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SOA International Experience Survey—Embedded Value Financial Assumptions

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Starting in 2003, the Society of Actuaries International Experience Study Working Group has been conducting surveys of published embedded value (EV) financial assumptions.² This article updates the survey with 2007 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	Munich Re
Old Mutual	Prudential UK
Standard Life	Swiss Life
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 23 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 2007 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.

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. 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.

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.

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¹ Dominique gratefully acknowledges the assistance of Nelson Lai of Towers Perrin's San Francisco office.

² SOA *International News*, Issue 34, October 2004 at <http://www.soa.org/library/newsletters/international-section-news/2004/october/isn0410.pdf>, Issue 36, July 2005 at <http://www.soa.org/library/newsletters/international-section-news/2005/july/isn0507.pdf>, Issue 40, November 2006 at <http://www.soa.org/library/newsletters/international-section-news/2006/november/isn-2006-iss40.pdf> and Issue 43, November 2007 at <http://www.soa.org/library/newsletters/international-section-news/2007/november/isn-2007-iss43.pdf>

These results are presented in two separate tables. Table 1 provides the number of companies contributing data as well as 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	12
CAPM	5
WACC	4
Other/Unknown	2

- 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 (RDR) appropriate for valuing similar cash flows in the market. Some companies that use the MCEV methodology use a certainty equivalent approach, which assumes that all assets earn and all discounting is performed using the risk free rate. Other companies use “real world” asset assumptions, but adjust the risk discount rate such that the calculated EV is the same as it would be if calculated on a market consistent basis. Our definition

of MCEV includes both types of approaches and is based on each company’s publications.

- 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 embedded value using TEV technique.
- Companies that explicitly set discount rates are referred to as calculating traditional embedded values (TEV). Two common methods that such companies use to set risk discount rates are the capital asset pricing model method (CAPM) and a method which sets the discount rate based on 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.

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 2007 Explicit and Implicit Discount Rates

Country	Traditional		Implied Discount Rate		
	Companies	Discount Rate	Companies	(In Force)	(New Business)
		(1)		(2)	(3)
Africa					
South Africa	0	NA	1	11.2%	11.2%
America Latin					
Brazil	1	16.8%	0	NA	NA
Chile	1	9.6%	0	NA	NA
Mexico	2	12.4%	0	NA	NA
Peru	1	11.1%	0	NA	NA
America North					
Canada	3	7.5%	1	6.9%	6.9%
US	7	7.4%	3	8.7%	8.5%
Asia / Pacific					
Australia	2	9.3%	1	8.0%	7.8%
China	4	9.4%	0	NA	NA
Hong Kong	3	7.6%	1	7.7%	7.7%
India	2	14.1%	0	NA	NA
Indonesia	2	15.2%	1	NA	6.9%
Japan	3	5.5%	1	7.9%	3.4%
Malaysia	3	8.2%	0	NA	NA
New Zealand	2	9.7%	0	NA	NA
Philippines	1	15.8%	0	NA	NA
Singapore	1	6.8%	0	NA	NA
South Korea	3	9.3%	1	6.8%	6.8%
Taiwan	4	7.2%	0	NA	NA
Thailand	2	11.2%	0	NA	NA
Vietnam	1	16.8%	0	NA	NA
Europe Central					
Bulgaria	1	7.1%	0	NA	NA
Croatia	1	9.4%	0	NA	NA
Czech	3	8.4%	0	NA	NA
Greece *	1	7.7%	0	NA	NA
Hungary	3	10.1%	0	NA	NA
Poland	4	9.2%	0	NA	NA
Romania	1	9.7%	0	NA	NA
Russia	3	9.0%	0	NA	NA
Slovakia	3	8.4%	0	NA	NA
Europe Western					
Austria *	1	8.0%	0	NA	NA
Belgium *	3	7.8%	1	8.7%	7.6%
Finland *	0	NA	1	7.2%	7.2%
France *	6	7.4%	4	6.6%	6.9%
Germany *	2	8.0%	3	6.4%	5.8%
Ireland *	3	7.6%	1	7.6%	7.6%
Italy *	3	7.1%	3	6.4%	5.8%
Luxembourg *	2	7.8%	0	NA	NA
Netherlands *	6	7.6%	0	NA	NA
Portugal *	1	8.0%	1	6.5%	5.5%
Spain *	4	7.5%	1	6.5%	5.5%
Sweden	2	8.0%	3	8.0%	7.8%
Switzerland	2	6.8%	1	5.8%	5.6%
UK	4	7.6%	2	7.3%	7.1%

