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## **Abstract**

This paper sets out the current proposals in the European Union for a new approach to setting the minimum solvency requirements for insurers. It goes on to describe the changes recently made by the regulator in the UK. These cover minimum solvency margins for property-casualty insurers that relate to the risks being run, internal capital assessments that all insurers have to make, and some specific changes for large and medium-sized life insurers carrying on participating business. This last change involves new market-consistent valuation rules and stress test-based minimum solvency margins, which we find leads to some significant changes in the ranking of solvency of life insurers. The FSA's approach has been well received, and will be a helpful input as the EU refines its plans.

# **DEVELOPING A NEW INSURANCE SOLVENCY REGIME IN THE EUROPEAN UNION: EVIDENCE FROM THE UK**

## **Introduction**

The European Union has a major project ('Solvency II') to develop a new regime for regulating the solvency of life and property casualty insurers. There is dissatisfaction in the EU with the current solvency regime that has not coped well with changing conditions in insurance and financial markets, and where minimum capital requirements are set by fixed ratios that largely fail to reflect the risks that insurers are running. The Solvency II project involves considerable research, consultation and testing, and it is likely to be 2010 before it is implemented.

The regulatory structure for insurance in the European Union is that the European Commission is responsible for Directives, which set out the overall rules, including how assets and liabilities are to be valued, and minimum solvency requirements. National governments then pass legislation to implement the Directive in their own countries, which may involve choosing options offered by the Directives. Insurers authorised in one country in the EU can have a 'single passport' to do business in other EU countries, with solvency regulation remaining the responsibility of the state in which they are authorised (though they are subject to conduct of business rules in the states in which they do business). However, the UK has been keen to make changes from what it regards as an outdated regime and implemented, at the end of 2004, some significant changes. These changes were particularly important for life insurance, where published data enables us to consider the impact of the new regime in more detail.

The purpose of the paper is to:

- explain the EU's current plans under Solvency II;
- explain how the UK has implemented a new regime for life insurers that uses market-consistent values of assets and liabilities, and minimum solvency margins based on stress tests;
- assess the extent to which the new regime in the UK alters perspectives on the solvency of life insurers; and
- set out some issues in implementing the new regime, and the behavioural responses of UK life insurers.

As the International Association of Insurance Supervisors (2006) looks for greater commonality in the way in which countries regulate insurers' solvency, these EU developments and the UK experience will be of interest in the US and elsewhere.

## **European Union developments**

### *Background*

The period 1995-2005 has seen some intense challenges for EU life insurers. Holsboer (2000) highlighted the impact of low interest rates, which have resulted in the guarantees given by life insurers becoming a more onerous liability. The decline in stock markets in 2000-03 has also been a problem, reducing the assets of those insurers with equity investments, and indeed many UK life insurers have traditionally favoured equities as part of a deliberately mis-matched investment strategy. Insurers have also found that increasing longevity of their annuitants has increased their liabilities unexpectedly.

The problems are evidenced by the downfall of Mannheimer Life and the near-collapse of Equitable Life, major life insurers in Germany and the UK respectively. The challenges to insurers are therefore also challenges to regulators.

#### *The current EU solvency regime*

The European solvency regime for insurers dates from 1973 (property casualty insurers) and 1979 (life insurers), when Council Directives 73/239/EEC and 79/267/EEC respectively implemented minimum solvency margins using what KPMG (2002) categorised as a “fixed ratios” approach, as distinct from the risk-based capital regime in the US. Broadly, the minimum solvency margins are calculated as:

- for non-life business, the greater of:
  - 18% of claims up to 7m euro, plus 16% of claims above (claims being averaged over 3 or 7 years); and
  - 26% of premiums up to 10m euro, plus 23% of premiums above;
- for life business: 4% of liabilities (but 0 or 1% applied if there were no or few guarantees in the contracts written) plus 0.3% of the sum at risk (i.e. amount payable on death minus the provision held), reduced for short-term term assurances;
- with a deduction for reinsurance; and
- subject to a minimum capital requirement (minimum guarantee fund).

However, for life insurers, the implications of the regime depend on how their assets and liabilities are valued, which is affected by the type of contract written.

