

Estimating the cost of capital during periods of financial crisis

Stephen Gray
UQ Business School

rence, Melbourne

Why and how do we estimate the cost of capital during “normal” times?

Why estimate the weighted average cost of capital (WACC)?

- Used as the discount rate in discounted cash flow valuations:
 - Extensively used by companies assessing new projects;
 - Used in independent expert valuation reports whenever DCF valuations are used;
 - Used in DCF calculations for impairment testing purposes.
- Used as the estimate of “fair” return for hundreds of billions of dollars of regulated infrastructure assets.
- Used as benchmark for some performance measurement and executive bonus schemes.

How is WACC usually estimated?

- Weighted average of:
 - Required return on debt; and
 - Required return on equity.
- Standard Capital Asset Pricing Model is used to estimate the required return on equity by the vast majority of:
 - Firms;
 - Independent experts; and
 - Economic regulators (ACCC, AER, State regulators).
- Requires estimates of:
 - Risk-free rate; $r_e = r_f + \beta MRP$
 - Beta;
 - Market risk premium.

Source:

Truong, Giang, Graham Partington and Maurice Peat, 2008, “Cost-of-capital estimation and capital-budgeting practice in Australia,” *Australian Journal of Management*, 33 (1), 95 – 121.

Graham, John and Campbell Harvey, 2001, “The theory and practice of corporate finance: Evidence from the field,” *Journal of Financial Economics*, 60, 187 – 243.

But if we apply the common practice...we get nonsense

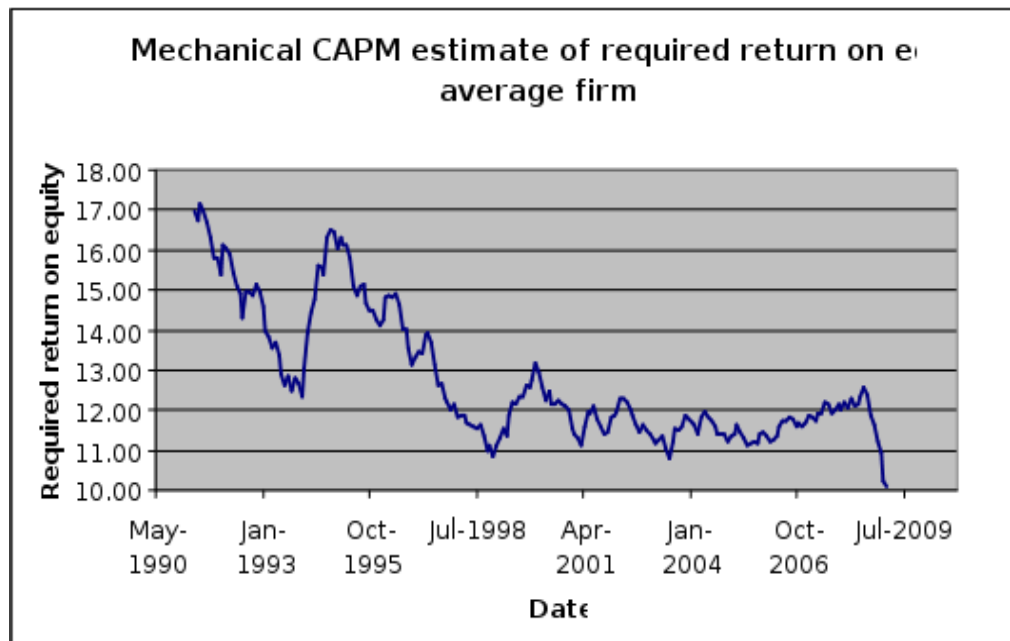
Standard mechanical implementation of CAPM...

- In corporate project evaluation and regulatory return exercises, it is common to:
 - Estimate risk-free rate as the yield on 10-year Commonwealth Government Securities (CGS); and
 - Estimate market risk premium as 6%.

Source:
 Truong, Giang, Graham Partington and Maurice Peat, 2008, "Cost-of-capital estimation and capital-budgeting practice in Australia," *Australian Journal of Management*, 33 (1), 95 – 121.

