Setting Profitability Targets
by Colin Priest BEc FIAA

1. Introduction

This paper discusses the effectiveness of some common profitability target measures. In particular I have attempted to create a model for the required return on capital for an Australian insurance company, and subsequently modelled the effects of varying interest rate environments upon commonly used target measures. Some occupations/roles have been given a special meaning within this paper, which may be used in a slightly different way for different company structures, so I will define these:

> **managing director**: the person within the insurance company who can exercise control over each and every aspect of the business
>
> **divisional manager**: a person who controls the expenses, premiums, claims handling, wordings, underwriting guidelines and marketing for some of the insurers' classes of business or distribution channel; a very senior role
>
> **underwriting manager**: a person who controls the premiums, claims handling, wordings and underwriting guidelines for one or more products

2. Criteria for a Good Profitability Target

a) Intelligible / Measurable

If a profitability target is intelligible, then the person who is to use it must understand how their actions can affect it. If a profitability target is measurable, then the numbers and statistics that the person sees must be comparable to that profitability target. For example, if the profitability target is a return on capital and no capital allocation has been made, then the manager cannot measure the actual return on capital. This also means that different styles of target may need to be used for people with different levels of understanding or sophistication with regard to insurance.

A profitability target should tell the manager all that they know about expected results. Different people have different levels of sophistication. When choosing a particular type of target, one should ask "what does this person need to know?".

b) Actionable

Targets may need to change depending upon their users. If a manager controls all underwriting matters, but not the expenses, then it may not be appropriate to give that manager an underwriting result as a profitability target. When some of the target is beyond the control of the user, it gives that person an excuse not to achieve, and may credit them with over-performance that they do not deserve.

c) Robust

A profitability target must be relatively stable over time and circumstances. If this is not possible, then the changes in the profitability target used should reflect easily identifiable and predictable actions. For example, a return on capital target may change if the company receives a large capital injection from its shareholders (from a share float or a parent company deciding to increase the solvency). Business managers need predictable targets to work towards when making their business decisions so that they can make strategic plans. In an environment of uncertainty decisions can become short term. If the targets change frequently or unpredictably they can lose credibility within a company, and managers may make decisions using their own ideas of profitability. Profitability measures should avoid appearing to "change the rules mid game”.

d) Equitable

Different insurances have different characteristics. The profit required from a category of insurance business should reflect its particular characteristics. Cross subsidisation is sometimes the best business decision, but should be deliberate and measured rather than an accident of the profitability measure. Individual profitability targeting allows managers to determine the level of risk due to cross subsidisation and manage it. Within a company, all operation divisions need a level playing field with regard to profitability targets, because divisional managers need to believe that a target is appropriate for them.

3. Return on Capital

A return on capital is the easiest measure for people to understand. It is the profit made divided by the amount of capital invested. This can be an internal amount of capital, or it can be the share price. Both are valid measures, and given stable price / earning ratios will track with one another. There are three main ways to set a return on capital:

1. a fixed percentage per annum
2. related to financial markets eg cash rates, share market
3. a fixed real rate per annum

The advantages of a fixed percentage per annum are that it is simple, and it provides a stable input to the pricing process. However, if the rate is unchanged from year to year, then the resulting target may be unrealistic in any single year. For example, shareholders may set a target of 10% pa return on capital, but if government bonds yield 15% pa in a year, then the shareholders have set too easy a target for the company to achieve. On the other hand, in another year government bonds may yield only 7% pa, and the target return may be beyond the reasonable profit that a competitive market will allow the insurer to price to. The concept of opportunity cost means that the returns for investing in insurance should compensate for the lost opportunities of investing elsewhere. Insurance returns should in some way be related to one or more financial or economic indicators measuring other uses for the investment money.

Under the capital asset pricing model the expected return of a company is related to its market risk (the covariance of its returns with that of the market). That is because investors can diversify away the individual risk of that company. This can be expressed in equation form:

$E_c = R_f + Beta_c \times (R_m - R_f)$

where E_c is the expected return for that company
R_f is the risk free rate of return
$Beta_c$ is a measure of the market risk of that company
R_m is the expected return for the market

The beta term is a measure of how much an asset's return follows changes in the return of the market portfolio. A beta value of 1 means that on average a company's return rises and falls by the same levels as the market returns. A beta value of zero means that the returns of the company are totally independent of the market returns. A beta value greater than 1 means that on average the company's returns move in the same direction as the market, but more so. A beta value less than 0 means that on average the company's returns move the opposite direction to the market. Beta values are calculated as the covariance between the company and the market returns, divided by the variance of the market returns.

