield than senior debt. We will discuss some methods of determining the fair price of subordinated bonds with respect to the price of senior bonds. The approach is based on the fact that the zero coupon bond might be considered as an option to improve the welfare of the company. Therefore, our task is to compare the prices of two options with different strikes:

- If the welfare A is greater than the higher threshold K_1 then both the senior and subordinate bonds are paid completely.
- If the welfare A is between the lower and higher thresholds the senior bond is paid completely, while the payment of the subordinated bond is proportional to the difference $A - K_2$.

When the welfare is below both of the thresholds then the senior bond is paid proportionally to A and the payment of the subordinated bond is ceased.

$$D_{\text{senior}} = \begin{cases} 1 & \text{when} \quad A > K_2, \\ \dfrac{A}{K_2} & \text{when} \quad 0 \le A \le K_2. \end{cases}$$

$$D_{\text{subordinate}} = \begin{cases} 1 & \text{when} \quad A > K_1, \\ \dfrac{A - K_2}{K_1 - K_2} & \text{when} \quad K_2 \le A \le K_1, \\ 0 & \text{when} \quad A \le K_2. \end{cases}$$

From the price of the senior bond that is linked with the put option with strike K_1, we get the implied volatility σ_{implied}. Next based on σ_{implied} we value the put option with strike K_2, hence also the subordinate bond.

The issuer may cease the coupon interest payments when there is no surplus in the time period from the previous coupon date. Therefore, the deferrable coupons may be considered as binary options on the increase

of the welfare in a given period of time. The payment of the *i*-th coupon is equal to

$$CF_i = \begin{cases} c & \text{when} \quad A_{T_i} > A_{T_{i-1}}, \\ 0 & \text{when} \quad A_{T_i} \le A_{T_{i-1}}, \end{cases}$$

where c is the par value of the coupon and T_i are the dates of the payments of coupons.

The right to redeem the contract earlier is modeled as an American or Bermuda option on the contract market value. The issuer is exercising the option when the market value of the contract is higher than its par value.

17.1. The model

Let A_t be the welfare of the company at time t, $t \ge 0$. We model it as a stochastic process on some probability space (Ω, M, P). The flow of information is described by a filtration of σ-fields $(\mathcal{F}_t)_{t \ge 0}$

$$\mathcal{F}_0 \subset \mathcal{F}_t \subset \mathcal{F}_s \subset \mathcal{M}, \quad 0 < t < s.$$

We assume that A_t is $\mathcal{F}_t$ measurable, that is, the stochastic process A_t is adapted to the filtration $\mathcal{F}$.

Following the classical asset value model introduced by Merton, we assume that the loans can be traded. For example, the money was raised by issuing corporate bonds. Thus we assume that the loans have 'market value'. For simplicity we split the loans' obligations into separate cash flows. We value each cash flow separately. Let D^i be the price process of the *i*-th loan obligation. We model it as a stochastic process adapted to the filtration $\mathcal{F}$.

$$D_t^i = \begin{cases} \text{the market value of } i\text{-th loan obligation at time } t & \text{for } 0 < t < T_i, \\ \text{the cash flow at time } t & \text{for } t = T_i, \\ 0 & \text{for } t > T_i. \end{cases}$$

The difference between the welfare and the market value of debt obligations is the market value of 'equity'

$$E_t = A_t - \sum_{i=1}^{n} D_t^i. \tag{17.1}$$

When our firm is a joint-stock company and the stocks are traded on the market, then E_t is given as a product of the number of issued shares and their price.

Market prices are governed by the pricing probability Q, the so-called risk-neutral measure. For $0 \le t < T_i$ we have

$$D_t^i = \mathbb{E}_{\mathbb{Q}}\left(\exp\left(-\int_t^{T_i} r_s ds\right) D_{T_i}^i \mid \mathcal{F}_t\right),$$

where r_t denotes the process of the risk-free interest rates, which is adapted to the filtration $\mathcal{F}$.

We assume that A_t is a left continuous stochastic process with jumps at the days of payment of the debt obligations and the issuance of new debts. Furthermore, we assume that under the pricing measure Q, in the periods between the jumps times, the process A_t follows the stochastic equation

$$dA_t = A_t + A_t \sigma_t dW_t, \tag{17.2}$$

where W_t is the underlying Brownian motion and σ_t is a volatility process.

17.2. Last maturity case

Let T be the last maturity of the existing debt obligations. We assume that, at the moment, the market is not expecting the new issues of longer maturity. Furthermore, we restrict ourselves to the case when there are two (aggregated) loans, one senior (D^2) and one subordinated (D^1), consisting of respectively n_2 and n_1 corporate bonds. Let K_2 and $K_1 - K_2$ be the amounts to be paid; they consist of the par values of bonds and their last coupons.

At the maturity time T the owner of the senior bond will receive K_2/n_2 when the welfare A_T exceeds K_2 and A_T/n_2 when $A_T \le K_2$ (the company is defaulting). So we can describe the payment as a contingent claim

$$N^2 = \frac{1}{n_2}[A_T - (A_T - K_2)^+].$$

Due to the Rule of One Price we see that its value at time t, $0 \le t < T$, equals

$$N_t^2 = \frac{1}{n_2}[A_T - D_t' - C_t(A_T - D_t', K_2, T)],$$

where D'_t is the market price of debts of shorter maturity and $C_t(A, K, T)$ is the price at time t for the European call option on welfare with strike K, maturity T and the price of basic instrument A. We recall that

$$C_t(A,K,T) = \mathbb{E}_{\mathbb{Q}}\left[\exp\left(-\int_t^T r_s ds\right)(A_T - K)^+ \mid \mathcal{F}_t\right].$$

Finally the market value of the senior debt amounts to

$$D_t^2 = A_t - D'_t - C_t(A_t - D'_t, K_2, T). \tag{17.3}$$

The owner of the subordinate bond, at the maturity time T, will receive $(K_1 - K_2)/n_1$ when the welfare A_T exceeds K_1, 0 when $A_T \le K_2$ and $(A_T - K_2)/n_1$ otherwise. So we can describe the payment as a contingent claim

$$N^1 = \frac{1}{n_1}[(A_T - K_2)^+ - (A_T - K_1)^+].$$

Due to the Rule of One Price we see that its value at time t, $0 \le t < T$, equals

$$N_t^1 = \frac{1}{n_1}[C_t(A_T - D'_t,\, K_2,\, T) - C_t(A_T - D'_t,\, K_1,\, T)].$$

Finally, the market value of the subordinate debt amounts to

$$D_t^1 = C_t(A_t - D'_t,\, K_2,\, T) - C_t(A_t - D'_t,\, K_1,\, T). \tag{17.4}$$