MRP	
Value	Proportion (%)
3 – 5%	11
5 – 5.5%	11
6%	47
6.5 – 7%	18
7 – 8%	8
other	5

...leads to nonsensical results

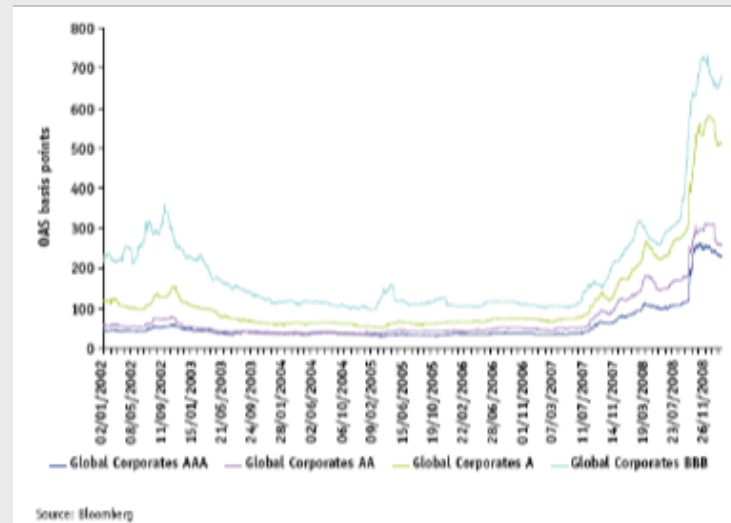


Symptoms of a global financial crisis

Global stock markets tank



Corporate bond spreads blow out



Mortgage default rates skyrocket



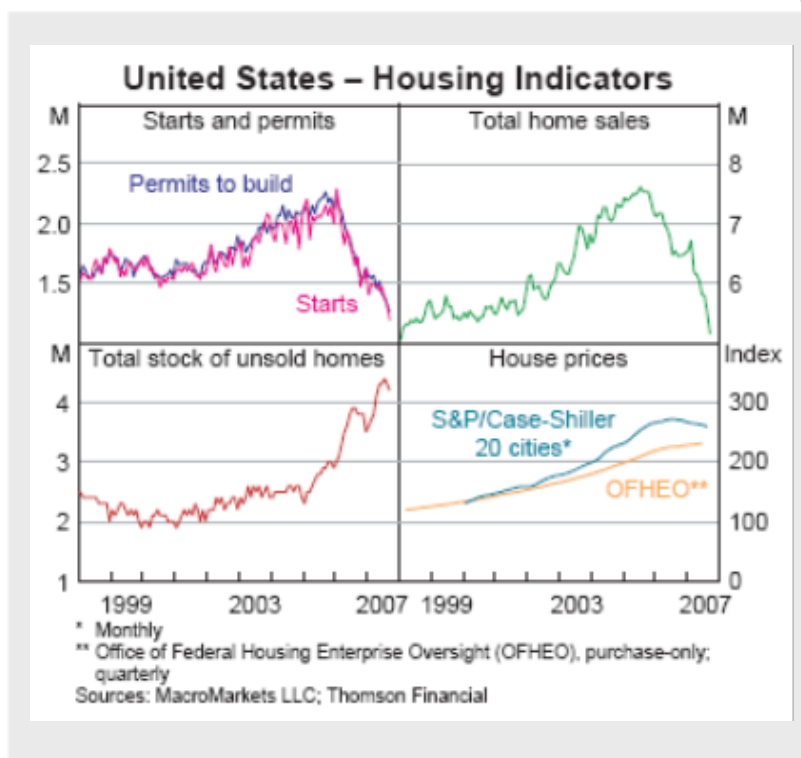
Source: CBA
Spectrum