Figure 1

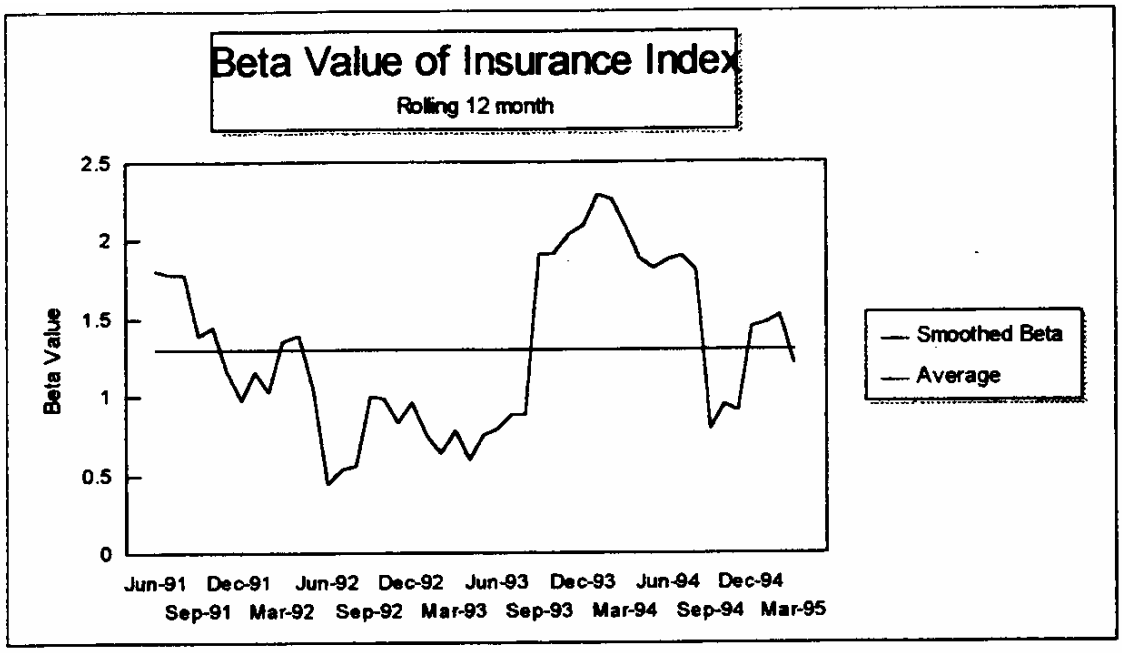


Figure 1 shows the calculated beta for the insurance index on the Australian share market from June 1991 to March 1995. The beta value has been calculated by comparing monthly returns on the insurance accumulation index with the all ordinaries accumulation index, and cash rates at the same point in time. The resulting monthly beta values have then been averaged over 12 months to smooth the result. There is no clear beta value showing from this historical data. The measured beta fluctuates over a wide range. The average beta measure for this period of approximately 1.3 reflects the insurance index achieving higher returns than the all ordinaries over this period. If we believe that the capital asset pricing model is valid (and on historical measures it may not be valid) then the relationship for insurance returns is:

Insurance Return = 1.3 times (All Ords Return less Cash Return)
plus Cash Return

While the historical evidence does not strongly support the application of the capital asset pricing model to insurance returns in Australia, this does not rule out the possibility that insurance returns are related to the all ordinaries index.

Figure 2

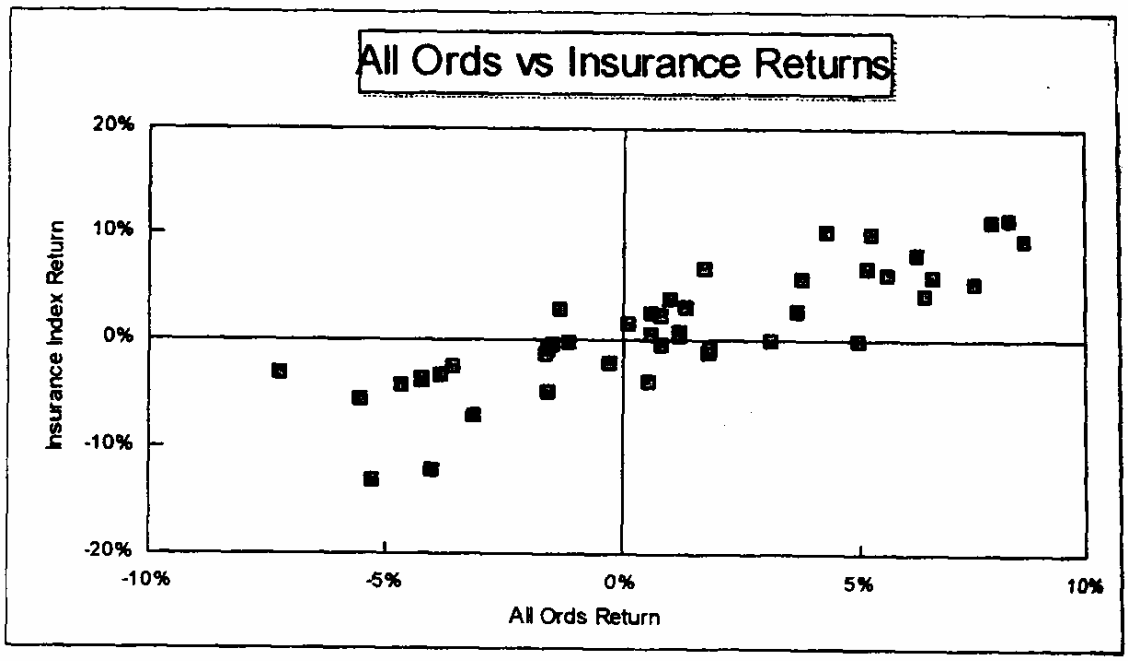


Figure 2 shows the relationship between actual returns on the insurance index versus those on the all ordinaries index for the period January 1992 to September 1995. This graph suggests a high correlation between returns on the all ordinaries and those of the insurance index. If a straight line is fitted using least squares regression, the relationship is:

Insurance Return = 1.15 times All Ords Return + 0.02% per month

Since the value of the constant is less than the standard error, we can take its value to be zero. So the relationship can be simplified to:

Insurance Return = 1.15 times All Ords Return

Another possible benchmark for setting returns on capital is to relate the required return to cash rates. The logic for this is that investors require a premium over cash rates for the extra risk and lower liquidity involved in investing in an insurance company.

