



Solvency II and Basel III

September 22, 2011

Reciprocal effects should not be ignored

There is a fair amount of overlap between Basel III and Solvency II.

The new capital and liquidity rules for banks (Basel III) and the new capital requirements for insurance companies (Solvency II) are set to be introduced in January 2013. Since insurers are major institutional investors – in bank bonds, among other things – there may well be some reciprocal effects between these two sets of regulations when they are implemented.

Solvency II will change the way in which insurance companies allocate their capital. Currently, the amount of capital that insurers are required to hold is determined by their premiums. In future, the risks that insurers take on as part of their investing activities will have to be accounted for at their fair value and will determine the capital that these institutions are required to hold.

Solvency II gives preferential treatment to bonds with good credit ratings and short maturities. Market risk, which factors in the volatility of investments, will impose more stringent capital requirements for bonds that are determined by the investments' maturity and credit rating. Government bonds issued by countries in the European Economic Area (EEA) require no capital backing – irrespective of the bond's credit rating – and covered bonds (*Pfandbriefe*) are given preferential treatment. This creates incentives for insurers to allocate their capital accordingly.

Basel III requires banks to establish more stable, long-term sources of funding. The new Basel III liquidity requirements oblige banks to place their funding on a more stable, long-term footing. As a consequence, they will issue more – and different – long-term bonds. At first glance, this appears to be diametrically opposed to the incentives that Solvency II creates for insurance companies – one of the largest groups of investors in bank bonds – because this regulation gives preferential treatment to shorter maturities.

Although this scenario will cause some assets to be reallocated, we do not expect to see any dramatic changes. If we look closely at the main types of investors in bank bonds and the various incentives that will affect the investment decisions made by insurers, it is clear that there will be changes in asset allocation. However, we do not expect this investor base to disintegrate. Covered bonds might receive a particular boost. By contrast, very long-dated bonds and subordinated debt will be much less attractive under Solvency II, although insurers have traditionally never been major investors in these asset classes.

Nonetheless, the precise nature of the reciprocal effects between Basel III and Solvency II should be examined before these rules are finally adopted. And given that the Solvency II project has been running for around ten years now, some aspects of its legal framework appear outdated – such as the across-the-board preferential treatment of government bonds.

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Introduction

European insurance companies are among the largest investors in Europe's financial markets, holding EUR 6.7 trillion worth of assets, including more than EUR 3 trillion in corporate and government bonds.¹ Historically, insurers have always been significant investors in long-dated bonds because these assets are a good match for insurers' long-term liabilities.

Insurers have always been regarded as steady, long-term investors that make a valuable contribution to the financing of national economies. They also perform an indirect financing function: they play a key role in banks' funding because they are among the largest purchasers of bank bonds, currently holding some 12% of all banking-sector liabilities to non-banks.² Insurance companies therefore invest in banks which, in turn, enables banks to lend to businesses. This is especially important for small and medium-sized enterprises (SMEs), most of which cannot raise funding in the capital markets.

January 2013 will see the introduction of the EU's Solvency II directive which, among other things, will fundamentally alter the capital requirements for insurance companies. In future, (more) capital will have to be set aside to cover the risks arising from insurers' investments. One consequence might well be a significant change in insurers' asset allocation, which could also have implications beyond the insurance industry itself and impact on the real economy.

Two key issues are therefore not only what Solvency II will mean for insurance companies' capital adequacy requirements but also, in particular, what potential impact this European regulation could have on insurers' investment strategies. One fear, for example, is that insurers might respond to Solvency II by scaling back their investment in corporate and bank bonds. This might deprive banks and companies of one of their main sources of funding.

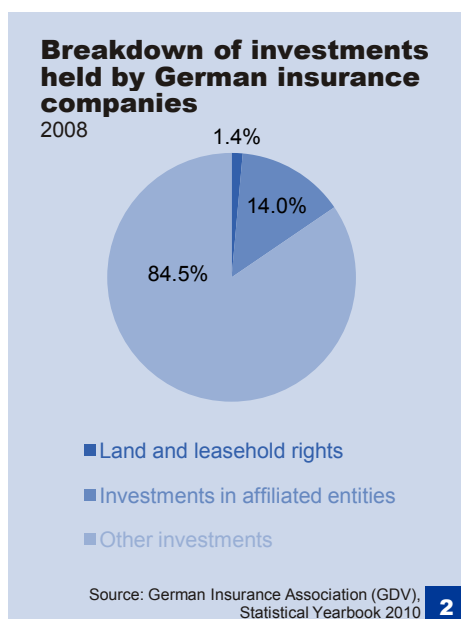
But to what extent will Solvency II really change insurers' investment behaviour? And what consequences might this have for banks' funding – especially given the new banking regulation (Basel III) that banks will have to implement (also starting in 2013)? The purpose of this study is to answer these questions.

Insurers' investment behaviour

Insurance companies' business models generate substantial capital resources (see chart 1) and are regarded as major institutional investors. The prime objective of their investment policies is capital preservation. Their investment horizons are also generally long term and relatively stable over time because insurance policies are long-term contracts, and capital outflows – in the form of insurance benefit payments – are (fairly) predictable. Insurers therefore tend to buy bonds in order to fund long-term liabilities such as pensions, which may require payments to be made for up to 30 years. Consequently, insurance companies and pension funds are ideal providers of the sort of long-term investment that supports the real economy with (invested) financial resources.³



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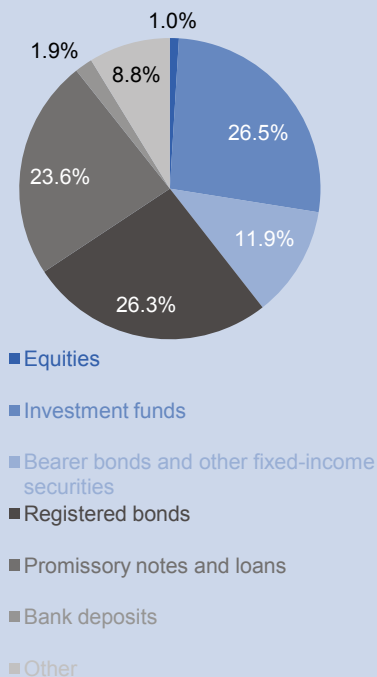
¹ Fitch.

² Munich Financial Center Initiative (fpmi).

³ European Commission.

Breakdown of investments

Other investments (2008)



Source: German Insurance Association (GDV), Statistical Yearbook 2010 **3**

Lamfalussy process / Solvency II

The Lamfalussy process is a procedure that is designed to simplify and, thereby, speed up the complex regular EU legislative process as part of a four-level plan. Under this process, the European Council and Parliament only pass framework directives; the technical details of draft legislation are proposed by the European Commission and adopted by member states' representatives on a comitology committee.

The Lamfalussy process will be used to introduce Solvency II. This means that the framework directive for Solvency II (level 1) will be supplemented by further implementing measures (level 2). The fundamental aspects are therefore first laid down as a framework arrangement in the form of a directive; the technical details are then supplemented by the European Commission in the form of regulations and directives.

The legislative part of Solvency II will come into force in January 2013. Its technical details are still being finalised.

Source: European Commission

Avoiding excessive risk

Because insurance companies prefer safe investments, they pursue conservative investment strategies; riskier asset classes are primarily added to boost investment returns. Insurers' investment portfolios are therefore dominated by fixed-income securities and investment funds. Real estate, equities and alternative investments are much less important.

