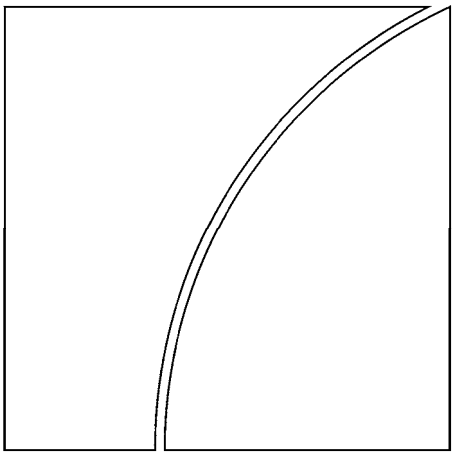
Committee on the Global Financial System



CGFS Papers

No 44

Fixed income strategies of insurance companies and pension funds

Report submitted by a Working Group established by the Committee on the Global Financial System

This Working Group was chaired by Peter Praet, Member of the European Central Bank's Executive Board

July 2011

JEL Classification: G22, G23, G28, M4

BANK FOR INTERNATIONAL SETTLEMENTS

Copies of publications are available from:

Bank for International Settlements
Communications
CH-4002 Basel, Switzerland

E-mail: publications@bis.org

Fax: +41 61 280 9100 and +41 61 280 8100

This publication is available on the BIS website (www.bis.org).

ISBN 92-9131-880-9 (print)

ISBN 92-9197-880-9 (online)

Preface

In November 2010, the Committee on the Global Financial System (CGFS) established a Working Group to examine how insurance companies and pension funds are being affected by forthcoming accounting and regulatory changes in the current low-interest rate environment, and to investigate possible implications of changes in their investment strategies for the financial system. Over the coming years, accounting and regulatory changes could lead to reallocations of funding across financial instruments and sectors and encourage greater use of derivatives. The changes could also make it more difficult for insurance companies and pension funds to play their traditional role as global providers of long-term risk capital and accelerate the shifting of risks to households.

The Working Group was chaired by Peter Praet of the National Bank of Belgium, now a Member of the European Central Bank's Executive Board. Among other sources, the report draws on industry input obtained through roundtable discussions and bilateral interviews with insurance companies and pension funds. The report was presented to central bank Governors at the Global Economy Meeting in June 2011, where it received endorsement for publication.

We hope that the central bank perspective adopted in this report helps to inform current debates on international accounting and regulatory changes by placing institutional investing in a broader financial system context.

Mark Carney

Chairman, Committee on the Global Financial System
Governor, Bank of Canada

Contents

Executive summary

Life insurance companies and pension funds constitute a large segment of the institutional investor space. With combined industry assets of some $40 trillion, these institutions play an important role in fixed income markets, especially as major providers of long-term funding to banks and the public sector. Insurance companies and pension funds find themselves at the intersection of major developments. Having weathered the financial crisis, they now face important changes in international regulation and accounting standards. In addition, their business models and balance sheets are particularly exposed to the low-interest rate environment due to the long duration of their liabilities compared to that of their assets (duration gap).

Against this backdrop, the present report, prepared by a working group chaired by Peter Praet, Member of the European Central Bank's Executive Board, seeks to develop a better understanding of how life insurance companies and pension funds are being affected by accounting and regulatory changes in the current low-interest rate environment. From the central bank perspective adopted in the report, an issue of particular interest is how these long-term investors might alter their investment strategies and asset allocations, and the likely consequences for market functioning and funding of various economic sectors arising from such changes. The report also presents the working group's assessment of possible implications for the financial system as a whole. Among other sources, the report draws on industry input obtained through roundtable discussions and bilateral interviews with insurance companies and pension funds.

At the time of writing, international accounting and regulatory changes remain in a state of flux. As a number of important rules, their calibration and phase-in arrangements are still subject to uncertainty, the findings of this report should be regarded as preliminary and subject to revision as new information arrives and other regulatory frameworks are phased in (eg Basel III or the Dodd-Frank Act). That said, there are grounds for expecting certain adjustments to the assets, liabilities and derivatives books run by insurance companies and pension funds, with potential consequences for financial markets.

The adoption of various international accounting standards by insurance companies and pension funds over the coming years may bring, alongside gains in transparency and comparability, somewhat greater volatility in their financial statements. Modifications to IAS 19 aim to improve the recognition, presentation and disclosure of employee benefit obligations by 2013, and require that changes in actuarial assumptions be reflected in profit and loss. Similarly, IFRS 4 Phase 2 proposes a single accounting model for insurance contracts by 2014 and requires that future cash commitments be discounted in each reporting period using a risk-free rate adjusted for a liquidity premium or a yield curve that reflects current asset returns. Accounting volatility may affect market assessments, company valuations and the ease with which an insurer secures capital, while reported changes in a pension fund's funding status can affect the sponsoring company. Possible consequences for investment strategies can then arise from increased pressure from markets or sponsoring companies to de-risk asset holdings with the aim of avoiding volatility in the financial statements.

Insurance companies will be affected to a greater extent by the introduction of Solvency II, a comprehensive risk-based regulatory framework to be phased in from 2013. Solvency II and other risk-based regulatory regimes in Europe require that assets should be marked to market and that liabilities be discounted at risk-free rates (possibly augmented by an illiquidity premium). Solvency II also requires insurers to hold loss-absorbing capital against the full range of risks on both their asset and liability side to weather unexpected losses with a probability of 99.5% over a one-year horizon. While the latest quantitative impact study by European insurance regulators suggests that the majority of insurance companies will not face an imminent need to raise new equity, they may rebalance their asset portfolios in line with the new risk charges. The proposed changes tend to make it more expensive to hold

equity-like instruments, structured products, and long-term or low-rated corporate bonds, whereas government bonds and covered bonds will receive relatively favourable capital treatment.

While these accounting and regulatory changes bring important benefits in terms of financial soundness and disclosure, the resulting portfolio shifts also have potential financial market implications. For instance, depending on initial conditions and current asset holdings across countries, demand for high-quality long-term bonds, already a preferred habitat, could strengthen as firms economise on capital charges and limit the duration gap when shortening the duration of their corporate bond holdings. While this tends to flatten the risk-free term structure, the term structure for lower-rated credit might steepen to attract other investors or keep insurers and pension funds invested in this segment.

However, such financial market implications may be transitory rather than permanent, as a long phase-in period leaves scope for other investors to reposition themselves and for insurers to get approval for internal models that could mitigate those implications. Effects will also be weaker in countries where firms already use risk models in line with new regulation, or where the size of the sector is small relative to bond market capitalisation. The impact on investment strategies and financial markets also depends on the final set of rules and their calibration. Moreover, life insurance companies and pension funds can adjust to accounting and regulatory changes in other ways. They can continue changing their product mix over time, extending a long-term trend of moving away from guaranteed return or defined benefit plans. Alternatively, they can transfer more risk to financial markets via reinsurance, securitisation or increased hedging. On this basis, proposed regulatory changes tend to encourage greater use of derivatives for hedging purposes, notably interest rate swaps, swaptions and futures, inflation swaps and equity options.

Some of these trends are reinforced by the exceptional macroeconomic environment. Low interest rates make it difficult for life insurance companies and pension funds to meet future obligations out of meagre fixed income yields. That such strains can undermine the industry is illustrated by the Japanese experience of the 1990s, although that experience also included a persistent decline in the equity markets. Many institutions today have insulated themselves from these effects, either by hedging interest rate risk, or by moving towards unit-linked insurance products or defined contribution schemes. While today's situation thus appears more manageable, the sector may step up the search for yield should low rates persist.

Life insurance companies and pension funds are likely to continue changing the characteristics of the products they offer with a view to reducing their exposure to risk. Shifting risks to households diminishes the extent to which the sector transforms financial market risk into reliable streams of retirement income and other benefits. This may result in greater sensitivity of household spending to changes in asset prices and interest rates, and might lead to a more conservative asset allocation in aggregate if households seek to reduce their risk exposure in pension plans, insurance policies, or retirement savings going forward.

As life insurance companies and pension funds are major players in financial markets, the possible responses described in this report may have further systemic implications. One channel through which portfolio shifts could affect market functioning is by reinforcing existing habitat effects in fixed income markets. Liability-driven investment strategies tend to raise the demand for risk-free long-term assets used for limiting duration gaps without attracting higher risk charges. As this favours government bonds, there is concern about the prospects for corporates, and bank funding in particular, over the medium term. Insurance companies and pension funds have continued to reduce their exposure to financial institutions since the crisis. However, a broad-based shift from bank funding toward government funding does not necessarily follow. Insurance companies and pension funds may play less of a role in unsecured bank funding, but they could expand their holdings of bank-issued covered bonds, or regain interest in unsecured bank debt once banks are

subject to stronger regulation. At the same time, the trend toward government debt is tempered by growing unease about the sustainability of public finances.

A related concern is whether life insurers and pension funds can maintain a long-term investor perspective. Factors contributing to this concern among market participants include the steep regulatory risk charges and short horizons to be used for assessing solvency and for addressing funding shortfalls. Prospective volatility in financial statements under international accounting rules may also limit the scope for taking long-term or illiquid positions without any concern for short-term fluctuations in their value. As is the case for institutional investors more generally, these factors tend to encourage a shift away from long-term investing in risky assets, in addition to the ongoing trend toward more conservative asset allocations in the aftermath of the financial crisis. This could alter the traditional role of life insurance companies and pension funds as global providers of long-term risk capital. A partial retreat of institutional investors from the long-term and/or illiquid segment of the credit market could reduce the private and social benefits the sector generates through long-term investing, and the extent to which it mitigates the procyclicality of the financial system.

1. Introduction

Life insurance companies and pension funds are confronted with major developments that could affect the important role they play as long-term investors in fixed income markets. Having weathered the financial crisis, they now face changes in international accounting standards and regulation. These new rules, notably Solvency II in Europe, are expected to affect investment decisions and influence investment horizons. In addition, the low-interest rate environment reduces investment returns and complicates asset-liability management.

Against this backdrop, the Committee on the Global Financial System (CGFS) set up a working group to investigate the potential effects of these factors on the business models and investment strategies of insurance companies and pension funds, and on the functioning and behaviour of the financial system. The present report was prepared by a working group chaired by Peter Praet, Member of the European Central Bank's Executive Board, and draws on regional roundtables and bilateral interviews with the private sector.[1] It follows earlier reports on institutional investors, including CGFS (2007) on global savings and asset allocation, and CGFS (2003) on incentive structures in institutional asset management.

The report examines how international accounting and regulatory changes may affect the investment strategies and portfolio allocations of life insurance companies and pension funds in the current macroeconomic environment. It also presents the group's preliminary assessment of possible implications for financial markets, sectoral funding patterns and the cyclical behaviour of the financial system. This assessment is necessarily tentative, as international accounting and regulatory rules remain in a state of flux and the broader macroeconomic environment may also change in the near future.

The report is organised as follows. Section 2 provides background on insurance companies and pension funds and the role they play in the financial system. Section 3 covers the international accounting and regulatory changes most relevant to these institutions, while Section 4 explores possible consequences for their investment strategies and portfolio allocation, including the use of derivatives. Section 5 places the analysis in the current macroeconomic context and presents a preliminary assessment of financial market implications.

2. Life insurance companies and pension funds in context

Life insurance companies and pension funds play an essential role in providing economic security to households across contingencies and across time. They also make up a large segment of the institutional investor space and play an important role in fixed income markets, especially as major providers of long-term funding to banks and other sectors. This section provides background on these issues, and how their asset-liability management and asset allocation affects the funding of various economic sectors. The effect of the global financial crisis of investment strategies and their financial condition sets the stage for the discussion of accounting and regulatory changes in the subsequent sections.

2.1 The importance of insurance companies and pension funds in the financial system

The insurance and pension funds industry constitutes a large segment of the financial system, comprising thousands of entities around the world. The industry channels a huge

[1] See Annex 1 for the list of Working Group members, and Annex 2 for industry participation.

volume of savings into a wide range of financial markets, and plays a significant role in providing long-term funds to various sectors in the economy. Among institutional investors, the worldwide asset holdings of insurance companies and pension funds are each of the same order of magnitude as those of mutual funds, which are multiples larger than those of hedge funds and sovereign wealth funds. Insurance investments are concentrated in the life insurance industry, with total investments worth $18.7 trillion at end-2009 (compared to $3.9 trillion in the non-life industry). European entities hold $10.4 trillion in insurance assets, nearly half of global insurance assets of $22.6 trillion (SwissRe (2010)).

The importance of the industry across countries can be assessed in terms of its size relative to the overall financial system.[2] The size of the financial system is approximated here as the sum of total assets of deposit money banks and stock and bond market capitalisation, as defined in the World Bank's *Financial Development and Structure Database*,[3] plus total investment of insurance companies and pension funds, based on OECD statistics, expressed at constant prices. Although comparisons across countries are complicated by national differences in data definitions, some broad observations can be made.

The size of pension fund systems differs widely across OECD countries. They range in size from 0.1% to 20% of the financial system (Graph 1, left-hand panel, y-axis). The countries at the low end of this distribution typically have a short history of private occupational pensions, often due to the presence of state-run public pay-as-you-go systems. Anglo-Saxon countries – Canada, Ireland, the United States, the United Kingdom and Australia – are clustered along with Switzerland in the range of 12–17%. A similar degree of cross-country dispersion is displayed by total investment of insurance companies as a percentage of the overall financial system (x-axis). The data are limited to the life insurance business and hence do not cover property and casualty insurance.[4] Relative to the large US financial system, the size of US life insurance companies is one of the lowest in the sample, at slightly less than 1%. By contrast, the United Kingdom and the Scandinavian countries (Denmark, Norway and Sweden) have relatively large life insurance sectors, accounting for 12–17% of their financial systems, followed by Japan and Germany at 10%.

Differences in historical, cultural, regulatory and economic developments undoubtedly play an important role in the dispersion observed across countries. Pension systems and life insurance are *both* small in those countries clustered around the origin of the scatter plot. In others, one sector tends to be large when the other is small, because regulation, custom or laws tend to favour one channel of accumulating retirement savings over another. It is therefore useful to consider pension funds and life insurance companies jointly by their combined size in the financial system (right-hand panel). The United Kingdom and the Netherlands exhibit the largest share at 29% and 26%, respectively, followed by the Nordic countries and Switzerland, while the United States are clustered with other Anglo-Saxon countries at around 15%. Both the median and average size of the sector lie above 10% of the financial system.

---

[2] An alternative measure of size (investments relative to GDP) is presented in Table 1 below.

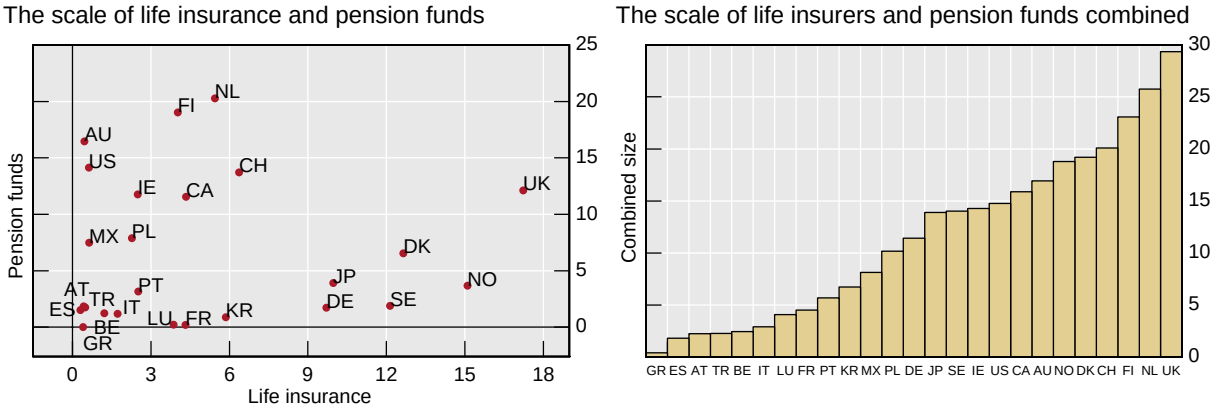
[3] Details relating to this database are provided in Beck et al (1999) and (2009). The database contains a select number of financial system indicators that are readily available for a large number of countries over extended periods of time. It is accessible at http://econ.worldbank.org/programs/finance.

[4] While this may be important for specific countries, the bulk of investments is held by the life insurance industry.

Graph 1

Life insurance companies and pension funds in the financial system

Total investment expressed as a percentage of financial system assets[1]



AT = Austria, AU = Australia, BE = Belgium, CA = Canada, CH = Switzerland, DE = Germany, DK = Denmark, ES = Spain, FI = Finland, FR = France, GR = Greece, IE = Ireland, IT = Italy, JP = Japan, KR = Korea, LU = Luxembourg, MX = Mexico, NL = Netherlands, NO = Norway, PL = Poland, PT = Portugal, SE = Sweden, TR = Turkey, UK = United Kingdom, US = United States.

[1] The size of the financial system is approximated as the sum of total assets of deposit money banks, plus stock and bond market capitalisation, as defined in the World Bank's *Financial Development and Structure Database* as of end-2009. The pension and insurance data are from the OECD's *Global Pension Statistics* and *Insurance Statistics*, end-2009. Investment data exclude assets linked to unit-linked products sold to policyholders and do not include assets under management of foreign affiliates and branches.

Sources: OECD and World Bank.

The large footprint of insurance companies and pension funds in the financial system is also reflected in their importance in fixed income markets. Their holdings of bills and bonds (those held via specialised mutual funds included) often account for a large segment of overall bond market capitalisation in their respective countries. This share exceeds 40% in countries where this sector is large compared to domestic bond markets, as in Switzerland, the Netherlands and the Nordic countries. The share still exceeds 30% in Canada and the United Kingdom, and lies close to or above 10% in other major markets, including France, Germany and the United States. It is thus plausible to expect some impact on financial markets when there are significant changes in the fixed income strategies of insurance companies and pension funds.

2.2 The industry's role and its services

What functions do insurance companies and pension funds perform to assume such a prominent place in the financial system? In a fundamental way, insurance and pension arrangements allow risk-averse individuals to smooth consumption across contingencies and time.[5] These are important and welfare-enhancing functions, provided the premiums or contributions charged for these services are appropriately priced.

Insurance allows individuals to substitute a small certain cost (the premium) for a large uncertain cost (the contingency insured against), and thus helps protect individuals and

[5] Pension systems can be viewed as an insurance scheme in which group members agree to pool their savings with each member drawing a pension based on the group life's expectancy and the total contribution of the member to the pool (Barr and Diamond (2004), Schudli (2005)). The way a pension system is organised determines how close is the relation between each member's contribution and the pension.

companies from the economic consequences of the risks they face.[6] The *raison d'être* of insurance companies is to take a large number of individual, independent and largely homogeneous risks and diversify them directly or indirectly (via reinsurance and securitisation), thereby helping consumers to smooth consumption over their lifetimes.

Box 1

Types of life insurance contracts

A very broad classification of life insurance products includes two main operational categories: (i) savings and retirement products and (ii) retail insurance products (see Vaughan and Vaughan (2008) for a comprehensive treatment of insurance contracts). Within these categories, a traditional distinction is made between two main types of contracts. There are contracts whereby the insurance company guarantees a specific return to the policyholder, and there are unit-linked contracts which do not guarantee a return to the policyholder but rather a return which depends on the performance of the underlying portfolio. There are various combinations of market objectives and optional guarantees within these different contracts. While a complete inventory is not necessary for the purpose of this report, the following classification may be useful.

(i) Savings and retirement products

These can take the form of fixed- or variable-rate deferred annuities. The former are comparable to bank certificates of deposits and have a normal duration of 3–10 years. They have large early surrender charges and asset risk is borne by the insurer. Variable deferred annuities may have no living benefit guarantees or they may have some form of living guarantee, premium guarantee, minimum-withdrawal or minimum-income guarantee. Contracts with no living guarantee transfer all risk to the policyholder and some forms of these contracts provide a death benefit. Contracts with a guarantee in the form of a minimum withdrawal assure to the policyholder the possibility of an annual minimum withdrawal, typically 5% of the original deposit, for as long as the policyholder lives. There are no risks of large withdrawals as premature withdrawals void the guarantee. When contracts offer a guarantee on a minimum income benefit, the policyholder can purchase, after a minimum period of years, a life annuity (ie policyholders receive specific annual payments for as long as they live). Again, there is no risk of a premature withdrawal in this type of contract. Finally, other life insurance contracts guarantee that the asset value will not fall below the original deposit value at the end of a predetermined period.

