Prepared by:
Stuart Reynolds, FIA
Richard See Toh, FIA
Emma McWilliam, FIA, FSA, MAAA
Matt Cocke, PhD, FIA
Philip Simpson, FIA, ASA, FSAI

June 2013

Milliman

2012 Embedded Value Results
Generating Value

◘ Milliman

Milliman is among the world's
largest providers of actuarial and
related products and services.
The firm has consulting practices
in healthcare, property & casualty
insurance, life insurance and
financial services, and employee
benefits. Founded in 1947, Milliman
is an independent firm with offices
in major cities around the globe.

milliman.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Background

- Economically, 2012 was another challenging year with many developed economies showing little or even negative growth. Despite this, financial markets showed a positive trend, with equity markets strengthening and credit spreads narrowing over 2012. Against this background, embedded value remained a key part of many insurance companies' disclosures, demonstrating value generation and financial robustness. Only one company, Aegon, largely drew back in its embedded value disclosures.

- The timetable for Solvency II suffered further delays in 2012. In response, the Chief Financial Officers Forum (CFO Forum) issued transitional guidance that until such time as all relevant standards, guidance and the effective date are finalised, there would be no requirement to make allowance for the developing Solvency II regime when applying the European Insurance CFO Forum *Market Consistent Embedded Value Principles*© (MCEV Principles[1]) or the European Embedded Value Principles (EEV Principles). Despite this, some companies still reflected some elements of the Long-Term Guarantees Assessment (LTGA) issued on 28 January 2013, in particular the extrapolation of the yield curve.

- Based on our review of 29 companies, around 50% still use the EEV Principles rather than MCEV Principles. However, there continues to be a trend toward reporting on a market-consistent basis such that now around 90% use some form of market-consistent valuation in their embedded value reporting.

Embedded Value Results

- The current CFO Forum members (that disclosed their embedded values) reported a combined embedded value of £222 billion (€273 billion[2]) at the end of 2012 compared to £200 billion (€239 billion[3]) at the end of 2011. All of the member companies in the group reported higher embedded values at end-2012 than at end-2011.

- Allianz, AXA and Prudential reported the three largest embedded values. The top performers (by percentage increase) were Allianz, AXA and Munich Re.

New Business Results

- The value of new business also increased over 2012 with the current CFO Forum members reporting a total value of new business of £9.8 billion (€12.0 billion) in 2012 compared to £8.5 billion (€10.1 billion) in 2011.

Embedded Value Methodology Hot Topics

- The framework used by companies in 2012 has generally remained static, with the overwhelming majority (some 90%) of companies applying some form of market-consistent valuation. Of particular interest was that Aegon discontinued full publication of embedded value results over 2012, citing the intention to replace the embedded value with relevant Solvency II information and, in the interim, publishing the market-consistent value of new business. In addition, Achmea moved from reporting under EEV Principles to MCEV Principles.

- Three key areas in embedded value methodology stood out this year as *hot topics*. They were (1) the construction of the risk discount rate, especially the extrapolation methodology used, (2) the allowance for cost of capital, including the cost of residual non-hedgeable risks and (3) recognising the time value of options and guarantees.

Three key areas in embedded value methodology stood out this year as *hot topics*. They were (1) the construction of the risk discount rate, especially the extrapolation methodology used, (2) the allowance for cost of capital, including the cost of residual non-hedgeable risks and (3) recognising the time value of options and guarantees.

---

[1]   Copyright© Stichting CFO Forum Foundation 2008.
[2]   Sterling to Euro exchange rate as at 31 December 2012.
[3]   Sterling to Euro exchange rate as at 31 December 2011.

Construction of the Risk Discount Rate

— All companies surveyed now use a bottom-up approach to determine the risk discount rate, with the exception of Legal & General which used a top-down approach.

— Around two-thirds of companies use swaps as the underlying basis for the risk-free yield curve, with the remainder using government bonds.

— A small number of companies make a 10 to 15 basis points (bps) adjustment for credit risk within the risk-free rate based on London Interbank Offered Rate (LIBOR) swaps.

— Companies have generally used the same methodology to derive liquidity premiums as at end-2011 namely that from Solvency II's fifth Quantitative Impact Study (QIS5). No company in this survey used the approaches for the matching adjustment from the LTGA, perhaps because of the timing of the LTGA Technical Specifications which were issued at the end of January 2013 and because it was unclear which method would be considered the most appropriate. The methods in the LTGA are more computationally intensive and place greater restrictions on the application of the matching adjustment than the QIS5 approach.

— Liquidity premiums for the majority of companies fell significantly, with some companies seeing decreases in the region of 70 bps for certain territories. Despite this, the liquidity premiums across all companies were in the range 30 to 130 bps at end-2012 compared to the range of 40 to 135 bps at end-2011. Reinsurers continued to generally assume zero liquidity premiums.

— Sensitivities to the liquidity premium were generally reported as a +10 bps adjustment to the liquidity premium or the removal of the liquidity premium, where applied. One company (Munich Re) disclosed a sensitivity to the adoption of the measures around the risk-free rate detailed in the LTGA Technical Specifications.

— Around 60% of companies disclosed that they had extrapolated the risk-free curve compared to around 50% at end-2011. The choice of parameters can materially alter an insurance company's embedded value. For example, Allianz reported a €2.8 billion increase to the starting embedded value of €20.9 billion (for covered business) due to use of the LTGA parameters. Extrapolation is another key area under the spotlight for Solvency II and there may be further development in this area as Solvency II progresses.

Cost-of-Capital / Cost of Residual Non-Hedgeable Risks

— There is still a range of disclosed average cost-of-capital charges in respect of non-hedgeable risks for those reporting under MCEV Principles, but convergence continues with the average across MCEV companies rising from 3.56% at end-2011 to 3.63% at end-2012. Specific areas of methodology difference include: the treatment of symmetrical risks, and diversification between hedgeable and non-hedgeable risks.

— Of companies reporting under MCEV in our survey, around 30% reduced the cost-of-capital charge, 10% increased the charge and those remaining maintained the same cost-of-capital assumption as at end-2011.

— There are similarities between the cost of residual non-hedgeable risks in MCEV and the risk margin in Solvency II. Going forward, it will be interesting to see if greater certainty over the Solvency II rules causes more convergence amongst companies' cost of residual non-hedgeable risks assumptions and methodologies.

Time Value of Options and Guarantees
— In general, market-consistent approaches were used to value options and guarantees. In addition, implied volatilities for interest rates and equities were based on year-end data; companies generally used at least 1,000 economic scenarios.

— Many companies disclosed allowances for dynamic policyholder behaviour in certain economic scenarios. The same companies disclosed modelling dynamic policyholder behaviour at end-2012 as at end-2011.

Disclosures

▪ Whilst convergence continues, differences in the interpretation and application of the EEV Principles and the MCEV Principles by companies remain. This may continue to present challenges for investors and analysts alike in carrying out direct comparisons. Embedded value results nevertheless continue to provide useful insights in terms of emerging trends, current position and future developments regarding profitability, sustainability of capital sources and creditworthiness.

▪ Some specific steps have been made towards converging some of the practices, such as the use of a bottom-up approach as well as an increasing proportion of companies reporting under some form of market-consistent basis. Furthermore, there has been a convergence in some assumptions, such as volatilities, compared to 2011.

Other Measures of Value

▪ Whilst embedded values continued to exceed market capitalisation at the end of 2012, the gap between the two measures narrowed since the end of 2011, with market capitalisation being 90% of embedded value on average at end-2012 compared to 77% at end-2011.

▪ Significant differences remain between International Financial Reporting Standards (IFRS), Solvency II and embedded value reporting and there continues to be uncertainty over the timetable for Solvency II and IFRS Phase II for insurance contract reporting. Consequently, companies are still faced with the challenge of clearly communicating results as they balance the alignment of different reporting bases and methodologies during 2013 and beyond.

▪ Given the different intended purposes of embedded value and Solvency II reporting, it remains to be seen how achievable convergence will be in practice. This will ultimately depend on whether or not additional margins of prudence are imposed under Solvency II, such as the restrictions on the application and size of the liquidity premium and the allowance for non-hedgeable risks.

INTRODUCTION

Economically, 2012 was another challenging year with many developed economies showing little or negative growth. Despite this, financial markets showed a positive trend, with equity markets strengthening and credit spreads narrowing over 2012. Against this background, embedded value remained a key part of many insurance companies' disclosures, demonstrating value generation and financial robustness. Only one company, Aegon, largely drew back in its embedded value disclosures.

Markets have shown a little more stability in 2012 compared with the volatility and fragile market confidence displayed in 2011. The comparison between market capitalisation and embedded value generally improved, with the average market capitalisation as a percentage of total embedded value rising to 90% at the end of 2012. This follows the general trend of strengthening equity markets and narrowing credit spreads. However, growth remains low and often negative, particularly in parts of the European Union. Governments continue to struggle to reduce deficits and many economies are projected to follow a slower path of recovery than expected.

The implementation timetable for Solvency II suffered further delays during 2012. In response, the CFO Forum issued transitional guidance in September 2012 that, until such time as all relevant standards, guidance and the effective date are finalised, there would be no requirement to make allowance for the developing Solvency II regime when applying the European Insurance CFO Forum *Market Consistent Embedded Value Principles* (MCEV Principles) or the European Embedded Value Principles (EEV Principles). Despite this, some companies still reflected elements of the Long-Term Guarantees Assessment (LTGA) issued on 28 January 2013, in particular the extrapolation of the yield curve.

Other regulatory changes, such as International Financial Reporting Standards 4 (IFRS4) Phase II for insurance contracts reporting, are on the horizon for insurers, with a revised exposure draft due in 2013. Furthermore, Dodd-Frank in the US and the European Market Infrastructure Regulations will impose risk management and reporting requirements on over-the-counter derivatives when they are fully implemented. Additionally, there will be a requirement for central clearing of some derivatives. The Regulatory Technical Standards have been adopted and reporting requirements for interest rate and credit derivatives could begin as early as October 2013.

In this publication, we focus on embedded value results as at year-end 2012. In addition to providing an overview of the methodology companies used and commenting on any developments, we have covered a range of current *hot topics* that companies may wish to consider when developing and enhancing their embedded value approaches in the future. These include:

- Determining the risk discount rate (RDR).
- Calculating the cost of capital (CoC).
- Assessing the cost of residual non-hedgeable risks (CRNHR).
- Evaluating the time value of options and guarantees (TVOG).
- Disclosures in embedded value reporting.
- Other measures of value (market capitalisation, IFRS and Solvency II).

Before covering these topics in detail, we also provide a high-level overview of some of the key components of an embedded value calculation.

The comparison between market capitalisation and embedded value generally improved, with the average market capitalisation as a percentage of total embedded value rising to 90% at the end of 2012.

EMBEDDED VALUE OVERVIEW

The embedded value of a company is intended to be a measure of the value of the shareholders' interests in the business. Over time, various principles and guidance have been issued by industry bodies to achieve consistency in the way embedded values are calculated between companies and reporting periods. Two of the main sets of guidance currently used by companies are the EEV Principles and the MCEV Principles. A brief outline of the methodology under these sets of principles, including key terminology, is described below and shown in Figure 1.