The typical asset allocation in a conventional (non-captive) European life insurer's portfolio consists of roughly 45% government bonds, 45% corporate bonds⁴ (with an average credit rating of A and an average maturity of four years), 7% equities and 3% real estate.⁵

This means that although – as with all rational investment decisions – the risk/return profile of the potential investment is the key factor, insurance companies focus on avoiding excessive risk (see charts 2 and 3).

The financial crisis has brought about changes in asset allocation

The financial crisis has reinforced the trend towards investing assets as part of a low-risk, market-correlated strategy with a small weighting of assets such as equities that are used to enhance investment returns. Insurance companies and pension funds have reacted to the financial crisis by shifting their asset allocation towards less risky investments: the proportion of fixed-income products in most portfolios has increased further since the financial crisis, whereas the weighting of variable-yield securities in life insurers' portfolios has fallen. In Germany, for example, insurance companies have reduced their weighting of equities from around 10% to roughly 4%. The proportion of real estate in portfolios has also decreased sharply in recent years.

Investment behaviour across Europe

Fixed-income securities are also the predominant form of investment throughout the European Union (EU), with bonds – both corporate and public sector – accounting for a significant proportion of portfolios. In some countries – such as France, Portugal and Spain – investments in private-sector assets (especially corporate bonds) play a considerable part.⁶ Differences in asset allocation across Europe are largely attributable to national differences in the regulatory framework and to the tax incentives for institutional investors.

Solvency II

However, the regulatory framework governing insurance companies across Europe will be changing in future. For the past ten years the European Commission has been planning new regulatory requirements for insurers that will also modify the capital adequacy rules applicable to these institutions: Solvency II. This directive will reform insurance regulation across Europe and, in particular, the solvency requirements governing insurance companies' capital adequacy. The pertinent directive (2009/138/EC) was published on 17 December 2009 and is due to come into effect at the beginning of 2013. In the meantime, the Commission is specifying the exact

⁴ These include bank bonds and non-financial bonds.

⁵ Fitch.

⁶ OECD.



QIS5

The QIS5 quantitative impact study was conducted under the direction of the European Insurance and Occupational Pensions Authority (EIOPA) in all member states of the European Economic Area on the instructions of the European Commission.

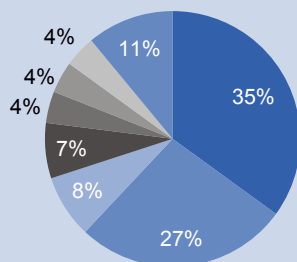
QIS5 is the fifth and most recent quantitative impact study prior to the introduction of Solvency II. Europe's insurance companies took this opportunity to test various aspects of the future Solvency II legislation in its present form. The EIOPA published the results of QIS5 in March 2011.

251 insurance companies and 26 corporate groups took part in the German sub-survey, which was conducted by the Federal Financial Supervisory Authority (BaFin).

Sources: EIOPA, BaFin

QIS5 balance sheet

Group level



- Corporate bonds
- Government bonds
- Equities
- Loans secured by mortgages
- Real estate
- Cash
- Investment funds
- Other

Sources: Fitch Ratings, EIOPA

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implementing measures to be taken.⁷ Several quantitative impact studies (QISs) have already been conducted for this purpose. The results of the most recent impact study (QIS5) were published at the end of March 2011. The rules have therefore not yet been finalised; some changes might still be made to their structure and calibration, which ultimately determine the capital requirements.

Solvency II will develop the current solvency rules into a consistently risk-based system of financial regulation. Until now, the amount of capital that insurers are required to hold has been determined purely by their volume of premiums. In future, their capital adequacy requirements will be based on the risks that they have actually taken on as part of their investing activities. This approach is based on a risk acceptability concept, which means that the higher the risk, the more capital needs to be set aside to cover this risk.

Solvency II also requires insurers to account for their assets and liabilities at their fair values. This means that the new risk-based approach explicitly recognises risks on the assets side of the balance sheet as well, which has not been the case in most European countries to date. The measurement of assets and liabilities is therefore migrating from a carrying-amount approach to a mark-to-market approach.⁸

The three-pillar model of Solvency II

Like the legal framework for banking regulation (Basel II and Basel III), Solvency II also consists of three pillars. Pillar I covers the minimum capital adequacy requirements and therefore specifies the quantitative solvency capital requirements for insurance companies and their capital adequacy requirements.

Minimum capital requirement and solvency capital requirement

The new capital adequacy requirements consist of the minimum capital requirement (MCR) – which is largely based on the insurer's premium income and specifies the minimum regulatory solvency capital required to be held – and the regulatory solvency capital requirement (SCR), which is the 'target' capital.⁹ The solvency capital requirement is calculated using either a standard formula stipulated in the directive or by means of an internal model that needs to be approved by the regulatory authorities. The Commission has therefore specified a standard risk classification model; however, insurers – especially the major insurance companies – can and, in most cases, will devise their own models and concepts. This enables risks to be captured more individually, which usually means that less capital is required to be held.

Pillar II lays down qualitative requirements for risk management by insurers and regulators and covers the supervisory review process, internal controls and risk management.¹⁰

⁷ Solvency II will be implemented as part of the so-called Lamfalussy process (see textbox on page 4).

⁸ Fitch.

⁹ The solvency capital requirement corresponds to an insurance company's economic capital; if this minimum requirement is not met, the company is monitored by the regulatory authorities, although they do not intervene directly in the company's day-to-day management. If the MCR is not complied with, however, the insurance regulator is entitled to demand that concrete measures be taken to restore solvency. The SCR is calculated as the respective insurance company's value-at-risk with a confidence level of 99.5% over a one-year period.

¹⁰ These include the specification of clearly defined responsibilities and transparent management systems; appropriate management of contracts, claims and reinsurance; and appropriate financial and asset management.

Omnibus II directive

The draft legislation for the Omnibus II directive was published by the European Commission in mid-January 2011 and supplements the Solvency II directive. Omnibus II is designed to bring Solvency II into line with the new European financial market regulatory architecture. In addition, Omnibus II will supplement the Solvency II directive by adding the technical specifications.

The technical specifications cover standards on issues such as regulatory supervision, capital add-ons, methods for measuring assets and liabilities, the standard SCR formula, internal models, and disclosure requirements.

The first draft of the Omnibus II directive provides for transitional arrangements of up to ten years for the implementation of significant parts of Solvency II. June 2011 saw the publication of an amendment to Omnibus II, which now specifies a five-year transitional period in which to finalise the modules for concentration risk, credit spread risk and equity price risk. It also stipulates a seven-year transitional period in which to determine the risk-free interest rate, which is used to measure some illiquid products.

Sources: European Commission, Fitch Ratings

Determining capital adequacy requirements

Each company calculates its own capital adequacy requirements by first determining its net asset value (NAV).

It then models a certain type of shock that corresponds to the risk module concerned; it might assume, for example, that a share price falls by 39%. This stress factor constitutes the shock scenario on which the calculation of the capital requirements is based. This assumption is then used to recalculate the company's NAV.

The difference between the two NAV figures constitutes the capital requirement for the risk module concerned.

Source: QIS5 technical specifications

Pillar III contains measures designed to strengthen market discipline. These include extensive disclosure requirements, the promotion of transparency, and close integration with International Financial Reporting Standards (IFRS). This pillar is intended to improve market discipline by enshrining heightened disclosure and transparency requirements in law.