For unit-linked business, similar to separate account business in the U.S., assets and liabilities are at market value. As liabilities to policyholders reflect daily market fluctuations in the value of the assets held, the insurer’s market risk is largely eliminated.

Since there are typically few financial guarantees, the solvency requirements are usually relatively low.

For non-linked business, national governments in the European Union choose one of two bases for measuring assets and liabilities. First, assets may be valued at historic cost (but market value if lower), with liabilities calculated by discounting future cash flows at not more than 60 percent of the current bond yield. Or, as chosen by the UK, assets can be at market value, with liabilities valued by discounting future cash flows at not more than the current yield on the assets held. The cash flows used in the valuation process are prudent estimates, intended to give a higher value to the liabilities than a best estimate. Non-linked business typically involves greater guarantees than linked business and hence the minimum solvency margin requirements are typically higher.

A working party chaired by Müller (1997) assessed the EU regime as it then stood, which we now refer to as "Solvency I". Their analysis included examining alternative approaches such as the U.S. risk-based capital method. They made a number of recommendations, including an increase in the minimum guarantee fund (which was implemented), and for the solvency margin in non-life insurance to reflect not only claims and premiums but also provisions (which was not adopted). It was acknowledged that a more fundamental review was needed (Dickinson *et al.*, 2001). However, the outcome was that the EU was entering the 21<sup>st</sup> century with an insurance solvency regime designed in the 1970s.

### *Solvency II project*

'Solvency II' is a more thorough investigation, examining alternative approaches to prudential regulation worldwide, and taking into account the latest developments in insurance markets, financial economics, risk management and actuarial science. The project has involved calls for advice, with responses from, inter alia, national insurance

industry trade associations and individual insurers, the European umbrella association of insurers (CEA), the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS) and actuarial organisations. A quantitative impact study is underway, with a number of insurers providing data on what would be the implications for their business of alternative approaches.

The new regime is intended to apply throughout the EU on a consistent basis, as distinct from the alternative applications of Solvency I that have been permitted.

The motivation for Solvency II does not rest merely on the weaknesses of Solvency I. It also recognises that insurers have improved the techniques used to manage their business. Indeed, such improvements have been a prerequisite of some of the changes that have taken place in the market. In particular, firms produce more detailed management information more frequently than previously: with such improved information available, there is no need to restrict regulation to broad approximations. Insurers have also introduced more refined models of their business, in many cases including stochastic methods, although many insurers are still at an early stage in model development (KPMG, 2002). However, if insurers are using models to run their business, including producing future projections of the firm's financial position, regulators should be able to take advantage of these developments in setting their requirements

Current thinking is set out in a number of documents on the European Commission website, [http://europa.eu.int/comm/internal\\_market/insurance/index\\_en.htm](http://europa.eu.int/comm/internal_market/insurance/index_en.htm), and outlined in this section. The structure of solvency regulation is based on the three pillars of Basle II, as applicable to banks, but suitably adapted (European Commission, 2005):

- pillar I covers quantitative rules on capital requirements;
- pillar II covers supervision of insurers and the risks they face, with rules on, for example governance, reinsurance and asset-liability management: there are both qualitative and quantitative aspects; and
- pillar III covers public disclosure and supervisory reporting.

Setting capital requirements cannot be done independent of how the assets and liabilities are valued. The EU is keeping a close eye on the work of the International Accounting Standards Board (2004), which is addressing this issue for insurers' accounts. However, IASB does not have a timetable for completing its work, and in any event the EU may wish to take a different approach when designing its requirements for the prudential protection of policyholders, which is a somewhat different perspective compared to the IASB principles, which consider a range of stakeholders in a neutral way.

Current thinking in the EU is that assets would be at market value, and liabilities would be a discounted best estimate of future cash flows plus a risk margin with a 75% confidence level (European Commission, 2005). However, it is not clear what the 75% confidence level is meant to be. Is it a specific margin for prudence, or is it an attempt to replicate the margin that would be required by another party in taking over the liabilities i.e. as an approximation to fair value? In any event, the 75% level may actually be less than the expected value of claims if the claim distribution were highly skewed, although this might be dealt with by another test based on the standard deviation of the distribution. However, defining that distribution may be difficult in practice (CEIOPS, 2005). In addition, we already know that, in practice, management has discretion on how the liabilities are calculated and that this can lead to biases, as is already well-established from a number of US studies in property-casualty insurance (e.g. Gaver & Paterson, 1999).