FIGURE 1: SUMMARY COMPONENTS OF EMBEDDED VALUE
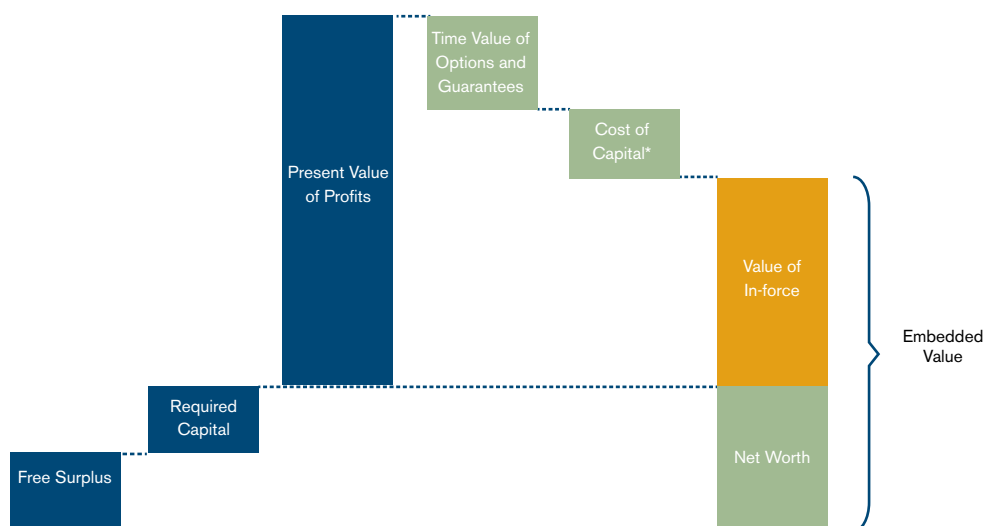
*   Under the MCEV Principles, the cost of capital is split into frictional costs and the cost of residual non-hedgeable risks. Companies using the EEV Principles may also choose to adopt this approach.

Under both the MCEV and EEV approaches, the embedded value is calculated as the sum of the *net worth* and *value of in-force* (VIF) of the business.

The *net worth* is equal to the *required capital* plus *free surplus* where:

- **Required capital** is the market value of assets, attributed to the business over and above that required to back the liabilities for the business and whose distribution to shareholders is restricted. The level of required capital may be set by reference to regulatory capital requirements, rating agency capital requirements to achieve a target credit rating, internal model capital requirements, or a combination of these.

- **Free surplus** is the market value of any assets allocated to, but not required to support, the in-force business at the effective date of the embedded value calculation.

The *VIF* is equal to the *present value of future profits* (PVFP) less the *time value of options and guarantees* less the *cost of capital* where:

- **Present value of future profits** is the present value of the net of tax shareholder cash flows from both the in-force business and the assets backing the associated liabilities. The PVFP includes an allowance for the intrinsic value of financial options and guarantees but not cash flows arising from projected future new business. The economic assumptions used to calculate the PVFP can differ under EEV Principles and MCEV Principles. Under EEV, the PVFP may be calculated using real-world investment return assumptions and a discount rate that includes a margin for risks not captured elsewhere in the calculation. Under MCEV, the PVFP is typically calculated using a *certainty equivalent* approach whereby assets are assumed to earn a return based on a risk-free curve and all cash flows are discounted using the same risk-free curve, though other approaches are possible.

- **Time value of options and guarantees** is the additional value of financial options and guarantees above the intrinsic value already allowed for in the calculation of the PVFP. This is typically calculated using stochastic techniques.

- **Cost of capital** is a deduction from the PVFP in respect to the additional costs from investing in assets backing the required capital via an insurance company rather than directly. Under EEV, the CoC is the difference between the required capital held at the effective date of the embedded value calculation and the present value of the projected releases of the required capital. Whereas under MCEV, the CoC is split into two independent components: *the frictional costs of capital and the cost of residual non-hedgeable risks*.

  — **Frictional costs of capital** reflect items such as the taxation and investment costs that arise on the assets backing the required capital.

  — **Cost of residual non-hedgeable risks** reflects the expected cost of capital related to non-hedgeable risks that can have an asymmetric impact on shareholder value (to the extent these risks have not already been reflected in the PVFP or TVOG). These can include both financial and non-financial risks.

The breakdown in number of companies from our sample of 29 using EEV, market-consistent EEV and MCEV Principles is shown in Figure 2. In addition, some companies follow equally valid approaches that do not entirely conform to either the MCEV or EEV Principles and these are also shown. For example, Swiss Re reports under a basis known as its *Economic Value Management* framework.

The framework used by companies in 2012 has generally remained static, with the overwhelming majority (around 90%) of companies applying some form of market-consistent valuation.

The framework used by companies in 2012 has generally remained static, with the overwhelming majority (around 90%) of companies applying some form of market-consistent valuation. Of particular interest was that Aegon discontinued the full publication of embedded value results over 2012, citing the intention to replace the embedded value with relevant Solvency II information. In the interim, Aegon has started to publish market-consistent value of new business. Further evidence of the trend towards market-consistent reporting was demonstrated by Achmea which moved from reporting on a non market-consistent basis under EEV Principles to MCEV Principles. Achmea indicated that this move represented a natural progression to improved consistency and transparency. Figure 2 shows the position of companies at year-end 2011 and 2012.

FIGURE 2: EV REPORTING PRINCIPLES						
	2011			2012		
EV REPORTING PRINCIPLES	CFO FORUM MEMBERS	OTHER COMPANIES	TOTAL	CFO FORUM MEMBERS	OTHER COMPANIES	TOTAL
EEV	2	1	3	1	0	1
MARKET CONSISTENT EEV	5	6	11	6	6	12
MCEV	8	5	13	7	7	14
OTHER	2	0	2	2	0	2
TOTAL	17	12	29	16	13	29

1. Numbers of companies based on a sample of 29.
2. Aegon has moved to a *market-consistent* approach and only reports a market-consistent value of new business.
3. Old Mutual has moved to be in the category of *Other Companies* disclosing MCEV.
4. Achmea has changed to report under MCEV Principles instead of EEV Principles and is under the category of *Other Companies*.
5. Swiss Re did not report explicitly under either EEV or MCEV Principles but under a framework called *Economic Value Management*.

EMBEDDED VALUE RESULTS

Embedded Value

In 2012, many developed economies experienced flat or negative growth, creating another year of challenging economic conditions in which insurers had to operate.

Particularly in the Eurozone, concern over the fate of the Euro, the future solvency of particular economies and the effectiveness of austerity programmes led to subdued consumer confidence and sentiment. The US economy equally experienced moderate growth over 2012. Asia, on the other hand, witnessed more favourable economic and consumer experience.

Against this backdrop, companies in our survey performed reasonably well over 2012. Effectively, all of the companies surveyed saw an increase, of varying degrees, in their embedded values compared to 2011. Overall, the current CFO Forum members (that disclosed their embedded value at the end of 2012) had a combined embedded value of £222 billion (€273 billion) at the end of 2012 compared to £200 billion (€239 billion) at the end of 2011. Figure 3 shows the embedded value results of current CFO Forum members over the last three year-ends.

All of the companies surveyed saw an increase, of varying degrees, in their embedded values compared to 2011.

FIGURE 3: PUBLISHED EMBEDDED VALUE RESULTS AT YEAR-END 2010, 2011 AND 2012
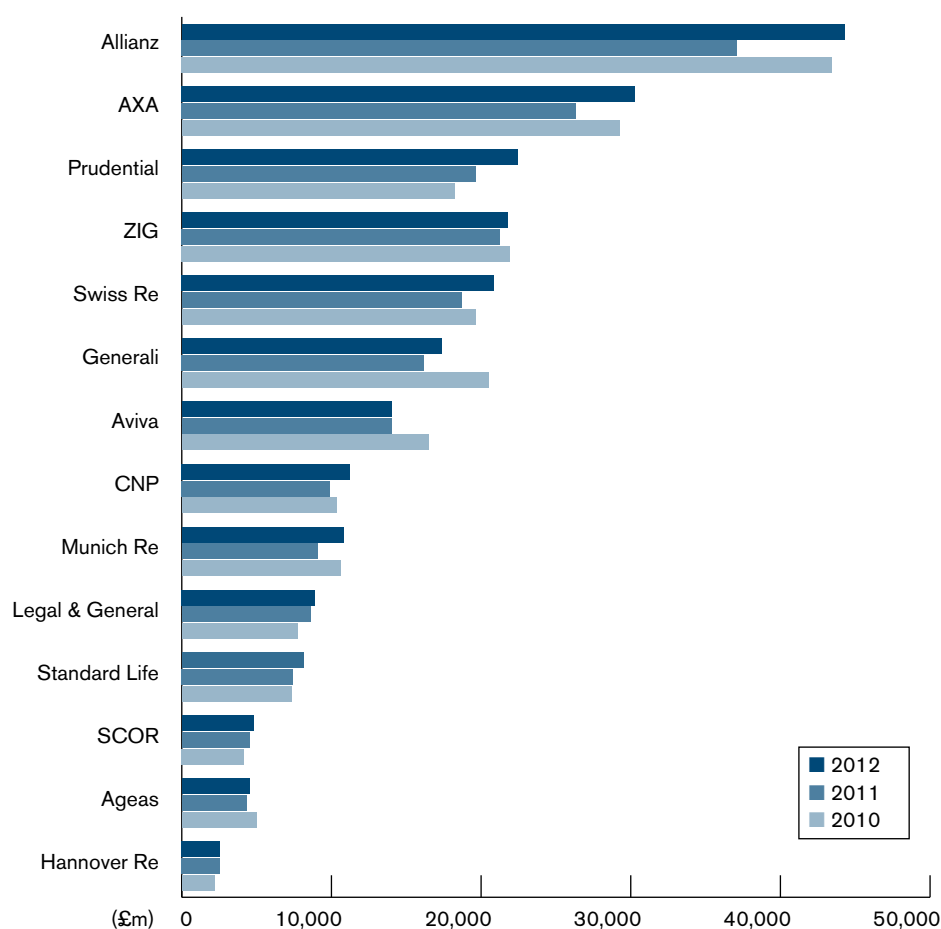
1. Ageas' embedded value is the total of *life* and *non-life & other insurance*.
2. Aegon and Lloyds TSB are not included in Figure 3 as they did not disclose their embedded values at the end of 2012.

The embedded values considered in Figure 3 include both covered and non-covered business. Allianz, AXA and Prudential take the top three positions in terms of the largest combined business embedded values. During 2012, the top performers based on percentage increases in embedded value were Allianz, AXA and Munich Re.

- Allianz cited that each of its key segments, Property and Casualty, Life and Health and Asset Management, performed strongly over 2012. Despite the low interest rate environment contributing to lower new business contributions, the economic environment, on balance, benefitted Allianz especially for existing business as the impact of the low interest rates was offset by improved equity market returns, narrower credit spreads and lower volatilities.

- AXA's significant operations around the world each contributed strongly to the group's overall embedded value. France continues to be the dominant component of AXA's embedded value and credits its focus on mature and high-growth markets as the key to its strong performance. AXA continued to focus on expanding its operations in Asia, drawing attention to the launch of its life insurance joint-venture with Industrial and Commercial Bank of China Co. Ltd in China. AXA pointed out that its total return on the life and savings business benefited from the general higher equity market performance, lower volatility and tighter spreads which outweighed the negative impact of lower interest rates.

