Investment Strategy

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• Brian White

Workshop Overview

• Current strategies: rationale
• Capital structure to maximise value
• Effect of investment strategy on cost of capital
• Joint optimisation of capital and investment
• Impact of recent tax changes
Rainbow of Modelling Tools

Red tools:
- Deterministic assumptions
- Fixed risk discount rate (aka “cost of capital”)

Amber tools:
- Stochastic assumptions
- Fixed discount rate (“cost of capital set by the board”)

Green tools:
- Stochastic assumptions
- Risk sensitive discount rates (“use financial economics”)

Questions to Answer

- What is the effect of
  - Investment strategy
  - Capital strategy

- On
  - Cost of capital
  - Company value

- Unashamedly shareholder focused

Investment Strategy: Preview

Optimal strategy for amber model: as found by classical ALM
Appraisal Model

Initial net assets: $K_0$

- Premium income
- less claims
- less expenses (inc tax)
- plus income on tech prov
- less increase in tech prov

\[ \{ m \} \]

Income on shareholder funds $eK_0$

less dividend paid $m + (e-g)K_0$

Retained profit $gK_0$

Net assets carried forward: $(1+g)K_0$

Illustrative Example

- Profit $m = 50$
  - Statutory, excluding income on locked out assets
- Capital $K_0 = 200$
  - Amount held in excess of regulatory requirements
- Earned rate $e = 3\%$
- Growth $g = 1\%$
- Discount rate $i = 8\%$
- Value Added = 570
- PV dividends = $200 + 570 = 770$

Current Strategies - Rationale

Effect of investment policy on RBC requirement and expected returns

Source: RSA q3 2001 analysts' presentation
Stochastic Model (period #1)

Level of capital

$K_0$  

$(1+g)K_0$

Pay dividend

Raise capital

Company fails: No more dividends ever!

Decisions – Initial Capital

Initial capital

Value added

Impairment effect

Effect of locking-in

Optimal capital: Unconstrained optimum
No arbitrary percentile: This is genuine economic capital

Risk Discount Rates

Risk discount rate

Decreasing marginal capital cost: So green model has higher optimal capital

Red model needs higher discount rate To factor in implicit risk of failure
Investment and Capital Cost

- Equity investment increases expected profits, but in the green model also increases the cost of capital.

Investment Strategy

- Optimal strategy for amber model: as found by classical ALM.

Optimal Capital as f(Risk)

- Even in the absence of pressure from regulators, rating agencies etc., insurers have an incentive to allocate capital resources sensitive to risk.

- Deterministic model: no capital required.
Conclusions

- Increasing use of stochastic models to answer investment and capital questions
  - Our model was simple, but more complex and realistic models fall into the same three-way split

- Broad agreement on capital answers, if not on methodology
- Investment strategy depends mostly on assumptions driving cost of capital
  - And not much on liability structures
  - Economic frameworks (FE / actuarial) vital
Questions for Discussion

- How is your company’s investment strategy articulated? How to justify equity holdings?
- If you’re sceptical about the FE, is it sound to suppose that business risk decisions don’t affect the returns that shareholder’s require?
- Would you like to see more about the model?
- Comments, observations on the relative merits of the approaches we’ve outlined

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Appendix: The Model

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Dividend Discount

- Time 1 dividend = \( m + (e - g)K_0 \)
  - Grows at rate \( g \)
  - Discount at rate \( i \) (rdr = risk discount rate)
- Present value = \( [m + (e - g)K_0] / (i - g) \)
  - \( = K_0 + \) value added
  - Value added \( [ m - (i - e)K_0] / (i - g) \)
    call this “A”

“Value Based” Presentation

- Transformation of traditional DCF
- ROC (return on capital)
  - \( = \) profit / net assets at year start
- Cost of capital = risk discount rate
  - \( A = K_0 \ast \frac{(ROC - i)}{(i - g)} \)

Stochastic Toy Model

Initial net assets: \( K_0 \)

\[
\begin{align*}
\text{Premium income} & - \text{less claims} \\
\text{less expenses (inc tax)} & - \text{inc in tech prov} \\
\text{plus income on tech prov} & \\
\text{Income on shareholder funds} & - \text{less dividend paid} \\
\text{Retained profit} & \\
\text{Net assets carried forward:} &
\end{align*}
\]

\[
X \sim N[m, s^2] \\
\frac{eK_0}{gK_0} \\
X + (e - g)K_0 \\
(1 + g)K_0
\]
Revised Value Added
- Allowing for Risk of Failure

\[ A = \frac{m - mK(d) + s\phi(d)}{(i - e) + (1 + e)K(d)} \]

\[ d = \frac{-1}{s}(1 + e)K - m \]

Note: as \( s \) tends to zero, we recover the deterministic result:

\[ A = \frac{m - (i - e)K}{i - g} \]

This is still a discounted cash flow formula, discounting mean dividends at the chosen discount rate – allowing for the probability of corporate failure and the option to default.

Illustrative Example

- Profit \( X \sim N[50, 100] \)
- Capital \( K_0 = 200 \)
- Earned rate \( e = 3\% \)
- Growth \( g = 1\% \)
- Discount rate \( i = 7.63\% \) (was 8\%)

- Smaller because now model failure risk explicitly
- Default option smaller than goodwill loss on failure
- Value Added = 570
- PV dividends = 200 + 570 = 770 (as before)

Capital Market Pricing

Risk neutral valuation:

\[ A = \frac{m_{\text{eq}} - m_{\text{eq}}K(d) + s\phi(d)}{i_{\text{eq}} - g + (1 + g)K(d)} \]

\[ d = \frac{-1}{s}(1 + e)K - m_{\text{eq}} \]

\[ m_{\text{eq}} = m - \gamma \psi s \]

Equivalently, can use unadjusted \( m \) together with discount rate \( i \) adjusted for risk. We do this adjustment by choosing the risk discount rates where our two calculations agree.
Illustrative Example (RN)

- Profit $X \sim N[50, 100]
  - 60% correlation with equity market
- Equity risk premium 4%, volatility 20%
  - Risk neutral mean = $50 - 60\% \times \frac{4}{20} \times 100 = 38$
- Capital $K_0 = 200$
- Earned rate $e = 3\%$
- Growth $g = 1\%$
- Discount rate $i = 5.93\%$
  - $i$ is risk free rate
- Value Added = 570
- PV dividends = $200 + 570 = 770$

Illustrative Example (risk adj)

- Profit $X \sim N[50, 100]$
- Capital $K_0 = 200$
- Earned rate $e = 3\%$
- Growth $g = 1\%$
- Discount rate $i = 7.63\%$
  - Same as for amber model
  - Back solved in this case, but not fixed
- Value Added = 570
- PV dividends = $200 + 570 = 770$

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