Figure 3

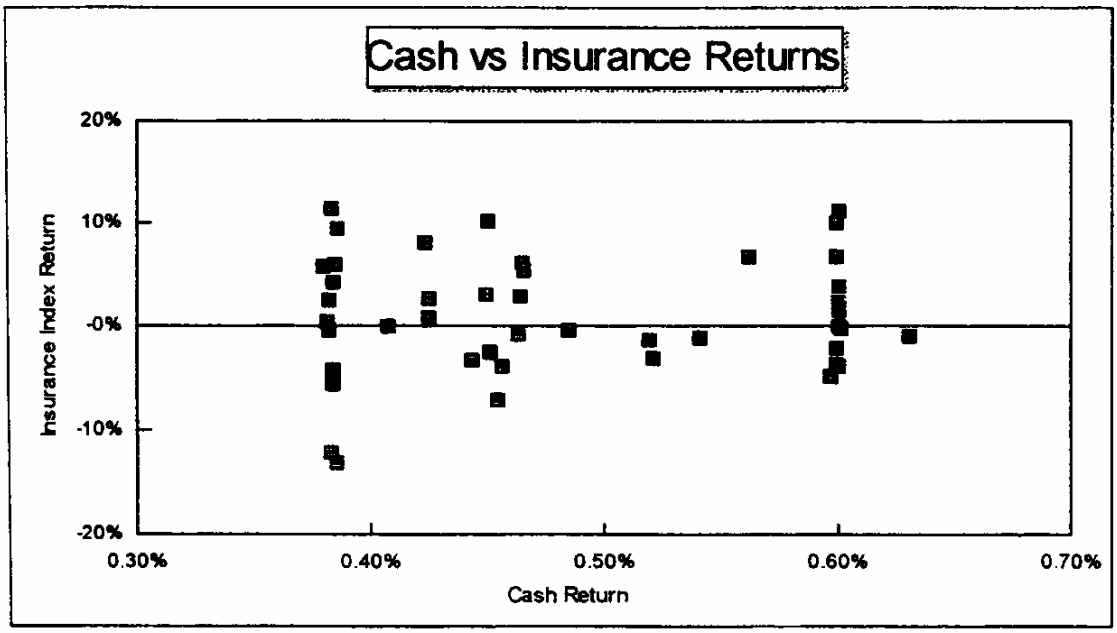


Figure 3 shows the historical relationship between returns on the insurance accumulation index and cash rates for the period January 1992 to September 1995. There does not appear to be a relationship between cash returns and investment returns.

Finally, a return on capital can be set as a real rate of return. The logic for this is that the investor expects to earn sufficient money to have the same purchasing power in the future, plus a margin for the risk of investing.

Figure 4

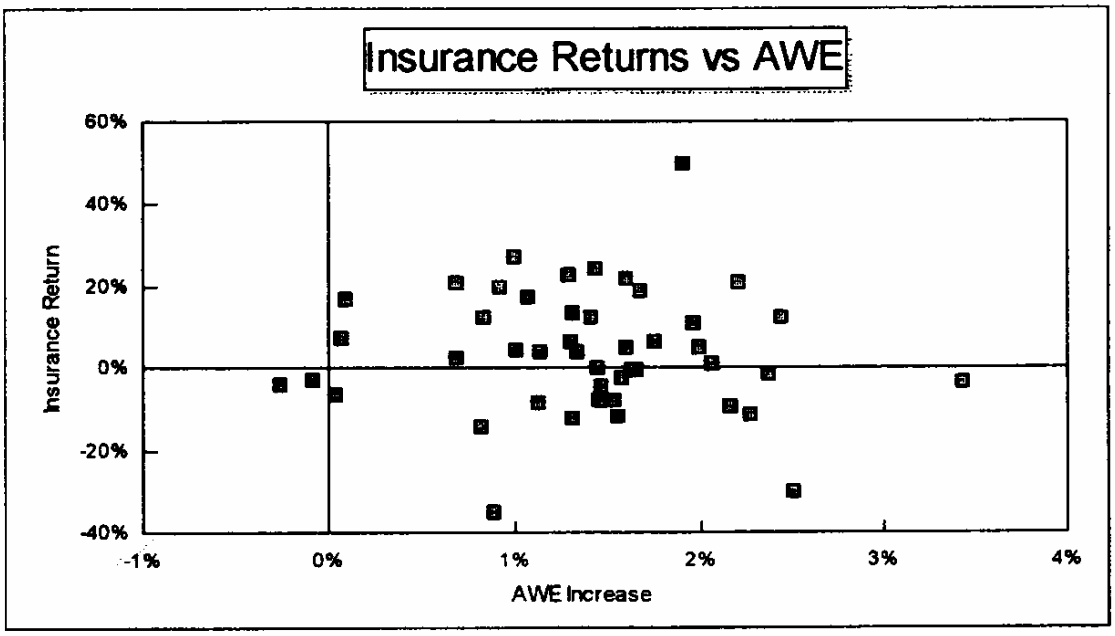


Figure 4 shows the historic relationship between insurance index returns and increases in the average weekly earnings index for the period March 1984 to June 1995. Historically, there has been very little correlation between inflation (as measured by average weekly earnings) and insurance returns.

My analysis compared historical insurance returns with other historical indicators and concluded that the only highly correlated relationship was between insurance returns and all ordinaries returns. This may be true of actual historical results, but does not necessarily translate into profitability expectations for the future. Firstly, actual historical returns may not have any relationship with historical expectations. Secondly, the contents of the insurance index have undergone changes during the measurement period e.g. the float of GIO.

My opinion is that targets of future returns on capital for Australian insurance companies should exceed the expected returns on Australian shares (as measured by the all ordinaries index).

Intelligible/Measurable Test:

This is the most intuitive measure of profitability. Since it is used outside of the insurance industry, non insurance people can understand it. This makes return on capital the natural selection as a target for shareholders to place upon the insurer. Managing directors, divisional managers and underwriting managers will also find this measure easy to understand. An achieved return on capital is easily measurable for an insurer in total, but becomes more difficult to measure for

individual classes of business. A risk based capital allocation must be undertaken so that capital is allocated to each class of business (or each category of however one chooses to measure the profitability of the business). Unlike most of the work carried out on risk based capital to date, the risk based capital process required is one of allocation rather than capital requirements. Risk based capital requirements measure the total amount of capital required to meet a certain level of solvency, whereas risk based capital allocation says the you have a particular amount of capital in total which will not change (during your chosen time horizon) and which you must allocate in total to different sections of the business. Risk based capital allocation can possibly have different parameters and drivers than risk based capital requirements. For instance, risk based capital requirements are sometimes statutory and therefore based only upon measurable factors; risk based capital allocation can include subjective factors e.g. the uncertainty of the cost of New South Wales' compulsory third party business due to incomplete history and a dynamic legal and cultural environment.

The negative of return on capital profitability targets is in the derivation of targets for the future. My analysis has shown that historical insurance profitability is related to share market rather than other economic measures. There is no objective and prospective share market return measure, unlike the bond market. This reduces the objectivity of any relationship of insurance return to share market return, as a subjective assessment must be made of expected share market returns.

