EUROPEAN CENTRAL BANK

EUROSYSTEM

POTENTIAL IMPACT OF SOLVENCY II ON FINANCIAL STABILITY
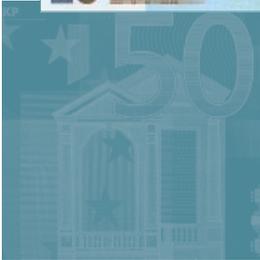
JULY 2007

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EXECUTIVE SUMMARY

Solvency requirements for EU insurance undertakings are currently guided by the so-called Solvency I system, which sets margins and absolute minimum capital requirements that are based on claims and technical reserves. As this system has been perceived as being insufficiently risk-based, the European Commission has proposed a revision to the solvency standards for EU insurance undertakings under the so-called Solvency II project. The new requirements will address concerns about the current system by placing greater emphasis on an economic approach to the valuation of the risks in insurers' balance sheets. The formal proposal for the Solvency II Directive is scheduled for July 2007, with implementation by Member States expected by around the end of 2010. The key objectives of Solvency II are to enhance the protection of policyholders, to deepen the integration of the EU insurance market, and to improve the competitiveness of European insurers. Solvency II also aims at fostering consistency of prudential supervisory and regulatory requirements across financial sectors (banks and insurers) in Europe, and it will represent a step towards greater harmonisation of national legislation and convergence of supervisory practices. The new system will cover life, non-life and reinsurance companies and, like Basel II for banks, it will have a three-pillar structure. The European Central Bank was invited by the Commission to prepare a report analysing the possible consequences of the new regulatory regime for financial stability. This report is designed to meet this request.

Although the analysis contained in this report identifies a number of areas where there is potential for risks to financial system stability to develop during the transition phase in implementing Solvency II and afterwards, it is important to emphasise that the overall assessment is that the new risk-based capital requirement system will most likely make a positive and lasting contribution to EU financial system stability. As regards the risks identified,

some relate to the insurance sector directly. The report also draws attention to the fact that because the EU insurance sector is sizeable and because it has growing linkages with the banking system and financial markets, Solvency II has the potential to affect other parts of the financial system, beyond the insurance sector.

Potential impact of Solvency II on the insurance sector: One of the main positive expected outcomes from Solvency II is an enhancement of protection of policyholders, which should be achieved by improving the financial strength and resilience of the European insurance industry. Solvency II should foster better risk management by recognising risk diversification and mitigation benefits. In enlarging the spectrum of eligible elements for regulatory capital, it should provide EU insurers with incentives to optimise their capital structures. The increased use of securitisation, subordinated debt and hybrid capital as funding sources should, together with the harmonisation of balance sheet valuation practices across EU countries, bring a higher level of transparency, allow regulatory capital to be raised at a lower cost, and increase the capacity of the EU insurance sector to underwrite risk. Pressure for financing of future growth through acquisitions will, for example, be eased. With a lower cost of capital and a resulting boost in profitability, together with enhanced efficiency, it is expected that there will be improvements in the long-term return on capital for shareholders and the competitiveness of the European insurance industry. Although competition among European insurers in their home markets could intensify, their competitiveness vis-à-vis insurers outside the EU should improve significantly.

These positive implications notwithstanding, it cannot be ruled out that in seeking a higher level of efficiency, Solvency II may lead to some stresses in the short term. Relatively inefficient insurance firms that are unable to either implement adequate risk management tools or invest in financial and human resources could be forced to exit the market. As a

consequence, risk premiums could rise temporarily and greater income volatility could also prevail in the medium term owing to the introduction of new market-based valuation rules for assets and liabilities, coupled with more risk-responsive capital requirements. Furthermore, the reinsurance sector may potentially become more vulnerable in the new regime as Solvency II might lead to a higher concentration of risk in re-insurers' balance sheets and to a higher preponderance of rating triggers[1] being included in reinsurance contracts. This may expose re-insurers to significant liquidity risk on the liability side. If such a development were to occur, it would be problematic for financial stability as the reinsurance sector could possibly become a source of systemic risk. However, this risk may be dampened somewhat if primary insurers choose the best rated re-insurers to limit their credit risk exposures and/or securitise reinsurance recoverables. In addition, re-insurers could also resort to securitisation to transfer risks to capital markets in order to reduce the expected rising concentration of risk in their balance sheets.

Potential impact of Solvency II on financial markets: The impact on financial markets is likely to be fairly limited. On the positive side it may provide some impetus for further development of the European corporate bond markets because it is likely to incite EU insurers to invest more in long-term bonds, including corporate securities. This should contribute positively to the size, liquidity and depth of the European corporate bond market. Furthermore, the expected enlargement of eligible elements for inclusion in regulatory capital to a greater spectrum of subordinated and hybrid debt could also help in promoting the development of this corporate market segment and in improving its efficiency. While some risks can be identified, for instance the possibility of portfolio reallocation, they appear manageable, especially in the short term. An econometric analysis shows that there is already some evidence that anticipation of the implementation of Solvency II has fostered some portfolio

reallocations out of equities toward bonds in some countries and that this has occurred in a smooth and gradual way. In other countries, the overall effect of Solvency II has been to dampen investment risk, for instance by limiting further growth in equity holdings despite strong stock market performance.

In the medium term, traditional issues related to risks of herding behaviour may appear, as the risk-based Solvency II system has the potential to amplify adverse financial market dynamics, whereby a large number of insurers may be forced to sell assets at times of financial stress in order to meet regulatory capital requirements. In addition, a greater number of financial institutions could adopt common risk modelling frameworks, which might potentially amplify common behaviours in financial markets. However, the supervisory approach of Solvency II, based on both the minimum capital requirements and the solvency capital requirements, may limit such effects.

Potential impact of Solvency II on the banking sector: There are three main possible positive consequences for the EU banking sector, which are related to reduced regulatory arbitrage opportunities, the potential for a lower cost of capital and to likely higher competition from EU life insurance undertakings. First, Solvency II will promote both convergence between regulatory and supervisory regimes for banks and insurance companies in Europe and cross-sector supervisory consistency. This is likely to reduce existing scope for regulatory arbitrage opportunities significantly and thus lessen the incentives to transfer credit risk from banks' balance sheets to the insurance sector. As a result, inefficiencies in the allocation of capital across financial sectors will most likely be reduced. Second, because Solvency II is expected to provide EU insurers with greater incentives to invest in long-term bonds, banks,

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1 A rating trigger can be defined as "any clause in a contract or agreement between two parties that allows one party to take protective action against deteriorating creditworthiness of the other party once a pre-determined rating threshold is breached."

being the most important issuers of long-term corporate bonds in Europe, are likely to benefit from greater demand from insurers. This could put downward pressure on the credit spreads of bonds issued by banks, thereby reducing the cost of capital. Third, a shift towards the issuance of unit-linked products by life insurers may intensify competitive pressures in the banking sector, as unit-linked products that are indexed to the performance of stock or bond markets share many features with savings products that are offered by banks. This should be seen as positive from a financial stability viewpoint as competitive pressures may ensure a certain level of efficiency in the medium term.

However, two main risks for the EU banking system may be identified: credit risks and risks associated with cross-holdings of securities between the banking and insurance sectors. Concerning credit risk, this could rise if the expected reduction in regulatory arbitrage opportunities were sufficient to lead to a retrenchment of insurers from the credit risk transfer (CRT) markets. This would mean that banks may be faced with fewer counterparties willing to bear long credit risk exposures. While it cannot be excluded that the hedge fund sector could step in, greater exposure of EU banks to this unregulated and rather opaque sector could still leave banks with greater credit risk. Higher credit risk may also come if household balance sheets were to become more sensitive to asset price swings. This could occur if life insurers attempt to seek capital relief by shifting their traditional life policies with guaranteed returns to unit-linked products, for which negligible capital requirements are required, as investment risk is fully borne by policyholders for the bulk of these products. As households may not be fully aware of the nature and scale of the risks they face, they may not take optimal saving decisions, and their balance sheets may become increasingly sensitive to asset price volatility. This could prove a source of additional credit risk for the banking sector if it were to affect the balance sheets of low-income, highly indebted households. This risk could be mitigated if structured unit-linked products that encompass some embedded guarantees for policyholders become widely sold in the run-up to Solvency II.

As regards the second source of risk for banks, the expected higher issuance of subordinated debt and hybrid capital in Solvency II might increase cross-holdings of securities between EU banks and insurers. In addition to cross-holdings of equities, banks and insurers may be increasingly inclined to hold more of each other's subordinated debt. Systemic risk could increase under such circumstances since the bankruptcy of a bank or an insurer would directly impinge on the other sector, through enhanced market price interdependencies between EU insurers and banks.

I INTRODUCTION

The European Commission (EC) has revised the solvency standards for EU insurance undertakings under the so-called Solvency II project. The formal proposal for the Solvency II Directive is scheduled for July 2007, with implementation by Member States expected around the end of 2010. The key objectives of Solvency II are to enhance the protection of policyholders, to deepen the integration of the EU insurance market, and to improve the competitiveness of European insurers. Solvency II also aims at fostering consistency of prudential supervisory and regulatory requirements across financial sectors (banks, insurers and investment firms) in Europe, and will represent a step towards greater harmonisation of national legislation and convergence of supervisory practices.

The new risk-based solvency regime will rely strongly on an economic approach for the valuation of risks in insurers' balance sheets. As this is in line with ongoing practices of insurers to manage risk and economic capital, any distortion from the new regulation may be expected to remain limited. By contrast, in the current Solvency I system, solvency margins and absolute minimum capital requirements are based on claims and technical reserves and are therefore perceived as insufficiently risk-based. The new system will cover life, non-life and reinsurance companies, and like Basel II for banks, will have a three-pillar structure.

The three pillars of Solvency II: The new system will cover life, non-life and reinsurance companies, and will have a three-pillar structure in the same way as Basel II does for banks. The focus of Pillar 1 is to create a more risk-sensitive and risk-responsive capital requirements system. This pillar will contain two quantitative capital requirements: the Solvency Capital Requirement (SCR) and the Minimum Capital Requirement (MCR). The SCR reflects a level of capital that ensures that significant unforeseen losses can be absorbed over a one-year horizon with a ruin probability of 0.5%. The MCR reflects the capital threshold below which supervisors would take immediate action. While Basel II only covers risks arising from the asset side (credit and market risks), together with the operational risk within Pillar I, Solvency II will cover a larger range of quantifiable key risks. In addition to the risks covered in Basel II, it will take into account risks on the liabilities side, such as mortality, longevity and catastrophe risks, as well as for risks arising from the interaction between assets and liabilities (asset liability management (ALM) risk).[2] Internal models that are used by large insurance undertakings to manage risk and capital will be recognised under Pillar I.

Pillar 2 will encompass supervisory activities. The key objective of this pillar is to strengthen the harmonisation of supervisory methods, to ensure consistency between the financial sectors, and to foster sound risk management and governance by providing a qualitative assessment of capital requirements and risks that have not been accounted for under Pillar I.

Finally, Pillar 3 will be devoted to supervisory reporting and public disclosure, and will aim at reinforcing risk-based supervision and market discipline. The required information should enable an assessment of the solvency and financial condition of EU insurers both on a solo and on a group level, on an annual basis at least, and will increase transparency in the European insurance industry. The improved capacity of market participants to make informed decisions and to monitor companies will provide insurers with a strong incentive to manage risk and capital in a sound manner and to maintain an adequate capital position.

Insurance and financial stability: This report seeks to analyse the possible consequences of

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2   The SCR will cover market risk (interest rate risk, equity risk, property risk, spread risk, market risk concentration and currency risk), credit risk, operational risk, and non-life underwriting risk (non-life premium and reserve risk and non-life catastrophe risk) and life underwriting risk (mortality risk, longevity risk, disability-morbidity risk, life expense risk, lapse risk and life catastrophe risk).

the new regulatory regime on financial stability following a request by the Commission to the European Central Bank (ECB). The ECB defines financial stability as "a condition in which the financial system – comprising of financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities" (ECB, 2006a). The insurance sector, as a component of the financial intermediaries matters for the stability of the financial system. Through its function of financial intermediation, it allows savings to be allocated more efficiently to investment opportunities; its core function of risk mitigation/risk diversification tends to reduce the overall level of risk in the economy; while its increasing role in the transfer of longevity and credit risk contributes to better risk allocation/risk-sharing in the economy. On the other hand, via its growing linkages with the banking sector and financial markets, the insurance industry is increasingly viewed as a potential source of vulnerability for financial stability. The new regulatory regime for EU insurance undertakings might therefore have repercussions on the EU insurers, and also, albeit to a lesser extent, on the EU banking sector and the financial markets as well. Although the most probable consequences of the implementation of Solvency II are likely to be positive for financial stability, some risks and vulnerabilities may not be ruled out.

The remainder of the report is structured as follows. The role that the insurance sector plays for financial stability, both positive and negative, is examined in Section 2. The impact of Solvency II on the EU insurance industry, on the capital markets and on the EU banking sector is assessed in Sections 3, 4 and 5. The main conclusions of this report can be found in Section 6.

2 ROLE OF THE INSURANCE SECTOR FOR FINANCIAL STABILITY

2.1 THE POSITIVE ROLE OF INSURANCE FOR FINANCIAL STABILITY: THE THREE MAIN CHANNELS

Insurers provide three main services that are relevant from a financial stability perspective: financial intermediation, risk diversification/ risk mitigation, and risk transfer. These main functions contribute to strengthening the resilience of the financial system by ensuring an efficient allocation of capital and risks within the economy.

2.1.1 THE FINANCIAL INTERMEDIARY FUNCTION AND THE EFFICIENT ALLOCATION OF CAPITAL IN THE ECONOMY

Insurance companies contribute to an efficient allocation of capital in the economy through their function of financial intermediation. Life insurers mobilise long-term savings from households through the sale of products such as annuities, unit-linked products or traditional life policies with guaranteed returns.[3] As a result, the liabilities of insurers' balance sheets typically display rather long-term maturities with high durations. To reduce the traditional negative duration gap of insurers' balance sheets (i.e. higher duration liabilities than assets), ALM requires investment with long maturities. Owing to this long temporal view, life undertakings have the potential to become a more stable source of funding for the corporate sector compared to bank lending, which is more cyclical. This also explains why insurers are often considered to be one of the most stable segments of the financial system when compared with banks or hedge funds. In periods of financial turmoil or recession, insurers might act as shock absorbers in maintaining or increasing their financing to corporations, thereby smoothing the consequences of credit cycles. Furthermore, thanks to economies of scale in their access to financial markets and reduced transaction and information costs, insurers provide their policyholders/shareholders with a better risk/ return trade-off (FSA, 2006).

2.1.2 RISK DIVERSIFICATION AND RISK MITIGATION AND REDUCTION IN THE OVERALL LEVEL OF RISK

Risk diversification and risk mitigation are the core economic functions of insurance companies, and contribute to lowering the overall level of risk in the economy. Risk diversification in the insurance sector generally refers to diversification within types of risk, across types of risk (e.g. insurance versus credit risk), across locations and across entities.[4] In pooling risks of many policyholders and ensuring that uncorrelated – idiosyncratic – risks are diversified, the insurance industry allows some risks to be eliminated. This mutualisation of risk enables financial losses associated with insured events to be spread among a large number of policyholders. Potential diversification benefits within bancassurance groups or financial conglomerates are also possible owing to the different risk profiles of insurance and bank entities (Rules, 2001a; Darlap and Mayr, 2006).[5]

Risks that cannot be diversified away – so-called systematic risk – can only be reduced through risk mitigation techniques. Risk mitigation refers to the use of financial derivatives, of securitisation – such as catastrophe or mortality bonds that are used to

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3 In the non-life insurance sector, the intermediation function is only incidental and results from the collection of premia in advance of claim payments (Cummins and Rubio-Misas, 2001). It is reflected in the difference between the rate of return on the assets and the rate credited to the policyholders.

4 There is also an intertemporal risk diversification, as non-life insurers usually build up equalisation reserves to dampen the effects of infrequent natural catastrophe events on their balance sheets, which tends to smooth the rates of return over time for policyholders and shareholders (Häusler, 2003). The implementation of the International Financial Reporting Standards (IFRS) from 2005 onwards should limit the use of such reserves.

5 See Slijkerman, Schoenmaker and de Vries (2005) for the rationale behind the recognition of diversification benefits within a financial conglomerate. If the downside dependence between a bank and an insurer distinctly differs from the dependence structure between two banks or between two insurers, financial conglomerates might require less capital charges than large banks or insurance companies. Hence, capital requirements for financial conglomerates could be set below the sum of the capital requirements for the banking and the insurance parts. A study by Oliver, Wyman & Co. (2001) suggests that there is scope for a 5-10% reduction in capital requirements for a combined bank/insurance company.

transfer risk to capital markets – and of reinsurance, which transfers risks from primary to reinsurance companies and from reinsurers to retrocessionaires.[6] All these transfers of risk allow better risk-sharing within the insurance sector and financial markets.

Regarding risk mitigation techniques, the use of reinsurance appears key as it provides a safety net for the primary insurance industry. Reinsurance companies typically absorb the most volatile part of the risk corresponding to peak exposures, i.e. the risk of huge losses arising from events occurring with a low probability, which primary insurers do not want to keep in their balance sheets. By pooling insurance risk, reinsurance firms can achieve a superior diversification of risks, both in terms of business lines and geographically. Hence, after a catastrophe event, they are better able to incur the losses that are transferred from primary insurers. As a result, risks and capital are better managed in the insurance industry, making the primary insurance sector more resilient. The residual risk that is not diversified, transferred to other institutions or shifted to the financial markets is borne by the shareholders of insurance companies and possibly also by policyholders, for example through their holding of with-profit life policies.

2.1.3 THE WIDER ROLE OF THE INSURANCE SECTOR IN THE TRANSFER OF RISKS WITHIN THE ECONOMY

The insurance sector may also strengthen the resilience of the banking sector via its recent involvement in credit risk transfer (CRT) markets, and could contribute to a better allocation of risks within the economy via its growing role in the transfer of longevity risk.

Role of insurance in the CRT market: The risks faced by the insurance sector are not perfectly correlated with the risks faced by the banking sector, which means that there is therefore scope for risk diversification. The significant transfer of credit risk from banks to insurers in recent years has allowed a reduction in the concentration of banks' exposures and risk diversification beyond banks' customer base (Rule, 2001b). This has thereby contributed to improving the ability of the banking sector to withstand adverse credit disturbances, as bank crises often arise from a significant concentration

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6 Reinsurers rarely keep all of the risks they underwrite. Typically, they transfer most of the risk they do not want to bear to other reinsurance undertakings participating in the retrocession market, known as retrocessionaires, while only a small fraction of the risk is spread to financial markets through securitisation.

