

SOA International Experience Survey—Embedded Value Financial Assumptions

by Charles Carroll¹, William Horbatt and Dominique Lebel

Starting in 2003, the Society of Actuaries International Experience Study Working Group has been conducting surveys of published embedded value financial assumptions.² This article updates the survey with 2005 data.

The purpose of this survey is to provide international actuaries with benchmark assumption data. Since many companies make this information publicly available, no formal data request was issued. Instead, the survey was based on reports published on the Internet by 30 companies centered in Asia, Australia, Canada and Europe, many of which are active internationally.

Each financial assumption presented in this article is the average value of the assumption reported by all companies in their 2005 embedded value reports. If no companies reported a specific assumption in a given country, then that assumption is labeled “NA,” signifying that data is not available. Some companies vary assumptions by projection year, while other companies use a single assumption; if a

company varies an assumption by projection year, the value for the earliest period is used in this study.

Financial Assumptions from Survey

Financial assumptions presented in this article include:

- (1) Discount rate—the rate used to calculate the present value of future distributable earnings.
- (2) Equity return—the total return on common stock investments.
- (3) Property return—the total return on investments in real estate.
- (4) Fixed return—the yield on a corporate bond portfolio held by an insurance company.
- (5) Government return—typically the yield on a 10-year bond offered by the local government.
- (6) Inflation—the rate used to increase future expenses and, possibly, revalue policy terms that are tied to inflation.
- (7) Tax rates—income tax rates by jurisdiction.

When reading Table 1, several thoughts should be kept in mind:

- A significant number of companies (15) introduced market consistent embedded value (MCEV) this year where the discount rate is not calculated directly, but is inferred from the embedded value calculation.
- In the case of traditional embedded values (TEV), the discount rate may be based on the company’s own weighted average cost of capital (WACC) or on Capital Asset Pricing Model (CAPM) methodology applied on a broader basis; in the latter case, many companies assume a level of volatility that matches the broad market (i.e. Beta is equal to one), which results in a discount rate that is equal to the risk free rate plus an average equity risk premium. Other companies

Companies Included in Survey

| | |
|-------------|---------------------|
| Aegon | Allianz |
| AMP | Aviva |
| AXA | CNP |
| Fortis | Friends Provident |
| Generali | Hannover Re |
| HBOS | Industrial Alliance |
| ING | Irish Life & Perm. |
| Legal & Gen | Lloyds TSB |
| Manulife | Mitsui |
| Munich Re | Nordea |
| Old Mutual | Prudential (U.K.) |
| Resolution | Standard Life |
| Swiss Life | Swiss Re |
| T&D | Tokio Marine |
| Winterthur | Zurich |

¹ Charles gratefully acknowledges the assistance of Yoshiaki Ito, FIAJ of Ernst & Young’s Tokyo office.

² *International News*, Issue 34, October 2004, Society of Actuaries, p. 19—this can be found at: <http://library.soa.org/library-pdf/ISN0410.pdf> and *International News*, Issue 36, July 2005, Society of Actuaries, p. 28—this can be found at: <http://library.soa.org/library-pdf/ISN0507.pdf>.

employing CAPM methodology may vary discount rates by product line to reflect the higher Beta associated with riskier business. For still other companies, the choice of risk discount rate appears to be based on judgment with no specific theoretical underpinning. Three companies disclosed using WACC and five companies disclosed using CAPM.

- Equity and property returns normally include both cash income (that is, stockholder dividends and rental payments) and asset value appreciation (or depreciation), and these yields may be reported net of investment expenses. Alternatively, equity returns may represent a fund appreciation prior to any fees or charges made against the fund. In all cases, equity and property returns will be influenced by company investment strategy.
- Fixed returns reflect the investments in an insurer's bond portfolio. Amortized book yields are typically used in countries where book profits are based on amortized book value, while current market redemption yields are used when profits are calculated using market values. Companies generally do not disclose whether the fixed income returns are net of defaults or investment expenses.
- The inflation assumption may differ from general inflation (for example, the increase in a consumer price index).
- Tax rates are dependent upon individual company circumstances (for example, the existence of tax loss carry forwards) and thus these rates cannot necessarily be applied to other companies.

