Investment Strategy

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- Roger Boulton
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- Alpesh Shah
- Gary Wells
- 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”)

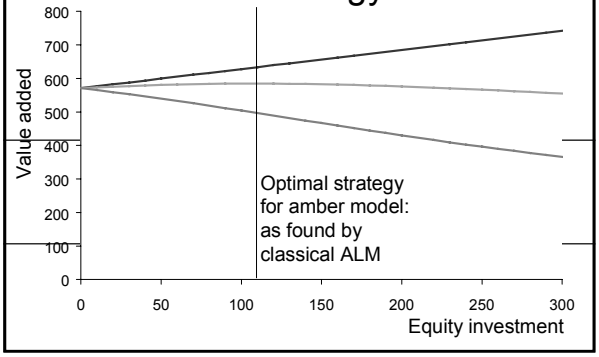
Amber tools:
- Stochastic assumptions
- fixed discount rate (“cost of capital set by the board”)

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



Appraisal Model

Initial net assets: K_0

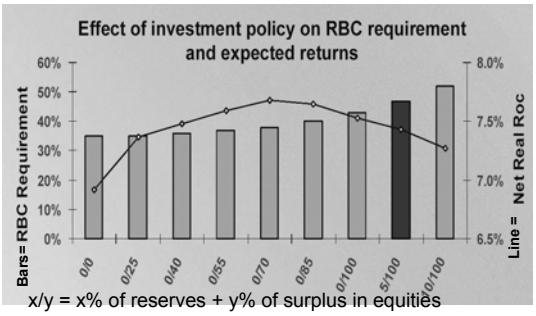
Premium income *less* claims *less* expenses (inc tax) *plus* income on tech prov *less* increase in tech prov	}	m
Income on shareholder funds		eK_0
less dividend paid		$m + (e\text{-}g)K_0$
Retained profit		gK_0

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

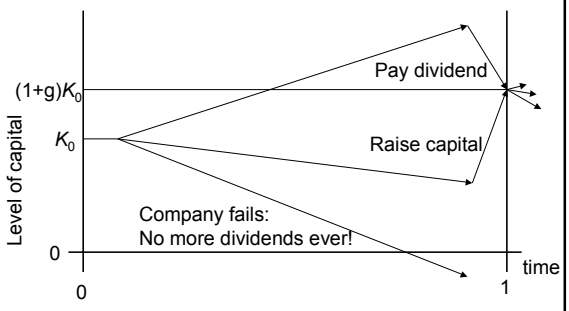
Current Strategies - Rationale



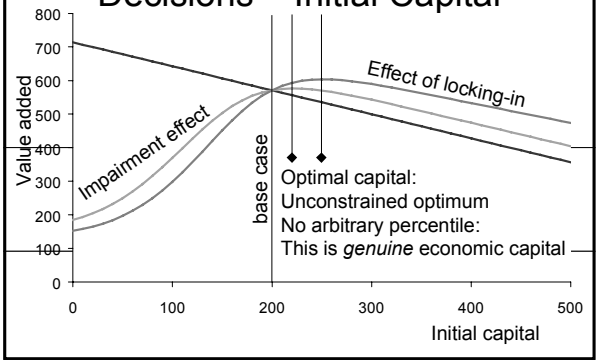
x/y = x% of reserves + y% of surplus in equities

Source: RSA q3 2001 analysts' presentation

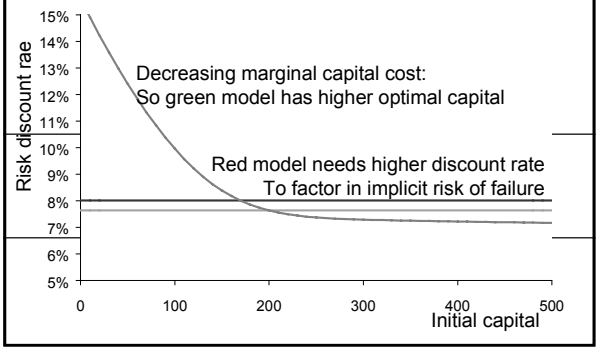
Stochastic Model (period #1)