Actionable Test:

Shareholders have a very real and immediate control over return on capital. They do this by dividend policy and capital raising. These actions immediately change the amount of capital in the insurer, whereas the insurance profit will not immediately be affected. In doing so they affect the measure of profitability more than the underlying profitability.

The managing director, having full control over the operations of the insurance company, has full control over each controllable input to the return on capital. Return on capital is therefore a complete measure of the profitability of business managed by the managing director, and appropriate to the level of control able to be exercised.

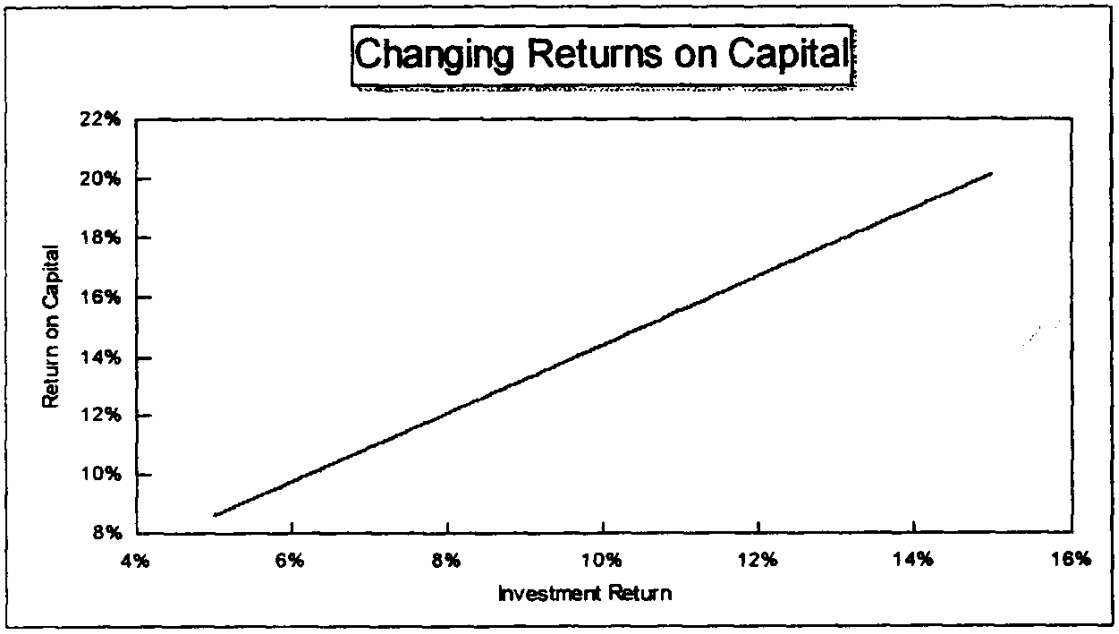
The divisional manager does not control investment policy. Investment policy can have dramatic affects upon the general insurance profit of a book of business, even for short tail business (the one exception which comes to mind is travel insurance, with an average risk period of 1 month, and credit terms to agents of 1 month, producing negligible technical reserves to invest). Because of this lack of control it could seem that the divisional manager should not usually be held responsible for the return on capital. Even if the insurer's investment practice is

one of matching to liabilities (which would provide a predictable return for the divisional manager), there is still the matter of the investment practice for the capital, which will produce neither predictable returns nor is it under the control of the divisional manager. Similarly the underwriting manager is far removed from investment practice, and it would be inappropriate to hold an underwriting manager responsible for return on capital.

Robustness Test:

The shareholder of an insurance company has invested money with the expectation of earning a return on that money. The return on capital for investing in insurance should therefore change when there are changes in financial markets. Figure 5 shows possible changes in return on capital for changes in cash rates.

Figure 5



I have used the relationship that insurance rate of return is 1.15 times the share market rate of return, and assumed that the share market rate of return is 2.5% pa higher than the investment rate earned on technical reserves. From this it can be seen that return on capital requirements should change dramatically with changes in interest rates. Therefore a nominal rate of return target will not be robust. However, if the rate of return target is set as a function of interest rates, a robust measure can be created.

Equitableness Test:

The equitableness of returns on capital depends considerably upon the equitableness of capital allocation within a company. As an aside, if a foreign company owns an Australian insurance company, then the insurer's return on capital target should be related to Australian market conditions to be equitable. This is because the insurer must operate within an Australian pricing environment, and achieve investment returns from the Australian investment market. As the insurance market is very competitive, the profits which are achievable will be related to those of other Australian insurers. If the overseas parent company thinks that the profit returns are too low for the capital investment, then it should sell the insurer which will sell at a higher price due to a lower discount rate than the parent company would value the company on its own discount rate.

Conclusion:

Return on capital is the most appropriate measure for shareholders to set, and for managing directors to be accountable. The return on capital targets for Australian insurers should exceed expected returns from the share market.

4. General Insurance Result

The general insurance result is:

Earned Premiums
less Incurred Claims
less Commission
less Expenses
less Reinsurance
plus Investment Earnings on Insurance Cash Flow

It is different to return on capital because it excludes investment income on capital. It can be thought of as that part of the profit that an insurer makes because it transacts insurance rather than just investing its capital.

Appendix A lists two models - one of a short tail product and one of a long tail product. These models illustrate that different classes of business can achieve different general insurance results for the same return on capital.

Table 1

	Short Tail Product		Long Tail Product	
	Undiscounted	Discounted	Undiscounted	Discounted
Loss Ratio	47.50%	44.20%	115.10%	53.30%
Claims Handling Expenses	4.50%	4.20%	8.50%	4.20%
Acquisition Expenses	15.00%	14.70%	13.00%	12.60%
Commission	15.00%	15.00%	4.50%	4.50%
Reinsurance	17.00%	17.00%	6.00%	6.00%
Combined Ratio	99.00%	95.10%	147.10%	80.60%
Interest (vs. Premium)	3.90%	NA	60.00%	NA
General Insurance Result	4.90%	4.90%	12.90%	19.40%

Table 1 shows the benchmark ratios for these two classes for an investment return of 8% pa, and a return on capital of 12% pa. As the table shows, general insurance results can be measured on both a discounted basis and an undiscounted basis.

