

# **Risk Management Metrics Subgroup**

## **Embedded Value Definition**

**DRAFT 2**

**June 20, 2001**

**DRAFT 2**

**EMBEDDED VALUE DEFINITION**

**Table of Contents**

1 Background and Purpose ..... 3

2 Definitions ..... 3

- Adjusted Net Worth.....3
- Appraisal Value.....3
- Business Value .....3
- Cost of Capital .....3
- Discount Rate.....4
- Distributable Profits.....4
- Embedded Value .....4
- Embedded Value Added.....4
- In-Force Business.....4
- Future Business .....4
- Required Capital.....4
- Value of In-Force Business .....5
- Shareholders' Free Surplus .....5

3 Methods..... 6

- 3.1 Basic Concept .....6
- 3.2 Methodology .....6
- 3.3 Adjusted Net Worth.....7
- 3.4 Value of In-Force Business .....8
- 3.5 Discount Rate.....8

4 Pro's and Con's of Embedded Value ..... 9

- 4.1 Pro's.....9
- 4.2 Con's.....9

5 Example ..... 9

## **1 Background and Purpose**

Embedded Value (EV) is an estimate of the economic worth of a life insurance business, excluding any value, which may be attributed to future new business. The EV is the sum of the value placed on the Shareholders' Equity and the value of the in-force business.

The purposes of performing EV calculations are:

- a) To provide information on the value of the Company to analysts and the rest of the investment community.
- b) To provide information with which to manage the Company, specifically operations that are creating value or destroying value. Also to provide information on where the value actually resides.
- c) To provide information for the determination of the value added by the New Business written during a reporting period.
- d) To provide information on risk exposures through the use of sensitivity, stress and scenario tests as well as stochastic measures of risk to the EV of the company.

From a risk management perspective, EV can become an important metric that combines the economic impact of many of the risk exposures of a company. For example, through the use of the projection models that are used to derive EV, the impact of various risks can be measured on the economic worth of the company. As more types of risks (e.g. credit, market, operational, etc.) are modelled, more sensitivity, stress, and scenario tests on EV can be used as tools to develop risk management metrics.

## **2 Definitions**

- ***Adjusted Net Worth***

The value of shareholders' Equity, adjusted to reflect the market value of surplus, the cost of capital not reflected in the value of In-Force Business.

- ***Appraisal Value***

Includes both the Embedded Value of a life company and the value of its Future New Business Capacity.

- ***Business Value***

This equals the Value of In-Force Business less the Cost of Capital.

- ***Cost of Capital***

The cost of Required Capital reflects the opportunity cost of restricted capital given the difference between the assumed future investment earnings rate on surplus and the interest rate at which this income and future capital releases are discounted to the present.

- **Discount Rate**

A risk-adjusted rate of return used to calculate the present value of projected Distributable Profits in respect of a particular block of business.

- **Distributable Profits**

The unrestricted net cash flows available for shareholders. They comprise asset cash flows over a particular period less any amounts required for liabilities or provisions and any amounts required for changes in Required Capital criterion. S/H dividends ....

- **Embedded Value**

E.V. is defined by the following equations:

- (1) = Shareholders' Free Surplus
- (2) = Required Capital
- (3) = Cost of Capital
- (4) = Value of In Force Business
- (5) = Business Value = (4) - (3)
- (6) = Embedded Value = (1) + (2) + (5)

For presentation and publication purposes, Shareholders' Free Surplus and Required Capital might be combined and reported as a single item, Shareholders' Equity.

- **Embedded Value Added**

Change in a life company's Embedded Value from one reporting period to the next, adjusted for capital injections and Shareholder dividends.

- **In-Force Business**

Business of the company that is in force on the date of the Embedded Value calculation.

- **Future Business**

Business that is expected to be written or put in force after the date of the Embedded Value calculation.

- **Required Capital**

The level of statutory capital which, in order to meet the requirements of regulatory authorities or for marketing or ratings purposes, must be maintained before any distribution can be made to shareholders.

- ***Value of In-Force Business***

The discounted value as of the valuation date of the stream of after tax distributable profits. These profits are calculated with reference only to the assets supporting current liabilities.

- ***Shareholders' Free Surplus***

The value placed on Shareholders' Equity reflects the after tax market value of the assets representing Shareholders' Equity, including any deferred realized gains and excluding goodwill. Shareholders' Free Surplus is the excess of the Shareholders' Equity over the Required Capital.

### **3 Methods**

#### **3.1 *Basic Concept***

The E.V. of a block of business is comprised of the following components.

- (i) Adjusted Net Worth
- (ii) Value of In-Force Business

E.V. does not measure the value of Future Business.

Although E.V. does not include the value of Future Business, an important component of the analysis of the change in E.V. from one year to the next is the value added by the new business written in the most recent year.

#### **3.2 *Methodology***

There are three general approaches for the determination of Embedded Value which are commonly used.