Chart 1 Net position in CRT of banks

buyers of credit protection
sellers of credit protection
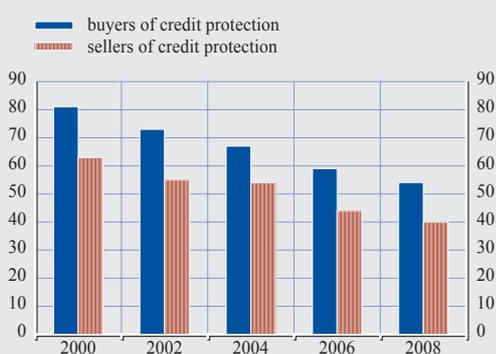
Source: British Bankers' Association (BBA).
Note: Figures for 2008 are forecasts.

Chart 2 Net position in CRT of insurers

buyers of credit protection
sellers of credit protection
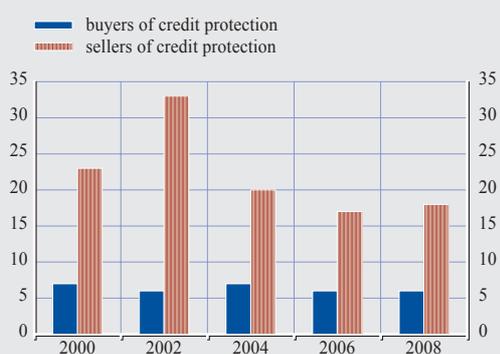
Source: British Bankers' Association (BBA).
Note: Figures for 2008 are forecasts.

of credit risks vis-à-vis borrowers that are vulnerable to the same shocks (Häusler, 2005). The cyclicality of banks' financial condition has been dampened over the last credit cycle in the US and in Europe, where the banking systems have proven to be more resilient, partly due to the spreading of credit losses between financial institutions (BIS, 2004). Although most credit risk transfers have occurred between banks (e.g. from large to small European and Asian banks), the banking sector as a whole is a net buyer of credit protection, i.e. the banks have ceded part of their credit risk to other financial institutions (see Chart 1). Up until 2004, the insurance sector absorbed the largest part of credit risk from banks through its high net selling position of credit protection instruments (IMF, 2004; BBA, 2006; see Chart 2).

Role of insurance in the transfer of longevity risk: The ongoing pension scheme reforms in Europe towards less generous public funding have put more emphasis on private savings and on life insurers and pension funds that manage a larger proportion of households' savings (BIS, 2006). In 2005 more than 28% of the financial wealth of euro area households, and over 11% of their total wealth, was invested in products delivered by insurers and pension funds (see Chart 3). With the partial disengagement of governments, part of the longevity risk[7] that was previously borne by pay-as-you-go (PAYG) retirement systems is now being transferred to life insurers as annuity providers and also to households. In absorbing some longevity risk from governments, insurers have contributed to dampening somewhat the risk that the ageing-related fiscal burden could become explosive in the medium term, and the associated risk that long-term interest rates could rise. The proportion of longevity risk that will *in fine* fall on insurers or on policyholders will depend on the ability and willingness of insurers to provide annuities at a fair price. Owing to the relatively limited development of annuity markets in Europe, an increasing proportion of retirement saving is currently invested in so-called unit-linked and index-linked products. One of the

Chart 3 Composition of euro area households' financial wealth

(percentages)
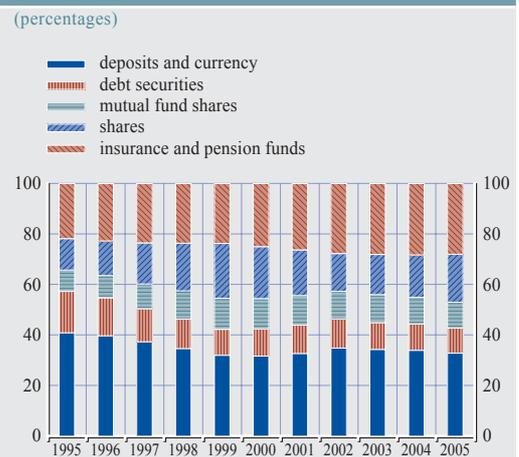
Source: British Bankers' Association (BBA).

characteristics of these products is that the investment risk is nearly fully borne by the policyholders. Hence, uncertainty about the amount of saving available at retirement adds to the risk that households may find it difficult to convert accumulated wealth into a guaranteed stream of income until death (lack of annuities). The absence of a liquid annuity market means that households would also have to bear longevity risk, not only its collective dimension, but also its individual component that could have been diversified away. In providing potentially more annuity products, life insurers may avoid spreading risk to those households that are not well prepared to manage financial and longevity risk.

7 Longevity risk is the risk of underestimating the average lifespan of a cohort. When borne by a household, it entails a risk of outliving one's resources. It has a collective and non-diversifiable dimension (King, 2004). Individual longevity risk – the risk that a person will die either prior to or after the average lifespan of his/her cohort – can be diversified away by pooling risks in private annuity markets, where those who live longer than the average may benefit from the contributions of those who died earlier.

2.2 INSURANCE AS A POTENTIAL THREAT TO FINANCIAL STABILITY

2.2.1 THE TRADITIONAL VIEW REGARDING INSURERS: NOT A SOURCE OF SYSTEMIC RISK

Insurance companies have traditionally not been considered as core financial institutions which could be a source of systemic risk (Trainar, 2004). Reinsurance undertakings are also often not perceived as being a source of systemic risk, despite the central role they play in the worldwide insurance markets as "insurers of last resort" and their very high level of business concentration.[8] The low potential of financial market disruption[9] and the limited counterparty risks for banks on the credit derivatives markets[10] support the view that reinsurance undertakings are not systemic core institutions.

Systemic concerns are usually focused on banks and especially on deposit runs. The most common argument against the systemic importance of the insurance sector highlights the difference in balance sheet structure between banks and insurance. The liabilities of (re)insurers are less liquid than bank deposits, making insurers less vulnerable to a loss of confidence and therefore to runs from their customers. This is because insurance contracts restrict policyholders' ability to withdraw their investment quickly: owing to the significantly lower surrender value of life policies, any cancellation involves a heavy loss for the insured; while the process of redemption is very time-consuming, so that any repayment takes much longer than a repayment of a bank deposit (Darlap and Mayr, 2006). Property and casualty (P&C) insurers also tend to pay off claims slowly, which limits any immediate pressure on liquidity. Furthermore, unlike insurers, banks are tightly interconnected within the interbank market and the payment system, which explains how liquidity pressures from one bank may rapidly propagate to others. Compared to banking crises, the risk of bankruptcy contagion within the insurance sector is much smaller: in a typical insolvency, life insurers stop taking on new policies and their remaining long-term policies are sold off

to other insurers, which limits the potential for spillover effects (Corder, 2004).

2.2.2 INSURANCE AS A POTENTIAL SOURCE OF VULNERABILITY FOR THE BANKING SECTOR

The financial landscape is evolving in response to important financial innovations in the field of securitisation in particular, which has increasingly blurred the distinction between insurance and banking activities and the types of risk they bear. Entry into each other's markets and the transfer of risk between financial institutions through the exchange of credit derivatives have changed the nature and incidence of systemic risk (Carey and Stulz, 2005). The insurance sector is therefore increasingly viewed as displaying the potential to destabilise the financial system (Das, Davies and Podpiera, 2003).[11] Vulnerabilities may develop via two main contagion channels: first, the growing linkages between insurers and banks may leave the banking system more vulnerable to a failure of, or a negative shock from, insurance companies; and second, owing to the rising size of insurers' investment portfolios, any significant risk reallocation within the insurance industry has the potential to impact asset price dynamics.

Impact on the banking system: Closer connections between banks and insurers – usually life insurers[12] – give rise to direct and

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8 See Group of Thirty (1997), p. 7: "Core institutions do not include large insurance companies or large finance companies, even those that are very active in international markets. Although these institutions are important by virtue of their size, they present substantially less risk to the system than failure of the core institutions of which they are customers."

9 See IMF (2002), Swiss Re (2003), Group of Thirty (2006) and Reuber (2000).

10 See IAIS (2005) and Fitch Ratings (2005a).

11 See also Tietmeyer (1999): "Systemic threats can also arise […] from difficulties at non-bank financial institutions and large insurance companies", p. 4, or Group of Ten (2001): "non-bank financial institutions, not just banks, have the potential to be sources of systemic risk", p. 8.

12 Life insurers have much larger investment portfolios than P&C insurers or reinsurers, as they are savings-oriented institutions. EU25 (euro area) life undertakings' portfolios represented €4,873.3 billion (€3,006.5 billion) at the end of 2005, while investment of non-life firms stood at about €1,092.5 billion (€900.3 billion) (see CEA, 2006). Due to their links with the banking sector and the size of their assets, they are considered as posing a more serious risk for financial stability than the other insurers.

indirect channels of contagion (De Nicolo and Kwast, 2002). The direct propagation channel stems from the intensification of off and on-balance sheet exposures between the insurance and banking sector, while the indirect channel focuses on the greater vulnerabilities of a less diversified financial system for banks.

The massive transfer of credit risk from banks to the insurance sector has raised direct interdependencies through counterparty credit exposures. As these transfers have essentially involved credit derivatives, such as collateralised debt obligations (CDOs), this has led to rising *off-balance sheet* exposures. Such risk transfers amid impressive growth in CDO markets has raised two sets of issues from a financial stability perspective (see Chart S1 in Appendix 1). First, the lack of transparency on the nature and the amount of risk effectively transferred was perceived as the most important source of risk (ECB, 2004). The question refers to whether the transfer of risk from banks to insurers has reduced risk for the financial system as a whole, or merely shifted it to less transparent sectors (Häusler, 2005). The second issue highlights regulatory arbitrage as a source of inefficient risk transfers, possibly increasing the probability of a systemic collapse. Regulatory arbitrage between the banking and insurance sector that can be motivated by poorly designed regulation in the banking sphere or by lighter regulatory requirements in the insurance industry could lead to inefficient concentration of credit risk in insurers' balance sheets and increase systemic risk (Franklin and Gale, 2005). In the early days of CRT markets, regulatory arbitrage was an important driver of many transactions between banks and insurers (IMF, 2004). However, the main motivation driving insurers' CRT activities rapidly became the search for higher yield and for risk diversification (IAIS, 2003; see Chart 4).

Direct interdependencies through *on-balance sheet* exposures may also lead to powerful contagion channels between banks and insurers and among the different entities of financial

Chart 4 Motivation behind credit derivatives transactions of European banks and insurers

(percentages)
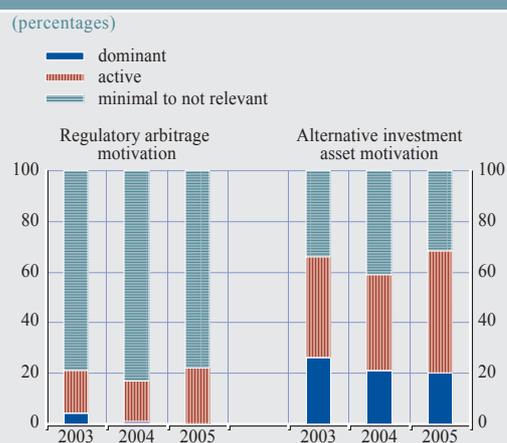
Source: Fitch Ratings.
Note: The survey regarding the motivation for credit derivatives includes European banks/brokers, dealers and insurance/reinsurance companies.

conglomerates/bancassurance groups. Unlike linkages via deposits, letters of credit or liquidity facilities provided by banks to insurers, cross-shareholding between banks and insurance companies have the potential to threaten the stability of the financial system. Mergers and acquisitions (M&As), which essentially began in the 1980s, have since significantly increased. Although banks more frequently have majority shareholdings in insurance companies than insurance undertakings have majority shareholdings in banks, insurers are increasingly investing in bank capital instruments via the purchase of subordinated debt issued by banks (Rule, 2001a). Banks might therefore become more sensitive to the financial condition of the insurance sector as a source of funding and credit risk. Any financial distress arising from the insurance industry is likely to reduce the value of banks: under stress, cross-shareholding and double-gearing can potentially provoke a negative spiral if equity prices (subordinated spreads) were to fall (increase) in one of these sectors and to trigger a further fall (increase) in the other. The links between the insurance and banking sectors do not need to be strong to trigger contagion, as only the perception of such links by market participants actually matters in a period of financial turmoil (Häusler,

2003; Corder, 2004). In an extreme scenario, even in the absence of any connections between these two financial sectors, pure psychological contagion under extreme conditions is likely to cause insurance and banking equity prices and subordinated spreads to co-move.

Growing interlinkages between banks and insurance through the bancassurance model appear to pose a key potential threat to the stability of the banking system.[13] The multiple propagation mechanisms within entities of financial conglomerates are likely to be more powerful than those between separate institutions. Contagion within financial groups can be described as "a negative externality that spreads from one group entity to another, ultimately resulting in the risk of loss to that other legal entity" (Darlap and Mayr, 2006). Bancassurance in increasing cross-holding of shares and securities between the two industries raises the contagion risk. Contagion channels within financial conglomerates are not restricted to purely financial linkages, and may also involve business and reputation issues. For example, insurance subsidiaries might affect their bank parents by reducing banks' operating incomes, via the cost of recapitalising an insurance subsidiary and through a reputation effect that may affect the confidence in the other parts of the group. Although in most jurisdictions each legal entity of the bancassurance group has a separate personality so that no entity is responsible for the liabilities of the other affiliated institutions, de facto holding companies may act as some kind of lender of last resort to their subsidiaries to reduce their risk of failure (Darlap and Mayr, 2006). Finally, regulatory arbitrage issues within financial conglomerates may also be more acute, as this may materialise as double-gearing in bancassurance balance sheets. Regulatory inconsistencies across jurisdictions and financial sectors may provide an incentive to institutions to overstate their regulatory capital by counting it twice or even more times, e.g. increasing the financial leverage of the group to satisfy all capital requirements.

The indirect contagion channel between banks and insurance companies arises from the effects of a less diversified financial system. "Indirect inter-dependencies are the mechanism through which it is possible for individual firms to have become more diversified, but for the banking system to have become more vulnerable to a systemic shock" (De Nicolo and Kwast, 2002). The ongoing process of financial consolidation and the emergence of large and complex financial institutions may have thereby raised the potential for systemic risk in two ways. First, although the different entities of a financial group taken individually may not be a source of systemic risk, their consolidation into one large entity might increase its systemic relevance if this leads to a lack of transparency and to moral hazard behaviour. Excessive risk-taking by managers may indeed be encouraged by their confidence in a bailout due to the too-big-to-fail status of financial conglomerates. Second, the emergence of such financial groups in increasing market concentration may hamper competition and could be harmful to systemic diversity in that it homogenises risk exposures. A certain degree of competition is needed to keep firms from becoming too inefficient. As a result, a large shock could affect major financial groups similarly. Although consolidation may have increased the extent of diversification in individual institutions, and thus lowered individual firms' risk, consolidated firms may have become more similar, and thus raised the aggregate vulnerability of the financial system.

2.2.3 INSURANCE AND THE POTENTIAL TO DISRUPT FINANCIAL MARKETS

In most European countries, insurers are the largest institutional investors and have the potential to disrupt financial markets. Investment portfolios of EU25 and euro area

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13 The formation of bancassurance groups is often motivated by the aim of securing efficiency gains in the distribution of short and long-term retail saving products (Rule, 2001a). The bancassurance model may either be realised via the merger of a bank and an insurance company, via significant cross-shareholdings, or may take the form of distribution agreements or joint ventures. In Europe, the most important institutional form of cooperation is distribution agreements.

Chart 5 Ratio of EU insurers' equity holdings to major stock index and market capitalisation

- major stock index capitalisation
- market capitalisation

Source: Bloomberg, CEIOPS and ACAM.
Note: Market-based valuation for Austria, Belgium, the Czech Republic, Germany, Finland, Ireland, Malta, the Netherlands, Portugal, Slovakia and Sweden. Book values are reported for Spain, Hungary and Luxembourg.

Chart 6 Share of real estate in EU insurers' investment portfolios

- real estate
- equities
- bonds
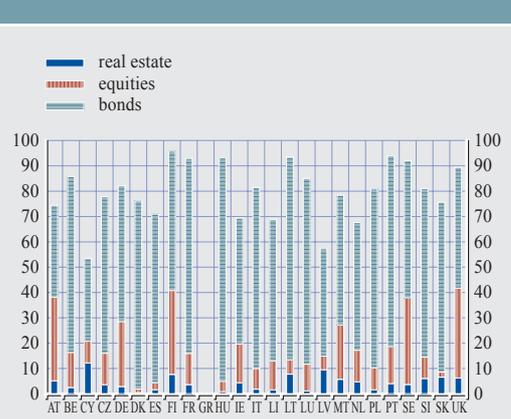
Source: CEIOPS.

insurers represented respectively 55.2% and 48.9% of GDP in 2005 (CEA, 2006). Any radical change in their investment risk profile might have a significant impact on the pricing of bonds, equity and possibly also real estate and CDO prices.

In the EU25, fixed-term securities held in insurers' balance sheets represented about 45% of the outstanding amounts of government bonds at the end of 2005, making them very large players in the bond markets.[14] The relatively high level of home bias in bond portfolios in Europe is manifested in a very significant part of insurers' bonds holdings being invested in euro area government bonds. Any major and abrupt change in bond portfolios by EU insurers may thereby possibly exert some influence on long-term interest rates. Regarding the potential of stock market disruption, it is more relevant at the domestic than at the EU level: given rather high levels of insurers' equity holdings with respect to domestic stock index capitalisation in some countries, such as Germany and France, vulnerabilities from potential portfolio reallocation out of equities could possibly impact equity price dynamics (see Chart 5). A significant part of equity portfolios are managed according to dynamic hedging, so that any

small fall in share prices may be amplified very rapidly.

The risk of insurers disrupting the real estate market appears contained as their property holdings amounted to only 2.5% of the EU25 total investment portfolios at the end of 2005, or less than 1% of GDP (see Chart 6).