- Munich Re's performance over 2012 was particularly strong. Its primary insurance business saw an increase in its MCEV results of 212%, mainly driven by the recovery of capital markets, with the tightening of credit spreads in the different regions in which Munich Re operates helping to offset low interest rates. On the reinsurance side, economic variance again benefitted performance, albeit to a lesser extent. Non-economic assumption changes and strong contributions from new business bolstered a positive performance from the reinsurance division.

Some of the more modest percentage increases in embedded value were seen by Aviva, Hannover Re and Legal & General.

- Aviva further reduced its holding in Delta Lloyd to approximately 20%, demonstrating a clear move to consolidate its operations globally. Furthermore, a number of other operations have been earmarked as *held for sale* including Aviva operations in Spain, Ireland and Malaysia. Some of these transactions may complete during 2013. The MCEV operating earnings in 2012 was lower than 2011 overall, with several regions experiencing lower operating earnings before tax except for the *Spain, Italy and Other* region which saw an increase – principally driven by Italy. Assumption changes for its French business also had a negative impact on Aviva's MCEV earnings during 2012.

- Hannover Re experienced an overall modest increase in its MCEV. This increase was driven by a robust performance in areas such as investment experience and value of new business being offset by challenging conditions in other components such as claims experience from the US. Hannover Re's foreign operations continued to dominate the group's MCEV, which includes its operations in South Africa, the US, Australia, Bermuda and the UK.

- Legal & General's performance over 2012 was stable and solid. The core areas of Protection & Annuities, Investment Management, Savings and US Protection continued to make broadly similar contributions to the group EV as in 2011. Contribution from new business was strong and increased during 2012. However, other areas had an offsetting impact on the EV earnings, such as experience variances and operating assumption changes.
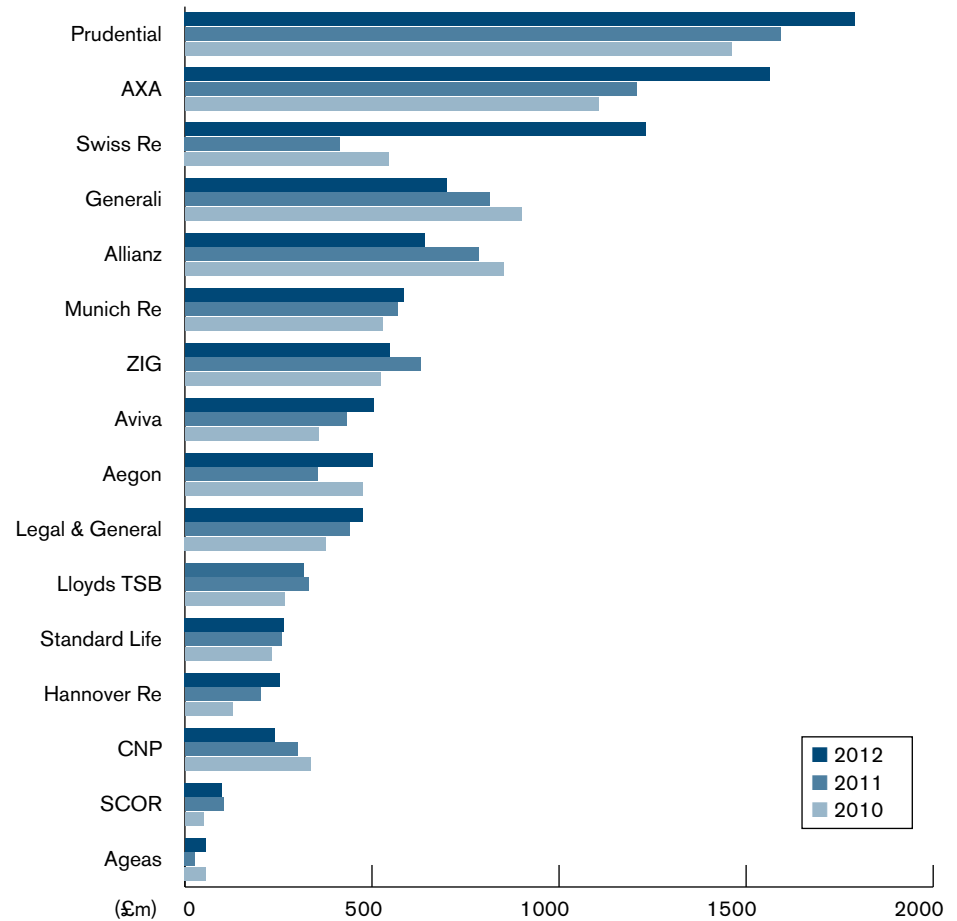
Value of New Business

Some companies noted that the economic conditions provided a challenging market environment for new business. In particular, low interest rates made certain products less attractive to potential customers. Despite this, the overall results for new business remained fairly positive with approximately 60% of the companies in our sample increasing the value of their new business over 2012. The total value of new business (VNB) written by the current CFO Forum members (that disclosed their value of new business at the end of 2012) reached £9.8 billion (€12.0 billion) in 2012, compared to £8.5 billion (€10.1 billion) in 2011.

Figure 4 shows the value of new business over the last three years for our sample of companies. Prudential, AXA and Swiss Re took the top three positions in terms of VNB in 2012. The top performer based on percentage increase in the VNB was Swiss Re, which saw a significant increase in VNB in 2012 compared to 2011, primarily driven by higher volumes and increased margins across its reinsurance and corporate solution divisions. Under Swiss Re's EVM approach the value of VNB is calculated for all divisions including Property and Casualty.

Underlying the value of new business results, the average new business margin for the CFO Forum members increased to 3.1% in 2012 from 2.8% in 2011[4]. There was approximately a 2.3% increase in volumes over 2012. However, individual companies' results varied, with around 60% reporting an increase in the VNB (driven equally by higher new business margins with lower volumes or with both higher new business margins and volumes) and the remainder reporting a reduction in the VNB (driven equally by lower volumes with lower margins or lower margins offsetting higher new business volumes).

---

[4]   This excludes Aegon.

FIGURE 4: PUBLISHED VALUE OF NEW BUSINESS AT YEAR-END 2010, 2011 AND 2012

1. Swiss Re VNB only includes the value from its underwriting activities.
2. Aegon now presents value of new business on a market-consistent basis covering 2012 and 2011. For 2010, Aegon's value of new business is based on EEV principles.

METHODOLOGY HOT TOPICS

Based on our analysis of companies' embedded value methodologies, evolving practices and emerging market trends continue in three key *hot topic* areas. These include (1) the construction of the risk discount rate, (2) how to allow for the cost of capital, including cost of residual non-hedgeable risks, and (3) recognising the time value of options and guarantees. We consider each of these in detail below.

Risk Discount Rate

The risk discount rate is one of the key assumptions required for a company's embedded value calculation (under either MCEV or EEV) as it is used to discount the projected cash flows.

In determining the risk discount rate, companies consider a number of key areas, such as:

- Whether to construct the risk discount rate using a *bottom-up* or a *top-down* approach. To comply with the MCEV Principles, a *bottom-up* approach is required.

- The underlying basis for the risk discount rate – typically swap rates or the return on government-issued debt.

- Allowing for the potential existence of a liquidity premium (also referred to as matching adjustment under Solvency II).

- Extrapolating for longer durations where reliable data in the asset market may not exist.

Companies may adopt a number of different approaches to address these areas, which in some cases will be dependent on whether they are reporting under the EEV or MCEV Principles. An overview of the approaches used to determine the risk discount rates by companies as at year-end 2012 is provided in Figure 5. Each of these areas is expanded in further detail in the subsequent sections.

Construction of Risk Discount Rate

Companies can construct their risk discount rates using either a top-down or bottom-up approach. However, in practice, the market appears to have been shifting over time to a bottom-up approach and only one company (Legal & General), amongst those included in the survey, continues to use a top-down approach. Aegon, which previously used a top-down approach, no longer completes a full year-end embedded value and Achmea moved to an MCEV reporting basis and consequently now adopts a bottom-up approach.

The top-down approach considers the risks a company is exposed to as a whole in order to derive a risk margin that applies to all future cash flows. This may be achieved, for example, by considering the company's *weighted average cost of capital*. By comparison, a bottom-up approach considers the risks to which each cash flow (or group of cash flows) is exposed, to determine a cash-flow-specific risk margin. Under MCEV, a bottom-up approach is required, whereas under EEV companies can choose to use either a top-down or bottom-up approach.

MCEV Principle 13 states that: *VIF should be discounted using discount rates consistent with those that would be used to value such cash flows in the capital markets.* To illustrate, equities are generally expected to yield returns above a risk-free asset to compensate for the additional risk inherent in equities. As such, under a market-consistent basis, in order to value equity cash flows a risk discount rate that reflects the additional risk should be used. This logic equally applies to liability cash flows by valuing them consistently with traded assets that exhibit the same (or similar) characteristics. Therefore, where cash flows are fixed or vary linearly with market movements, companies can adopt the certainty equivalent approach (i.e., assets are assumed to earn a rate based on a risk-free curve and all cash flows are discounted using the same risk-free curve) so as to achieve the same result. However, where companies use illiquid assets to match their liabilities this can be reflected in the risk discount rate. The certainty-equivalent approach may also be adopted by firms reporting under the EEV Principles.

FIGURE 5: OVERVIEW OF RISK DISCOUNT RATE CONSTRUCTION

OVERVIEW OF COMPANIES' APPROACHES TO DERIVING THEIR DISCOUNT RATE

Company	Principles	Risk Discount Rate Methodology	Underlying Basis for Risk Discount Rate	Liquidity Premium	Extrapolation of Risk-free Curve
CFO Forum Members					
Ageas	EEV (MC)	Bottom up	Swaps, -10bps for credit risk	Yes, QIS 5[3]	Yes, LTGA[7]
Allianz	MCEV	Bottom up	Swaps, -10bps for credit risk	Yes, QIS 5	Yes, LTGA
Aviva	MCEV	Bottom up	Swaps	Yes, QIS 5[4]	Yes, other[8]
AXA	EEV (MC)	Bottom up	Swaps	Yes, QIS 5	Yes, LTGA
CNP	MCEV	Bottom up	Swaps	Yes, QIS 5	Yes, LTGA
Generali	EEV (MC)	Bottom up	Swaps	Yes, QIS 5	Yes, LTGA
Hannover Re	MCEV	Bottom up	Swaps	No	Not disclosed
Legal & General	EEV	Top down	Gov. Bonds	Not disclosed[5]	Not disclosed
Lloyds TSB	EEV (MC)	Bottom up	Gov. Bonds	Yes, method not disclosed	Not disclosed
Munich Re	MCEV	Bottom up	Swaps	No	Yes, other[8]
Prudential	EEV (MC)	Bottom up	Swaps (Annuities)[2] Gov. Bonds (Other)	Yes, method not disclosed	Not disclosed
SCOR	MCEV	Bottom up	Swaps, -15bps for credit risk	No	Yes, other[9]
Standard Life	EEV (MC)	Bottom up	Gov. Bonds	Yes, method not disclosed	Not disclosed
Swiss Re	Other[1]	Bottom up	Gov. Bonds	No	Not disclosed
ZIG	MCEV	Bottom up	Swaps	Yes, QIS 5	Not disclosed
Other Companies					
Chesnara	EEV (MC)	Bottom up	Swaps	Not disclosed	Not disclosed
Achmea	MCEV	Bottom up	Swaps	Not disclosed	Not disclosed
Resolution (Friends)	MCEV	Bottom up	Swaps	Yes, other[6]	Yes, other[10]
Irish Life & Permanent	EEV (MC)	Not disclosed	Not disclosed	Not disclosed	Not disclosed
Mediolanum	MCEV	Bottom up	Swaps	No	Yes, other[11]
Old Mutual	MCEV	Bottom up	Swaps	Yes, method not disclosed	Yes, method not disclosed
Phoenix	MCEV	Bottom up	Gov. Bonds, +10bps	Yes, method not disclosed	Yes, method not disclosed
PZU	EEV (MC)	Bottom up	Gov. Bonds	Not disclosed	Yes, other[10]
Royal London	EEV (MC)	Bottom up	Gov. Bonds	Not disclosed	Not disclosed
St James's Place	EEV (MC)	Bottom up	Gov. Bonds	Not disclosed	Not disclosed
Storebrand	EEV (MC)	Bottom up	Swaps	No	Yes, other[12]
Swiss Life	MCEV	Bottom up	Swaps	Yes, QIS 5	Yes, QIS 5[13]
VIG	MCEV	Bottom up	Swaps	Yes, QIS 5	Yes, LTGA