Finally, it should be noted that some companies use identical assumptions for multiple countries (on the basis that this results in immaterial differences), and this practice would tend to dampen differences between countries.

Several observations can be made concerning Table 1 on page 10 when compared to similar data published last year:³

- For the averages that are based on a significant number of companies, there was very little change from last year.
- The lack of significant change is interesting in that the majority of companies (21) in the study complied with European Embedded Value (EEV) Principles in 2005, many for the first time.

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³ ibid

Limitations

Readers should use judgment when interpreting the results of the survey and note that:

- When comparing one assumption to another, it should be noted that different companies might be contributing data to different assumptions, so that differences between variables may reflect differences between companies, rather than differences between the assumptions.
- Some cells include data from many companies, while others include data from as few as one company.

Countries Included in Survey

(Number in parentheses is the number of companies that disclosed assumptions for this country)

| | |
|------------------|-----------------|
| Australia (3) | Austria (4) |
| Belgium (7) | Brazil (1) |
| Bulgaria (2) | Canada (4) |
| Czech (3) | Chile (1) |
| China (4) | Denmark (1) |
| Finland (2) | France (10) |
| Germany (8) | Greece (3) |
| Hong Kong (3) | Hungary (3) |
| India (3) | Indonesia (2) |
| Ireland (6) | Italy (7) |
| Japan (6) | Luxembourg (6) |
| Malaysia (3) | Mexico (1) |
| Netherlands (10) | Norway (1) |
| New Zealand (2) | Peru (1) |
| Philippines (1) | Poland (4) |
| Portugal (3) | Romania (2) |
| Russia (2) | Singapore (1) |
| South Africa (1) | Slovakia (3) |
| Spain (8) | South Korea (3) |
| Sweden (1) | Switzerland (3) |
| Thailand (3) | Taiwan (4) |
| U.S. (9) | U.K. (11) |
| Vietnam (1) | |

