Article from:

International News

November 2007 – Issue No. 43

SOA International Experience Survey— Embedded Value Financial Assumptions

by Charles Carroll,[1] William Horbatt, and Dominique Lebel [2]

The Society of Actuaries' International Experience Study Working Group has been conducting surveys of published embedded value (EV) financial assumptions beginning with 2003 EV publications.[3] This article updates the survey with 2006 data.

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	Old Mutual
Prudential UK	Resolution
Standard Life	Swiss Life
Swiss Re	T&D
Tokio Marine	Zurich

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 28 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 2006 embedded value reports. If no companies reported a specific assumption in a given country, then that assumption is labeled "NA" to signify that data is not available. Some companies vary assumptions by calendar year, while other companies use a single assumption; if a company varies an assumption by calendar year, the value for the earliest period is used in this study.

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.

Financial Assumptions from Survey

Financial assumptions presented in this article include

(1) Discount rate—the risk discount rate (RDR) used to calculate the present value of future distributable earnings.

(2) Implied discount rate—for companies with market consistent embedded value (MCEV) calculations, the traditional embedded value (TEV) discount rate that would develop the same EV.

(3) Equity return—the total return on common stock investments.

(4) Property return—the total return on investments in real estate.

(5) Fixed return—the yield on a corporate bond portfolio held by an insurance company.

(6) Government return—typically the yield on a 10-year bond offered by the local government.

(7) Inflation—the rate used to increase future expenses and, possibly, revalue policy terms that are tied to inflation.

(8) Tax rates—income tax rates by jurisdiction.

These results are presented in two separate tables. Table 1 provides the number of companies contributing data as well discount rates for TEV companies and the implied discount rate for MCEV companies. Table 2 contains the rest of the financial data.

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

- The methodologies followed by the companies to determine discount rates were as follows:

Methodology	Number of Companies
MCEV	13
CAPM	5
WACC	4
Not Disclosed	6

- 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.

- 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 Table 1, which are labeled "Implied Discount Rate" are the RDR inferred from the MCEV calculation. That is, they are discount rates that would develop the same embedded value using TEV techniques.

- Companies that explicitly set discount rates are referred to as calculating traditional embedded values (TEV). Two common methods used by them are the capital asset pricing model (CAPM) and the company's own weighted average cost of capital (WACC).

- Under CAPM, many companies assume a level of volatility that matches the broad market (i.e., Beta is equal to 1), which results in a discount rate that is equal to the risk-free rate plus an average equity risk premium. Other companies employing CAPM methodology may vary discount rates by product line to reflect the higher Beta associated with riskier business.

In last year's study, out of 30 companies studied, 15 reported using some form of market consistent methodology. In this year's study, the authors adopted a stricter definition of what it means to be on an MCEV basis. The definition is outlined in the second bullet above. As a result of the stricter definition, four companies that were classified as MCEV companies last year were classified under one of the other categories this year. In addition, two companies classified as MCEV last year did not publish results this year because they were acquired. Four companies that were classified under other methods last year were classified as MCEV this year because they reported a change to a methodol-

Charles Caroll, FSA, MAAA, FCA is a partner at Ernst & Young LLP in New York, N.Y. He can be reached at charles.carroll@ey.com.

William R. Horbatt, FSA, MAAA, is a consulting actuary with Actuarial Consortium in Short Hills, NJ. He can be reached at Horbatt@ActuarialConsortium.com.

Dominique Lebel, FSA, MAAA, FCIA, is a senior consultant at Towers Perrin in San Francisco, Calif. He can be reached at Dominique.Lebel@towersperrin.com.

ogy that met the strict definition of MCEV utilized in this year's study. Thus, although the net change in companies on an MCEV basis is a reduction of two, this does not indicate a reduction in the interest in MCEV. In fact, we expect the progression from TEVs to MCEVs to continue to increase.

When reading this and other tables, 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.