1   Swiss Re uses an Economic Value Management framework.
2   Prudential uses swaps for its UK shareholder-backed annuity business.
3   QIS5 methodology to deriving a liquidity premium is to take 50% of the corporate spread over swaps less 40 bps if greater than zero.
4   Aviva uses 60% of the corporate spread over swaps less 40 bps if greater than zero for US business.
5   An allowance for a liquidity premium can be regarded to be implicit within the spread over the risk-free rate for certain assets.
6   Methodology stated as consideration of negative basis trade and structural models.
7   Smith-Wilson approach using LTGA parameters.
8   Nelson-Siegel extrapolation methodology.
9   Insufficient information is given to determine whether the QIS5 extrapolation method is used.
10 Spot rates after a certain duration are set level and equal to the rate at that duration.
11 Spot rates after a certain duration are extrapolated at a rate equal to the slope of the curve in the preceding 10 years.
12 Norwegian and Swedish swap markets deemed insufficiently liquid beyond 10 years. Equilibrium rate used for 20+ years with linear interpolation between 10 and 20 years.
13 Smith-Wilson approach using QIS5 parameters.

Basis for Risk-Free Rate

To begin the construction of a suitable risk discount rate curve, companies will typically identify returns on assets in the market that are a proxy to the *risk-free* rate. The MCEV Principles terms this proxy the *reference rate*. In practice, the starting point for the reference rate is either government bonds or interest-rate swaps, based on interbank lending rates. However, in reality, no assets exist that are completely risk-free, as even bonds issued by the most secure government will carry some residual level of risk.

Based on our study, there was an even split between the use of swaps or government bonds as the starting point for the reference rate for companies reporting under the EEV Principles, whereas almost all companies reporting under MCEV Principles use swap rates. This may come as no surprise, as MCEV Principle 14 states that swap rates should be used where they can be considered reliable. Phoenix is an exception as it reports under MCEV but uses government bonds as the basis for its reference rate (plus 10 bps).

Companies that opted to use swap rates as the basis for their reference rates also needed to decide which swap rates to use. In the recent past, industry practice has seemed to suggest swaps based on interbank lending rates, such as the London Interbank Offered Rate (LIBOR) in the UK for sterling-based cash flows. As the underlying rate (e.g., LIBOR) contains some level of compensation for the credit risk associated with lending money to a bank, even for a short duration, an adjustment is sometimes made to the resulting interest rate curve. Two companies (Ageas and Allianz) continued to apply a reduction to the swap rate of 10 bps. For 2012, CNP no longer applies a 10 bps reduction, whereas SCOR has introduced a reduction of 15 bps.

The most recent Solvency II information issued at the end of January 2013 under Part II of the LTGA Specifications proposes an allowance for credit risk as at the end of 2011 of 35 bps based on an analysis of the difference between swap and overnight deposit rates. This adjustment goes much further than any allowances we observed at the end of 2011 in our last report. There may be an economic argument for companies to periodically review these adjustments in light of prevailing market conditions or associated solvency regimes.

In recent years, there has been an industry move to use overnight deposit rates such as the Sterling Overnight Index Average (SONIA) and the Euro Overnight Index Average (EONIA), instead of the traditional LIBOR, as the discount rate for swap valuation purposes. The banking industry in particular has been an early adopter of this approach, and most fixed-income desks now use this methodology as standard in their market pricing. Overnight deposit rates are viewed by these banks to be more consistent with the need for counterparties to re-balance collateral on a daily basis, and are perceived by the banks to be a better measure of risk-free. This will become increasingly more widespread, as the entire interest rate swap market moves towards central clearing once the Dodd-Frank and European Market Infrastructure Regulations have been fully implemented. In particular, this is because all the major clearing houses also use this discounting basis to calculate variation margin calls and receipts for cleared interest rate swap positions.

Use of a discount rate based upon SONIA, for example, may also have advantages over one based on LIBOR because:

- It is based upon data from actual transactions rather than a survey of anticipated transaction rates.

- It should contain less of a premium for credit risk as the term of the deposit is overnight rather than the usual three to six months for LIBOR.

This may indicate that a reference rate based on a SONIA swap rate may be considered a better proxy for a *risk-free* yield. At present, the market for swaps with floating coupons based on SONIA is not as developed as that of LIBOR, in particular at longer terms. Therefore, a SONIA swap rate may not be suitable in determining the reference rate for an embedded value calculation as the duration at

which data becomes unreliable is much shorter. If the market for such swaps were to become more developed then the use of SONIA swap rates may offer a valid alternative.

Allowance for Liquidity Premium

Typically, the additional return on an asset (such as a corporate bond) over the risk-free yield is considered to be made up of three key components, which compensate for (1) the expected cost of defaults of the issuer, (2) the uncertainty surrounding the unexpected cost of defaults and (3) other risks predominantly thought to be in respect of the illiquidity of the asset, particularly in adverse conditions (known as the *liquidity premium*). Consequently, companies that closely match their asset and liability positions to mitigate spread risk may consider it appropriate to make an allowance for the latter part of the additional yield they expect to receive in the form of a liquidity premium adjustment.

Based on their disclosures, companies generally did not change their methodology used to determine the value of the liquidity premium, with most continuing to use that described in QIS5 (rather than using one of the options under the LTGA).

Based on their disclosures, companies generally did not change their methodology used to determine the value of the liquidity premium, with most continuing to use that described in QIS5 (rather than using one of the options under the LTGA). In summary, the QIS5 approach specified a liquidity premium estimate given by 50% of (spread less 40 bps), subject to a minimum of zero, where the 40 bps represented the long-term level of expected default costs and the 50% splits the remaining spread between the liquidity premium and the unexpected cost of defaults. In QIS5, the assumed spread was based on the spread of corporate bond yields over the swap curve in the relevant currency and duration determined in two stages (i.e., by taking the combination of the corporate bond spreads over government bond yields and the spread of swaps over government bond yields). Most companies also apportioned varying levels of the liquidity premium to different groups of business using the *bucket-style*[5] approach described under QIS5.

A few companies, such as Allianz and Swiss Life, disclosed that they did not use the two-stage approach described above to determine the US and European spreads over swaps. Instead, they determined the spreads directly using other sources of market data. For example, Allianz stated it believed determining spreads directly to be a more appropriate methodology, as the disturbances in some sovereign debt markets had led to distortions in government bond spreads.

For the purposes of the 2012 year-end embedded value reporting, no company in this survey disclosed the use of any of the various methods for calculation of the matching adjustment laid out in Part II of the LTGA Technical Specifications for Solvency II issued at the end of January 2013. The methods detailed within the LTGA seem to be computationally more intensive and contain more restrictive conditions surrounding the application of the matching adjustment than the QIS5 approach to the liquidity premium. This may have been a reason why companies chose not to change methodologies at this time, perhaps awaiting the publication of the results of the LTGA and the final Omnibus II text. Also, companies may have been well progressed into their 2012 year-end reporting processes by the time of publication of the LTGA Technical Specifications and may not have been able to incorporate the proposals within their embedded value results. It is unclear which of the LTGA proposals would be most appropriate to use in determining embedded value liquidity premiums. With this in mind, the matching adjustment (and countercyclical premium) looks set to remain an area of debate and discussion, which may lead to a divergence between the reference rate used by companies under embedded value and Solvency II reporting in the future.

In general, allowances for liquidity premiums have significantly decreased for the majority of companies over 2012, as shown in Figure 6, and are more in line with those made at the end of 2010. This is largely a result of a narrowing of credit spreads observed in financial markets over 2012 and is not due to a shift in methodology.

---

[5] Under QIS5, 100%, 75%, 50% or 0% of the calculated liquidity premium was applied, depending on the specific line of the company's business. These standard proportions are commonly known as the risk bucket. The factors considered in determining what proportion of the liquidity premium to apply to a category of business may include, inter alia, the duration of the business and predictability of cash flows. Generally, the use of a higher proportion of the liquidity premium would be justified on longer-duration business with more predictable cash flows, such as annuity business.

Companies disclosing that they applied no liquidity premium adjustment at the end of 2012 continued to be predominantly reinsurers, including Hannover Re, Munich Re, Swiss Re and SCOR, but also still included insurers Mediolanum and Storebrand. Despite the increased focus on allowances for liquidity premiums, around a quarter of our surveyed companies chose not to disclose whether they had applied liquidity premium adjustments or not. Legal & General adopted a top-down approach to setting its risk discount rates and therefore disclosed the yields that were used rather than the value of liquidity premiums, as these are implicit within the approach. Consequently, Figure 6 summarises only those companies for which the use and value of a liquidity premium adjustment was explicitly disclosed.