Risk modelling of asset classes under Solvency II

The new, integrated and proactive risk management specified in the first pillar is key to investment behaviour because, in future, insurers will have to set aside risk-sensitive reserves to cover not only insurance-related risk but also the market risk that they take on as a result of their investment policies. There are eight main risk categories:

- Risk adjusting, i.e. the risk-bearing capacity of the claims reserve
- Operational risk, e.g. organisational deficits, strategic risk, legal risk.

And six further risks that are aggregated under the basic solvency capital requirement (BSCR):

- Market risk, i.e. the volatility of investments
- Actuarial risk arising from life insurance, e.g. calculation of premiums, purchase of reinsurance cover
- Actuarial risk arising from non-life insurance
- Actuarial risk arising from health insurance
- Counterparty default risk arising from reinsurers and from debtors' investments
- Risk arising from intangible assets.¹¹

Market risk

If we are to examine the impact of Solvency II on insurers' investment behaviour, the capital markets and banks' funding, market risk and its various components are of particular relevance because the market risk module is concerned with the volatility of investments.¹² Changes in capital adequacy requirements for the individual asset classes might therefore cause insurers to reallocate the assets in their investment portfolios.¹³

QIS5 also revealed the relevance of the market module: market risk accounted for some 70% of the total capital requirements for life insurance products in Europe.¹⁴ Consequently, the market module dominates the solvency capital requirement for European life insurers, which in turn hold a total share of roughly 80% of the assets held in the European insurance industry.¹⁵ The key question is therefore which of the asset classes in the market risk module use the most capital: QIS5 revealed that equities and the credit spread risk module together accounted for more than 50% of the aggregate SCR – excluding potential diversification effects (see chart 5).

¹¹ See the QIS5 technical specifications (also for further details on Solvency II and the individual modules).

¹² The various modules that form part of market risk are shown in chart 6.

¹³ The stress factors discussed here have been taken from QIS5, i.e. the scenarios and calibration have not yet been finalised.

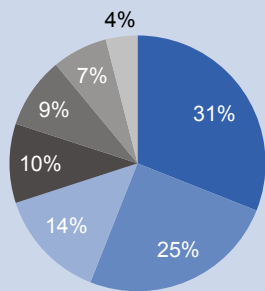
¹⁴ BCG.

¹⁵ Fitch.



Share of market risk under the standard model (SCR)

QIS5 results (excl. diversification)



- Credit spreads
- Equity / capital markets
- Interest rates
- Real estate
- Currencies
- Illiquid premium
- Market concentration

Source: EIOPA

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Although the credit spread risk module has a significant impact ...

Credit spread risk is especially important in any analysis of Solvency II's potential impact on banks' funding because it factors in a wide range of stress scenarios for various asset classes such as all types of bonds (including high yield), subordinated bonds and hybrid capital, structured financial products and credit derivatives.¹⁶

The amount of capital set aside to cover these bonds is proportional to their maturity periods and credit ratings, which means that bonds with shorter maturities and/or better ratings require less capital backing than debt securities with longer maturities and/or inferior ratings. Since capital adequacy requirements become more stringent as maturity periods increase and/or credit ratings deteriorate, long-dated and poorly-rated bonds automatically become less attractive because of the amount of capital required to cover them.¹⁷ The credit spread module therefore reveals a preference for shorter periods and better ratings.

Capital requirements for structured products are determined by a bond-like rating approach plus a stress factor that relates to the underlying asset.^{18,19} Spread-widening and limiting factors are applied to derivatives.

Exceptions prove the rule

Covered bonds constitute the first major exception to the rule and are given preferential treatment under Solvency II. The minimum stress factor applied to these bonds is only 0.6%, which is lower than the factor for AAA-rated corporate bonds (minimum of 0.9%). However, this preferential treatment only applies if the bond has a AAA rating and meets the requirements laid down in article 22(4) of the UCITS directive (85/611/EC).²⁰

The second exception are government bonds issued by full member states of the EEA or OECD as well as government guarantees backed by multinational development banks, which are totally exempted from the credit spread module and do not need to be covered by any capital. These exceptions apply irrespective of the bonds' credit ratings.^{21,22} Government bonds are therefore given preferential treatment under QIS5 compared with corporate and bank bonds.

... the interest-rate risk is also relevant

In addition to the credit spread module, the interest-rate risk module also has a significant impact on the risk components of the market

¹⁶ N.B.: If credit derivatives have been purchased in order to hedge a counterparty default risk, they form part of the counterparty default risk module.

¹⁷ Surprisingly, unrated bonds do better in terms of their capital adequacy requirements than bonds that have credit ratings of B or lower.

¹⁸ This means that Solvency II requires a 'look-through' test. Consequently, the capital requirement can never be lower than that for the underlying instrument. This is intended to prevent regulatory arbitrage.

¹⁹ Asset-backed securities (ABSs) are discriminated against under Solvency II: for example, senior ABS tranches are valued as if they were rated two notches lower, while mezzanine ABSs have a capital requirement of 100%.

²⁰ Article 22(4) of the Undertakings for Collective Investment in Transferable Securities (UCITS) directive defines the minimum requirements for giving a bond preferential treatment as a covered bond in the various spheres of European financial market regulation. Source: European Covered Bond Council.

²¹ Status prevailing during QIS5.

²² The EEA consists of the EU member states plus the EFTA member countries (except for Switzerland).

Categories of the market module

Market risk						
Interest rates	Equities	Real Estate	Credit spreads	Exchange rates	Concentration risk	Illiquidity
<ul style="list-style-type: none"> Stress scenarios for interest rates Modelling based on yield curve For all interest-rate sensitive assets and liabilities Designed to capture mismatch risk arising from differing maturities of obligations on the assets and liabilities side of the balance sheet (asset/liability mismatch risk) Captures assets such as bonds, loans, insurance policy loans and interest-rate derivatives 	<ul style="list-style-type: none"> Stress scenarios for capital markets Factors in sudden market falls and upturns Stress factors: 39% for global securities (e.g. equities from EEA/OECD countries), 49% for others (e.g. equities from emerging markets or hedge funds), 0% for shareholdings in banks & financial service providers, 22% for strategic shareholdings 	<ul style="list-style-type: none"> Stress scenarios for assets such as real estate, land and leasehold rights One single stress factor of 25% <u>Not included:</u> investments in real-estate companies, firms engaged in real-estate management or project development companies; these are included under capital markets risk 	<ul style="list-style-type: none"> Factors in stress scenarios for various types of investment Mainly bonds, covered bonds (<i>Pfandbriefe</i>), bank deposits, investment pool holdings, hybrid capital, credit derivatives and certain ABSs <u>Not included:</u> bonds backed by government guarantees, e.g. government bonds issued by full EEA/OECD member states and bonds backed by multinational development banks 	<ul style="list-style-type: none"> For all investments denominated in foreign currency One single stress factor of 25% 	<ul style="list-style-type: none"> Credit-worthiness-related risk premiums on aggregate debtor exposure Any concentrated exposure to a counterparty incurs more stringent capital requirements EEA government bonds are exempted Always in relation to a counterparty only; <u>not</u> in relation to asset classes or geographical regions 	<ul style="list-style-type: none"> Captures the illiquidity risk Stress scenario: yield curve reduced by 65%

Source: QIS5 technical specifications

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Illiquidity premium

The illiquidity premium will be relevant for the correct matching of assets and liabilities under Solvency II. Insurers are allowed to add this premium to the risk-free interest rate that is used to discount liabilities. In principle this premium increases the discount factor, thereby reducing the liabilities.