As regards solvency, current thinking (European Commission, 2003) is that insurers would be subject to both a Minimum Capital Requirement (MCR) and a Solvency Capital Requirement (SCR). The MCR reflects a level of capital below which the insurer's operations present an unacceptable risk for policyholders, and imminent supervisory action is therefore needed. It may follow a simple fixed ratio approach, determined after carrying out impact studies.



The SCR would have regard to the overall risk profile of an insurer, covering the relevant risks, and calibrated so that the probability of failure is sufficiently low: a working rule of 0.5% failure in a one-year period has been put forward. However, an insurer may alternatively calculate the SCR using its own internal model after validation and approval by the regulator.

It would be useful to see some research on whether it is optimal to use a 0.5% failure rate and a 1-year time horizon. A cost-benefit analysis in this area is obviously very demanding, and would need to take into account the potentially stifling effects of tighter regulation on competition and innovation (see Finsinger, Hammond & Tapp, 1985, for a study of the effect of tighter regulation in Germany compared to the UK).

The 0.5% 'rule' is a Value at Risk (VaR) calculation, a risk measure widely used by banks. However, VaR has deficiencies, especially as it is not what we would now call a coherent risk measure. In particular, the VaR of a portfolio may be more than the VaR of sub-portfolios that it consists of, which does not appear logical for a risk measure (Dowd, 2005). Regulators may therefore wish to review which measure of risk is most appropriate.

## **A new regime in the UK**

### *Concerns with the old regime*

In the UK, the Financial Services Authority (FSA) acquired its powers as the new regulator for insurance and other financial services in December 2001. By 2005 large elements of the prudential regulation of the industry had been transformed.

FSA had a number of concerns with the regulatory regime that it inherited, and we mention three in particular.

First, it was concerned that the solvency requirements did not properly reflect the risks to the business. The fixed ratios approach is inadequate in this respect and, by failing to make adequate allowance for the hedging that a firm has in place, it does not encourage prudent risk management. Furthermore, by basing the solvency requirement on the firm's liabilities, it gives an incentive for under-provisioning (KPMG, 2002)

Second, FSA was keen to emphasise the responsibilities that directors of insurers had for the running of their business, consistent with the corporate governance requirements for UK listed firms. They had a particular concern in life insurance, where each firm had an "appointed actuary", who had the responsibility for placing a value on the firm's liabilities, meaning that the directors did not have full control over their balance sheet (FSA therefore introduced new actuarial roles, with clear reporting lines to the Board, as a replacement for the appointed actuary system).

The third concern was life insurers carrying on participating business. Here, the Third Life Directive requires the net premium valuation method to be used to measure liabilities. Although this had been suggested as a suitable way of regulating solvency (Skerman, 1966), it was later criticised as inappropriate in changing financial conditions, especially where the life insurer's investments included equities, and furthermore it did not reflect how life insurers managed their business in practice (Scott *et al.*, 1996). Although the net premium method appeared to emphasise prudence, in practice it was difficult to ascertain what prudence there was in the absence of true "realistic" information

For life insurers, the FSA's priority has therefore been to consider those firms carrying on participating business. The valuation problem has become more important because such insurers have seen a substantial decline in solvency levels, mainly because of the impact of adverse financial conditions, combined with mis-matched investment strategies. However, FSA was also conscious that this was the type of business where management have substantial discretion on how they manage the business, including the values they pay on policies being surrendered or reaching maturity. The fear was that poor

management – in what admittedly were demanding financial conditions – could lead to policyholders being disadvantaged or even insolvency of the insurer. If the fixed ratios approach to minimum solvency margins was failing to encourage prudent risk management, that was a problem.