Comparing equations (17.1) and (17.4) we get the following formula for E_t:

$$E_t = A_t - D'_t - D_t^2 = C_t(A_t - D'_t, K_1, T). \tag{17.5}$$

Since the market value of 'other' debts D'_t equals

$$D'_t = A_t - D_t^1 - D_t^2 - E_t,$$

it can be eliminated from our equations. We get

$$\begin{aligned}
E_t &= C_t(E_t + D_t^1 + D_t^2, K_1, T),\\
D_t^1 &= C_t(E_t + D_t^1 + D_t^2, K_2, T) - C_t(E_t + D_t^1 + D_t^2, K_1, T),\\
D_t^2 &= E_t + D_t^1 + D_t^2 - C_t(E_t + D_t^1 + D_t^2, K_2, T),
\end{aligned}$$

which are equivalent to the following two equations:

$$E_t = C_t(E_t + D_t^1 + D_t^2, K_1, T),$$
$$E_t + D_t^1 = C_t(E_t + D_t^1 + D_t^2, K_2, T). \tag{17.6}$$

Such general model assumptions are enough to imply that the subordinated debt is cheaper than the senior one; that is, for any moment t before the maturity

$$\frac{D_t^1}{K_1 - K_2} \leq \frac{D_t^2}{K_2}.$$

Usually the stocks and senior bonds are much more liquid then the subordinated bonds. Therefore it would be useful to have an algorithm giving the approximated value of the subordinated bond as a function of the prices of stocks and senior bonds. Based on the fact that the Black–Scholes formula gives a reasonable approximation of the price of a European option, we make the following interpolation assumption:

> *The Black–Scholes implied volatilities of call options on welfare with strikes K_1 and K_2 are equal to each other when the rate r is given by the yield to maturity of the fixed income government bonds with maturity T.*

Note that the assumption is valid when, for example, the stochastic process $E_t + D_t^1 + D_t^2$ is a geometric Brownian motion as in the Black–Scholes option pricing model. In models close to the Black–Scholes one the above assumption serves as a good approximation, especially when based on the market prices of the liquid instruments we want to derive the price of the illiquid ones.

The interpolation assumption allows us to rewrite equations (17.6) in the following way:

$$E_t = (E_t + D_t^1 + D_t^2)N(d_1^+) - K_1 e^{-r(T-t)}N(d_1^-),$$
$$E_t + D_t^1 = (E_t + D_t^1 + D_t^2)N(d_2^+) - K_2 e^{-r(T-t)}N(d_2^-). \tag{17.7}$$

$r \geq 0$ denotes the market, risk-free interest rate, N is the cumulative distribution function of a normal standard distribution $N(0, 1)$ and for $i = 1, 2$

$$d_1^{\pm} = \frac{1}{\sigma\sqrt{T-t}} \ln\left(\frac{E_t + D_t^1 + D_t^2}{K_i \exp(-r(T-t))}\right) \pm \frac{1}{2}\sigma\sqrt{T-t},$$

where $\sigma > 0$ is the volatility.

Since for fixed K_1, K_2, r, $T - t$, E_t and D_t^2 the system of non-linear equations (equation 17.7) has just one solution $(D_t^1 \sigma)$ (see Appendix, Lemma 2), we can calculate (numerically) D_t^1 for the given K_1, K_2, r, $T - t$, E_t and D_t^2.

17.3. Valuation of deferrable coupons

We restrict ourselves to the case when the coupons are paid only when the welfare of the issuer of a bond has increased in a given period of time before the contingent payment. For simplicity we assume that the deferrable payments are scheduled once a year; one year before maturity, two years before maturity and so on. So we can describe the payment of the coupon as a contingent claim being a left-side derivative of the call option payment

$$CF_{i,T-i} = c\,\|_{A_{T-i} > A_{T-i-1}} = -c\left(\frac{\partial}{\partial K}\left(A_{T-i} - K\right)^+\right)_{|K = A_{T-i-1}}.$$

Hence its price at time t, $T - i - 1 \le t < T - i$, is

$$CF_{i,t} = \mathbb{E}_{\mathbb{Q}}\left(\exp\left(-\int_t^{T-i} r_s ds\right) CF_{i,T-i} \mid \mathcal{F}_t\right) = -c\,\frac{\partial}{\partial K} C_t\left(A, A_{T-i-1}, T-i\right).$$

For $t < T - i - 1$ we get

$$\begin{aligned} CF_{i,t} &= \mathbb{E}_{\mathbb{Q}}\left(\exp\left(-\int_t^{T-i-1} r_s ds\right) CF_{i,T-i-1} \mid \mathcal{F}_t\right) \\ &= \mathbb{E}_{\mathbb{Q}}\left(-c\exp\left(-\int_t^{T-i-1} r_s ds\right)\frac{\partial}{\partial K} C_{T-i-1}(A, A_{T-i-1}, T-i) \mid \mathcal{F}_t\right). \end{aligned}$$

When we extend our interpolation principle for coupons, we get for $t \le T - i - 1$

$$CF_{i,t} = \exp(-(T-i-1-t)r)cN(d_3^-), \quad d_3^- = \frac{r}{\sigma} - \frac{1}{2}\sigma,$$

where σ is the implied volatility calculated for senior bonds.

Appendix

Proofs and auxiliary results

We keep the notation and assumptions used in the chapter.

1. **Lemma 1** *The Rule of One Price implies that for any* $t \in [0, T]$

$$\frac{D_t^1}{K_1 - K_2} \le \frac{D_t^2}{K_2}.$$

2. *Proof.*
It is enough to observe that for any positive γ if one buys $\gamma(K_1 - K_2)\, n_2$ senior bonds, then the outcome is better than if one buys $\gamma K_2 n_1$ subordinated bonds. Indeed:

$$\begin{aligned}\gamma(K_1 - K_2)n_2N^2 - \gamma K_2 n_1 N^1 &= \gamma(K_1 - K_2)(A_T - (A_T - K_2)^+) \\ &\quad - K_2[(A_T - K_2)^+ - (A_T - K_1)^+] \\ &= \gamma[K_1(A_T - (A_T - K_2)^+) - K_2(A_T - (A_T - K_1)^+)] \ge 0.\end{aligned}$$

Hence the price for $\gamma(K_1 - K_2)n_2$ is higher than the price for $\gamma K_2 n_1$ subordinated bonds

$$\gamma(K_1 - K_2)D_t^2 \ge \gamma K_2 D_t^1.$$

Hence

$$D_t^1 \le \frac{K_1 - K_2}{K_2} D_t^2.$$

3. **Lemma 2** *Let* $K_1 > K_2 > 0$, $r \ge 0$, $t < T$, $E > 0$ *and* $0 < D^2 < K_2 \exp(-r(T - t))$ *be fixed parameters. Then the system of equations*

$$E = (E + D^1 + D^2)N(d_1^+) - K_1 e^{-r(T-t)} N(d_1^-), \tag{17.8}$$

$$E + D^1 = (E + D^1 + D^2)N(d_2^+) - K_2 e^{-r(T-t)} N(d_2^-),$$

$$d_i^{\pm} = \frac{1}{\sigma\sqrt{T-t}} \ln\left(\frac{E + D^1 + D^2}{K_i \exp(-r(T-t))}\right) \pm \frac{1}{2}\sigma\sqrt{T-t}. \tag{17.9}$$

has a unique solution (D^1, σ). *Moreover* D^1 *belongs to the interval* $(0, D^2 (K_1 - K_2)/K_2)$ *and* σ *to* (σ_0^+, σ_0^-), *where* σ_0^+, *and* σ_0^- *are respectively solutions of equations (17.8) and (17.9) for* $D^1 = 0$.