Finally, any reduction in the net selling position of credit protection instruments by insurers could theoretically have some impact on the prices of CRT instruments. As CRT instruments are predominantly CDOs issued by banks, the liquidity of this customised market segment is significantly less than that of credit default swaps (CDS). Some segments of the CRT market are rather illiquid, and significant disruptive market price dynamics may arise if insurers were to start unwinding their positions over a short period.

2.2.4 REINSURANCE AS A RISING POTENTIAL SOURCE OF VULNERABILITY

Although the reinsurance sector has traditionally not been perceived as a source of systemic risk,

14 This aggregate figure is a broad approximation, as not all EU countries provide a market value of their investment portfolios. The same caveat applies to EU averages regarding real estate holdings.

the recent widespread inclusion of rating triggers in reinsurance contracts has significantly raised its vulnerability to a systemic event. A rating trigger can be defined as "any clause in a contract or agreement between two parties that allows one party to take protective action against deteriorating creditworthiness of the other party once a pre-determined rating threshold is breached."[15] Concretely, in the case of a downgrade of a reinsurer below a certain level, such as BBB, its customers (i.e. primary insurers that ceded risk) may require the reimbursement of part of their premiums that have been paid, with a similar logic as bank runs, where depositors ask for their money back.[16] Although the primary industry is more sheltered against any deterioration of credit worthiness of the reinsurance counterparts, the reinsurance sector as reinsurers may become more vulnerable to a possible loss of confidence on the part of their customers. This means that the "first-come, first-served" logic may also affect the reinsurance business once a rating breaks the threshold and activates the triggers. Hence, the liabilities of reinsurers may potentially become liquid, albeit less quickly than for banks. The negative impact may especially affect those companies involved in the retrocession market. Indeed, in a slightly similar way that banks participating in the payment system are interconnected within the interbank market, the retrocession market links the majority of reinsurance companies worldwide. Such transfers of risk between reinsurance companies, also known as retrocession, split up large and unique risks and distribute them around the international reinsurance market. This allows cover to be obtained even for risks which are too large for the largest individual reinsurers. Such risk retrocession spirals within reinsurers link them in a tight network via a multitude of reinsurance contracts. As a result, if a systemic event were to occur in the reinsurance sector, for example the confluence of several major natural catastrophes to which a critical mass of reinsurers are exposed and whose impact on claims are much more important than expected,[17] then the consequences for reinsurers may be

more serious. Each reinsurance company participating in the retrocession market would have to absorb not only the repercussions of the initial systemic shock, but also the potential withdrawal of its customers, and finally would also face significant increasing credit risk from their reinsurers' counterparties, which could also be possibly affected by a shrinkage of liquidity from runs of their primary insurers.

15 See Moody's (2005a).
16 In 2004 the activation of rating triggers destabilised the financial position of several reinsurers: as their ratings fell below security thresholds, these companies had to return large amounts of premium to customers. This eventually led to further downgrades. The losses of business incurred by these reinsurance firms were furthermore aggravated by implicit triggers: brokers and distributors apply minimum rating requirements as one of the criteria in the placement of reinsurance, so that if a reinsurance company fails to maintain a certain minimum financial strength rating, then they will no longer market its products. Unlike explicit triggers, implicit triggers are not built into contracts. However, both implicit and explicit triggers may substantially hamper the capacity of the reinsurer to withstand any negative shocks and to recover afterwards. In 2005 more than half of the reinsurance contracts outstanding included such an explicit clause. About 51% of the reinsurers surveyed by Moody's in 2005 responded that they had rating triggers within their reinsurance contracts, compared with 41% in 2004, 35% in 2003 and 26% in 2002; see Moody's (2005b). Rating triggers tend to be included more often in reinsurance contracts involving small reinsurers with rather low ratings. This is because their bargaining power tends to be limited by the closeness of their position to the trigger points (Fitch Ratings, 2004). However, large reinsurers have also been increasingly accepting such clauses in their contracts.
17 The probability that the reinsurance industry could suffer systemic events has increased significantly owing to climate change, whose influence on natural catastrophes is currently very difficult to predict.

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3.1 POSITIVE EXPECTED OUTCOMES: IMPROVED EFFICIENCY AND COMPETITIVENESS OF EU INSURERS

One of the main positive expected outcomes from Solvency II is the enhanced protection of policyholders that will be achieved by increasing the resilience of the European insurance industry. Higher levels of transparency, consolidation and integration in the EU insurance market will contribute to raising the efficiency and improving the competitiveness of the European insurance sector. This will be realised through the recognition of risk diversification/mitigation benefits in terms of capital relief, stricter requirements for risk and capital management and enlarged public financial disclosure requirements.

3.1.1 RECOGNITION OF DIVERSIFICATION BENEFITS, CONSOLIDATION AND IMPROVED EFFICIENCY

The current regulatory regimes in EU countries do not adequately account for risk diversification in the insurance business, so that the risk of insurance groups being engaged in many different business lines or geographical areas could potentially be overestimated, and capital requirements may appear artificially high. Furthermore, inconsistent regulations across jurisdictions in Europe may create competitive distortions, with capital being caught up in entities where risk diversification benefits are not recognised at all.

Search for diversification benefits and impetus to M&As: Solvency II will recognise risk diversification within and across types of risk, across locations and types of business. EU insurers might therefore seek to reduce their risk concentration, which is often the major driver of failure, and look for new diversification opportunities in order to profit from capital relief, which would reduce their cost of capital and increase profitability (CROF, 2005). As the European insurance market is mature, organic growth may prove difficult: any attempt to increase market shares would give rise to strong competitive pressures and cause a significant decline in insurance prices, which might be detrimental to the industry. It is thus likely that the search for diversification benefits will materialise in significant M&As in the European insurance sector. Although national M&As continue to be the norm, cross-border M&As may also be expected due to the geographical diversification that may be achieved (Chart 7 and 8). As differences in culture, in consumer protection law and in taxation still hamper direct access to markets abroad, insurers may prefer to take over existing foreign companies in order to grow internationally (Darlap and Mayr, 2006). By recognising diversification effects, Solvency II may therefore encourage the building-up of large insurance groups. This notwithstanding, Solvency II – going beyond Basel II with regard to the diversification benefits – may provide scope for regulatory arbitrage across sectors, thus conceivably posing undesirable effects on the stability of the financial system due to e.g. the transfer of credit risk from the banking to the insurance sector.

Consolidation and improved efficiency: Such consolidation is likely to improve the level of efficiency in the EU insurance industry, as poorly performing firms will have to become more efficient, to quit the market or to be absorbed by more efficient companies. As the primary aim of these M&As would be to increase the size and market share of acquiring undertakings, then acquirers are likely to prefer relatively efficient firms, as the cost of integrating them would be lower than that of an inefficient target (Cummins and Rubio-Misas, 2001). Furthermore, large undertakings, which were previously constrained from exploiting their diversification advantages, could gain market share as capital relief may give them a competitive advantage due to lower cost of capital. The recognition of risk diversification benefits through internal models may thus encourage large firms to grow further in order to benefit from economies of scale, which would

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Chart 7 Number of M&As in the EU insurance market

outward
inward
cross-border
domestic
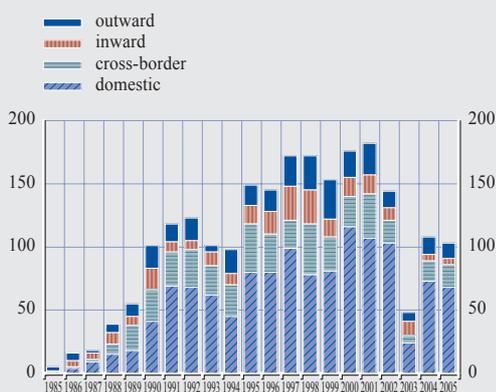
Source: Thompson Financial SDC.

Chart 8 Value of M&As

(in EUR billions)

inward
outward
cross-border
domestic
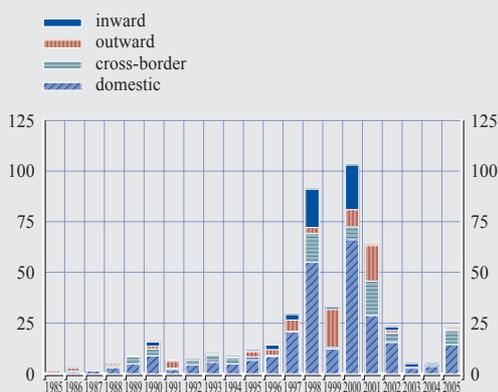
Source: Thompson Financial SDC.

therefore allow them to spread their fixed costs over a larger base and thus to reduce average costs.[18] Improvements in managerial efficiency and a potential reduction in income volatility by increasing firm size and diversification may also lead to efficiency gains for EU insurers.[19] Finally, larger firms may also expect greater economies of scope if the merging entities enter new markets and distribute their products to a wider customer base.

3.1.2 STRENGTHENED EU INSURERS' BALANCE SHEETS

In recognising risk mitigation benefits in terms of capital relief, Solvency II is likely to reduce risk concentration, dampen tail risk and strengthen insurers' balance sheets, as losses associated with significant shocks may be spread outside the EU insurance industry. Furthermore, the new risk-based capital regime may also persuade EU insurers to transfer investment risk to policyholders in order to reduce regulatory capital requirements, by converting traditional life policies with guaranteed returns into unit-linked products.

Recognition of risk mitigation benefits: In the new regulatory regime, insurers will have a strong incentive to take advantage of all available risk mitigation techniques such as reinsurance, securitisation and derivatives

hedging. In particular, Solvency II will strongly foster the use of reinsurance. Primary insurers are therefore expected to transfer an increasing part of their risk to reinsurers, which is likely not to be limited to peak risks. This may promote securitisation, the development of which has so far been impaired by regulation in most EU jurisdictions, and should thereby contribute to strengthening balance sheets in terms of improving liquidity, risk management and financial flexibility.[20] To start with, given the

18 To observe such a positive impact of consolidation, insurers need to operate with increasing returns to scale. For those insurance firms operating primarily at a variable cost and smoothing income volatility through reinsurance, significant economies of scale may not be present. Cummins and Rubio-Misas (2001) find that consolidation in the Spanish M&A market may not necessarily improve overall efficiency as it may reduce the number of firms operating with increasing returns to scale and increase the number operating with decreasing returns to scale. See Group of Ten (2001) for an analysis of the effects of consolidation in the financial sector on efficiency and stability.

19 This source of economies of scale may be particularly applicable to insurers, because the essence of insurance is risk diversification through pooling.

20 A "true sale" structure that refers to a transfer of assets, liabilities or future cash flows to an off-balance sheet Special Purpose Vehicle (SPV) is not always possible in the life insurance sector due to regulatory restrictions (Walhof, Dorsman and Thibeault, 2005; Fitch Ratings, 2005c). In the non-life sector, such securitisation SPVs that are bankruptcy-remote from the originator and that can be rated independently are subject to capital requirements. These solvency requirements make it challenging for such structures to be economically viable compared with more competitive traditional reinsurance and retrocession (Fitch Ratings, 2006a).

rather limited capacity of the reinsurance sector, it is likely that reinsurers will increasingly rely on securitisation in issuing catastrophe or mortality bonds in order to absorb rising risks from primary insurers. Given the complexity and the significant initiation costs associated with securitisation, only large and sophisticated players may be expected to benefit fully from the resulting decline in the cost of capital.[21] However, the incentive for primary insurers to resort more to value of in-force (VIF) securitisation – which allows life insurers to monetise future profits associated with existing business – or to high-frequency, low-severity securitisation in the non-life sector appears rather contained in the Solvency II regime, when compared with capital relief allowed by the use of reinsurance. Second, as primary insurers will face extensive credit risk from the potential failure of reinsurers, they may try to mitigate this rising risk by securitising reinsurance recoverables.[22] Although primary insurers usually have a diversified pool of reinsurance counterparties to limit the risk associated with too concentrated exposures, a large catastrophic event may affect several reinsurance counterparties and let insurers' balance sheets be unhedged.

Increasing incentives to transfer investment risk to policyholders: In the new risk-based capital regime, market risks will be included in the calculation of regulatory capital. At the time of the implementation of Solvency II, there will be a "one-shot" benefit in terms of capital requirement for those companies that have a high proportion of unit-linked products in their balance sheets: lower regulatory capital will reduce their costs of capital and increase their profitability. Indeed, solvency requirements attached to such products will be nearly negligible compared to traditional life policies or to with-profit policies, which are furthermore difficult to price. Some countries (e.g. Ireland, Luxembourg and the Czech Republic) will definitely be at an advantage compared with Germany, Latvia, Denmark or Slovenia, for example (see Chart 9).

Chart 9 Share of unit-linked products in the total investment portfolio of insurers

share of unit-linked products in total investment portfolio in % (left-hand scale)
growth rate in unit-linked products (right-hand scale)
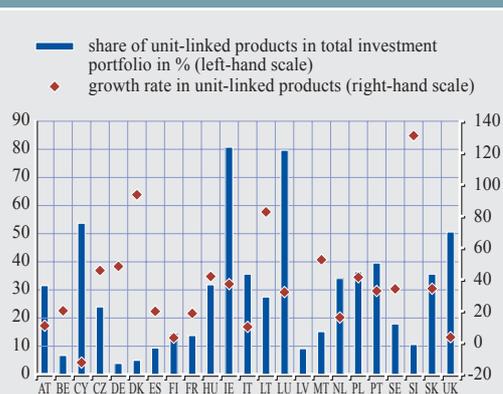
Source: CEIOPS.
Note: Market-based valuations were used for Austria, Belgium, the Czech Republic, Germany, Finland, Ireland, Malta, the Netherlands, Portugal, Slovakia and Sweden. Book values were used for Spain, Hungary and Luxembourg.

Larger companies will also significantly benefit from Solvency II, as their share of unit-linked products in the total investment portfolio is much higher than that prevailing in small-life undertakings' balance sheets (see Chart S2). Some life insurance companies for which regulatory capital requirements represent a constraint may thus face a greater incentive to pass financial risks on to policyholders by offering more unit-linked and index-linked products, whose investment risk is fully borne by policyholders at least for the bulk of these products, or may even seek to convert their stock of traditional life policies with guaranteed return into unit-linked products. Such transfers may be considered as positive for financial stability, at least in the short term, as they lead to a wider diffusion of risks from insurers' balance sheets, and strengthen the resilience of

21 SPV structures usually have higher credit ratings than the issuing party (originator), as SPV assets are not linked to their originator's credit risk.
22 These receivables from a reinsurance contract, which can form a significant part of insurers' assets, are difficult to value owing to the high and rising correlations between various reinsurance recoverables after catastrophic events, and because reinsurance counterparties may all be regulated by different jurisdictions. The value of reinsurance recoverables depends directly on the claims reserves of the insurer, whose valuation method may vary until claims are settled and paid (S&P, 2006).

the insurance sector. Moreover, this would increase the purely financial intermediary role of life insurers. On the other hand, the shifting of risks to consumers may lead, in worst case situations, to reputation risk for the institutions concerned thus undermining consumer confidence in the financial sector.

3.1.3 OPTIMISATION OF CAPITAL STRUCTURE, GREATER TRANSPARENCY AND MARKET-BASED DISCIPLINE

Solvency II will provide EU insurers with a strong incentive to optimise their capital structure by enlarging the elements of eligible capital to innovative tools such as hybrid capital, subordinated debt and securitisation, and in giving due credit in terms of capital relief.

The issuance of both subordinated debt[23] and hybrid capital[24] offers several advantages over equity as a funding source. These products benefit from fully tax-deductible interest expenses.[25] Hence the cost of financing is below that of equity, and the retained earnings are higher, producing higher dividends for shareholders. Although subordinated debt is eligible as capital, the holder of this debt is a creditor and not a shareholder, which avoids the dilution of common shareholders. These alternative sources of financing are not only important for companies which need to raise regulatory capital and which have a limited access to traditional capital markets, such as mutual firms. Insurers may also benefit from wide access to fixed income investors in order to finance share buybacks or dividend increases. In the run-up to Solvency II, more issuance of subordinated debt and hybrid capital may be expected both to raise regulatory capital and to finance M&A activities. EU insurers have de facto made extensive use of these instruments in recent years in order to benefit from favourable conditions on the bond markets, as well as perhaps in anticipation of Solvency II (see Chart 10).[26]

Chart 10 Issuance of hybrid capital, senior and subordinated debt by EU insurers

(in EUR millions)
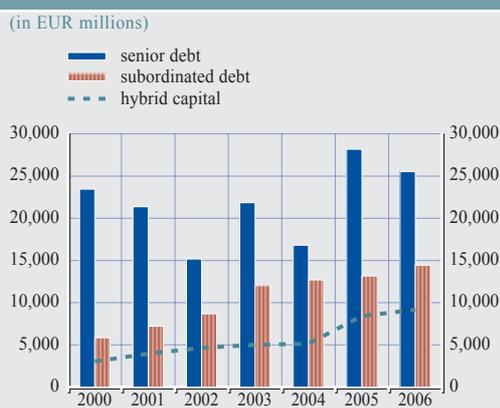
Source: Bondware.

To a certain extent, European insurers in the new solvency regime will have a greater incentive than in the past to rely on securitisation – catastrophe bonds and VIF – as an alternative source of funding. However, as reinsurance will be more rewarding for primary insurers, and given that securitisation is more costly than subordinated debt and hybrid capital, the magnitude of securitisation driven by Solvency

23 A subordinated debt is a debt that is either unsecured or has a lower priority than senior or policyholders'/depositors' claims. Interest and principal are mandatory and if missed, constitutes a default.

24 Hybrid securities are instruments combining the features of both debt and equity. Like traditional bonds, these securities have fixed coupons and can be redeemed for fixed amounts. Like equity, they are subordinated to other types of debt and issuers can pass coupons under certain circumstances without triggering a default. Hybrid capital often consists of subordinated debt, although this is not always necessarily the case.

25 The exact reduction in the average cost of capital depends on how precisely the risk characteristics of a hybrid actually match those of the equity and/or debt that it replaces.

26 The incentive to issue subordinated debt and hybrid capital may be limited by two factors. First, excessive reliance on hybrid securities and subordinated debt may be detrimental as it increases financial leverage, the fixed cost of servicing makes them less flexible than common equity, and many hybrids are less permanent than common equity. Second, as market disclosure requirements will apply to the composition of regulatory own funds, market players and rating agencies may penalise institutions which relied too heavily on these instruments as s source of funding, compared to institutions with more core tier 1 capital.