Symptoms of a global financial crisis

Property values plummet



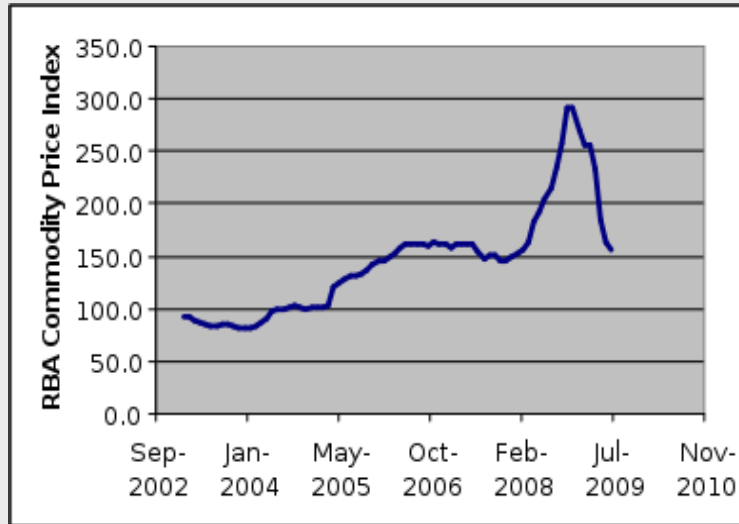
Residential home market seizes up



URINGTHEGFC

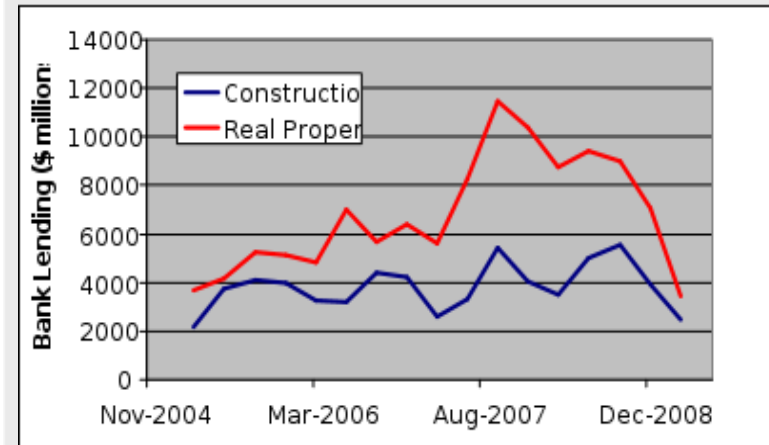
Symptoms of a global financial crisis

Commodity prices plummet



Source:
RBA

Bank lending dries up



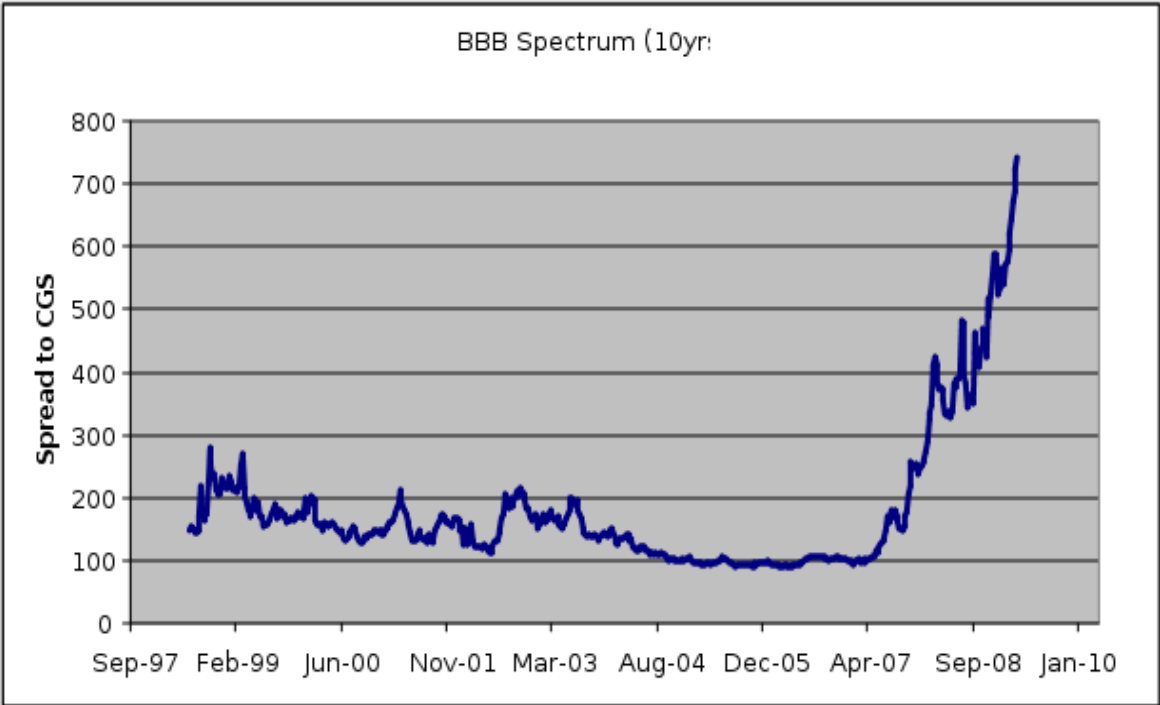
Source:
RBA

And so on...