4. *Proof.*
For simplicity we put

$$k_1 = K_1 \exp(-r(T-t)), \quad k_2 = K_2 \exp(-r(T-t)) \quad \text{and} \quad \hat{\sigma} = \sigma\sqrt{T-t}.$$

Let $\hat{\sigma}_1(D^1)$ be a solution of the functional equation

$$E = (E + D^1 + D^2)N(d_1^+) - k_1 N(d_1^-),$$
$$d_1^{\pm} = \frac{1}{\hat{\sigma}_1(D^1)} \ln\left(\frac{E + D^1 + D^2}{k_1}\right) \pm \frac{1}{2}\hat{\sigma}_1(D^1).$$

We observe that $\hat{\sigma}_1(D^1)$ is strictly increasing. Indeed it is differentiable, and taking the derivative of the Black–Scholes formula we get

$$N(d_1^+) + (E + D^1 + D^2)N'(d_1^+)\hat{\sigma}_1'(D^1) = 0.$$

Hence the derivative $\hat{\sigma}_1'$ is negative. Furthermore

$$\hat{\sigma}_1(0) = \sigma_0^+\sqrt{T-t}, \quad \hat{\sigma}_1(k_1 - D^2) = 0.$$

Hence $\hat{\sigma}_1$ is strictly decreasing on the interval $[0.k_1 - D^2]$.

Analogically let $\hat{\sigma}_2(D^1)$ be a solution of a functional equation

$$E + D^1 = (E + D^1 + D^2)N(d_2^+) - k_1 N(d_2^-),$$
$$d_2^{\pm} = \frac{1}{\hat{\sigma}_2(D^1)} \ln\left(\frac{E + D^1 + D^2}{k_2}\right) \pm \frac{1}{2}\hat{\sigma}_2(D^1).$$

We observe that $\hat{\sigma}_2(D^1)$ is strictly increasing. Indeed it is differentiable, and taking the derivative of the Black–Scholes formula we get

$$N(d_2^+) + (E + D^1 + D^2)N'(d_2^+)\hat{\sigma}_2'(D^1) = 1.$$

Hence the derivative $\hat{\sigma}_1'$ is positive. It is also bounded. For $D^1 > k_2 - E - D^2$ we have

$$\hat{\sigma}_2'(D^1) = \frac{1 - N(d_2^+)}{(E + D^1 + D^2)N'(d_2^+)} \leq \frac{1}{(E + D^1 + D^2)d_2^+}$$
$$\leq \frac{1}{(E + D^1 + D^2)\sqrt{2\ln(E + D^1 + D^2)}}.$$

Hence $\hat{\sigma}_2$ is strictly increasing on the half line $[0, +\infty)$. Furthermore

$$\hat{\sigma}_2(0) = \sigma_0^- \sqrt{T - t}.$$

Since the Black–Scholes price for the call option is decreasing when strike is increasing and increasing when volatility is increasing, we get that

$$\sigma_0^- < \sigma_0^+.$$

Hence the graphs of $\hat{\sigma}_1$ and $\hat{\sigma}_2$ intersect at just one point

$$(D^1, \sigma) \in (0, k_1 - D^2) \times (\sigma_0^-, \sigma_0^+).$$

The range of D^1 can be improved. From Lemma 1 it follows that

$$D_t^1 \leq \frac{K_1 - K_2}{K_2} D_t^2.$$

This concludes the proof.

18
Hybrid Securities' Impact on Risk

18.1. Overview

Financial hybrids were introduced by Basel II together with the tier-based structure of capital. This system has failed in the sense that it did not provide a sufficient level of loss-absorption capacity on a going-concern basis. One of the reasons for this was that hybrids did not embed contingent conversion. Post-crisis rules and regulations implemented enhanced levels of capital in general. Apart from quantitative effects, one may point to qualitative gains that have been achieved from the issuance of CoCos. The issuing of CoCos may improve solvability if these bonds are properly structured. We will present a model showing how a CoCo may improve total solvability of an individual issuer, also taking into account the relatively higher interest CoCos pay in comparison to senior debt notes.

There is another side of the coin, however: where some risks are diminished, others may unexpectedly come up. The introduction of an innovative, yet untested instrument gives rise to new risks that are not necessarily reflected properly in pricing.

Some risks were already mentioned in the book (e.g. extension risk, conversion and write-down risk, and coupon cancellation – see section 13.3.2). Apparently market participants are aware of those risks. In March 2014 Danske issued €750 million worth of PWD high-trigger CoCos with a 5.75% coupon. However, at that time the CET1 ratio was 15%, far above the CoCo trigger point. Investors accepted this offer and demanded a yield of 7.5%, which is very high compared to other similarly credit rated bonds as an offset for write-downs fears. At the same time, ten-year dollar bonds issued by the Ivory Coast, the politically troubled African country that saw some of its debt written off in 2009, yielded about 6% (Turner, 2014).

The most prominent risk to be considered may also be one of the most obscure – the contagion risk, that is, the risk of negative shocks being transmitted throughout the financial system during times of systemic stress.

One can say that contagion risk is accounted for by regulators, and that one of the risk-spreading channels has already been discovered and prevented by regulators (see section 4.3). Nevertheless, there is a still a threat that the potential for contagion risk remains undiscovered and not fully reflected in the pricing of CoCos. As shown in the previous chapter, CoCos' structural and market valuation models are based on classic asset-dynamics assumptions. They work well during tranquil (or 'normal') time periods, but may catastrophically underestimate the probability of extreme events.

Therefore, the bond contagion measuring methodology will be proposed in the final sections of this chapter.

18.2. Impact of new CoCos on issuer's solvability

18.2.1. Introductory remarks

There has been voluminous research regarding how new CoCos impact the risk that may have to be absorbed by the issuing financial institution.

Two types of conclusions were generally drawn: on the one hand, the issuance of CoCos instead of senior unsecured debt increases the financial stability of banks. One the other hand, the way a CoCo is structured (which includes such factors as whether it has a PWD or an equity conversion clause; the value of its conversion ratio; and bondholders' equity share after conversion) may have an impact on the risk-taking incentives of stockholders. Hilscher and Raviv (2014) conclude that a high conversion ratio significantly reduces the risk propensity of stockholders and issuers' management.

An analysis of the effect of CoCo issuance on the pricing of senior unsecured debt suggests that a bank with write-down CoCos is perceived by senior bondholders to be riskier when compared with non-issuers, and this is reflected by a significantly larger increase in CDS spreads (ECB, 2014).

De Spiegeleer et al. (2015b) found that the new CoCo issue causes two opposite effects on the issuer's existing CoCo prices: on one hand, the issuer's solvability and capital ratio increase, thus positively affecting existing CoCos. But there is also a counter effect: since the

supply of CoCos rises, the existing 'off-the-run' CoCos become less attractive for the investors than the brand new 'on-the-run' securities. What is interesting here is that the latter negative effect typically prevails.