II may be rather limited. Usually securitisation is required once insurers have already used up their maximum permitted capacity for subordinated debt (Fitch Ratings, 2005c).

Greater transparency: Securitisation and rising issuance of both subordinated debt and hybrid capital are expected to bring about greater transparency in the insurance industry. This will disclose additional information about companies' underlying books to investors and to regulators. A more transparent pricing framework will emerge, as once a certain risk is priced in the market, it may provide a benchmark to price other risks more accurately. Furthermore, these alternative funding tools could provide a secondary market that enables the recognition of the fair value of an insurer in an easier and more transparent way. This is especially important given the increasing complexity of large insurance companies, which makes these institutions more difficult for investors to assess.[27] The greater transparency expected from financial reporting and public disclosure requirements in Pillar III and from harmonising the calculation of technical reserves and accounting standards across EU countries should improve the comparability of firms for investors. The holders of insurance subordinated debt would have more precise and accurate information regarding the risk profile of insurance undertakings, and should thus be better placed to monitor these companies. Such a reduction in asymmetric information might foster competition across undertakings and across countries and promote market-based discipline.

Greater market-based discipline: Pillar III of Solvency II will encourage market-based discipline by providing EU insurers an incentive to maintain sound conditions in the insurance sector. The price of subordinated debt at the time of issuance may influence insurers' management, as perceived riskier insurers by the financial markets may face increased funding costs. On the secondary market, the prices of the outstanding amount of securities may provide additional information as markets

rapidly process large information flows. Whereas in a world of complete markets with no friction, subordinated debt spreads would not convey any additional information relative to equity prices, so that both instruments would be equally valuable for market discipline purposes, in an incomplete market framework, subordinated debt prices may provide a better information signal regarding the expected default risk. The payoff structure of subordinated debt aligns the incentives of debt holders to those of regulators. Subordinated debt holders might be more suitable than policyholders or shareholders to monitor the firms because the latter may benefit from the insurance company taking on more risks under certain conditions, while the former may be covered by some guarantees or insurance regarding the reimbursement of their policies. Any credible commitment not to bail out subordinated debt holders would remove the subordinated debt prices from "too big to fail" types of guarantees. Furthermore, subordinated spreads reveal additional information when compared with expected default frequencies, as they reflect the recovery rate for a perceived loss given default.[28]

* * *

Overall, Solvency II will foster better risk management, will recognise risk diversification and risk mitigation benefits and, by enlarging the spectrum of eligible elements for regulatory capital, will provide EU insurers with incentives to optimise their capital structures. The increased use of securitisation, subordinated debt and hybrid capital as sources of funding will bring a higher level of transparency, will

[27] The rising degree of transparency may also contribute to improving risk management by preventing hidden and cross-subsidies within the same product between the different guarantees and benefits provided. A more transparent pricing of risks may also dampen the magnitude of the underwriting pricing cycle by providing benchmark prices linked to credit spreads and interest rates (Fitch Ratings, 2006a).

[28] Notwithstanding these advantages, subordinated debt markets are relatively illiquid and inefficient as debt is traded infrequently on the secondary market, and the number of sellers and buyers is small compared with equities markets; furthermore, subordinated spreads start behaving like equity when the credit quality of the issuer declines.

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allow regulatory capital to be raised at a lower cost, and will increase the capacity of the EU insurance sector to underwrite risk. The financing of future growth – either acquisitions or new business – will be eased. The lower cost of capital and the resulting boost in profitability, together with enhanced efficiency, will improve long-term return on capital and increase the value to shareholders, and should improve the competitiveness of the European insurance industry. Although competition among European insurers in their home markets could intensify, their competitiveness vis-à-vis insurers outside the EU should improve significantly. Market penetration by other non-EU insurers can therefore be expected to decline markedly.

Although a high level of efficiency is beneficial for the stability of the financial system in the medium term, as it ensures that risks are correctly priced and shared in the economy, there are also circumstances where attempts to strengthen the efficiency of the financial system may undermine financial stability in the short term.

3.2 TWO POTENTIAL NEGATIVE ASPECTS FOR FINANCIAL STABILITY

3.2.1 SOME VOLATILITY OF EARNINGS AND CAPITAL POSITION IN EU INSURERS' BALANCE SHEETS

One of the possible negative impacts of Solvency II is that it could increase the volatility of earnings and capital position in the EU insurers' balance sheets. In the short run, this could be caused by less efficient firms exiting the EU insurance market, from M&As and from falling insurance prices of listed undertakings. In the medium term, market-based valuation for the assets and liabilities together with possible substantial variations in the overall risk profile of insurers in the new risk-based regulatory regime may involve relatively significant changes in capital requirements in case significant negative duration gaps remain.

Possible higher volatility in the short term: In the new risk-based capital framework, market,

credit as well as mortality and catastrophe risks will all be explicitly included in the solvency requirement. This is likely to put pressure on relatively inefficient insurance undertakings, for which risk management and risk-based capital management practices are not widespread. These firms may not fully succeed in implementing adequate risk management tools or in investing in financial and personal resources.[29] Furthermore, relatively poor levels of profitability may hamper strategies to raise regulatory capital in the equity markets. The higher degree of efficiency expected from Solvency II may thus adversely affect these poorer performing companies, which may be forced to exit the market owing to intensified competition. Empirically inefficient firms may be able to survive over several years, so that the exit of these firms from the EU insurance market is likely to be fairly orderly. The main risk for companies with an intermediate level of efficiency is to be acquired by a large undertaking with a strong capital position located in or outside the EU.

Although the probability of rising volatility in earnings in the short term appears rather contained, it cannot be totally excluded that this risk could materialise, which might entail rising risk premia and downward pressure on insurance stock prices. M&As may also contribute to increasing the volatility of insurance equity prices. Despite significant potential for efficiency gains from consolidation, the empirical evidence is mixed (Cummins and Rubio-Misas, 2001). The stock markets may punish M&As that they judge as being unlikely to produce any major benefits via discounting the value of merged firms. Factors determining the potential impact of new regulatory rules on insurance stock prices include firms' financial characteristics such as size and performance, and market characteristics such as initial regulatory structure and market concentration

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29 This may for example impact small life insurers that have failed to price correctly certain life policies with embedded guarantees and bonuses. These small companies may furthermore be affected by rising competitive pressures from large diversified undertakings benefiting from capital relief and thus from a reduced cost of capital.

(Campbell, Goldberg and Rai, 2003). These authors found that the third Life Directive has resulted in rising stock insurance prices, while the third Non-life Directive has had a modest negative wealth effect in Europe.

Possible higher volatility in the medium term: An important characteristic of Solvency II is that it grounds its risk-based solvency framework on an economic valuation of insurers' balance sheets. The new rules to assess technical reserves and the market-based approach used to value assets and liabilities should increase the volatility of insurers' earnings and capital position. A key element of the new rules is the choice of a risk-free rate to discount the value of future liabilities. Any change in market interest rates will lead to changes in insurers' equity, as insurers' balance sheets typically display a negative duration gap. This will especially affect life insurance companies owing to their long-term liabilities. Non-life insurers displaying long-tail claims such as those arising from asbestos may also be impacted.[30] Furthermore, the new valuation rules for assets and liabilities must be compatible with the expected outcomes of the International Financial Reporting Standards (IFRS) for Phase II of insurance contracts (which are scheduled for 2009). So far, the International Accounting Standard Board (IASB) has reached the following tentative conclusions for Phase II of insurance contracts: "Assets and liabilities arising from insurance contracts should be measured at their fair value […] an undiscounted measure is inconsistent with fair value".[31] Designing an accounting basis in Solvency II even though the IASB did not reach any final conclusions regarding insurance contracts appears a challenge. However, Solvency II will not impose full implementation on all insurers, and the rules may be amended later on when the IASB project is finalised. Furthermore, as Solvency II is likely to encourage EU insurers to close the negative duration gap of their balance sheets, the impact on volatility in the medium term may be significantly limited: in the absence of a duration gap, neither changes in the market interest rate nor equity prices will exert influence on the value of the firm. Finally, the high degree of transparency required under Pillar III might increase the impact of self-fulfilling public disclosure prophecies. The occurrence of any breach in the SCR or MCR will have to be released at the end of each year, which may possibly trigger instability if policyholders become aware of issues surrounding their insurance company and surrender their policies, thereby exacerbating the initial problem.

3.2.2 POTENTIAL RISING VULNERABILITY IN THE REINSURANCE SECTOR

Solvency II may lead to a widespread inclusion of rating triggers in reinsurance contracts which is likely to make reinsurers more vulnerable by exposing them to liquidity risk in the same way as runs can take place in banks (see Sub-section I.B.4). Under the new regulatory regime, more capital relief may be expected from the use of reinsurance by primary insurers, so that EU primary insurers may face a stronger incentive than in the past to transfer risk to the reinsurance sector. The reinsurance market is expected to grow significantly as a result. This will increase the credit risk exposures of primary insurers vis-à-vis reinsurers. In Solvency II, credit risk will be explicitly included in regulatory capital requirements, so that any financial problem faced by a reinsurer will result in rising credit risk and also higher capital requirements for primary insurers. The propagation channel between the two sectors may therefore be enhanced. To avoid this, primary insurers may securitise reinsurance recoverables.[32] Securitising reinsurance recoverables could easily remove credit risk from primary insurers' balance sheets if a rating trigger is introduced into the special purpose vehicle (SPV) structure. In this case, the payout would depend on the

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30 The other non-life insurers that did not previously discount their liabilities may benefit from the adoption of Solvency II, as discounting will lead their solvency to improve by reducing the present value of their liabilities.

31 See "Tentative conclusion for Phase II-BC6", in IASB (2005), p. 421.

32 However, the insurance company buying this synthetic protection will have to bear the basis risk, as the payout may not resemble the behaviour of the insurer's actual reinsurance recoverable balance.

activation of predefined triggers (S&P, 2006). Primary insurers may also require the inclusion of rating triggers in reinsurance contracts to protect themselves against any significant deterioration in the creditworthiness of their reinsurers. To a certain extent, the primary sector could achieve greater stability, as rating triggers would shelter them against the propagation of solvency pressures within the whole insurance industry. However, reinsurance undertakings may become more vulnerable to runs from their customers, and may face rising credit risk exposures from retrocessionaire counterparties. As a key risk management strategy, retrocession leads to a significant level of credit risk for all companies, as these contracts may not be fully collectible in the case of insolvency. Although the mechanism of the propagation of shocks between reinsurers only involves credit risk[33], which is less problematic than liquidity risk, as a result of Solvency II, all reinsurers may potentially face the need to raise regulatory capital at the same time in response to rising credit risk exposures. As reinsurance companies are very often part of large conglomerates, such pressures on capital requirements may well spread to other parts of the financial system, e.g. the banking sector.

On the other hand, in order to deal with rising risk transfers from primary insurance undertakings, reinsurance companies are likely to increase their use of securitisation significantly to move peak risks to capital markets and thereby limit the risk of being the final absorbers of risks within the economy. Although the probability of being exposed to a systemic event has increased owing to climate change, such transfers of peak risk may shelter them to a certain extent from a generalised loss of confidence in the reinsurance market by spreading potential losses among a large number of investors.

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33 Liquidity risk as a propagation mechanism between reinsurers is much less relevant when compared with the banking sector, as pressures on liquidity cannot materialise quickly from one reinsurer to another; however, liquidity may be exacerbated by banks refusing to extend some credit lines to reinsurers facing financial stress.

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The positive impact of Solvency II on the financial markets is likely to remain limited, although the new regulatory regime will tend to foster the development of the European corporate bond markets and could possibly reduce home bias in bond portfolios. The risk of financial market disruption appears rather contained in the short term as insurance undertakings are expected to hold more capital than Solvency II will require, and as some firms are already engaged in portfolio shifts, anticipating the outcome of the new regulatory regime. However, in the medium term, pro-cyclicality and herding issues are likely to become more relevant.

4.1 POSITIVE EXPECTED OUTCOMES OF POTENTIAL PORTFOLIO ALLOCATIONS IN FAVOUR OF BONDS

Solvency II may provide the impetus for the development of the European corporate bond market as it will favour investment in long-term bonds and encourage securitisation through the recognition of risk mitigation benefits. Furthermore, the likely consolidation of the EU insurance industry and the rewarding of geographical risk diversification could foster investment outside Europe and contribute to reducing the home bias of bond portfolios.

4.1.1 IMPETUS FOR THE DEVELOPMENT OF THE EUROPEAN CORPORATE BOND MARKETS

Solvency II will provide EU insurers with an incentive to hold more bonds on the assets side and to issue more subordinated and hybrid capital on the liabilities side. This may contribute positively to the size, liquidity, deepness and volatility of the European corporate bond market, which is still currently rather thin in this regard.[34] More liquid capital market is positive for financial efficiency as it could lower the cost of capital by ensuring less volatility. Moreover, a more liquid European corporate bond market may facilitate the diversification of risks in financial institutions'

– including insurers' – balance sheets and create better conditions for a smooth absorption of financial shocks.[35]

In the Solvency II regime, market risk on the asset side will lead to capital charges. In the QIS (Quantitative Impact Study) II calibration, the weights associated with equity holdings and real estate are respectively 0.4 and 0.2, while the parameter for bond holdings may vary from 0 to a negative value depending on the magnitude of the duration gap (CEIOPS, 2006b). This will therefore provide EU insurers facing a significant negative duration gap and needing to increase regulatory capital with an incentive to favour bond holdings, as this will lead to lower investment risk and therefore reduced capital requirements. It is likely to increase the share of bonds in insurers' balance sheets, both as a result of new inflows being mostly or exclusively invested in long-term securities, or through active portfolio shifts out of equities into bonds. On the other hand, large insurers may also choose to close asset-liability mismatches by relying on derivatives such as swaptions[36] to hedge interest rate risk.

Given the still rather low level of government bond yields, EU insurers may rationally seek higher returns by preferring to invest in corporate bonds rather than in government bonds. The expected rising demand on the part of life insurance undertakings for long-term bonds in the run-up to Solvency II in order to match the typical long maturity liabilities could encourage corporations to supply very long-maturity paper. To a certain extent, this additional alternative supply of long-term bonds might compensate for the rather limited

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34 Through their direct activities of arbitrage, trading and diversification, insurers may also generate market liquidity and thereby attract more trading, which in turn reduces costs and contributes to further developing liquidity (Davies, 2003).

35 US insurance companies weathered the slump in equity markets from 2000 to 2003 much better than their European counterparts. This is because they had significantly more holdings of corporate bonds and far less equities in their investment portfolios than euro area insurance undertakings (IMF, 2004).

36 A swaption is an option giving the buyer the right to enter into a swap agreement, which is usually an interest rate swap by a specified date.

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supply of very long-term bonds by European governments. Furthermore, insurers may provide a more stable source of funding to corporations than bank loans, which are rather cyclical. The resilience of the financial system could thereby be enhanced, as in general the more diverse the channels of intermediation for the corporate sector are, the more limited the impact of any crises affecting banks (Greenspan, 1999). Furthermore, this additional supply of long-term funds could increase the amount of investment in the economy and thereby support economic activity, which will eventually benefit households and banks via reduced credit risk.

On the liability side, potentially higher issuance of subordinated and hybrid debt by EU insurers could further deepen the European subordinated corporate market and improve its efficiency. As a result, the financial system may also become more market-oriented.

4.1.2 DIVERSIFICATION OF INVESTMENT PORTFOLIOS AND POSSIBLE REDUCTION OF HOME BIAS

The Solvency II regime will recognise a geographical diversification of risks, both in terms of different business locations and of diversified investment portfolios. Regarding the latter, the benefits rewarded may be limited, as the capital charge for foreign currency risk will be higher than the capital relief obtained from risk diversification in portfolios. However, with the expected consolidation in the European insurance sector, the size of companies will tend to increase, which raises the probability that large undertakings will seek to diversify their investment risk outside the EU25. It is therefore likely that a greater proportion of bonds and equities, the vast majority of which are invested in the euro area, may still be invested outside Europe. Such enhanced cross-border portfolio investments by institutional investors are likely to contribute to the efficiency of capital markets by equalising total real returns and thus the cost of capital between markets (Davies, 2003). Furthermore, if reallocations tend to benefit US assets, for example US Treasury bonds, then EU insurers

might contribute to lessening, albeit to a limited extent, the risk of an abrupt correction in the foreign exchange and financial markets by offering an additional and rather stable source of financing of the US current account deficit.

4.2 POTENTIAL NEGATIVE OUTCOMES: THE RISK OF FINANCIAL MARKET DISRUPTION

The implementation of Solvency II might have potentially negative outcomes for financial markets. In the short run, the risk of market disruption will be closely connected to the magnitude of possible portfolio reallocations, while in the medium to long term, negative financial market feedback effect and herding behaviour by financial institutions might worsen any financial turmoil amid a less diversified financial system.

4.2.1 CONTAINED RISK OF FINANCIAL MARKET DISRUPTION IN THE SHORT TERM

The risk of European financial market disruption in the short term depends on the scale of the portfolio shifts that may be needed to meet any possible increase in regulatory capital requirements under the new solvency regime. Although Solvency II will lead to stricter capital requirements for most undertakings, the final impact on capital held in insurers' balance sheets remains highly uncertain.[37] Many insurers hold more capital than is currently required by the EU Directive in order to obtain a certain credit rating, or because of stricter national regulations than EU ones. Furthermore, those companies that may be constrained by the new risk-based solvency regime may raise fresh capital or "save regulatory capital"[38] rather than reduce investment risk. As Solvency II will enlarge the list of eligible assets backing capital to subordinated debt, hybrid capital and

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37 According to the preliminary calibration of QIS II, only in one EU25 country would life insurance companies have had to raise capital significantly, with the same picture for non-life undertakings.

38 Strategies consisting in saving regulatory capital involve for example transferring risk from primary insurers' balance sheets to the reinsurance sector, to the capital markets through securitisation or to households through the sale of unit-linked products, as well as the liquidation of some business lines transferred to specialised run-off providers.

securitisation, it should be easier to raise capital than under the Solvency I regime. The need to shift investment risk downwards is likely to be dampened, which will contain the risk that large portfolio reallocations could disrupt the financial markets.