The FSA's predecessor regulator, the Department of Trade and Industry, had recognised some of the issues relating to market risks by requiring life insurers to carry out a stress test, which led to many insurers setting aside an amount (the so-called "resilience test reserve", added as an extra item in their liabilities), reflecting the additional resources they would need in the event of adverse changes in share prices and interest rates. However, this approach was relatively basic compared with the requirements that FSA was to introduce

Pressure for change also arose from the near-failure of Equitable Life, which in 1997 had been the fourth largest life insurer in the UK and which concentrated heavily on participating business. Its circumstances are complex, and it has been a subject of several reports. However, some key points are (Penrose, 2004):

- The traditional statutory solvency valuation was inadequate because the liabilities valued were only the guaranteed benefits, whereas in practice the life insurer also expected to pay dividends (bonuses in UK terminology) to policyholders, for which inadequate (and often only implicit) provision was made;
- Equitable Life had issued many policies with guaranteed annuity options, but it placed no value on such options in evaluating its liabilities, even when the option was in-the-money; when pressed by the regulator to make provision for the option, the insurer was able to substantially negate the effect by a financing reinsurance treaty, which was subsequently criticised as artificial; and
- Equitable Life had poor controls for managing risk.

Eventually, Equitable Life decided to cease selling new policies and, having strengthened its risk management practices and implemented a number of changes, including switching most of its equity portfolio into bonds, its solvency has improved.

The Equitable Life episode led to pressure for change, particularly from complaining policyholders and politicians. However, there was also pressure from many other life insurers who, when the reduction in share prices in 2000-03 led to a decline in their published solvency, complained that the requirement for prudence built into their calculations of liabilities resulted in their financial position being portrayed as worse than it really was. Since no-one actually knew how prudence was affecting solvency, there was pressure from both regulator and insurers for 'realistic balance sheets.' This was to be a key part of the new solvency regime that the FSA introduced.

#### *The new regime – property-casualty business*

The FSA introduced, at the end of 2004, an "Enhanced Capital Requirement" (ECR) for property-casualty insurers, requiring firms to hold capital in a way that more readily reflects the risks of their business (FSA, 2003b). It therefore represents some move away from fixed ratios towards a risk-based capital regime. The ECR uses factors applied to categories of the insurer's assets, premiums and provisions, and is the sum of:

- the asset-related capital requirement, calculated as the sum of, for each asset type, the value of assets held multiplied by a factor, e.g. 0% for deposits with approved banks; 3.5% for bonds; 7.5% for land and property; and 16.0% for shares; plus
- the insurance-related capital requirement, which is the sum, of, for each class of insurance business, (net premiums x factor 1) + (provisions x factor 2); see examples in table 1; minus

- the firm's equalisation provisions: the regulator is effectively saying that the equalisation provisions are not "true" liabilities and can therefore be used as an offset in calculating the required capital.

Table 1. Insurance-related capital requirement: examples of factors

	Factor 1	Factor 2
Private medical insurance	5.0%	7.5%
Private motor	10.0%	9.0%
Household property	10.0%	10.0%
Commercial property damage and theft	10.0%	10.0%
Employers' liability, product liability, private liability, professional indemnity	14.0%	14.0%
Marine liability	22.0%	17.0%
Space and satellite	32.0%	14.0%

The ECR is designed to be consistent with a 99.5% confidence that the firm will survive for a one-year period, being broadly equivalent to a BBB credit rating. The factors are based on actuarial work done by Watson Wyatt (2003). The ECR calculation is disclosed privately by insurers to FSA and is not publicly available, and we do not consider it further in this paper.

*The new regime – Individual Capital Adequacy Standards (ICAS)*

The ICAS framework was introduced at the end of 2004, and applies to both life and property-casualty insurers. Financial Services Authority (2002) set out the plans for what became new rules, of which the two key elements are:

- An internal capital assessment, a self-assessment by insurers of the capital they require for their business; and
- A supervisory tool subsequently referred to as Individual Capital Guidance, by which the FSA could require firms to hold additional capital.

The main benefits of the new framework were said to be reducing the probability of prudential failure in a cost-efficient way, greater transparency in the way regulatory capital standards are set, and promoting a strong culture of risk management.