* euro currency zone



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

- Traditional discount rates continue to be generally higher than implied discount rates, but this is not the case for all countries (e.g., United States).
- More country-specific information continues to be provided for traditional discount rates than for implied discount rates while implied discount rates are more common in Europe than elsewhere.
- Both traditional and implied discount rates have generally increased from 2006. However decreases were most common in the United States and in some countries in Asia and Latin America.

The second table presents the balance of the financial assumptions used in embedded value calculations. 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 returns 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.
- As discussed above, some companies that use the MCEV methodology use a certainty equivalent approach, which assumes that all assets earn the risk free rate. The data in Table 2 is based on "real world" assumptions, where available, not certainty equivalent assumptions.

Table 2: Average 2007 Financial Assumptions

<u>Country</u>	<u>Companies</u>	<u>Equity Return</u>	<u>Property Return</u>	<u>Fixed Return</u>	<u>Government Return</u>	<u>Inflation</u>	<u>Income Tax Rates</u>
		(4)	(5)	(6)	(7)	(8)	(9)
Africa							
South Africa	2	12.0%	10.0%	NA	8.5%	5.5%	34.8%
America Latin							
Brazil	1	NA	NA	10.8%	NA	4.0%	40.0%
Chile	1	11.0%	NA	7.4%	6.5%	NA	NA
Mexico	2	13.1%	NA	8.8%	8.6%	4.0%	40.0%
Peru	1	10.5%	NA	6.2%	6.0%	NA	NA
America North							
Canada	5	7.9%	8.6%	4.7%	4.3%	1.8%	32.0%
US	13	8.2%	6.4%	6.1%	4.5%	2.5%	34.6%
Asia / Pacific							
Australia	4	10.3%	8.4%	6.6%	6.6%	2.8%	30.0%
China	4	9.3%	5.6%	4.7%	5.3%	3.5%	25.0%
Hong Kong	5	8.6%	NA	5.9%	4.4%	2.3%	9.5%
India	2	12.8%	NA	8.0%	8.8%	5.0%	NA
Indonesia	2	14.1%	12.1%	NA	10.2%	6.0%	NA
Israel	0	NA	NA	NA	3.8%	NA	NA

³ ibid

Table 2: Average 2007 Financial Assumptions (cont.)

Country	Companies	Equity Return (4)	Property Return (5)	Fixed Return (6)	Government Return (7)	Inflation (8)	Income Tax Rates (9)
Japan	4	5.4%	NA	3.0%	1.9%	0.3%	36.0%
Malaysia	4	9.7%	5.8%	8.0%	4.9%	2.8%	19.5%
New Zealand	2	10.4%	8.5%	6.9%	6.6%	3.0%	NA
Philippines	1	NA	NA	NA	9.3%	5.0%	NA
Singapore	1	9.3%	NA	NA	4.3%	1.8%	NA
South Korea	3	9.9%	6.8%	5.6%	5.7%	2.8%	27.0%
Taiwan	4	6.9%	4.4%	3.9%	3.5%	2.1%	25.0%
Thailand	2	9.7%	NA	5.7%	6.0%	3.0%	NA
Vietnam	1	NA	NA	NA	10.3%	6.0%	NA
Europe Central							
Bulgaria	1	8.5%	NA	4.0%	4.0%	NA	NA
Croatia	1	9.8%	7.0%	NA	5.8%	NA	NA
Czech	3	9.0%	5.9%	4.6%	4.7%	3.0%	24.0%
Greece *	1	8.2%	NA	4.6%	4.6%	NA	NA
Hungary	3	10.7%	9.2%	7.0%	6.8%	3.0%	20.0%
Poland	4	9.5%	7.1%	5.7%	5.8%	3.1%	19.0%
Romania	1	11.1%	NA	6.6%	6.6%	NA	NA
Russia	3	7.5%	NA	5.8%	6.9%	3.0%	NA
Slovakia	2	9.0%	5.6%	4.7%	4.7%	3.0%	19.0%
Europe Western							
Austria *	3	8.4%	5.2%	NA	4.5%	NA	NA
Belgium *	7	8.0%	6.0%	4.8%	4.6%	2.1%	34.0%
Finland *	1	7.3%	6.3%	NA	4.3%	2.7%	NA
France *	11	7.5%	6.1%	4.8%	4.5%	2.4%	34.4%
Germany *	7	7.8%	5.7%	5.0%	4.6%	2.2%	29.9%
Ireland *	5	7.7%	6.0%	5.7%	4.6%	4.2%	18.2%
Italy *	8	7.5%	6.0%	5.2%	4.6%	2.3%	31.0%
Luxembourg *	4	7.8%	6.2%	4.7%	4.7%	1.9%	NA
Netherlands *	9	7.8%	6.3%	4.9%	4.5%	2.1%	25.5%
Portugal *	3	8.4%	5.2%	5.2%	4.7%	2.0%	26.0%
Spain *	9	7.9%	6.3%	5.0%	4.6%	2.2%	28.7%
Sweden	6	7.5%	6.4%	5.5%	4.6%	3.6%	29.0%
Switzerland	5	6.8%	4.1%	3.4%	3.4%	1.2%	22.0%
UK	9	7.8%	6.8%	5.6%	4.8%	3.3%	28.0%