Table 1: Average 2005 Financial Assumptions

| <u>Country</u> | <u>Discount Rate</u> | <u>Equity Return</u> | <u>Property Return</u> | <u>Fixed Return</u> | <u>Government Return</u> | <u>Inflation</u> | <u>Tax Rates</u> |
|-----------------------|----------------------|----------------------|------------------------|---------------------|--------------------------|------------------|------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Africa | | | | | | | |
| South Africa | 10.8% | 11.1% | 9.1% | 7.6% | 7.5% | 4.6% | 32.0% |
| America Latin | | | | | | | |
| Brazil | 23.2% | NA | NA | NA | 11.2% | 5.7% | NA |
| Chile | 9.6% | NA | NA | 7.3% | 5.8% | 3.0% | NA |
| Mexico | 12.1% | NA | NA | 9.0% | 8.9% | 3.5% | NA |
| Peru | 12.6% | NA | NA | 7.6% | 3.4% | 3.0% | NA |
| America North | | | | | | | |
| Canada | 7.3% | 7.8% | 8.6% | 4.6% | 4.1% | 2.0% | 34.0% |
| U.S. | 7.6% | 8.3% | 7.6% | 5.3% | 4.6% | 2.5% | 34.8% |
| Asia / Pacific | | | | | | | |
| Australia | 8.7% | 9.6% | 7.3% | 6.1% | 5.3% | 2.8% | 30.0% |
| China | 9.7% | 8.2% | 4.0% | 4.2% | 4.9% | 2.9% | 33.0% |
| Hong Kong | 8.0% | 9.7% | NA | 6.3% | 5.0% | 1.4% | 17.5% |
| India | 12.7% | 10.3% | 8.5% | 8.0% | 8.4% | 4.8% | 35.0% |
| Indonesia | 17.6% | 18.1% | 17.5% | NA | 13.0% | 7.3% | 20.0% |
| Japan | 6.5% | 5.5% | NA | 1.9% | 1.8% | 0.4% | 36.1% |
| Malaysia | 7.6% | 7.6% | 6.4% | 6.5% | 5.6% | 3.2% | 13.3% |
| New Zealand | 8.9% | 8.6% | 7.8% | 4.6% | 4.4% | 2.5% | NA |
| Philippines | 16.5% | NA | NA | NA | 10.5% | 5.5% | NA |
| Singapore | 6.8% | NA | NA | NA | 4.5% | 1.8% | NA |
| South Korea | 9.5% | 9.2% | 6.8% | 4.7% | 5.4% | 2.6% | 27.0% |
| Taiwan | 7.8% | 5.8% | 2.3% | 3.4% | 3.3% | 2.1% | 25.0% |
| Thailand | 11.2% | 9.6% | 7.3% | 4.9% | 6.2% | 1.9% | 30.0% |
| Vietnam | 16.5% | NA | NA | NA | 10.5% | 5.5% | NA |
| Europe Central | | | | | | | |
| Bulgaria | 7.3% | 7.2% | 4.4% | 4.0% | 3.9% | 3.3% | 15.0% |
| Czech Republic | 7.9% | 6.8% | 4.4% | 3.8% | 3.8% | 2.3% | 24.0% |
| Greece * | 6.8% | 6.6% | 4.1% | 3.6% | 3.5% | 2.0% | 32.0% |
| Hungary | 8.9% | 9.5% | 8.6% | 6.0% | 6.1% | 3.8% | 16.0% |
| Poland | 8.5% | 7.7% | 6.3% | 5.1% | 4.9% | 2.5% | 19.0% |
| Romania | 7.4% | 7.4% | 4.6% | 8.3% | 6.1% | 2.0% | 16.0% |
| Russia | 10.9% | 9.2% | 6.8% | 7.5% | 6.6% | 4.0% | 24.0% |
| Slovakia | 7.9% | 6.9% | 4.4% | 4.0% | 3.9% | 2.5% | 19.0% |
| Europe Western | | | | | | | |
| Austria * | 6.4% | 6.6% | 4.0% | 3.5% | 3.3% | 1.8% | 25.0% |
| Belgium * | 7.2% | 6.7% | 4.9% | 3.6% | 3.4% | 2.0% | 34.0% |
| Denmark | 7.2% | 6.6% | NA | NA | 3.4% | NA | NA |
| Finland * | 6.7% | 6.7% | NA | 3.5% | 3.4% | NA | NA |
| France * | 6.6% | 6.4% | 5.2% | 3.6% | 3.4% | 2.0% | 34.3% |
| Germany * | 7.4% | 6.8% | 4.8% | 3.5% | 3.6% | 2.1% | 40.0% |
| Ireland * | 6.5% | 6.5% | 5.0% | 3.5% | 3.3% | 3.4% | 16.9% |
| Italy * | 6.3% | 6.3% | 4.8% | 3.5% | 3.4% | 2.2% | 36.3% |
| Luxembourg * | 7.0% | 5.6% | 5.1% | 3.7% | 3.3% | 2.4% | 25.8% |
| Netherlands * | 6.7% | 6.2% | 5.2% | 3.6% | 3.4% | 2.2% | 29.6% |
| Norway | 7.2% | 6.6% | NA | NA | 3.4% | NA | NA |
| Portugal * | 6.5% | 6.9% | 4.1% | 3.5% | 3.3% | 2.7% | 27.5% |
| Spain * | 6.7% | 6.0% | 5.1% | 3.6% | 3.4% | 2.2% | 35.0% |
| Sweden | 6.8% | NA | NA | NA | 3.3% | NA | 28.0% |
| Switzerland | 8.0% | 6.1% | 3.6% | 2.3% | 2.4% | 1.0% | 22.0% |
| U.K. | 7.4% | 7.3% | 6.4% | 4.6% | 4.2% | 3.0% | 30.0% |

* Asterisks refer to countries within the Euro zone.

- Some companies that restated 2004 results to be on an EEV compliant basis restated the risk discount rates for 2004, usually by only a small amount.

