



# Chapter 27 – Appraisal Values

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Additional Space for Notes



## Introduction

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This chapter provides an introduction to appraisal values. An appraisal value is an economic valuation of the shareholders' interests in a life insurance or other financial services company. The calculation of appraisal values is an important task for actuaries in the life insurance and wealth management sectors of the financial services industry.

Many companies perform internal appraisal valuations of their businesses. These provide critical management information on the value of the business and how it is changing. Additionally, some life insurance companies publish appraisal values (or components thereof) as supplementary financial information for external market analysts.

Appraisal values also often form the basis for assessment of value in merger and acquisition activities.

Practice Guideline 199.03 Economic Valuations published by The Institute of Actuaries of Australia applies to actuaries performing an economic valuation of an economic asset. An appraisal value is one particular type of economic valuation. Previous Guidance Notes GN 252 – Actuarial Appraisals of Life Insurance Business and GN552 – Economic Valuations have been replaced by PG 199.03 but can still be found on the Institute's website. GN 252 was specifically concerned with appraisal values for life companies.

There are no prudential (APRA) or accounting standards governing the calculation and disclosure of appraisal values in Australia. The methodology for the calculation of appraisal values described in this chapter is commonly used in Australia. However, some companies use alternative methods. In Europe, the CFO forum has published principles and guidance for Market Consistent Embedded Values (MCEV). These principles have been widely adopted by European life companies. The MCEV principles are described in the last part of this chapter.

## Definition of Appraisal Value

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The appraisal value of a life insurance company is an estimate of the value of the life insurance business to the shareholders of the company.

An *appraisal value* has three components:

- a. adjusted net worth;
- b. value of in force business; and
- c. value of future new business.

The sum of the adjusted net worth and the value of in force business is known as the *embedded value*.

Where a life insurance company has participating business, the appraisal value is based on the shareholders' interest in the profits of the participating business. It does not include profits allocated to policy owners.



## Adjusted Net Worth

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Net worth refers to the 'excess assets' of the company. It is the amount of shareholder assets in excess of regulatory capital requirements and could in theory be paid to shareholders immediately. In most circumstances the net worth can be calculated as:

- the capital base less the prudential capital requirement (PCR).

The prescribed capital amount would be used instead of the prudential capital requirement if the embedded value was to be disclosed to persons outside the company. Any supervisory adjustments included in the PCR must remain confidential. If subordinated debt was included in the capital base, it would need to be excluded from adjusted net worth as it does not belong to shareholders.

Sometimes target capital is valued as part of the value of in force business, instead of being included in adjusted net worth. This recognises the fact that life insurance companies must, in practice, hold surplus assets in excess of the prudential capital requirement to provide a buffer against the risk of breach. This amount (or a component of it) may be deducted from net assets to reflect the fact that surplus assets may not, in practice, be immediately distributable to shareholders. If surplus assets are included in the value of in force, the embedded value will be reduced.

## Value of In Force Business

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The value of in force business is the present value, at the hurdle rate (or risk discount rate), of future distributions to shareholders of profits and capital. It excludes capital that has already been included in the adjusted net worth. The amount that can be distributed at the end of each year is the profit for the year, plus the amount of capital that can be released. Capital releases are only possible if the capital base meets the prudential capital requirement. These distributions are often known as "distributable profits".

The hurdle rate normally exceeds the expected after tax rate of investment return on the assets backing capital. This results in the present value of future distributions of capital being less than the current face value of capital. This difference between the current face value of capital and the present value of future distributions is sometimes referred to as a "cost of capital".

The value of in force business is determined from a cash flow projection, not dissimilar to that used for the projection method for calculating the value of future profits for insurance contract policy liabilities. The key differences between the valuation of future profits and the valuation of in force business are:

- A valuation of in force business requires projections for all types of business, including insurance contracts whose policy liabilities are determined using an accumulation method and investment contracts.
- Discount Rates – the value of in force is determined using a hurdle rate (or risk discount rate) representing the required rate of shareholder return whereas insurance contract policy liabilities are calculated using the expected earned rate on the assets backing the business or a risk free discount rate.
- Prudential Capital Requirement – the value of in force business includes the release of the capital required to meet the prudential capital requirement for the business as well as the best estimate shareholder profits emerging from the



policy liabilities. The amount of capital needed to meet the future PCR needs to be projected as well as the policy cash flows.

- Investment returns – the value of in force business includes the investment earnings on the assets backing the policy liabilities and capital. The rate of investment earnings is the best estimate. The discount rate differs from the investment earnings rate. Therefore investment earnings have to be projected as an explicit cash flow item.
- Tax – this must be modelled as an explicit cash flow item. Profits must be valued net of tax.