The Individual Capital Assessment (ICA) describes the requirement for each firm's directors to assess what capital they need so that there is no significant risk of being unable to pay their liabilities as they fall due. FSA expects insurers to carry out stress tests and scenario analysis in respect of each type of risk, enabling them to estimate what range of outcomes is probable, and hence the capital needed to cover potential losses. The assessment is made using the firm's future business plans and projections. It is also possible that an insurer's ICA results will lead FSA to conclude that the standard capital requirement is excessive in the light of an insurer's individual circumstances, and FSA can then grant a waiver.

Insurers are asked to prepare their ICA on the basis of the capital consistent with a 99.5% confidence level over one year or, if appropriate, an equivalent lower confidence level over a longer time frame. Those factors are the same as those used in parameterising the new standard solvency tests (ECR for property-casualty insurance and stress tests for participating life business). Therefore, the capital required may not differ greatly. However, the benefit of the ICA is that it depends on an individual insurer's particular circumstances and business plans. FSA suggests that insurers may assess the extent to which their actual business differs from the assumptions underlying the standard capital requirement. Examples include a high concentration of risks in one area; and if there is evidence of weaknesses in systems and controls. These would be indicators that an above average level of capital may be required

Operational risk is not considered separately in parameterising the new standard solvency tests but FSA expect to see it considered in the ICA. This is an area that has been difficult for insurers, as they have little experience of operational risk measurement. However the Association of British Insurers (the industry trade body) has recently

announced that it will set up a database of operational losses in the industry, which should help insurers in their future work.

The ICA report is not publicly available but is made available to the FSA on request. If FSA feel that the directors have understated the capital needed, they can issue Individual Capital Guidance (ICG), setting out what they require.

The Financial Services Authority (2005) has provided some evidence of how the regime is operating:

- Firms' submissions to FSA have varied from four pages to over 80 pages (short submissions have had to be re-submitted!);
- Operational risk was one of the least developed areas;
- Some life insurers are planning to increase the sophistication of their approach, for example a "nested stochastic" method, whereby they use (e.g.) 1000 simulations for the first projection year, after which each individual scenario has its own 1000 simulations to produce the closing balance sheet;
- Assessing the appropriate level of a catastrophe event is challenging, as there is limited data available about extreme events; and
- One particularly difficult area is the correlations between risks; in particular, normal relationships may break down in stressed conditions.

Many firms have had to devote substantial resources to preparing their ICAs. However, the outcome appears to have been very positive in enabling insurers to understand and manage better the risks to which they are exposed.

#### *The new regime – participating life business*

**Introduction.** The new 'realistic reporting' regime, implemented at the end of 2004, applies to life insurers with over £500m of participating business liabilities (FSA,

2003a). Smaller firms writing participating business can also choose to be regulated on this basis: however, only one has done this, thereby leaving a question mark over the many firms who are still reporting on what could, perhaps rather disparagingly, be referred to as an artificial rather than realistic basis.

The new regime introduces new requirements for the valuation of assets and liabilities, producing a realistic balance sheet', and the calculation of the minimum solvency requirement. We also mention below the disclosure that FSA has prescribed.

**Assets.** Although the UK has traditionally used market value, some assets are excluded as inadmissible or are included at less than market value. Under the new regime these are all at market value.

One unusual aspect of the old regime was that it allowed insurers to include a (crude) estimate of a firm's future profits as an 'implicit item' asset. However, this was essentially an artificial device to compensate for what were perhaps over-prudent elements of the regulation, and it will not be permitted in the European Union after 2009. It is not permitted in the realistic balance sheet.

However, where the insurer writes non-participating business, the surplus expected to arise on such contracts is essentially an asset available to the participating business, and the new regime places a value on this, using assumptions that are intended to be consistent with a market valuation.

**Liabilities.** These are calculated consistent with how the business is operated; with a market-consistent valuation of options and guarantees; and taking into account the effect of actions that management expect to take.

The new rules recognise that life insurers typically operate their participating business by declaring dividends such that the amount payable when a policy matures is about equal to the accumulation of premiums paid by the policyholder, together with the



investment return earned, less applicable costs. This amount is known as the asset share (essentially the share of the assets of the firm which are attributable to that policy). In the realistic balance sheet, the liabilities on participating policies are taken as the asset share as accrued to the balance sheet date, which means that the liabilities as calculated go beyond the guaranteed benefits valued using the net premium method and reflect the reality of life insurers paying dividends being an obligation that should be accounted for.