- Global trade falls.
- Corporate bond markets seize up and are effectively closed for a period.
- Many companies struggle to refinance, and some fail as a result.
- A number of global banks fail.
- Governments bail out some financial institutions and engage in massive stimulatory spending, and now have record deficits.

How does a GFC affect the cost of debt capital?

Debt spreads rose dramatically



Source: CBA Spectrum

ASED

How does a GFC affect the cost of equity capital?

Under the CAPM, the cost of equity is a function of three parameters

- Risk-free rate
 - Systematic risk or “beta”
 - Market risk premium
- $$r_e = r_f + \beta \times MRP$$

Lots of equity has been issued at attractive prices

THE AUSTRALIAN FINANCIAL REVIEW
 MONDAY 3 AUGUST 2009 www.afri.com Price \$3.00 (incl GST)

■ \$21 billion in paper profits ■ Fund managers the big winners ■ Shareholders locked out

Capital raising bonanza for investors

Simon Evans, Brett Clegg and Paulina Duran

Investors who backed the record run of capital raisings over the past 12 months are sitting on at least \$21.1 billion in paper profits and returns that outpaced the broader sharemarket more than threefold.

As companies sought to pay down debt in the face of sharply tightening credit markets and pressure from lenders to dramatically cut gearing levels, 94 equity raisings among the top 200 listed companies provided huge windfalls for investors.

Large institutional fund managers, which received preferential treatment over small retail shareholders in many of the capital raisings, have been the biggest winners.

An analysis by *The Australian Financial Review* reveals that the median discount attached to \$74 billion of raisings was a substantial 19.8 per cent, reflecting market turbulence and lower risk appetite among the investment banks that underwrote the transactions.

The discount was calculated as the issue price compared with the share price before the raising. A combination of these large discounts and the rebound in the sharemarket from its March 6 low has driven the gains.

The S&P/ASX 200 Index closed up 53.6 points to 4244 on Friday, capping off a 35 per cent rally over the past five months.

MARKET MOVES

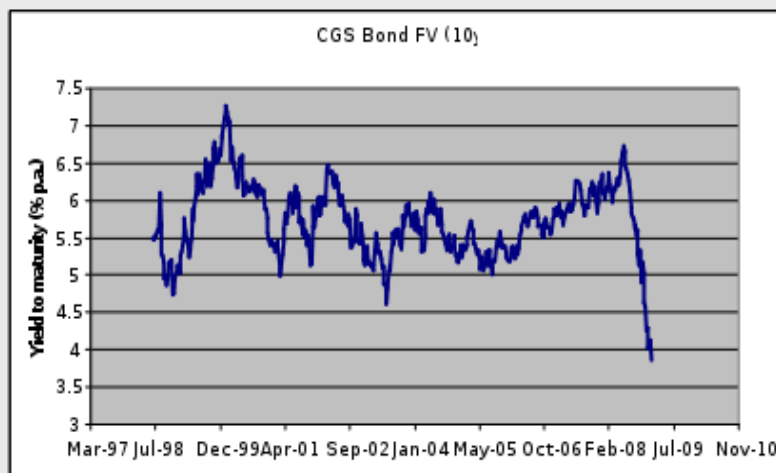
- To be fair to everyone on the register, companies should be doing a rights issue to existing shareholders. — Shareholder John Curry, page 14
- Top 20 performers: table, page 14
- All eyes on earnings, page 15
- Pointing the way, page 17
- Profits: the week ahead, page 21

Continued page 14

INCREASED?

Risk-free rate – biased downward by a flight to quality?

Commonwealth government bond yields plunged...