(ii) Retail insurance products

This category provides protection against the financial consequences of death or disability and against outliving one's means. The level premium insurance contract is executed in case of death and thus cannot be surrendered prematurely. The primary risk of this product is that of a pandemic. The fixed universal life contract pays the policyholder annual premia after a certain age with the asset risk being borne entirely by the insurer (their cash value is low during the first years of the contract because surrender charges are high). By contrast, in the variable form of the contract, the asset risk is borne by the policyholder. Disability contracts are associated with employment-related accidents, and the policy cannot be surrendered for its cash value.

The different risks covered by insurers will largely determine their business models. Three broad categories of risks can be identified: non-life-related risks (ie property and casualty), life-related risks, and (mostly) credit risk associated with investing in financial instruments for

[6] A textbook introduction to risk and insurance can be found in Vaughan and Vaughan (2008).

which monoline insurance companies provide financial guarantees.[7] Life insurance broadly covers two types of risk: first, protection against investment risk, and against the financial consequences of death or disability and, second, against outliving one's means. In the former, the insurer provides financial guarantees in the form of either capital protection or minimum yield for a policy holder's savings. It incurs financial risk to the extent that it is not hedged or securitised. In the latter, insurers assume mortality and longevity risk, ie the risk that policyholders in aggregate outlive their contributions and the return on them during the life of their contracts. Accordingly, life insurance products include savings and retirement products, such as fixed or variable annuities with or without guarantees on the capital or its return, and retail insurance products, such as traditional fixed or variable life insurance and disability insurance (Box 1 discusses these contracts in more detail).

A pension scheme is an arrangement set up by employers, the government or other institutions (employer associations, trade unions) that aims at providing people with an income when they are no longer earning a regular income from employment. Pension systems differ in how they are organised and in the relation between contributions and benefits. Pay-as-you-go schemes (PAYG) are usually state-run and based on the sovereign's ability to tax the working population in order to pay the pensions of the retired generation.[8] The state taxes a group of people and transfers the revenues to another, on an annual or on a lifetime basis. By contrast, fully-funded schemes are based on contributions from participants and their employers. The return on these contributions is credited to the scheme's fund. In contrast to PAYG schemes that pay pensions out of tax or other current income, fully-funded schemes pay pensions out of the fund's accumulated contributions and past returns.

In spite of certain similarities, life insurance companies and pension funds operate in different institutional settings. Participation in a pension scheme is often mandatory and forms part of the employment contract. In addition, pension schemes usually function within national borders; hence, multinationals typically have one or more separate pension funds in each of the countries in which they conduct business. As a result, pension asset allocations have more of a domestic orientation, and pension contracts vary more across countries than is the case for insurance contracts. The main types of pension products are identified in Box 2. In the case of pure defined contribution (DC) contracts, all risks are borne by participants of the scheme and total pension entitlements are equal to the value of the scheme's assets, similar to the unit-linked products of life insurers. By contrast, in the case of defined benefit (DB) and hybrid contracts, some or all of the risks are borne by the fund and its sponsor (if applicable) and pension liabilities consist of technical provisions.

This report will focus on life insurance companies and funded pension schemes, which share the important feature that they hold large investment portfolios backing primarily long-dated liabilities. It is an important characteristic of their liabilities that they extend years or decades into the future, while they are funded up-front through premium payments or pension contributions that are invested in financial and real assets. As a result, life insurers and pension funds typically have a negative duration gap, with liabilities of longer duration (hence more interest-sensitive) than their assets. This is in sharp contrast with banks, which provide maturity transformation and accordingly face greater liquidity risk (see Table 1). The nature

[7] Monolines or financial guarantors are insurance companies that provide credit protection or guarantees to issuers of various types of debt instruments, by issuing financial guarantees. To the extent that monolines are insurance regulated entities they are not allowed to sell credit default swaps.

[8] It is effectively a transfer mechanism, although the determinants of who pays, who receives, and the incentive structure can differ from traditional transfers.

of their liabilities in principle allows pension funds and life insurers to play the important role of long-term investors in financial markets.

Table 1

Differences between insurance and banking business models

Area	Insurance	Banking
Business scope	Risk pooling and risk transfer	Payment services, intermediation with maturity transformation
Funding	Liability-driven	Liability and market funding-driven
	Up-front premiums	Mostly short-term funding
	Assets and liabilities are mostly matched	Assets and liabilities are not strictly linked
	Limited use of inter-company borrowing/lending	Interbank borrowing/lending is significant
Balance sheet	Business cycle influences balance sheet in a limited manner	Assets and liabilities exposed to business cycle
Risks	Substantial interest rate risk	Substantial credit and liquidity risk
	Low liquidity risk	Key risk due to maturity transformation and wholesale funding
	Low interconnectedness due to relatively higher substitutability	Substantial trading among institutions (interbank and repo)
	High percentage of assumed risk is retained	Low owner risk retained, especially with securitisation
	Leverage is limited	Significant use of leverage
ALM and investment	Relatively stable funding and liability-driven investment	Low liquidity and asset-driven investment

Box 2

Types of pension contracts

The two main types of pension plans are defined benefit (DB) and defined contribution (DC).

In a DC scheme, the participant's contributions are determined in advance, but the level of pension payments is not. During the accumulation phase, the contributions are invested in a certain portfolio and the participant bears all the investment risk. Upon retirement, the participant usually buys a life annuity (from an insurer) that provides protection against longevity risk and changes in interest rates. However, during the accumulation phase, a participant is not protected against changes in real rates of return, in future earning paths, and in the future pricing of annuities. In a pure DC scheme, there is no risk-sharing or redistribution among participants. Further, financial markets shocks during the working life of an individual participant may have a large impact on the level of pensions.

In a DB scheme, future pension payments are determined in advance, based on the wage history and years of service of a participant. In contrast, the level of contributions may vary substantially over time, depending on the reserves or funding shortfall of the fund. Investment risks and longevity risks are shared among various parties and there is also redistribution among generations. If a DB scheme is run by a public agency, risks fall on present and future participants or indirectly on taxpayers, depending on how it is financed. If a DB scheme is sponsored by a private company, risks fall mainly on present and future workers and, depending on the characteristics of the contract and pension system, also on the sponsor and thereby indirectly on its shareholders and customers. Usually pensioners are still exposed to some risks, such as inflation in the absence of indexation of pension rights or, in extreme cases, a reduction of nominal benefits. However, compared to DC schemes, an individual participant is much less exposed to financial market fluctuations over the life of the contract.

In practice, many schemes are neither pure DC nor pure DB, but fall somewhere in between. A notable example are the "cash-balance" plans in the United States, in which the sponsor of the pension scheme does not guarantee a given amount of benefits (as in a pure DB scheme), but a given capitalisation rate for the contributions. DC schemes with a minimum guaranteed return are another example.

For schemes with DB characteristics, many different options are possible with regard to risk-sharing. For example, if the retirement age is fixed, longevity risk is borne mainly by future participants and sponsors, but if the age is adjusted automatically in line with changes in life expectancy, longevity risk is borne mainly by the current participants themselves. Participants may sometimes choose to have a higher pension if they continue working beyond the normal retirement age and vice versa. Furthermore, if indexation of pension payments and pension rights is mandatory, inflation risk is borne by present and future participants and fund sponsors, but if indexation depends on the funding ratio, it is mainly borne by present participants and pensioners. Some DB funds also link the pension level to the final earned wage of a participant, thus resulting in redistribution towards participants with a relatively steep career path. In addition, for both DC and DB schemes, there can be a variety of rules for the transferability of pension rights from one fund to another.

2.3 Asset-liability management (ALM) and the use of derivatives

The liabilities of insurance companies and pension funds play a crucial role in their asset management. Traditionally, their investment strategies had focused on outperforming a market index or some peer group average. Such asset-driven strategy has obvious limitations, as exemplified by the situation of many pension funds in the early 2000s: following the bursting of the equity bubble, their assets were depleted while the low interest-rate environment contributed to inflate their liabilities. As a result, many pension funds experienced major funding shortfalls.

This experience has prompted insurance companies and pension funds to recognise that what matters is not a corporate bond or other index to be replicated, but rather how assets

perform against the size and time profile of liabilities. As a result, "liability-driven investment" (LDI) strategies have emerged.[9] The starting point for LDI is to recognise that pension and insurance liabilities are effectively a series of current or future cash payments; hence, a cash flow profile can be constructed and used as benchmark. The present value of these liabilities is affected by changes in real interest rates and inflation expectations. The two general approaches to LDI aim to manage and mitigate the risks due to these factors:

- *Duration matching ("partial immunisation")*: this approach mirrors the characteristics of the cash flow liabilities by matching the interest rate sensitivities of assets and liabilities, and
- *Cash flow matching ("complete immunisation")*: this approach consists in matching liabilities with assets whose cash flows are identical by aligning interest rate and inflation sensitivity along the full term of the liability profile.

Each of these strategies has its advantages and drawbacks. In principle, duration matching can hedge interest rate risk up to second degree precision. However, it is not well equipped to deal with situations where the entire term structure shifts. Cash flow matching takes account of interest rate risk as well as shifts of the yield curve. However, it is often difficult to implement (due to the uncertainty of cash flows/liabilities), or too expensive (in reducing flexibility), or simply undesirable as it fails to provide any meaningful return. As a result, insurance companies and pension funds consciously allow for a mismatch between their assets and liabilities, within a certain tolerance level.

The most commonly used instruments in LDI strategies are long-term bonds for hedging interest rate risk, and inflation-linked bonds for hedging changes in inflation expectations. However, the precision of the match is in both cases limited by the availability of suitable bonds. As a result, many other instruments such as swaps have become popular in conducting LDI strategies. Such an LDI portfolio comprises an underlying physical part and a swaps overlay component, whereby the physical component is chosen to reflect the liabilities. The swaps overlay component typically entails giving up one set of future cash flows (typically from the physical assets) in exchange for other cash flows from swap contracts. The swaps overlay effectively allows the duration of assets backing the long-dated liabilities to be lengthened.

More generally, institutional investors use derivatives to manage a wide variety of risk exposures; they can be used both to hedge risks and to enhance risk-adjusted returns. The use of derivatives often provides a faster, more cost- and tax-efficient way to manage risks than markets in the underlying securities, and derivatives markets may well be more liquid too. On this basis, insurers and pension funds use derivatives in the context of the following activities:

matching the maturities of assets and liabilities;

hedging (for example inflation, volatility, currency or counterparty risk including optionality) by transferring insurance and/or market risk to third parties; and

enhancing returns.

Depending to some extent on whether they are regulated or not, the use of derivatives by institutional investors varies from country to country. In major jurisdictions, regulated entities

[9] An additional impetus to the development of LDI has been given by the wave of regulatory and accounting changes that require insurance companies and pension funds to value their liabilities on a market basis (Section 4). LDI can indeed help insurers to get a clearer picture of their asset and liability positions, such as their interest rate risk exposure.

are subject to tight regulations: derivatives may be used only to reduce an insurer's risk profile, or for the sake of efficient portfolio management. Insurance regulatory regimes often require collateralisation and diversified counterparties, and the range of derivatives and their use is tightly prescribed; entering uncovered derivative positions in an attempt to secure higher yields is prohibited.

Pension funds. The use of derivatives in ALM allows pension funds to tailor cash flows to match their liabilities, notably in the context of their LDI strategies. The need for a swap overlay arises largely from the duration of DB pension liabilities, which is typically too long to be matched using only conventional (or index-linked) bonds.[10] These derivative contracts are therefore used to lengthen the duration of the assets.

Pension funds' LDI strategies can also involve the use of other types of derivatives. Pension funds seeking to hedge inflation risks use index-linked products, such as inflation-linked government bonds and inflation derivatives. LDI strategies also lead funds to match most or all of their foreign currency exposure resulting from international investments, such as a global equity portfolio. LDI can also involve exposure to riskier assets, such as alternative asset classes, in order either to diversify the portfolio or to search for better returns. Finally, some pension funds do not aim to match liabilities at all times, but only to hedge tail risk, allowing for upside potential and limited downside risk. These funds usually buy receiver swaptions, to protect against a fall in interest rates, and sometimes equity put options. To reduce the cost of these hedging strategies, some sell payer swaptions, effectively giving up some upside potential in case of an interest rate spike.

Insurance companies. The activities just described are also conducted by insurance companies. In addition, to manage their risk profile, insurers also engage in risk transfer activities to hedge risk taken through investments or via the origination of liabilities. For hedging purposes, insurers typically use foreign exchange, interest rate and equity derivatives, since these correspond to the financial risks guaranteed by insurers. Insurance-linked securities and insurance derivatives, such as longevity swaps or industry loss warranties, are also used as risk and capital management tools for risk transfer, although this market segment remains relatively small.

Like pension funds, life insurers use derivatives extensively to reduce interest rate risk, both with respect to duration and convexity. They can reduce this risk by expanding their fixed-income portfolios or by using interest rate derivatives to raise the modified duration of their investments.[11] Dutch life insurers, for example, use derivatives to reduce by half the risk of a potential decline in capital and reserves. In general, such choices depend on insurers' risk tolerance and interest rate expectations (DNB (2010)). The level of activity varies quite substantially between countries. Whereas large European and some US insurance companies are active users of various interest rate and equity derivatives, Korean insurance companies, for example, barely make use of interest rate derivatives.

---

[10] Pension fund managers explained in bilateral interviews that inflation swaps (eg EUR-HICP) are often created using index-linked bonds as the underlying. Thus, the maximum duration of index-linked bonds and inflation swaps are the same (30 years).

[11] For example, when interest rates fall sharply, new premiums collected by insurance companies may be higher than expected, which may cause the effective duration of the liabilities to rise. This might require buying fixed income products with a high duration, or the use of fixed-for-variable rate swaps to synthetically extend the duration of the assets. The choice between these methods depends on the yield spread between interest rate swaps and government bonds. When the swap spread turns negative, taking exposure via government bonds becomes the more cost-effective method.

When insurers can use derivatives only for risk reduction or efficient portfolio management, their total derivative exposure is limited to a fraction of their total balance sheet size. However, for unregulated or differently regulated entities, derivative transactions other than for the purpose of hedging are possible. Such "supervisory arbitrage" exploits the absence of an effective group supervision requirement in some jurisdictions to take advantage of differing capital requirements. IFRS standards require disclosing only the mark to market values of these trades, not their exposure (The Geneva Association (2010a)). The use of derivatives also raises a number of other challenges, which include counterparty, liquidity and tail risk, the requirement of accurate valuation methodologies and exposure to regulatory, rating and accounting uncertainties.

An important activity in this context is credit risk protection, comprising (i) credit insurance, (ii) financial guarantees and (iii) writing credit default swaps (CDS). Although these activities are related to insurance, only a few insurers engage in financial guarantees and CDS writing, as these are considered non-core activities (The Geneva Association (2010b), Acharya et al (2011)), and regulated insurance entities are typically prohibited from writing CDS. Credit insurance and CDS both cover against credit events, but there are important differences. Whereas credit insurance leads to losses only when the credit event occurs, CDS can lead to cash outflows when the probability of the event increases.

2.4 Portfolio allocation and sectoral funding

Insurance companies and pension funds are traditionally regarded as long-term investors in financial markets. Their characteristic long-dated liabilities translate, through liability-driven investment strategies, into greater holdings of longer-term debt instruments than is the case for other institutional investors. In the portfolio allocation shown in Table 2, bills and bonds indeed constitute the dominant asset class in the majority of OECD countries. The overall size of their asset holdings again suggests that changes affecting the insurance and pensions industry may have significant financial market implications.

The investments of insurers and pension funds provide substantial funding to various economic sectors, notably to financial institutions and the public sector. Aggregated ECB statistics show that the euro area insurance corporation and pension fund sector (ICPF) holds total financial assets of €7 trillion in 2010 Q3, of which 38% is in the form of bonds, 19% in deposits and loans combined, and 23% in mutual fund shares. Of the €6 trillion in claims on entities in the euro area, €1,549 billion (or 26%) is on monetary and financial institutions (MFIs), and €1,276 billion (21%) on the public sector. With a public sector share in their euro area debt securities portfolios of 53%, the sector holds 18% of the stock of debt securities issued by euro area governments, underscoring its important role as a source of public sector funding. Similarly, 28.4% of its euro area debt securities exposure is to MFIs, which represents some 11% of the outstanding stock of debt securities issued by euro area MFIs. With €1,348 billion (47%) of the sector's combined holdings of euro area debt securities and deposits being claims on MFIs, changes in the ability of insurance companies and pension funds to take on bank exposure can be expected to affect bank funding conditions. This may be most relevant for the medium- and long-term segments, since 95% of the sector's bank debt claims are in maturities exceeding two years.

Table 2

Total investment and asset allocation of insurance companies and pension funds
for selected investment categories, at end-2009

	Pension funds					Life insurance companies				
	Total investment		Allocation[1]			Total investment[2]		Allocation[3]		
Country	USD billions	% of GDP	Bonds and bills	Cash and deposits	Equity	USD billions	% of GDP	Bonds	Loans	Equity
Australia	808.2	82.5	12.8	16.0	54.4	26	2.3	53.1	3.7	21.9
Austria	19.0	5.0	54.9	9.8	26.8	0	0.1	17.6	0.3	na
Belgium	19.2	4.1	40.8	6.2	34.5	20	4.0	81.4	6.9	7.2
Canada	806.3	60.3	35.2	3.9	33.9	330	22.7	38.4	2.6	22.4
France[4]	21.9	0.77	na	na	na	461	16.8	76.3	0.6	20.0
Germany	173.8	5.2	40.8	3.3	6.1	1,019	29.5	35.0	33.3	3.5
Italy	86.8	4.1	49.0	6.4	11.1	132	6.0	91.8	na	3.3
Japan[5]	1,055.7	20.6	47.7	6.4	13.7	3110	52.76	54.5	16.34	5.36
Korea	29.6	3.6	33.8	40.2	2.7	219	23.9	40.5	23.7	6.3
Mexico	107.1	12.2	80.6	1.0	14.9	9	1.0	84.9	1.5	0.4
Netherlands	997.9	129.4	46.5	3.6	32.2	286	34.8	57.9	11.5	16.8
Spain	118.2	8.1	59.2	18.5	12.1	25	1.62	na	na	na
Sweden	33.4	8.2	60.9	2.97	31.4	231	52.9	55.5	0.6	35.5
Switzerland	551.4	100.6	36.5	na	25.7	243	46.7	55.7	12.6	1.6
United Kingdom	1753.0	66.6	4.2	28.6	39.6	2136	94.7	33.3	1.79	43.8
United States[6]	9,603.6	68.0	31.4	2.2	45.4	425	3.0	79.9	12.9	3.4

Notes: National definitions differ across countries (OECD (2010a)). na: not available. [1] Asset allocation as a percentage of total investment. The asset allocation data include both direct and indirect investments through mutual funds. The three listed asset classes sum to less than 100%; other investments (not shown) include loans, land and buildings, unallocated insurance contracts, private investment funds and mutual funds not invested in cash, bills, bonds or equities. [2] Total investment data exclude assets linked to unit-linked products sold to policyholders and do not include assets under management of foreign affiliates and branches. For some countries, total investments amount to a fraction of total assets. [3] Asset allocation as a percentage of total investment. [4] Data accounting for pension funds refer to the year 2008. [5] Japan's insurance data are as end-March 2010. [6] The assets of US life insurance companies and private pension funds combined amount to approximately $10 trillion (flow of funds statistics, end-2009), with life insurance assets accounting for nearly half of this aggregate. The same aggregate is split differently in the OECD data used here, as the life insurance category only includes companies for which direct premiums accounted for 100% of gross premiums; the remaining assets are attributed to pension funds.

Source: OECD Global Pension Statistics, OECD Global Insurance Statistics and OECD staff estimates.

2.5 The global financial crisis

The large asset portfolios of insurance companies and pension funds expose them to market fluctuations. The financial crisis caused significant losses for insurance companies and pension funds, as did the bursting of the equity bubble a decade ago. In 2008 alone, pension funds in the OECD lost $3.5 trillion in market value, down from $18.7 trillion at end-2007, and recovered $1.5 trillion in the year 2009 (OECD (2010a)). Aggregate country-level statistics suggest that the pension industry has made losses in most countries during 2008, with the exception of Germany and several emerging markets. This is reflected in the sharply negative aggregate investment returns among OECD countries. Losses differed significantly across asset classes. In particular, with equity markets collapsing by nearly 50% between mid-2007 and March 2009,[12] institutions with greater equity allocations endured considerable valuation losses on their equity portfolios.

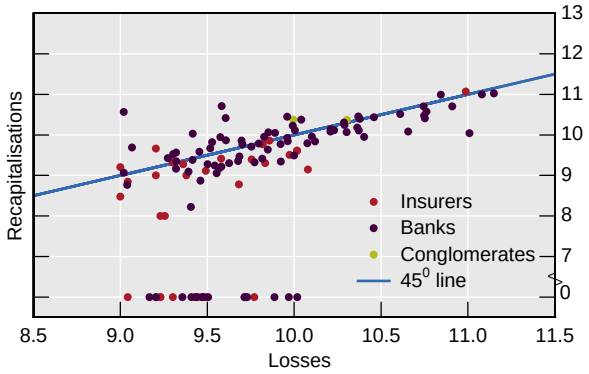
[12] See, eg, "MSCI developed countries index, all sectors" (Graph 3, left-hand panel).