These include:

- (i) Full Financial Projections
- (ii) Aggregate Projections
- (iii) Approximation Techniques

Projection techniques are generally used for the determination of Embedded Value. Such techniques involve the project of future events using either models or seriatim methods. For certain lines of business such as group life, group health or reinsurance, claims ratio techniques are acceptable. These involve the projection of future retained premiums and expected claim experience.

### **3.3 Adjusted Net Worth**

The determination of Adjusted Net Worth starts with the published value of Shareholders' Equity and allows for adjustments in respect of:

- i) The recalculation of liabilities to a basis consistent with the Value of In-Force Business;
- ii) The market value of assets comprising Shareholders' Equity, adjusted as in (i);
- iii) The cost of capital held in respect of Shareholders' Equity and any other Required Capital in excess of that provided for in the Value of In-Force Business;
- iv) Any liability in respect of subordinated debt or equity subject to a standing order e.g. preferred shares.
- v) Goodwill and Taxes.

There are two commonly used approaches for the determination of Adjusted Net:

- 1) The Adjusted Net Worth is equal to the value of excess assets or "free surplus" which are those assets in excess of liabilities plus required surplus. The value of excess assets is equal to the tax-adjusted market value of those assets, which is the value that could be realised on the sale of the excess assets, net of any tax that would be payable. Items such as deferred acquisition costs, subordinated debt, deferred realised gains on surplus assets and deferred tax provisions, participating retained earnings and shareholders retained earnings must be revalued on a basis consistent with the inclusion of such items in the projected cash flows that are included in the Value of In Force Business.
- 2) There is another way to break down the embedded value. The Adjusted Net Worth is the value assigned to any assets in excess of the specific assets assigned to support the liabilities. Such excess assets include the assets assigned to support the Required Capital used in the calculation of the Cost of Capital. The Value of In Force Business then becomes the value of future profits less the cost of Required capital.

### **3.4 Value of In-Force Business**

Under the Full Financial Projection approach, determination of the value of in force business involves the following steps:

- i) Setting assumptions about future experience of the business block.
- ii) Projecting future insurance cash flows, future assets and investment income, future liabilities and future taxes in order to determine future operating earnings.
- iii) Projecting future Required Capital levels consistent with the above projections.
- iv) Determining future annual Distributable Profits from these projections.
- v) Calculating the present value of those Distributable Profits at a Discount rate.

### **3.5 Discount Rate**

The Discount Rate used in Embedded Value work should reflect two components:

- A risk-free rate of return
- A risk premium addition

The Discount Rate should be consistent with the parameters of the economic model used to project Distributable Profits.

## 4 Pro's and Con's of Embedded Value

### 4.1 Pro's

- (i) Consistent with finance practice of valuing free cash flows.
- (ii) Consistent with methods used to price new products.
- (iii) Commonly used in evaluating mergers and acquisitions
- (iv) Provides a useful platform for risk analysis using sensitivity tests, stress tests and stochastic analysis.
- (v) Gaining acceptance as a public reporting tool in Europe and Canada.
- (vi) As a by-product, can provide useful forecasts of cash flows, earnings, etc.

### 4.2 Con's

- (i) Very sensitive to choice of assumptions.
- (ii) Complicated to explain to non-actuarial audience.
- (iii) Generally not consistent with risk neutral valuation of financial products and capital markets instruments.

## 5 Example

### Embedded Value Example

	t = 0	1	2	3	4	5	6	Present Value at t = 0
Premiums		\$1,000	\$900	\$810	\$729	\$656		
Investment Income		\$48	\$46	\$41	\$37	\$33	\$16	
Total Income		\$1,048	\$946	\$851	\$766	\$689	\$16	
Benefits and Reserve Changes		\$1,500	\$550	\$495	\$446	\$401	(\$525)	
Expenses		\$150	\$45	\$41	\$36	\$33	\$0	
Taxes		(\$211)	\$123	\$110	\$99	\$89	\$189	
Total Outflow		\$1,439	\$718	\$646	\$581	\$523	(\$336)	
Book Profits		(\$391)	\$228	\$205	\$185	\$166	\$351	\$439 = Value of In Force
Change in Required Capital	(\$444)	\$44	\$40	\$36	\$32	\$29	\$262	
After Tax Interest on Req. Cap.		\$21	\$19	\$17	\$15	\$14	\$7	
Net Capital Flows	(\$444)	\$66	\$59	\$53	\$48	\$43	\$269	(\$71) = Cost of Capital
<b>Distributable Profits</b>	(\$444)	(\$326)	\$287	\$258	\$232	\$209	\$620	\$368 =VOIF - Cost of Cap.
Excess Assets (at market)	\$489							
Corporate Debt and Pref. Stock	\$150							
<b>Adjusted Net Worth</b>	\$339							\$339 = Free Surplus + Required Capital
<b>Embedded Value</b>								\$707