Half of the companies indicated in their embedded value disclosures for 2005 that they had adopted, at least for some portion of their covered business, a Market Consistent Embedded Value (MCEV) methodology. A methodology is considered market consistent if each cash flow is valued consistently with traded instruments that display similar risks. Thus, under the MCEV approach, each cash flow is discounted using a risk discount rate appropriate for valuing similar cash flows in the market. So, companies following MCEV, strictly speaking, do not have risk discount rates that are comparable to those used by companies employing a more traditional approach. For companies employing an MCEV methodology, discount rates in the table above are the RDR inferred from the MCEV calculation. That is, they are discount rates that would develop the same value of insurance in-force (VIF), but following traditional embedded value methodology.

The implied risk discount rates for companies that adopted an MCEV methodology typically exhibit much greater differences between countries than is the case for companies following a traditional EV approach. In some cases the rates varied by up to 10 percent. Such differences were much greater than the differences in risk free rates between countries. They reflect the different risk profiles of the products that compose the in-force business in the different countries. In particular, products with guaranteed cash values and minimum interest crediting rates will tend to have high implied discount rates under an MCEV approach.

Investment Premiums and Other Marginal Relationships

Investment premiums are the additional yield an investor is expected to receive by purchasing an asset other than a government bond.

- Equity premium—the excess yield from investing in common stock over the return on government bonds.
- Property premium—the excess yield from investing in real estate over the return on government bonds.
- Credit spread—the excess yield from investing in a mix of corporate and government bonds over the return on government bonds.

In addition, the following two marginal relationships may be of interest:

- Risk premium—the excess of the embedded value discount rate over the return on government bonds.
- Real return—the excess of the government return over inflation.

Table 2 presents the average marginal relationships disclosed by the companies in the study. The margins are the average result for those companies that disclosed assumptions for both returns used to calculate the margin. Since some companies disclosed an assumption for government bonds, but not for the other returns, the values in Table 2 are not always equal to the differences in the values shown in Table 1.

A few observations can be made when comparing Table 2 to last year's results:

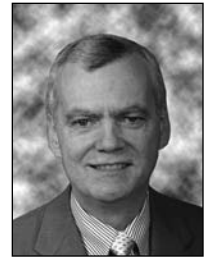
- Real rates of return generally decreased in Western Europe, while changes elsewhere were mixed.
- There were significant increases in the risk premium for certain countries such as Switzerland and Germany. (For further discussion of this, see the discussion later in this article about Table 3.)
- Except for the risk premium in Mexico, all Latin American margins remained constant or decreased.
- Margins in North America generally changed very little, except for Canadian property premiums, which increased significantly.
- The trend in margins in Central Europe was mixed, with no clear pattern discernible.
- Asian credit spreads generally increased while changes in other margins were mixed.

Please note that the data is relatively sparse outside of Western Europe and North America, so observations and conclusions could be different if additional data was available.

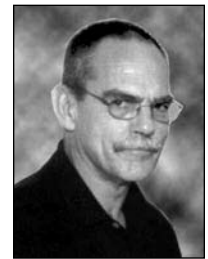
Components of Implied Risk Discount Rates

Two of the companies that adopted an MCEV methodology for their EV reporting for 2005 provide in their disclosures an analysis of the components of their implied risk discount rates (IDRs) by territory that provides some interesting insights into the differences from traditional EV and the value drivers of MCEV.

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Table 2: 2005 Investment Premiums and Other Marginal Relationships