FIGURE 6: SUMMARY OF LIQUIDITY PREMIUM ADJUSTMENTS AS AT YEAR-END 2011 AND 2012

SUMMARY OF LIQUIDITY PREMIUM

Company	Underlying Basis for Risk Discount Rate	Liquidity Premium Method	Value at 2011 (bps)	Value at 2012 (bps)	Sensitivity
CFO Forum Members					
Ageas	Swaps	QIS 5	71 (UK) 43 - 53 (Euro) 70 (US)	43 (UK) 29-35 (Euro) 46 (US)	No Liquidity Premium Liquidity Premium + 10bps
Allianz	Swaps	QIS 5	118 (Euro) 103 (US)	44 (Euro) 59 (US)	Not disclosed
Aviva	Swaps	QIS 5	130 (UK Annuities) 118 (France) 88 (Spain) 133 (US Immediate Annuities) 113 (US Other)	130 (UK Annuities) 44 (France) 30 (Spain) 91 (US Immediate Annuities) 77 (US Other)	Liquidity Premium + 10bps
AXA	Swaps	QIS 5	132 (UK) 108 (Euro) 90 (US)	75 (UK) 46 (Euro) 64 (US)	No Liquidity Premium Liquidity Premium + 10bps
CNP	Swaps	QIS 5	108 (Euro)	37 (Euro)	Liquidity Premium + 10bps
Generali	Swaps	QIS 5	135 (UK) 118 (Euro) 102 (US)	77 (UK) 44 (Euro) 59 (US)	No Liquidity Premium Liquidity Premium + 10bps
Lloyds TSB	Gov. Bonds	Not disclosed	119 (UK Annuities)	73 (UK Annuities)	Not disclosed
Prudential	Swaps (Annuities) Gov. Bonds (Other)	Not disclosed	135 (UK Annuities)	96 (UK Annuities)	Liquidity Premium + 10bps
ZIG	Swaps	QIS 5	130 (UK) 60 (Euro) 90 (US)	75 (UK) 37 (Euro) 55 (US)	Not disclosed
Other Companies					
Resolution (Friends)	Swaps	Other	90 (UK Annuities)	75 (UK Annuities and Heritage)	No Liquidity Premium
Old Mutual	Swaps	Not disclosed	50 (OMLAC(SA) Immediate Annuities & Fixed Bond business)	50 (OMLAC(SA) Immediate Annuities) 45 (Fixed Bonds)	Liquidity Premium + 10bps
Phoenix	Gov. Bonds	Not disclosed	90	60	Not disclosed
Swiss Life	Swaps	QIS 5	107 (Euro) 108 (US)	85 (UK) 48 (Euro) 68 (US)	Not disclosed
VIG	Swaps	QIS 5	100 (Euro) 80 (Other)	34 (Euro) 2 - 34 (Other)	No Liquidity Premium

At year-end 2012, liquidity premiums applied generally were within the range 30 to 130 bps compared to 40 to 135 bps at year-end 2011. Although the range has only narrowly shifted downward, in practice there has been a general widespread downward shift in the values of the liquidity premiums applied. Only one company in our sample disclosed a liquidity premium of 100 bps or more for the 2012 year-end (compared to 10 companies at the end of 2011), namely Aviva, which maintained a liquidity premium of 130 bps for UK annuities.

Recognising the sensitivity of the results to the liquidity premium, a number of companies also disclosed embedded value sensitivities to the size of the liquidity premium. These sensitivities were generally based on a 10 bps increase to the liquidity premium or the removal of the liquidity premium. Swiss Re does not include a liquidity premium in its main results, and therefore provides sensitivities to the inclusion of 10, 50 and 100 bps liquidity premiums, which result in an increase in embedded value. Similarly, Munich Re and Hannover Re disclose a sensitivity to the inclusion of a liquidity premium of 10 bps.

Yield Curve Extrapolation

In order to calculate the VIF component, some companies require a risk-free curve that extends to very long durations, reflecting both current market conditions and long-term economic views. This may pose a challenge where available market data is of a shorter duration than the projected cash flows. Even where data is available for very long swap contracts or sovereign bonds, as the case may be, the market may not be sufficiently deep or liquid for such data to be reliable. Therefore, to obtain suitable rates at such long durations, companies may extrapolate the risk-free yield curve from the last observed liquid market data point (*last liquid point*, or LLP) to some long-term equilibrium rate (sometimes referred to as the *ultimate forward rate*, or UFR). Extrapolating the risk-free curve from the LLP may help to reduce the impact on the VIF calculation of volatility that is due to demand and supply imbalances for the long durations in the asset market.

There are a number of extrapolation methods available to companies, such as:

- Assuming that a flat rate continues beyond a certain point.
- Assuming a margin over government bond yields at longer durations.
- Using the Smith-Wilson technique (consistent with QIS5/LTGA).
- Using the Nelson-Siegel method, which fits a model to the observed yield curve.

Around 60% of the companies disclosed that they were using extrapolation techniques, up from around only 50% of companies disclosing the use of extrapolation at the end of 2011.

Figure 5 shows that around 60% of the companies disclosed that they were using extrapolation techniques, up from around only 50% of companies disclosing the use of extrapolation at the end of 2011. Of those disclosing their extrapolation methodologies, the QIS5/LTGA approach was most prevalent with the majority of these using the LTGA parameterisation. In the main, this has meant that companies are using an LLP for Euro countries of 20 years and a period over which convergence to the UFR is achieved of 10 years for all currencies. Some companies, such as Generali, did use the alternate period of convergence of 40 years.

Suitable values for key inputs into the chosen extrapolation method, such as the LLP, the UFR and the period over which convergence to the UFR is achieved, can vary over time. As such, companies should ensure that these values are fit for their intended purpose before using them in their embedded value reporting. The change in extrapolation approach had a very significant impact on certain companies' embedded value results, with some companies restating their 2011 results for the change. For example, Ageas reported a €317 million increase in embedded value and Allianz reported a €2,757 million increase. Given the sensitivity of embedded value results to the extrapolation parameters, it will be interesting to see which method is chosen as a result of the LTGA, both for Solvency II and embedded value reporting.

Cost of Capital

Cost of capital is typically reflected as a deduction from the PVFP to reflect the fact that assets backing the required capital are held within an insurance company rather than directly and, therefore, cannot be distributed to shareholders immediately. Additional costs may arise from investing in assets via an insurance company, such as additional taxation, investment expenses or the fact that investors do not have direct control over their capital (known as agency costs). Cost of capital may also arise in respect of non-hedgeable risks, which are covered separately in the next section.

Under Principle 8 of the MCEV Principles, *an allowance should be made for the frictional costs of required capital for covered business. The allowance is independent of the allowance for non-hedgeable risks.*

Companies reporting under MCEV Principles typically allow for the frictional costs of capital within the investment income on assets backing the required capital by:

- Projecting investment returns using the reference rate net of tax and investment management expenses.

- Discounting using the reference rate gross of tax and investment management expenses.

Companies may also adopt such an approach under the EEV Principles, especially if they use a market-consistent basis. Alternatively, the cost of capital may be calculated based on the difference between the *real world* investment return assumptions and the risk discount rate.

The majority of companies using a market-consistent embedded value calculate the cost of capital using the frictional cost approach, which is the approach required under MCEV Principles. However, the definition of required capital differs between companies. As at year-end 2012, almost all companies disclosed that they set their required capital by reference to local regulatory requirements, with the vast majority of them also taking into consideration the result from an internal capital model. In addition, approximately a third of the companies disclosed the consideration of the level of capital needed to achieve a certain target credit rating.

Cost of Residual Non-Hedgeable Risks

Generally, non-financial risks such as mortality, longevity, morbidity, persistency, expenses, operational and tax risks are regarded as non-hedgeable. By comparison, the majority of financial risks are generally considered to be hedgeable. However, there are still some financial risks that fall under the banner of non-hedgeable. These financial non-hedgeable risks often arise from uncertainty in setting best-estimate assumptions which can arise from a lack of deep and liquid market information. To illustrate, companies may employ extrapolation techniques to determine appropriate risk-free rates to apply at longer durations and the impact associated with this uncertainty should be captured in the CRNHR, if not already allowed for in the PVFP or TVOG. Companies that do not recognise the impact of this uncertainty may potentially underestimate the CRNHR.

Principle 9 of the MCEV Principles states: *An allowance should be made for the cost of non-hedgeable risks not already allowed for in the time value of options and guarantees or the PVFP. This allowance should include the impact of non-hedgeable non-financial risks and non-hedgeable financial risks. An appropriate method of determining the allowance for the cost of residual non-hedgeable risks should be applied and sufficient disclosures provided to enable a comparison to a cost of capital methodology.*

As at year-end 2012, almost all companies disclosed that they set their required capital by reference to local regulatory requirements, with the vast majority of them also taking into consideration the result from an internal capital model.

When assessing the CRNHR, companies usually consider the following:

- The cost of non-hedgeable risks (NHR) where they have not already been allowed for in the PVFP or TVOGs.

- The asymmetry[6] of risks and the impact that this has on shareholder value.

- The cost associated with the uncertainty in setting best estimate assumptions.

Under MCEV Principles, regardless of how companies allow for their CRNHR, the equivalent average cost-of-capital charge should be presented. The residual capital derived in respect of the residual non-hedgeable risks should be based on a company's internal economic capital model. The cost-of-capital charge represents the excess return or risk premium that investors might reasonably expect on capital exposed to such residual risks.

Companies may, however, determine the most appropriate level of internal capital over their self-determined future time horizons as appropriate for each company's business model and strategy. For example, selecting a higher confidence level in the capital calculation for the CRNHR may be in line with maintaining a target company credit rating. However, companies are required to express this as the equivalent average cost-of-capital charge based on the capital required on a 99.5% confidence interval over a one-year time horizon.

The majority of companies continue to use approximate methods to project the residual NHR-based capital, for example, by running off the initial capital derived over the projection term in line with certain drivers.

The majority of companies continue to use approximate methods to project the residual NHR-based capital, for example, by running off the initial capital derived over the projection term in line with certain drivers. The drivers reported by companies generally include reserves, premiums and sums at risk. The choice of drivers has generally remained stable.

Figure 7 shows the range of the equivalent average cost-of-capital charges based on the companies included in our analysis reporting under MCEV Principles, split by CFO Forum members and other companies. Some companies have noted a change in their methodologies to be more consistent with their European peers, with some companies reporting an equivalent charge of 4% per annum.

FIGURE 7: EQUIVALENT AVERAGE COST-OF-CAPITAL CHARGE FOR NON-HEDGEABLE RISKS AT YEAR-END 2011 AND 2012
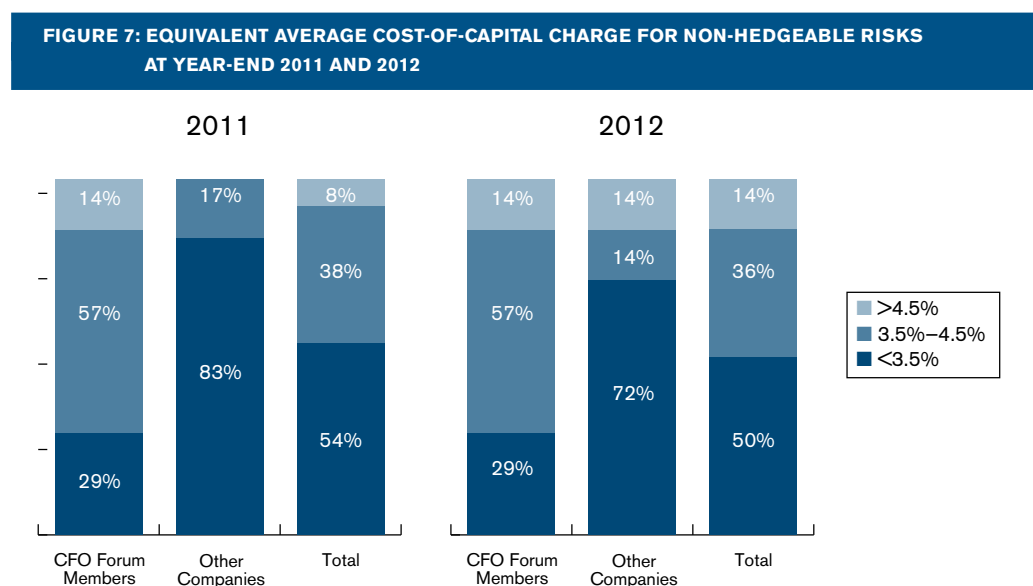
6   A risk where equal and opposite movements upwards and downwards result in financial outcomes that are not of equal magnitude.