However, the adoption of market-based valuation for assets and liabilities could potentially trigger significant portfolio reallocations out of equities into bonds to avoid extra volatility in earnings and equities (Dickinson and Liedtke, 2004).[39] Marked-to-market accounting will account for any temporary volatility in asset prices, which is likely to be greater in stock markets than in bond markets. As equity prices may be subject to bubbles, or might not always reflect a fundamental view of the intrinsic value of a firm, this could distort the valuation of insurers' balance sheets. On the other hand, Solvency II will involve the adoption of the "Prudent Man Regulation", which will reduce the scope of existing binding quantitative limits on the different asset categories as currently required by national regulation. The new Directive's greater expected flexibility regarding the types and composition of investment portfolios may, in principle, allow insurance companies to take on more investment risk. Large insurers with sophisticated internal models, which would be able to demonstrate risk reduction through asset diversification, would thus be in a position to increase their investment risk while keeping their regulatory capital requirements constant. In order to gauge the risk of market disruption, an econometric analysis has been performed (see below) to test whether any gradual portfolio shifts from EU insurers have already taken place, as this could be interpreted as an indication of a smooth transition towards the new regime.

Quantitative analysis

This section assesses whether insurers have changed their asset allocation[40] after the European Commission issued a consultative document on the shape of the new risk-based capital regime in February 2004.[41] Although the

final project and the new solvency rules as well as their potential impact on required capital and investment risk are imperfectly known, the anticipation of a new risk-based capital regime may already have fostered changes in insurers' behaviour. At one extreme, if their expectations regarding the final outcomes of Solvency II prove entirely correct, then no significant impact on balance sheets should be observed at the time of its implementation in 2010. Therefore, it is likely that all actions to adjust the levels of investment risk and capital will occur between 2004 and 2010. One way to analyse the impact of Solvency II is therefore to test for different behaviour before and after the issuance of the consultative Solvency II document, and to assess whether any gradual portfolio shifts have already taken place since 2004.

However, the problem with this is that portfolio shifts since 2004 may not entirely be related to Solvency II, and it is difficult to disentangle the direct impact of the new regulatory regime from changes caused by the ongoing adjustment of balance sheets in the field of ALM since 2001 to reduce the negative duration gap[42], and from other factors such as the implementation of the IFRS. Much of the literature deals with this identification problem by regressing the risk-weighted assets on measures of insurance capital and various control variables whose presence aims at capturing other possible determinants likely to drive changes in asset allocation (Furfine, 2001).

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39 According to a 2003 survey undertaken by the Accounting Task Force of the Geneva Association to investigate the possible impact of the new accounting rules, the vast majority of respondents considered that there would be a "significant or major effect" on asset reallocation with "lasting effects".

40 Reallocations that affect the split between on and off-balance sheet activities such as a reduction in the net selling position in credit protection instruments, for example, are not analysed, although the impact on CDO prices may be significant, as credit risk derivatives issued by banks tend to be rather customised products, making the market segment rather illiquid (Fitch Ratings, 2005a).

41 See http://europa.eu.int/comm/internal_market/insurance/docs/markt-2543-03/markt-2543-03_en.pdf

42 Such ALM strategies consisted in increasing bond holdings and decreasing equity exposures after the stock market decline to reduce the negative duration gap.

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Investment risk: In insurance balance sheets, investment risk is primarily determined by the allocation of assets across equities, bonds and real estates, which compose the bulk of investment portfolios. The risk-weighted asset that reflects insurers' decisions on risk-taking is calculated according to the QIS III calibration of the MCR, which corresponds to a VAR of 90%:[43]

$$RWA_{i,t} = 0.12\,Equities + 0.08\,RealEstate +$$
$$0.05\,Bonds_{|Non-Life} + 0.07\,Bonds_{|Life}$$

The measure of investment risk, denoted *Risk*, is calculated as the ratio of risk-weighted assets to total assets. It overestimates somewhat the risk of EU insurers' portfolios as it ignores the benefits of risk diversification in asset portfolios. The control variables of a macroeconomic nature for each country *j* encompass the growth rate of domestic GDP – *rgdp*, domestic stock index returns – *rstock*, long-term government bond yields – *ltyield*, and residential property index returns – *resipp*, which are likely to influence portfolio shifts: $Macro_{j,t} = \{rgdp_{j,t}, rstock_{j,t}, ltyield_{j,t}, resipp_{j,t}\}$. The control variables related to firms' characteristics indexed by *i* are profits, size, share of subordinated debt, the capital ratio, share of unit-linked products, type of business and whether they are listed and whether they are mutual insurers.

$$Char_{i,j,t} = \begin{cases} size_{i,j,t}, roe_{i,j,t}, roa_{i,j,t}, shareul_{i,j,t}, \\ sharesub_{i,j,t}, capital_{i,j,t}, dbus, dsmall, \\ dmedium, dl\arg e, dlisted, dmut \end{cases}$$

Profits: Return on equity/surplus (ROE) and return on assets (ROA) are introduced in the regression as current profit after taxes may be used to increase insurers' capital through retained earnings rather than through equity issuance. A high level of profitability is expected to have a positive impact on both capital and investment risk, as there would be less need to reduce investment risk.

Subordinated debt: The ratio of subordinated debt over total liabilities – *sharesub* – is introduced to capture the possible limited need

to raise capital/reduce investment risk for companies with a significant amount of these instruments in their balance sheets, as they will be eligible as regulatory capital in the Solvency II regime.

Share of unit-linked products: The share of unit-linked products over total assets –*shareul* – is included in the regression. Life insurers that have a low proportion of unit-linked products/a high share of traditional life policies with a guaranteed return will be at a disadvantage as regulatory capital requirements may be much higher than those required for companies with a bulk of index-linked products in their portfolios.

Capital/surplus: The ratio of capital to total assets is used, where insurers' capital is defined as the sum of equities and reserves (Schrieves and Dahl, 1992). Poorly capitalised or well capitalised insurers may react differently to the new regime: poorly capitalised firms may be more prone to raising capital and reducing investment risk than their well capitalised counterparts.

Size: A dummy capturing the size of insurance undertakings is added following the CEIOPS definition.[44] Regarding composite firms, CEIOPS does not provide any guidance, so that the following assumption is used: a composite firm with more than €1,000 million gross written premium *or* with more than €10 billion gross technical provisions is considered as large, and if its gross written premium is less than €100 million and its gross technical provision less than €1 billion it is classified as small; all other firms fall into the medium-size category. The size of insurers may matter as this influences access to capital markets, risk diversification potential and investment

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43 For composite insurers, the econometric analysis assumes a weight of 0.06 on bond holding.
44 A life undertaking with less than €1 billion in gross technical reserves is considered small, one with more than €10 billion is large, and any insurance company between these limits is considered as medium-sized; for non-life insurers, the upper and lower bounds for the gross written premium are respectively €100 million and €1,000 million (CEIOPS, 2006a).

opportunities, all of which may impact both investment risk and capital levels. Small insurers may therefore be in a position to reduce investment risk with a greater probability than large companies. As an alternative to this size dummy, the logarithm of total assets is also introduced and is denoted *Size* (Campbell et al., 2003).

Type of business: Another dummy catches the type of business of insurers as life, non-life, composite and reinsurance undertakings may be affected differently by Solvency II. For example, composite firms may benefit from the recognition of risk diversification in terms of capital relief compared with companies specialised in life or non-life business, and may thereby face lower pressures to reduce investment risk/increase capital.

Listed: A dummy for listed companies and for undertakings that are not listed, but which belong to a listed group, *dlisted*, is introduced, to capture the potential effect of the new IFRS accounting rules. Such companies may have already adjusted their balance sheets in order to limit any possible increase in earnings volatility.

Mutuals: Another dummy for the mutual insurance undertakings – *dmut* – is also included as these firms may be more inclined to reduce investment risk and engage in portfolio reallocation out of equities than other insurers with access to equity markets.

Solvency II: A dummy is introduced to capture the potential changes of insurers' asset allocation after the European Commission's 2004 issuance of a consultative document on the possible shape of Solvency II in Europe. The dummy that is denoted *dsolvII* is equal to 1 in 2004 and 2005 and 0 otherwise. To capture the possible differentiated impact across countries in the EU, a set of dummies is furthermore introduced, which consist in country dummies multiplied by the Solvency II dummy.

Data: Domestic stock indexes are drawn from Bloomberg, while GDP, long-term government interest rates and residential property price indexes come from ECB databases. Data on EU insurers' balance sheets come from Standard & Poor's (S&P) Eurothesys Life & Non-life database. This database provides the various components of investment portfolios such as equities, bonds and real estate for companies located in 24 EU countries over the period 1995-2005 (there are no data for Lithuania). The balance sheet data used are "as reported by companies", and could therefore be either book or market value in 2005. The sample after removing outliers is composed of 2,212 insurance undertakings, of which 1,073 are in the non-life sector, 769 are life insurers, 302 are composite firms and 68 are reinsurance companies. The following equations are estimated using standard unbalanced panel estimation techniques with fixed effects for the EU25, EU15 and EU12:

$$risk_{i,t} = \gamma_0 + \gamma_2 capital_{i,t} + \sum_k \alpha_k Macro_{i,j,k,t} + \sum_l \omega_l Char_{i,l,t} + \beta dsolvII + \varepsilon_{i,t}$$

$$risk_{i,t} = \gamma_0 + \gamma_2 capital_{i,t} + \sum_k \alpha_k Macro_{i,j,k,t} + \sum_l \omega_l Char_{i,l,t} + \sum_j \beta_j dcountry * dsolvII + \varepsilon_{i,t}$$

The first equation is designed to assess whether Solvency II has a significant impact on all the aggregated companies in the three geographical areas, while the second allows for countries reacting in a different way to the Solvency II regime. The results are presented in Table 1.

After controlling for macroeconomic effects, for firms' characteristics and for the possible impact of the IFRS, it proves that the dummy capturing the influence of the issuance of the consultative document relative to the possible shape of Solvency II on investment risk appears significant at a 10% level for the EU25, EU15 and EU12. Despite the strong performance of the European stock and real estate markets, the anticipation of the new risk-based capital regime has led to portfolio reallocations that have tended to reduce market risk in EU insurers' balance sheets. A second round of

panel estimation has been performed to disentangle the aggregate effect of Solvency II and to allow for possible differences in country reactions regarding Solvency II. Country dummies have been multiplied by the Solvency II dummy.

In Austria and Finland, insurers have tended to increase their asset risk. This result remains relevant whatever the geographical regions considered. In Austria, small and medium-sized, well and poorly capitalised insurers have raised their equity holdings in the non-life and composite sector (see Tables 4, 5 and 6 in Appendix 3). By contrast, insurers located in Germany, Greece, Italy and Sweden have significantly reduced their investment risk. In Germany, the dampening effect of Solvency II on risk in the life and non-life sectors is not related to the capitalisation of companies. While small-sized companies have tended to raise their equity holdings, medium firms have sought to reduce them. In Italy, for the relatively well capitalised firms of small and large size operating in the life and composite business, a reduction of their equity exposures has been observed. In Greece, by contrast, only small and medium-sized composite undertakings did this, independently of their capitalisation level. Finally, Swedish life companies also contributed – albeit to a lesser extent – to limiting insurers' investment risk in Europe. In the new Member States, the dummy is significant at a 10% level and negative, which suggests that these countries have sought to reduce investment risk in relation to the Solvency II regime. This essentially involved the large and well capitalised firms in the non-life and composite industry. In France, Ireland, Luxembourg and Portugal, the coefficients of the Solvency II dummy are negative but not significant, although for France in the EU12 estimation the coefficient is nearly significant at a 10% level. For the other countries, the coefficients are positive but not significant.

Impact of capital: The capital ratio appears to be positively related to investment risk. This finding is in line with the empirical evidence,

which suggests that there is a positive relationship between capital and asset risk levels in the P&C industry (Cummins and Sommer, 1996) and in the life insurance industry (Baranoff and Sager, 2002). This positive link is consistent with agency theory, where risk-taking is inversely related to the degree of separation between managers and owners, and to insurers' desire to avoid bankruptcy costs.[45]

Regarding the impact of market prices, stock market returns tend to increase the risk-taking of insurers, while lower long-term government bond yields tend to increase the level of investment risk. The lower the bond rate, the higher the incentive to reallocate portfolios out of bonds and towards assets displaying greater returns such as equities, which results in higher asset risk. Residential property prices appear with a negative coefficient, which suggests that the higher the housing index level, the lower the risk in insurers' portfolios. Over the period, the huge rise in housing markets has frequently been perceived as a bubble, so that EU insurers may have rationally reduced their property holdings, as real estate prices have reached historical highs. The growth rate of GDP as an indicator of future income for the industry appears to be a robust variable in terms of explaining the evolution of investment risk in EU insurers' balance sheets.

Regarding the firms' characteristics, the share of subordinated liabilities together with the dummies for mutual insurers and listed companies do not prove significant and are thus not displayed in Table 1. There is no evidence of a major shift in asset allocation from listed insurance undertakings, their subsidiaries and mutual insurers since 2004 that differs from that of any other firms in the sample. However,

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45 On the other hand, a negative relation between capital and risk may be consistent with the hypothesis that deposit insurance for banks and guarantee funds for insurance companies provide incentives to increase risk as capital decreases (Cummins, 1988). Deposit insurance and guaranteed funds may be viewed as put options, with a strike price equal to the value of the guaranteed. Risky behaviour is encouraged as any shortfall between equity and liabilities can be recovered by the guaranteed fund through the exercise of the put. This can be viewed as a risk-subsidy hypothesis.

the coefficient on the size captured by the logarithm of the total assets is positive and significant. This suggests some differences in insurers' behaviour according to their size: the larger the company, the higher the level of investment risk.[46] Furthermore, the share of unit-linked products appears to be a robust variable to explain the evolution of the asset risk. The greater the share of unit-linked products in life insurers' balance sheets, the lower the asset risk. As these products are not accounted for in investment portfolios, the greater their proportion in the balance sheets, the lower the share of investment portfolios to total assets, and therefore the lower the measure used to capture investment risk.

The econometric study shows that the issuance of the consultative document about Solvency II has had some impact on the asset allocation of EU insurers' balance sheets in terms of exerting an influence towards lower investment risk, despite the strong performance of stock and real estate markets in Europe. This should induce a rather smooth transition towards the new risk-based capital regime, as the insurance undertakings that would be constrained by the new solvency standards will gradually adjust their balance sheets.

4.2.2 THE POTENTIAL TO AGGRAVATE FINANCIAL STRESS: A LONGER-TERM RISK

Herding behaviour by financial institutions and negative feedback effects

As Solvency II is a risk-based system it has the potential to enhance negative financial market feedback effects, whereby a large number of insurers may be forced to sell assets in times of financial turmoil in order to meet regulatory capital requirements. Behaviour aiming at reducing their risk profile is rational and optimal for individual institutions; however, this may in turn reinforce negative dynamics by forcing share prices to fall even further. After a stock market crash, the value of assets declines and the solvency position of insurance companies further deteriorates. Insurers would have to raise capital at the worst possible time,

when the supply of capital has dried up, or would be so low that this would entail a huge cost of capital. Therefore undertakings would have no choice but to sell shares, despite the long-term nature of their balance sheets, which would otherwise let them act as contrarians, i.e. buying in bearish markets that they may judge temporary.[47] Thus regulation may have perverse effects in forcing firms to adjust rapidly to any short-term under-funding, generating a risk of further financial instability (Davies, 2003).

Regulatory capital requirements will tend to fluctuate more with investment risk and therefore with changes in equity prices, property prices and changes in credit risk than under Solvency I. The current solvency regime may not give rise to such dynamics, as regulatory capital only depends on the amount of claims, premium and technical reserves. The design of Solvency II would to some extent mitigate such concerns through the use of the two solvency standards (MCR and SCR), combined with a range of measured supervisory interventions (Pillar II). Gradual interventions triggered when available capital moves below the SCR and until it reaches the MCR create a natural dampening mechanism, and avoid selling shares which would prevail in a unique capital requirement regime. The purpose of a risk-oriented approach is to force an institution to take action when its risk profile reaches an undesirable level.

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46 The measure of risk used ignores diversification benefits and then tends to overestimate somewhat the investment risk of larger companies with sizeable portfolios that are more likely to be diversified than those of smaller-sized firms.

47 The bursting of the equity bubble in 2000 reduced the solvency margins of insurers with large equity exposures, triggering in turn the significant selling of equities by some companies located in the United Kingdom and Germany.