Best estimate assumptions are used to determine appraisal values. For insurance contracts, the mortality, morbidity and lapse assumptions are usually the same as the assumptions used in determining policy liabilities. Expense assumptions may differ as an embedded valuation may allow for anticipated future expense savings. There may also be an allowance for future changes to pricing. Future reductions to fees and/or premiums may be assumed to occur due to competitive pressures – this is known as "margin squeeze". For investment-linked contracts, assumptions for lapse/withdrawal rates and servicing expenses are necessary, even though these may not be required to value the policy liabilities.

Determining an appropriate risk discount rate is one of the most challenging and important tasks in an appraisal value calculation. This issue is discussed further in the readings for this course. The risk discount rate must be consistent with the risk free rate. The risk discount rate is usually set at a margin above the risk free rate. Margins of 3% to 5% are commonly used. Effectively, this means that shareholders expect to earn a return that is 3% to 5% above the risk free rate on the capital they invest in a life company.

## Value of Future New Business

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To arrive at an appraisal value, the value of future new business is added to the embedded value.

The value of future new business is the value of the shareholder profits expected to emerge from future sales of new business, net of the cost of supporting capital.

Valuing new business may be done in a number of ways. These include:

- estimating sales into the future and building a projection model of the distributable profits from all such future sales; and/or
- calculating the value of one year's new business and multiplying by a "capitalisation" factor. The capitalisation factor depends on the number of years of new business that are to be included in the appraisal value and the discount rate (and margin squeeze/expansion) that is considered appropriate for this purpose.

The value of future new business is often the more subjective component of the appraisal valuation, as there can be a lot of uncertainty around future sales volumes and future pricing. Depending upon the size of the company, the stage of development of the company, the relative profit margin on its new business and the potential for future growth in sales, the value of future new business can be the most materially significant part of the appraisal valuation.



The first step in estimating future sales volumes is to estimate the likely growth in the life insurance market. This will vary by product – for example sales of superannuation and risk products might be expected to grow strongly for a number of years, then stabilise at a lower growth rate as a greater proportion of the population enters retirement. The next step is to estimate growth rates for the company by allowing for future changes in the company's share of the total market.

For the purpose of providing supplementary information to market analysts, some life companies disclose the embedded value and the value of the new business sold in the latest reporting period. This information allows analysts to calculate the appraisal value using their own estimate of an appropriate capitalisation factor for future new business.

## Imputation Credits

The value of imputation credits is often included in embedded and appraisal values of life insurance and wealth management businesses.

Imputation credits (also known as franking credits) are tax benefits that are passed to shareholders with their dividend distributions. An imputation credit represents the amount of tax that the company has already paid on its shareholder profits. Australian shareholders have to pay tax on their dividend income, but they can reduce their tax liability by the amount of imputation credits they have received with their dividends. If they did not receive imputation credits they would effectively be taxed twice – the life company paying tax on its profits and the shareholders paying tax again on their dividends. Imputation credits have value to some, but not all shareholders. Foreign shareholders are generally not able to obtain any value from imputation credits. The value attributed to imputation credits will depend on the ownership of the company and the purpose of the valuation. For a foreign-owned company, the value might be zero if the company was assumed to continue in foreign ownership. But if the foreign parent was intending to sell the company to an Australian entity, the imputation credits would potentially have a value to the new owners.

The explicit valuation of imputation credits is usually disclosed as separate items for both in force and future new business in the appraisal value. This allows the users of the information to assess the impact of including imputation credits in the valuation.

Including imputation credits essentially means that an appraisal value represents the value of the business in the hands of the shareholders, before the shareholders are taxed on their dividend income. This is often referred to as a "gross-gross" valuation. This means that a before tax or "gross" risk discount rate is applied to net of tax profits plus imputation credits. The resulting appraisal value is effectively before tax or "gross" of tax for the shareholders.

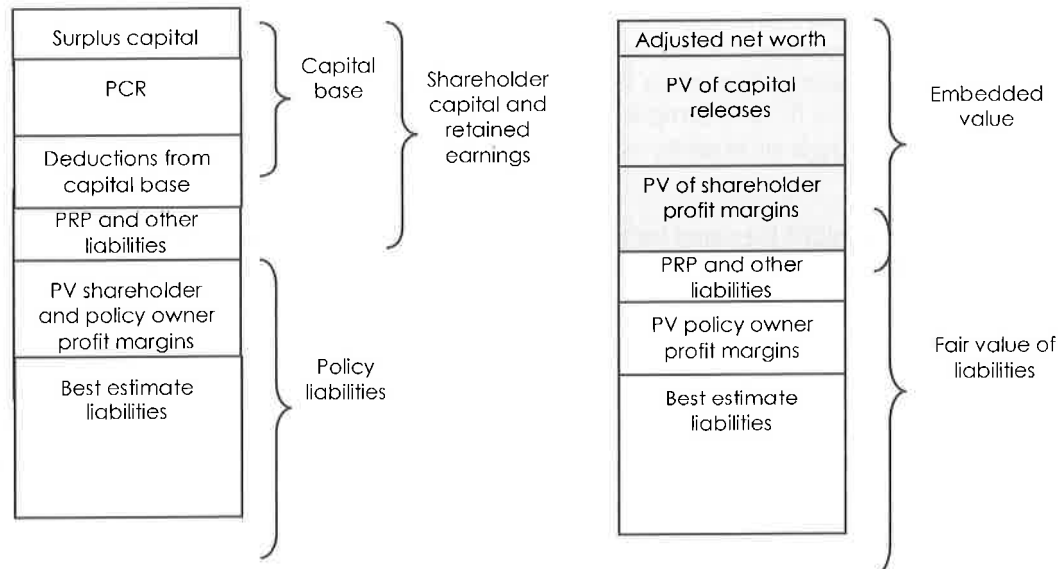
Sometimes a valuation may exclude imputation credits and use a discount rate that is "net" of tax. A net of tax discount rate applied to net of tax earnings (i.e. a "net-net" approach) should produce an equivalent result to the "gross-gross" method. However, it is less useful to the users of the information because they cannot adjust the results to reflect their own tax position (i.e. they cannot deduct the value of imputation credits if the credits are of no value to them).