Other elements of calculating the liabilities consistent with how the business is operated are that insurers:

- Make a realistic assumption that some policyholders will surrender their policies;
- Include additional policy liabilities if relevant, e.g. where insurers have indicated that they will constrain changes in dividend rates to protect policyholders from volatility in investment conditions;
- Deduct charges that insurers expect to make, e.g. deductions from future premiums as a charge for the guarantees provided; and
- Include the expected costs of financing debt (which may be omitted in the traditional valuation if the debt is subordinated to policyholder liabilities).

Stochastic modelling is used to calculate the cost of options and guarantees. Previously, some options were valued on a deterministic basis, and this could lead to an out-of-the-money option being given no value. This is recognised as inadequate, and FSA expects options and guarantees to be valued using stochastic methods.

Actuaries have been using models for stochastic calculations for some years. The most widely used actuarial model in the UK up to the late 1990's was the Wilkie model

(Wilkie, 1995). However, this assumed mean reversion of investment returns and produced values that were not market-consistent. However, given that assets are at market value, FSA requires the stochastic modelling to produce values that are market-consistent

The actuarial work involved in this has advanced significantly (Sheldon and Smith, 2003), and the outcome of the calculations may be similar to the concept of the fair value of liabilities, as referred to by IASB (2004). However, a substantial issue remains how to calibrate such models to market conditions. Where an insurer has options that apply some twenty five years hence, there may be no similar options with prices observable on non-insurance financial markets, so a good deal of judgement is necessary.

The rules allow insurers to take account of actions that management plan to take. So, where a stochastic model projects some adverse scenarios, the insurer may reduce the impact by, for example, reducing the rates of dividend and surrender values, and by switching into more secure assets. Incorporating such management actions inevitably adds to the complexity of the modelling, but does help give a more realistic picture of the insurer's financial position. The management actions assumed must be consistent with documents issued by the insurer that describe how the business is run.

While the liability calculation is market-consistent, it is a rather different approach from the use of a best estimate plus risk margin at the 75% confidence level put forward by the EU.

**Minimum solvency requirement.** To complement the realistic balance sheet, the FSA has chosen stress tests as the basis for the capital that life insurers need to hold.

The rules require life insurers to consider some specified alternative scenarios and to proceed as follows.

Say a firm has assets with a realistic value of 4500. Its liabilities on the realistic basis are 4000, and these increase to 4200 in the alternative scenario. However, its assets

are not as sensitive to changed conditions: the firm needs 4120 of its current assets to produce a value of 4200 in the alternative scenario. Therefore the firm needs to hold capital of 120 to cover the risk; and the firm's stress tests capital requirement is the highest of such figures in the specified alternative scenarios.

The stress tests are selected so as to be consistent with there being a 99.5% probability of the firm being able to meet its realistic liabilities in one year's time. The calibration of the tests has regard to a typical fund that is open to new business and on the assumption that the firm's business is well diversified, well managed with assets matching its liabilities and good controls, stable with no large, unusual, or high risk transactions.

The stress tests were determined following a report by Watson Wyatt (2004). They cover a limited number of risks: market risk, credit risk, and one aspect of insurance risk, namely persistency risk (i.e. the risk that there is a change in the degree to which policyholders continue (persist) in paying premiums on policies).

The market risk test involves considering:

- the market value of equities rising or falling by a figure in the range 10-20%: less than 20% applies if the FTSE Actuaries All Share Index is lower than the average index value over the previous 90 calendar days;
- property values rising or falling by 12.5%; and
- the yield on all fixed-interest securities rising or falling by 17.5% of the yield on long-term UK government securities (e.g. by 1.05 percentage points if the government bond yield is 6%): similar changes apply to non-UK assets.

The credit risk scenario is that the spread of yields on bonds and debt, over government bonds, is increased, more so for bonds with low credit ratings. Bonds issued by certain banks, governments and multinational organisations are exempt from these stress tests. There is a similar change in the value of any reinsurance or analogous non-

reinsurance financing agreements entered into by the firm, and in the value of other exposures, including derivatives and quasi-derivatives.