| Country | Risk | Equity | Property | Credit Spread | Real Return |
|-----------------------|---------------|---------------|----------------|----------------|----------------|
| | Premium | Premium | Premium | | |
| | (8)=(1)-(5)** | (9)=(2)-(5)** | (10)=(3)-(5)** | (11)=(4)-(5)** | (12)=(5)-(6)** |
| Africa | | | | | |
| South Africa | 3.3% | 3.5% | 1.5% | 0.0% | 3.0% |
| America Latin | | | | | |
| Brazil | 12.0% | NA | NA | NA | 5.5% |
| Chile | 3.8% | NA | NA | 1.5% | 2.8% |
| Mexico | 3.2% | NA | NA | 0.1% | 5.4% |
| Peru | 9.2% | NA | NA | 4.2% | 0.4% |
| America North | | | | | |
| Canada | 3.2% | 3.7% | 4.6% | 0.5% | 2.1% |
| US | 3.1% | 3.8% | 3.0% | 0.8% | 2.1% |
| Asia / Pacific | | | | | |
| Australia | 3.4% | 4.3% | 2.0% | 0.8% | 2.6% |
| China | 4.8% | 4.7% | 0.7% | 0.5% | 2.1% |
| Hong Kong | 3.0% | 4.5% | NA | 1.5% | 3.0% |
| India | 4.4% | 3.0% | 1.4% | 0.5% | 3.5% |
| Indonesia | 4.6% | 3.5% | 2.9% | NA | 5.8% |
| Japan | 4.6% | 3.4% | NA | 0.2% | 0.6% |
| Malaysia | 2.0% | 2.9% | 1.7% | 1.4% | 2.5% |
| New Zealand | 4.5% | 4.3% | 2.0% | 0.3% | 1.9% |
| Philippines | 6.0% | NA | NA | NA | 5.0% |
| Singapore | 2.3% | NA | NA | NA | 2.8% |
| South Korea | 4.1% | 3.5% | 1.1% | 0.0% | 2.8% |
| Taiwan | 4.5% | 3.3% | 0.4% | 0.6% | 1.2% |
| Thailand | 5.0% | 3.5% | 1.2% | 0.1% | 4.1% |
| Vietnam | 6.0% | NA | NA | NA | 5.0% |
| Europe Central | | | | | |
| Bulgaria | 3.4% | 3.5% | 0.7% | 0.0% | 0.6% |
| Czech Republic | 4.1% | 3.0% | 0.7% | 0.0% | 1.5% |
| Greece * | 3.3% | 3.1% | 0.7% | 0.1% | 1.6% |
| Hungary | 2.8% | 3.4% | 2.3% | 0.1% | 2.3% |
| Poland | 3.5% | 2.8% | 1.1% | 0.3% | 2.5% |
| Romania | 1.3% | 3.5% | 0.8% | 0.0% | 4.1% |
| Russia | 4.3% | 3.5% | 1.1% | 0.0% | 2.6% |
| Slovakia | 4.0% | 3.0% | 0.7% | 0.0% | 1.4% |
| Europe Western | | | | | |
| Austria * | 3.1% | 3.3% | 0.7% | 0.2% | 1.5% |
| Belgium * | 3.6% | 3.1% | 1.3% | 0.2% | 1.6% |
| Denmark | 3.8% | 3.2% | NA | NA | NA |
| Finland * | 3.3% | 3.4% | NA | 0.2% | NA |
| France * | 3.0% | 2.9% | 1.8% | 0.3% | 1.4% |
| Germany * | 3.7% | 3.2% | 1.2% | 0.1% | 1.6% |
| Ireland * | 3.1% | 3.2% | 1.7% | 0.2% | -0.1% |
| Italy * | 3.0% | 3.0% | 1.5% | 0.1% | 1.2% |
| Luxembourg * | 3.6% | 1.9% | 2.0% | 0.6% | 0.8% |
| Netherlands * | 3.2% | 2.6% | 1.8% | 0.2% | 1.3% |
| Norway | 3.8% | 3.2% | NA | NA | NA |
| Portugal * | 3.1% | 3.5% | 0.7% | 0.2% | 0.7% |
| Spain * | 3.3% | 2.6% | 1.7% | 0.2% | 1.2% |
| Sweden | 3.4% | NA | NA | NA | NA |
| Switzerland | 6.1% | 3.5% | 0.4% | 0.0% | 1.7% |
| UK | 3.1% | 3.2% | 2.3% | 0.3% | 1.0% |

* Asterisks refer to countries within the Euro zone.