We will discuss the problem of the solvability of a bank or an insurance company from the point of view of the supervising institution. The approach has been coined by Jaworski, Liberadzki and Liberadzki (2015c). From a supervision authority's perspective, it is a matter of indifference whether a CoCo contains write-down or conversion clauses. Therefore we will deal with the following characteristics of the issuer:

- the welfare process A_t understood as a market value of all the assets owned by the company in case of its liquidation at a moment t;
- the debt process D_t understood as an aggregated amount which would be chargeable in case of liquidation of the company at t due to all its debts and other liabilities.

The surplus of the welfare process A_t over the debt process D_t indicates the solvability of the company.

We denote by E_t the surplus (net welfare) process

$$E_t = A_t - D_t.$$

Note that when the company is in a good shape then E_t coincides with the market value of the company. Hence in the case of a joint-stock company, we may approximate E_t by the capitalization of the company, that is,

$$E_t \approx NS_t,$$

where S_t is the stock price at time t of one share issued by the company and N is the total number of shares.

18.2.2. CoCos and the surplus process

We will consider two approaches to raising the money. The first approach is a classic one: the company issues corporate bonds. The second approach is modern: the company issues CoCos. Note that raising money by issuing CoCos is more expensive but still less risky from the point of view of the supervising authority. Hence there is a tradeoff: when a company is doing well the issuance of CoCos decreases the

surplus process, but when a company is doing not so well it increases this process. To explain this in greater detail we will apply the following simplified model. The model notation and assumptions are as follows:

1. T_0 is the day of issuance and T is the first subsequent day of the payment of the interest. Furthermore we assume that the CoCo is periodically triggered and T is the day of the first check.
2. We denote by C the amount of money raised by the company (the same for both strategies) and by i_1 and i_2 the interest rates respectively for bonds and CoCos, that is, the interest equals $i_1 C$ in the first case and $i_2 C$ in the second. For simplicity we assume that the nominal value of the debt in both cases equals C.
3. We denote by A_t^i, D_t^i and E_t^i the wealth, debt and surplus processes for the first ($i = 1$) and the second ($i = 2$) strategies.
4. Since the CoCos are most often triggered when the share market price falls below some level, say k, and the surplus process coincides with the capitalization of the company, we assume that the CoCo is triggered when the surplus process E_T^2, calculated after the cash flows, falls below some threshold (strike) K, where $K = Nk$. Putting it another way, we assume that in the case of conversion of the CoCos at time T only the nominal is affected, and the interest remains chargeable.

Our goal is to compare the surplus processes after the checking of the trigger. We denote them by E_{T+}^i.

We have the following equalities before 'triggering'.

$$A_T^2 = A_T^1 + (i_2 - i_1)C \quad \text{and} \quad D_T^2 = D_T^1.$$

Hence

$$E_T^2 = A_T^2 - D_T^2 = A_T^1 - (i_2 - i_1)C - D_T^1 = E_T^1 - (i_2 - i_1)C.$$

We obtain that the triggering condition $E_T^2 < K$ is equivalent to

$$E_T^1 < K + (i_2 - i_1)C.$$

After checking the trigger we get

$$E_{T+}^1 = E_T^1 = A_T^1 - D_T^1.$$

While

$$E^2_{T+} = \begin{cases} E^1_T - (i_2 - i_1)C & \text{when} \quad E^1_T \geq K + (i_2 - i_1)C, \\ E^1_T + (1 - i_2 + i_1)C & \text{when} \quad E^1_T < K + (i_2 - i_1)C. \end{cases}$$

The function describing the dependence of E^2_{T+} on E^1_T is discontinuous and not monotonic (see Figure 18.1).

18.2.3. CoCos and Value-at-Risk calculation

Now we show how the issuance of CoCos instead of corporate bonds affects the Value-at-Risk (VaR) calculations. We keep the notation from the previous section. Let X^i denote the change of the surplus (net wealth) in the time period $[T_0, T]$, due to the i-th strategy.

$$X^1 = E^1_{T+} - E_{T_0}, \quad X^2 = E^2_{T+} - E_{T_0},$$

where E_{T_0} is the surplus prior to the issuance.

We recall that VaR of random variable Y modeling a position and a given significance level $\alpha \in (0,1)$ is defined as follows:

$$\mathrm{VaR}_\alpha(Y) = \inf\{\upsilon \in \mathbb{R} : \mathbb{P}(Y + \upsilon \leq 0) < \alpha\}.$$

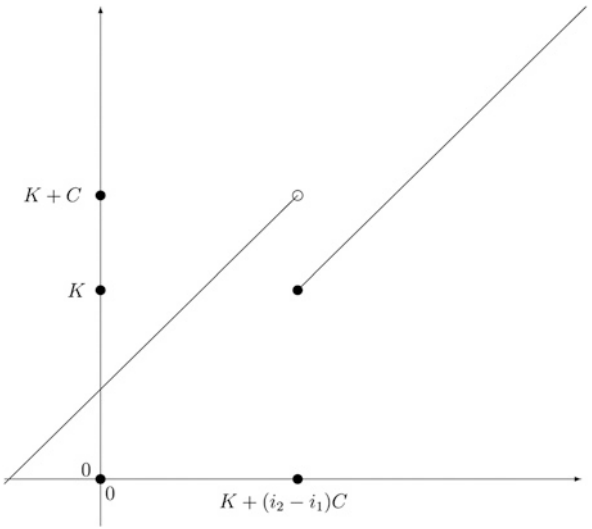


Figure 18.1 Graph of E^2_{T+} as a function of E^1_T

The above can be expressed in terms of quantiles:

$$\mathrm{VaR}_\alpha(Y) = -Q^+_\alpha(Y).$$

For more details concerning VaR the reader is referred to Follmer and Schied (2004) or Jorion (2007). Although the dependence between E^2_{T+} and E^1_{T+} is not monotonic in general, it is monotonic in intervals; therefore, we get the following estimates.

1. **Theorem 1** *Let α be a fixed significance level. Then the following estimates hold:*

- $VaR_\alpha(X^2) = VaR_\alpha(X^1) - (1 - i_2 + i_1)C$ *when*
$$VaR_\alpha(X^1) \geq E_{T_0} - K + (1 - i_2 + i_1)C;$$
- $E_{T_0} - K \geq VaR_\alpha(X^2) \geq VaR_\alpha(X^1) - (1 - i_2 + i_1)C$ *when*
$$E_{T_0} - K + (1 - i_2 + i_1)C > VaR_\alpha(X^1) \geq E_{T_0} - K - (i_2 - i_1)C;$$
- $VaR_\alpha(X^1) + (i_2 - i_1)C \geq VaR_\alpha(X^2) \geq E_{T_0} - K - C$ *when*
$$E_{T_0} - K - (i_2 - i_1)C > VaR_\alpha(X^1) \geq E_{T_0} - K - (1 + i_2 - i_1)C;$$
- $VaR_\alpha(X^2) = VaR_\alpha(X^1) + (i_2 - i_1)C$ *when*
$$E_{T_0} - K - (1 + i_2 - i_1)C > VaR_\alpha(X^1).$$