The persistency risk scenario is that there is a change of 32.5% in the rates at which policies terminate. For example, if the standard assumption in the realistic balance sheet was that policyholders surrender at the rate of 4% per annum, this would change to 2.70% or 5.30%.

**Disclosure.** The results of the realistic valuation and stress tests are included in the annual financial information provided by insurers to the FSA, and this is also publicly available.

These results are accompanied by a report on the valuation, as required by FSA rules, this typically being over twenty pages long. This gives considerable detail on how the insurer has valued its liabilities and carried out its stress tests, with particular emphasis on the modelling it has done. For example, the insurer must explain:

- assumed returns and volatilities of the assets, and the correlations between assets, together with the justification for these assumptions;
- the assumed value of put options on bonds, equities and property, for various durations and strike prices, as used in the stochastic valuation of guarantees and options;
- the management actions assumed; and
- the number of projections done.

*Results – participating life business*

We now assess the results of the 38 life insurers who, as at 31 December 2004, prepared figures in accordance with the new rules. The assets of these insurers, relating to participating business, varied from £0.3 to £78.6 billion.

First, we examine how the realistic value of assets compares with the standard regulatory value (table 2). On average, the realistic value is 2.4% higher; in eight of the 38 firms it is more than 5% higher (maximum 9.9%). In two firms the realistic value is lower, by up to 1.0%.

Table 2. Comparison of asset valuations

Assets	£ billion
Standard regulatory value	384.3
Minus present value of future profits	-0.9
Present value of future profits on non-participating contracts	8.9
Other adjustments to bring regulatory to market value	1.1
Realistic value of assets	393.4

Turning now to liabilities (see table 3), realistic liabilities are on average, 8.1% higher than the standard regulatory value (excluding the resilience test reserve). For five firms they are lower (by up to 3.0%), for seventeen they are higher (up to 40.8%).

Table 3. Comparison of liability valuations

Liabilities	£ billion
Standard regulatory basis*	341.170
Realistic basis:	
Asset shares	323.698
Provision for options and guarantees	28.017
Other policy liabilities	12.125
Minus charges	-10.937
Financing costs	0.753
Current liabilities	14.997
Total on realistic basis	368.651

\* excluding the resilience test reserve

On the old basis the assets were 12.7% higher than the liabilities, the excess being £43.1 billion. On the new basis the comparable figures are 6.71% and £24.7 billion. We should, however, not conclude that solvency has been over-stated in the past by the regulatory basis. This is because FSA has been keen that insurers are given an incentive to

manage their business in accordance with the realistic balance sheet, and has therefore deliberately relaxed the rules governing the standard regulatory method. Therefore, of more interest is whether the ranking of insurers' solvency is similar using the standard regulatory and new realistic bases.

Although the top firm, measured by A/L, in the regulatory basis is also top on the realistic basis, there are many important differences. If we rank the 38 firms by A/L, we find that there are 4 firms where the rank improves by 10 or more, 5 where it worsens by 10 or more. One firm moves from 3<sup>rd</sup> to 23<sup>rd</sup>, another from 12 to 36<sup>th</sup>.

Two firms had a realistic value of assets lower than their realistic value of liabilities, and had arrangements from their parent in place to provide support to the fund, thus ensuring that the liabilities were covered. However, a further seven firms were only able to have realistic assets at least equal to realistic liabilities as a result of being able to include the value of expected profits from non-participating business as an asset, which was not permitted under the previous regime.

How does the capital required in accordance with the new method of stress tests compare with what was required under the old regime that uses fixed ratios? In aggregate, the old basis produced a capital requirement of £ £13.7 billion using the fixed ratios calculation, on top of which we add £5.9m from the resilience test, making £19.5 billion. The capital requirement from the stress tests amounted to rather less: £11.1 billion, which is 3.0% of the realistic liabilities. The correlation coefficient between the stress test capital requirement and the old fixed ratios calculation (each as a proportion of the realistic liabilities) was only 0.108, whereas it was 0.383 with the old resilience test reserve.