A lower charge does not necessarily imply a weaker assumption or lower overall CRNHR. Instead, it may capture the different extents to which companies allow for NHR in their PVFP and TVOGs, diversification, varying business models and strategies as well as the general differences in the wider embedded value methodologies adopted by companies. The equivalent average cost-of-capital charges differ across companies. At the lower end of the spectrum, one company made no allowance for the CRNHR, while the highest observed in our analysis was 7% per annum. The company which made no allowance stated that the CRNHR was not applicable because of the insurer's particular business model. The insurer has a closed book with no new business, using significant outsourcing, and the insurer states that it has succeeded in closing out significant legacy risks. This insurer discloses a CRNHR as a sensitivity to the main results.

The CRNHR has similarities to the proposed risk margin under Solvency II. However, a key difference between the risk margin and the CRNHR is that the risk margin covers all business and not just long-term business, whereas the CRNHR will be in respect of long-term business only. As such, the risk margin will have explicit allowance for diversification between covered and non-covered business, which is in contrast to the MCEV Principles.

The latest draft Solvency II guidance in the LTGA refers to a cost-of-capital charge of 6% and, whilst not directly comparable, our analysis indicates this is potentially higher than the charge companies are currently considering in their MCEV reporting.

Some companies identified particular concerns with the CRNHR approach, citing that, according to the MCEV Principles, no allowance for further risk management actions is anticipated or reflected and that this was not representative of the company's future risk profile. Consequently, providing sensitivities will help companies to demonstrate to observers the future potential impact of their risk management profiles and plans.

Companies continue, in the main, to allow for diversification in line with the MCEV Principles, which states that diversification should not be allowed for between hedgeable and non-hedgeable risks or between covered and non-covered business in the CRNHR. However, a few companies, such as Zurich Insurance Group (ZIG) and Munich Re, have recognised diversification benefits between covered and non-covered business. This is in line with these companies' approaches at end-2011.

Many companies have changed the cost-of-capital charge at end-2012. Of companies reporting under MCEV in our survey, around 30% reduced the charge, 10% increased the charge and those remaining maintained the same cost-of-capital assumption as at end-2011. Overall, the average across MCEV companies that disclosed their cost-of-capital charge at both the end of 2011 and 2012 fell from 3.56% at the end of 2011 to 3.43% at the end of 2012. Achmea reported under the MCEV Principles for the first time at the end of 2012 and used a comparatively high rate of 6%, more in line with that included in the latest Solvency II guidance. The average rate including Achmea is 3.63%.

For some companies, the movement in charge may be caused by underlying movements in business mix. For example, at both end-2011 and end-2012, CNP used a frictional cost of capital on symmetrical risks and a 5% cost of capital on asymmetrical risks. The overall cost of capital fell from 2.8% at end-2011 to 2.4% at end-2012.

Certain challenges in this area still remain to be addressed going forward and there is likely to be continued evolution in this area.

Many companies have changed the cost-of-capital charge at end-2012. Of companies reporting under MCEV in our survey, around 30% reduced the charge, 10% increased the charge and those remaining maintained the same cost-of-capital assumption as at end-2011.

Time Value of Options and Guarantees

The impact of financial options and guarantees can be split into two components. The first is the effect on the PVFP in respect to the intrinsic value of such financial options and guarantees. The second is the time value of financial options and guarantees. The TVOG is the difference between the central PVFP capturing the intrinsic impact and the average of the PVFPs over a range of scenarios obtained by stochastic calculations.

The TVOG corresponds to the asymmetry in the impact over a range of scenarios on the distributable earnings to shareholders. For example, in the case of participating contracts, profits are shared between shareholders and policyholders. Losses, however, are only shared up to a certain point, after which shareholders bear all the subsequent losses. This can be further exacerbated by the actions of policyholders (dynamic policyholder behaviour).

The features of products that generally give rise to an assessment of TVOG can include interest-rate guarantees on traditional products, profit-sharing features such as bonuses or levels of credited rates, guaranteed benefits on unit-linked products and guaranteed annuity options.

As noted, companies are required to assess the TVOG using stochastic techniques. Closed-form solutions can also be used where these lead to sufficiently accurate results but may not be suitable in valuing certain guarantees. The stochastic models must be appropriately calibrated and internally consistent with the rest of the modelling methodologies and approaches. Management actions can be allowed for which can include actions regarding the credited rate to policies, bonus rates, charges to asset shares and investment strategies. These management actions can be reflected, provided that such actions have passed through the company's normal governance and approval processes, are consistent with the operating environment and take into account the market reaction to discretion.

Principle 7 of both the EEV and MCEV Principles requires firms to make appropriate allowance for the potential impacts on shareholder values from financial options and guarantees. In carrying out this assessment, an important element is the calibration of companies' stochastic models to the implied volatility from appropriate financial market instruments.

For year-end 2012, virtually all companies that disclosed their approaches used end-period implied volatilities for interest rates and equities.

For year-end 2012, virtually all companies that disclosed their approaches used end-period implied volatilities for interest rates and equities. Hannover Re used end September 2012 to calibrate but reflected significant differences between September and December 2012 via an adjustment. The majority of companies continued to base volatility assumptions for property on historical analysis and expert opinion in the absence of meaningful option prices from which implied volatility could be accurately derived.

Figures 8a and 8b show the average, the highest and the lowest implied volatility levels used by companies complying with the MCEV Principles. Furthermore, the majority of companies continued to base asset correlations on historical market relationships. The MCEV guidance in this area requires companies to check correlations against external sources for reasonableness, which was, in part, in anticipation of future sources of correlation information becoming available.

As can be seen, implied volatilities across the different regions decreased. These reductions had clear and direct implications for the TVOG component for a large number of companies.

FIGURE 8A: SWAPTION IMPLIED VOLATILITIES - AVERAGE, HIGHEST AND LOWEST FOR MCEV COMPANIES
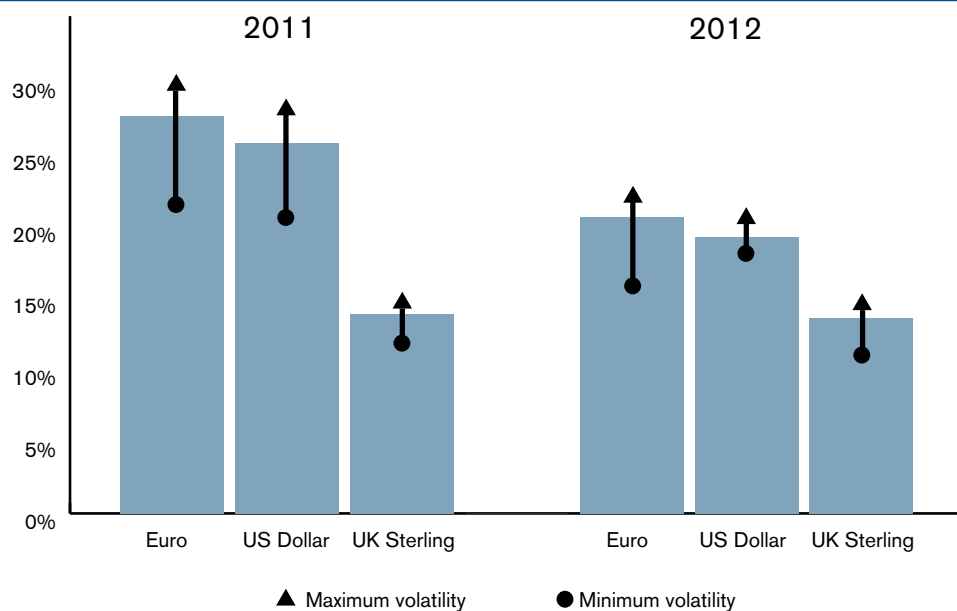
Swaption implied volatilities are based on 20-year swap length, 20-year option term.

FIGURE 8B: EQUITY IMPLIED VOLATILITIES - AVERAGE, HIGHEST AND LOWEST FOR MCEV COMPANIES
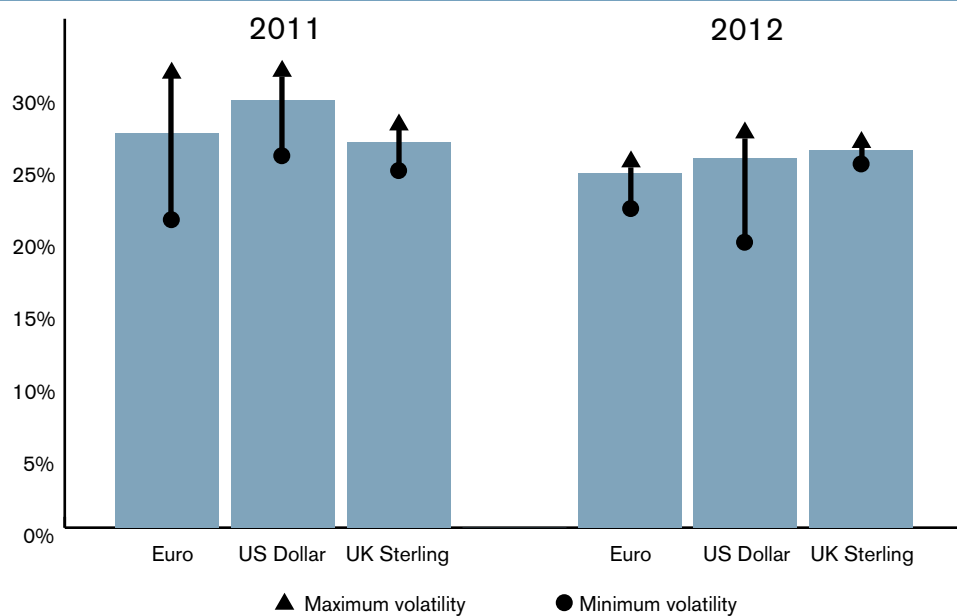
Equities based on 10-year options.

24

Dynamic policyholder behaviour is included in many companies' assessments of TVOG. In particular, a number of companies recognise the impact of dynamic policyholder behaviour under certain economic scenarios. For example, if the spread between the credited policyholder rate and the market benchmark were to exceed certain boundaries, this would trigger a change in the best-estimate assumption for the level of lapses. In considering dynamic policyholder behaviour, certain difficulties may be encountered in allowing accurately for the rationality of policyholders exhibiting certain behaviours.

No company in this survey has disclosed that they have developed their methodology to include dynamic policyholder behaviour other than those that already disclosed they incorporated such dynamic behaviour in our 2011 survey.

Figure 9 shows that, where information was disclosed, a large number of companies allowed for dynamic policyholder behaviour and the majority applied 1,000 economic scenarios on a market-consistent basis.