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Table I Econometric results – Panel estimation

Risk	EU25		EU15		EU12	
	EU25 solvency II dummy	Country solvency II dummies	EU25 solvency II dummy	Country solvency II dummies	EU25 solvency II dummy	Country solvency II dummies
Capital	0.0040** [0.013]	0.0038** [0.017]	0.0042*** [0.009]	0.0040** [0.013]	0.0448* [0.066]	0.0040* [0.097]
Size	0.0711*** [0.004]	0.0690*** [0.005]	0.7156*** [0.004]	0.0696*** [0.005]	0.0525** [0.049]	0.0481* [0.07]
Shareul	-0.0549*** [0.000]	-0.0549*** [0.000]	-0.0549*** [0.000]	-0.0548*** [0.000]	-0.0590*** [0.000]	-0.0589*** [0.000]
Rgdp	0.0040** [0.034]	0.0039** [0.039]	0.0043** [0.02]	0.0041** [0.027]	0.0034 [0.301]	0.0028 [0.399]
Rstock	0.0013*** [0.000]	0.0011*** [0.001]	0.0012*** [0.000]	0.0009*** [0.003]	0.0007** [0.044]	0.0004 [0.302]
Ltyields	-0.0398*** [0.000]	-0.0409*** [0.000]	-0.0477*** [0.00]	-0.0498*** [0.000]	-0.0569*** [0.000]	-0.0581*** [0.000]
Resipp	-0.0053*** [0.01]	-0.0058*** [0.008]	-0.0106*** [0.000]	-0.0118*** [0.000]	-0.0042 [0.138]	-0.0043 [0.139]
DumAU45		0.7347*** [000]		0.7379*** [0.000]		0.7530*** [0.000]
DumBE45		0.0581 [0.671]		0.0899 [0.511]		0.0462 [0.738]
DumDK45		0.1296 [0.234]		0.1537 [0.158]		
DumFI45		0.3850** [0.02]		0.3753*** [0.003]		0.3760*** [0.003]
DumFR45		-0.3904 [0133]		-0.3452 [0.184]		-0.4178 [0.110]
DumGE45		-0.2053*** [0.00]		-0.2218*** [0.000]		-0.2089*** [0.000]
DumIR45		-0.0449 [0.678]		-0.0776 [0.474]		-0.0456 [0.677]
DumIT45		-0.2564*** [0.000]		-0.2532*** [0.000]		-0.2543*** [0.000]
DumGR45		-0.5868*** [000]		-0.6575*** [0.000]		-0.5709*** [0.002]
DumLu45		-0.1655 [0.241]		-0.1647 [0.243]		-0.1643 [0.244]
DumNL45		0.1057 [0.292]		0.0558 [0.577]		0.1141 [0.261]
DumPO45		-0.2127 [0.176]		-0.2486 [0.114]		-0.2147 [0.177]
DumSP45		0.1092 [0.912]		0.0368 [0.708]		-0.0085 [0.931]
DumSW45		-0.1928** [0.037]		-0.1930** [0.037]		
DumUK45		-0.0415 [0.480]		-0.0273 [0.642]		
DumEU1045		-0.9423* [0.070]				
dsolvII	-0.0515* [0.067]		-0.0510* [0.07]		-0.0593* [0.065]	
C	3.521*** [0.000]		3.5859*** [0.000]	3.6380*** [0.000]	3.6722*** [0.000]	3.7514*** [0.000]
R²	16.72%	16.20%	15.59%	16.00%	7.23%	7.93%
Nb of obs.	14970	14970	14932	14932	9388	9388

Note: "Risk" is the ratio of risk-weighted assets to total assets. "Capital" is the ratio of surplus to total liabilities. "Shareul" denotes the share of unit-linked products in total assets; "Size" is the logarithm of the total assets of insurers' balance sheet. "Rgdp" is the growth rate of nominal gross domestic products; "ltyields" is the ten-year government bond yield; "rstock" is the return on domestic stock indexes; and "resipp" is the rate of return of domestic residential property index. "DsolvII" is the Solvency II dummy that equals 1 in 2004 and 2005 and 0 otherwise. "Dum_ _45" is the country dummy multiplied by the Solvency II dsolvII dummy. *** denotes significance at 1% level, ** at 5% and * at 10%. Robust P-values of coefficients are displayed in brackets.

5 SOLVENCY II AND ITS POTENTIAL IMPACT ON THE BANKING SECTOR

5.1 POSITIVE EXPECTED OUTCOMES

A surge in M&As in the insurance sector and a potential increase in insurance securitisation are likely outcomes of Solvency II, which may significantly raise non-interest incomes of EU banks. However, the most important positive effects for financial stability are expected to arise from the emergence of a level playing-field for European financial institutions, from a lower cost of capital for EU banks and from the higher competition from EU life insurers.

5.1.1 EMERGENCE OF A LEVEL PLAYING-FIELD FOR EUROPEAN FINANCIAL INSTITUTIONS

Solvency II takes the first steps towards convergence between the regulatory frameworks for European banking and insurance activities and towards achieving greater consistency between supervisory practices. The establishment of a level playing-field capable of harmonising capital regulation for all types of institutions has become progressively more relevant owing to the steady blurring of the traditional boundaries between the types of activities and the risk borne by insurance companies, banks and other non-bank financial institutions. In principle, the same risk should result in similar capital requirements to ensure consistency between banking and insurance regulatory standards, and should preclude regulatory arbitrage opportunities across financial sectors and within entities of financial conglomerates (IAIS, 2003). For example, a CDO held by a bank or by an insurer should lead to the same capital charge, as the risk of default of this instrument remains the same whether it is located in the balance sheet of an insurance company or a bank.[48] This appears especially important to avoid an inefficient allocation of risk and capital, as this would be detrimental to financial stability (Greenspan, 1999; Knight, 2004). However, it appears difficult to achieve perfect consistency between the regulatory frameworks of Solvency II and Basel II. Although risk measurement and risk

management techniques have converged in the banking and insurance spheres over the last decade, differences in risk characteristics faced by banks and insurers will persist, translating into significant different balance sheet structures, and precluding full consistency between Solvency II and Basel II.

Beyond the difference in objectives – the primary aim of Solvency II is to strengthen the protection of policyholders, while Basel II is more focused on the solvency positions of large international banks – there are several other reasons that prevent full consistency. The first reason lies in the fact that risk-taking initially occurs on the liabilities side of the balance sheet for insurance undertakings, while banks take risks on the assets side (loans, mortgages, etc.). As a result, risk-based capital requirements under Basel I and Basel II only focus on risk originating from the assets side and ignore risk from the liabilities side, whereas Solvency II addresses risks from the liabilities side and the asset-liability mismatch, in addition to credit and market risks.[49] Hence, a similar asset portfolio with constant risk for one bank and one insurer may not give rise to the same capital charge, as risks on the liabilities side have to be taken into account in capital requirements in the insurance industry. However, the fact that the Solvency II regime recognises risk diversification to a greater extent than Basel II somewhat mitigates the higher capital requirements for insurance undertakings than for banks.

More broadly, the solvency risk posed by any financial institution should theoretically depend on its entire balance sheet. The bulk of bank liabilities are deposits that are payable on demand with equal value in all states of nature,

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[48] However, one could also argue that CDO exposures may not be treated in the same way in terms of capital charges in both the banking and insurance sectors, if failure in the latter is not perceived as posing a systemic risk to the same extent as in the banking sector (Booth, 2002).

[49] To ensure that each risk category is treated in a consistent way, Solvency II aims at calibrating a defined probability of insolvency of 0.5%. This differs greatly from the calibration in Basel II, which was based on the previous level of capital at 8% of risk-weighted assets.

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whereas insurers have a contingent liability structure in which claims are only paid in subsets of states of nature (see Chart 11). Hence, banks would be expected to have higher capital requirements than insurers for a given asset portfolio with constant risk if liquidity risk on the liabilities side is included in the bank capital regulation (Kupiec and Nickerson, 2005). However, bank deposits benefit from some form of insurance, so that the difference between risks in insurers' and banks' liabilities may not be so clear-cut.

Furthermore, the elements eligible as capital may also differ within the banking and insurance regulatory regimes (CEBS/CEIOPS, 2007). This may give a competitive advantage to the financial sector, which benefits from having a larger list of assets eligible for regulatory capital, as this tends to lower the cost of capital. Although the same risk may give rise to the same capital charge in the two risk-based systems, regulatory arbitrage opportunities may not totally disappear. Finally, on the supervisory side, it is necessary to ensure that the general objective of harmonisation between the two regimes – also taking into account the goal of level playing-field – does not introduce incentives for financial institutions in both sectors for a premature use of the more advanced risk management techniques, such as full

models, before these tools meet demanding standards and reach a high level of robustness.

5.1.2 POSSIBLE LOWER COST OF CAPITAL FOR EU BANKS AND BANCASSURANCE GROUPS

Solvency II will encourage insurers to close the negative duration gap of their balance sheets, and may lead to investment in both government and corporate bonds (see Sub-section 4.1.1). In Europe, the most important issuers of long-term corporate bonds are banks (see Chart 12). Hence, insurers that favour corporate bonds in their portfolios are likely to invest more in debt instruments issued by EU banks. In 2005 the flow of net issuance of long-term debt by euro area banks represented about 15% of the total stock of bonds held by EU insurers. Hence, any portfolio reallocation out of equities towards bonds or any inflows invested exclusively in bonds are likely to put downward pressure on EU banks' senior and subordinated spreads, and could eventually reduce the cost of capital for banks.

Senior debt constituted the bulk of debt flows issued by EU banks (see Chart 13). Therefore, depending on whether insurers invest in banks' subordinated or senior debt, the final impact on spreads may differ, owing to the thinner subordinated market segment. As the yield associated with subordinated debt is much

Chart 11 Balance sheet structure of large and complex banking groups in the euro area

- other assets
- fixed assets
- cash
- securities
- customer loans
- other liabilities
- equity
- other funding
- money market funding
- deposits
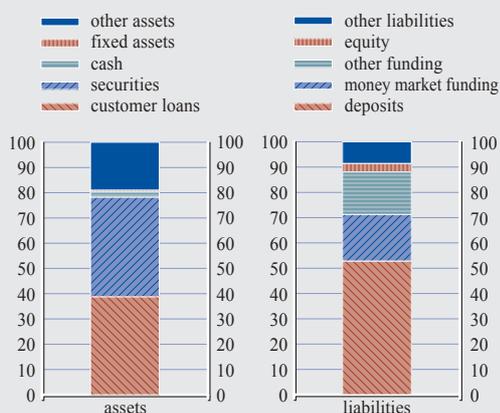
Sources: Bureau van Dijk (Bankscope) and ECB calculations.

Chart 12 Issuance of long-term securities other than shares by euro area governments, non-financial corporations and monetary institutions

(in EUR millions)

- non-financial corporate sector
- governments
- monetary and financial institutions
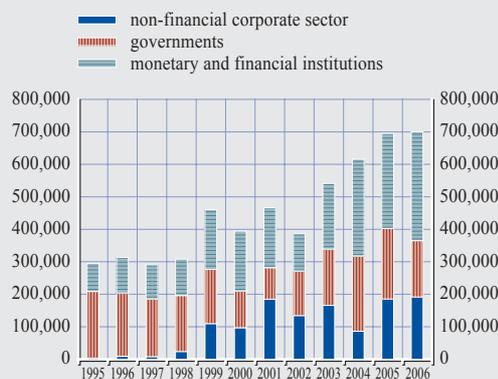
Source: ECB.
Note: 2006 data encompass issuance until November 2006.

Chart 13 Issuance of senior and subordinated debt by EU private and public banks

(in EUR billions)

- senior debt
- subordinated debt
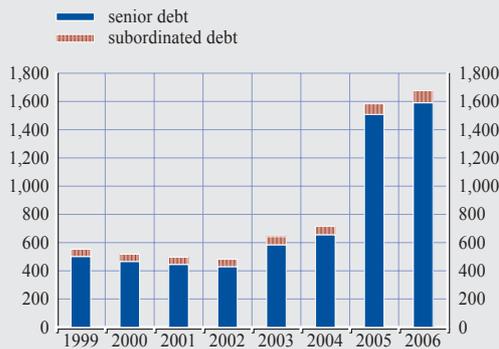
Source: Bondware.

Chart 14 Yields on ten-year senior and subordinated debt issued by euro area banks

(yields in %)

- banks senior all 10+ yield
- banks all sub all 10+ yield
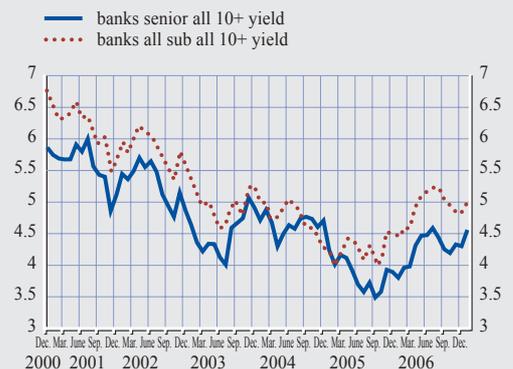
Source: JP Morgan.

higher than that of senior debt, insurers may rationally prefer the subordinated segment in the search for yield (see Chart 14). The subordinated spread for EU banks could possibly face more downward pressures than the senior spread.

5.1.3 INCREASED COMPETITION IN THE EU BANKING SECTOR FROM LIFE INSURERS

Solvency II may exacerbate somewhat competition in the EU core banking market, which is positive from a financial stability viewpoint as competitive pressures may ensure a certain level of efficiency in the medium term. The new regulatory regime may prompt life insurance companies to convert their traditional life policies into unit-linked products (see Sub-section 3.1.2). Whereas traditional life policies with guaranteed returns are not substitutable for banking products, unit-linked products share many features with banks' saving products, as they are indexed to the performance of stock markets and to a less extent to bond markets. A second source of competitive pressure may also come from the incentive for EU insurers to invest more in bonds, including corporate bonds, which would directly compete with bank loans. In mobilising a growing share of households' savings, insurers are likely to constitute a growing source of funding for the corporate sector in the period ahead. Although

bank loans may not totally substitute for market financing, competition in the EU banking core market may intensify significantly. This trend could furthermore be reinforced by Basel II, which might induce EU banks to favour credit to households rather than riskier small corporations.

By contrast, EU banks will not face intense competitive pressures in their core market from insurers seeking diversification benefits by expanding their business to banking activities and in engaging in M&As in the EU banking sector. Indeed, like the Basel II capital framework, Solvency II will not recognise diversification benefits from non-correlated insurance and banking activities within financial conglomerates and bancassurance groups through lower regulatory capital requirements, on the grounds that Basel II only focuses on banks and Solvency II only on insurance undertakings.[50] The European insurance and banking regulations certainly do not therefore promote, or at least do not reward, the establishment of large financial groups in Europe. From a financial stability viewpoint, the emergence of large insurance groups is less

[50] In most EU jurisdictions the different entities of a bancassurance or financial conglomerate are supervised separately according to sector-specific regulation, while they have to comply with Directive 2002/87/EC on financial conglomerates.

problematic than that of large bancassurance groups, which may represent a more serious source of systemic risk through contagion risk (Darlap and Mayr, 2006).[51] The disregarding of diversification benefits between different business lines of bancassurance may therefore be rather positive when seen from this perspective.

5.2 POTENTIAL NEGATIVE OUTCOMES

5.2.1 TWO POTENTIAL NEGATIVE CONSEQUENCES IN THE SHORT TERM

Beyond the possible negative spillover of falling insurance stock prices on banks and bancassurance valuation, Solvency II is expected to have two main effects in the short term. First, it is likely to induce a redistribution of risks between insurers and banks that might increase counterparty risk for banks in the short term. Second, Solvency II may well increase cross holding of equities and subordinated debt between EU banks and insurers.

Possible retrenchment of insurers from the CRT markets and higher counterparty risk for EU banks

The implementation of Solvency II entails the convergence of regulatory regimes for banks and insurance companies in Europe. As credit risk in insurers' balance sheets will give rise to higher regulatory capital in the new risk-based capital regime, regulatory arbitrage opportunities may decline, and insurers will have less incentive to absorb additional credit risk from the banking sector. Risk-sharing between banks and insurers, which had formerly contributed to strengthening the resilience of the banking system, may therefore be reduced. The ongoing retrenchment of insurers from the CRT markets in Europe which started in 2003 may thus accelerate further. This may have negative implications for banks unless they can find other counterparties to absorb their credit risk. The involvement of hedge funds in credit derivatives markets, which has been steadily rising in recent years, may indeed intensify in the period ahead (Fitch Ratings, 2006b). In 2006 hedge funds became the most important

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Chart 15 Relative importance of hedge funds in the CRT market

(percentages)

Source: BBA.
Note: 2008 data are forecasts.
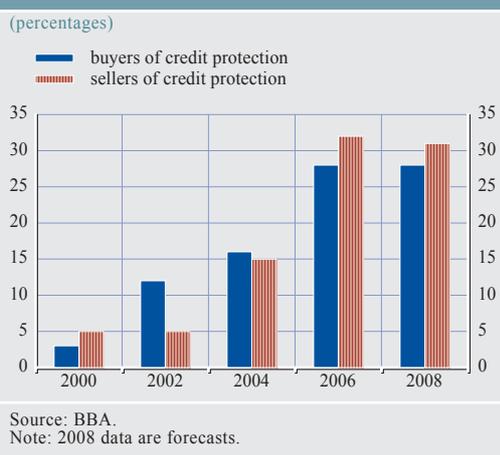
counterparty of banks in the credit risk market, representing about 32% of the total selling position of credit protection instruments. The insurance sector by contrast only accounted for 17%, down from 20% in 2004 (BBA, 2006) (see Chart 15). The rising concentration of credit risk in hedge funds' balance sheets will increase the counterparty risk exposure of EU banks to these unregulated and opaque institutions, a fact that could prove prejudicial to financial stability in the medium term.

On the other hand, Basel II will significantly reduce the stimulus for banks to continue to transfer high-quality loan risk from their balance sheets (Fitch Ratings 2005b). In the 1998 Basel Capital Accord, high and low-quality loans, albeit with different credit risks, led to similar amounts of regulatory capital. This provided EU banks with a significant incentive to shed high-quality credit risk from their balance sheets, and explains why initial transfers of credit risk in credit derivatives markets have focused on the less risky part of structured products, senior CDO tranches. As such uniform treatment of credit risk in term of capital requirements will disappear in Basel II,

51 Due to contagion and reputation risks, any diversification benefits that would have been recognised in bancassurance could be rapidly removed as the correlation that is used to aggregate the various diversifications in risk types and business lines increases significantly during periods of financial turmoil (Schulte-Herbrüggen and G. Becker, 2006).

regulatory-based risk transfers from banks may diminish unless they involve increasingly riskier tranches. However, it is more likely that risk management considerations rather than regulatory arbitrage may foster future transfers of risk (Fitch Ratings, 2005a and 2006).

Higher cross holding of securities between EU insurers and banks in the short term

An indirect and possibly negative impact of Solvency II could be a rise in cross holding of subordinated debt and equities between EU banks and insurance undertakings (see Sub-section 2.2.2). With the greater recognition of subordinated debt and hybrid capital as eligible elements of regulatory capital in Solvency II, insurers may rationally issue more of these instruments in the same way as banks in the past as a response of Basel II.[52] Banks are now the most important issuers of subordinated debt in the euro area. Unlike traditional cross-shareholdings that are often stable, cross-holdings of subordinated debt may be more volatile as subordinated debt ultimately matures. This may enhance stock prices and subordinated spread interdependencies between EU insurers and banks, thereby reinforcing contagion channels across financial sectors and thereby increasing systemic risk, since the bankruptcy of a bank or an insurer will directly impinge on the other sector (Davies, 2003).

5.2.2 TWO POTENTIAL NEGATIVE OUTCOMES IN THE MEDIUM TERM FOR THE EU BANKING SYSTEM

In the medium term, the risk redistributions from insurers to policyholders and also within households that are expected from Solvency II could increase the overall level of risk in the economy and of credit risk in EU banks' balance sheets. It cannot be excluded that the implementation of the new risk-based solvency regime for EU insurers may result in a slightly less diversified financial system as well.

Potential higher credit risk for banks from riskier household balance sheets

The new risk-based capital regime will provide EU insurers with a significant incentive to sell

unit-linked products rather than traditional life policies with guaranteed returns, as this shift will lower regulatory capital requirements. Through this shift in products, more risk will be transferred to policyholders. The spreading of risk from insurance companies' balance sheets and its dissemination to a large number of policyholders could possibly increase the overall level of risk in the economy.