Intelligible / Measurable Test:

The general insurance result measure is a specialist measure used only in insurance. It will not always be understood by shareholders, and is therefore unlikely to set as a measure by shareholders unless the shares are owned by another insurance company. Senior management of insurance companies generally use this measure, and so will understand it, but the incidence of use and understanding is likely to reduce as the seniority of the employee reduces.

The components of the general insurance result are readily available from accounting data. It is therefore very easy to measure historically. The components of the general insurance result are easily modelled, and prospective investment expectations can be taken from yield curves. So the general insurance result is quite suitable to set prospectively.

Actionable Test:

Because general insurance results only measure some of the insurer's activities, they are not appropriate for shareholders to set or for managing directors to be held accountable, unless there are additional targets for investment return on capital (in which case it would be simpler to set a return on capital target). They can, however, be very appropriate for divisional managers, especially when the insurer's investment practice is one of matching liabilities. In cases of broad mismatching, investment returns on technical reserves may be both unpredictable and beyond the control of the divisional manager. When this is so, it may be more appropriate for a general insurance result with notional

investment income (from a theoretically matched portfolio) to be given as a target for the divisional manager. The underwriting manager does not control a significant proportion of the factors causing the general insurance result, and so should not be given a general insurance result as a target.

Robustness Test:

The models in Appendix A have been used to examine the effect of different interest rates upon target general insurance results, both discounted and undiscounted.

Figure 6

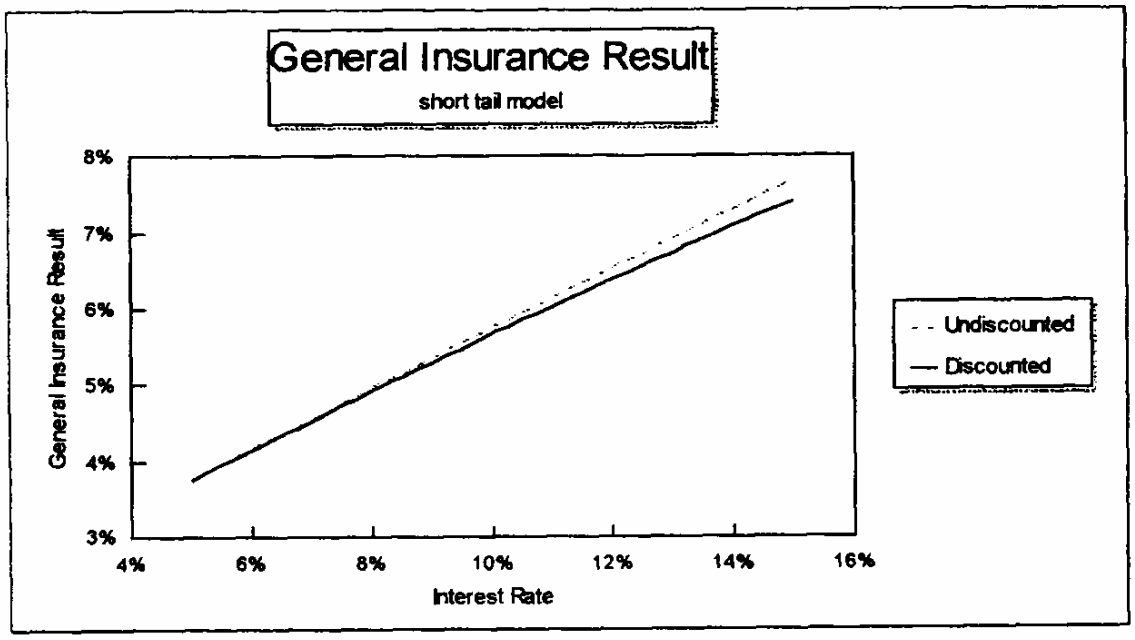
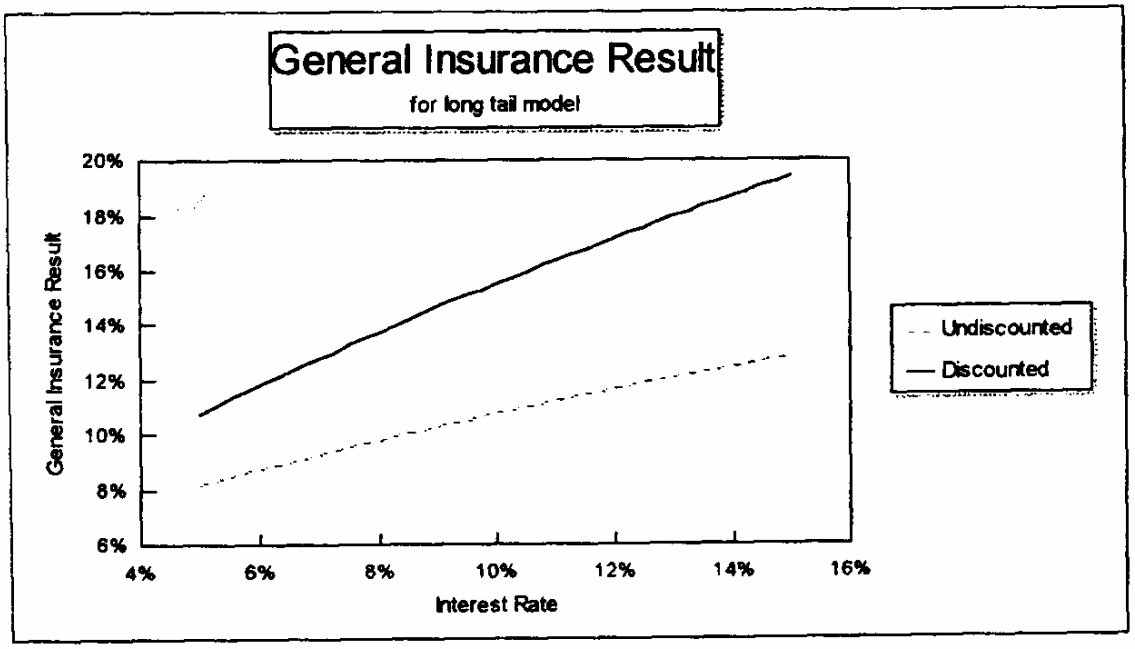


Figure 7



Figures 6 and 7 show the relative effects of changes in interest rates (and associated changes in return on capital) upon general insurance result targets. The relative robustness of undiscounted and discounted general insurance results is different for short tail and long tail business. For short tail business the discounted and undiscounted targets are relatively similar, with the discounted target showing slightly less variation. However, for long tail business the undiscounted general insurance result target shows considerably less variation for interest rate changes. It must be remembered however, that undiscounted general insurance results are not robust on an accounting year basis for different levels of written premium growth, as they distort the timing of profits.