FIGURE 9: TIME VALUE OF OPTIONS AND GUARANTEES: NUMBER OF SCENARIOS AND POLICYHOLDER BEHAVIOUR

COMPANY	OPTIONS AND GUARANTEES	SCENARIOS	USE OF DYNAMIC POLICYHOLDER BEHAVIOUR
CFO Forum Members			
Ageas	Market-consistent	1000	No
Allianz	Market-consistent	1000 (5000 in Germany)	Yes
Aviva	Market-consistent	At least 1000	Yes
AXA	Market-consistent	At least 1000	Yes
CNP	Market-consistent	1000	Yes
Generali	Market-consistent	1000	Yes
Hannover Re	Market-consistent	1000	Not disclosed
Legal & General	Real-world	Not disclosed	Not disclosed
Lloyds TSB	Market-consistent	Not disclosed	Not disclosed
Munich Re	Market-consistent	1000	Yes
Prudential	Both	Not disclosed	Yes
SCOR	Market-consistent	Not disclosed	Not disclosed
Standard Life	Market-consistent	Not disclosed	Yes
Swiss Re	Market-consistent	Not disclosed	Not disclosed
ZIG	Market-consistent	1000	Yes
Other Companies			
Achmea	Market-consistent	Not disclosed	Not disclosed
Chesnara	Market-consistent *	Not disclosed	Not disclosed
Irish Life & Permanent	Market-consistent	Not disclosed	Not disclosed
Mediolanum	Market-consistent	1000	Not disclosed
Old Mutual	Market-consistent	Not disclosed	Yes
Phoenix	Market-consistent	Not disclosed	Not disclosed
PZU	Market-consistent	1000	Not disclosed
Resolution (Friends)	Market-consistent	2000	No
Royal London	Market-consistent	Not disclosed	Not disclosed
St James's Place	N/A **	N/A	N/A
Storebrand	Market-consistent	1000	No
Swiss Life	Market-consistent	2000	Yes
VIG	Market-consistent	1000	Yes

* Market-consistent with approximations.
** St James's Place does not offer products that carry any significant financial guarantees or options.
Aegon is no longer included as it discontinued disclosure of embedded value metrics.

DISCLOSURES

Individual differences in the interpretation and approach to embedded value reporting still remain, even where EEV Principles or MCEV Principles are adopted. Such disparities continue to present challenges for companies, investors, analysts and other interested parties alike in understanding disclosures and adjusting results to fairly evaluate and compare companies on a consistent basis. Naturally, this environment has put more emphasis on the additional information companies provide to help more clearly identify the dynamics of the business and the value-creation strengths of business models and strategies.

In certain areas, companies differ in the level of detail provided and this also presents challenges for market observers in carrying out in-depth comparisons between companies. On average, those companies producing standalone embedded value reports devoted approximately 35 pages to embedded value compared to an average of approximately 20 pages for those companies including embedded value in only their annual report. Whilst this is a crude comparison, it is indicative of the different amount and granularity of information that companies publish.

The EEV and MCEV Principles prescribe the minimum disclosures regarding methodologies and presentation of results. The MCEV Principles specify the format of the results presentation in Appendix A (*Presentation of analysis of earnings*) and Appendix B (*Group MCEV analysis of earnings*). Appendix A specifies the breakdown of the analysis of movement in embedded value split by distinct components of value (free surplus, required capital and the value of in-force). Appendix B specifies that covered and non-covered business should be separately presented. The MCEV Principles indicate that the non-covered business should be based, as far as possible, on the unadjusted IFRS net asset values (in practice, however, various adjustments will be required to ensure consistency).

The majority of companies stating compliance with the MCEV Principles in our sample presented their analysis of change broadly in line with Appendix A. There were also a number of EEV-compliant companies that chose to present their results consistent with Appendix A and Appendix B.

Furthermore, the EEV and MCEV Principles specify the minimum sensitivities that companies should disclose and this has helped to standardise disclosures across companies. The EEV and MCEV Principles also encourage companies to provide the results of additional sensitivities to help observers better understand the underlying dynamics of the companies' business. For example, a number of companies provided additional sensitivities surrounding the impact of the liquidity premium, while Munich Re and Storebrand included sensitivities to adopting the approach for the extrapolation of the risk-free curve detailed within the LTGA. Few companies included additional sensitivities in respect to the CRNHR, but where this was done, consideration was given to the impact of increasing the charge for CRNHR or allowing for diversification benefits between hedgeable and non-hedgeable risks.

Analysts have commented that developments in embedded value reporting over the last few years have furthered greater understanding amongst users. In particular, the increased levels of disclosures have provided the ability to compare and contrast the performance of different firms. However, one area which analysts have indicated is not particularly helpful is the continual evolution taking place, which has meant that stability in guidance and subsequent approaches has not been possible. Given the anticipated steps to further align the MCEV Principles with Solvency II, there is likely to be continued evolution going forward. However, in light of the most recent CFO Forum statement regarding the postponement of reflecting Solvency II in embedded values going forward, such alignment is likely to be delayed.

Embedded values continue to provide rating agencies with valuable information in their assessments of the creditworthiness of firms. The return on embedded value is a useful indication of the company's profitability. Furthermore, additional disclosures and the component nature with which the analysis is presented assist rating agencies in drilling down into the underlying key risk drivers and the areas of the company that are most important and/or where the ability to generate value is most at risk and thus the company's ultimate creditworthiness. For example, Standard & Poor's states that return on embedded value is one of the factors considered in determining life insurers' ratings.

Overall, companies appear to have continued to take steps to align methodologies across their current (and expected) reporting metrics.

OTHER MEASURES OF VALUE

In this final section, we discuss how the results from embedded values compare and contrast with other metrics used by parties such as investors or market analysts. In particular, we consider first how embedded value compares to market capitalisation and then how developments in both Solvency II and IFRS reporting may impact embedded value reporting going forward.

Market Capitalisation

The acid test of embedded value has always been how much the market believes the result. One simplistic way of measuring this is to compare a company's market capitalisation to its embedded value at a given point in time. However, discrepancies in the embedded value and the market capitalisation can be due to a number of reasons whose impact may not always be entirely clear. For example, no allowance is made for future new business sales or for intangible assets such as the loyalty of a customer base within a company's embedded value calculation, which may be factors investors consider and hence should be reflected within the market capitalisation. This may suggest that, as long as these items are thought to create value, market capitalisation should exceed the reported embedded value. Another reason for discrepancies may be timing differences between the availability of embedded value and market data.

Figure 10 shows the market capitalisation as a percentage of the embedded value for current CFO Forum members as at 31 December 2010, 2011 and 2012.

FIGURE 10: MARKET CAPITALISATION AS A PERCENTAGE OF EMBEDDED VALUE AS AT 31 DECEMBER 2010, 2011 AND 2012
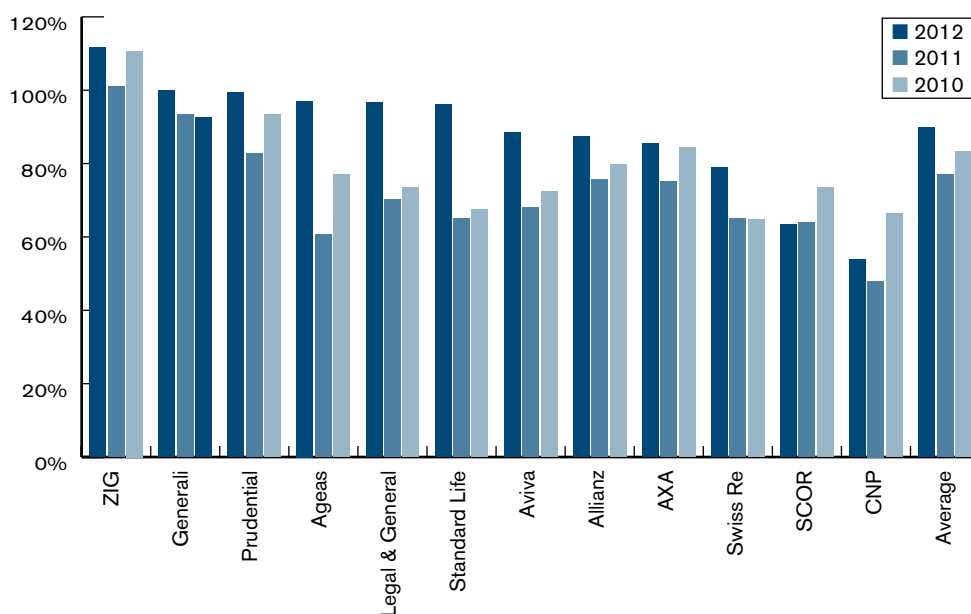
Excludes Lloyds Banking Group, Hannover Re and Munich Re. A comparison of their embedded values to market capitalisation has not been included because their embedded values do not contain all the business within the group.

Market capitalisation has been sourced from Bloomberg for the last trading day of 2012, except for SCOR whose market capitalisation has been sourced from its annual report.

Ageas embedded value is the total of *life* and *non-life & other insurance*.

Aegon has been removed from the comparison as it no longer discloses an embedded value.

Figure 10 shows that, for almost all companies considered, embedded value has exceeded market capitalisation at year-end 2010, 2011 and 2012. However, on average, the gap between the two measures has fallen over the course of 2012, and published embedded value became materially closer to market capitalisation. For the companies in our sample, the average market capitalisation rose as a percentage of total embedded value from 77% to 90% over 2012.

For most of the companies in Figure 10, market capitalisation rose over the year, generally coinciding with the improved equity and credit markets over the period. The average increase in market capitalisation for the companies we surveyed was 33%. One might therefore reasonably expect that the embedded value of companies that report on a market-consistent basis should rise as well. In fact, based on our analysis, all of the companies we surveyed reported increases in embedded values over 2012, with an average increase of 14%.

In general, embedded values rose by less than market capitalisation and so the gap between the two measures narrowed.

Solvency II
The uncertainty surrounding the final form and implementation timetable for Solvency II continued throughout 2012, with a full implementation date now not likely until 1 January 2016 at the earliest. As such, it remains difficult to assess the likely impact on embedded value.

Further indication of the direction of Solvency II came with the release of the updated technical specifications for the LTGA conducted by European Insurance and Occupational Pensions Authority (EIOPA) during March 2013. While it was stressed that this should not be used to pre-empt the final form of Solvency II, it did allow firms to test the application of proposed measures such as the matching adjustment and counter-cyclical premium. These are adjustments to the discount rate used to value corresponding liabilities which aim to recognise the liquidity premium in firms' long-term asset investments, although companies still tended to apply QIS5 rather than the LTGA, preferring to report sensitivities in the liquidity premium.

The LTGA also highlighted that when determining the risk-free rate, the adjustment for credit risk inherent in LIBOR should vary according to current market conditions, as measured by the difference between overnight indexed swaps and LIBOR swap rates. The deduction to LIBOR swap rates increased from 10 bps for QIS5 to 35 bps for the LTGA, but no companies in this survey took this into account in their embedded value methodology.

However, the LTGA also tested the impact of changes to some of the parameters used to extrapolate the risk-free curve to longer durations, including reducing the LLP for the Euro currency from 30 to 20 years and changing the speed of convergence to the UFR to either 10 or 40 years. Previously, it was assumed that all currencies reached the UFR at a duration of 90 years. Companies in our survey that used the QIS5/LTGA extrapolation methodology typically chose to reflect these changes in their embedded value results in some way.

Recognising that companies have invested significant time and resources into their Solvency II development, in March 2013 EIOPA issued a series of four consultation papers on guidelines for national supervisors in relation to the early introduction of specific elements of the Solvency II project. These consultation papers cover:

- Forward-looking assessment of the undertaking's own risks (based on the ORSA principles).
- System of governance.
- Pre-application of internal models.
- Reporting.

For almost all companies considered, embedded value has exceeded market capitalisation at year-end 2010, 2011 and 2012. However, on average, the gap between the two measures has fallen over the course of 2012, and published embedded value became materially closer to market capitalisation.