2. *Proof.*
X_2 depends on X_1 in a similar way as E^2_{T+} on E^1_{T+}. We have

$$X^2 = f(X_1),$$

where for $x \in \mathbb{R}$

$$f(x) = \begin{cases} x - (i_2 - i_1)C & \text{for} \quad x \geq K - E_{T_0} + (i_2 - i_1)C, \\ x + (1 - i_2 + i_1)C & \text{for} \quad x < K - E_{T_0} + (i_2 - i_1)C. \end{cases}$$

We derive from f two continuous non-decreasing piece-wise linear functions f_1 and f_2 defined for $x \in \mathbb{R}$ by

$$f_1(x) = \begin{cases} x - (i_2 - i_1)C & \text{for} \quad x \geq K - E_{T_0} + (i_2 - i_1)C, \\ K - E_{T_0} & \text{for} \quad K - E_{T_0} + (i_2 - i_1)C > x \geq K - E_{T_0} + (-1 + i_2 - i_1)C, \\ x + (1 - i_2 + i_1)C & \text{for} \quad x < K - E_{T_0} + (-1 + i_2 - i_1)C, \end{cases}$$

$$f_2(x) = \begin{cases} x - (i_2 - i_1)C & \text{for} \quad x \geq K - E_{T_0} + (1 + i_2 - i_1)C, \\ K + C - E_{T_0} & \text{for} \quad K - E_{T_0} + (1 + i_2 - i_1)C > x \geq K - E_{T_0} + (i_2 - i_1)C, \\ x + (1 - i_2 + i_1)C & \text{for} \quad x < K - E_{T_0} + (i_2 - i_1)C. \end{cases}$$

Since $f(K - E_{T_0} + (i_2 - i_1)) = K - E_{T_0}$ and $f(K - E_{T_0} + (i_2 - i_1)) = K + C - E_{T_0}$, f is bounded by f_1 and f_2,

$$\forall x \in \mathbb{R} \quad f_1(x) \le f(x) \le f_2(x).$$

Since f_1 and f_2 are non-decreasing and continuous, we get following estimates:

$$\begin{aligned} -f_1(-\mathrm{VaR}_\alpha(X^1)) &= \mathrm{VaR}_\alpha(f_1(X^1)) \ge \mathrm{VaR}_\alpha(X^2) \ge \mathrm{VaR}_\alpha(f_2(X^1)) \\ &= -f_2(-\mathrm{VaR}_\alpha(X^1)). \end{aligned}$$

After rewriting the inequalities in segments where both f_1 and f_2 are linear, we get the equalities and inequalities stated in the theorem (Figure 18.2).

Based on the above theorem, one gets the following hints when the issuance of CoCos is improving VaR and when it is not. It shows that when the probability of the conversion at time T is bigger than the significance level α then independently of the size of the issuance the value of VaR_α is decreasing. Hence in the case of $\alpha = 0.01$, as suggested

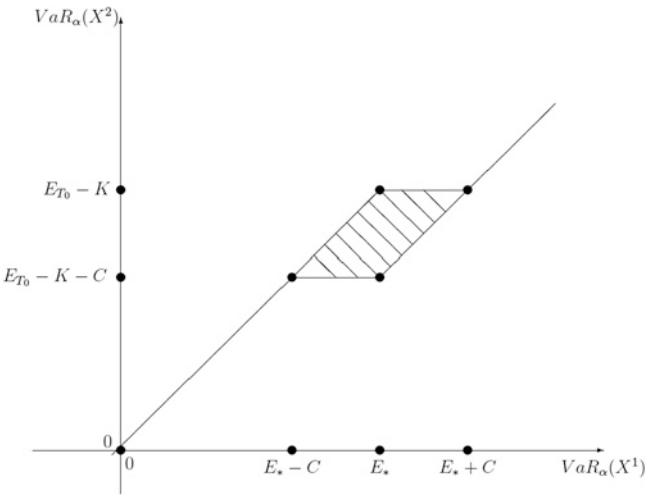


Figure 18.2 Bounds for $\mathrm{VaR}_\alpha(X^2)(E_* = E_{T_0} - K - (i_2 - i_1)C)$

by the third Basel accord, any 'reasonable' trigger will improve the performance. In more details:

3. **Corollary 1** *For a given* α

$$\begin{aligned} &\textit{if } \mathbb{P}(E_T^1 \le K) \ge \alpha \textit{ then } VaR_\alpha(X^2) \le VaR_\alpha(X^1) \\ &\textit{and if } \mathbb{P}(E_T^1 \le K + C) \le \alpha \textit{ then } VaR_\alpha(X^2) \ge VaR_\alpha(X^1). \end{aligned}$$

18.3. Introduction to market contagion

On June 14, 2012, the Swiss National Bank (SNB) criticized in its *Financial Stability Report* the low level of capitalization of Credit Suisse, urging the bank to increase its capital by suspending dividends and by raising new capital (Avdijev et al., 2013).

On the day the SNB report was published, the equity price of Credit Suisse dropped by more than 10% while the yield on the bank's Tier 2 CoCos maturing in February 2041 rose by 39 basis points. These CoCos issued on February 24, 2011, initially had a fixed coupon of 7.875%. What is important to note is that the bond is converted into equity with the CET1 conversion trigger of 7%. By comparison, the yield to maturity on non-CoCo subordinated debt with a similar remaining maturity as the CoCo increased by 23 basis points while the yields on more senior debt issues and CDS spreads hardly moved.

This incident shows that CoCo bonds are going to be the most volatile debt instruments issued by banks. What is more, CoCos with a write-down feature, not to mention coupon deferral with no dividend stopper, are in fact junior to equity. Similarly, the bail-in bonds absorb losses at distress prior to equity. One way in which some CoCo issuers have attempted to comfort investors over the prospects of being treated equally to equity, or even subordinated, is by the use of dividend stopper clauses. The problem with dividend stoppers is that they are prohibited under Basel III. The banks from outside the EU, such as the Swiss ones having the ability to include those clauses, can make their issues slightly more attractive (Wigan, 2014).

Hybrid bonds, with their coupon deferral clauses and contingent conversion features, are sensitive in case of distress. Since the banks' CoCo trigger characteristics are rather homogenous, there might be a wave of CoCo write-downs and conversions in case of a global banking contraction.

In section 2.12 we already illustrated the vulnerability of CoCo bondholders to underlying stock prices. In times of distress, CoCo investors may dynamically hedge the equity exposure embedded within a CoCo by taking an offsetting short position in the underlying shares (De Spiegeleer and Schoutens, 2013). This would unleash a self-fulfilling death spiral, accelerating the downward trajectory of a bank's shares during a crisis (International Financial Law Review, 2014).

To get the idea of the risk associated with hybrids, it is useful to apply a modern concept of contagion risk modeling.

Classic portfolio theory (the Markowitz approach and the Capital Asset Pricing Model) may lead to catastrophic risk underestimation, as these models were created to capture 'normal' market conditions; that is, they consider the value range for random variables in the middle of their distributions, thus ignoring extreme events. Moreover, not only the extreme events probability seems to be revaluated but also the linear as well as non-linear interdependence increases must be taken into account.