Source: CBA Spectrum

...much more than state government yields

Figure 3: Spread between CGS and State Government 10 year nominal debt



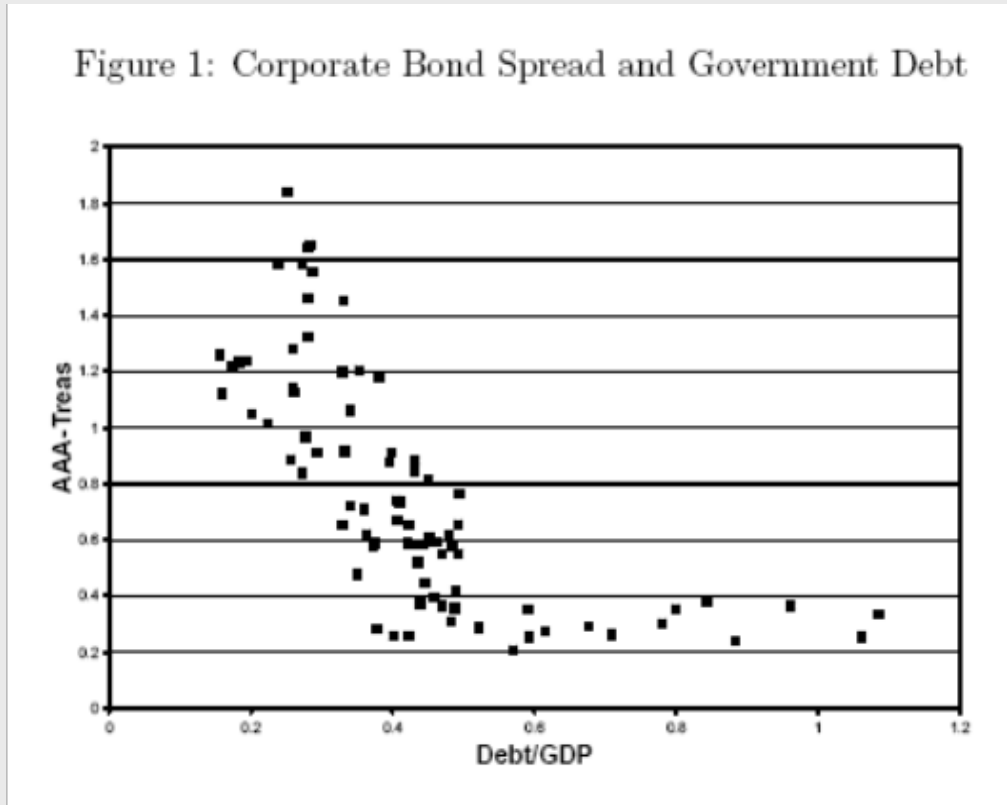
Source: CEG – Report for Transgrid

Key questions

- The CAPM requires the yield on a risk-free (zero-beta) asset.
- During a GFC, investors might (over?) pay for other features of government securities. Not only are they risk-free, but they are also:
 - Highly liquid;
 - An acceptable source of collateral; and
 - Seen by investors as a prudent place to have funds, in the circumstances.
- If the price is bid up, the yield gets squeezed and might reflect features other than “risk-free-ness.”

Demand and supply does affect government bond yields

When demand for government bonds is high relative to supply, yields tend to decline



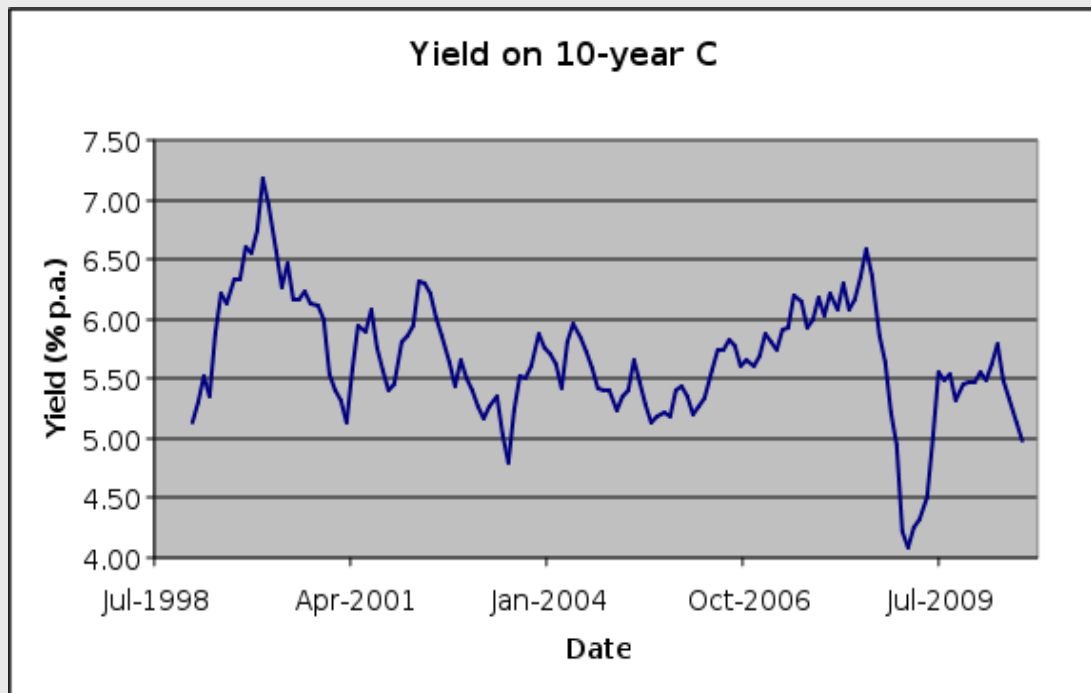
Source: Krishnamurthy, Arvind and Annette Vissing-Jorgensen, 2010, "The Aggregate Demand for Treasury Debt," *Journal of Political Economy*, forthcoming.