Table 1:
Average 2006 Explicit and Implicit Discount Rates

Country	Companies	Traditional Discount Rate	Companies	Implied Discount Rate	
				(In Force)	(New Business)
		(1)		(2)	(3)
Africa					
South Africa	0	NA	1	10.8%	10.8%
America Latin					
Brazil	1	19.1%	0	NA	NA
Chile	1	10.7%	0	NA	NA
Mexico	2	12.8%	0	NA	NA
Peru	1	13.7%	0	NA	NA
America North					
Canada	4	7.4%	1	6.6%	6.6%
US	7	7.8%	3	11.4%	12.1%
Asia / Pacific					
Australia	2	9.0%	1	7.9%	7.2%
China	3	10.5%	0	NA	NA
Hong Kong	3	8.3%	1	7.6%	7.2%
India	2	14.5%	0	NA	NA
Indonesia	1	17.5%	0	NA	NA
Japan	6	6.4%	1	9.8%	4.4%
Malaysia	2	9.1%	0	NA	NA
New Zealand	2	9.5%	0	NA	NA
Philippines	1	16.5%	0	NA	NA
Singapore	1	6.9%	0	NA	NA
South Korea	2	8.9%	1	NA	8.6%
Taiwan	3	7.1%	0	NA	NA
Thailand	2	12.1%	0	NA	NA
Vietnam	1	16.5%	0	NA	NA
Europe Central					
Bulgaria	1	7.9%	0	NA	NA
Czech	2	8.2%	0	NA	NA
Greece *	2	7.1%	0	NA	NA
Hungary	2	9.8%	0	NA	NA
Poland	3	8.8%	0	NA	NA
Romania	1	10.7%	0	NA	NA
Russia	1	11.3%	0	NA	NA
Slovakia	2	8.8%	0	NA	NA
Europe Western					
Austria *	1	6.8%	1	6.3%	6.2%
Belgium *	3	7.3%	2	7.5%	6.4%
Finland *	1	6.8%	0	NA	NA
France *	6	7.0%	3	6.3%	6.4%
Germany *	2	7.4%	4	6.1%	5.5%
Ireland *	3	7.0%	1	5.7%	5.7%
Italy *	3	6.6%	3	6.4%	5.7%
Luxembourg *	3	7.3%	1	7.0%	7.0%
Netherlands *	6	7.1%	2	7.5%	6.4%
Portugal *	1	6.8%	1	6.6%	5.8%
Spain *	4	7.0%	2	6.5%	6.0%
Sweden	0	NA	1	6.9%	6.9%
Switzerland	1	7.0%	1	5.4%	NA
UK	7	7.7%	5	6.9%	6.8%

* euro currency zone

Several observations can be made concerning Table 1 when compared to similar data published last year:[4]

- MCEV implied discount rates are most prevalent in South Africa, the United States and Western Europe while only TEV discount rates are found in Central Europe and Latin America.
- MCEV implied discount rates are frequently lower than TEV discount rates, particularly with respect to new business. A number of companies in their EV reports attribute lower implied risk discount rates on new business to changes in either contract terms or sales mix which have reduced the value of contract options and guarantees (particularly minimum interest rate guarantees).
  - Exceptions to this observation include the U.S. and Japanese implied discount rates which reflect the high value of options of guarantees.
- TEV discount rates generally increased from last year in the United States and Europe, frequently by 0.3 percent to 0.5 percent. Results were mixed outside these regions.

The second table presents the balance of the financial assumptions used in embedded value calculations that we surveyed. Note that:

- 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.

Table 2:
Average 2006 Financial Assumptions

Country	Companies	Equity Return	Property Return	Fixed Return	Government Return	Inflation	Income Tax Rates
		(4)	(5)	(6)	(7)	(8)	(9)
Africa							
South Africa	2	11.4%	9.4%	7.9%	8.1%	4.9%	32.0%
America Latin							
Brazil	1	NA	NA	12.7%	8.2%	4.0%	34.0%
Chile	1	NA	11.2%	7.8%	6.4%	3.0%	NA
Mexico	2	12.0%	NA	8.6%	7.9%	3.9%	40.0%
Peru	1	NA	NA	8.3%	7.4%	2.0%	NA
America North							
Canada	6	7.9%	8.6%	4.7%	4.3%	1.9%	34.3%
US	14	8.6%	6.6%	5.9%	5.0%	2.4%	34.7%
Asia / Pacific							
Australia	4	9.8%	7.8%	6.1%	6.1%	2.9%	30.0%
China	4	8.2%	3.6%	4.3%	4.9%	3.5%	33.0%
Hong Kong	5	8.1%	7.3%	5.7%	4.8%	1.4%	14.4%
India	2	8.3%	NA	6.5%	9.3%	5.3%	NA
Indonesia	2	15.1%	13.3%	NA	11.3%	6.5%	NA
Japan	7	6.6%	5.0%	2.4%	1.9%	0.5%	36.1%
Malaysia	4	9.5%	5.0%	5.8%	5.4%	2.8%	8.0%