We now consider the excess capital that firms had, i.e. the excess of assets over the sum of liabilities and the capital requirement. In total, for the 38 insurers, the excess capital was £13.7 billion on the realistic basis, which compares with realistic liabilities of

£368.7 billion, and an excess of (realistic) assets over liabilities of £24.7 billion. The £13.7 billion is rather less than the £23.6 billion on the standard regulatory basis.

Where a firm's excess capital was lower on the new basis than the old basis, it was obliged to hold more capital than the rules of the old regime. 23 firms out of 38 were affected by this, the total additional capital requirement being £12.9 billion. In the case of the largest firm, the additional capital requirement was £3.6 billion, although this was comfortably met from the fund's assets of £77.1 billion. However, firms where the new basis showed a more favourable position were still required to hold the regulatory minimum, as derived from (current) EU rules (which are therefore arguably excessive in some cases).

We rank firms in order of excess capital on the regulatory and realistic loss (divided by the realistic value of their assets). There were 5 firms where the rank deteriorated by 10 or more when moving from the regulatory to the realistic basis, 4 where it improved by 10 or more.

#### *Behavioral responses – participating life business*

The introduction of realistic balance sheets has led to responses by life insurers in two main areas: firstly, the formality with which financial management is carried out and secondly, actions to address the onerous nature of guarantees.

The increased formality is evident in the requirement to carry out more sophisticated modelling than firms typically had done, and indeed than would have been feasible say only five years ago. The sophistication of models has increased tremendously; effectively FSA has ensured that all (medium and large) firms writing participating business have taken these advances on board.

In addition to this formality in modelling, life insurers have become more formal in their financial management rules, as they cannot model the business appropriately unless they know how they will manage it.

Second, the realistic balance sheet had helped highlight the cost of guarantees. Desai's (2004) survey shows that many insurers have reduced the equity content of their assets and/or hedged the cost of guarantees as a result of insights obtained from realistic balance sheets, and many have introduced charges for policyholders' guarantees as a result.

In practice, it is difficult to identify the effects of the new solvency rules from other changes that have been taking place. The regulator has been placing more emphasis on insurers' risk management procedures (FSA, 2003c), of which stress testing is a part. Furthermore, the fall in equity prices over 2000-03, and the consequent reduction in insurers' solvency, was also leading insurers to reduce the equity content of their portfolios. In this demanding financial environment, the realistic balance sheet on a market-consistent basis has certainly focused the attention of life insurers on the onerous nature of the guarantees they have given.

## **Conclusions**

The new UK regulator, the Financial Services Authority, has made substantial changes to the prudential regime for UK insurers, taking advantage of recent developments in risk management and modelling. There are many similarities with the current plans in the European Union.

The changes have been greatest for life insurers writing participating business. Here, the new 'realistic' approach has, in general, been well received by insurers. They will see it as beneficial for their reports to be prepared on a basis consistent with the realities



of their business instead of an approach that builds in artificial prudence that cannot be identified as such.

In some areas there are inconsistencies between insurers: for example in the future economic assumptions they make (notwithstanding the intention that they be market-consistent), and the extent to which they take credit for expected future management actions. This is an inevitable feature of implementing a new regime, and we can expect greater consistency in the future.

We can also expect FSA to refine its requirements for example, the stochastic nature of mortality risks can be important in valuing liabilities, and we can envisage FSA asking insurers to consider incorporating this in their modelling

Public disclosure of these new results is very welcome. We now have a better understanding of the finances of life insurers, with some marked changes in the ranking of insurers compared to results on the old regime. Some of the comments in IAIS (2003) express concern that making the results of stress testing publicly available may lead to disquiet and have adverse outcomes. There is no evidence of this, however.

FSA has taken some risks by implementing a new solvency regime that is inconsistent with EU directives as they currently stand. It may be 2010 before Solvency II is implemented, but the FSA cannot wait that long: economic realities and political pressures are forcing its hand. There is a lesson that if Solvency II needs to be changed in the future, long delays are not acceptable. The experience in the UK will prove valuable as Solvency II is developed. It should also provide some helpful insights as IAIS and IASB develop their own standards for wider use internationally.

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