* euro currency zone

Several observations can be made concerning Table 2 when compared to similar data published last year:⁴

- Equity, property and fixed income returns have generally increased from 2006. Most exceptions were in Asia.
- Government returns increased throughout most of Europe by about 0.5 percent, but were mixed outside this continent. Inflation generally followed government returns.
- Tax rates declined in some countries, particularly Germany (10 percent), Italy and Portugal (6 percent). Tax rates increased in some other countries, notably Malaysia (11 percent) and Brazil (6 percent).

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.

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⁴ *ibid*

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 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	Equity	Property	Credit	Real Return
	Risk Premium	Premium	Premium	Spread	
	(10)=(1)-(7)**	(11)=(4)-(7)**	(12)=(5)-(7)**	(13)=(6)-(7)**	(14)=(7)-(8)**
Africa					
South Africa	NA	3.5%	1.5%	NA	3.0%
America Latin					
Chile	3.1%	4.5%	NA	0.9%	NA
Mexico	3.8%	4.5%	NA	0.2%	4.5%
Peru	5.1%	4.5%	NA	0.2%	NA
America North					
Canada	3.4%	3.8%	4.2%	0.7%	2.4%
US	3.2%	3.8%	1.9%	1.7%	1.7%
Asia / Pacific					
Australia	3.1%	3.8%	1.9%	0.0%	4.0%
China	4.2%	5.0%	0.9%	0.6%	2.4%
Hong Kong	3.3%	4.2%	NA	1.1%	2.1%
India	5.3%	4.5%	NA	-0.3%	4.3%
Indonesia	5.1%	4.0%	2.0%	NA	4.3%
Japan	3.7%	3.5%	NA	0.9%	1.3%
Malaysia	3.3%	4.8%	1.7%	4.0%	3.8%
New Zealand	3.1%	3.8%	2.0%	0.3%	3.5%
Philippines	6.5%	NA	NA	NA	4.3%
Singapore	2.6%	5.1%	NA	NA	2.5%
South Korea	3.5%	4.3%	1.1%	-0.1%	3.1%
Taiwan	3.7%	4.1%	1.8%	1.0%	2.2%
Thailand	5.2%	4.5%	NA	0.5%	3.8%
Vietnam	6.5%	NA	NA	NA	4.3%
Europe Central					
Bulgaria	3.1%	4.5%	NA	0.0%	NA
Czech	3.6%	4.2%	1.1%	0.0%	1.8%
Greece *	3.1%	3.6%	NA	0.0%	NA
Hungary	3.3%	3.9%	2.3%	0.2%	3.9%
Poland	3.4%	3.7%	1.2%	0.0%	2.8%
Romania	3.1%	4.5%	NA	0.0%	NA
Russia	4.1%	NA	NA	0.0%	NA
Slovakia	3.7%	4.3%	0.9%	0.0%	1.7%
Europe Western					
Austria *	3.6%	4.0%	0.9%	NA	NA
Belgium *	3.4%	3.4%	1.4%	0.3%	2.8%
Finland *	NA	3.0%	2.0%	NA	1.6%
France *	3.0%	3.1%	1.6%	0.3%	2.2%
Germany *	3.6%	3.3%	1.2%	0.4%	2.6%
Ireland *	3.2%	3.3%	1.6%	1.0%	0.3%
Italy *	2.7%	3.0%	1.6%	0.4%	2.3%
Luxembourg *	3.4%	3.2%	1.5%	0.3%	3.0%
Netherlands *	3.2%	3.3%	1.8%	0.5%	2.4%
Portugal *	3.6%	4.0%	0.9%	0.4%	2.7%
Spain *	3.2%	3.4%	1.8%	0.5%	2.5%
Sweden	NA	3.0%	1.8%	1.1%	0.5%
Switzerland	3.8%	3.7%	1.0%	-0.1%	2.3%
UK	3.0%	3.2%	2.3%	1.0%	1.4%