** Calculated including only companies with complete data.

In these analyses, the MCEV implicit discount rate is expressed as the sum of four components, three of which are marginal: (1) the risk free rate (not marginal), (2) a margin for financial risks, (3) the cost of options and guarantees, and (4) the cost of capital:

- The risk free rate (RFR) is frequently the government bond rate and may vary by duration. These rates were shown above in Table 1.
- The margin for financial risks (MFR) may be calculated as the additional expected yield above the risk free rate on a portfolio of assets that match expected policyholder cash flows.
- The cost of financial options and guarantees (FO&G) are stochastically determined based upon policy terms, the portfolio of assets that match policyholder cash flows and stochastic market assumptions.
- The cost of capital (CoC) is an explicit charge for capital investment underlying the portfolio.

Table 3 above illustrates the analysis of the implied risk discount rates for the two companies that provided the data for value of insurance in-force calculations at Dec. 31, 2005.

An important determinant of differences between implied risk discount rates for different countries is the cost of financial options and guarantees (FO&G), particularly minimum interest rate guarantees that companies reported to have impacted costs in Germany and Switzerland.

Stochastic Market Assumptions

A number of European companies are calculating the values of options and guarantees following stochastic approaches in order to comply with European CFO Forum guidelines for embedded value calculations. Sixteen of the 30 companies surveyed disclosed stochastic market assumptions in their 2005 European embedded value (EEV) reports. Averages of several of these assumptions are shown in Table 4 below (volatility may also be referred to as standard deviation).

Note that some companies reported volatility without reporting yields. Some companies determined volatilities from historical market experience while others measured the implied volatility in current derivative prices, which

Table 3: Sample Implied Risk Discount Rates (IDR)

| Country | RFR | MFR | FO&G | CoC | IDR |
|-------------|-------|-------|-------|-------|--------|
| Australia | 5.27% | 1.73% | 0.10% | 0.55% | 7.65% |
| Benelux | 3.32% | 3.36% | 1.97% | 0.65% | 9.30% |
| France | 3.29% | 3.05% | 1.26% | 0.72% | 8.32% |
| Germany | 3.47% | 2.47% | 3.16% | 1.19% | 10.28% |
| Hong Kong | 4.37% | 1.32% | 1.10% | 0.60% | 7.39% |
| Japan | 2.03% | 6.84% | 0.79% | 1.14% | 10.80% |
| Switzerland | 2.50% | 3.50% | 4.70% | 0.90% | 11.60% |
| U.K. | 4.22% | 0.95% | 0.24% | 0.75% | 6.15% |
| U.S. | 4.66% | 1.93% | 0.62% | 0.52% | 7.73% |

Table 4: Sample Stochastic Assumptions

| | Companies | Stock | | Property | | Bonds | | |
|-------------|-----------|-------|------------|----------|------------|-------|------------|------------|
| | | Yield | Volatility | Yield | Volatility | Yield | Volatility | Type |
| Europe | 11 | 6.8% | 19.9% | 5.2% | 16.3% | 3.5% | 6.6% | Government |
| Japan | 2 | 4.2% | 18.5% | | | 1.7% | 11.3% | Government |
| So. Africa | 1 | 11.1% | 22.0% | 9.1% | 15.0% | 7.6% | 13.0% | Government |
| So. Korea | 2 | 9.2% | 36.0% | 6.8% | 14.0% | 4.9% | 3.7% | Government |
| Switzerland | 2 | 5.7% | 18.2% | 2.6% | 14.0% | 1.4% | 13.2% | Government |
| U.K. | 7 | 6.3% | 20.1% | 7.1% | 16.0% | 3.7% | 5.5% | Government |
| U.S. | 7 | 8.3% | 19.1% | 8.6% | 14.0% | 5.2% | 7.9% | Mixed |

may result in significant differences between companies.

Summary

The SOA International Experience Study Working Group (IESWG) publishes this survey to enhance the knowledge of actuaries about current international market conditions and practices. Practices continue to evolve and we wish to encourage an open discussion on appropriate methodologies and further disclosure of both assumptions and the thoughts behind their formulation.

The IESWG intends to update this survey annually. We invite additional companies to provide data, on a confidential basis, to be included in this and future surveys. Please contact Ronora Stryker (rstryker@soa.org) or Jack Luff (jluff@soa.org) at the Society of Actuaries for further information. □