What to do about the risk-free rate?

Alternative estimates

- Some businesses and valuation professionals have proposed:
 - Using an estimate from prior to the beginning of the crisis (i.e., the CGS yield from a “normal” period is more likely to reflect only the risk-free feature of CGS). See TransGrid regulatory decision;
 - Using an estimate based on state government or other AAA-rated bonds (i.e., bonds that are effectively risk free, but without such a liquidity premium built into them).

The issue is now largely resolved



Source:
RBA

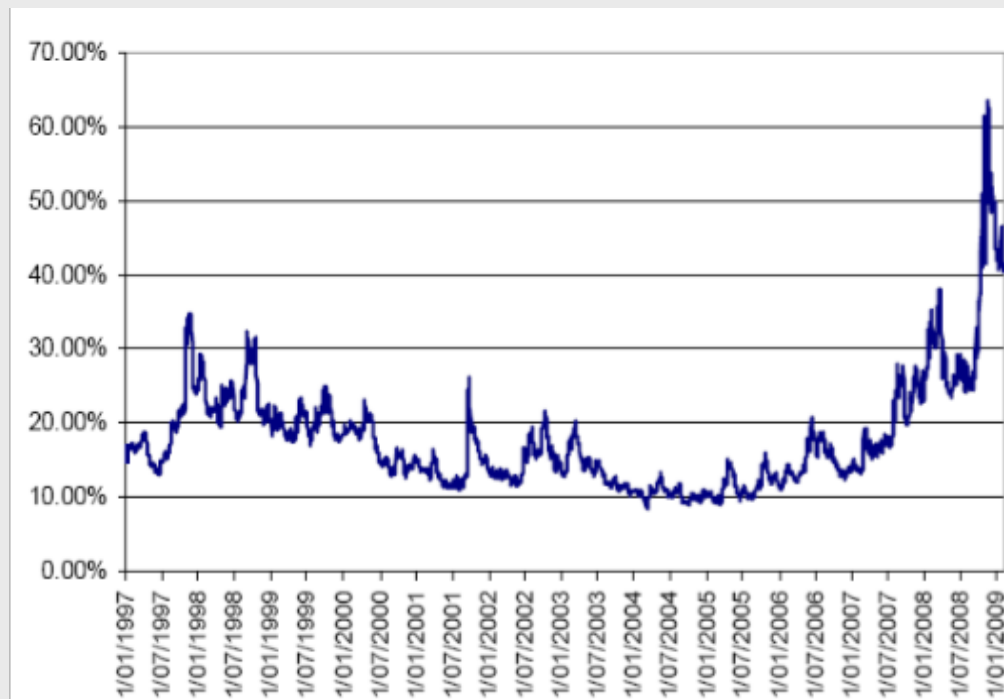
ETHEBESTESTIMATE

Market risk premium – higher premium for risk?

MRP goes up for two reasons

- The MRP is the additional return (over and above the risk-free rate) that investors require for holding a broadly diversified “market” portfolio.
- Investors will require a higher return from the market portfolio if:
 - The market portfolio becomes riskier; or
 - The price of each unit of risk (in terms of extra return) increases.