Credit losses as a symptom of the financial crisis attracted even more attention, not just among banks but also among insurance companies.[13] Each dot in Graph 2 (left-hand panel) represents an institution's total credit losses (x-axis) and recapitalisations (y-axis) since mid-2007. With combined losses of $1,509 billion ($801 billion in North America), the banking industry suffered much larger credit losses than the insurance industry ($234 billion, of which $192 billion was in North America).[14] Even so, 33 insurance companies suffered losses exceeding $1 billion dollars on their credit portfolios (red dots), of which 23 received recapitalisations from private or public sources. As with banks, those recapitalisations, if any, fell short of the credit losses incurred (accordingly, most dots lie below the 45º line). Credit losses thus added to pressure on indicators of solvency.

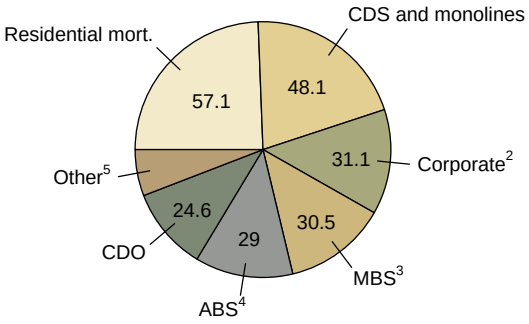
Graph 2

Credit losses and capital raising

Credit losses and recapitalisations: banks vs insurers[1]



Credit losses by insurers, in billions of US dollars



[1] The panel shows banks and insurance companies with total credit losses exceeding $1 billion US dollars since mid-2007, as reported on Bloomberg. Each dot represents one institution's total credit losses (x-axis) and recapitalisations (y-axis), both from private and public sources. The insurance companies quoted on Bloomberg booked total credit losses of $234 billion, and recapitalisations of $177 billion. [2] Subsidiaries, investment in other firms and corporate debt. [3] CMBS, subprime RMBS and ALT-A securities. [4] Non-mortgage asset-backed securities. [5] Leveraged loans, CLO, SIV, prime mortgages and other.

Sources: Bloomberg; BIS calculations.

Most credit losses faced by insurers were on mortgage-related structured products and on CDS contracts, the latter primarily at AIG (Graph 2, right-hand panel).[15] Common exposure to real estate and structured products as well as large holdings of bank liabilities by insurance companies help explain why the share prices of banks and insurers were highly correlated during the crisis (Graph 3), in spite of major differences in their respective business models. The elevated correlation between all asset prices largely eliminated the perceived benefits of financial diversification during the crisis. However, rising correlations between the monthly returns of banking and insurance were observed throughout the

[13] The term "credit losses" in this report is a broad measure comprising losses on invested credit assets (the larger part) as well as losses following the writing of credit protection.

[14] These figures include realised and reported mark to market losses on credit instruments at companies quoted on Bloomberg. They exclude other losses, such as losses on guaranteed-return insurance products.

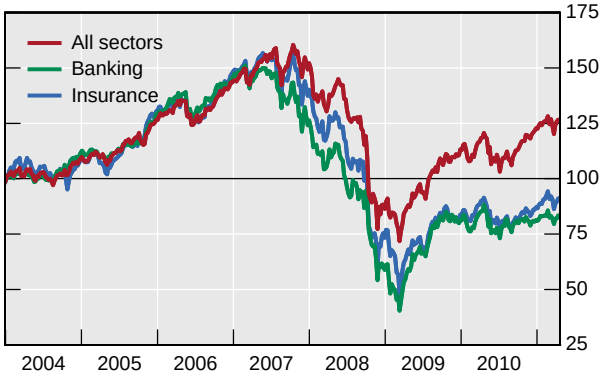
[15] The insurance industry emphasises that the "non-core" financial activities of a few account for most losses among insurers. A case in point is AIG's Financial Products Corporation, which sold protection on super senior risk tranches of structured products in the net notional amount of $527 billion up to the end of 2007 (Sjostrom (2009)).

decade, suggesting a longer-term structural increase in financial linkages between the two industries (Billio et al (2010)).

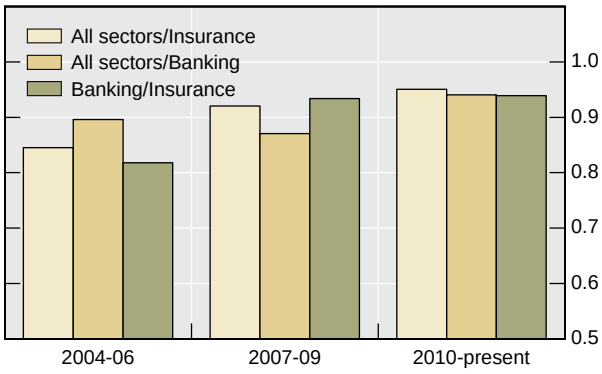
Graph 3

Correlation between insurance and bank equity

Equity indices by sector[1]



Correlations on weekly percentage changes[2]



[1] MSCI developed countries equity indices, by sector, as of 14 April 2011. 1 January 2004 = 100. [2] Correlations of non-overlapping weekly percentage changes in the MSCI indices shown in the left-hand panel.

Sources: Datastream; BIS calculations.

This close correlation underscores insurers' desire to limit the perceived interconnectedness between banks and insurers, and continues to be a driver that leads insurers to reduce their exposure to other financial institutions and banks in particular. In the working group's interviews, insurers felt that it was virtually impossible for the industry to play the traditional long-term investor role in financial markets due to intense market pressure on share prices in an overall volatile environment.

A number of other lessons relevant for asset allocation can be draw from these industry interviews. Liquidity risk, counterparty risk, and the ineffectiveness of diversification in a crisis will inform risk management models and procedures to a greater extent. Liquidity stresses can arise even in a business with a large share of long-term liabilities on account of collateral calls, credit downgrades and cash outflows. The dangers of structured products, cross-border exposures and general market volatility were also frequently quoted, and these lessons have contributed to a shift in investment behaviour toward simpler, safer and less volatile assets. The decline in the equity share in investment portfolios, for instance, is not only a result of lower equity valuations, but also includes a degree of re-allocation.

2.6 Solvency and funded status

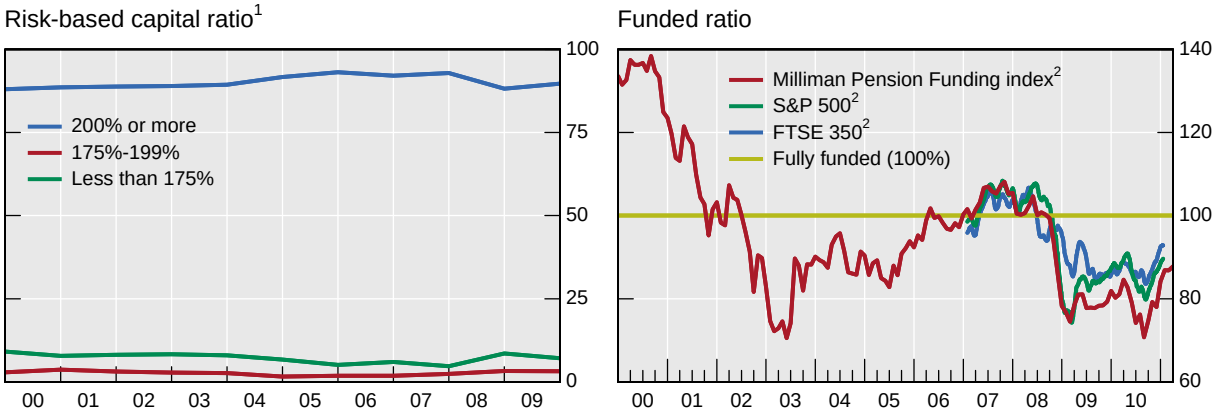
Life-insurers and pension plans issue long-term conditional commitments to policy holders and participants. Consequently, their financial health and solvency is of paramount importance to the beneficiaries of these obligations. The financial crisis has added to the challenges faced by insurers and by pension funds especially. In the United States, for instance, the funded status of US pension funds has declined much more than standard measures of solvency for life insurers.

Most US insurers maintained a risk-based capital ratio well above the regulatory minimum level. At the height of the crisis, only 10% of insurance companies reported risk-based capital

ratios below 200%, a level below which US insurers have to submit a plan to restore capital (Graph 4, left-hand panel). By contrast, the funded status among US DB pension plans deteriorated sharply in the second half of 2008 and into 2009, but recovered somewhat in late 2010 (right-hand panel).[16] Following the equity bubble in the early 2000s, corporate pension plans had become underfunded, and it was not until 2007 that the pensions plan assets in aggregate again exceeded liabilities.

Graph 4

Solvency and funded status in the United States



[1] Percentage of insurance companies with risk-based capital ratios in the intervals shown in the legend. [2] The funded ratio is defined as total assets to liabilities measured as projected benefits obligations, in per cent. The Milliman index covers the 100 US public companies with the largest defined benefit pension plan assets, with combined assets of over $1.2 trillion at the end of 2010.

Sources: Hewitt Associates; Milliman Pension Funding Study; National Association of Insurance Commissioners (NAIC).

It is important to note that an underfunded pension plan is not necessarily insolvent as long as the plan sponsor can be expected to make up the deficit at some future date. This puts pressure on the earnings of sponsoring companies that have to increase contributions. The 100 public companies comprising the Milliman index contributed a record $59.4 billion to their DB plans in 2010 (Ehrhardt and Morgan (2011)). In the case of US public pension plans, where underfunding is ubiquitous, there are implications for contingent public liabilities (Novy-Marx and Rauh (2011)).

A key question is whether the health of a pension plan, or the scale of a company's exposure to its pension plan, gives rise to riskier investment strategies. US fund-level data do indeed suggest that this is the case, as the weakest quintile of plans grouped by funded status had the largest allocation to equities whereas the strongest quintile had the largest allocation to fixed income. However, higher equity allocations are no longer observed when ranking by the exposure that sponsoring companies have to their pension plans. Even so, there is anecdotal evidence to suggest that large funding deficits in a low-interest environment are starting to lead to rising portfolio allocations to higher-yielding investments.

[16] The funded ratio is defined as total assets to liabilities measured as projected benefits obligations. For DC plans, insolvency is not an issue as the liabilities of the plan are by definition the value of the assets.

2.7 On the rationale for regulation

As for banking regulation, the microprudential rationale for regulating insurance companies and pension funds is rooted in consumer protection in the presence of agency problems that prevent policyholders from controlling managers and inducing them to act prudently. The core problems are that:

- Individual policyholders cannot realistically monitor the financial position of the company/scheme – they face a collective action problem in joining forces to monitor.
- Policyholders are "tied in" to some extent, in particular as the services are provided in the distant future, long after the premiums and contributions are paid.
- For limited liability insurance companies, the pay-offs to managers and owners are asymmetric since the downside is limited while the upside is not, which may encourage excessive risk-taking.
- For pension funds, incentives for managers are unbalanced for a different reason. Managers are typically under pressure from trade unions, employees, and pensioners to maximise pension rights, and from employers and government sponsors to minimise costs. These forces are not balanced by pressures from future generations to prevent funding deficits for current generation pension.

These problems create incentives for managers to be insufficiently prudent in their financial management. The long-term nature of the contracts compounds the effects of their decisions by creating additional scope to hide a deteriorating financial position. Managers can hide poor financial performance by under-provisioning, which systematically worsens the position of policyholders who will receive their payments in the future. Combined with the asymmetric pay-off problem, this leads to "gambling for resurrection" – by the time insolvency occurs, policyholders will have lost a lot of value.

The two core elements of prudential regulation of insurance companies and pension funds are standards for resilience as well as valuation, disclosure and examination. The latter requires insurance companies and pension schemes to truthfully report their financial position. The former element calls for supervisory intervention on behalf of policyholders if the institution fails to demonstrate financial resilience by some solvency standard such as risk-based capital ratios or funded status.

A common policy response to agency problems and possible failures is to introduce collective guarantee schemes. This protects beneficiaries from the consequences of a failure of an insurer or pension fund.[17] As in the case of deposit insurance, this further reduces policyholders' incentives to monitor, and the authorities must require adequate information and supervise the institutions for the implicit guarantees they underwrite, or for the charges they levy.

There is growing interest in systemic risk as an additional rationale for regulation, in view of the important role insurance companies and pension funds play in the economy. The channels through which the actions of insurers and pension funds might be considered systemic can be usefully classified as either direct – where the immediate impact is on the real-economy end-user of financial services – or indirect – where the immediate impact is on other market participants, with the potential for spillovers to the real economy.

[17] Alternatively, pension funds can also cause problems in the corporate sector when large funding shortfalls weaken the sponsoring company (eg General Motors and the US auto industry more generally).

The potential for insurers and pension funds to have direct systemic implications is generally considered to be rather limited. For example, although insurance against catastrophes can become unavailable or costly after a large event, these instances are very rare. There is also scope for wider disruption emanating from pension funds, which interact with the real economy through two channels: contributions and pensions. DB funds sometimes lower contributions when their schemes are well funded and raise contributions in case of funding shortfalls. As the funding status of pension funds is often highly correlated with economic growth, such adjustments in contributions can have significant procyclical effects. Regarding the second channel, if DB funds are unable to meet their pension obligations due to financial losses, this can cause a substantial income shock for pensioners, leading to further shocks in the real economy and financial system. Alternatively, the government may intervene to maintain retirement incomes at adequate levels, with budgetary consequences. For DC funds, a financial shock may have less impact on present pension payments, but may affect the savings behaviour of active participants more strongly because they are immediately faced with a negative wealth effect. This can also exacerbate the effect of adverse shocks. These direct channels are most relevant for countries with large pension fund assets relative to the size of their economy (Graph 1).

The potential for insurers and pension funds to have an indirect impact on the financial system is generally considered more relevant. The banking sector is inherently vulnerable due to the nature of its liabilities. Any withdrawal of short-term funding can force banks to sell assets – potentially causing financial market instability – or to restrict the flow of new lending – causing macroeconomic instability. Their long-term liabilities provide insurers and pension funds with insulation from this risk. However, distress selling can be triggered when asset valuations decline to the point of putting pressure on solvency positions, or when surrenders or margin calls generate a surge in liquidity needs.

A second source of systemic risk can arise from interconnections with the banking sector. Banks may come under pressure and curtail credit and payment services if insurance companies or pension funds were to reduce suddenly their holdings of banking sector debt and equity. Conversely, institutional investors may be exposed to losses through their bank counterparties in derivative contracts. Uncovered derivative positions are potential sources of liquidity risk as well. Insurance conglomerates may also become systemic through venturing into other business areas, such as insuring (potentially correlated) default risk to entities that rely on effective insurance. This activity may involve selling protection through CDS contracts (eg AIG) or financial guarantees (eg monolines). This highlights the importance of having a clear understanding of the activities that insurance conglomerates undertake and regulating appropriately.

3. Accounting and regulatory changes

Over the coming years, a number of accounting and regulatory changes will affect financial institutions in many jurisdictions. For insurance companies and pension funds, the most relevant changes at the international level are Solvency II and changes to International Financial Reporting Standards (IFRS). European insurance companies that will be subject to both changes generally expect that Solvency II will have the greater impact. For the industry, both developments will significantly improve the current reporting and solvency frameworks and also have implications that potentially affect business models and investment strategies. This section describes the major changes in some detail, leaving a discussion of investment strategies and financial market implications to subsequent sections.

There remains considerable uncertainty regarding the final set of rules to emerge, as well as the transition period over which these accounting and regulatory changes will be phased in. In addition, the extent to which these changes will affect firms depends on existing accounting practices and regulatory rules in different countries, as well as on the range of products that firms offer. As there are major differences in this respect (Section 2), the consequences are difficult to generalise to the entire industry and across jurisdictions.

3.1 The nature of liabilities and their valuation

Since the accounting and regulatory changes discussed in this section bear on the valuation of liabilities, it is useful to reiterate the importance of this topic. Pension funds and life insurance companies incur liabilities that come due in the distant future. The present value of such long-dated liabilities is highly sensitive to the method and rate used for discounting. As an illustration, following Novy-Marx and Rauh (2011), the aggregate reported US state pension liabilities in the plans they study are $3.14 trillion as of June 2009. This allows for expected rates of return on pension plan assets (centred on 8%) to be used for discounting future liabilities. But pension liabilities are hard promises, whereas expected asset return cannot be earned with certainty. If, following the logic of financial economics, the same liabilities were valued like a *risky bond* by discounting future cashflows at municipal bond yields, their value rises to $3.53 trillion dollars. However, if they were treated as a *non-defaultable* federal liability and discounted using the Treasury yield curve, the liability comes to $5.28 trillion, 68% above the state-reported number. The different valuation methods thus imply starkly different measures of US state pension funding shortfalls, ranging from $1.2 to $3.3 trillion (given that the state funds hold $1.94 trillion in assets).

For insurance companies, valuation depends on the type of contracts they issue (Box 1). Insurance contracts are currently accounted for under IFRS 4 (Phase 1), which allows insurers to use their existing accounting policies subject to certain modifications. As a result, accounting policies vary widely across entities and jurisdictions, which causes problems related to the comparability of insurers' financial statements that often arise from the discount rate for liabilities (see below). By contrast, the accounting of (most) investment contracts follows IAS 39, which allows companies to choose to report fair value through profit and loss (P&L) or through other comprehensive income (OCI). Prospective accounting changes may retain this optionality.

For pension funds, the nature of liabilities also depends on the type of pension contract. As pension funds are typically non-profit entities with no shareholders, the valuation of pension liabilities may not be required, but still important for three purposes:

- assessment of funding adequacy for supervision;
- valuation of entitlements that are transferred from one pension fund to another, by individual participants or for a fund as a whole, or for reinsurance of pension liabilities; and

- valuation of corporate pension obligations in the annual accounts of a sponsoring company.

The technical provisions for a DB or hybrid pension scheme are calculated as the present value of all current and future pension payments. In most cases, accumulated pension entitlements are nominal amounts. If a scheme provides for unconditional future indexation, which is mandatory in the United Kingdom for example, the value of pension payments also reflects expected inflation. Furthermore, some pension systems require that expected trends in life expectancy or pension fund expenses are taken into account for the calculation of future cash flows (CEIOPS (2008)).

In practice, discount rates used to calculate technical provisions are determined by national pension systems. The discount rates for five countries with large pension systems (see Graph 1) are as follows:[18]

- United States: corporate pension liabilities are discounted using high-grade (AA) corporate bond rates. Public pensions use the expected rate of return on pension fund assets.
- United Kingdom: pension funds can choose their own discount rate, based on the expected return on assets and strength of sponsoring employer to pay additional contributions in case of funding shortfalls.
- Netherlands: current swap rate.
- Japan: 80–120% of 10-year government bond rates.
- Canada: government bond benchmark rates plus 0.5 percentage points.

For companies that report under the International Financial Reporting Standards (IFRS), the valuation of corporate DB pension obligations is governed by IAS 19. As the IFRS is an international standard, the calculation of cash flows and the discount rate (high-grade corporate bond rate) may differ from national pension regulations.[19] Therefore, the balance sheet of a corporate pension fund for accounting purposes may differ from that for regulatory purposes. This can give rise to conflicting ALM and risk management incentives for the pension fund. Note that some companies have switched to collective DC schemes that need not be accounted for on the balance sheet (Swinkels (2007)).

3.2 Accounting and financial reporting changes

The international accounting standards most likely to affect insurance companies and pension funds relate to IFRS 4 and IAS 19.[20] The revision of the accounting standard for insurance contracts is a joint project between IASB and FASB; the two boards ultimately aim to achieve a common standard which would broaden the scope of application accordingly. For accounting purposes, insurance contracts are distinguished from investment contracts. The main difference is that for insurance contracts, the company accepts significant

[18] See also Pugh and Yermo (2008), Novy-Marx and Rauh (2011).

[19] Under IAS19, the rate used for discounting post-employment benefit obligations will be determined by reference to market yields on high-quality corporate bonds at the end of the reporting period.

[20] The International Accounting Standards Board (IASB) is responsible for developing International Financial Reporting Standards (IFRS); similarly, the Financial Accounting Standards Board (FASB) codifies the generally accepted accounting principles in the United States (US GAAP) that are used for financial accounting and reporting by non-governmental entities.

insurance risk from the policyholder, while for investment contracts there is not enough transfer of risk to qualify those contracts as proper insurance contracts. The contracts discussed in Box 1 all have some insurance-like features; examples are some single-premium or long-term savings contracts.