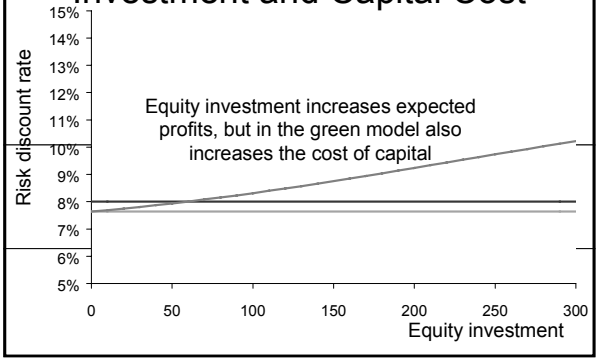
Decisions – Initial Capital



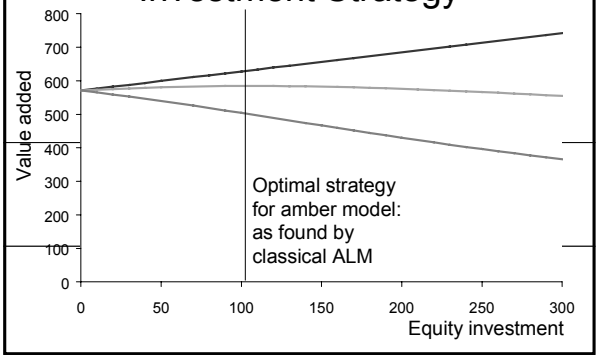
Risk Discount Rates



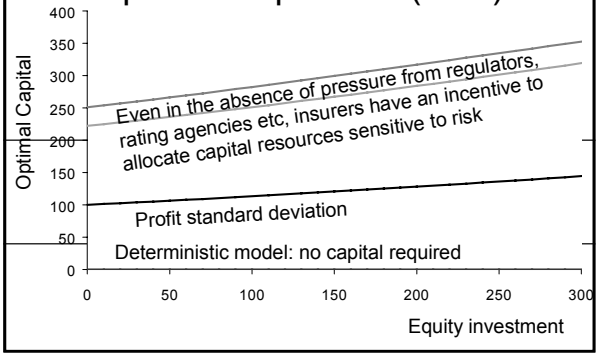
Investment and Capital Cost



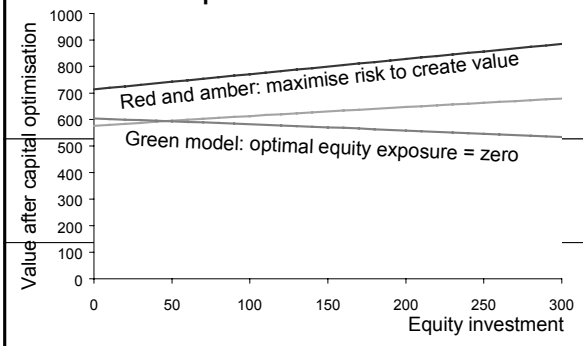
Investment Strategy



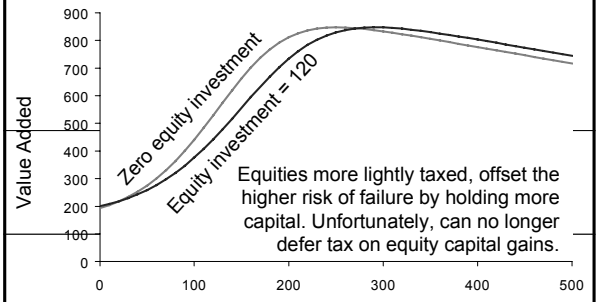
Optimal Capital as f(Risk)



Best Capital and Investment



If Equity Tax Effect = 1.2% pa



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
  - $A = K_0 * (ROC - i) / (i - g)$

Stochastic Toy Model

Initial net assets:	K_0
Premium income *less* claims *less* expenses (inc tax) *plus* income on tech prov *less* increase in tech prov	$X \sim N[m,s^2]$
Income on shareholder funds	eK_0
less dividend paid	$X + (e\text{-}g)K_0$
Retained profit	gK_0
Net assets carried forward:	$(1+g)K_0$

Revised Value Added - Allowing for Risk of Failure

$$A = \frac{\left\{\begin{matrix} m - m\Phi(d) + s\phi(d) \\ -\left[(i-e) + (1+e)\Phi(d)\right]K \end{matrix}\right\}}{i - g + (1+g)\Phi(d)}$$

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

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 ~ 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:

$$A = \frac{\left\{\begin{matrix} m_{RN} - m_{RN}\Phi(d) + s\phi(d) \\ -\left[(i_{RF} - e) + (1+e)\Phi(d)\right]K \end{matrix}\right\}}{i_{RF} - g + (1+g)\Phi(d)}$$

$$d = \frac{-(1+e)K - m_{RN}}{s}$$

$$m_{RN} = m - \gamma\rho s$$

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 ~ N[50, 100]
  - 60% correlation with equity market
- Equity risk premium 4%, volatility 20%
  - Risk neutral mean = 50 – 60% * 4/20 * 100 = 38
- Capital K_0 = 200
- Earned rate e = 3%
- Growth g = 1%
- Discount rate i = 5.93%
  - ie risk free rate
- Value Added = 570
- PV dividends = 200 + 570 = 770

Illustrative Example (risk adj)

- Profit X ~ 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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