[4] ibid

Table 2: *(Cont …)*
Average 2006 Financial Assumptions

New Zealand	2	9.0%	8.0%	6.7%	6.4%	2.6%	NA
Philippines	1	NA	NA	NA	10.5%	5.5%	NA
Singapore	1	9.3%	NA	NA	4.5%	1.8%	NA
South Korea	3	9.1%	6.1%	5.1%	5.1%	2.9%	27.0%
Taiwan	4	6.5%	2.6%	3.1%	3.2%	2.1%	25.0%
Thailand	2	NA	NA	6.4%	6.9%	1.9%	NA
Vietnam	1	NA	NA	NA	10.5%	5.5%	NA
Europe Central							
Bulgaria	1	NA	NA	4.1%	4.1%	1.9%	NA
Czech	3	8.0%	4.7%	4.2%	4.0%	2.5%	24.0%
Greece *	2	7.0%	NA	4.2%	4.1%	1.9%	NA
Hungary	3	10.5%	9.1%	6.8%	7.0%	2.5%	20.0%
Poland	4	8.8%	6.7%	5.6%	5.3%	2.4%	19.0%
Romania	1	9.4%	NA	6.6%	6.4%	1.9%	NA
Russia	1	NA	NA	7.4%	7.2%	5.5%	NA
Slovakia	2	8.5%	5.3%	5.0%	4.5%	2.5%	19.0%
Europe Western							
Austria *	4	7.5%	4.8%	4.0%	4.1%	1.8%	NA
Belgium *	8	7.5%	5.4%	4.3%	4.1%	1.9%	NA
Finland *	1	7.4%	NA	4.0%	3.9%	NA	NA
France *	11	7.2%	5.7%	4.2%	4.0%	2.1%	34.3%
Germany *	9	7.4%	5.5%	4.6%	3.9%	2.1%	39.9%
Ireland *	6	7.3%	5.7%	4.0%	4.0%	3.9%	12.5%
Italy *	9	7.2%	5.6%	4.4%	4.0%	2.1%	35.7%
Luxembourg *	6	7.4%	5.6%	4.5%	4.1%	2.9%	25.2%
Netherlands *	11	7.4%	5.8%	4.3%	4.0%	2.1%	25.5%
Portugal *	4	7.7%	5.4%	4.4%	4.0%	NA	NA
Spain *	10	7.4%	5.7%	4.3%	4.0%	2.0%	30.0%
Sweden	2	6.8%	5.3%	NA	4.0%	3.1%	28.0%
Switzerland	4	7.1%	4.6%	3.2%	3.1%	0.8%	22.0%
UK	16	7.7%	6.7%	4.9%	4.7%	3.3%	30.0%

* euro currency zone

Several observations can be made concerning Table 2 when compared to similar data published last year:[5]

- Asset returns almost universally increased in Western Europe and North America, generally increased in Central Europe and were mixed in Asia.
- Inflation rates did not follow a distinct pattern, which is somewhat surprising given the general increase in interest rates.

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. For those companies calculating MCEVs, the actual size of the investment premiums is not important, as any differences relative to government bonds are backed-out in the calibration of the risk discount rate. What is important for these companies is the definition of the risk-free rate of return (e.g., government bond yield, swap yield) and whether, for illiquid liabilities, there is any addition for an assumed liquidity premium.

- 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:

[5] ibid

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

Table 3 presents the marginal relationships derived from Table 2. The column numbering continues the numbering in the prior table.