## Embedded Value Reporting

The breakdown of the total assets of a life company into its liability and capital components is represented graphically below. The column on the left shows the breakdown that corresponds to the balance sheet, with shareholder capital further



broken down into surplus capital, the PCR and the deductions from the capital base. For life investment contracts, profit margins and best estimate liabilities are implicit in the policy liabilities, even though these concepts are not explicitly used in the valuation. The column on the right shows the breakdown according to economic values. The total height of both columns must be the same as the total assets are the same (fair value) under both reporting methods.



On the right hand side, the economic value of the liabilities and policy owners' retained profits has been called the "fair value of liabilities". The fair value includes an item called "increase in liabilities" which arises because of the use of a hurdle rate to discount shareholder profits and because of the treatment of tax in the embedded value calculation.

The fair value of liabilities is the amount for which a liability could be settled, between knowledgeable, willing parties in an arm's length transaction. If a liability is transferred between life companies, the company acquiring the liabilities will want to earn a hurdle rate (above expected investment returns) on the capital they must provide to support the liabilities. They can only earn the hurdle rate if the assets they receive exceed the best estimate of the liabilities. The excess of fair value over best estimate (including PRP and policy owner profit margins) is a margin for risk which reduces the PV of shareholder profits on the economic balance sheet compared to the normal balance sheet.

In the diagram on the left, PV shareholder profits are valued gross of tax (for products taxed on profits). In the diagram on the right, PV shareholder profits are valued net of tax and tax is treated as part of the liabilities.

Another point to note is that "deductions from the capital base" on the left hand side are included in "PV of capital releases" on the right hand side. For example, deferred tax assets in excess of deferred tax liabilities must be deducted from the capital base, but will form part of the embedded value. The capital base is measured using a "wind-up" basis, whereas the embedded value is measured assuming the company continues as a going concern. Deferred tax assets can have zero value in a "wind-up" but can be used to reduce future tax liabilities for a going concern.

The diagram does not include the value of future new business. If this was included, the liabilities would reduce (if future new business has a positive value to shareholders the



best estimate liability for it must be negative) and embedded value would be replaced by a larger block representing appraisal value.

## Other Considerations in Determining an Appraisal Value

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When doing an appraisal value you should be clear about who you are preparing it for, who will use it and the purpose of the appraisal value. You will also need to understand the business you are valuing. Based on these you should select appropriate methods, models and assumptions. If, for example the business you are valuing is a small, immaterial part of a bigger economic valuation, your valuation of the "smaller" entity may be approximate.

If the appraisal value might be used for purposes other than those intended, you should disclose any qualifications or limitations on the usage of the appraisal value. For example, where the appraisal value could reasonably be construed to be a market value or fair value when this was not the intended purpose, you should include a statement to that effect in the your report.

An appraisal value is very sensitive to the assumptions that are used. It is very different in this respect from policy liabilities, where a change in assumptions often has no impact on the results. An appraisal value investigation should highlight the sensitivity of the results to changes in the key assumptions.

## Analysis of Change in Appraisal Value

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If appraisal values are used for regular financial reporting, it is important to analyse the movement in the appraisal value since the previous valuation. Internal management and external analysts need to understand the reasons for the change in appraisal value. It is of little value to report a large movement in appraisal value without giving an explanation of why the movement occurred.

The analysis of change also acts as a check on the accuracy of the calculations (unexplained items should be small). It highlights areas where there has been a significant deviation between actual experience and the best estimate assumptions and areas where there has been a significant change to best estimate assumptions.

Conceptually, the approach and items that appear in an analysis of change in appraisal value are similar to the analysis of profits. A sample representation for the analysis of change in appraisal value (for a savings portfolio) is shown below.