IFRS 4: Accounting for and valuation of insurance contracts

The first phase of IFRS 4 was introduced in 2005, and provided insurers with a universal definition of an insurance contract for the first time. The IASB defines an insurance contract as follows: "A contract under which one party (the insurer) accepts significant insurance risk from another party (the policyholder) by agreeing to compensate the policyholder if a specified uncertain future event (the insured event) adversely affects the policyholder." In addition, the standard imposed disclosure requirements for identifying and explaining the amounts in an insurer's financial statement arising from insurance contracts. This was intended to help users of those financial statements to understand the amount, timing and uncertainty of future cash flows arising from insurance contracts.

However, the first phase of IFRS 4 was limited in scope and did not address issues of measurement and recognition, and therefore did not change the different valuation methodologies currently followed under various local GAAPs. For instance, IFRS 4 allows insurance companies to continue to measure insurance liabilities on an undiscounted basis if they had done so under national accounting standards prior to adopting IFRS.[21] This means that some insurers are reporting a claim due tomorrow in the same way as claims due in (say) 20 years.[22] Other insurance companies are currently using the discount rates that reflect the characteristics of the assets backing the insurance liabilities, not the rates that reflect the characteristics of the liabilities. In effect, that means the insurer takes credit immediately for investment performance that it hopes to achieve in the future (IFRS (2010)). IFRS 4, Phase 1 was therefore considered a temporary solution pending the finalisation of a second phase whose objective would be to set out a robust and relevant model for accounting for insurance liabilities.

The long-awaited second phase is expected to bring about much more comparability at global level between insurance undertakings reporting under IFRS and a sound and transparent basis for measuring insurance liabilities. In short, IFRS 4 Phase 2 proposes a single measurement model focusing on a current assessment of the amount, timing and uncertainty of the future cash flows that the insurer expects its existing insurance contracts to generate as it fulfils them. The exposure draft issued in 2010 foreshadows that IFRS 4 Phase 2, due to be completed in late 2011, will bring substantial change when it comes into effect in 2014–15.[23]

The proposed new standard fundamentally changes the accounting practices of insurers and other entities that issue contracts entailing insurance risks,[24] such as certain pension fund arrangements. In brief, the proposal requires that all insurance contracts must use a current

---

[21] However, insurers cannot modify their previous accounting policies.

[22] This is, however, subject to a liability adequacy test that requires insurers to assess at the end of each reporting period whether its recognised liabilities are adequate, using *current* estimates of future cash flows.

[23] The FASB will consider the feedback on its exposure draft with a view to finalising a standard in 2012. However, the joint insurance project may be re-exposed in the future as the two boards are working toward developing a harmonised IFRS for insurance contracts, and the effective date could shift accordingly.

[24] These include amongst others mortality, longevity, disability risks for life contracts, as well as premium, reserve and catastrophe risks for non-life contracts.

measurement model to determine the present value of expected future cash flows to fulfil insurance obligations, where estimates are re-measured for each reporting period. Under the proposed IFRS 4 Phase 2, such changes in the valuation of liabilities directly affect profit and loss, by analogy to IFRS 9, which requires fair value changes to go through the P&L.[25] It is possible, however, that an eventual common insurance standard in the future could allow liability valuation changes to be recognised in other comprehensive income (OCI) rather than P&L.

As far as the discount rate is concerned, the options have recently been expanded to allow for different choices. The exposure draft on IFRS 4 Phase 2 had suggested the use of a discount rate based on the risk-free rate, adjusted for a liquidity premium. The current revision no longer advances any prescribed method, but allows the discount rate to be determined either by a general bottom-up approach (eg the risk-free rate augmented by a liquidity premium and other factors, excluding default risk), or by a top-down approach based on a yield curve that reflects current asset returns (IFRS Foundation (2011)). The top-down approach determines the yield curve for discounting liabilities from current market returns for either the actual portfolio of assets the insurer holds, or for a reference portfolio of assets with characteristics similar to those of the insurance contract liability. Under this approach, the insurer excludes from those rates factors that are not relevant to the insurance contract liability, such as default risk. It is conceivable that different regions in the world would follow different methodologies for the determination of the discount rate.

It is useful to distinguish three areas where insurance firms or pension funds are likely to feel the impact of IFRS 4 Phase 2: these are (i) the volatility of income statements, (ii) ALM practices, and (iii) data and reporting requirements.

(i) Despite its merits in terms of robustness, transparency and comparability, the proposal is likely to result in increased volatility in the income statement and significant changes in its presentation. A first key element to consider is the long-term nature of the insurance business, with liabilities extending over several years, or decades in the case of life insurance (Section 2). If insurance liabilities under the final standard are re-measured periodically through the P&L, insurers' reported annual performance will be influenced substantially by (short-term) changes in financial and non-financial assumptions used for measuring those liabilities. For example, changes in interest rates could have a significant impact on earnings and capital.

Accounting volatility complicates the task of interpreting financial statements and affects asset-liability management. While it is important to have fair values on the balance sheet, it remains a point of contention whether it is useful to users of financial statements to have these mechanically reflect all valuation changes – in particular on financial elements – in the P&L. Changes in the financial features of insurance contracts largely reflect short-term market fluctuations that are largely unrelated to the ultimate fulfilment of insurance liabilities. The resulting depiction of annual performance may not accurately reflect the underlying insurance business, and has no predictive value for future performance. However, under

[25] In November 2009, the IASB published IFRS 9 (Financial Instruments) which covers the classification and measurement of financial assets. In October 2010, the requirements for classifying and measuring financial liabilities were added to IFRS 9. The additions, which are part of the IASB's plan to replace IAS 39, retain most of IAS 39's requirements for financial liabilities. IAS 39 governs the accounting of financial instruments, including investment contracts without discretionary participation features issued by insurance companies. The main change is that in cases where the fair value option is taken for financial liabilities, the part of a fair value change due to an entity's own credit risk is recorded in other comprehensive income (OCI) rather than in profit and loss (P&L), unless this creates an accounting mismatch (PricewaterhouseCoopers (2010)). Subject to EU endorsement, IFRS 9 should come into effect in January 2013.

certain conditions IFRS 9 provides the option to value debt instruments at amortised cost, which would have the effect of lowering volatility in financial statements.[26]

This issue potentially affects dividend policy and hence the accumulation of equity capital. Re-measurements of insurance liabilities require long-term estimates and projections that come with a high degree of uncertainty. Reflecting these re-measurements in the P&L does not have the same effect as re-measuring balance sheet elements. This is so because recording changes in the P&L affects financial institutions' equity through retained earnings. All elements going through the P&L become part of a firm's net result and retained earnings, which are considered own funds in financial and prudential analysis. As a result, posting valuation changes in liabilities through the P&L may therefore convey the mistaken impression that profits are realised by performance and available for distribution to shareholders or policyholders.

(ii) IFRS 4 Phase 2 is also likely to produce changes in investment strategies as a result of ALM practices. The way investment assets are selected to cover insurance liabilities is managed through ALM (Section 2). ALM is an essential part of insurers' activities and a primary driver of their performance. When insurers apply the approach outlined in the exposure draft for IFRS 4 Phase 2, they may also choose fair valuation for all their assets in order to reduce or eliminate accounting mismatches between liabilities and assets. This option is available under both IFRS 9 (on the measurement of financial assets and liabilities) and IAS 39 (on financial instruments: recognition and measurement). However, taking this option under IFRS 9 does not allow reporting fair value changes in a way that would remove accounting volatility from P&L statements.[27] The combination of IFRS 4 and IFRS 9 currently means that all changes in the fair value of financial assets and current values of liabilities (resulting from changes in discount rates) will go through the P&L statement and will significantly contribute to insurers' income statement volatility. This again makes it difficult for investors to look through this statement volatility and extract insurers' underlying performances.

Increased P&L volatility can have a number of economic consequences. Possible effects on investment strategies can arise from increased pressure on insurance companies and pension funds, to de-risk their asset holdings to avoid adding to the volatility in their (or their sponsors') financial statements. This channel and its implications are discussed in Section 4.

(iii) IFRS 4 Phase 2 is also likely to result in additional demands on data and modelling systems. IFRS measurement requirements are based on the economic characteristics of the insurance contract, rather than on the legal nature of the contract as is normally the case in regulatory reporting requirements.[28] The proposal thus creates additional demands on the data and modelling systems of insurance companies. Firms may also need to prepare two sets of books, for regulatory and financial statements. Even though IFRS and Solvency II do not have the same objectives, reducing the measurement gap between the two is important for market confidence as it mitigates the risk of investor confusion resulting from dissimilar information in prudential and accounting disclosures. Information on solvency will be disclosed under Pillar III public disclosure requirements.

---

[26] Moreover, a firm can make an initial choice to value equity investments not held for trading through other comprehensive income. This would decrease volatility of net income as only dividend income is recorded in P&L.

[27] IAS 39 maintains fair value through the "other comprehensive income category" (OCI), which can be considered a temporary revaluation reserve not included in P&L, a treatment that helps to limit volatility.

[28] These demands will vary across jurisdictions, of course, depending on current accounting and regulatory reporting requirements.

IAS 19: Accounting for and disclosure of employee benefits

IAS 19 is the IFRS accounting standard that covers the reporting of employee benefit obligations and, most importantly, employer-sponsored DB pension schemes. IAS 19 was the subject of heated debate even before its EU implementation in 2005. Although commended for bringing transparency and standardisation to accounting for DB pensions, IAS 19 has also been criticised for its inflexibility with respect to the great variety of pension systems across countries. The stark distinction between DB or DC schemes did not address the growing range of pension schemes that fall between those extremes. Another criticism has focused on the ability of sponsoring companies to defer, under IAS 19 as well as under its US equivalent, the effect of profits and losses in their pension schemes on the company's annual financial statements.

Proposed changes are expected to come into effect in 2013.[29] They amend the accounting for DB plans through which some employers provide long-term employee benefits, such as pensions and post-employment medical care. In DB plans, pension sponsors ultimately bear the risk of rising costs and poor investment performance. The draft proposes improvements to the recognition, presentation, and disclosure of DB plans.[30] From this report's perspective, perhaps the most significant change is the removal of the corridor, an accounting technique that allowed entities to report only those changes in employee benefits that exceeded a specific set of thresholds. Without this corridor, all changes in actuarial assumptions will be directly reflected in the P&L statement, increasing its volatility.[31]

Overall, the international accounting changes to be introduced in the coming years are likely, on balance, to produce greater volatility in financial statements for various combinations of existing rules and regulations across countries. Insurance companies offering guaranteed return products and pension plans providing DB plans will see more of the implied risks reflected on their financial statements. These changes may influence how firms design and finance the life insurance contracts and pension promises they offer, possibly extending a long-term structural trend whereby more risk is shifted to insurance policyholders and pension plan participants.

3.3 Regulatory changes: Solvency II

Solvency II is a new risk-based regulatory framework that will be phased in at the start of 2013 for insurance and reinsurance undertakings in the EEA (ie EU countries as well as Norway, Lichtenstein and Iceland). The scope of Solvency II excludes pension funds, but there is a European Commission call for advice on the introduction of a similar regime for institutions for occupational retirement provisions. The main purpose of Solvency II is to enhance financial stability by introducing a risk-based capital framework to better capture the economic rationale of insurance transactions and to allocate sufficient capital to each risk activity. The framework also seeks to create improved and harmonised legislation in order to foster fair competition combined with better consumer protection. The implementation of Solvency II, which requires the translation of EU legislation into national regulation, should be finalised by 1 January 2013. However, in the proposed Omnibus II directive there are a

[29] In April 2010, the IASB published for public consultation an exposure draft of proposed amendments to IAS 19 *Employee Benefits*. A further review of outstanding issues will be implemented after mid-2011.

[30] However, it does not address the measurement of defined benefit plans or the accounting for contribution-based benefit promises.

[31] This is balanced, however, by increased transparency on reporting entities' commitments towards employees and improved comparability between entities, as the use of the corridor is optional under IAS 19.

number of transitional arrangements, which will allow a gradual phasing in of Solvency II over a maximum period of 10 years.[32] This could mean that Solvency II might not be fully implemented across Europe for several years. The rationale of the transitional arrangements is to avoid market disruptions.

3.3.1 What is new under Solvency II?

Solvency II is a comprehensive risk-based capital framework.[33] The solvency capital requirement stipulates that insurers hold a certain level of available and eligible capital to ensure that they are able to meet policyholder obligations in times of market stress. Under the current Solvency I regime, the insurers hold capital in proportion to technical provisions (life insurance) or gross premiums (non-life). The current regime thus does not take into consideration risk sensitivities stemming from the asset side of the balance sheet (Table 3). Solvency II, on the other hand, aims to reflect the full range of risks faced by insurers on both their asset and liability sides. Capital requirements under Solvency II will depend on all the risks the firms are exposed to; those related to insurance risks, such as longevity, morbidity and catastrophic risks, as well as those arising from their holdings of financial assets. Thus, under Solvency II, the capital requirements will be determined on the basis of the complete risk profile of the undertakings, as well as on the way in which such risks are managed (through financial hedging, reinsurance or other risk-mitigating techniques).

By analogy to banking regulation (Basel II and III), Solvency II organises capital requirements in a three-pillar structure. The rules on capital adequacy are part of the first pillar. They are based on two sets of rules: the Solvency Capital Requirement (SCR) and the Minimum Capital Requirement (MCR), along with a "ladder of intervention" for supervisors. The SCR can be regarded as a solvency buffer which, when breached, will trigger intervention by supervisors; the MCR is the minimum level of capital below which a firm will be put into run-off. Under the standard formula, MCR will be between 25% and 45% of the SCR. The second pillar in Solvency II is devoted to qualitative requirements, such as risk management and governance, while the third pillar concerns reporting and disclosure.

---

[32] In the current proposition of Omnibus II, a number of issues remain unresolved regarding the length and design of the transitional arrangements and whether they will differ across countries. The Omnibus II directive is available online at:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011PC0008:EN:NOT

[33] Risk-based capital requirements for insurers are not, of course, new in other major jurisdictions, including the United States. The National Association of Insurance Commissioners (NAIC) adopted risk-based capital requirements for life insurers in 1992. Earlier state laws regulating insurers' investments had been relaxed to allow insurers to take advantage of high-yield investments to support new products. Developments in real estate markets, and the junk bond problems of Executive Life and several other insurers, prompted the NAIC in 1991 to regulate the asset side of the balance sheet (Klein (1995)).

Table 3

Simple comparison between Solvency regimes

Solvency I	Solvency II
Not a risk-based capital requirement; no direct link to underlying risks (no concept of unexpected losses)	Risk-based capital requirement based on all quantifiable risks
Capital requirement of 4% of technical provisions held for life contracts For non-life contracts, the capital requirement is based on a calculation on gross premiums and on provisions for claims outstanding	Capital must be sufficient to cover unexpected losses over a one-year time horizon with 99.5% confidence Possibility of a capital add-on to cover non-quantifiable risks
No economic valuation of assets and liabilities; liabilities are valued at book value and assets sometimes at market values	Economic valuation of balance sheet; closely linked with IFRS (assets and liabilities marked to market)
Differences between countries in the determination of statutory technical provisions allowed	Pursue harmonisation across Europe
No explicit recognition of risk-mitigation techniques (other than outward reinsurance)	Explicit recognition of risk-mitigation techniques and loss-absorbing capacity items
No distinction made between different qualities of capital items	Distinction made between available capital items of different qualities
Limited disclosure requirements	Enhanced disclosure requirements

3.3.2 Mark to market valuation of assets and liabilities

In Solvency II, both assets and liabilities are marked to market, ie fair valued. The present value of liabilities, or technical provision, is defined as the amount an insurer would have to pay to transfer its insurance obligations immediately to another willing buyer. It consists of the best estimate, the present value of the expected future cash flows (net payments to policyholders), calculated on a specified discount rate curve (term structure), and the risk margin, which is an additional premium above the best estimate.[34] How the discount rate is constructed is of considerable importance given that the risk margin, and the present value of liabilities, will increase when this rate decreases.

The current expectation of how this rate will be constructed, is the swap curve (excluding credit risk), augmented by an illiquidity premium for those obligations coming due more than a year ahead. (This was also the discount rate used in Quantitative Impact Study 5.) In addition, an extrapolation (technique) towards a fixed rate (ultimate forward rate) will be used

[34] The risk margin depends on the cost of capital (probably 6%) and the risk (SCR) of the company.

to get the discount rates for longer maturities than those available from market rates in different countries.

The motivation for adding an illiquidity premium, according to the proponents, is that there is general acceptance that the valuation of corporate bonds should take into account risk spreads in the discounting of future cash flows.[35] Bond spreads during the crisis far exceeded the cost of credit risk mitigation (CDS spreads), and therefore included a substantial component pricing in illiquidity. The important role the illiquidity premium played in the valuation of *assets*, while liability cash flows continued to be discounted at the risk free rate, was largely responsible for a substantial shortfall in insurers' balance sheets. The application of the illiquidity premium on the *liability* side would aim to reduce this valuation mismatch to avoid situations where insurers are forced to dispose of illiquid assets. The financial condition of insurers would be improved by allowing them to discount liabilities at a higher rate when markets are illiquid. Such a countercyclical mechanism might even mean that insurers would be willing to take on additional illiquid assets in a period of market distress, depending on whether the change in their net asset-liability position would improve their capital position.

The ultimate choice of discount rates is therefore likely to play an important role in the effect of liability valuation on insurers' investment strategies. Current discussions within the broader regulatory community revolve around the extent to which a measured illiquidity premium should be added to the discount rate, and which liabilities can be discounted using that rate. The size of the illiquidity premium is expected to depend on a market interest rate (yield) and will be calculated by EIOPA.

3.3.3 The solvency capital requirement and risk modules

The SCR stipulates that an insurer has enough capital (own funds) when it covers unexpected losses with a probability of 99.5% over a one-year horizon (one-year value at risk). To meet the solvency capital requirement, the capital items must be recognised as eligible from a regulatory perspective. Capital items are divided into core capital (basic own funds) and contingent capital items (ancillary own funds), and classified into three tiers, depending on the loss-absorbency characteristics of the items.[36] There are restrictions on the composition of capital for fulfilling the solvency requirement (Tier 1 should be at least 50% of the SCR, Tier 3 less than 15% of SCR) and the minimum requirement (Tier 1 and Tier 2 must comprise basic own-fund items only and Tier 1 should be at least 80% of the MCR). The insurance undertaking can calculate SCR through an internal model, a standard model, or through a combination (a partial internal model).

Insurance products will differ in their regulatory treatment. Contracts where risks are borne by policyholders are excluded when calculating the SCR. For unit-linked products, the exposure to investment risk falls on the policyholder rather than on the insurer. That means that the SCR will become much lower for unit-linked products than for products with some

[35] The practical difficulty is to decompose observed spreads into expected credit risk, unexpected credit risk and an additional premium for illiquidity as investors incur additional transaction and frictional costs in case assets have to be sold under illiquid market conditions.

[36] These characteristics are assessed on the degree to which they meet certain criteria: available to absorb losses at all times, undated maturity, repayment or redemption at the option of the insurer, degree of subordination, discretion over payment of interest/dividend, no acceleration of insolvency etc. The highest quality of capital must meet all criteria in full and unconditionally. Tier 2 items can meet certain criteria partially or conditionally, and all remaining items are classified as Tier 3 capital.

kind of policyholder guarantee.[37] However, the assets covering unit-linked products are not considered part of the insurance companies' assets; capital is instead levied on a fraction of expected profits from future premiums. The amount of required capital therefore depends on how future premiums and profits will be recognised under Solvency II, which remains an open issue. Given this uncertainty, it is difficult to judge whether Solvency II penalises certain products, though the increasing cost of providing guarantees was a consistent theme in industry interviews.

Under the standard model, risks are divided into six risk modules: market, counterparty (default), life, non-life, health and intangible risk, where each module is further divided into sub-modules (see below). The risks for these modules are aggregated by using correlations, and diversification effects between these risks are explicitly recognised. In addition, there is a capital charge for operational risk and an adjustment for the loss-absorbing effect of profit-sharing and deferred taxes.

The design of market risk charges for different financial instruments is perhaps the most significant aspect for asset allocation. The market risk module is in turn divided into seven sub-modules: equity, spread, interest rate, property, currency, concentration and illiquidity risk (relating to the illiquidity premium in the discount rate). In the equity category, "global" equities (EEA/OECD countries) attract a capital requirement of 39%, while "other" equities and alternative investments one of 49% (before any diversification benefits). Bonds will be charged for duration and credit risk according to specific risk curves, and structured products are subject to a two-part charge. The assessment on investment strategies will therefore have to take into account not only the overall capital requirement, but also the way insurers will rebalance their portfolios in response to the new risk charges (see Section 4).