Table 3:
Investment Premiums and Other Marginal Relationships

Country	Traditional Risk Premium (10)=(1)-(7)**	Equity Premium (11)=(4)-(7)**	Property Premium (12)=(5)-(7)**	Credit Spread (13)=(6)-(7)**	Real Return (14)=(7)-(8)**
Africa					
South Africa	NA	3.5%	1.5%	0.0%	3.0%
America Latin					
Brazil	10.9%	NA	NA	4.5%	4.2%
Chile	4.3%	NA	4.8%	1.4%	3.4%
Mexico	4.9%	5.0%	NA	-0.1%	4.0%
Peru	6.3%	NA	NA	0.9%	5.4%
America North					
Canada	3.2%	3.5%	NA	0.6%	2.4%
US	2.9%	3.7%	1.5%	1.1%	2.4%
Asia / Pacific					
Australia	3.1%	3.8%	1.8%	0.1%	3.1%
China	5.0%	4.7%	0.6%	0.6%	2.0%
Hong Kong	3.5%	2.9%	NA	0.8%	2.5%
India	5.2%	0.2%	NA	-1.6%	4.1%
Indonesia	6.0%	4.0%	2.2%	NA	5.0%
Japan	4.5%	4.9%	3.1%	0.6%	1.2%
Malaysia	3.1%	4.1%	0.8%	0.8%	3.3%
New Zealand	3.1%	3.0%	2.0%	0.3%	3.9%
Philippines	6.0%	NA	NA	NA	5.0%
Singapore	2.4%	4.8%	NA	NA	2.8%
South Korea	3.8%	4.0%	1.0%	-0.1%	2.2%
Taiwan	3.5%	4.1%	0.4%	0.5%	1.4%
Thailand	5.2%	NA	NA	0.3%	4.0%
Vietnam	6.0%	NA	NA	NA	5.0%
Europe Central					
Bulgaria	3.8%	NA	NA	0.0%	2.2%
Czech	4.1%	4.0%	0.8%	0.0%	1.7%
Greece *	3.0%	2.9%	NA	0.1%	2.4%
Hungary	3.1%	3.4%	2.3%	0.1%	4.3%
Poland	3.6%	3.5%	1.1%	0.3%	2.8%
Romania	4.3%	3.0%	NA	0.2%	4.5%
Russia	4.1%	NA	NA	0.2%	1.7%
Slovakia	4.3%	4.0%	0.9%	0.0%	2.1%
Europe Western					
Austria *	2.9%	3.4%	0.7%	0.1%	2.2%
Belgium *	3.3%	3.4%	1.3%	0.3%	2.2%
Finland *	2.9%	3.5%	NA	0.1%	NA
France *	3.0%	3.2%	1.7%	0.3%	2.0%
Germany *	3.5%	3.7%	1.8%	1.3%	2.0%
Ireland *	3.0%	3.3%	1.7%	0.1%	0.1%
Italy *	2.6%	3.2%	1.6%	0.7%	2.0%
Luxembourg *	3.3%	3.4%	1.6%	0.5%	1.3%
Netherlands *	3.1%	3.3%	1.8%	0.3%	1.9%
Portugal *	2.9%	3.8%	1.5%	0.7%	NA
Spain *	3.0%	3.4%	1.7%	0.5%	2.1%
Sweden	NA	3.0%	1.5%	NA	0.7%
Switzerland	4.5%	3.9%	1.5%	0.5%	2.0%
UK	3.0%	3.1%	2.1%	0.3%	1.3%

* = euro zone
** = calculated including only companies with complete data

A few observations can be made when comparing Table 3 to last year's results:

- Equity premiums generally increased, except in North America and several other countries.

- Property premiums generally decreased or remained level.
- Credit spreads increased or decreased in equal proportions.
- Real returns generally increased except in Asia.

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.

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[6] for embedded value calculations. Seventeen of the 28 companies surveyed disclosed stochastic market assumptions in their 2006 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).

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 continue 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. ☐

Table 4:
Sample Stochastic Assumptions

	Companies	Stock Yield	Volatility	Property Yield	Volatility	Bonds Yield	Volatility	Type
Europe	11	6.7%	21.0%	5.4%	14.1%	4.0%	7.0%	Government
Japan	2	3.0%	18.5%			2.2%	10.2%	Government
So. Africa	1	11.4%	22.0%	9.8%	15.0%	7.9%	13.0%	Government
So. Korea	2		36.4%			5.1%	6.4%	Government
Switzerland	2		18.4%		17.0%	3.3%	17.4%	Government
UK	9	5.0%	20.5%	4.5%	15.9%	4.8%	6.7%	Government
US	9	8.0%	19.2%		16.9%	5.1%	9.4%	Government

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 may result in significant differences between companies.

Six companies disclosed the number of scenarios used to calculate the values of options and guarantees. As can be seen from the table below, four of the six companies use 1,000 scenarios.

Scenarios	Number of Companies
100 to 200	1
1,000	4
5,000	1

---

[6] See http://www.cfoforum.nl/ for more information on the European CFO embedded value guidelines