<b>Analysis of Change in Appraisal Value</b>	
<b>Analysis Item</b>	<b>Appraisal Value</b>
	\$m
Value at start of year	1,000
Expected change in value	110
Expected value at end year	1,110
Experience variations over period	
expenses	(20)
sales (volume)	8
sales (mix)	16
redemptions	(16)
investment earnings	(20)
	8
Assumption changes	
redemptions	(85)
	(77)
<b>Actual value at end year</b>	<b>1,033</b>

The example illustrates the type of items which could appear in an analysis of change. In practice, the key variance items will depend upon the business being valued and what the variations are. For example, if the information above were based on a risk portfolio rather than a savings portfolio, then variance items relating to claims experience would be included. Changes due to movements in the risk free discount rate and risk discount rate are always likely to be significant, although they are not shown in this table. Other items which may appear include changes to the assumed growth rate of future new business, pricing changes, dividend payments to shareholders and capital injections.

In practice the analysis is likely to be further split so that it explains the movement in embedded value (often including a separate analysis of the movement in adjusted net worth) and the movement in the value of future new business. One of the most important items in the analysis of change for both of these items is the value of the new business sold during the reporting period. The value of new business sold will explain part of the increase in the embedded value. It will also directly affect the value of future new business if this is calculated using a capitalisation factor applied to the value of one year's new business.

Because the value of one year's new business is such an important item in determining the appraisal value, it is important to analyse the reasons why it changes from one year to the next. Changes in the value of one year's new business will be mainly driven by changes in volume and mix, best estimate assumptions, acquisition costs and product pricing.

## Expected Change in Appraisal Value

The expected value is most commonly calculated by "rolling forward" the appraisal value from the previous reporting date. Simplistically, this involves growing the net worth at the assumed fund earning rate, growing the value of in force and value of future new business at the risk discount rate (referred to as "unwinding the discount rate") and adjusting the net assets for dividend payments to shareholders (including franking credits) and new capital raised during the period.

Additional complicating steps are to:



- allocate expected cash flow for the period from both in force and new business over the period into the net assets (and subsequently remove from the value of in force and new business) and
- adjust the value of in force and value of future new business by transferring the present value of future profits from the new business expected to be written over the period to the in force, as by the end of the period such new business would now be in force. This amount, now included as in force, should be removed from the value of future new business.

## Experience Variations and Assumption Changes

Experience variations occur when actual business volumes, cash flows and other items that were forecast in the previous appraisal valuation do not occur at the levels expected. For instance, sales inflows could be higher than forecast and this will impact the appraisal valuation as the number of contracts now being administered will be higher than forecast. This may generate higher past period and future period cash flows that will be reflected in a higher appraisal value compared to expected.

Some experience variations will be the same as for the analysis of profit. For example, there will be an item for death claims being different from the best estimate. Other experience variations will be very different.

Any assumption changes made at the reporting date will affect future expected cash flows and have a far greater impact on the appraisal value than on the reported profits. Assumption changes are identified separately from experience variances in the analysis of movement and the appraisal value will be affected by both changes in non-economic assumptions (e.g. claims, lapses) and economic assumptions (e.g. investment earnings rates, risk discount rates).

## Comparison with Other Valuation Methods

Two other methods that can be used to value a life company are the shareholders' equity reported on the balance sheet (capital and retained profits) and a price/earnings ratio.

The equity on the balance sheet is not useful as a measure of shareholder value because:

- it ignores the value of future profits expected to emerge from the liabilities;
- it ignores the value of future new business; and
- it does not deduct a "cost of capital" from the capital held to meet the prudential capital requirement.

The method most commonly used to value non-life insurance companies is via a price/earnings (P/E) ratio. The latest year's profit (or next year's forecast profit) is multiplied by a P/E ratio. The P/E ratio is derived from a comparison of market values of similar listed companies to their reported profits. There is an obvious difficulty if there are no similar listed companies. In this circumstance a broader pool of reference companies could be used (e.g. companies in similar industries or foreign listed companies).



Adjustments to the P/E multiple can be made to reflect company specific issues such as risk or growth rates. The reported profit may also be adjusted to remove any distortions such as one-off items. This method may be unsuitable for life companies because:

- profit margins can emerge unevenly (e.g. terminal bonuses for traditional business);
- the mix of business may change over time (e.g. new risk and investment-linked business may be less profitable than existing participating business);
- actual profit can be significantly distorted by experience profits (e.g. random variations in claims). Experience profits could be ignored, but the profit margins emerging for the current year will not reflect any changes to best estimate assumptions since the previous year end;
- there is no explicit allowance for risk. A lower P/E multiple could be used for business with higher perceived risk, however such an adjustment to the P/E multiple would be fairly subjective.

The P/E method can, however, be used for life companies that have a simple product range and a reasonably stable rate of growth. An example would be an established life company whose business consisted entirely of single premium investment-linked business.



## Example 1

The following example is provided to assist in understanding the fundamental concepts and calculations of an appraisal value. A spreadsheet is provided for this chapter and this example is in sheet "Example 1". It is recommended students work through the example carefully.