Equitableness Test:

It is imperative that general insurance result targets be the result of modelling for various classes of business if there is to be equity. Different classes of business should have vastly different general insurance results. It is not appropriate to set a general insurance result target for a company that is experiencing a change in its mix of business, especially if the balance and short tail and long tail classes is changing. Different classes of business should be compared against their general insurance result targets rather than comparing the general insurance results of different classes.

Conclusion:

General insurance result targets are appropriate for divisional managers where there is little mismatching between investments and liabilities. For long tail business, undiscounted general insurance results vary less for interest rate changes, but should only measure the result for accident or underwriting years rather than for accounting years.

5. Combined Ratio / Underwriting Result

The underwriting result is:

Earned Premiums
less Incurred Claims
less Commission
less Expenses
less Reinsurance

The combined ratio is:

Incurred Claims
plus Commission

plus Expenses
plus Reinsurance
all divided by Earned Premiums

The combined ratio and underwriting result measure exactly the same thing, but express it in slightly different ways. For the rest of this section I will simply refer to the combined ratio. The combined ratio ignores all effects of investment earnings. Table 1 in the previous section shows some sample combined ratios.

Intelligible / Measurable Test:

Combined ratios are easier to understand than general insurance results. They are simply the profit without any investment earnings. The data to calculate combined ratios is readily available from accounting data and are therefore easy to measure historically. Combined ratios and the component ratios making them up are commonly used within insurance companies. While many people would not know how to calculate a combined ratio from first principles (e.g. how to earn premium) they will still be able to read and understand their implications. The components of a combined ratio are easy to model. So a combined ratio is quite suitable to target prospectively.

Actionable Test:

Combined ratios only measure a subsection of the profit of an insurer. For this reason they are not appropriate measures for shareholders to set, and appropriate targets for managing directors to meet, unless additional targets for other components of profit are set. They can be appropriate for divisional managers where there is considerable mismatching between assets and liabilities, and where the divisional manager has no control over investment decisions. In such a case, the combined ratio measures the total results of the decision making areas of the divisional manager. Like the general insurance result, combined ratios are not appropriate targets for underwriting managers, as they measure more than the manager's area of control.

Robustness Test:

The models in Appendix A have been used to examine the effect of different interest rates upon the target combined ratios, both discounted and undiscounted.

Figure 8

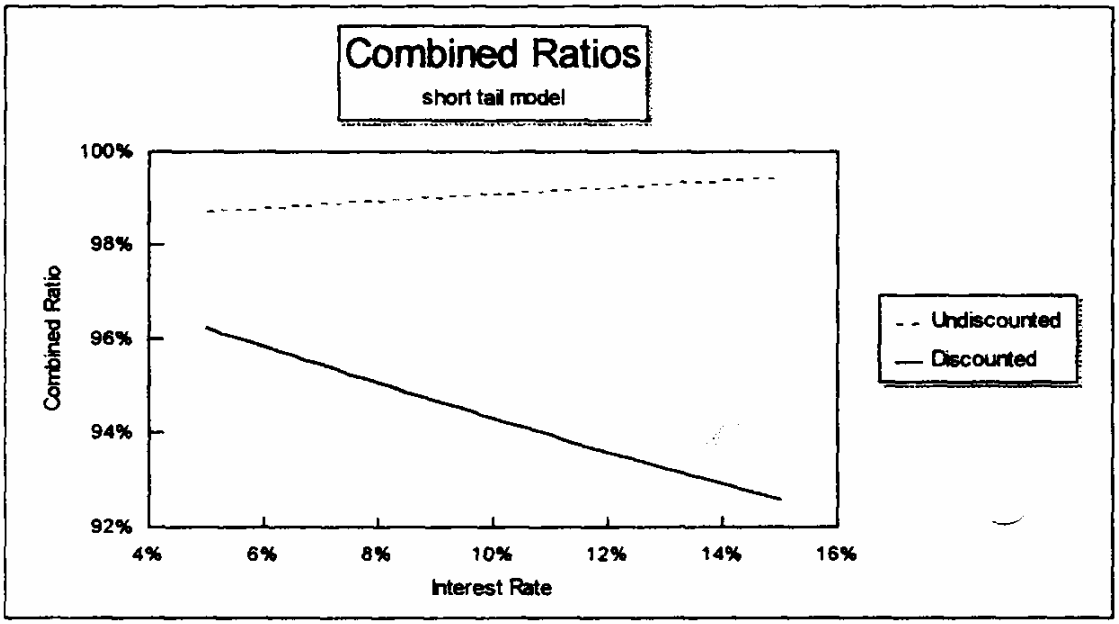
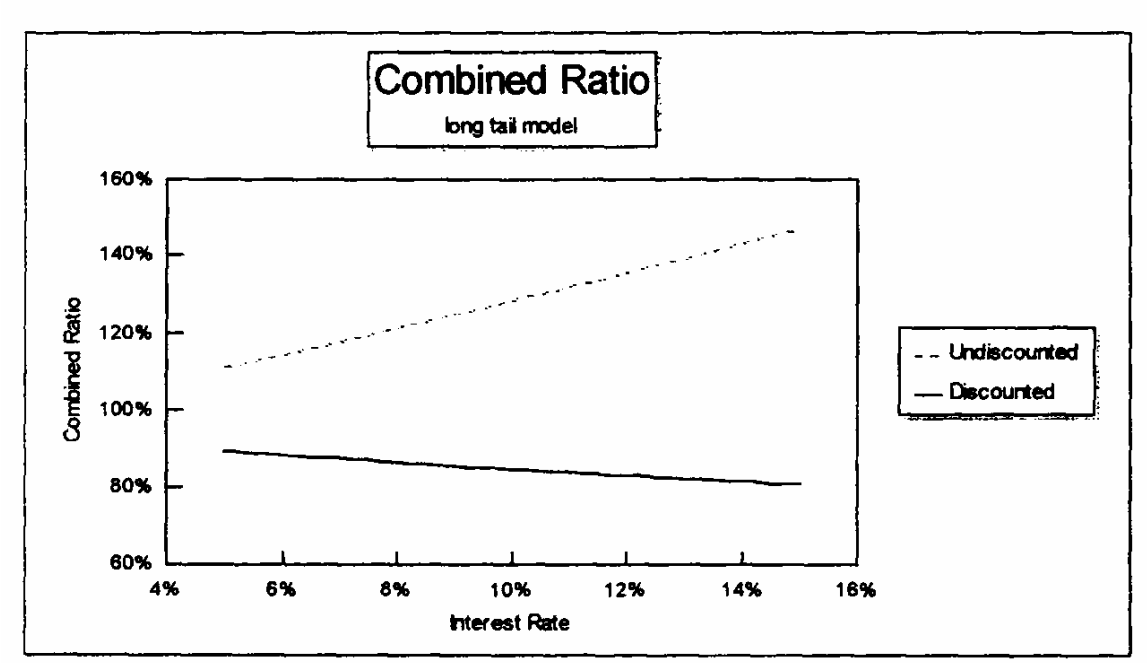