However, regulators have yet to finalise the details of this illiquidity premium and its impact on investments held over the long term.

module. Corporate bonds are stressed by the credit spread module and the interest-rate risk module (duration matching). The interest-rate risk constitutes the difference between the insurance liabilities and the investment cash flows expected to cover them in future.²³ All interest-rate-sensitive assets and liabilities are subjected to scenarios of both rising and falling interest rates,²⁴ the key factor is the resultant change in capital, with the more adverse scenario determining the capital adequacy requirements. The interest-rate risk is also known as the asset/liability mismatching risk. Because the new rules require all liabilities to be matched by non-current assets, this affects life insurance companies in particular because they have many non-current liabilities by virtue of their business models. Interest-rate risk is therefore of considerable importance to German life insurers as well because of their high proportion of fixed-income investments and their insurance liabilities.²⁵

Equity price risk relevant despite modest equity investments

Although equity price risk accounts for a fairly large proportion of the total market risk, this is largely due to the fact that the capital requirements for equities are so demanding. Insurers have a relatively small weighting of equities in their portfolios (less than 10%). Most insurance companies have been reducing their equity

²³ BCG.

²⁴ Scenarios of falling interest rates are more problematic for life insurers because, particularly in this case, the duration of their liabilities is longer than that of their assets.

²⁵ Insurance companies can take account of the mismatching risk in their investment strategies either by reducing the interest-rate sensitivity of their liabilities or, if market interest rates are falling, by aligning the maturity periods of their assets with those of their liabilities (Deloitte).

investments for some years now, especially in the wake of the financial crisis. Equity price risk accounts for a larger share of total market risk for non-life insurers (approximately 50%) than it does for life insurers (roughly 10%).

Diversification lowers capital requirements

However, the final decision on the amount of capital required to be held is not solely determined by the individual risk modules, because the capital adequacy requirements do not simply constitute the sum total of the various modules. Investment portfolios can be diversified across a number of individual risks. A wide range of uncorrelated risks therefore reduces the marginal cost of taking on a certain risk. This means that the rules governing the amounts of capital required to be held under Solvency II ultimately have only a diluted effect. Consequently, the final capital adequacy requirements will be lower than the simple sum total of the individual requirements resulting from the various risk modules.

This approach is based on the assumption that it is extremely unlikely that all actuarial risks will materialise at the same time. Correlation coefficients are therefore assigned to the various risk categories used under Solvency II; this reveals that some risks are totally uncorrelated with others for regulatory purposes. It is assumed, for example, that the risk of a hurricane in the United States is unrelated to whether a global pandemic breaks out. On the other hand, this approach takes account of the fact that certain risk categories are certainly correlated with each other: it is assumed, for example, that there is a 75% correlation between an adverse trend in the capital markets and a widening of credit spreads.²⁶

The ability to diversify is essential in order to accurately assess the impact of Solvency II. It is certainly true that, viewed in isolation, the capital adequacy requirements imposed by Solvency II appear to be huge at first glance – especially compared with Solvency I, which imposed no capital requirements for market risk. However, the assumption that certain events and, consequently, certain risks are uncorrelated means that they offset each other to some extent, thereby significantly lowering capital requirements. Diversification is therefore becoming an increasingly important factor in insurers' portfolios and, by extension, for capital management under Solvency II.

Internal models lower capital requirements

Solvency II also allows companies to use their own internal models – as an alternative to the standard model – to determine their capital requirements.²⁷ A large number of insurers – especially large companies – are already using their own model assumptions, and further companies are currently developing their own models that meet the needs of Solvency II. The design of these internal models will generally be similar to that of the SCR model specified by the Commission. However, the internal models will enable insurers to gauge their individual risk situation more accurately. This means that the final capital requirements are likely to turn out lower than if these insurers were to use the standard model, despite the fact that the internal models usually require capital backing for risks arising from

²⁶ By contrast, spread risks benefit from the level of diversification provided by the illiquidity premium because it is assumed that there is a negative correlation between the illiquidity premium and the credit spread risk.

²⁷ Solvency II also allows companies just to replace individual parts of the standard model with their own internal partial models.

Challenges facing small insurers' capital management

Insurance companies that have diversified their investment portfolios and already use internal models to ensure that they maintain a balanced risk profile are unlikely to be hit particularly hard by Solvency II. On the other hand, insurers that have a high risk profile, do not have a very diversified investment portfolio and have not yet established any internal risk management processes might be more adversely affected. Professional risk management of their investments is therefore becoming an increasing necessity for insurance companies. The more complex the underlying investment structure is, the more stringent the requirements will be for the risk measurement, risk analysis and risk decision-making processes needed.

Consequently, Solvency II could present small and medium-sized insurers in particular with significant challenges. As a result, these insurers might increasingly outsource either all or part of their investment management. There might even be a wave of consolidation in the insurance industry.

It is also possible that small and medium-sized insurance companies that have not used their own internal models to date are not yet fully aware of the impact that Solvency II will have. This might be because the QISs have only ever revealed snap-shots, which means that fluctuations in the level of capital requirements, for example, that might be revealed by an ongoing reporting procedures required by Solvency II have not yet been fully taken into account.

It is generally reasonable to assume that the application of these comprehensive new specifications and standards will cause available capital resources to be more carefully allocated in future. Solvency II will also reveal the extent to which the profits generated by insurers can be justified in terms of the risk that these companies take.

Smaller insurers could also boost demand for reinsurance because they have little or no access to capital markets and therefore cannot hedge their risks in this way.

government bonds – based on their credit ratings – in contrast to Solvency II.

Hedging strategies lower capital requirements

It is also possible to use alternative risk transfer instruments such as cat swaps and cat bonds in order to mitigate risk (as reinsurers already do). Hedging strategies are likely to become more important under Solvency II as a way of potentially lowering capital adequacy requirements. Hedging strategies are now increasingly being used to mitigate credit risk in addition to interest-rate risk and equity price risk.

Technical details have yet to be finalised

As things stand at present (QIS5), the amounts of capital required to be held for equities, real estate and long-term bonds in particular are fairly substantial. This is because the prices of these instruments are more volatile; consequently, insurers will be required to hold more capital so that they are better able to hedge the risk of potential price movements.

However, the specifications for QIS5 do not necessarily represent the final version of the technical specifications under Solvency II. Although the European Commission still plans to introduce this legislation at the beginning of 2013, its calibration may be subject to change.

Channels of impact resulting from interaction with Basel III

In addition to the direct effects of Solvency II on the insurance industry, there could also be some interaction between Solvency II and other regulatory initiatives that have been accelerated in the wake of the financial crisis. The most relevant of these initiatives is the new round of banking regulation, Basel III, which is to be implemented from the beginning of 2013 at exactly the same time as Solvency II. Basel III is not only going to step up regulatory requirements for the quantity and quality of capital adequacy at banks; for the first time, it is also introducing binding quantitative liquidity standards for banks, which will lead to much stricter rules for bank funding structures. This will then result in an increase in banks' requirement for capital, and also a change in the nature of this requirement.

The interaction with Solvency II could manifest itself through two main channels of impact: first, the appeal of hybrid capital instruments for insurance companies could diminish owing to the new requirements relating to the quantity and quality of capital and, by implication, the more rigorous rules for hybrid capital. Secondly, insurance companies could step back from their role as lenders to banks as a consequence of the design of Solvency II, making it more difficult for banks to achieve the changes in their funding structures necessary as part of the new liquidity requirements.