The example is for a single YRT policy. In practice, this calculation would be done across a portfolio of policies. It is shown for illustration only under simplified assumptions. The best estimate rate of investment return is assumed to be the same as the risk free discount rate.

You are given the following data, assumptions and information relating to the starting net worth:

Entry	56	next
Sex	Male	
Smoker	Non smoker	
Policy term	10	years
Premium term	10	years
Sum insured	250,000	increases with CPI annually
Premium payable		annually
Risk free rate	7%	
Tax rate	30%	
Inflation	2%	
Expenses		
	Fixed initial	\$350.00 point of sale
	Fixed renewal	\$75.00 indexed and starts from beginning year 2
Commission		
	Variable initial	70% of annual premium
	Variable renewal	5% of annual premium, indexed and starts from beginning year 2
Mortality	100%	
Mortality table	IA90-92	
Lapse rate	15%	
Reserves as % IF	20%	Policy liabilities and capital requirements
Net worth (assets) at start	1,500.00	
Risk discount rate	10%	



## Term premium rates

## Decrement Rates

Male non-smoker

Age next	Rate per \$1,000 sum insured	Age next	qx
56	0.00553	56	0.0043
57	0.00622	57	0.0047
58	0.00703	58	0.00529
59	0.00797	59	0.00591
60	0.00900	60	0.00662
61	0.01027	61	0.00743
62	0.01168	62	0.00836
63	0.01324	63	0.00940
64	0.01507	64	0.01058
65	0.01704	65	0.01192

The resulting projection of cash flows (excluding interest earnings on net worth) is shown in the table below.

Embedded/Appraisal value											
Year	Premium	Investment Income	Death outgo	Mat outgo	Surr outgo	Expense	Commission	Increase in reserves	Distributable Profit (gross)	Tax	Distributable Profit (net)
1	1,383	5	1,065	0	0	350	968	277	-1,272	43	-1,315
2	1,342	104	1,023	0	0	65	68	-8	298	71	227
3	1,309	102	985	0	0	56	68	-7	308	69	240
4	1,280	100	949	0	0	48	68	-6	320	66	254
5	1,246	98	916	0	0	42	67	-7	325	63	262
6	1,224	96	886	0	0	36	68	-4	335	60	275
7	1,198	94	858	0	0	31	67	-5	342	57	285
8	1,168	92	829	0	0	26	67	-6	343	52	291
9	1,142	90	802	0	0	23	67	-5	346	48	298
10	1,107	88	775	0	0	19	66	-228	563	43	520

Distributable Profit (lifetime) 1,336

Distributable Profit (NPV 10%) 272.23

Note: Investment income for VIF/VNB calculations is that the earnings on those assets backing capital reserves. This is because the 'Excess Assets' component of the EV/AV implicitly includes the future earnings on these assets in the face/market value given to them.

The initial excess assets held are assumed to be \$1,500 in order to support the initial strain of the business. The ongoing policy liabilities plus capital requirements are assumed, for simplicity, as being 20% of annual premiums in force on business written. This results in the following reserves and excess assets, which are used in the derivation of the distributable profits.

Additionally, in order to determine the tax amount, it is necessary to determine the policy liabilities. To assist, the policy liabilities are shown below (you may also wish to confirm these in your calculations to refresh your understanding of policy liability calculations).



### Reserves and excess assets

Year	Reserve (boy)	Excess assets (boy)	Policy liabilities (boy)
1	0	1,500	0
2	277	259	-1138
3	268	498	-1085
4	262	762	-1013
5	256	1,054	-920
6	249	1,367	-813
7	245	1,709	-682
8	240	2,078	-534
9	234	2,471	-372
10	228	2,889	-191

The appraisal value also needs to include a value for imputation credits. These are assumed to be worth 70% of the value of future tax payable. (Perform the calculation yourself based on the above tax cash flows!)

Using the results above and calculating imputation credits, the appraisal value can be expressed as:

Item	Value \$	
Adjusted Net Worth	1,500	
Value of Inforce Business	-	As assumed only new business
Value of New Business	272	
Value of Imputation Credits	286	
Appraisal Value	2,058	

## Example 2

The following example is intended to show the fundamental concepts of an appraisal value as well as an analysis of change for an investment product. The workings can be found in the spreadsheet included with this chapter.

The example relates to 1,000 superannuation bonds that all mature in 10 year's time, when all of the clients turn 65.