Some risks that were previously diversified away by pooling individual risks at the insurance company level may now re-emerge in households' balance sheets. Consider the individual component of longevity risk that can be eliminated in insurers' balance sheets, because the savings of those who die earlier than the average lifespan finance the retirement income of those who live longer (see Sub-section 2.1.3). The change from annuities to unit-linked products with a lump sum as an exit option effectively transfers both financial and longevity risk – the individual and collective components – to the policyholders. Hence, rather than benefiting from a certain income flow during the entire retirement period until death, policyholders would have an uncertain level of accumulated wealth that will depend on the performance of the financial markets over their working life, and would on top of this face an additional source of uncertainty arising from the uncertainty of their lifespans. While the source of uncertainty for insurers was correctly predicting the average expected longevity, households face both the risk of underestimating the average lifespan and the risk of living longer than average. Furthermore, the level of risk/return that policyholders could reach individually may be

52 In 1998, the Basel Committee amended the definition of tier 1 capital to include hybrid capital securities, subject to a limit of 15% of tier 1 for hybrids with step-up. While the Sydney press release did not fix an explicit limit for hybrids without step-up, this was interpreted in some Member States as meaning that hybrids without step-up were recognised as eligible for up to 50% of total original own funds. The subordinated debt may be included in tier 2 capital as hybrid capital, either in upper tier 2 if it is a perpetual debt or in lower tier 2 if it has a minimum maturity of greater than five years. The amount of lower tier 2 subordinated debt allowed is equivalent to 50% of tier 1 capital.

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significantly lower than that achieved by insurers, which benefit from economies of scale, from risk diversification in their portfolios and reduced transaction costs. Hence, not only may the risk attached to retirement saving be higher, but the return for a given level of risk may be lower as well.

It is highly probable that households are not fully aware of the nature and scale of the risk they face when deciding to invest in more complex products than traditional life policies with guaranteed returns (IMF, 2005b). This may be problematic for consumer protection of low-income individuals who are not able to incur the costs of obtaining financial advice and who bear the risk of outliving their resources. Even for high-income households, any decision on saving may prove non-optimal, given uncertainty about longevity. In general, risk transfer has beneficial systemic effects only to the extent that those who bear the risk are better equipped to withstand them than those who shed them. Financial intermediaries are likely to be better positioned than households to bear and manage investment and longevity risks over long horizons and to absorb significant financial losses (Häusler, 2005).

It is important to keep in mind that households (domestic and foreign) own all of the assets and liabilities in the economy. While financial intermediaries can smoothen-out higher frequency risks, thereby acting as shock-absorbers, the household sector ultimately bears all of the financial risk in the economy. As stakeholders of insurance companies, households are generally exposed *only indirectly* to financial and longevity risks, either as shareholders, creditors or policyholders. However, if Solvency II leads to a greater transfer of these risks to policyholders, the final impact on policyholders may be less positive than for the shareholders, and may even prove negative as it may lead to a redistribution of risk to heavily indebted low income households. This could lead to an increase in credit risk for banks because adverse market disturbances could then impair the capacity of households to honour their debt obligations.

Indirect impact: a less diversified financial system

The increased convergence in the regulatory framework for European financial institutions may have some possible downsides for the preservation of financial stability in periods of financial turmoil (Carey and Stulz, 2005). In the insurance industry, more risks will be assessed and managed in the same way. As Solvency II aims at consistency with the banking regulatory framework and at reducing regulatory arbitrage opportunities, a certain degree of convergence will be achieved regarding risk and capital management across the two sectors. As a result, more homogeneous risk assessment and management within the European financial landscape may be expected from the implementation of Solvency II. This could result in herding behaviour if a growing number of financial institutions were to adopt a common risk modelling framework, possibly posing risks of adverse dynamics at times of market stress (see Basak and Shapiro, 2001; Scholes, 2000).

6 CONCLUSION

The key objectives of Solvency II are to enhance the protection of policyholders, to deepen the integration of the EU insurance market, and to improve the competitiveness of European insurers. Solvency II also aims at fostering consistency of prudential supervisory and regulatory requirements across financial sectors (banks and insurers) in Europe, and it will represent a step towards greater harmonisation of national legislation and convergence of supervisory practices. The new system will cover life, non-life and reinsurance companies and, like Basel II for banks, it will have a three-pillar structure.

Although the analysis contained in this report identifies a number of areas where there is potential for risks to financial system stability to develop during the transition phase in implementing Solvency II and afterwards, it is important to emphasise that the overall assessment is that the new risk-based capital requirement system will most likely make a positive and lasting contribution to EU financial system stability. As regards the transition risks identified, some relate to the insurance sector directly. In addition, because the EU insurance sector is sizeable and because it has growing linkages with the banking system and financial markets, Solvency II also has the potential to affect other parts of the financial system, beyond the insurance sector.

Beginning with the insurance industry, one of the main positive expected outcomes from Solvency II is an enhancement of protection of policyholders that will be achieved by reinforcing the financial strength and resilience of the European insurance industry. Greater transparency, consolidation and integration of the EU insurance market, together with an expected improvement in the allocation of capital resources and risks within the industry, should contribute to raising the efficiency and improving the competitiveness of the European insurance sector. This should be realised through recognition of risk diversification/

mitigation benefits for meeting regulatory capital requirements, stricter requirements for risk and capital management and enlarged public financial disclosure requirements.

A high level of efficiency should be beneficial for the longer-term stability of the financial system. This is because it facilitates efficient pricing and sharing of risks in the economy. However, there can be circumstances where attempts to strengthen the efficiency of the financial system may pose risks for financial stability in the short term. In this respect, one of the possible negative impacts of Solvency II is an increase in the volatility of earnings and capital positions of EU insurers. In the short term, this could arise from relatively inefficient companies being forced to exit the market, potentially causing insurance sector risk premiums to rise. In the medium term, volatility may also stem from market-based valuation of insurers' assets and liabilities, together with possible variations in their overall risk profiles and therefore in the capital requirements in the new risk-based regulatory regime.

As for financial markets, the impact of Solvency II is likely to remain fairly limited. On the positive side, the new regulatory regime should foster the further development – in terms of size, depth and liquidity – of European corporate bond markets. This is because it is likely to encourage EU insurers to invest more of their assets in long-term bonds, including corporate debt securities, while at the same time facilitating higher levels of issuance of subordinated and hybrid debt. Furthermore, because the new system will recognise geographical risk diversification, this may foster more investment in bonds outside the EU, thereby possibly leading to a reduction of existing home biases in bond portfolios.

Although some potential risks of the new regulatory regime for financial markets can be identified, these appear to be rather limited. While asset prices could be vulnerable to possible portfolio reallocation from equities to bonds, the evidence so far is that this has been

taking place, possibly in anticipation of Solvency II, in a rather smooth and gradual fashion. However, in the medium term, negative financial market feedback effects and herding issues could become more relevant. Since Solvency II is a risk-based system it has the potential to enhance feedback effects, whereby a large number of insurers may be forced to sell assets in a situation of financial turmoil in order to meet regulatory capital requirements. Furthermore, if more financial institutions adopt similar risk-modelling frameworks, the tendency towards common behaviours could be amplified.

Finally, the impact on the EU banking sector is likely to be overall positive. Convergence towards a harmonised regulatory and supervisory framework for both insurance and banking activities may provide fewer opportunities for regulatory arbitrage, thereby improving the allocation of risk and capital across the financial system. In addition, any possible higher demand for long-term debt instruments on the part of insurers could mean that the cost of capital for banks could decline since Solvency II will reward bond-holding and, in Europe, banks are the most important issuers of long-term corporate bonds. Finally, Solvency II may also foster a higher competitive environment for banks in Europe as life insurance undertakings will be encouraged to offer more savings products to households (i.e. unit-linked products) that are traditionally sold by banks and also to invest more in corporate bonds, which may directly compete with bank loans to corporations.

However, there are two possible risks for the banking sector associated with the implementation of Solvency II: greater credit risk and risks associated with cross-holdings of securities between the banking and insurance sectors. Concerning credit risk, banks may find fewer counterparties willing to take exposures to credit risks if the insurance sector retrenches from the credit risk transfer market or they may find their exposures vis-à-vis hedge funds rising if these lightly regulated and highly opaque

institutions were to step in to take on exposures previously borne by insurers. In addition, if household sector balance sheets became more sensitive to asset market developments, the credit risk of banks could rise. This could happen if Solvency II were to lead to a redistribution of risk from insurers to policyholders – especially low income and highly indebted households – through a shift from traditional life policies with guaranteed returns to unit-linked products. For the latter products, the investment risk is fully borne by the policyholders. This may increase credit risk in banks' balance sheets in the medium term as asset price developments could adversely affect their ability to repay debts.

As regards the second source of risk for banks, better recognition of subordinated debt and hybrid capital as eligible capital in Solvency II will encourage EU insurers to increase their issuance of these instruments. This might increase cross-holdings of equities and subordinated debt between EU banks and insurers. Systemic risk could increase as a result, since the bankruptcy of a bank or an insurer would directly impinge on the other sector through enhanced market price interdependencies between EU insurers and banks.

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CHARTS

Chart S1 Global collateralised debt obligation (CDO) issuance

(Q1 2004-Q2 2006, USD billions, notional amounts)

- cash flow CDOs
- funded bespoke tranches
- unfunded bespoke tranches
- standard index tranches

synthetic credit
risk transfer
portfolio instruments
= portfolio credit swaps
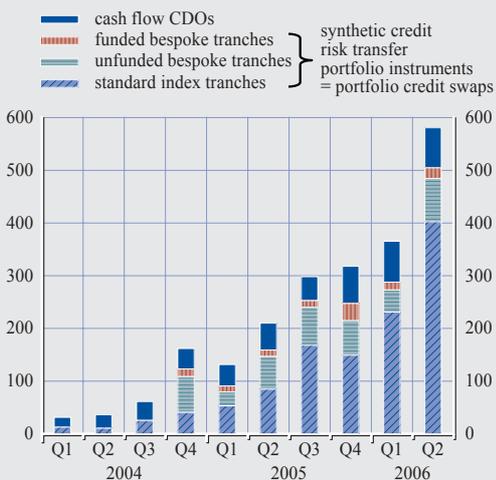
Sources: Bond Market Association and Creditflux.
Note: Notional amounts were not adjusted for the riskiness of different tranches. Portfolio credit swaps mostly consist of synthetic CDOs. The term "unfunded" implies that the principal amount is not transferred between the two parties, while "bespoke" denotes customised, tailor-made, non-index or non-standard tranches.

Chart S2 Share of unit-linked products in total investment portfolios according to size

(Share of unit linked products in total investment portfolios)

- 0
- 0-5
- 5-20
- 20-50
- >50
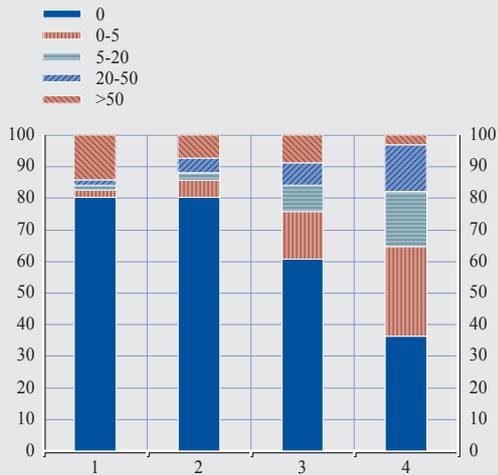
Source: S&P.

8.2 APPENDIX 2

STATISTICAL TABLES

Table 1 Information on EU insurers' balance sheets by year						
Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.531	3.882	0.207	50.671	13.999	5.424
1996	12.615	3.870	0.205	51.442	14.010	4.916
1997	12.623	3.968	0.209	51.045	15.384	4.531
1998	12.731	4.045	0.217	51.285	16.897	4.123
1999	12.852	4.082	0.221	50.239	18.931	3.727
2000	12.906	4.050	0.217	49.895	19.333	3.638
2001	12.981	3.912	0.209	50.996	17.584	3.408
2002	12.889	3.671	0.216	51.413	15.622	3.418
2003	12.972	3.645	0.209	51.943	15.562	3.151
2004	13.141	3.660	0.207	50.591	16.065	2.862
2005	13.378	3.949	0.216	48.361	17.804	2.506
Total	12.850	3.890	0.212	50.796	16.448	3.862

Source: S&P.

Table 2 Information on EU insurers' balance sheets by country

Country	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
Austria	12.86	4.61	0.13	36.05	24.64	6.59
Belgium	12.69	4.57	0.16	63.69	14.10	4.50
Cyprus	10.75	1.47	0.53	60.91	34.50	0.00
Czech Republic	10.68	3.38	0.35	53.64	9.75	7.97
Denmark	12.95	5.87	0.24	65.70	19.17	2.77
Estonia	9.29	4.95	0.44	36.43	25.42	14.93
Finland	12.30	5.64	0.17	51.10	20.25	14.76
France	13.65	4.86	0.16	63.31	16.70	5.86
Germany	13.23	3.05	0.16	14.36	20.31	2.60
Greece	12.01	4.14	0.22	45.88	26.73	13.25
Hungary	10.56	3.91	0.38	61.37	14.83	5.77
Ireland	12.82	3.02	0.26	62.68	10.94	1.22
Italy	13.44	4.14	0.14	79.87	6.51	4.14
Latvia	8.67	2.93	0.55	49.40	2.06	9.66
Luxembourg	12.45	3.58	0.13	64.64	16.54	1.09
Malta	10.60	3.89	0.41	48.57	11.47	12.99
Netherlands	13.28	3.36	0.21	46.97	14.87	2.24
Poland	11.37	3.30	0.30	69.86	5.43	2.60
Portugal	12.31	5.01	0.17	61.97	12.70	13.66
Slovakia	12.09	3.07	0.18	45.85	7.67	6.73
Slovenia	12.98	3.34	0.19	51.02	4.15	6.95
Spain	13.08	3.49	0.16	58.67	3.74	7.13
Sweden	12.74	5.13	0.23	57.11	28.17	3.72
UK	12.46	3.41	0.30	58.84	15.83	2.02
Total	12.85	3.89	0.21	50.80	16.45	3.86

Source: S&P.

Table 3 Information on EU15 insurers' balance sheets by year and by country

Austria

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.688	3.571	0.135	34.256	14.910	7.704
1996	12.681	3.668	0.129	37.819	13.170	7.183
1997	12.539	3.882	0.132	38.836	15.325	7.006
1998	12.674	4.235	0.147	36.198	19.736	6.491
1999	12.732	4.810	0.141	33.896	26.063	6.803
2000	12.823	5.008	0.133	32.081	30.741	6.675
2001	12.777	5.088	0.123	33.301	31.739	6.733
2002	13.048	5.087	0.123	35.094	30.702	6.354
2003	13.103	5.035	0.133	39.059	29.155	6.155
2004	13.209	5.285	0.140	37.889	31.534	5.655
2005	13.385	5.662	0.120	39.233	34.027	5.088
Total	12.855	4.612	0.133	36.054	24.637	6.593

Belgium

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.525	4.488	0.143	64.256	10.863	5.035
1996	12.584	4.507	0.138	63.953	10.906	4.700
1997	12.505	4.695	0.139	64.678	13.042	4.175
1998	12.532	4.737	0.163	64.188	15.332	4.466
1999	12.412	4.587	0.166	65.109	15.270	4.476
2000	12.513	4.615	0.173	63.720	17.071	4.216
2001	12.732	4.436	0.158	61.842	15.676	5.315
2002	12.986	4.259	0.144	59.755	15.424	4.709
2003	12.963	4.478	0.156	62.243	14.459	4.211
2004	12.991	4.597	0.169	63.934	14.041	4.120
2005	13.397	4.915	0.177	66.916	13.217	3.796
Total	12.694	4.570	0.156	63.693	14.095	4.503

Germany

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	13.094	2.742	0.154	20.671	13.803	3.614
1996	13.074	2.794	0.150	18.557	15.194	3.369
1997	12.957	3.036	0.156	17.187	18.171	3.091
1998	13.139	3.242	0.155	15.815	21.100	2.935
1999	13.168	3.316	0.153	13.327	23.100	2.719
2000	13.195	3.345	0.161	12.152	24.394	2.562
2001	13.238	3.270	0.156	12.001	23.802	2.364
2002	13.314	3.063	0.157	11.587	22.322	2.205
2003	13.347	2.918	0.157	12.025	20.897	2.010
2004	13.427	2.799	0.157	12.395	19.543	1.918
2005	13.615	2.949	0.148	12.348	20.795	1.778
Total	13.229	3.045	0.155	14.359	20.309	2.602

Table 3 Information on EU15 insurers' balance sheets by year and by country (cont'd)

Denmark

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.624	5.589	0.241	70.073	12.050	3.133
1996	12.735	5.758	0.234	69.665	13.865	2.647
1997	12.701	5.907	0.245	67.372	16.653	2.473
1998	12.823	6.074	0.250	63.887	20.901	2.327
1999	12.842	6.302	0.253	61.946	24.078	2.201
2000	13.029	6.279	0.248	61.872	24.428	2.639
2001	13.019	6.112	0.225	64.256	21.330	3.096
2002	13.163	5.567	0.230	69.670	15.640	3.660
2003	13.182	5.344	0.235	67.901	17.817	3.323
2004	13.320	5.662	0.232	63.869	22.633	2.780
2005	13.343	5.588	0.246	62.133	22.135	2.596
Total	12.946	5.871	0.241	65.700	19.168	2.772

Finland

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	11.828	4.664	0.144	43.987	12.299	21.648
1996	11.987	5.111	0.129	47.835	14.773	18.373
1997	11.974	5.414	0.152	48.226	16.999	17.499
1998	12.204	5.648	0.196	49.911	18.417	16.412
1999	12.358	5.990	0.179	51.589	22.479	15.448
2000	12.266	5.508	0.203	51.255	20.343	13.688
2001	12.389	5.627	0.180	53.981	20.465	13.082
2002	12.502	5.828	0.166	55.036	20.983	12.096
2003	12.257	6.098	0.172	54.115	24.676	11.901
2004	12.424	6.066	0.159	52.044	27.145	11.076
2005	13.903	6.315	0.136	55.929	26.886	8.817
Total	12.304	5.636	0.166	51.095	20.253	14.761