Channel of impact 1: diminished appeal of hybrid capital

Under Basel III, there will be a change in the extent to which instruments will be allowed to count towards regulatory capital; this applies in particular to hybrid capital. In future, Tier 1 and Tier 2 securities will only be recognised if they include loss-absorbing components. This automatically leads to a change in banks'



requirement for capital. During the specified transition phases, all existing lower Tier 2 securities will therefore presumably (have to) be replaced because, under Basel III, none of these securities is likely to be deemed capable of absorbing losses. The deadline for phasing out and replacing the securities with new loss-absorbing instruments is ten years from the implementation date for Basel III. Tier 2 securities worth a total of some EUR 260 billion will have to be refinanced. In addition, there will be further Tier 2 securities worth EUR 120 billion that will expire or will be redeemable in 2011 or 2012.²⁸

New bondholder liability reduces appeal

It is a reasonable assumption that the particular appeal for insurance companies of subordinated bonds will be seriously undermined by the plans for a new bondholder liability:²⁹ the new loss absorbency component could make subordinated bank bonds less attractive, primarily when compared with other bonds, owing to the fact that they will be subject to a greater probability of default and liability in the future. The uncertainties in the payout structure of new types of instruments such as CoCos or similar such instruments also make them unsuitable for matching with insurance liabilities.

Furthermore, under Solvency II, subordinated bonds such as Tier 1 hybrid securities, CoCos and other new loss-absorbing instruments also become less attractive compared with other bonds from the same issuer. This is because ratings for these types of bonds are likely to be lower in the future compared with ratings for conventional bank bonds as a result of changes in risk constellations. In late 2010, the ratings agency Fitch announced that its ratings on hybrid capital securities issued by banks in compliance with the proposals by the Basel Committee would be based on its existing unsupported Issuer Default Rating (IDR) approach. As a guideline, Fitch quoted a downgrading by at least three notches on the IDR (Fitch, 8 November 2010).

Rating downgrades lead to significantly higher capital requirements

Solvency II is therefore likely to lead to higher capital requirements because ratings, in particular, have a substantial impact in this regard: for example, the relevant factor in the capital requirement under Solvency II (F factor) increases from 1.1 for an AA rating to 2.5 for a BBB rating. This equates to an increase of 127% – for the same maturity and the same issuer.³⁰ Added to this is the fact that Tier 1 bonds are frequently of a more long-term nature, which further diminishes the appeal of such bonds for insurers under the credit spread module.

Although greater volumes of loss-absorbing bonds will have to be issued as a consequence of the new regulatory initiatives, these bonds will not therefore be particularly attractive to insurance companies in view of their relatively lower ratings. However, this is a comparatively small market: although insurers have been among the buyers of hybrid capital instruments (because these instruments have hitherto been treated as normal bonds with the same rating)³¹

²⁸ Deutsche Bank, Global Markets Research (2011), p. 24.

²⁹ An example of these initiatives is the German Banking Restructuring Act, which came into force at the beginning of 2011. This Act permits bail-ins as a method of eliminating bank debt in an emergency.

³⁰ Deutsche Bank, Global Markets Research.

³¹ Happe (2011).

the largest investors in subordinated bonds have traditionally been money market funds and hedge funds, for example.³²

Channel of impact 2: more stable funding requirement

A more critical factor will be the impact of Solvency II combined with the Basel III changes on liquidity, which require banks to set up more stable funding structures. Both directly and indirectly, insurance companies represent an important source of funding for banks; however, the new rules could have an adverse impact in future on insurance companies as providers of lending for banks. The newly introduced Net Stable Funding Ratio and Liquidity Coverage Ratio will play a key role in this regard.³³

Net Stable Funding Ratio (NSFR)

The rationale behind the NSFR is that banks must be able to guarantee their long-term funding on a more independent and stable basis. In this context, 'long-term' means longer than one year; stable refers, among other things, to equity capital, long-term (senior) bonds (more than one year) and covered bonds. The NSFR therefore aims to promote a reduction in funding risk.

Liquidity Coverage Ratio (LCR)

A further component of the new liquidity requirements under Basel III is the Liquidity Coverage Ratio (LCR). As in the case of the NSFR, this ratio is designed to ensure that banks have guaranteed funding when there is little liquidity in the markets, but in this case the ratio relates to a 30-day period.

Channel of impact 2: effects on bank bonds

At first glance, the structure of Solvency II, and particularly that of the credit spread module, could lead to the conclusion that (long-term) bank bonds are going to lose their appeal for insurers. Also, under Solvency II, there are other bonds, such as government bonds, that could be a more favourable option for covering long-term liabilities.

However, when the issue is considered in more detail, it becomes clear that the impact is likely to be relatively modest as there are some important aspects that mitigate the negative effects.

1. General appeal of bonds under Solvency II

Currently, it is still unclear whether and to what extent demand for long-term investments will decrease under Solvency II. This is because long-term insurance liabilities must be matched with corresponding (long-term) assets. In addition, although the investment behaviour of insurers is generally driven predominantly by safety concerns, the basis of investment decisions is nevertheless a balanced risk/return profile. Under Solvency II, the amount of capital required to be held will become an additional component in the trade-off considered as part of each individual investment decision. Therefore, insurers will not only be mindful of minimising their capital requirements in line with the necessary regulatory capital. Rather, they will be attempting to achieve efficient management of the risks that they plan to take on – and the capital require-

Investment decisions are influenced by three key considerations: risk/return profile, maturity period and credit rating

³² According to fpmi, insurers hold around 20 to 25% of subordinated bonds, profit-sharing rights and silent shareholdings issued by banks.

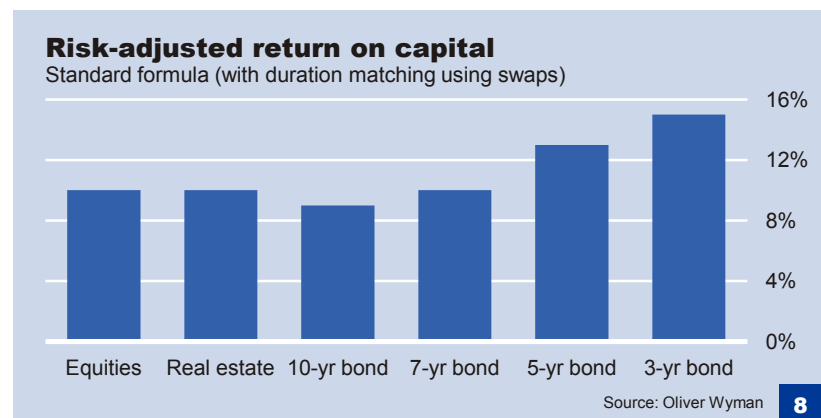
³³ Bank for International Settlements: International regulatory framework for banks (Basel III).



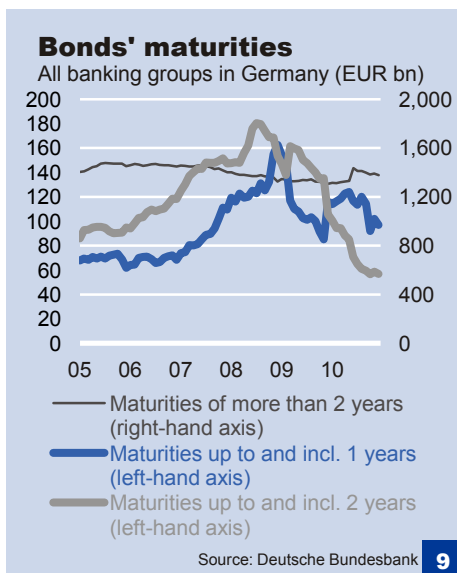
ments associated with these risks – in the context of maximising the return on capital. In turn, these returns will not necessarily be maximised by minimum employment of capital, but by the targeted, diversified use of such capital. The expected return on capital therefore needs to be taken into account (chart 8); the critical factor is not the capital requirement alone.