Adjusted net worth 2,000,000  
 Opening FUM 20,000,000  
 All funds returned at end of 10 years as all members turn 65

Premium p.a. - received at start of year  
 no of members 1,000

Fees:  
 Member fee p.a. 90 net of policyholder tax and paid at start of year  
 % fee 1.20% net of policyholder tax and paid over the year

risk discount rate 12%

Expenses:  
 \$ per member exp 75 paid at start of year  
 % per member 1.10% paid over the year  
 exp

Policyholder tax 15%  
 rate  
 Shareholder tax 30%  
 rate

Investment return 8%

Lapse rate 12% leaving mid way through the year

PCR (% of FUM) 1%  
 Assumes there are no deferred acquisition costs running off  
 Distributable profits paid at end of year

Time	Number of members boy	P/H FUM at boy	Premiums	P/H interest	P/H tax on interest	P/H fees gross of tax	P/H tax on fees	Lapses	Maturity	P/H FUM at end
1	1,000	20,000,000	0	1,504,000	-225,600	-380,318	57,048	-2,467,200	0	18,487,930
2	880	18,487,930	0	1,390,292	-208,544	-346,864	52,030	-2,280,671	0	17,094,173
3	774	17,094,173	0	1,285,482	-192,822	-316,558	47,484	-2,108,737	0	15,809,021
4	681	15,809,021	0	1,188,838	-178,326	-289,084	43,363	-1,950,201	0	14,623,611
5	600	14,623,611	0	1,099,696	-164,954	-264,159	39,624	-1,803,969	0	13,529,849
6	528	13,529,849	0	1,017,445	-152,617	-241,531	36,230	-1,669,042	0	12,520,333
7	464	12,520,333	0	941,529	-141,229	-220,974	33,146	-1,544,508	0	11,588,297
8	409	11,588,297	0	871,440	-130,716	-202,284	30,343	-1,429,532	0	10,727,547
9	360	10,727,547	0	806,712	-121,007	-185,280	27,792	-1,323,350	0	9,932,414
10	316	9,932,414	0	746,918	-112,038	-169,800	25,470	-1,225,263	9,197,701	0



Time	PCR at boy	PCR at eoy	Int on PCR	S/H fees	S/H expenses	S/H tax on int on PCR	S/H tax on fees	S/H tax on expenses	Distributable profits	Imputation credits
1	200,000	184,879	16,000	380,318	-286,684	-4,800	114,095	86,005	91,865	23,023
2	184,879	170,942	14,790	346,864	-261,702	-4,437	104,059	78,510	83,904	20,990
3	170,942	158,090	13,675	316,558	-239,048	-4,103	-94,967	71,714	76,681	19,149
4	158,090	146,236	12,647	289,084	-218,490	-3,794	-86,725	65,547	70,123	17,481
5	146,236	135,298	11,699	264,159	-199,821	-3,510	-79,248	59,946	64,164	15,968
6	135,298	125,203	10,824	241,531	-182,856	-3,247	-72,459	54,857	58,745	14,595
7	125,203	115,883	10,016	220,974	-167,428	-3,005	-66,292	50,228	53,814	13,348
8	115,883	107,275	9,271	202,284	-153,388	-2,781	-60,685	46,016	49,324	12,215
9	107,275	99,324	8,582	185,280	-140,602	-2,575	-55,584	42,181	45,233	11,185
10	99,324	0	7,946	169,800	-78,364	-2,384	-50,940	23,509	168,891	20,870

The following table shows the value represented by the example at time 0 as well as the expected value in one year's time (which equals the actual value if all goes as expected).

	Net Worth	Value of Inforce	Embedded Value	Value of New Business	Total
<b>Values at time 0</b>	\$2,000,000	\$529,387	\$2,529,387	\$0	\$2,529,387
<b>Expected change in value</b>	\$80,000	\$63,526	\$143,526	\$0	\$143,526
<b>Move distributable profits to Net Worth</b>	\$114,888	-\$114,888	\$0		\$0
<b>Expected value at end of period</b>	\$2,194,888	\$478,025	\$2,672,913	\$0	\$2,672,913
<b>Actual value at time 1</b>	\$2,194,888	\$478,025	\$2,672,913	\$0	\$2,672,913

Note: this assumes a cash return is expected (and earned) on net worth of 4% after allowing for tax and imputation credits

If expenses turned out to be different from expected with:

- \$10,000 difference in profit for the period after allowing for tax and imputation credits
- the per member expense assumption for future years will be increased to \$80 per member, then the following two tables represent the impact on cash flows and value.





Time	PCR at boy	PCR at eyo	Int on PCR	S/H fees	S/H expenses	S/H tax on int on margin	S/H tax on fees	S/H tax on expenses	Distributable profits	Imputation credits
1	184,879	170,942	14,790	346,864	-266,102	-4,437	-104,059	79,830	80,824	20,066
2	170,942	158,090	13,675	316,558	-242,920	-4,103	-94,967	72,876	73,971	18,336
3	158,090	146,236	12,647	289,084	-221,897	-3,794	-86,725	66,569	67,738	16,765
4	146,236	135,298	11,699	264,159	-202,820	-3,510	-79,248	60,846	62,065	15,338
5	135,298	125,203	10,824	241,531	-185,495	-3,247	-72,459	55,648	56,898	14,041
6	125,203	115,883	10,016	220,974	-169,750	-3,005	-66,292	50,925	52,188	12,860
7	115,883	107,275	9,271	202,284	-155,431	-2,781	-60,685	46,629	47,894	11,786
8	107,275	99,324	8,582	185,280	-142,401	-2,575	-55,584	42,720	43,974	10,807
9	99,324	0	7,946	169,800	-79,947	-2,384	-50,940	23,984	167,784	20,538

## Expenses different from expected

During the period expenses (after allowing for tax and imputation credits) were \$10,000 worse than expected.