3.3.4 Will Solvency II bite?

Solvency II proposes a more granular and risk-sensitive quantification of the risks faced by insurers, and capital requirements are generally found to be higher than under previous regulation. At the same time, available capital is also likely to increase, due to the discounting of future projected liability cash flows as well as the release of unrealised capital gains on assets into own funds. However, it is possible that the resulting increase in capital will be insufficient to cover the higher capital requirements. Hence, the capital surplus will be reduced and some firms might want to increase surplus levels by raising new capital.

The fifth and last quantitative impact study (QIS 5) before the introduction of Solvency II was conducted in late 2010. The European Insurance and Occupational Pensions Authority (EIOPA) presented the European results based on a sample of 2,520 insurance firms (EIOPA (2011)).[38] One of the conclusions that can be drawn from QIS 5 is that most companies have sufficient capital (own funds) to cover the new solvency requirements, and the industry average shows a comfortable SCR of 165% for the participating institutions. This is in spite of the fact that the aggregate capital surplus is roughly 25% lower than under the current regulation.

The variation observed across insurers implies, however, that a significant share of the industry will have to take action geared either towards reducing risk profiles or raising new capital. Some 15% of insurers fell short of the 100% SCR threshold, and another 8.3% fell in

[37] Also products with variable annuities are expected to gain in comparison to products with guarantees in Solvency II, as the capital requirement will be less.

[38] Some 68% of relevant insurers participated in the study. In total 85% of premiums of the insurers subject to Solvency II are covered by the test.

the range of 100–125%. Solvency ratios below 100% will trigger regulatory intervention once Solvency II is in force. Analysts expect smaller and medium-sized insurance companies to target a solvency ratio of at least 125%. Accordingly, at least a quarter of the sector would have to take action based on these results.

While capital requirements under Solvency II tend to be higher than under current regulation, the difference hinges on whether insurers use the standard formula or apply an internal model. QIS 5 results show that the capital surplus declines significantly for users of the standard formula of Solvency II. By contrast, the average capital surplus among insurance groups using internal models (only 26 groups in the sample) increased by 6%. Across all users (solo level) of internal models, the capital surplus decreased by merely 1%. However, the situation is not homogenous across countries as, according to QIS 5, the capital surplus will be higher under Solvency II in 13 out of 30 countries (EIOPA (2011)). On average, the use of group internal models in QIS 5 resulted in a reduction of capital requirements by 20% compared to the standard formula for groups.

It is possible that future enhancements of internal models might further reduce solvency capital requirements. Solvency II appears to provide strong incentives for insurance companies to seek approval for their internal models.[39] This will allow them to include more company-specific information for the calculation of capital adequacy. Some life insurers indicated that they already operate with risk models in line with Solvency II and do not expect it to have a major impact on their asset-liability management and asset allocation strategies. Others explicitly stated that the portfolio reallocations described below were based on their internal models.

It is difficult to draw strong conclusions from QIS 5 results as significant changes in the proposals can be expected up to the point when the framework is finalised in October 2011.[40] Indeed, firms emphasised in interviews that regulatory uncertainty in relation to Solvency II is one of the main challenges for life insurance companies in the countries within the scope of application. Even so, if the requirements as tested under QIS 5 remain unchanged, some modifications to business models and investment strategies, especially among small and mid-cap insurers, can be expected. This will be the focus of the next section.

4. The impact of accounting and regulatory changes on investment strategies

The previous section concluded that accounting and regulatory changes are expected to have significant implications for institutional investors worldwide. Although some of the envisaged changes are of a European nature, notably the advent of the Solvency II framework, there is divergence on how the changes will be implemented in different countries. The pension fund industry faces no international initiatives like Solvency II and the asset allocation changes are more likely to be driven by national circumstances. As a consequence, generalised trends emerging in their asset allocation are harder to discern and may be attributed largely to the low-interest rate environment (Section 5). The risk profile of pension funds will depend much on their funding status and national regulation. At the

[39] However, internal models are at various stages of development. Comparisons between capital requirements under internal models and the standard formula thus entail a degree of uncertainty.

[40] The main ideas of Solvency II were set out in *The Solvency II Framework Directive (November 2009)*, but many important implementation details remain to be decided.

international level, it appears that insurance companies will be more affected, and this section will largely focus on the impact on their financial market activities.

Insurance companies and pension funds subject to accounting and regulatory changes in principle can adjust their operations in several ways:

Firms can change the size and allocation of their asset portfolios, to align them to capital charges and achieve lower volatility in financial statements.

Alternatively, firms can reduce regulatory capital requirements and volatility by the transfer of risk to financial markets, through reinsurance, securitisation or hedging with derivatives. This would boost solvency ratios as much as raising capital would. In addition, some insurance companies might streamline their group structures to better capitalise on diversification benefits under Solvency II.[41]

Another option is to redesign their products over time. Firms can reduce guarantees and options embedded in (new) pension plans and insurance contracts, and thereby shift risk to households. The move away from defined benefit pensions and guaranteed-return insurance contracts, or their repricing, is a longer-term structural trend that is strengthened by the experience of financial crises and the low-interest rate environment in its aftermath.

In line with this report's focus on financial market implications, this chapter will concentrate its discussion on changes in asset allocation and the use of derivatives.

4.1 Impact of Solvency II on investment strategies

For the majority of insurance companies, results from the latest quantitative impact study (QIS 5) suggest that the introduction of Solvency II in Europe does not create an imminent need to raise new equity or change their investment policies (Section 3). However, an assessment of the impact on investment strategies should not only gauge overall capital needs, but also consider how insurers might optimise the risk-return characteristics of their portfolios in accordance with changed risk charges. Overall, the working group believes that this could lead to a larger share of portfolios being allocated towards less risky asset classes with lower capital charges under Solvency II.[42] The quantitative impact studies suggest, and many industry analysts indeed expect, that the main impact of Solvency II will occur not on the liability but on the asset side of insurers' balance sheets. This impression was supported by the industry interviews conducted by the group.

A top-down approach to the issue of prospective portfolio adjustments is to gauge the risk contributions of various asset classes under the QIS 5 study. Of all the risks included in the Solvency II framework, market risk accounted for two thirds of the total SCR in QIS 5. Within the market risk module, the three largest contributions came from equity risk, spread risk, and interest rate risk (EIOPA (2011)). This would suggest that insurers with low capitalisation might have to reduce their holdings of equity and credit positions, as well as to limit the duration gap between their assets and liabilities.[43] In particular, the largest market risk contributions for solo undertakings come from equity (42%), spread risk (30%) and interest

[41] About a quarter of insurance undertakings with a solvency capital ratio below 100% belong to insurance groups or financial conglomerates. These institutions could in principle increase the capital level of the insurance undertakings through capital reallocation or intragroup risk transfers.

[42] Since internal models vary across insurers, this assessment is more straightforward for users of the standard formula featuring uniform rules for the calculation of capital requirements.

[43] Conversely, the ability of well capitalised firms to take on more risk in pursuit of higher long-run returns may become their competitive advantage.

rate risk (28%). For insurance groups, spread risk ranks first (42%), equity risk second (35%) and interest rate risk third (20%). The different rankings are due to higher equity holdings among smaller insurers,[44] suggesting that this group might seek to improve their capital ratio by reducing the share of equity (or alternative investments classified in this category) in their portfolios.

However, other forces induce the opposite incentives. In the current environment of protracted low interest rates, insurance firms and pension funds face increasing pressure to search for yield in order to meet guaranteed returns or defined benefits (Section 5.1). Yet interviews do not point to an industry-wide movement toward higher risk classes at this time. While low yields currently constitute a drag on profitability, the pressure to search for yield would intensify if the low-interest environment is maintained long enough to start consuming capital. Similar pressures arise due to increased competition in the industry where insurance companies compete with banks and pension funds in the same product space, and may face additional competition from firms located in jurisdictions with less stringent capital standards.

Against this background, it is useful to evaluate the new solvency rules with reference to individual asset classes, with particular emphasis on equities, government bonds, corporate and covered bonds, and structured products.

Equities. Under Solvency II the equity risk sub-module provides a framework for the stress-testing of equity holdings and alternative investments such as private equity, hedge funds and commodities. "Global equities" (EEA/OECD countries) attract a capital requirement of 39% of their market value, and "other equities" and alternative investments one of 49%. Under the assumption of capital costs of 12%, "OECD Equities" ought to yield at least 4.68% (=0.39*12%) to cover the capital costs. This return target appears reachable, especially for life insurers with their long-term investment horizon. Moreover, diversification benefits could reduce the effective equity risk charge by about half (EIOPA (2011)). Equities should therefore remain a viable asset class. "Other equities" comprise a range of assets, private equity, commodities, hedge funds and even infrastructure investments considered relatively solid. On this group, the hurdle rate of 5.88% (=0.49*12%) is more challenging and might well lead to a reduction in allocations. However, industry interviews provided little evidence of a reduction in the allocation to these alternative assets at this stage.

Most European insurers have reduced their equity risk significantly over the last decade, reflecting a combination of lower equity valuations and some net disposals during the equity bubble and the latest crisis. Within the industry, equity holdings are lowest among reinsurance companies and highest among life insurers. As the equity backing ratios[45] for many large insurers are only 5–8%, the impact of Solvency II is likely to be small in view of the size of stock markets worldwide. However, this assessment differs across jurisdictions and industry segments. UK insurers,[46] as well as smaller and medium-sized companies in other countries, may have to reduce their equity holdings, given that equity risk ranks highest in their overall market risk exposure. Yet, one must be careful when attributing observed trends to the regulatory changes. Some asset classes have plainly disappointed from a risk-return perspective during the crisis (eg equity, hedge funds, structured products, financial sector exposures), and their falling portfolio share is a direct consequence of valuation losses

[44] CEA Statistics No 42 for 2008 show that the average allocation to shares and securities with equity features is 26%.

[45] The equity backing ratio is defined as the percentage of assets held in equities and asset classes with similar (equity) risk characteristics such as hedge funds, private equity, commodities etc.

[46] UK insurers have higher equity backing ratios than other European insurers. Interviews with UK insurers do point to a future reduction of this asset class.

and disposals that may have nothing to do with any behaviour pre-empting regulatory change.

That said, the regulatory charges on these positions do not encourage a broad-based re-entry into these asset classes. That regulation can discourage equity holdings can also be confirmed from comparing differently regulated institutions within the same country. Regulated US insurers hold less than 10% of the general account in equity and alternative assets; for US pension funds not subject to the insurers' risk-based regime, the equity share stands at 54% even after the crisis, in many cases much higher.[47]

Government bonds. Since European government bonds in domestic currency are classified as risk-free under Solvency II, there is a clear regulatory incentive to increase exposure to this asset class, including to euro area periphery debt. However, major insurance companies also rely on internal risk models that account for spread and default risk on sovereign debt. As in the case of banks, this would tend to moderate the incentive to shift toward high-yield sovereign debt even if the overall demand for sovereign debt is likely to rise. On balance, however, one may expect greater demand for long-dated sovereign debt which, all else equal, will further contribute to low long-term interest rates. In addition, insurers' efforts to reduce their duration gaps tend to reinforce the demand for long-dated government debt from an ALM perspective.

Any sizeable shifts in the government bond space may lead to noticeable financial market implications, given the volume of government bonds on the balance sheets of insurers (as well as on those of pension funds, see Section 2.4). Depending on initial conditions and current bond holdings, further shifts into government bonds may well produce downward pressure on yields, although differentiation across issuer countries is likely to occur.

Corporate and covered bonds. The impact of Solvency II on the corporate bond market is also potentially significant. Historically, insurance companies constitute a key investor base, holding more than 30% of the corporate bond supply.[48] Solvency II will impose capital charges on corporate and covered bonds that did not exist under Solvency I, although internal models at large insurers had taken into account credit risk before Solvency II was developed.

Under the standard formula, Solvency II capital charges have relatively steep duration and credit slopes which can be expected to lead to some portfolio adjustments. The capital requirements for corporate and covered bonds are calculated by multiplying a rating-induced shock factor with the duration of the bonds. A BBB-rated bond with a duration of 10 therefore requires 25% (=2.5%*10) in equity capital before diversification benefits. This formula appears to penalise long-term bonds since credit spreads at the long end are less volatile than those at the short end. The credit slope is similarly steep.[49] Corporate bonds with a low rating effectively attract a capital charge similar to that of equities.

---

[47] An insurer's general account supports contractual obligations for guaranteed, fixed-dollar benefit payments, such as life insurance policies. The pension fund data are data from Compustat's North America Pension Annual database (end-2009).

[48] This is confirmed by the corporate bond holdings disclosed in QIS 5 (of all regions, and including covered bonds) of around €2,200 billion on a group level (under the assumption that unit-linked investments are allocated in line with the rest of the portfolio). There is some €2,000 billion in euro-denominated corporate bonds outstanding (excluding FRNs and high-yield bonds) and the stock of euro-denominated covered bonds is close to €1,000 billion.

[49] According to the standard formula, the rating-based risk factor for corporate bonds varies between 0.9% for AAA and 2.5% for BBB in the investment-grade segment and is larger for high-yield bonds (BB 4.5%, B or lower 7.5%).

Euro-denominated longer-dated corporate bonds do not usually offer significantly higher risk premia than bonds with a shorter duration of up to five years. Various industry studies therefore claim that insurance companies aiming to optimise their asset allocation according to the standard formula of Solvency II will buy mostly short-dated corporate bonds in the future, since the spread to capital requirement ratio is unfavourable for longer-term bonds. This view concurs with industry feedback claiming that credit instruments with a maturity of 3–5 years could become the preferred habitat.[50]

A reduction in firms' euro-denominated corporate bond holdings could well have an impact on the funding capacity of European corporates. This may be partly offset by the incentives Solvency II provides for buying fixed income securities with the aim of better matching assets and liabilities. That said, such matching might be accomplished with government bonds attracting lower risk charges. European government securities in domestic currency are classified as risk-free and attract no capital requirement. This, too, puts corporate bonds at a relative disadvantage. Whatever the exact allocation across the credit spectrum, steep credit risk charges make it more likely that ratings downgrades will be met with forced selling and other cliff effects (at least under the standard model).

Within the corporate space, there is also movement between sectors that may not reflect differential regulatory charges. There is now less appetite for financials than was the case in the past. Many insurers placed tighter limits on their financial sector exposure in response to the crisis. The desire to diversify the corporate bond portfolio away from banks is seen as a reaction both to high correlations between financials (see Section 3) and the prospect of loss-sharing arrangements in the future.[51]

The regulatory treatment of triple A-rated covered bonds appears more lenient than that of corporate bonds.[52] The cheapening of this asset class has led to attractive valuations in relation to low capital requirements under Solvency II. Taking activity in the EUR primary market as a guide, there are signs of an ongoing shift from corporate to covered bonds.[53] Heavy covered bond issuance by itself may contribute to making senior unsecured bonds less attractive, as more high-quality assets end up in pools of collateral securing covered bonds. Another factor favouring covered bond issuance is the uncertain prospect of unsecured bank debt in view of regulatory discussions on haircuts and bail-in clauses.[54] In addition, concerns about contagion effects on the euro area banking sector from the European sovereign debt crisis may have driven the investor base of European bank debt more towards secured instruments (van Rixtel and Romo González (2011)).

Industry interest in new bank debt instruments such as contingent capital appears to be uniformly low. This was a common theme across the working group's market interviews,

---

[50] However, not all insurers indicated that they will prefer short-dated bonds due to Solvency II.

[51] This tendency is not common to all insurance companies; some UK insurers, for instance, noted that the allocation to bank debt was not reduced in response to the crisis.

[52] Basel III also provides a favorable treatment for covered bonds compared to unsecured bonds. Covered bonds can be included in the banks' liquidity coverage ratio as liquid assets.

[53] Covered bond issuance in 2011 Q1 reached €100 billion (up from €69 billion in 2010 Q1). This is single largest quarterly issuance on record in the euro-denominated covered bond market. At the same time, European unsecured bank bond issuance and non-financial corporate bond issuance remain strong and above the average pre-crisis level. Thus far, upcoming regulatory changes do not seem to have a negative impact on issuance volumes and there is presently no evidence of a clear preference for shorter dated unsecured bank bonds that could be attributed to Solvency II.

[54] The European Commission consultation launched in January 2011 on the implementation of burden-sharing among bank bondholders excludes covered bonds from its scope.

quite independently of the accounting and regulatory background. This asset class can be difficult to align with investment mandates, and receives a risk treatment comparable to that of equities. Insurers also consider the valuation of contingent convertibles to be a very complex task, and credit rating agencies currently do not plan to rate these instruments. Uncertainty over the design of contingent convertibles contributed to the reserved reception of this new type of bank debt.

Structured products. Under Solvency II, the capital charge for structured products is the greater of two distinct charges. The direct charge, corresponding to a shock to the structured product itself, follows the same approach as that for corporate bonds (depending on the rating of the structured product). Another charge relates to shocks to the assets underlying the structured product. In many cases, this "underlying charge" appears to be dominant. The capital requirements thus call for careful documentation and command a high risk charge, frequently set to 100% for some structured products such as typical non-AAA RMBS and CLOs.[55] This may induce insurers to sell part of their remaining asset holdings. The industry's overall outlook for this asset class is generally negative, as both capital requirements and the risk of illiquidity during a crisis are relatively high.[56] EIOPA is mindful of QIS 5 participants' request to reduce the complexity of rules for structured products, and plans to reconsider the "underlying charge" for structured credit before implementation.

The trade-offs between different asset classes can be illustrated by means of a basic example. Under the instrument-specific capital requirements in Solvency II, the following investment allocations generate the same capital requirement under the standard formula:[57]

- 100% in covered bonds (AAA-rated) with a duration of one year,
- 20% in covered bonds (AAA-rated) with a duration of five years, and the rest in EEA government bonds,
- 13.3% in corporate bonds, AAA-rated, with a duration of five years, and the rest in EEA government bonds,
- 8.6% in corporate bonds, A-rated, with a duration of five years, and the rest in EEA government bonds,
- 1.6% in corporate bonds, B-rated, with a duration of five years, and the rest in EEA government bonds,
- 1.5% in "global equities" and the rest in EEA government bonds,[58]
- 1.2% in "other equities" and the rest in EEA government bonds.[59]

---

[55] However, some market participants claim that newly issued structured products can be structured so as to conserve capital, circumventing Solvency II to some extent.

[56] Primary market activity for structured products has plummeted. The lack of investor interest for this asset class since the financial crisis may be compounded by regulatory uncertainty around Basel III and Solvency II. Currently, euro-denominated volumes bought by investors remain well below the levels registered before the crisis. Investors bought only €88 billion of the 2010 issuance of €380 billion in structured products, since the primary use was to create repo collateral for the issuer.

[57] This example only considers the capital charges from spread risk and equity risk. Interest rate risk and currency risk are not taken into account. For this example, the capital requirements are taken from the technical specification for QIS 5.

[58] Global equities comprise equities listed in EEA or OECD countries. The capital charge for global equities is 39% of the market value, and, in QIS 5, 30% after a symmetric adjustment.

[59] See Section 3 for a definition of "other equities". The capital charge of 49% in QIS 5 falls to 40% after a symmetric adjustment.

These trade-offs convey the impression that it becomes relatively expensive for insurers to hold long-term debt or low-rated corporate bonds – the same goes for structured products, which face additional reporting requirements. Similarly, the equity risk and spread risk sub-components can be reduced by de-risking some of the firm's holding of equities, hedge funds and infrastructure investments, and structured credit bonds respectively, and by building up positions in government bonds (issued within EEA). By contrast, covered bonds and (EEA) government paper are seen to receive favourable capital treatment within Solvency II. In line with these observations, industry interviews suggest that most insurers (as well as pension funds subject to risk-based regulation) will increase their allocation to government and covered bonds, while reducing that to equity and long-term corporate bonds (beyond those reallocations already undertaken during the financial crisis). The demand for highly rated bonds may also rise as a result of insurers trying to close their duration gap to reduce the capital charge under the interest risk sub-module.

The introduction of the Swiss Solvency Test (SST), which shares important features with Solvency II, has led to similar observations. The SST has been in use at large Swiss insurance companies since 2006, although the key ratios became binding throughout the industry in 2011. Consistent with insurers' objective of reducing their duration gap (but also with other forces during the financial crisis), an increased demand for long-term government bonds, swaps and covered bonds was observed, leading at times to an inverted yield curve between maturities of 15 and 30 years.[60] An early study on the SST foreshadowed these trends, and conjectured that the capital requirements could lead to higher funding costs for Swiss companies with low or no rating (Schmeiser et al (2006)).

The trend to more demand for corporate debt (and reduction in demand for equities) was also observed following the implementation of new risk-based capital regulation in the UK in 2004, although the trend had already started in response to the equity crisis in the earlier part of the decade. The introduction of minimum funding requirements and the implementation of the FRS 17 accounting standard resulted in large purchases of very long-term bonds by UK pension funds (BIS (2006)). This strong buying is seen as part of the reason for the inversion of the 10–30 year yield curve in UK gilts in 2005–06.