2. Senior bank bonds remain attractive

Taking into account optimum risk-adjusted return on capital as far as possible, corporate bonds with short to medium maturities still have some appeal for insurers, even under Solvency II. Senior bank bonds with an investment horizon of three to five years therefore remain attractive based on the balance of risk and return (see also chart 8).³⁴



8



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In the past, insurers have bought into corporate bonds that have tended to have short to medium-term maturities. The average bank bond also has a maturity of three to five years and therefore falls within the average investment horizon that is attractive to insurers. In 2010, for example, the average maturity of bank bonds was 5.6 years.³⁵

A distinction therefore needs to be made between what insurers understand by a 'long-term' investment horizon and the definition applied by banks. In other words, even if there were a reduction in the long-term demand from insurers for investment instruments under Solvency II, this would relate to an investment horizon of 15-20 years or more. Generally speaking, though, banks have no incentive, even under Basel III, to issue bonds with such long maturities. Bank funding would therefore not be affected by such a drop in demand.

The bank bond maturities in demand from insurers basically cover the requirements faced by banks under the stable funding provisions of Basel III, and these bonds are therefore attractive to both investors and issuers.³⁶

³⁴ Fitch.

³⁵ Moody's.

³⁶ Note: Toward the shorter end of maturities, bank bond maturities attractive to insurers could in principle be limited by deposits. Bonds with very short maturities, for example one year, could be less attractive relative to deposits because the capital requirements for deposits are determined in the concentration risk module and do not therefore have to take into account any market volatility, resulting in lower capital requirements than under the rules for bonds, which are included in the credit spread module.

Credit quality of bonds already relatively high

Under Solvency II, ratings are also highly significant in addition to maturities: lower ratings result in considerably higher capital requirements (chart 12). Senior-ranking investment-grade bonds, in particular, will therefore remain attractive for insurance companies. Since some 70% of bonds currently held by insurers already have at least an A rating (chart 13), the credit quality of bonds held by European insurers already seems to be at a relatively high level. It is unlikely therefore that there will be any great changes in the demand structure from insurers in this regard. However, some banks have been subject to downgrading in the past, particularly during and after the financial crisis. This could impact on the relative attractiveness of bank bonds.

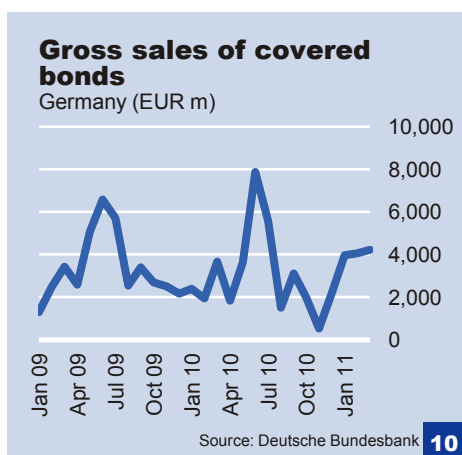
Nevertheless, short to medium-maturity senior bank bonds, especially those of investment grade, will still remain attractive under Solvency II for at least as long as the issuers manage to offer attractive or reasonable returns. However, bonds with lower ratings, for example those from banks with weak finances, could be faced by (greater) problems in the future, and it could be difficult to place such bonds at a reasonable price.

3. Possible shift in funding habits

Covered bonds will be favoured by the new regulatory environment: they receive preferential treatment under both Basel III and Solvency II.³⁷ Back in 2007, European insurers together with pension funds subscribed some 40% of covered bond issues.³⁸ In Germany, local insurers are currently by some way the largest investors in covered bonds – around 50% of the total German covered bond market is accounted for by insurance companies.³⁹ This proportion could see a further increase under the new regulatory framework. Over the last 18 months, there has already been a discernible uptrend in demand from insurers for covered bonds in some parts of Europe.⁴⁰

The disadvantageous treatment of structured loans under Solvency II (ABSs for example) could be another factor that increases demand and, therefore, sales of covered bonds in future because the capital costs for non-qualifying bonds are very high (100% capital cover). In future, insurers could therefore withdraw from this segment of the market.⁴¹

Independently of the impact under Solvency II, reciprocal effects between the market for bank bonds and that for government bonds could reinforce the upward trend in issues of covered bonds. This is because investors in sovereign debt from countries with debt problems are increasingly demanding higher interest rates on the relevant government bonds; the effect of this trend is also being felt on bank bond markets, and funding costs for banks in these countries have risen. As a consequence, many banks, particularly in these countries, have started to issue an increasing number of



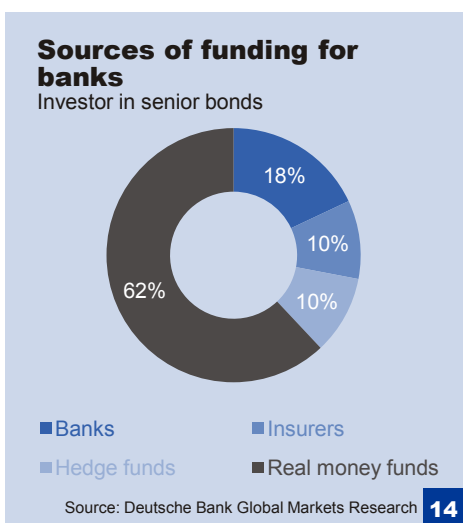
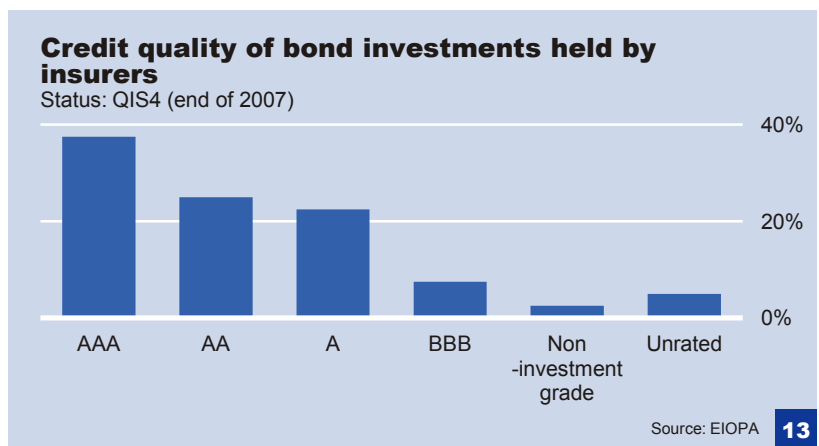
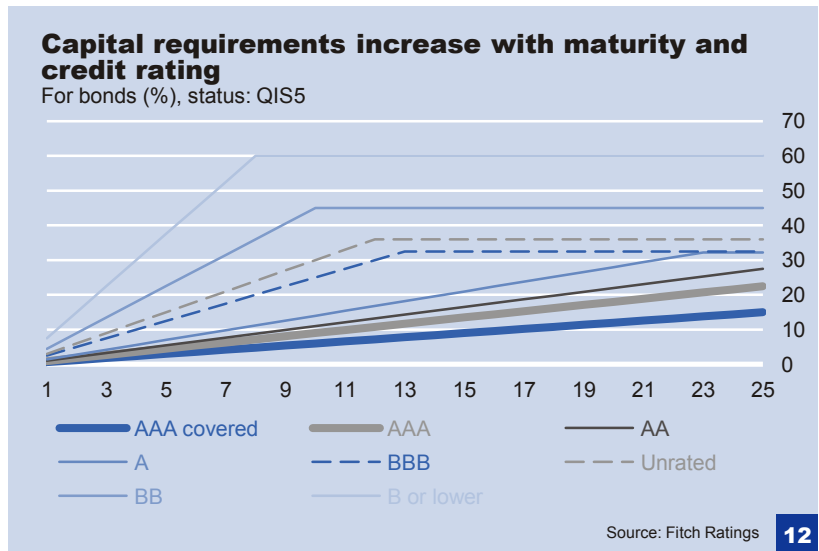
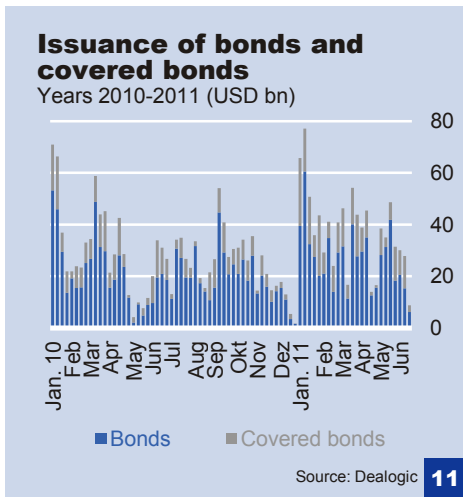
³⁷ As a reminder: The capital requirements for covered bonds are lower than those for other types of bond, such as senior bonds, provided that the covered bonds have an AAA rating and satisfy the UCITS directives. Covered bonds with lower ratings do not benefit from this preferential treatment. Under Basel II, banks can include covered bonds for the purposes of both the NSFR and LCR.