The future expense assumption per member is \$5.00 higher.

	Net Worth	Value of Inforce	Embedded Value	Value of New Business	Total
Values at time 0	\$2,000,000	\$529,387	\$2,529,387	\$0	\$2,529,387
Expected change in value	\$80,000	\$63,526	\$143,526	\$0	\$143,526
Move distributable profits to Net Worth	\$114,888	-\$114,888	\$0	\$0	\$0
Expected value at end of period	\$2,194,888	\$478,025	\$2,672,913	\$0	\$2,672,913
Expenses higher than expected in period	-\$10,000	\$0	-\$10,000	\$0	-\$10,000
Change in expense assumption	\$0	-\$14,779	-\$14,779	\$0	-\$14,779
Unexplained	\$0	\$0	\$0	\$0	\$0
Actual value at time 1	\$2,184,888	\$463,246	\$2,648,134	\$0	\$2,648,134

## Example 3

Your company reports to its parent on an annual basis. The method in use is to calculate an appraisal value at the end of each financial year.



The appraisal value report provided to your parent includes the following information:

- The actual appraisal value at the end of the current financial year;
- The expected change in that appraisal value over the following year.

The actual appraisal value at 30<sup>th</sup> June 2012 is considerably different to the expected appraisal value provided in last year's reporting.

The company is a niche marketer that sells a range of YRT products with TPD and trauma riders available. The company has been selling these products for 25 years.

The following information is provided in respect of this business.

Appraisal information at 30/6/2011, values are in \$m:

VIF	88.91
VNB	72.05
ANW	8.54
Total AV	169.50

Expected change in the appraisal value from 30/6/2011 to 30/6/2012 is \$19.31m.

The capital requirements above the policy liabilities are estimated to be 20% of the value of in force calculated on appraisal value assumptions.

Capital strain for appraisal value reporting purposes expected for the 11/12 financial year, at the end of the financial year, is \$8m.

Assume a risk discount rate of 10% is in use.

Identify and roughly quantify the impact of new business being 20% greater than expected for the current year on the experience on the parts (i.e. VIF, VNB and ANW) and the whole of the appraisal value as given.

Identify the impact of expenses (acquisition and maintenance combined) being \$2m higher than expected. (Hint: assume the expense variation occurs in the same year as the increase in new business in a))

Identify the changes you would expect in the VIF, VNB and ANW and the appraisal value overall if actual lapses were 30% higher than expected at all durations in force.

Solution

- $VIF \text{ on NB} = VNB(@inception) * (1+RDR)^{0.5} + NB \text{ strain}(@ \text{ year end})$
- As this company has been writing business for some time and is established in a niche market a multiple closer to the upper end of this range would be likely, let's say 8 times.
- Thus we can deduce the rough value of 1 year's new business as  $VNB/8 = 72.05/8 = 9.01m$ . Therefore VIF for 1 year of new business =  $9.01 * 1.1^{0.5} + 8 = 17.45$ .
- If new business is 20% higher than expected then VIF after this 1 year of new business is added would be expected to increase by  $20\% * 17.45 = 3.49m$ .
- If new business is 20% higher than expected the VNB would be expected to increase by somewhere between 1 and 1.2 times, depending on the expected



sustainability of the increase. In the absence of information around this a, conservative approach would be to allow a 10% increase, leading to a new VNB of 79.30 (increase of  $79.30 - 72.05 = 7.25$ ).

- Additional reserves for capital are 20% of VIF, currently  $88.91 \times 0.2 = 17.78\text{m}$ .
- The VIF will increase as indicated above, presumably the capital will increase in line with this due to the additional liabilities and the additional assets backing them and these being invested in a manner similar to the current arrangement.
- Thus the capital will increase by  $3.49 \times 0.2 = 0.7\text{m}$ .
- VNW will also be reduced by the 1 year of strain now included in the VIF for this year's NB. Overall change to VNW =  $-0.7 - 8 \times 0.2 = -2.30\text{m}$
- This gives the following new end of year values:

<b>Change in VIF from NB increase</b>	3.49
<b>Change in VNB from NB increase</b>	7.25
<b>Change in ANW from NB increase</b>	-2.30
<b>Plus beginning year AV</b>	169.50
<b>Plus change in AV</b>	19.31
<b>Total</b>	197.25

Expenses \$2m higher than expected:

- Generally initial expenses would be around 20% of premium.
- New business strain would be around 70% to 90% of premium, let's say 80%.
- Thus an increase in new business of 20% above expected would generally result in a corresponding increase in initial expenses of  $20\% \times 20\% \times \$8\text{m} / 80\% = \$400,000$ .
- Thus \$400,000 has been allowed for in a). The remaining \$1.6m is an expense overrun that will affect the VNW.