Overall, it seems likely that capital requirements under Solvency II will, in aggregate, lead to a risk reduction in the asset allocation of the insurance sector as a whole. This may to some extent be regarded as an intended consequence and legitimate goal of regulation, but one that has implications for financial markets and sectoral funding. Government and covered bonds receive relatively favourable capital treatment, compared to (longer-term) corporate bonds, equity and structured products. Insurance firms may rebalance their portfolios accordingly, steepen the respective yield curves and contribute to some degree of market segmentation. Firms might, for instance, compensate a shortening of corporate bond holdings with longer-dated government bonds to prevent a widening of their duration gap. This would raise demand in the long-term public bond segment, already their preferred habitat, possibly depressing government bond yields further. Effects will also differ significantly across countries; due to home bias in asset holdings, they may be expected to be larger in countries where insurance companies constitute a larger share of the financial system (Section 2, Table 2).

This broad assessment comes with several caveats. Financial market effects may be of a transitory rather than a permanent nature, as a long phase-in period leaves scope for other investors to reposition themselves and for insurers to develop their internal models. Conclusions that appear plausible under the standard model may change with the adoption

[60] The equity exposure among Swiss insurers was already very low.

of internal models. Larger insurers run sophisticated internal models whose design is neither observable nor finalised at this time. To the extent that credit and duration curves are flatter than under the standard formula, the consequences may be less pronounced or even vanish. Indeed, results from the QIS 5 suggest that internal models might allow insurance groups to lower their regulatory capital charge by some 20%, thus obviating the need to rebalance portfolios to comply with Solvency II. However, no internal models have been approved to date, and some regulators might refuse to do so should internal models greatly undercut the capital charges under the standard approach. As such, the eventual adoption of internal models could moderate, but is unlikely to reverse, the effects outlined above.[61] Moreover, the impact will be weaker in countries where insurers already use risk models that are broadly in line with the requirements of Solvency II. Under these circumstances, the exact impact on investment strategies and financial markets is difficult to predict and will further depend on the final set of rules and the calibration of parameters. This uncertainty complicates the assessment and is perceived by some insurers as an obstacle to conducting their business on a long-term basis.

4.2 The role of accounting changes and ratings

The accounting changes to be phased in over the coming years are numerous. Their effects on the investment strategy of insurance companies and pension funds are more elusive than those of risk-based capital regulation. This is not only due to the uncertainty about the final shape of accounting rules, but also due to the fact that accounting and regulatory changes affect management strategies differently. Solvency regulation potentially has a direct effect because it results in requirements with a direct and reliably measurable impact. Accounting changes have more of an indirect effect when markets or stakeholders react to accounting information in a somewhat less measurable and observable way.

To reach an assessment, a reasonable approach is to focus on volatility as the main mechanism through which changes are most likely to play out. Section 3 concluded that international accounting changes are likely, on balance, to produce greater volatility in financial statements for various combinations of existing rules and regulations, and depending in particular how firms will use the reporting options embedded in different accounting standards (notably IFRS 4 and IFRS 9).[62] Volatility is also a recurring theme in the industry interviews with insurers and pension funds conducted by the Working Group. One can therefore presume that the effects of accounting changes on investment strategies operate primarily through volatility.

Discussions with firms revealed concern about potential increases in the volatility of their financial statements. Despite the long-term nature of their business, which would argue in favour of looking past short-term fluctuations in performance, they nevertheless felt that market observers and shareholders respond to reported results. For insurance companies, this may affect market assessments, company valuations and the ease with which they can secure capital. Pension funds are less affected by these procyclical elements on account of different incentives and the absence of shareholder equity and hold risk-based capital. Nevertheless, large changes in their funding status can still affect their corporate sponsor.

---

[61] In line with this view, responses given in several industry interviews describe expected portfolio adjustments following their own internal model, rather than the standard model.

[62] Under current IFRS and US GAAP, a large proportion of insurers' assets is already measured at fair values. Under IFRS 9 insurers have the option to value standard debt instruments either at fair value or at amortised cost, and an insurer may find it advantageous to use either option depending on the final shape of IFRS 4 Phase 2 (Section 3.2).

Pension funds may also choose to reduce volatility in their earnings by increasing their allocation to fixed income securities as part of an LDI strategy.

As a result, a rise in P&L volatility can have significant economic consequences. P&L remains the key metric for investors and market analysts. Increased volatility affects ratings, market assessments, and therefore the cost of funds or, in the case of pension funds, the financial statements of plan sponsors. This reportedly leads to pressure on firms to reduce their exposure to riskier asset classes, such as equity and lower-rated long-term bonds. Concerns about volatility can thus translate into portfolio allocation in different ways. Pension funds, on the one hand, are sometimes pressured by their sponsoring companies to de-risk their asset side, because the asset-valuation changes booked at the pension fund add volatility to the company's earnings per share. For insurers, increased accounting volatility can lead to direct market pressure to reduce their exposure to riskier asset classes, or to regulatory pressure when solvency ratios come close to the regulatory minimum requirement.

Even so, the impact of envisaged changes to IFRS remains unclear at this stage, and industry participants generally expect a greater impact from regulatory changes. The majority of insurers who are subject to changes in both IFRS and regulation said that the impact of accounting changes on asset allocation and hedging would be of lesser importance than that of Solvency II, though a number of market contacts also claimed that the impact of accounting changes on volatility could promote procyclicality (Section 5.2). But gains in transparency and comparability may well outweigh a possible rise in volatility. IFRS make financial statements more comparable, and IFRS 4 Phase 2 is expected to open up the insurance business, which analysts often regard as lacking in transparency. The need for insurers to alter their investment strategies in response to volatility can perhaps be mitigated by providing investors with additional explanatory information on earnings volatility, and by highlighting performance measures that reflect the long-term nature of the insurance business. In this respect, the effects might be most relevant to a transitional period until investors get used to the new standards and learn to see through pure accounting volatility.

The issue of volatility in financial statements is intimately related to how firms are perceived in the markets and assessed by credit rating agencies. Public ratings can act as an additional constraint on the degree of risk-taking that insurers or pension funds and their sponsors can take. Credit rating agencies use various criteria, such as asset quality and investment risk, to derive financial strength ratings. Ratings are important to most companies, and vital for reinsurers, whose business depends on a strong capital position – accordingly, most reinsurers have credit ratings of single A or higher. The ratings criteria may guide the investment policies of those insurers aiming to achieve specific ratings.

However, the standing of credit rating agencies has declined throughout the financial crisis, and there may now be fewer instances where ratings criteria are binding on investment choices. The introduction of sophisticated Solvency II rules could further reduce the market's reliance on ratings. A number of analysts expect the solvency ratio to become the ultimate ratings standard for European insurers, ultimately displacing credit ratings for insurers. At present, it remains an open question whether investors and other stakeholders will increasingly rely on Solvency II margins or on external ratings for the assessment of insurance companies' capital strength.

4.3 Risk transfer

It can be costly for an institution to respond to rising volatility and regulatory capital requirements by changing its portfolio allocation. Alternatively, firms can reduce their risk-based capital requirements or financial statement volatility by transferring risk to financial markets. The main methods for doing so are reinsurance, the securitisation of liabilities, or the use of derivatives for hedging purposes (next subsection).

Will Solvency II lead to increased transfer of risk to capital markets? Under Solvency II, formal recognition will be given for the use of risk-mitigating techniques, whether for financial risks or insurance risks. Subject to being legally enforceable and generating an effective transfer of risks to a third party, there would be a reduction in the SCR commensurate with the extent of risk mitigation. That means that the transfer of underwriting risks would lead to a reduction in the SCR for the relevant underwriting risk.

Securitisation permits the transfer of risk to financial markets. Although still a relatively small market, there is growing interest among insurers in off-loading a portion of the tail risk in their liabilities onto capital market investors, eg for longevity or natural catastrophes. Even so, risk retention in life insurance is about 93% (CEA (2010)), and ceded risks remain on the balance sheet.[63] From investors, there is increasing demand for such instruments, as the underlying risks are often uncorrelated with financial market risks, hence providing diversification opportunities in the investment portfolio. Although such instruments may not be as well understood as those with traditional financial risk-return profiles, the potential benefits have become more apparent in view of the surging correlations during the crisis (Section 2). From the business model point of view, the traditional core business of underwriting insurance risks in return for a premium may be shifting towards engineering financial market solutions that are linked to insurance risks.

4.4 The use of derivatives

The possible implications of accounting and regulatory changes for insurance companies and pension funds extend beyond the rebalancing of portfolios outlined above. The increasing role of derivatives for managing risk (Section 2) means that the accounting and regulatory changes will also have implications for the use of derivatives that will interact with on-balance sheet adjustments. The use of derivatives can serve as an alternative to changes in portfolio allocation. Dynamic adjustments are made either in underlying securities markets, or in derivatives markets.

4.4.1 Impact of accounting and regulatory changes

Accounting and regulatory changes can be expected to raise demand for the use of derivatives. New regulation leads to asset-liability mismatches being measured more precisely and disclosed more to market participants. Under Solvency II, capital requirements for insurance companies are determined on the basis of market values of assets and best estimates of liabilities, thus using similar – albeit not identical – fair value principles as under IFRS. Therefore, asset-liability mismatches of insurers can result in higher statement volatility and may require more solvency capital than was previously the case. This raises incentives to closely match duration and cash flows of assets and liabilities, either by adjusting the composition of physical investment portfolios or by using risk mitigation strategies such as hedging with derivatives.

Liabilities under Solvency II are discounted at interest rate swap rates plus an allowance for an illiquidity premium (Section 3). Insurance companies are thus likely to make more frequent use of interest rate swaps to match liabilities and might buy more swaptions to protect against interest rate volatility. In addition, insurers might also choose to increase the allocation to government bonds in their investment portfolios with the aim of better aligning assets and liabilities. For investments in corporate bonds, insurers may substitute part of the duration of their physical credit portfolio by interest rate swaps when this results in lower

[63] Before the crisis, securitisation allowed banks to transfer significant percentages of risk. It is now recognised that this practice eroded asset quality, was opaque and resulted in inappropriate underwriting practices.

capital requirements. This is an alternative to increasing the allocation to government bonds to avoid widening the duration gap between liabilities and assets. As the spread between swap rates and government bond yields fluctuates over time, insurers will have to hold capital against this swap spread risk when investing in government bonds. Alternatively, they may hedge this risk with "swap spread locks" or similar contracts. As the best estimate of liabilities is not only influenced by swap rate fluctuations but also by changes in the illiquidity premium, insurers might try to better match liabilities by investing in corporate bonds similar to the bonds in the index that is used to determine the illiquidity premium.

More frequent use of interest rate derivatives and government bonds for matching liability duration would give insurers more leeway in taking investment decisions for other asset classes. This would allow insurers to focus on optimising their asset allocation according to other criteria, such as the attainment of an investment performance target.

Besides interest rate derivatives, insurers will probably also employ more other derivatives (such as equity derivatives and CDS). In some markets, longevity swaps have been developed which protect against the risk of longer-living pensioners, but this segment is small and not liquid enough for broader use. In general, the requirement to hold capital against all kinds of risks under Solvency II will make insurers think more carefully about whether to retain or hedge risks. They may choose to do the latter, taking advantage of the expanding universe of derivatives markets. The UK experience seems to confirm that hedging activity and derivatives usage increases after a transition to a risk-based solvency regime.

Other developments, however, may mitigate the trend toward greater use of derivatives. First, the use of derivatives means that additional counterparty risk has to be taken into account, and may translate into liquidity risk via margin requirements. Second, adjustments to the products offered by insurers may also play a role. Much demand for hedging is driven by the options and guarantees embedded in insurance products. A life insurer offering interest rate guarantees, for example, typically needs to hedge against the risk of spread compression in the case of declining interest rates, or against lapse risk in times of increasing interest rates. If insurers respond to regulation by replacing traditional life insurance policies by unit-linked products with fewer guarantees and options, this would mitigate the need for increasing usage of derivatives for hedging purposes. Third, insurance companies may be deterred from using derivatives when full recognition of risk mitigation is difficult to receive.[64] Finally, in some cases insurers may also opt for reinsurance or for securitising parts of insurance risks as alternatives to the use of derivatives.

Some accounting mismatches will remain due to differences in the measurement of assets and liabilities under new accounting standards. Some insurers said they regarded the amortised cost category as most appropriate and will value debt instruments accordingly under IFRS 9. For these insurers, accounting mismatches will probably arise if IFRS 4 (Phase 2) is implemented as currently proposed. Correspondingly, insurers would have to measure their liabilities at their fulfilment value for each period. In contrast, other insurers indicated that they will use the option to value debt financial instruments at fair value through the P&L, thereby partially counterbalancing fluctuations of the value of liabilities. Nevertheless, there will be accounting mismatches also in the latter case because the measurement rules for assets and liabilities differ under the newly proposed standards. Yet

[64] This may be addressed to some extent by envisaged changes to IFRS 4 in Phase 2, and a possible relaxation of hedge accounting requirements under IFRS 9. Similarly, the Derivatives Risk Mitigation guidance recently adopted by National Association of Insurance Commissioners in the United States gives fuller, though still not complete, recognition for using derivatives in risk mitigation.

insurance companies have indicated that they will not pursue hedging strategies with the sole aim of reducing pure accounting volatility; instead, they will probably provide additional information to investors and other stakeholders in order to better explain this volatility in their balance sheets.

On balance, the proposed regulatory changes seem to be encouraging somewhat increased use of certain derivatives for hedging purposes; in particular those that are considered most liquid such as interest rate swaps, swaptions and futures, inflation swaps and equity options.

4.4.2 New trends in risk management after the crisis

The financial crisis has generally made investors more aware of liquidity and counterparty risk and it has contributed to the use of certain types of derivatives. As liquidity largely evaporated in many underlying cash markets, the use of government bond futures and interest rate swaps has become more widespread for shorter- and longer-term hedging purposes. At the same time, derivatives (such as commodity derivatives) are used increasingly for return enhancement rather than for hedging purposes. Moreover, in some countries there was also increased active currency management and use of derivatives to hedge currency risks during the crisis. Large insurers headquartered in countries with small domestic bond markets are significantly exposed to currency risk on account of their foreign bond holdings. However, the three most common issues institutional investors brought up regarding derivatives concern liquidity risk, counterparty risk and collateral management.

The importance of liquidity has undoubtedly been one of the main lessons from the financial crisis to any type of investor. Both insurance companies and pension funds have indicated that during the crisis they resorted to increased use of exchange-traded derivatives as well as some OTC derivatives to manage their risk exposure and tactical asset allocation. At the same time, some mentioned difficulties in efficiently adjusting their holdings of private equity, hedge funds or structured credits. There has also been increased use of CDS, both as indicators to assess counterparty and geographical risk (in addition to ratings) and as tools to manage underlying credit risk exposure. CDS use has benefited from significant product development during the last years, which has produced various types of CDS baskets with which investors can hedge or take risks more quickly and efficiently.

The broad use of OTC derivatives has also increased the attention paid to counterparty risk. Whereas the trend toward central counterparties will arguably simplify credit risk management, the insolvency regime and the credit risk of the clearing house has become a new preoccupation. For example, large US pension funds worry that the centralised clearing requirements under the Dodd-Frank Act[65] will involve some form of mutualisation of losses. Pension funds see themselves as cross-subsidising other less regulated or creditworthy investor types (such as hedge funds). To avoid this, and to ensure their continued access to swap markets, the industry is requesting the option of posting collateral for cleared swaps on a segregated basis with third-party custodians (Harshaw (2011)).

There are also concerns about higher collateral requirements under compulsory central clearing. Some institutions oppose pure cash margin requirements and instead wish to use bonds as acceptable collateral with centrally cleared derivatives. These investors claim that cash margining would lead to increased holdings of cash or qualified collateral at the expense of other investments; this would lead them to hedge fewer risks in the first place, which in turn would reduce liquidity. However, this view is not widely shared, as institutional

[65] Dodd-Frank Wall Street Reform and Consumer Protection Act – Title VII: "Wall Street Transparency and Accountability Act".

investors hold ample amounts of good-quality collateral and have used it for bilateral derivative contracts.

5. Financial system implications

Earlier sections of this report highlighted the essential role that life insurance companies and pension funds play in the economic and financial system, providing services that allow firms and consumers to diversify risk and smooth consumption over time. They are also significant investors in real and financial assets, particularly in fixed income securities but also in a growing array of alternative assets. Through their role in the financial system and various financial activities, they are interconnected with other financial institutions. As a result, developments that affect their services and investment strategies can have important implications for the financial system and economy more broadly.

The pertinent regulatory and accounting frameworks, currently in a state of flux, can have significant implications for firms' investment strategies, as described in the previous section. The resulting implications for the financial system, however, have to be considered in conjunction with the current exceptional macroeconomic environment which places insurance companies and pension funds in a more challenging operating environment than is the case for other sectors. Although some of the pressures arising from the financial crisis have diminished, low interest rates and sovereign risk contribute to ongoing strains on their financial positions. Potential risks to the financial soundness of the industry, and to the financial system more broadly, will increase the longer these pressures are sustained. Accordingly, this section considers the macroeconomic environment in which insurance companies and pension funds currently operate, before presenting a preliminary evaluation of financial system implications arising from changes in their business models and investment strategies.

5.1 The macroeconomic environment

In the aftermath of the global financial crisis, both long-term government and corporate bond yields declined sharply, reaching historically low levels (Graph 5). A number of factors contributed to this development. First, central banks reacted to the financial crisis with unprecedented policy actions, including abundant and unconventional liquidity operations and the recourse to debt purchase programmes in several countries. Second, the severe economic slowdown and decline in inflationary expectations, sometimes to the point of fuelling concerns about deflation, put downward pressure on long-term interest rates. Third, the flight to safety during the past few years contributed to increased demand for debt instruments perceived to be risk-free. Although long-term interest rates started to rise since late 2010 on the improving global economic outlook and inflation expectations, they remain low in absolute terms in historical perspective. The relief that lower interest rates bring to other sectors is not shared by insurance companies and pension funds.

If long-term interest rates were to remain at these low levels for an extended period of time, life insurance companies and pension funds would face continuing challenges as a result. An extended low-interest environment can affect their financial condition in several ways. One is the adverse balance sheet valuation effect: a decline in interest rates raises the present value of liabilities more than it raises the value of assets, because liabilities typically have a longer duration (Section 2). Accounting practices will influence the depth and speed at which this will occur. The valuation effect is felt more directly by institutions discounting their long-dated liabilities at a market rate, and is partly offset when assets are also marked to market. For instance, the 100 US public companies with the largest DB plans had their 2009 asset gains of 14.1% largely offset by the increase in liabilities generated by falling discount rates; similarly, the continued decline in discount rates in 2010 raised liabilities by 7.7%, so that the

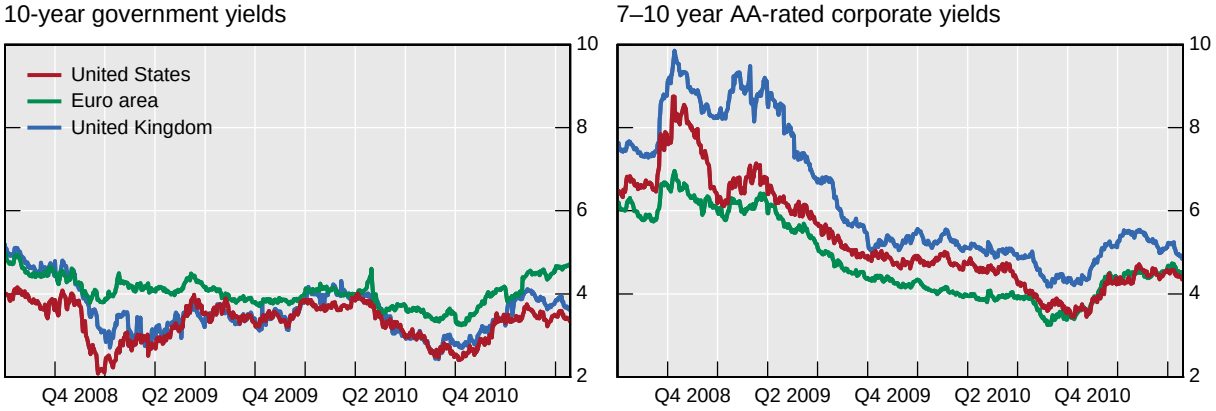
funded ratio increased only modestly from 81.7% to 83.9% in spite of record sponsor contributions and investment gains of 12.8% (Ehrhardt and Morgan (2010, 2011)).

Further losses arise over time the longer low interest rates are maintained. It becomes more difficult to meet future obligations out of low fixed-income yields, and any reinvestment of cashflows is likely to occur at lower yields. Lower demand for insurance products also reduces the flow of new business. More generally, pension contributions and insurance premiums have to be invested in assets at rates below those expected when the pension and insurance contracts were originally priced (Dickinson (2000)).