³⁸ Bank for International Settlements (BIS).

³⁹ Federal Association of German Banks (BdB).

⁴⁰ Fitch.

⁴¹ Happe (2011).



covered bonds because of the lower risk markup as a result of the collateralisation involved.

The growing appeal of covered bonds could therefore lead to a shift in funding habits (in other words, banks may issue more covered bonds rather than senior bonds) but not necessarily to a loss of the investor base (i.e. insurers no longer generally buy bank bonds).⁴²

4. Others are also buying bank bonds

Another reason why there might only be a moderate impact on bank funding from Solvency II is that banks have other sources of funding, notably money market funds, hedge funds, and other banks, in addition to insurers. For example, senior bonds are not placed primarily with insurers: real money funds account for the largest group of buyers for such bonds (see chart 14). In contrast, insurers only account for a proportion of around 10%.

5. Portfolio diversification will gain in importance

A further factor is that, under Solvency II, diversification of lending will have much greater importance than hitherto. The consequence will be that the existing diversification in credit exposure will remain and may even increase: existing major investment positions will be subject to greater diversification, and there will be a contraction in

⁴² Over the long term, this trend could have an adverse impact on opportunities for banks to place unsecured bonds at a reasonable price because the rise in issues of covered bonds is necessarily accompanied by a fall in the volume of unencumbered assets that would be available to the unsecured creditors in the event of a liquidation.

investments subject to concentration of risk. The impact of the requirements will therefore be to drive greater diversification in insurers' portfolios.

6. Effects also dependent on the alternatives

Even if bank bonds were to become so unattractive for insurers as a result of Solvency II that insurers no longer planned to invest in such bonds, the question arises as to what alternative investments would be available for insurers. The insurance industry is commonly viewed as 'liability-driven'⁴³; it reports huge volumes of premiums that need to be allocated one way or another. A critical factor will therefore also be the relative attractiveness of bank bonds compared with other corporate bonds because, within the corporate bonds market, bank bonds are in competition with non-financial corporate bonds – to which the same rules apply under Solvency II. Bank bonds would only be disadvantaged if they were notorious for involving higher capital requirements; the capital requirements depend on maturities and ratings.

Good rating, short maturity: features of most European corporate bonds

In terms of maturities, bonds from European issuers in the non-financial sector, as well as bank bonds, appear to be relatively attractive as they are mostly bonds with short to medium maturities.^{44,45} Nevertheless, it is possible that other sectors will also become more attractive for insurers because of the downgrading suffered by some banks since the financial crisis. A further factor is the uncertainty regarding the planned increase in bondholder liability in the banking sector. As a result, investment-grade corporate bonds could be serious competitors for bank bonds – as is currently the case. In view of the relative deterioration in bank ratings compared with other corporate ratings there could also be some adjustment in favour of corporate bonds.

7. Internal models reduce appeal of government bonds

In the new regulatory environment, EEA government bonds initially appear to be significantly more attractive than, for example, bank or other corporate bonds owing to the advantage they enjoy (compared with other types of bond) from their preferential treatment under Solvency II and Basel III. In addition, government bonds frequently have very long investment horizons, which means that they are well-suited to matching with long-term insurance liabilities.

However, most insurers (particularly the larger insurance companies) will use internal models and not the standard formula provided by the European Commission. They will therefore also not overlook the current trends as regards European sovereign debt; they will ensure that the risks associated with the government bonds are adequately factored into their internal models. Insurers will then make sure that capital adequacy matches these risks – even if this is not expressly required under Solvency II. This will diminish the supposed appeal of government bonds because such bonds will ultimately be valued in accordance with the associated risk and supported by adequate capital.

However, bonds from EEA governments with a low(er) level of indebtedness could become more attractive, particularly if the bonds

⁴³ An investment strategy is liability-driven if investment decisions are for the most part based on the cash flow required to cover payment obligations in future.

⁴⁴ Deutsche Bank, Global Markets Research (2011).

⁴⁵ Insurers are already significant buyers of non-financial corporate bonds: Estimates put the proportion of the total (German) market for corporate bonds directly held by insurers at around 15% (Source: fpmi).

Equities and Solvency II

European insurance companies have been de-risking their investment portfolios in recent years, especially in the wake of the financial crisis. Consequently, they have been constantly reducing their equity investment weightings, which now account for only 7% of their portfolios on average.

Given that the capital requirements for equities under Solvency II are relatively demanding, it is fair to assume that insurers will not be looking to significantly increase the amounts that they invest in equities in future. Rather, equities will increasingly only be used as an additional enhancement in portfolios.

The weightings given to equities in insurers' portfolios vary from one jurisdiction to another. This means that insurers in the United Kingdom, for example, might well reduce their equity holdings because equities weightings have traditionally always been relatively large here.

cover long investment horizons and thus satisfy the asset/liability matching requirement. Overall, this could lead to a rise in the demand for investment-grade government bonds, primarily for those bonds with the requisite long-term maturities. Under Solvency II, government bonds could therefore become the predominant class of bonds among very long-maturity bonds (maturities of 10 to 20 years or more) – if the structure of the rules remains as currently planned.

No significant change in the investment landscape

In summary, although Solvency II will lead to some changes in current funding habits, it nevertheless seems likely that all the parties involved can reach a compromise that they are able to live with. The existence of a large number of transitional arrangements covering periods of up to ten years, as currently planned in relation to the introduction of Solvency II, could further mean that Solvency II is implemented in phases over a number of years with the result that assets are reallocated gradually in small steps. The longer the transitional phases, the lower the direct impact on insurers' asset allocation.