While it remains to be seen how national supervisors will incorporate these guidelines into local requirements, the reporting requirements, in particular, look likely to require firms to put in place processes to provide Solvency II balance sheet reporting from 1 January 2014. While this does not specifically require firms to provide calculations and results on a Solvency II basis, with Solvency I requirements still in force, these requirements will potentially leave firms reporting on at least three different metrics for the interim period.

Companies and users of companies' accounts would ideally prefer Solvency II and embedded value reporting to converge as far as possible so that common assumptions and calculations can be used. However, it remains to be seen how achievable this will be, given that the two methodologies are intended to be used for different purposes and will ultimately depend on whether additional margins of prudence are imposed under the Solvency II regime.

The key areas where differences may apply are similar to those highlighted at the end of 2011 and include:

- Investment return assumptions and discount rates (e.g., matching adjustment/liquidity premium, countercyclical adjustments, allowance for sovereign debt and extrapolation).
- Contract boundaries and consideration of what constitutes new business.
- Market-related cost of capital versus the fixed Solvency II risk margin calculation.

IFRS Developments
The preparation of accounts on an IFRS basis gives rise to a different interpretation and timing of profit and loss compared to the embedded values basis. This is fundamentally due to IFRS focusing on a current view of assets and liabilities together with current profit generation compared to embedded value, which also makes allowance for future earnings and the shareholder value created. Reconciliation of these different measures helps to reveal different features of firms' underlying performances. Consequently, companies reconcile their embedded value shareholder net worth to the IFRS net asset value. It is also worth noting that assets under embedded value are at market value, whereas under current IFRS reporting requirements, assets can be held at market value or amortised cost.

The IFRS 4 Phase II project aims at further standardising international accounting requirements for insurance contracts. The proposed IFRS 4 Phase II balance sheet, based on the latest information, is compared to MCEV and Solvency II in Figure 11.

FIGURE 11: COMPARISON OF MCEV, PROPOSED IFRS 4 PHASE II AND SOLVENCY II BALANCE SHEET
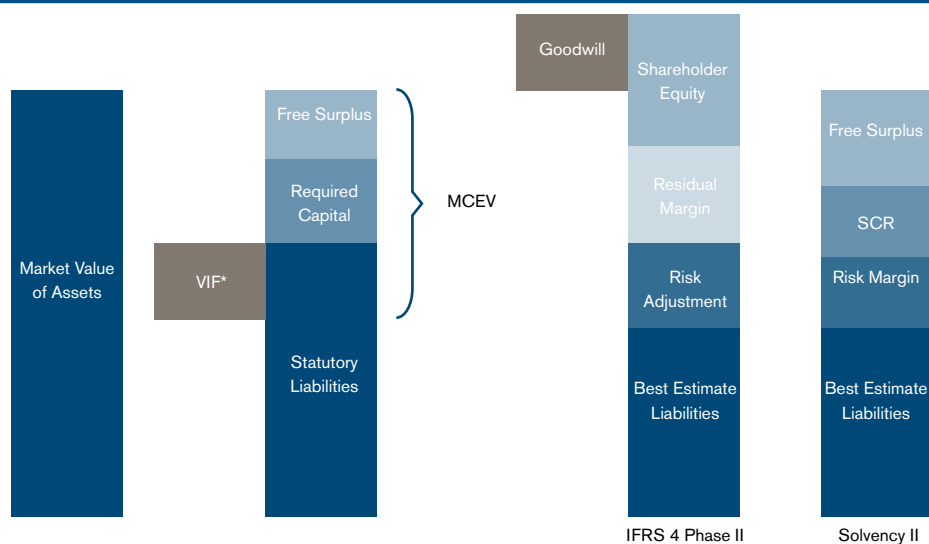
* VIF is PVFP less TVOG, CoC and CRNHR.
Size of components under each reporting metric are for illustration only.

The International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) have completed their deliberations on their joint insurance contract project. The IASB plans to issue a limited exposure draft around mid-2013 with the FASB issuing a full exposure draft a few months after. The IASB limited Exposure Draft will have a comment period of 120 days. To help insurers prepare for the implementation, the IASB has stated it is their intention to allow three years between the issue of a final standard and mandatory effective date. Early adoption will be allowed.

The IASB will ask for feedback on only a limited set of issues where significant changes have been made in the proposed approach from the 2010 Exposure Draft. These issues are (based on the tentative decisions taken by the IASB to date):

- **Treatment of participating contracts**. For contracts with contractual pass through of investment experience, including unit-linked business, use a mirroring approach to measure the participation feature and use the accounting value of the underlying asset to value the liability. For all other participation features – use discount rates reflecting participation.

- **Presentation of premium and claims in statement of comprehensive income**. The investment component is to be excluded from premiums and claims.

- **Treatment of unearned profit in an insurance contract**. The residual margin will be 'unlocked' and changes to the expected underlying cash flows can be reflected in changes in the residual margin in Other Comprehensive Income (OCI).

- **Approach to transition**. A full retrospective application of the building blocks is required, including both the risk margin and the residual margin.

- **Changes in discount rate**. Presenting the effect of changes in the discount rate used to measure the insurance contract liability in OCI rather than in Profit and Loss.

- **Premium recognition**. Premiums recognised at the time the service is provided.

However, it is likely that companies will respond more generally and not just on the specific questions asked by the IASB in order to continue to influence any elements that they wish to be modified.

One of the more important developments is the further enhancements of the presentation requirements using the earned premium model. These enhancements will require significant additional calculations without impacting the total level of income.

Additionally, the FASB accounting model has some important proposed changes to the IASB model, which will be of importance to entities reporting under US GAAP. These differences include:

- The most material difference is likely to be the use of a single margin rather than a separate residual and risk margin as proposed under IFRS.

- The single margin under FASB will be locked in, and subsequent re-measurement will not be allowed.

- The acquisition costs included in the liability measurement under the FASB proposal will be those related to successful sales only, whereas the IFRS approach allows all acquisition costs associated with obtaining a portfolio of contracts.

- The FASB will require the use of the premium allocation method for short-term contracts, whereas under the IASB this approach is optional.

In addition to enhancing embedded value reporting and the frequently evolving guidance, companies also have to incorporate, assess and interpret developing aspects of IFRS reporting requirements and Solvency II.

In addition to enhancing embedded value reporting and the frequently evolving guidance, companies also have to incorporate, assess and interpret developing aspects of IFRS reporting requirements and Solvency II. Companies must also consider and assess how to better ensure that their true inherent values are reflected in their market capitalisations. This is no easy feat, and companies continue to face challenges to not only maintain their value creation but also to effectively communicate their financial performances and strengths to investors, analysts and customers alike.

Milliman

CONTACT

If you have any questions or comments on this briefing paper or any other aspect of embedded value reporting, please contact any of the consultants below or speak to your usual Milliman consultant.

Amsterdam
Dennis de Vries
dennis.devries@milliman.com
+31 6 10152187

Henny Verheugen
henny.verheugen@milliman.com
+31 6 10149938

Beijing
Sharon Huang
sharon.huang@milliman.com
+86 10 8523 3189

Boston
William Hines
william.hines@milliman.com
+1 781 213 6228

Brussels
Kurt Lambrechts
kurt.lambrechts@milliman.com
+32 499 221636

Bucharest
Adrian Allott
adrian.allott@milliman.com
+40 314 326 526

Chicago
Anna Berezovskaya
anna.berezovskaya@milliman.com
+1 312 499 5679

Ted Schlude
ted.schlude@milliman.com
+1 312 499 5622

Bruce Winterhof
bruce.winterhof@milliman.com
+1 312 499 5624

Laird Zacheis
laird.zacheis@milliman.com
+1 312 499 5623

Dublin
Mike Claffey
mike.claffey@milliman.com
+35 31 647 5902

Dermot Corry
dermot.corry@milliman.com
+35 31 647 5910

Dusseldorf
Michael Leitschkis
michael.leitschkis@milliman.com
+49 211 938866 18

Hong Kong
Michael Daly
michael.daly@milliman.com
+852 2152 3138

Nigel Knowles
nigel.knowles@milliman.com
+852 2152 3808

Paul Sinnott
paul.sinnott@milliman.com
+852 2152 3838

London
Matt Cocke
matthew.cocke@milliman.com
+44 20 7847 1546

Nick Dumbreck
nick.dumbreck@milliman.com
+44 20 7847 1538

Chris Lewis
christopher.lewis@milliman.com
+44 20 7847 1536

Emma McWilliam
emma.mcwilliam@milliman.com
+44 20 7847 1524

Eoin O'Byrne
eoin.o'byrne@milliman.com
+44 20 7847 1517

Stuart Reynolds
stuart.reynolds@milliman.com
+44 20 7847 1535

Richard See Toh
richard.seetoh@milliman.com
+44 20 7847 1529

Phil Simpson
philip.simpson@milliman.com
+44 20 7847 1543

New York
Steve Schreiber
steven.schreiber@milliman.com
+1 646 473 3104

Stuart Silverman
stuart.silverman@milliman.com
+1 646 473 3108

Marc Slutzky
marc.slutzky@milliman.com
+1 646 473 3102

Madrid
Luca Inserra
luca.inserra@milliman.com
+34 91 598 4077

Milan
Aldo Balestreri
aldo.balestreri@milliman.com
+39 045 9235016

Dominic Clark
dominic.clark@milliman.com
+34 609 026 561

Jeremy Kent
jeremy.kent@milliman.com
+39 02 76 26 05 1

Paola Luraschi
paola.luraschi@milliman.com
+39 02 76 26 0524

Ed Morgan
ed.morgan@milliman.com
+39 02 76 26 05 1

Mumbai
Sanket Kawatkar
sanket.kawatkar@milliman.com
+91 22 6784 8410

Munich
Marcus Looft
marcus.looft@milliman.com
+49 89 12 71 08 711

Paris
Jerome Nebout
jerome.nebout@milliman.com
+33 1 42 99 15 80

Eric Serant
eric.serant@milliman.com
+33 1 42 99 15 90

Seattle
Novian Junus
novian.junus@milliman.com
+1 206 504 5624

Craig Likkel
craig.likkel@milliman.com
+1 206 504 5540

Craig Reynolds
craig.reynolds@milliman.com
+1 206 504 5530

David Wang
david.wang@milliman.com
+1 206 504 5524

Seoul
Chihong An
chihong.an@milliman.com
+82 2 3276 2501

Sung Hoon Kim
sunghoon.kim@milliman.com
+82 2 3276 2502

Singapore
Wen Yee Lee
wenyee.lee@milliman.com
+65 6327 2302

Richard Holloway
richard.holloway@milliman.com
+65 6327 2301

Sydney
Wade Matterson
wade.matterson@milliman.com
+61 2 8090 9103

Taipei
Wing Wong
wing.wong@milliman.com
+88 62 8780 0701

Tokyo
Steve Conwill
stephen.conwill@milliman.com
+81 3 5211 7031

Masaaki Yoshimura
masaaki.yoshimura@milliman.com
+81 3 5211 7174

Warsaw
Marcin Krzykowski
marcin.krzykowski@milliman.com
+48 22 630 6200

Zurich
Scott Mitchell
scott.mitchell@milliman.com
+41 44 287 8062

Nick Kinrade
nick.kinrade@milliman.com
+41 44 287 9074