* = 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 from 2006, property premiums generally remained the same or increased from last year.
- Credit spread changes were mixed, with central Europe decreasing. Credit spreads are negative for some countries, which is counterintuitive.
- Risk premiums are generally consistent with equity premiums.
- Real returns increased in Europe, but were mixed elsewhere.

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 for embedded value calculations. Thirteen of the 23 companies surveyed disclosed stochastic market assumptions in their 2007 European embedded value (EEV) reports. Averages of several of these assumptions are shown in Table 4 (volatility may also be referred to as standard deviation).

Table 4: Sample Stochastic Assumptions

Companies		Stock		Property		Bonds		
		Yield	Volatility	Yield	Volatility	Yield	Volatility	Type
Europe	10	7.8%	24.1%	7.6%	14.8%	4.8%	7.5%	Government
Japan	2		22.8%			2.4%	7.3%	Government
So. Africa	1		25.4%			8.1%		Government
So. Korea	1		36.4%			6.1%	13.1%	Government
Switzerland	4		24.3%		17.4%	3.7%	10.5%	Government
UK	4	7.6%	25.1%	6.6%	16.3%	4.7%	7.6%	Government
US	8	7.9%	23.3%		20.4%	5.1%	9.0%	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. Also, not all companies use consistent definitions for average returns (e.g., geometric vs. arithmetic).

Some observations can be made regarding stochastic and other elements of EV calculations this year:

- Companies generally consider 1,000 scenarios to be sufficient.
- A wide variety of interest rate models are used such as: 2 factor Black-Karasinski, 2 factor Heath Jarrow Morton, 2 factor Vasicek, Vector Auto Regression (VAR), TAS 9.5, 1 factor with mean reversion, Hull

White Model, and the Barrie & Hibbert proprietary model.

- No consensus yet exists on how to reflect the cost of non-financial risk (NFR) in EV calculations. This is typically reflected in the discount rate for TEVs. Approaches include increasing the cost of required capital, explicitly calculating the cost of NFR using the difference between the value of inforce calculated using a risk free rate (RFR) versus a RFR plus a risk margin rate (risk margins varying between 0.5 percent to 3.5 percent) or ignoring NFR assuming it is already allowed for in the EV.

It should be noted that the CFO Forum published its MCEV Principles in June 2008. As a result, CFO Forum companies will be required to report the value of their business on a market-consistent basis. Adoption of the MCEV Principles will be mandatory by Dec. 31, 2009,

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at the latest. We expect that several companies will be making changes to their EV calculations and reporting 2008 EV results on a MCEV basis that is compliant with MCEV Principles.

Summary

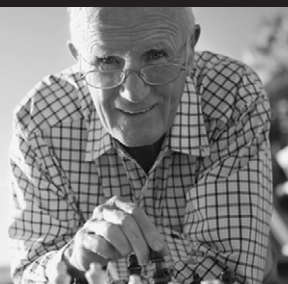
The SOA International Experience Study Working Group (IESWG) publishes this survey to enhance the knowledge of actuaries about current international market conditions and practices. Practices continue to evolve and we

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. □

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