A vast array of techniques has been forged recently for quantifying the contagion effect. In organizing these models, we were inspired first and foremost by the approach of Jaworski (2013), Durante and Jaworski (2010) and Jaworski and Pitera (2013). The copula theory is worth the reader's attention, as it captures non-linear contagion effects.

However, there is a kind of a variety among contagion-effect definitions. It is important to stress that the contagion does not simply equal strong interdependency: the contagion requires a significant rise in the level of interdependency during times of contraction.

18.4. Market contagion – definitions

As is common in the literature, contagion is defined as the change in the way countries' own fundamentals or other factors are priced during a crisis period, that is, a change in the reaction of financial markets either in response to observable factors, such as changes in sovereign risk among neighboring countries, or due to unobservables, such as herding behavior of market participants (Beirne and Fratzscher, 2013).

The World Bank makes use of following definitions:

1. *Broad Definition*: Financial contagion is usually referred to as a cross-market transmission of shocks or the general cross-market spillover effects. It can take place both during 'good' times and 'bad' times.

Thus, contagion does not need to be related to crises. However, it is emphasized during crisis times (www.econ.worldbank.org). *Definitions of contagion*: If present, it may mitigate the benefits of diversification precisely when those benefits are needed most and have serious consequences for investors. Therefore, understanding this highly non-linear effect is of great interest not only to financial theorists but to practitioners as well (Durante and Jaworski, 2010; Jaworski and Pitera, 2013).

2. *Restrictive Definition*: Contagion is the transmission of shocks to other countries or the cross-country correlation, beyond any fundamental link among the countries and beyond common shocks. This definition is usually referred to as excess comovement, commonly explained by the concept of herding behavior (www.econ.worldbank.org). The World Bank recognizes the following categories of fundamental links: financial links,[1] real links[2] and political links.[3]
3. *Very Restrictive Definition*: Contagion occurs when cross-country correlations increase during 'crisis times' relative to correlations during 'tranquil times'. (www.econ.worldbank.org)

According to the probabilistic definition, contagion is the significant growth of the probability of shock in one country leading to the occurrence of shock in another country. For example, a company in one country fails, causing a company in another country to default.

The contagion process can be translated into three effects: (i) spillover, (ii) transmission and (iii) comovement.

Spillover: the contagion spreads as a jump process. Beyond a threshold, the changes become leap-like, often deferred, and usually strengthened by a common level of investors' stop-loss orders.

Transmission: the spread occurs continuously. The market participants' levels of stop-loss orders are usually dispersed. Positions are closed at different times.

Comovement: the changes occur simultaneously, with no time delay. The same effect, however, would be classified as spillover if data is measured frequently or as comovement if data is gathered over the course of intermittent time intervals.

There is, however, much disagreement among economists about what contagion is and how it should be tested for empirically. Mink and de Haan (2013) refer to the following definition: 'Contagion is an episode in which there are significant immediate effects in a number of countries

following an event – that is, when the consequences are fast and furious and evolve over a matter of hours or days.' When the effect of the event is gradual, they refer to this as spillovers rather than contagion. In other cases, one may question whether the label of 'contagion' is adequate. For instance, in a widely used approach, contagion is inferred by a significant rise in the correlation of asset returns in 'crisis' periods compared to 'tranquil' periods (Mink and de Haan, 2013).

Basically, these studies examine whether cross-correlations between markets increase significantly during a major crisis -period or during a post-crisis period in comparison to the pre-crisis period. If the correlations increased significantly during and after crisis periods, in comparison to pre-crisis periods, the authors conclude evidence in favor of contagion (Yunus, 2013).

Ehrmann et al. (2005) analyzes the degree of financial transmission between money, bond and equity markets and exchange rates within and between the United States and the euro area. They find that asset prices react most strongly to other domestic asset price shocks, and that there are also substantial international spillovers, both within and across asset classes. The results underline the dominance of US markets as the main driver of global financial markets: US financial markets explain, on average, more than 25% of movements in euro area financial markets, whereas euro area markets account only for about 8% of US asset price changes.

18.5. A framework for market contagion modeling

Dynamic models are able to capture spillover and transmission. More precisely, spillover may be modeled by a regime-switching model, while in the case of transmission the GARCH approach (or, more generally, continuous variance models) is more accurate. Switching models are based on the Markov two-state chain. Within this framework, two states experiencing economic upturns and downturns are considered, and additionally, the probability of transition is examined. If a basic random walking approach is used, then during an upturn period the drift is positive and volatility is relatively small: during contraction the drift turns negative and volatility grows. As a result, both the trend toward drift and instability are volatile. An additional switching process should take on two modes or values: contagion and non-contagion. In practice, switching models turn out to be rather complicated to calibrate, because the contagion effect is unobservable, as there is no available measurement to describe the presence or the absence of the contagion.

Comovement may be approximated by static models such as copula class models.

Jaworski (2013) points out that the most classic approach to model contagion is the Granger causality analysis.

Modeling contagion may also refer either to the spatial analysis approach or to the time analysis approach.

Within the spatial approach, random variable changes are grouped into small and significant ones. In the spatial framework, according to Bradley and Taqqu (2004), 'there is contagion from market X_1 to market X_2 if there is more dependence between X_1 and X_2 when X_1 is doing badly than when X_1 exhibits typical performance.'

Let us consider X_t to be a two-dimensional stochastic process. Assume the X_t is stationary and ergodic. If $m(t)$ is a type I regression function:

$$m(v) = E(X_{t,2} \mid X_{t,1} = v).$$

There is a linear contagion effect referring to intervals $[a, b]$ and $[c, d]$, $-\infty \le a \le b \le c \le d \le +\infty$, when

$$P(X_{t,1} \in [a,b]) > 0 < P(X_{t,1} \in [c,d]) \quad \text{and} \quad \frac{m(b)-m(a)}{b-a} > \frac{m(d)-m(c)}{d-c}.$$

In case of normal joint probability distribution of X_t, both the type I and type II regressions are linear:

$$m(v) = \alpha + \beta v, \quad \beta = \mathrm{Cov}(X_{t,1}, X_{t,2}) / D^2(X_1), \quad \alpha = E(X_{t,2} - \beta E(X_{t,1})).$$

Since the $m'(v) = \beta$ is constant, there is no contagion effect unless we go beyond the normal distribution assumption. Bradley and Taqqu (2004) point out that if the first derivative is equal β, the contagion exists only if β increases for extreme value interval (Figure 18.3).

Coefficient β should be calculated separately for each 'stripe' around the value v_i (as presented on the Figure 18.3). Maintaining the assumption on $m(v)$ linearity within each value interval, it is recommended to use the difference quotient instead of the first derivative.

Another approach within the spatial framework utilizes copula theory. The term 'copula' was coined by Sklar (1959), who proved that that a collection of marginal distributions may be merged together by using copula transformation to form a model of multivariate distribution. Any joint distribution F of a set of random variables

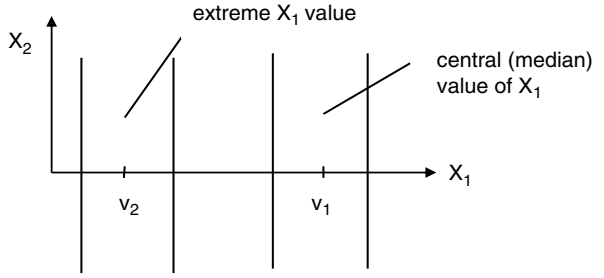


Figure 18.3 Two value stripes used for contagion effect measuring

$X_1, X_2, \ldots, X_n$ can be separated into two parts: the first is the combination of the marginals that (if expressed in cumulative distribution form) are $F_i(\cdot)$ where $F_i(x) = P(X_i \le x)$ and the second is the copula that describes the dependence structure between the random variables (Kemp, 2011).