Graph 5

The low-interest rate environment

In per cent



Sources: Bloomberg; Merrill Lynch.

That these strains can eventually undermine the entire industry is illustrated by the Japanese experience of the 1990s. Japanese life insurers had written guaranteed-return contracts that drove them into insolvency after the bursting of the bubble (Box 3). Today's situation shares several features with the Japanese low-interest rate environment, which similarly followed a financial crisis. Industry interviews conducted by the working group also suggest that the presence of legacy guaranteed-return products undermines the profitability of insurers (and, similarly, traditional pensions entitlements put pressure on the funded status of pension funds).[66]

Many institutions today have already insulated themselves from these effects, either by hedging interest rate risk, or by moving towards unit-linked insurance products or DC schemes. Even so, minimum return-guaranteed products remain prominent in many countries. Of the €4.8 trillion in life companies' assets outstanding in EU member states, some 70–75% (or €3.5 trillion) is estimated to offer some form of interest rate guarantee (JP Morgan (2010)). In some jurisdictions, life insurance companies are allowed to smooth the returns over the life of the contract using a reserve fund.[67] This allows the company to tap

[66] The guaranteed returns embodied in traditional life insurance contracts and pension obligations appear to have been revised downward only minimally. They often remain high, in the US case in the range of 7–8%. Issues of competition and fairness are perhaps among the less noted reasons accounting for the persistence of high promised returns: life insurers may try to avoid losing market share, and occupational pension funds could be reluctant to discriminating between current and subsequent worker cohorts when yields fall.

[67] If portfolio returns are high during a particular year, then the company is allowed to store some of the returns in a reserve fund instead of paying the entire amount due to the policyholder (85% in France for instance).

into the reserve fund during years when returns are low, in order to meet the minimum guaranteed return requirement.[68] That said, a further decline in rates could move many institutions closer to minimum solvency ratios, although this scenario appears unlikely in the absence of a marked deterioration in the macroeconomic outlook or in sovereign debt markets.

A sustained period of low long-term interest rates is known to lead to various adjustments in the investment strategies and overall ALM of insurance companies and pension funds (Holsboer (2000)). First, a weaker financial position resulting from lower interest rates may be mitigated by holding more reserves, increasing premiums or pension contributions, or a combination of the two. Industry interviews confirmed that the low yield environment may require an increase in the price of minimum return guarantees. Second, the yields in combination with lower funding levels put pressure on insurance companies and pension funds to tilt their investment profiles toward higher-yielding asset classes. Within the constraints set by regulation, this search for yield could lead to larger allocations to assets such as corporate bonds, quoted shares or alternative investments such as private equity, at least where such positions do not attract high regulatory charges. Insurance companies and pension funds in interviews also pointed out that they are raising their 2011 holdings and the long-term strategic allocation to include more emerging market debt and equity.

While many private sector contacts described the present situation as “manageable”, at least while equity markets stay up, some indicated that it is becoming harder to resist the temptation to search for yield when low rates are maintained long enough to start consuming capital. At the same time, the scope for risk-taking is moderated by supervisory constraints, at least where risk-based capital requirements are, or will be, in place. Pension funds with underfunded status tended to characterise the current environment as more stressful, pointing out that current yields on traditional fixed income assets were too low to return to a fully funded position. Incentives to generate higher investment returns were therefore more evident among this group.

Since the low-interest rate environment has lasted for several years, it has reinforced two longer-term trends in the ALM strategies of insurance companies and pension funds. One is the trend toward redesigning liabilities and moving away from products offering a guaranteed return or defined benefits (risk-shifting).[69] This trend has been observed for decades, especially in the UK and US private sector,[70] and it is now being fuelled by the crisis experience as well as by accounting and regulatory changes (Sections 3 and 4). The low-interest rate environment may also lead insurance companies and pension funds to enhance their ALM. They may make increased use of derivatives to hedge long-term guarantees against (market) interest rate risk (Section 4). This would be embedded in more active risk management and further innovations in ALM that offer enhanced control of actuarial and financial risks. In particular, a strategy to cope with lower interest rates would be to shift further toward liability-driven investment (LDI) and dynamic strategies involving swaps, swaptions or a combination of both (Xu (2007)). This reinforces the longer-term trend toward LDI, which has a number of interesting implications for financial markets.

This option to smooth returns implies that the life insurance company does not need to earn a minimum return of x% every year over the life of the contract, but an average of x% over multiple years.

[68] Rules on this topic vary by country and company. It should also be noted that returns on the life insurance contract are typically exempt from taxes.

[69] There is also scope for repricing existing products to address the mismatch between assets and liabilities resulting from lower rates (Wall Street Journal (2010)).

[70] In the United States, the share of defined benefit-only pension plans among active participants in the private sector has declined from 60% in 1980 to below 10% in 2009 (The Economist (2011)).

Box 3

Return guarantees in a low-yield environment: the case of Japanese life insurers in the 1990s

The current difficult environment for insurance companies and pension funds shares important features with the Japanese experience of the 1990s. During the build-up phase of the bubble (mid- to late 1980s), Japanese insurers not only promised high guaranteed returns to policyholders but also followed myopic investment strategies. As a result, once the bubble burst and plunged the economy into an environment of extremely low interest rates, serious negative margin problems emerged. Between 1997 and 2001, seven life insurance companies failed.[1] Although the reasons differed slightly in each case, there were several factors in common: (i) a failure of investment and asset-liability management, and (ii) a severe negative margin problem, arising from the high guaranteed returns for low premiums that life insurance companies had promised their policyholders.

Why did insurance companies guarantee high returns to policyholders? One reason was fierce competition in the insurance industry. Promising high returns had been the main tool for private insurance companies in their struggle to stand their ground on the unlevel playing field that was tilted in favour of a public insurer managed by the postal agent and the agricultural cooperatives. The rigidity of insurance contracts then contributed to driving private insurers into bankruptcy.[2]

Another important factor was the failure of investment and ALM. The left-hand panel of Graph 3.1 suggests substantial overinvestment among Japanese insurers, with asset growth far exceeding nominal GDP growth in the 1980s. Asset growth was fuelled by a boom of investment-style insurance products, mainly "lump-sum payment endowment insurance", which was sold in 1985 with a five-year interest rate of 8.8%, as well as "variable rate insurance" which was popular among consumers favouring high-risk, high-return investments.[3]

While insurers expanded their liability side with such products, the composition of their asset portfolios also changed dramatically (middle panel). Japan's insurers lent money to industry in historically high volumes. In the early 1980s, 60% of their assets were still in loans. But in the course of deregulation, banking activity expanded throughout the 1980s, and insurers redirected their investment toward financial assets such as stocks and bonds, which exposed them to huge losses after the bubble burst. The Tokyo stock price index alone declined by 60% between December 1989 and July 1992.

---

[1] These institutions (with the year of bankruptcy) were Nissan Mutual Life Insurance Company (1997), Toho Mutual Life Insurance Company (1999), Daihyaku Mutual Life Insurance Company (2000), Taisho Life Insurance Company (2000), Chiyoda Mutual Life Insurance Company (2000), Kyoei Life Insurance Company (2000) and Tokyo Life Insurance Company (2001). Another insurer, Yamato Life Insurance Company, failed in 2008 because of large losses on subprime mortgage-related investments.

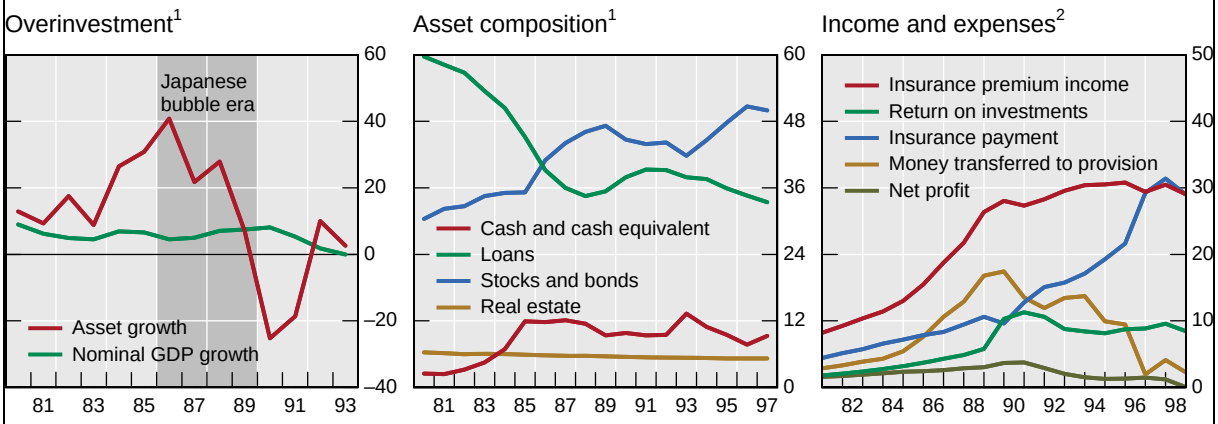
[2] If the insurers could have lowered the guaranteed return during the contracted period, the problem would have been avoided. Until 2003, Japan's Insurance Business Act prohibited lowering guaranteed returns unless an insurer went under. The Act was revised in 2003, and it is now possible to lower a return (only) if the insurer faces a high probability of bankruptcy.

[3] In the mid-1980s, the share of "lump-sum payment endowment insurance" accounted for some 80% of newly contracted insurance overall.

Box 3 (cont)

Graph 3.1

Japanese life insurers in the 1990s



[1] In per cent. [2] In trillions of yen.

Source: Japan Institute of Life Insurance.

A decomposition of income and expenses shows that growth in insurance premiums and investment returns levelled off in the 1990s (right-hand panel). This was a result of structural factors, such as deteriorating household income, intensifying competition from other financial institutions, and the shrinking of the insurance market due to demographic changes. Meanwhile, the volume of insurance payments had continued to rise, mainly due to refunds for policy surrenders against the background of falling confidence in the life insurance sector. Surrender rates peaked in 1997 at 14.6% (for group insurance policies), 8.3% (for personal insurance) and 10.6% (for personal pension plans). This led to a marked deterioration in the performance of Japan's insurers (net profit). To cover the loss, insurers used unrealised profits from their long-term stock holdings, which had accumulated to a level equivalent to nearly half their total assets at the peak in 1989. However the continuous downtrend of stock prices in the course of the 1990s meant that some insurers were unable to continue their operations.

5.2 Systemic implications

Insurance companies and pension funds find themselves at the intersection of major regulatory and accounting developments in a challenging macroeconomic environment. As major players in financial markets, their possible responses, described at length in earlier sections of this report, may have systemic implications. The final part of this report presents the working group's preliminary assessment of possible implications for financial markets arising from (i) a process of risk-shifting to households, (ii) changes in sectoral funding patterns, (iii) greater emphasis on LDI strategies and the use of derivatives, (iv) incentives to reduce long-term investing, and (v) heightened procyclicality.

5.2.1 Risk-shifting to households

The accounting and regulatory changes considered in this report come at a time when insurance companies and pension funds still feel the consequences of the financial crisis and the exceptional macroeconomic environment. These factors combined make it more difficult or costly to honour guaranteed returns or defined benefit obligations. Life insurance companies and pension funds are thus likely to continue changing the characteristics of the products they offer with a view to repricing or reducing their exposure to risk stemming from the liability side of their balance sheets. Although the scope for changing existing products is

constrained by contractual commitments and national regulations, as well as by competitive pressures, firms can alter their product mix gradually over time. Thus, life insurance companies are likely to favour investment contracts or unit-linked products, while pension funds shift away from DB plans.[71]

Concentration. The retreat from offering guarantees may not be uniform across the industry. Some countries have been on this trend for decades. In the US pension system, for instance, no new DB plans are opened other than in small private companies or in the public sector. In other countries, consumers' demand for defined benefits or return guarantees may mean that promised returns are repriced or lowered rather than phased out. The importance of risk management, internal models and market expertise in this context may mean that there are economies of scale in the provision of guaranteed-return products. One possible outcome is a movement toward greater concentration in products that offer some form of guarantee. Smaller undertakings might sell this part of their business to their larger peers, leading to greater concentration within the industry.

Risk-sharing. Shifting a portion of the risk to households has several implications. It reduces the financial services the industry provides to economic agents, and the extent to which the sector transforms financial market risk into reliable streams of retirement income and other benefits. This may result in inefficient risk-sharing, since risk-averse individuals are not as well placed as large financial institutions to manage and absorb financial risk. A realisation of losses can lead to negative wealth effects that could reinforce a downturn.[72] When fully exposed to market risk, individuals may opt for pension plans or insurance policies with lower risk allocations, or choose to build their own retirement savings by holding relatively safe mutual funds or bank deposits. Such products may not offer sufficient expected return to ensure adequate retirement income without additional saving.

Aggregate risk profile. It is an open question whether asset holdings in aggregate would exhibit a more conservative risk profile. This would depend on how insurance companies and pension funds alter their portfolio allocations when issuing products with fewer guarantees. While doing so in principle enables firms to choose riskier investment profiles, risk-averse individuals may not subscribe to this choice if given the option. The experience with US DC schemes suggests that plan participants tend to choose more conservative investment profiles, so that DC plans in aggregate hold a lower proportion of equities than is common among traditional DB plans. This observation is not uniform across countries, however, as unit-linked products issued by Dutch insurance companies, for instance, feature a greater equity share than their guaranteed products do.

Transmission mechanism. These choices may have broader consequences for the economy at large, such as through the provision of risk capital (see below) or through the monetary transmission mechanism. A reduction in return guarantees could make household spending more sensitive to changes in interest rates, since these will go hand in hand with changes in their expected investment yields or retirement income.[73] Monetary policy changes may therefore translate into greater income or wealth effects than would be the case if insurance companies and pension funds had guaranteed investment returns and future benefits.

---

[71] Pension funds can also reduce payouts, although this may be difficult owing to reputational effects and other constraints.

[72] Faced with reductions in their living standards, households might also raise demands that could eventually put pressure on national budgets.

[73] Countries in which floating-rate mortgages are dominant also show a greater sensitivity of house prices to changes in short-term interest rates (Tsatsaronis and Zhu (2004)). This is likely to affect wealth effects in a similar fashion.

5.2.2 Changes in sectoral funding patterns

While accounting and regulatory changes will bring important benefits in terms of financial soundness and disclosure, the potential portfolio reallocations outlined in Section 4 will also have noteworthy implications for the financial markets. Under the proposed changes, it tends to become relatively expensive to hold equity-like instruments, structured products, and long-term or low-rated corporate bonds, at least for European insurers, and assuming that their internal models track basic risk features of the standard model. In contrast, covered bonds and government debt, especially when issued by EEA governments, receive relatively favourable capital treatment within Solvency II. This would tend to be reinforced by greater demand for high-quality bonds for closing costly duration gaps and for implementing liability-driven investment strategies (LDI) more generally. The extent of portfolio reallocations will differ across countries, depending on initial conditions such as the current composition of asset holdings.

Yield curve effects. Reallocations across the credit and maturity spectrum could affect the respective yield curves, although such effects may be transitory in nature. The risk-free term structure may tend to flatten due to greater demand for high-quality long-term bonds, especially if insurers and pension funds use longer-dated government bonds to manage the duration gap while shortening the duration of their corporate bond holdings. The term structure for lower-rated credit, however, might well steepen to keep insurers and pension funds invested in this asset class or to attract other investors. These yield movements would raise the opportunity cost of shortening their corporate bond portfolios and controlling the duration gap using longer-term government bonds. The size and persistence of such yield curve movements will thus depend on how insurance companies and pension funds, as well as other investors, rebalance their portfolio in response to changing yields.

Habitat effects. Another channel through which shifts in asset demand could affect liquidity and market functioning is the investor base, reinforcing existing habitat effects in fixed income markets. For instance, insurance companies' rising demand for government bonds could, ultimately, lead to their dominance in that market, especially in the long-term segment. A less diverse investor base could increase the risk of a one-way market, especially in times of stress. Such trends deserve close monitoring. At the same time, there is concern about a possible lack of investors to fund banking institutions over the medium term, possibly forcing them to deleverage and to reduce lending as a result. Banks' refinancing needs remain high, and regulatory standards will require greater issuance into the longer-term segment in fulfillment of the Net Stable Funding Ratio under Basel III. European insurance companies (and pension funds to a lesser extent) constitute a bank funding source of considerable importance (Section 2). However, since the start of the crisis, insurance companies and pension funds have been reducing their exposure to financial institutions, and prospective regulatory risk charges provide little incentive to raise their allocation to corporates.[74]

Counterbalancing forces. Yet these observations cannot be reduced to predicting a broad-based shift from bank funding toward government funding. Growing interest in covered bonds, including those issued by banks, may well compensate for reduced holdings of unsecured bank debt. Moreover, as the resilience of banks improves with stronger regulation, unsecured bank debt may become more attractive again in the future. At the same time, the trend toward holding more government debt is tempered by growing unease about the sustainability of public finances. Investors are becoming more selective, not least among sovereign issuers. As the scope of the sovereign debt crisis in Europe widens, credit

[74] Limited appetite for bank debt extends to the case of contingent convertible debt. Neither insurance companies nor pension funds in interviews indicated much interest in this asset class (Section 4.1).

rating agencies are placing negative outlooks on major sovereigns. It is thus unlikely that institutional investors will continue to regard public debt of affected sovereigns as "risk-free" should the likelihood of debt restructurings rise.

5.2.3 Greater emphasis on LDI strategies and the use of derivatives

The working group's interviews showed that insurance companies and sponsors of DB pension plans have been placing more emphasis on risk management and ALM practices in recent years. ALM practices, and LDI strategies in particular, involve greater use of fixed income assets and long-maturity interest rate swaps to match more closely their liabilities' cash flows (Sections 2.4 and 4.4). This trend towards more advanced matching and hedging techniques should be welcome, inasmuch as it allows long-term institutional investors to better meet their future liabilities and reduce their sensitivity to market values and short-term volatility. At the same time, the trend has some broad implications for financial markets, which have to be monitored closely.

Demand-supply imbalances. A first implication of greater emphasis on LDI is that it strengthens the demand for fixed income instruments from insurance companies and pension funds. This in turn increases the risk of large demand-supply imbalances in the long-term bond market, putting downward pressure on yields. This implication of ALM practices for fixed income markets has drawn the attention of public authorities since the mid-2000s or earlier. It calls for the expansion of markets for inflation-linked and ultra-long fixed income securities, as well as for the overdue development of longevity-indexed bonds (Group of Ten (2005)). There is evidence that, at least in some countries, a move towards better duration matching in the mid-2000s had a significant impact on long-term bond prices (Ferguson (2006), Gieve (2007) and Section 4). Even in mature economies, life insurance companies and pension funds have difficulties effectively matching assets to their long-dated liabilities. An adequate supply of long-duration assets is instrumental to any LDI strategy and thus to the development of life policies, annuity products and funded pension schemes. LDI strategies would also benefit from longevity-linked securities. The rise in government issuance of inflation-linked and long-dated securities over the past few years, also as a consequence of fiscal strains in advanced economies, only partly filled the void in the supply of long-duration assets.

Lower expected returns. A second implication of a greater emphasis on ALM practices is that the expected returns on managed portfolios may decline as the reliance on fixed income instruments grows. This could become a concern especially for those insurance companies and defined benefit providers that have little room left for investing in assets with higher expected return owing to poor capitalisation or underfunded status. Meagre investment yields over time leave a dent in the capital strength of a financial institution and also weaken its competitive position. Moreover, lower investment returns on managed portfolios may require pension plan participants or policyholders to increase their savings in order to secure the adequacy of their wealth at the end of the accumulation period.

Larger derivatives books. The increasing importance of liability-based risk management also entails a growing reliance on derivatives, such as interest rate swaps and swaptions (Section 4). A positive consequence of this development is that the use of interest rate derivatives may help to take some pressure off long-term bond markets, since they allow insurance companies and pension funds to lengthen duration without acquiring the underlying bonds. Whether this conclusion holds for the system as a whole, however,

depends on the behaviour of dealers and who takes the ultimate risk. It holds if dealers do not fully hedge their swap exposures or can offset them otherwise.[75]

Counterparty risk. The growing use of derivatives also poses challenges. The drawbacks singled out in interviews are the cost of using derivatives and, above all, the issue of counterparty risk. The latter can be mitigated by the posting of collateral, which adds to hedging costs and requires careful collateral management to avoid being caught short of liquid assets. Long-term investors widely use collateral for bilateral derivatives contracts, the counterparty risk for derivatives being managed through ISDA and CSA. Many market participants indicated that they are comfortable with their selective choice of counterparties and the placement of collateral in segregated accounts.

Financial market infrastructure. At the same time, major changes in market infrastructure are in store for the coming years. The requirement to clear OTC derivatives through central counterparties should, among other benefits, simplify the management of counterparty risk, provided that pending issues on access are resolved. At the same time, some insurance companies and pension funds flagged a concern that clearing through central counterparties may be more costly in terms of collateral posting and margin requirements. Others viewed this impact as marginal, since they already post highly liquid collateral for most trades.