Lapses 30% higher:

- There will be a lower end of year in force than expected, which will result in a proportionate reduction in the PVFP and thus VIF will reduce.
- VNB will not be affected as the NB strain affects the net worth.
- There will be a lower capital requirement at the end of the year due to the reduced end of year in force.
- ANW is affected by the reduction in capital, which increases the net worth.
- The reduction in VIF would be expected to be greater than the increase in ANW due to the capitalised effect of loss of all future profits from a lower in force at year-end.
- Therefore overall AV will be lower.



- Any subsequent increase in the lapse assumption (given experience) will further decrease the VIF and also reduce the VNB due to the reduction in renewal premium volumes to recover the new business strain.

## Market Consistent Embedded Values

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Embedded values and appraisal values are widely used by European life companies as a means of supplementary financial reporting. For many years, this supplementary information varied by country and, in some cases, by company within a country making it difficult for investors in life companies to compare their relative performance. In October 2009, the "CFO Forum" published a set of Market Consistent Embedded Value (MCEV) principles as a step to improve the consistency and transparency of embedded value reporting. The CFO Forum is a high-level discussion group formed and attended by the Chief Financial Officers of major European listed, and some non-listed, insurance companies. The MCEV principles can be accessed at the CFO Forum website ([www.cfoforum.eu](http://www.cfoforum.eu))

An MCEV consists of:

- free surplus;
- required capital; and
- value of in force business

The required capital consists of shareholder assets whose distribution is restricted (e.g. required to meet regulatory requirements, but may include target surplus). Free surplus consists of the remaining shareholder equity. The value of in force business is the risk-adjusted value of future distributable profits expected to emerge from the policy liabilities.

The value of in force business consists of:

- present value of future shareholder profits (after tax); less
- the time value of financial options and guarantees; less
- frictional costs of required capital; less
- the cost of residual non-hedgeable risks.

The VIF should be valued on a market consistent basis, i.e. valued using discount rates consistent with those that would be used to value such cash flows in the capital markets. Different discount rates might be used for different types of cash flows. For example, if shareholder assets were invested in equities, a higher discount rate would be used to value the best estimate investment returns than if the assets were invested in fixed interest. Alternatively, a simplifying method sometimes used for calculating the VIF on a market consistent basis is to assume that both future investment returns and the discount rate are at the risk free rate.

The present value of future shareholder profits is determined using best estimate assumptions, but excludes the time value of financial options and guarantees.

The time value of financial options and guarantees must be calculated using stochastic techniques. This is a key difference between an MCEV and the "traditional" method discussed earlier in this chapter. The financial options and guarantees include guarantees provided to participating business (e.g. that death and maturity benefits



will not be less than the sum insured and reversionary bonuses, and the surrender values will not be less than the LPS 360 minimum). Under the traditional method, the value of financial options and guarantees would be allowed for by adjusting the risk discount rate. If the guarantees were closer to being “in the money” a higher risk discount would be used. However this adjustment is fairly crude. Financial options and guarantees are asymmetric in nature (i.e. in most scenarios, including the best estimate scenario, the options and guarantees won't come “into the money” and will have zero cost, but in some adverse scenarios they will). A stochastic model is a far more accurate method of measuring the cost of financial options and guarantees.

Frictional costs are defined to be the tax and investment expenses relating to required capital. By investing capital in a life company, shareholders lock-in their capital and become liable for additional tax and investment expenses, compared to the alternative of investing directly in assets similar to those held by the life company. The life company is taxed on its investment income and shareholders are taxed again on their dividends from the life company. Note that if shareholders can use imputation credits to offset their tax liabilities double-taxation is avoided and frictional costs are limited to investment expenses.

Residual non-hedgeable risks are those risks not already allowed for in the value of future shareholder profits or in the time value of financial options and guarantees. Non-hedgeable means that the risks cannot readily be transferred to another party such as a reinsurer or through matching the assets to the liabilities. These risks include operational risks, strategic risk and reputational risk. This tends to be the most subjective part of the valuation but is usually quite significant. The cost of residual non-hedgeable risks might, for example, be allowed for by adding a margin to the discount rate used to determine the present value of future shareholder profits.

An MCEV (in total) should not necessarily be materially different from a traditional embedded value. Both methods have the same objective of determining the economic value of the shareholders' interest in a life company. However the presentation of the components of the embedded value differs and an MCEV uses a more complex method of allowing for risk. It can be useful to use both methods in order to gain greater insights into the value of the business. For this reason, some companies publish both traditional and market consistent embedded values in their market disclosures. The MCEV methodology is particularly useful for valuing life companies with complex or asymmetric risks such as those found in participating business. It tends to be less useful for simpler types of business such as risk insurance business and investment-linked business that do not have financial options or guarantees.