France

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	13.336	4.979	0.154	61.183	16.632	7.501
1996	13.370	4.939	0.169	62.546	15.555	6.807
1997	13.380	5.020	0.163	63.638	16.904	5.840
1998	13.638	5.059	0.158	64.247	17.204	5.711
1999	13.882	4.933	0.148	63.695	17.434	5.541
2000	13.934	4.943	0.166	61.523	18.874	5.035
2001	13.977	4.551	0.153	67.925	13.540	4.534
2002	13.243	4.146	0.176	63.303	18.603	5.705
2003	13.939	4.033	0.139	63.443	18.916	5.980
2004	13.646	3.489	0.187	58.185	14.863	6.414
2005	14.573	4.623	0.208	54.798	17.049	5.104
Total	13.647	4.855	0.160	63.307	16.699	5.859

Table 3 Information on EU15 insurers' balance sheets by year and by country (cont'd)

Ireland

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.372	3.401	0.224	66.004	11.144	1.719
1996	12.447	3.330	0.225	65.883	10.272	1.488
1997	12.568	3.279	0.210	66.807	9.728	1.417
1998	12.721	3.077	0.235	66.845	8.760	1.251
1999	12.521	3.243	0.284	62.268	11.329	1.346
2000	12.671	3.058	0.258	60.445	15.403	0.997
2001	13.003	2.821	0.267	59.088	13.450	1.245
2002	13.025	2.589	0.295	58.413	9.477	1.059
2003	13.049	2.809	0.294	60.514	11.040	0.945
2004	13.165	2.879	0.291	61.452	10.681	0.876
2005	13.487	2.815	0.296	62.936	8.777	1.148
Total	12.821	3.020	0.262	62.680	10.940	1.219

Italy

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.591	4.770	0.178	78.552	3.889	6.754
1996	12.871	4.898	0.161	79.615	4.398	6.186
1997	12.878	4.949	0.161	78.086	5.139	5.921
1998	13.222	4.535	0.145	79.547	5.047	4.969
1999	13.607	4.351	0.131	77.544	8.204	3.487
2000	13.471	4.002	0.128	80.704	8.401	3.775
2001	13.583	3.792	0.133	80.800	7.767	3.624
2002	13.641	3.506	0.127	81.317	6.471	2.969
2003	13.796	3.543	0.128	81.640	7.172	2.658
2004	14.006	3.561	0.127	80.840	7.213	2.484
2005	14.748	4.023	0.115	76.595	8.915	2.494
Total	13.442	4.141	0.140	79.867	6.514	4.141

Greece

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	11.453	4.353	0.210	51.645	20.495	21.875
1996	11.596	4.306	0.223	50.418	22.360	19.110
1997	11.785	4.249	0.195	52.198	24.055	15.923
1998	11.933	4.707	0.183	46.833	32.520	12.988
1999	12.469	4.329	0.212	36.550	39.770	10.743
2000	12.317	3.911	0.241	35.520	29.075	9.465
2001	11.986	3.958	0.192	33.857	36.295	11.208
2002	11.557	4.152	0.235	55.796	26.654	10.246
2003	12.133	4.210	0.223	46.680	22.750	15.007
2004	12.582	3.691	0.213	52.060	15.117	12.710
Total	12.005	4.139	0.216	45.879	26.734	13.251

Table 3 Information on EU15 insurers' balance sheets by year and by country (cont'd)

Luxembourg

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.044	3.610	0.109	63.921	11.354	2.444
1996	12.108	3.388	0.109	67.220	9.260	1.821
1997	12.222	3.584	0.099	66.625	16.061	1.320
1998	12.222	3.780	0.137	69.314	14.237	1.157
1999	12.366	3.710	0.124	67.845	18.041	1.435
2000	12.581	3.611	0.107	63.269	19.338	1.010
2001	12.560	3.435	0.116	62.460	18.042	0.885
2002	12.654	3.516	0.113	64.589	18.979	0.785
2003	12.726	3.504	0.134	63.885	18.018	0.689
2004	12.689	3.375	0.161	60.514	18.110	0.774
2005	12.436	3.889	0.230	62.337	15.849	0.152
Total	12.448	3.577	0.130	64.640	16.544	1.086

Netherlands

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.787	2.629	0.208	36.000	9.756	3.779
1996	12.901	2.872	0.218	38.626	11.398	3.418
1997	12.951	3.265	0.225	41.657	14.911	3.264
1998	12.937	3.549	0.236	43.459	17.191	2.642
1999	13.102	3.682	0.238	44.002	19.954	1.822
2000	13.304	3.715	0.207	45.957	20.563	1.514
2001	13.391	3.521	0.199	49.639	17.426	1.525
2002	13.576	3.313	0.173	52.213	13.254	1.793
2003	13.691	3.496	0.186	57.575	12.281	1.620
2004	13.867	3.487	0.189	57.136	12.500	1.300
2005	14.040	3.587	0.211	57.906	13.787	1.190
Total	13.280	3.360	0.209	46.969	14.875	2.240

Portugal

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	11.666	4.892	0.186	60.210	6.309	18.590
1996	11.835	5.001	0.174	61.300	10.308	16.984
1997	11.986	5.155	0.179	59.408	13.465	16.757
1998	12.225	5.077	0.154	59.792	13.897	15.168
1999	12.347	5.104	0.178	57.735	16.133	13.081
2000	12.282	5.275	0.184	62.271	16.707	11.756
2001	12.923	4.948	0.139	61.896	14.412	11.392
2002	12.635	4.935	0.136	63.316	13.942	10.203
2003	12.781	4.854	0.138	65.473	14.910	10.773
2004	12.866	4.634	0.163	67.766	10.494	8.521
2005	12.805	5.146	0.157	69.543	11.045	9.336
Total	12.306	5.012	0.165	61.970	12.696	13.657

Table 3 Information on EU15 insurers' balance sheets by year and by country (cont'd)

Sweden

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.266	4.668	0.215	55.946	23.814	7.149
1996	12.310	5.269	0.261	55.988	29.071	4.797
1997	12.312	5.242	0.272	54.209	30.307	3.409
1998	12.595	5.440	0.266	52.948	32.083	4.217
1999	12.877	5.364	0.273	53.847	33.693	2.808
2000	12.864	5.135	0.236	54.682	31.041	3.596
2001	12.836	5.339	0.237	56.004	28.712	2.828
2002	12.706	4.954	0.210	62.019	23.134	3.893
2003	12.803	4.658	0.187	63.226	22.766	3.232
2004	13.210	4.912	0.201	60.542	25.437	2.854
2005	13.289	5.388	0.198	59.662	28.167	2.712
Total	12.737	5.132	0.233	57.108	28.171	3.722

Spain

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.500	3.766	0.180	56.484	4.265	10.449
1996	12.760	3.638	0.157	53.780	3.851	9.444
1997	12.763	3.525	0.147	53.147	4.256	8.939
1998	13.096	3.471	0.150	56.389	3.967	7.445
1999	13.406	3.498	0.150	62.185	4.258	4.958
2000	13.127	3.457	0.152	62.758	4.027	5.790
2001	13.298	3.412	0.154	61.706	3.631	6.829
2002	13.091	3.444	0.163	60.062	3.175	6.596
2003	13.167	3.276	0.172	60.226	2.549	5.406
2004	13.513	3.546	0.175	61.466	3.940	5.820
2005	14.256	3.224	0.128	54.972	3.569	3.474
Total	13.082	3.491	0.159	58.669	3.742	7.132

United Kingdom

Year	Size	Risk	Capital	Share of bonds	Share of equities	Share of real estate
1995	12.037	3.665	0.293	55.610	18.572	2.596
1996	12.181	3.366	0.281	57.944	15.989	2.257
1997	12.293	3.330	0.287	57.646	15.205	2.120
1998	12.348	3.353	0.292	58.199	16.047	1.835
1999	12.516	3.398	0.309	58.794	17.300	1.858
2000	12.582	3.453	0.306	57.212	17.646	2.026
2001	12.582	3.410	0.305	58.680	15.830	1.832
2002	12.527	3.249	0.316	60.847	13.395	2.077
2003	12.554	3.327	0.296	61.776	13.766	2.042
2004	12.818	3.371	0.272	60.336	14.776	1.817
2005	12.817	3.705	0.321	62.099	14.798	1.639
Total	12.458	3.410	0.297	58.842	15.828	2.025

8.3 APPENDIX 3

FURTHER ECONOMETRIC RESULTS

Table 4 Impact of Solvency II on relatively well and poorly capitalised EU insurers					
	Well versus poorly capitalised dummies	Relatively well capitalised		Relatively poorly capitalised	
Capital	0.0041** [0.011]	0.0066*** [0.002]	0.0065*** [0.002]	0.0096*** [0.003]	0.0094*** [0.003]
Size	0.0705*** [0.004]	0.1192*** [0.004]	0.1181*** [0.004]	-0.0037 [0.890]	-0.0093 [0.732]
Shareul	-0.0549*** [0.000]	-0.0455*** [0.000]	-0.0454*** [0.000]	-0.0698*** [0.000]	-0.0696*** [0.000]
Rgdp	0.0039** [0.035]	0.0073*** [0.010]	0.0071** [0.013]	0.0027 [0.196]	0.0026 [0.200]
Rstock	0.0013*** [0.000]	0.0020*** [0.001]	0.0018*** [0.003]	0.0004 [0.212]	0.0001 [0.826]
Ltyields	-0.0397*** [0.000]	-0.0196 [0.108]	-0.0216* [0.077]	-0.0873*** [0.000]	-0.0896*** [0.000]
Resipp	-0.0052** [0.011]	-0.0052** [0.035]	-0.0059** [0.023]	-0.0033 [0.362]	-0.0043 [0.280]
DumAU45			0.06845*** [0.001]		0.7455*** [0.000]
DumBE45			0.1098 [0.978]		0.0618 [0.551]
DumDK45			0.1768 [0.251]		-0.1590 [0.230]
DumFI45			0.2524 [0.342]		0.1981* [0.064]
DumFR45			-0.9823* [0.088]		0.0209 [0.934]
DumGE45			-0.2521*** [0.010]		-0.2442*** [0.000]
DumIR45			-0.1638 [0.275]		-0.1046 [0.240]
DumIT45			-0.5543*** [0.000]		-0.1156 [0.108]
DumGR45			-0.4501** [0.024]		-0.2409*** [0.000]
DumLu45			-0.3301 [0.471]		-0.0467 [0.692]
DumNL45			-0.0711 [0.697]		0.1943** [0.041]
DumPO45			-0.6906** [0.024]		-0.0788 [0.556]
DumSP45			0.3932** [0.021]		-0.2049* [0.063]
DumSW45			-0.2312* [0.094]		-0.0015 [0.988]
DumUK45			-0.1092 [0.187]		0.0638 [0.347]
DumEU1045			-1.064* [0.089]		-0.4748*** [0.000]
dsolvII		-0.1038** [0.036]		-0.0449 [0.131]	
Dpoorly45	-0.0312 [0.310]				
Dgood45	-0.0794* [0.092]				
C	3.5270*** [0.000]	2.6095*** [0.000]	2.6486*** [0.000]	4.9754*** [0.000]	5.0734*** [0.000]
R²	15.79%	4.76%	5.04%	23.67%	24.03%
No of obs.	14,970	6,343	6,343	8,627	8,627

Note: Relatively poorly (well) capitalised insurance undertakings refer to firms with a lower (higher) capital position than the average position for each type of business.

Table 5 Impact of Solvency II on small, medium and large EU insurers

	Small			Medium		Large	
	EU25 solvency II dummy	EU25 solvency II dummy	Country solvency II dummies	EU25 solvency II dummy	Country solvency II dummies	EU25 solvency II dummy	Country solvency II dummies
Capital	0.0040** [0.013]	0.0037** [0.045]	0.0033* [0.072]	0.0121*** [0.002]	0.0117** [0.02]	-0.0070 [0.457]	-0.0024 [0.802]
Size	0.0727*** [0.003]	0.0662* [0.061]	0.0685* [0.053]	-0.1555* [0.064]	-0.1673** [0.042]	0.2096* [0.098]	0.1990 [0.109]
Shareul	-0.055*** [0.000]	-0.0516*** [0.000]	-0.0516*** [0.000]	-0.0657*** [0.000]	-0.0656*** [0.000]	-0.0405*** [0.001]	-0.0377*** [0.000]
Rgdp	0.0040** [0.033]	0.0008 [0.752]	0.0008 [0.753]	0.0047* [0.085]	0.0048* [0.081]	0.02627* [0.098]	0.0254*** [0.000]
Rstock	0.0013*** [0.000]	0.0011** [0.02]	0.0008* [0.078]	-0.000 [0.933]	-0.0002 [0.634]	0.0022** [0.017]	0.0022** [0.017]
Ltyields	-0.040*** [0.000]	-0.0614*** [0.000]	-0.0633*** [0.000]	-0.0732*** [0.000]	-0.0774*** [0.000]	0.0101 [0.764]	0.0281 [0.386]
Resipp	-0.005*** [0.010]	-0.0093*** [0.002]	-0.0110*** [0.000]	0.0036* [0.094]	0.0032 [0.152]	-0.0095 [0.153]	-0.0094 [0.166]
DumAU45			0.7435*** [0.000]		0.6193*** [0.000]		
DumBE45			0.4207 [0.123]		-0.2464*** [0.014]		0.2474 [0.173]
DumDK45			0.0.370 [0.818]		0.0618 [0.723]		0.1082 [0.730]
DumFI45			0.3309* [0.077]		0.2015* [0.074]		0.6442** [0.016]
DumFR45			-0.1690 [0.747]		-0.4558 [0.290]		0.3782 [0.106]
DumGE45			0.3787*** [0.000]		-0.2086*** [0.002]		0.0575 [0.582]
DumIR45			0.0844 [0.687]		-0.0747 [0.512]		
DumIT45			-0.2714** [0.018]		-0.0979 [0.276]		-0.3307** [0.02]
DumGR45			-0.5057** [0.021]		-0.7036*** [0.000]		
DumLu45			-0.2521 [0.110]		0.2260 [0.557]		
DumNL45			0.1800 [0.451]		0.2337** [0.041]		-0.0307 [0.871]
DumPO45			-0.2570 [0.165]		-0.2781 [0.337]		
DumSP45			0.1556 [0.481]		0.1038 [0.436]		-0.0233 [0.889]
DumSW45			-0.1566 [0.144]		0.0847 [0.764]		0.1175 [0.534]
DumUK45			0.0219 [0.782]		0.1892** [0.050]		-0.8589*** [0.000]
DumEU1045			-1.3723 [0.121]		-0.1703 [0.390]		
dsolvII		-0.0294 [0.498]		0.0041 [0.926]		-0.1848* [0.07]	
Dsmall45	-0.0235 [0.577]						
Dmedium45	-0.0470 [0.227]						
Dlarge45	-0.1799*** [0.005]						
C	3.5026 [0.000]	3.8444*** [0.000]	3.8563*** [0.000]	6.5301*** [0.000]	6.7291 [0.436]	1.2180 [0.558]	1.2360 [0.542]
R²	15.8%	22.57%	23.12%	0.51%	0.57%	7.73%	5.17%
No of obs.	14,970	8,047	8,047	5,861	5,961	1,078	1,078

Note: Small, medium and large insurance undertakings are defined according to CEIOPS (2006a).

	Life	Non-life	Composite	Reinsurance
Capital	0.0082**	0.0089***	-0.0038**	0.0134**
	[0.014]	[0.000]	[0.0447]	[0.020]
Size	0.1837***	-0.5090*	0.0929*	-0.2900*
	[0.000]	[0.095]	[0.057]	[0.066]
Shareul	-0.0624***		-0.0362***	
	[0.000]		[0.000]	
Rgdp	0.0022	0.0059**	0.0172***	-0.0046
	[0.423]	[0.038]	[0.002]	[0.474]
Rstock	-0.0003	0.0010**	0.0023***	0.0018
	[0.608]	[0.024]	[0.007]	[0.284]
Ltyields	-0.0427***	-0.0650***	-0.0470***	-0.0290
	[0.004]	[0.000]	[0.000]	[0.485]
Resipp	-0.0092***	-0.0032	-0.0312***	0.0051**
	[0.003]	[0.334]	[0.000]	[0.034]
DumAU45	0.5166	0.5947*	0.9633***	-0.5841**
	[0.231]	[0.071]	[0.000]	[0.047]
DumBE45	1.4155**	-0.0638	0.0585	
	[0.039]	[0.823]	[0.541]	
DumDK45	-0.1077	0.3898*		0.5200
	[0.283]	[0.071]		[0.191]
DumFI45	0.7007***	0.0820		
	[0.001]	[0.591]		
DumFR45	0.5416**	-1.1110***	0.2650**	0.5340**
	[0.012]	[0.01]	[0.019]	[0.03]
DumGE45	-0.3159***	-0.1886***	0.3868**	0.0706
	[0.000]	[0.003]	[0.047]	[0.794]
DumIR45	-0.1482	0.2163	-0.230	-0.4994***
	[0.181]	[0.210]	[0.832]	[0.01]
DumIT45	-0.2017***	-0.1447	-0.3050***	2.0798***
	[0.001]	[0.264]	[0.001]	[0.000]
DumGR45	-0.1309	-0.4023	-0.8924***	
	[0.603]	[0.152]	[0.000]	
DumLu45	-0.0802	-0.3761	-0.4376	1.1611***
	[0.517]	[0.131]	[0.494]	[0.000]
DumNL45	0.5969***	-0.1983	0.5505	
	[0.000]	[0.132]	[0.311]	
DumPO45	-0.1934	-0.2353	-0.5190	
	[0.263]	[0.274]	[0.361]	
DumSP45	-0.1482	-0.1548	0.2690*	-0.1144
	[0.469]	[0.917]	[0.068]	[0.823]
DumSW45	-0.2842*	-0.0897	-0.4093	0.0400
	[0.071]	[0.474]	[0.118]	[0.796]
DumUK45	-0.1077	-0.0846	-0.7451***	0.4508**
	[0.283]	[0.281]	[0.000]	[0.018]
DumEU1045		-0.5383***	-1.334**	
		[0.000]	[0.028]	
C	3.2167***	4.4745***	3.7840***	6.4840***
	[0.000]	[0.000]	[0.000]	[0.004]
R²	41.28%	0.25%	19.97%	3.52%
No of obs.	5,329	7,160	1,879	602