Liquidity management. The experience of the crisis has already forced firms to step up their liquidity management. The impact of central clearing on investment strategies and liquidity may therefore be only limited. However, insurance companies and pension funds also rely to some extent on bank credit lines for their liquidity needs, and the provision of such credit lines will become more costly under the new Basel III liquidity standards. Liquidity management is likely to grow in importance overall, even for institutional investors that traditionally did not have to manage liquidity risk too closely thanks to their liability profile.

5.2.4 Pension funds and life insurers as long-term investors

Life insurance companies and pension funds are traditionally thought of as long-term investors, in view of the long-dated nature of their liabilities. This is reflected in their substantial presence in the long-term and/or illiquid segment of the market, including long-term bonds or real estate and infrastructure projects. However, it is becoming more difficult for insurance companies and pension funds to play this traditional role. The experience of the financial crisis and the low-interest environment combined with accounting and regulatory changes is likely to move firms toward the shorter end of the market as far as risky assets are concerned.[76] While the crisis and new regulation have the positive effect of strengthening risk management strategies, interview results suggest that firms consider that the adjustments to their investment choices will limit their ability to take a long-term perspective.

Some factors contributing to this sentiment derive from the accounting and regulatory changes discussed above. On the one hand, stronger solvency regulations tend to come with steeper risk charges and, in the case of Solvency II, posit a one-year value at risk horizon. Similarly, pension funding rules in several jurisdictions stipulate short grace periods for addressing funding shortfalls. On the other hand, prospective statement volatility under

---

[75] A full analysis of this issue would also have to take into account the price changes of both bonds and swap spreads to reach a conclusion.

[76] In line with this view, a recent report on the future of long-term investing (WEF 2011) expects a further decline in long-term investing by life insurers and pension funds, largely as a result of de-risking in response to regulatory and accounting changes, including a move towards mark to market accounting and stricter capital requirements, as well as a lower institutional tolerance for risk. The same argument is contained in the Conference Report of the Eurofi G20 High-Level Seminar of 2011.

international accounting rules also limits the scope for taking long-term or illiquid positions without any concern for short-term fluctuations in their value. As is the case for institutional investors more generally, these factors tend to encourage a shift away from long-term investing, in addition to the ongoing trend toward more conservative asset allocations in the aftermath of the financial crisis.

Supply of risk capital. This could alter the traditional role of life insurance companies and pension funds as global providers of long-term risk capital. A partial retreat of institutional investors from long-term or illiquid market segments could be felt by the economy at large. Credit risk premia and liquidity premia would rise. It is expected that these forces will attract other investors, such as endowments, foundations, sovereign wealth funds, mutual funds and hedge funds. However, one consequence is that the new investor base comprises a greater share of unregulated entities. In the extreme case, if no investors were drawn to this segment, a sufficiently large withdrawal of life insurers and pension funds from long-term investing would confront the economy with a structural shortage of investible capital for long-term or illiquid projects.

Lost benefits. These outcomes would tend to undermine the private and social benefits of having a large and established base of investors engaged in long-term investing. As itemised in WEF (2011), the private benefits (to investors) of long-term investing include earning risk premia, capturing secular trends, avoiding buying high and selling low, and minimising transaction costs and market impact. The social benefits, for the economy as a whole, include the stabilising role of long-term investors in global financial markets, and the promotion of sustainable global economic growth (see also CGFS (2003)).

Common investment behaviour. Another possible consequence is that insurance companies and pension funds under similar accounting and regulatory frameworks could become more homogenous due to similar incentives. Even though insurers follow different lines of business, their investment strategies may become more synchronised under a common regulatory framework.[77] Where they used to exhibit contrarian or stabilising behaviour, they may henceforth move in the same direction as markets and the economy, leading to procyclical effects.

5.2.5 Heightened procyclicality

Procyclical behaviour occurs naturally in the course of financial cycles as, for example, perceptions of risk change and investors' desired levels of leverage adjust (eg Borio et al (2001), and Geanakoplos (2009)). Measures that add to procyclicality could complicate authorities' financial stability objectives. It is thus important to consider actual and prospective developments in terms of their impact on procyclicality, consistent with broader international efforts to address this issue.[78]

Asset price feedback. Procyclical effects are perhaps most likely to occur when mark to market accounting and regulatory ratios (or other financial constraints) interact.[79] Compared to other financial institutions subject to similar forces, insurance companies and pension

---

[77] This view was echoed in various interviews conducted by the working group in different continents.

[78] For example, the new Basel III capital accord includes a countercyclical capital buffer designed to mitigate procyclicality in capital requirements. The CGFS has previously reviewed procyclicality in the form of margin requirements, examining potential avenues to mitigate their impact (see CGFS 2010).

[79] That mark to market valuation together with capital requirements may lead to procyclical behaviour is discussed in, eg Heaton and McDonald (2010). Different channels through which distress selling and asset market feedback can occur are outlined in Shim and von Peter (2007). The issue of downward liquidity spirals is modelled in Brunnermeier and Pedersen (2009).

funds feel additional pressures through the valuation of their long-dated liabilities. Consider, for example, insurance companies under Solvency II or another risk-based capital regime. Measured solvency ratios decline when asset prices and/or discount rates fall, and capital may be difficult to raise at those times. In such circumstances, institutional investors might rebalance portfolios to shed risk through a shift from equity and corporate debt toward government bonds whose capital requirement is zero under Solvency II. However, selling equity positions and corporate bonds puts downward pressure on the respective market prices and hence firms' assets. At the same time, a market shift into government bonds puts downward pressure on the discount rate, which raises the present value of liabilities throughout the sector. The combined effect may weaken solvency further, and prompt continued selling and hence further rounds of market feedback.

Dynamic hedging. Increasing reliance on LDI may similarly introduce elements of procyclicality, given the sheer size of institutional investors' portfolios relative to government bond market capitalisation (Section 2). As insurance companies and pension funds implement ALM strategies by purchasing long-term conventional and index-linked bonds or interest rate swaps, they put downward pressure on long-term interest rates. But given that a market discount rate must be used to value liabilities, and that duration matching is always incomplete, the decline in interest rates tends to increase the valuation of liabilities more than that of assets, contributing to wider funding gaps. This can result in renewed attempts to match assets and liabilities through further purchases of bonds or equivalent measures, reinforcing the downward pressure on interest rates (CGFS (2007)). The likelihood of feedback effects may increase under stressed market conditions, to the extent that institutional investors' portfolio choices become more homogeneous and eventually also more price-inelastic (ie a larger share of asset managers start thinking that they cannot delay adjusting their bond holdings for the given price conditions).

Sector spillovers. Feedback effects may spill over to other sectors, since price declines could be particularly pronounced in markets where insurance companies are among the largest investors. This may, in turn, lead to reduced risk-taking among other market participants or financial institutions to comply with risk management guidelines or statutory requirements. In this way, feedback effects can spread across financial markets with the consequence of falling prices and lower liquidity in market segments relevant for bank funding.[80]

Countercyclical forces. At the same time, as in the case of banking regulation, stronger regulation raising the resilience of the sector should also help to counteract procyclicality. In addition, an illiquidity premium, if included in the discount rate under Solvency II, would counteract the procyclicality arising from market illiquidity. The recognition that procyclical behaviour can have destabilising effects on markets has also prompted discussions to allow for the use of dampeners in the Solvency II framework. Such dampeners can be thought of as countercyclical buffers (as in Basel III), and may be quantitative or qualitative in nature.

[80] Similar arguments on how problems within the insurance sector can spread to other parts to the financial sector and affect financial stability can be found in Acharya et al (2009).

References

Acharya, V, J Biggs, M Richardson and S Ryan (2009): "On the financial regulation of insurance companies", Stern School of Business, *Working paper*.

Acharya, V et al (2011), "Systemic risk and the regulation of insurance companies", in Acharya, V et al eds, *Regulation Wall Street: the Dodd-Frank Act and the new architecture of global finance*, Hoboken.

Bank of France (2005): "Interest rate risk management by life insurance companies and pension funds", *Financial Stability Review*, June.

Barr, N and P Diamond (2006): "The economics of pensions", *Oxford Review of Economic Policy*, vol 22, no 1, pp 15–39.

Beck, T, A Demirgüç-Kunt and R Levine (1999): "A new database on financial development and structure", World Bank, *Policy Research Working Paper*, no 2146, July.

——— (2009): "Financial institutions and markets across countries and over time", World Bank, *Policy Research Working Paper*, no 4943, May.

Bank for International Settlements (2006): *76th Annual Report*, 26 June.

Billio, M, M Getmansky, A Lo, and L Pelizzon (2010): "Econometric measures of systemic risk in the finance and insurance sectors", *NBER Working Paper,* no 16223.

Borio, C, C Furfine and P Lowe (2001): "Procyclicality of the financial system and financial stability: issues and policy options", in *Marrying the macro- and microprudential dimensions of financial stability*, *BIS Papers*, no 1, March, pp 1–57.

Brunnermeier, M and L Pedersen (2009): "Market liquidity and funding liquidity", *Review of Financial Studies*, vol 22, pp 2201–38.

Casu, B, C Girardone and P Molyneux (2006): *Introduction to Banking*, Prentice Hall.

CEA (2010): "Insurance: a unique sector. why insurers differ from banks", June.

CGFS (2003): "Incentive structures in institutional asset management and their implications for financial markets", *CGFS Report*, no 21.

——— (2007): "Institutional investors, global savings and asset allocation", *CGFS Report*, no 27.

Committee of European Insurance and Occupational Pensions Supervisors (2008): *Survey on fully funded, technical provisions and security mechanisms in the European occupational pension sector*, CEIOPS-OPSSC-01/08.

CEIOPS (2010): "Spring Financial Stability Report 2010", June.

Committee on the Global Financial System (2007): "Institutional investors, global savings and asset allocation", *CGFS Papers,* no 27, February.

Committee on the Global Financial System (2010): "The role of margin requirements and haircuts in procyclicality", *CGFS Papers,* no 36, March.

Dickinson, G (2000): "The implications of lower interest rates for insurers: a comment", *The Geneva Papers on Risk and Insurance*, 25(1), pp 59–62.

Dodd-Frank Wall Street Reform and Consumer Protection Act – Title VII: Wall Street Transparency and Accountability Act.

The Economist (2011): *Special report on pensions*, April 9, 2011.

Ehrhardt, J and P Morgan (2010): Milliman 2010 Pension Funding Study.

——— (2011): Milliman 2011 Pension Funding Study.

Eling, M and H Schmeiser (2010): "Insurance and the credit crisis: impact and ten consequences for risk management and supervision", *The Geneva Papers*, vol 35.

Ernst and Young (2004): IASB IFRS 4 and IAS 39 - Insurance and Investment Contracts.

European Central Bank (2009): "Credit default swaps and counterparty risk", August.

ECB (2009): "The importance of insurance companies for financial stability", *ECB Financial Stability Review*, December.

ECB (2010): "The euro area insurance sector", *ECB Financial Stability Review*, June.

——— (2010), "Box 16: Are low risk-free interest rates good or bad for insurance companies?", *Financial Stability Review*, June, pp 117–9.

European Insurance and Occupational Pensions Authority (2011): EIOPA Report on the fifth Quantitative Impact Study (QIS 5) for Solvency II, 14 March.

European Securitisation Forum (2010): Securitisation Data Report Q4:2010.

Ferguson, R (2006): "Globalization, insurers, and regulators: shared challenges call for collaborative solutions", Speech delivered at the National Association of Insurance Commissioners (NAIC), *BIS Review*, 12/2006, 23 February.

Fleuriet, V and C Lubochinsky (2005): "Interest rate risk management by insurance companies and pension funds", *Financial Stability Review*, no 5, pp 95–111, June.

Geanakoplos, J (2009): "The leverage cycle", *The NBER Macroeconomics Annual,* vol 24.

The Geneva Association (2010a): "Systemic risk in insurance: an analysis of insurance and financial stability", Special Report of the Geneva Association Systemic Risk Working Group, March.

——— (2010b): "Key financial stability issues in insurance: an account of The Geneva Association's ongoing dialogue on systemic risk with regulators and policy makers", Special Report of the Geneva Association Systemic Risk Working Group, July.

Gieve, J (2007): "Uncertainty, policy and financial markets", Speech delivered at the Barbican Centre, *BIS Review*, vol 84, 24 July.

Group of Ten (2005): "Ageing and pension system reform: implications for financial markets and economic policies", Report prepared at the request of the Group of Ten by a group of experts chaired by I Visco, *OECD Financial Market Trends*, 89 (Supplement 1).

Harshaw, J (2011): "Protection of cleared swaps customers before and after commodity broker bankruptcies", Letter to the Commodity Futures Trading Commission, January 18.

Heaton, L and R McDonald (2010): "Is mark-to-market accounting destabilizing? Analysis and implications for policy", *Journal of Monetary Economics*, no 57, pp 64–75.

Holsboer, J (2000): "The impact of low interest rates on insurers", *The Geneva Papers on Risk and Insurance*, 25(1), pp 38–58.

IFRS (2010): A snapshot at the proposed changes regarding insurance contracts.

IFRS Foundation (2011): "Taking stock: progress towards an IFRS for insurance contracts", discussion paper for the Insurance Working Group meeting 16 May 2011.

JP Morgan (2010): "Judging the impact of Solvency II on euro area fixed income markets", European Rates Strategy, 26 November 2010.

Klein, R (1995): "Insurance regulation in transition", Journal of Risk and Insurance, 62(3), pp 363–404.

The Netherlands Bank (2010): "Life insurance corporations reduce interest rate risk using derivatives", *DNB Statistical Bulletin*, June.

Novy-Marx, R, and J Rauh (2011): “Public pension promises: how big are they and what are they worth?”, *Journal of Finance*, forthcoming.

OECD (2010a): *Pension markets in focus*, no 7, July.

——— (2010b): *The impact of the financial crisis on the insurance sector and policy responses*, April.

Plantin, G and J–C Rochet (2007): *When insurers go bust: an economic analysis of the role and design of prudential regulation*, Princeton University Press.

PricewaterhouseCoopers LLP (2010): IFRS Bulletin, IASB updates IFRS 9 for financial liabilities, November.

Pugh, C and J Yermo (2008): “Funding regulations and risk sharing”, *OECD Working Papers on Insurance and Private Pensions*, no 17.

Schmeiser, H, M Eling, N Gatzert, S Schuckmann and D Toplek (2006): “Volkswirtschaftliche Implikationen des Swiss Solvency Test”.

Schludi, M (2005): *The reform of Bismarckian pension systems*, Amsterdam University Press.

Shim, I and G von Peter (2007): “Distress selling and asset market feedback”, *Financial Markets, Institutions and Instruments*, BIS Working Papers, vol 16(5), pp 243–91.

Sjostrom, W (2009): “The AIG bailout”, *Washington and Lee Law Review*, vol 66, p 943.

Swinkels, L (2007): “Have pensions plans changed after the introduction of IFRS?”, *Working paper*, European Pension Academy.

Swiss Re (2001): “The economics of insurance: how insurers create value for shareholders”, Swiss Re Technical Publishing.

——— (2010): “Insurance investment in a challenging global environment”, Swiss Re Sigma Study, no.5.

Tsatsaronis, K and H Zhu (2004): What drives housing price dynamics: cross-country evidence, *BIS Quarterly Review*, March.

Van Rixtel, A and L Romo González (2011), “Non-enhanced debt financing by euro area banks under severe financial stress”, *Banco de España Financial Stability Review*, April.

Vaughan, E and T Vaughan (2008): *Fundamentals of Risk and Insurance*, 10th edition. John Wiley & Sons.

Wall Street Journal (2010): “Low interest rates hurt insurer’s bottom line”, 6 November.

World Economic Forum (2011): “The future of long-term investing”, a World Economic Forum Report.

Xu, B (2007): “Hedging interest rate risks in Dutch pension funds and life insurance companies”, mimeograph, 14 April.

Annex 1:
Working Group members

European Central Bank	Peter Praet (Chair)
National Bank of Belgium	Patrick Van Roy
Bank of Canada	Graydon Paulin
Deutsche Bundesbank	Jens Lindemann
European Central Bank	Torsti Silvonen
Bank of France	Luc Riedweg
Bank of Italy	Giuseppe Grande
Bank of Japan	Hidehiko Sogano
	Shun Kobayashi
Bank of Korea	Sung Jun Kim
Central Bank of Luxembourg	Francisco Nadal De Simone
The Netherlands Bank	Francis Weyzig
Sveriges Riksbank	Jonas Söderberg
Bank of Spain	Adrian van Rixtel
Swiss National Bank	Alois Seeholzer
Bank of England	George Speight
	John Elliott
Federal Reserve Bank of New York	Morten Bech
Bank for International Settlements	Goetz von Peter (Secretary)
	Dietrich Domanski
	Ingo Fender

The Secretariat of the International Association of Insurance Supervisors (IAIS) commented on a draft version of the report.

Annex 2:
Industry participation at roundtables and interviews

AG Insurance

Alecta

Allianz SE

AMF

Assicurazioni Generali Spa

Association of British Insurers

Axa Winterthur

Baloise

Banco Popular Español

BBVA

BONUS Pensionskassen AG

BT Pension Scheme Management Ltd

BVK Personalvorsorge des Kt. Zürich

Caisse de dépôt et placement du Québec

Daehan Life Insurance

Dai-ichi Life Insurance Company Ltd

ERGO Versicherungsgruppe AG (Munich Re Group)

Fonditel

Goldman Sachs Global Markets Institute

Goldman Sachs (Singapore)

Government Pension Investment Fund

Great Eastern Life (Singapore)

Great-West Life

Hartford Life

Ilmarinen Mutual Pension Insurance Company

ING insurance

Intesa Sanpaolo Previdenza Sim

JP Morgan Asset Management

L&G (Prudential)

La Caixa

Länsförsäkringar

Manulife Financial

Mapfre

Meiji Yasuda Life Insurance Company

Mercer pensions consultants
Metlife
Milliman
Mizuho Securities Co Ltd
National Association of Pension Funds
New York Life
New York State Insurance Department
Nippon Life Insurance Company
Nomura Asset Management
Ontario Teachers' Pension Plan
Pension Fund Association
Pension Fund Managers
Pioneer Investment Management Sgr
PFZW (Dutch pension fund for social and healthcare workers)
PGGM (asset management)
Principal Financial Group
Protective Life
Prudential
Prudential (Singapore)
Publica Pensionskasse des Bundes
Rabobank pension fund
Samsung Life Insurance
Schweizerische Mobiliar Versicherung
SEB Trygg Liv
Skandia
SPP
Sumitomo Life Insurance Company
Sun Life Financial
Swiss Life
Swiss Re
The State Pension Fund (VER), Finland
The Pensions Regulator
Tower Watson pensions consultants
Unespa
Unilever Netherlands pension fund
Varma Mutual Pension Insurance
Zurich Financial Services

Previous volumes in this series

No	Title	Issue date
CGFS Papers No 43	The impact of sovereign credit risk on bank funding conditions	July 2011
CGFS Papers No 42	Interactions of sovereign debt management with monetary conditions and financial stability	May 2011
CGFS Papers No 41	Long-term issues in international banking	July 2010
CGFS Papers No 40	Research on global financial stability: the use of BIS international financial statistics	June 2010
CGFS Papers No 39	Funding patterns and liquidity management of internationally active banks	May 2010
CGFS Papers No 38	Macroprudential instruments and frameworks: a stocktaking of issues and experiences	May 2010
CGFS Papers No 37	The functioning and resilience of cross-border funding markets	March 2010
CGFS Papers No 36	The role of margin requirements and haircuts in procyclicality	March 2010
CGFS Papers No 35	Credit risk transfer statistics	September 2009
CGFS Papers No 34	The role of valuation and leverage in procyclicality	April 2009
CGFS Papers No 33	Capital flows and emerging market economies	January 2009
CGFS Papers No 32	Ratings in structured finance: what went wrong and what can be done to address shortcomings?	July 2008
CGFS Papers No 31	Central bank operations in response to the financial turmoil	July 2008
CGFS Papers No 30	Private equity and leveraged finance markets	July 2008
CGFS Papers No 29	Research on global financial stability: the use of BIS international financial statistics	December 2007
CGFS Papers No 28	Financial stability and local currency bond markets	June 2007
CGFS Papers No 27	Institutional investors, global savings and asset allocation	February 2007
CGFS Papers No 26	Housing finance in the global financial market	January 2006
CGFS Papers No 25	Foreign direct investment in the financial sector – experiences in Asia, central and eastern Europe and Latin America	June 2005
CGFS Papers No 24	Stress testing at major financial institutions: survey results and practice	January 2005

All volumes are available on request from the BIS and are also on our website www.bis.org.