The decomposition relies on Sklar's theorem, which states that there exists *n*-dimensional copula *C* such that

$$F(x_1, \ldots, x_n) = C(F_1(x_1), \ldots, F_n(x_n)) \ \forall x \in R^n. \tag{18.1}$$

If marginal cumulative distribution functions $F_1, \ldots, F_n$ are continuous then *C* is unique.

According to Durante and Jaworski (2010), 'There is contagion from market *X* to market *Y* if the conditional copula of the market returns *X* and *Y*, when *X* is smaller than certain quantile, dominates the conditional copula when *X* is around its median.'

Let us assume the two-dimensional case. If *C* is a copula for the joint distribution for X_1 and X_2, then the copula $C_{[\alpha,\beta]}$ is a conditional distribution copula, given that:

$$F_{X_1} \in [\alpha, \beta]. \tag{18.2}$$

Following Durante and Jaworski (2010) there is a non-linear contagion effect relative to intervals $[\alpha, \beta]$ and $[\gamma, \delta]$ $0 \le a \le b \le c \le d \le 1$, when copula $C_{[\alpha,\beta]}$ dominates over $C_{[\gamma,\delta]}$ with respect to concordance order (the higher the copula value, the more intense the relation).

$$\forall p \in [0,1]^2 \ C_{[\alpha,\beta]}(p) \ge C_{[\gamma,\delta]}(p) \quad \textit{and} \quad \exists p_0 \in [0,1]^2 \ C_{[\alpha,\beta]}(p_0) > C_{[\gamma,\delta]}(p_0). \tag{18.3}$$

Referring once again to Figure 18.3, we simply compare conditional copula values for each value 'stripe' and therefore conclude that a higher copula value marks stronger interdependence. The above-defined non-linear contagion effect does not depend on marginal distribution. In addition, the copulas act independently whenever we work on indexes, prices or logarithmic returns. The practical problem in this approach is that copula values must be verified at each point.

Despite the very strong relation between comonotonic random variables, there will be no contagion effect, as their interdependence, although strong, remains stable.

Time approach is represented by contagion analysis based on segmentation of the time axis. We may divide the time axis into three exclusive segments: segment A capturing the strong downturn trend; B capturing a modest upsurge trend and finally D referring to the remaining periods. We further assume the distribution to be a constant within the periods A and B (Jaworski, 2013):

$$\forall t \in A \; X_t \sim X_A, \quad \forall t \in B \; X_t \sim X_B. \tag{18.4}$$

There is a linear contagion effect relative to A and B periods if

$$\text{Corr}(X_{A,1}, X_{A,2}) > \text{Corr}(X_{B,1}, X_{B,2}). \tag{18.5}$$

The non-linear contagion effect may be uncovered by comparing the copula values:

$$\forall p \in [0,1]^2 \; C_{X_A}(p) \geq CX_B(p) \quad \text{and} \quad \exists p_0 \in [0,1]^2 \; C_{X_A}(p_0) > C_{X_B}(p_0). \tag{18.6}$$

However, it is relatively difficult to estimate copula values, so it is more convenient to compare a copula-dependent measure like Spearman rho or Kendall tau constructing thus a contagion index d:

$$d = \rho(\{x_t : t \in A\} - \rho(\{x_t : t \in B\}, \tag{18.7}$$

where ρ refers to the correlation coefficient (Spearman or τ Kendall).

18.6. Contagion at the bond market

The formal definition of contagion and divergence depends on whether we deal with bond prices or yields. In the first case, dropping prices are

contagious; hence, we compare the lower tail and the median part. In the second description, the increase of yields is contagious; hence, we compare the upper tail and the median part. We will follow the approach presented in Jaworski, Liberadzki and Liberadzki (2015a). Instead of the lower tail, we consider the upper tail of the distribution. We restate the definition:

Let X_t and Y_t be the daily changes of yield-based indices of markets **X** and **Y**. We assume that in a given period of time they are stationary.
Let $C_{[a,b]}$ denote the copula of the conditional distribution of (X_t, Y_t) under the condition $F_X(X_t) \in [a,b]$.

Definition 1. *We say that there is contagion from market X to market Y with respect to intervals [1 – α, 1] and β_1, β_2, if* $C_{[1-\alpha,1]} = C_{[\beta_1,\beta_2]}$ *and*

$$\forall (u,v) \in [0,1]^2 \; C_{[1-\alpha,1]}(u,v) \geq C_{[\beta_1,\beta_2]}(u,v),$$
$$\forall (u,v) \in [0,1]^2 \; C_{[1-\alpha,1]}(u,v) \leq C_{[\beta_1,\beta_2]}(u,v).$$

The comparison of copulas in concordance ordering, when we have only their estimates based on empirical data, is rather challenging. Therefore we switch to concordance measures. We choose Spearman ρ. Furthermore we reduce the number of parameters. Since the distributions of daily changes are (nearly) symmetric in the median part, we put $\beta_1 = 1 - \beta_2$. Next to avoid the loss of empirical data or the counting of some of them twice, we put $\beta_2 = 1 - \alpha$. This leads to the following definition of a contagion index.

Definition 2. *Let C be a copula and* $\beta \in (0.5, 1)$.

$$\Delta\beta(C) = \rho(C[\beta,1]) - \rho(C[1-\beta,\beta]),$$

where ρ denotes the Spearman rank correlation.

The choice of β is a more subtle problem. To avoid possible random fluctuations, in Durante et al. (2014, 2015), it was proposed to measure the set of β's for which the index is positive. However, it is recommended to follow the approach proposed in Jaworski and Pitera (2014), based on the paradigm that there is no contagion for Gaussian distributions, namely, for Gaussian copula Δ_β is changing sign for $1 - \beta \approx 0.21$ (compare Jaworski and Pitera, 2014). Δ_β is positive for a smaller median

part and negative for bigger. Therefore we selected $\beta = 0.8$. To reduce the possible fluctuations we apply the weighted sum of empirical estimates

$$\Delta = \frac{1}{4}\left(\widehat{\Delta_{0.82}} + 2\widehat{\Delta_{0.8}} + \widehat{\Delta_{0.78}}\right),$$

where

$$\widehat{\Delta_{\beta}} = \widehat{\rho[\beta, 1]} - \widehat{\rho[1-\beta, \beta]}.$$

Here $\widehat{\rho[\beta_1, \beta_2]}$ denotes the Spearman rank correlation of truncated empirical data.