Combined Ratios
short tail model
100%
98%
96%
94%
92%
Combined Ratio
4%
6%
8%
10%
12%
14%
16%
Interest Rate
Undiscounted
Discounted

Figure 9



Figures 8 and 9 show the relative effects of changes in interest rates (and associated changes in return on capital) upon combined ratio targets. The relative robustness for long tail and short tail are opposite. For short tail business, the undiscounted combined ratio remains relatively unchanged for different interest rates. However, for long tail business, the more stable

target is the discounted combined ratio.

Equitableness Test:

Like general insurance results, combined ratio targets should be modelled for individual classes if there is to be equity. Different classes of business have vastly different combined ratio targets. It is not appropriate to set a combined ratio target for a company that is experiencing a change in its mix of business, especially if the balance of short tail and long tail classes is changing. Classes of business should be compared against their individual combined ratio targets rather than against the combined ratios of other classes of business.

Conclusion:

Combined ratios can be the most appropriate profitability target for divisional managers where there is considerable mismatching between assets and liabilities. For short tail business, undiscounted loss ratios are the most stable

targets, while for long tail business discounted loss ratios are the most stable targets.

6. Loss Ratio

The loss ratio is:

Incurred Claims
divided by Earned Premium

Table 1 shows some benchmark loss ratios for a long tail product and a short tail product.

Intelligible / Measurable Test:

The loss ratio is fairly intuitive to read - the proportion of premiums which are being used to pay for claims. The data to calculate loss ratios is readily available from accounting data and are therefore easy to measure historically. Loss ratios are commonly used within insurance companies. While many people would not know to calculate a loss ratio from first principles (e.g. how to earn premium) they will still be able to read and understand their implications.

The components of a loss ratio are easy to model. So a loss ratio is quite suitable to target prospectively.

Actionable Test:

The loss ratio is a very specific measure, and therefore would rarely be the only profitability measure used. It may be most appropriately used for the underwriting manager, as it covers the results of the underwriting manager's decision making areas. In the case of an intermediary based insurer, it may be incomplete as a measure for the underwriting manager, and may need to be combined with commission ratio. This is because intermediary based companies often charge different premium rates for different commission rates, to maintain a fixed premium net of commission. In such a case the effect of different commission rates can have quite an effect upon the required loss ratio.

Robustness Test:

Figure 10

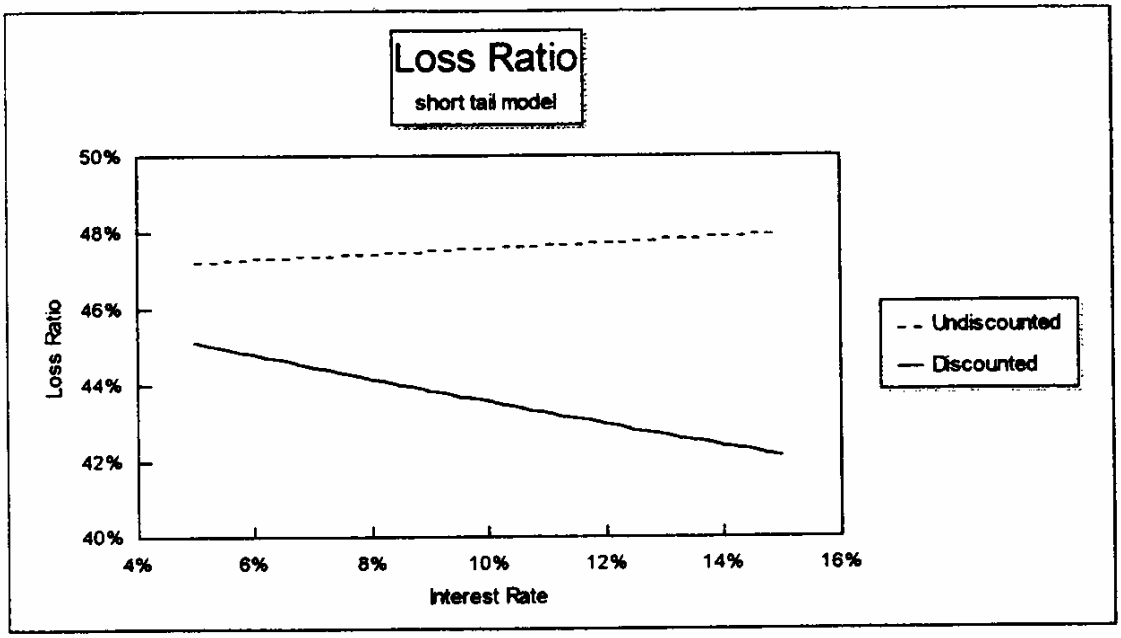
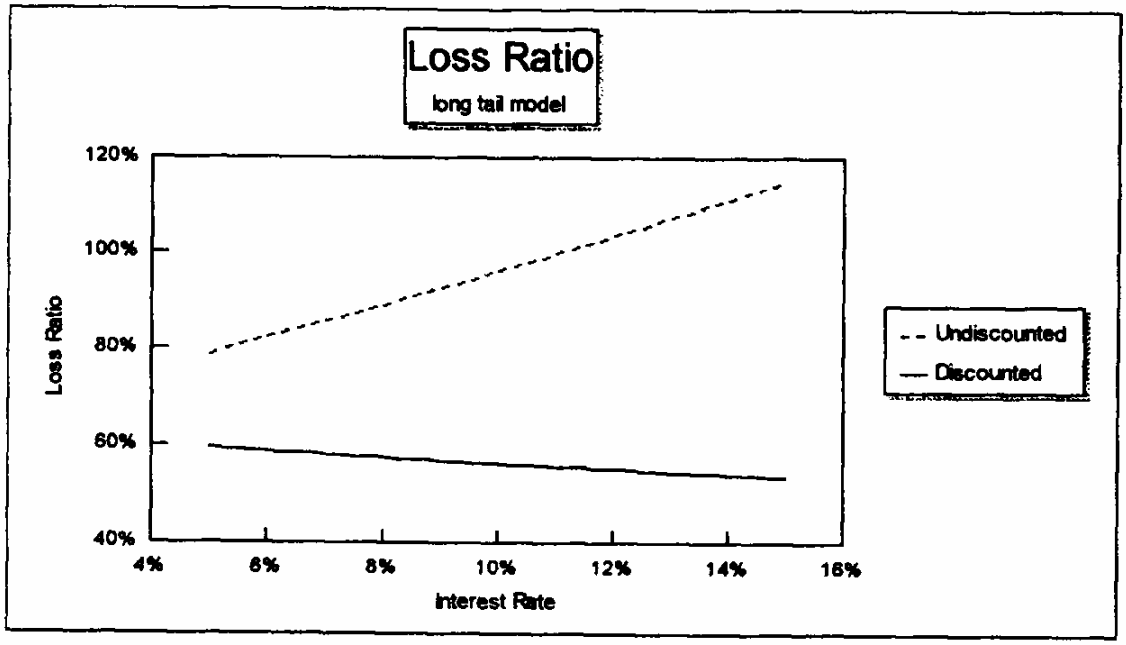


Figure 11



Figures 10 and 11 show the relative effects of changes in interest rates (and associated changes in return on capital) upon loss ratio targets. For short tail

business the undiscounted loss ratio target shows negligible change for different interest rates. However, for long tail business the discounted loss ratio is the more stable target for varying interest rates. Long tail business can be subject to substantial movements in prior year claim reserves and for this reason loss ratio targets should be on an accident or underwriting year basis.

Equitableness Test:

Loss ratio targets for different classes of business can differ by an order of magnitude. It is imperative that loss ratio targets consider the mix of classes of business and commission rates and changes in these factors will change the required target ratio.

Conclusion:

Loss ratio targets in combination with commission rate targets are appropriate for underwriting managers. For short tail business undiscounted loss ratios are the most stable for changing interest rates, as the extra investment earnings approximately balance the higher return on capital requirements. For long tail business the discounted loss ratio is the more stable over a range of interest rates, but the discounted loss ratio target will still need to be changed as interest rates change.

Appendix A: Short Tail and Long Tail Benchmark Models

1. Short Tail Assumptions

Claims Handling Expenses	4.50%	of premium, paid in the same timing as claims payments
Acquisition Expenses	15.00%	half when premium is written, remainder as premium is earned
Commission	15.00%	written premium
Reinsurance	17.00%	written premium
Tax Rate	36.00%	
Credit Terms	30	days
Capital Allocation	30%	unearned premium
	13%	outstanding claims (central estimate)

Quarter	Claim Payment
1	6.85%
2	18.51%
3	22.46%
4	23.59%
5	17.24%
6	5.89%
7	2.10%
8	1.08%
9	0.63%
10	0.39%
11	0.28%
12	0.19%
13	0.15%
14	0.11%
15	0.08%
16	0.08%
17	0.08%
18	0.07%
19	0.07%
20	0.07%
21	0.05%
22	0.03%
23	0.02%

2. Long Tail Assumptions

Claims Handling Expenses	8.50%	of premium, paid in the same timing as claims payments
Acquisition Expenses	13.00%	half when premium is written, remainder as premium is earned
Commission	4.50%	written premium
Reinsurance	6.00%	written premium
Tax Rate	36.00%	
Credit Terms	0	days
Capital Allocation	36%	unearned premium
	23%	outstanding claims (central estimate)

Quarter	Claim Payment
1	0.43%
2	0.87%
3	2.76%
4	4.65%
5	6.90%
6	9.16%
7	8.60%
8	8.04%
9	6.96%
10	5.88%
11	5.69%
12	5.51%
13	4.95%
14	4.40%
15	3.92%
16	3.43%
17	3.02%
18	2.61%
19	2.45%
20	2.28%
21	1.57%
22	0.85%
23	0.72%
24	0.59%
25	0.52%
26	0.45%
27	0.41%
28	0.37%
29	0.33%
30	0.30%
31	0.25%
32	0.21%
33	0.17%
34	0.13%

35	0.13%
36	0.12%
37	0.12%
38	0.12%
39	0.07%
40	0.02%
41	0.01%
42	0.00%

3. Return on Capital

Return on Capital = 1.15 times (Investment Return + 2.5% pa)