Conclusion

The answer to the question of whether Basel III and Solvency II create diametrically opposed incentives is therefore both 'yes' and 'no'. There is some overlap between the two, and they will probably bring about a few changes in the bond markets. However, fears that the entire investor base might disappear are unjustified.

Given the lack of empirical evidence and the fact that the final calibrations are not yet available, it is impossible to accurately gauge the consequences of simultaneously implementing two such far-reaching regulatory frameworks as Basel III and Solvency II. It is therefore questionable whether regulatory authorities should introduce such major interacting regulatory initiatives at the same time without being able to properly assess what the reciprocal effects might be.

Furthermore, the Solvency II project has been running for around ten years now and was therefore inevitably launched under different conditions from those currently prevailing. Consequently, some of this regulation already appears to be in need of revision. For example, the rationale for maintaining the rules on government bonds (no capital backing required) seems dubious: judging by recent developments in the European sovereign debt crisis, this regulation appears optimistic. In terms of being able to capture and measure risks accurately it does not seem wise to grant a blanket exemption for (these) government bonds, as is currently the case for the EEA member states. It would be better to adopt a more nuanced approach. For example, it has been the case for a while now that the credit default swap (CDS) spreads in some non-EEA countries are much lower than in some EEA states.

It might therefore be worthwhile revising or reconsidering some of the Solvency II regulations given that the current incentive structures appear questionable against the backdrop of the financial and sovereign debt crisis.

Excursus on examples of regulatory initiatives

It is also possible to study the potential impact of Solvency II by looking at countries that have already introduced similar regulatory initiatives.

1. One possible consequence of such regulation is that it can trigger a 'flight to safety' as well as a 'flight to transparency'. A case in point is Australia, where insurers reacted to the recently introduced regulation by reallocating assets on a large scale from equities into bonds. In recent years, however, German insurers in particular have already significantly reduced the weightings of equities in their portfolios to around 4% at present. It is therefore unlikely to see any further reductions as a result of Solvency II.
2. A different trend has been observed in the United States, where a risk-based minimum capital requirement was introduced back in the 1990s. The new regulation gave insurers an incentive, among other things, to prefer commercial mortgage-backed securities (CMBSs) over other, unsecured mortgage loans on commercial real estate. This situation was largely due to the fact that the risk-based capital requirements gave preferential treatment to CMBSs compared with loans. Academic research (e.g. Stanton and Wallace, 2010) has shown that insurers' investment strategies have indeed occasionally been influenced by the resultant regulatory arbitrage and that these investment strategies in turn contributed to the fact that some insurers were highly leveraged, which during the financial crisis made them more vulnerable to bankruptcies triggered by relatively minor systemic shocks. Solvency II appears to have taken account of this situation at least to the extent that Pfandbriefe are the only type of covered bonds to have been given preferential treatment. Loans are not discriminated against either.
3. The Swiss Solvency Test (SST) is a regulatory framework based on Solvency II. Rather than consisting of a predefined model, it is predicated on a series of principles that enable insurers to capture their risks individually. There is also a readily available standard model that is consistent with the principles of the SST. The major life and non-life insurers have been conducting the SST since 2006, while some smaller companies as well as reinsurers and health insurance funds have been doing so since 2008. Following a five-year introductory period the SST has been legally binding since the beginning of 2011.

Because introduction of the SST has only been legally binding since 2011, it is not yet possible to accurately measure its impact. However, the Swiss Federal Office of Private Insurance (FOPI) reckons that the SST is unlikely to have any effect on the equity market. According to the FOPI, the average portfolio weighting of equities held by Swiss life insurance companies is 10.14%, while the corresponding figure for non-life insurers is 7.53%. These percentages are not expected to fall significantly as a result of the introduction of the SST. It is possible, however, that the SST will have an impact on the bond market because an improvement in asset/liability matching might boost demand for long-term government bonds in the short run. Stronger demand for long-term government debt, swaps and covered bonds has already been observed. Academic research (e.g. Schmeiser et al (2006)) conducted back in 2006 pointed out at the time that the SST might push up the cost of funding for companies that have a low credit standing or no credit rating.

Since the European Commission still plans to introduce these rules at the beginning of 2013 and does not wish to allow any further delays, however, there are unlikely to be any major changes to the Solvency II legislation. One can only hope that those responsible make at least some modifications to the calibrations or to the standard model which, as it stands, is highly complex.

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Selected bibliography

- BIS (2011). Bank for International Settlements. Fixed income strategies of insurance companies and pension funds. CGFS Paper No. 44. July 2011.
- Deutsche Bank Global Markets Research (2010). European Insurers – Solvency II – Everything in moderation.
- Deutsche Bank Global Markets Research (2011). Basel III and Solvency II – Impact on credit markets. Fundamental Credit Special.
- EU COM (2010). European Commission. QIS5 Technical Specifications.
- EIOPA (2011). European Insurance and Occupational Pensions Authority. EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.
- Fitch Ratings (2011). Solvency II Set to Reshape Asset Allocation and Capital Markets. Insurance Rating Group – Special Report.
- Happe, Karl (2011). Wie reagieren die Versicherungen auf die neue Qualität von Bankrisiken? Zeitschrift für das gesamte Kreditwesen, 14 – 2011. 15 July 2011, pp. 703 – 706.
- IMF (2011). International Monetary Fund. Possible Unintended Consequences of Basel III and Solvency II. IMF Working Paper WP/11/187.
- Morgan Stanley, Oliver Wyman (2010). Solvency II: Quantitative & Strategic Impact – The Tide is Going Out. Morgan Stanley Research Europe.
- Schmeiser, H., M. Eling, N. Gatzert, S. Schuckmann and D. Toplek (2006). Volkswirtschaftliche Implikationen des Swiss Solvency Test. Institut für Versicherungswirtschaft St. Gallen, Schriftreihe, Band 48.
- Stanton, Richard, Wallace, Nancy (2010). CMBS Subordination, Ratings Inflation, and the Crisis of 2007-2009. NBER Working Paper Series, WP 16206. July 2010.

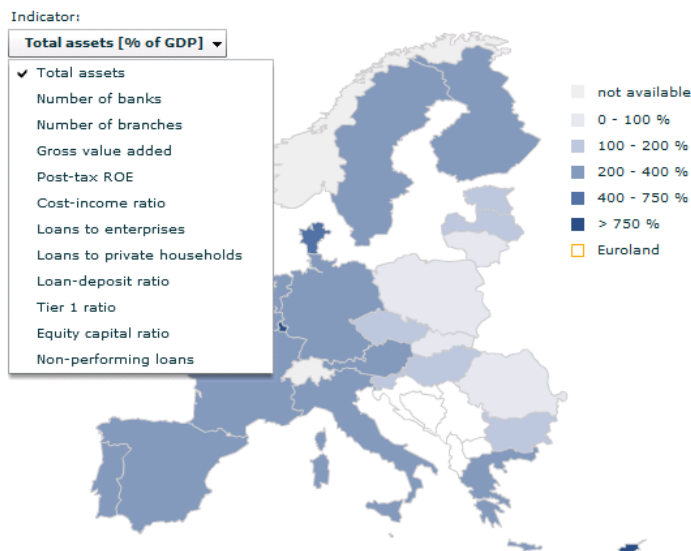


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