Notes

1 The Definition of Hybrid Securities

1 Directive 2014/59/EU of the European Parliament and of the Council of May 15, 2014, establishing a framework for the recovery and resolution of credit institutions and investment firms (BRRD).
2 See Chapter 7.
3 Regulation (EU) No 575/2013 of the European Parliament and of the Council of June 26, 2013, on prudential requirements for credit institutions and investment firms (CRR).
4 Directive 2013/36/EU of the European Parliament and of the Council of June 26, 2013, on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV).
5 See section 5.2.1.
6 See section 5.2.2.
7 See section 5.3.3.
8 See section 5.3.1.

2 Evolution of Hybrids

1 See section 5.3.
2 See section 5.5.3.
3 See section 5.3.3 on dividend-pusher provisions.
4 Lloyd's Banking Group in November 2009, Dutch Rabobank in March 2010 and Credit Suisse in February 2011 issued a form of CoCo bonds to qualify for anticipated regulatory capital treatment under Basel III. See also section 5.5.2.
5 In fact due to short position in equity put option, the CoCo bondholder has got both negative option delta and gamma.
6 See section 5.5.3.

4 CRD IV Package Legal Framework

1 See sections 18.3–18.6 on contagion definitions and modelling.

5 CRR Additional Tier 1 Financial Instruments

1 The current status of regulatory technical standards implementation by the European Commission may be found at http://ec.europa.eu/internal_market/bank/regcapital/acts_en.htm#rts
2 ISIN: DE000DE8FHG4.
3 See section 9.1.
4 See section 5.5.5 for a high-trigger and low-trigger CoCo differentiation.

5 See section 14.3.
6 Common Equity Tier 1/Risk-Weighted Assets ratio, that pursuant to CRR Article 92(1)(a) should be at least 4.5%.
7 As Haldane illustratively put it, that meant 'there were only three possible explanations: Bank assets had become half as risky, bank managers had become twice as good at risk management, or the banks were gaming the system', see: *Business Wire* (2014).
8 See Chapter 16.
9 Under Basel III banks' equity can still be as low as 3% of banks' total assets. It is not clear that anything would have been substantially different in the 2007–2009 crisis had Basel III already been in place. See Admati and Hellwig (2013).
10 See section 5.5.2.
11 See section 16.3.
12 See below of this section.
13 See section 5.3.4.
14 See Chapter 18.

6 CRR Tier 2 Bonds

1 See section 5.5.2 on Lloyd's ECNs.

7 The Role of Hybrid Securities in the BRRD

1 See section 7.3.
2 See section 11.3.
3 See section 2.6.
4 See sections 5.4 and 6.5.
5 See section 5.6.
6 See section 6.6.
7 Another interesting point is whether the amount of 'Tier 3' and TLAC eligible liabilities will have to be calculated subject to deduction of such liabilities of other financial institutions – just like it works under CRR with regard to CET1, AT1 and T2 instruments.

8 Hybrid Securities Issued by Insurers

1 Directive 2009/138/EC of the European Parliament and of the Council of November 25, 2009, on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) applicable from January 1, 2016.
2 Commission Delegated Regulation (EU) 2015/35 of October 10, 2014, supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II).
3 Insurers that incorporated the legal form of mutual and mutual-type association with variable contributions may call their members for supplementary contributions; see Solvency II Directive Preamble, indent (52).
4 100 bp = 100 basis points: here it refers to the step up level, that is, how much the coupon increases.

5 30NC10 = 30 non-call 10; 30 years maturity bond with a call option exercises no earlier than 10 years from the issue date.

9 Corporate Hybrids

1 See section 5.3.3.
2 See section 15.3.
3 The first NC15 issue. See Table 9.2.
4 See Table 9.1.
5 Magnolia Finance Limited Prospectus, p. C-24.
6 Jersey is a small island located on the English Channel. The rationale for establishing a company seat there is low taxation (tax haven).
7 This means that the variable coupon is based on the reference rate of EURIBOR 3M plus 5.5% of the margin. EURIBOR 3M is a London interbank reference rate quoted for a 3-month maturity.
8 Article 19(1)(b) of Directive 77/91/EEC (Second Company Law Directive).

10 Issuing Hybrids

1 See sections 7.1.2 and 7.3.1.
2 See section 11.4.
3 See section 13.2.1.

11 Public Offering and Admission to Trading

1 Directive 2003/71/EC of the European Parliament and of the Council of November 4, 2003, on the prospectus to be published when securities are offered to the public or admitted to trading (Prospectus Directive or PD).
2 See section 7.1.2.
3 See section 11.7.2.
4 Regulation (EC) No 809/200 (Prospectus Regulation or PR).
5 See section 13.3.2.

12 Regular and Timely Ongoing Disclosure

1 Directive 2004/109/EC (Transparency Directive or TD).
2 Directive 2004/39/EC (MiFID).

13 Financial Intermediation

1 Regulation (EC) No 600/2014 (MiFIR).
2 Directive 2014/65/EC (MiFID II).
3 Except for the rules regarding adequate policies and arrangements for central counterparties for OTC derivatives that will apply from 3 September 2018.
4 See section 10.3 on 'recognized stock exchanges' and 'stock regulated markets'.
5 Undertakings for the collective investment in transferable securities' are investment funds regulated at the EU level by Directive 2014/91/EU.

6 Regardless of whether or not it may be deemed to embed a derivative (ESMA, 2014).
7 See section 5.4.
8 See section 5.3.
9 Organized Trading Facility (OTF) is a multilateral system which is not a regulated market or MTF.The difference between MTF and OTF is that (i) MTF (as well as regulated markets) may carry out trade in all financial instruments, while OTF is limited to trading in bonds, structured finance products, emission allowances and derivatives, and (ii) MTF (as well as regulated market) brings together buying and selling interest in accordance with non-discretionary rules (see MiFID II Article 4[1][21] and [22]).

14 Non-EEA CoCos

1 See section 6.6.
2 See section 10.3.
3 See section 5.3.3.
4 This convention means that a perpetual cannot be redeemed by the issuer before five years from the date of issue. See sections 2.2. and 5.2.2.

15 Bonds Credit Risk Modeling

1 It is a short rate for the transaction beginning at the moment t with infinitely short duration dt.
2 The Wiener process is a stochastic process with normally distributed independent increments, for $0 \le s \le t$ the expected value of process increments is 0 with a variance equal to time change $t - s$: $W_t - W_s \sim N\left(0, \sqrt{t-s}\right)$.
3 Here we assume investors to be risk-averse; that is, their expected utility of income curve is concave.

16 Contingent Convertible Bonds Pricing

1 See section 5.5.3.
2 See section 5.5.3.
3 The information about the DB notes excerpted from (i) *Prospectus* relating to £650,000,000 Undated Non-cumulative Fixed to Reset Rate Additional Tier 1 Notes of 2014 and (ii) Deutsche Bank Annual Review 2014.
4 Following a write-down the Deutsche Bank will be entitled (but not obliged) to effect, in its sole discretion, an increase of the redemption amount and the nominal amount of the notes up to their initial nominal amount.

18 Hybrid Securities' Impact on Risk

1 Financial links exist when two economies are connected through the international financial system.
2 Real links are the fundamental economic relationship among economies. These links have been usually associated with international trade.
3 Political links are the political relationships among countries.

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