Option implied volatilities have increased markedly



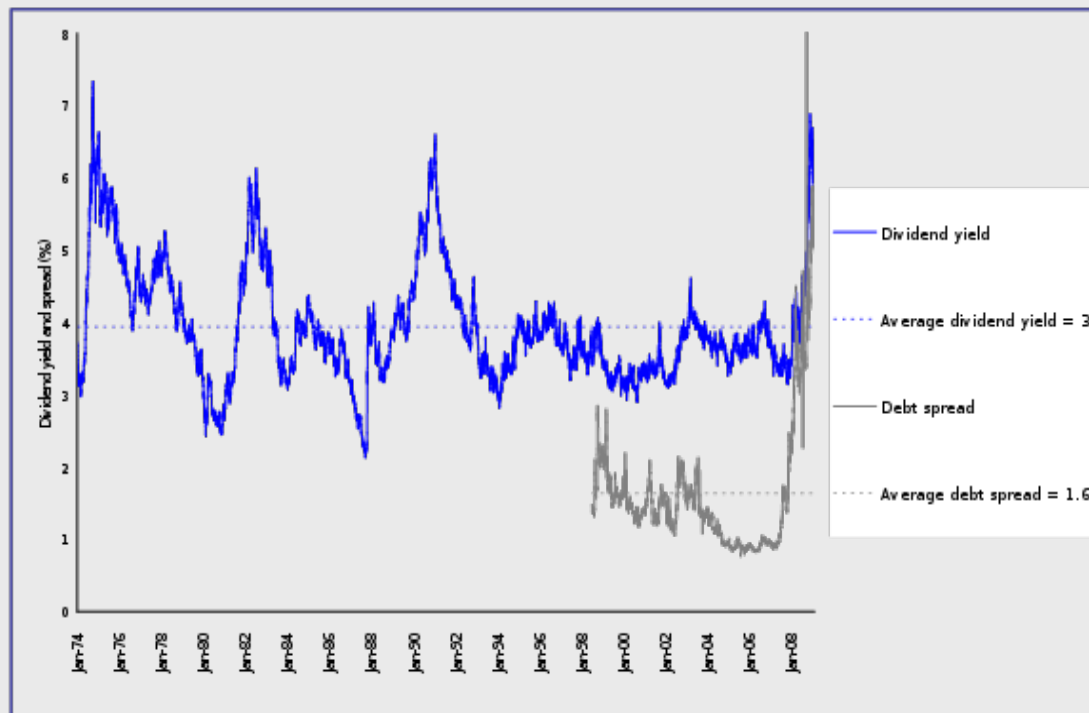
Source: Grundy
(2009)

Market risk premium – higher premium for risk?

Indicators of the price of risk

- The empirical finance literature has identified other variables that have historically been correlated with the price of risk (i.e., increases in these variables indicate higher required returns):
 - Dividend yield;
 - BBB-debt spreads.

The price of risk also appears to be high



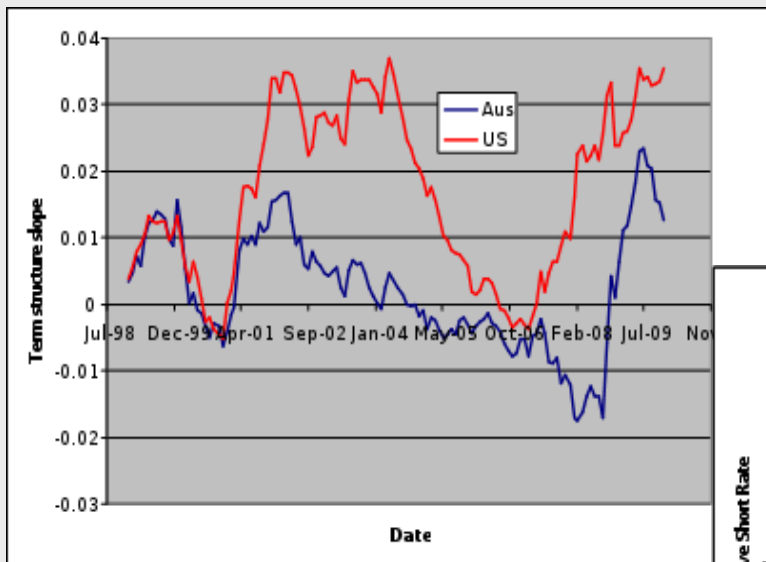
Source:
Datastream

Market risk premium – higher premium for risk?

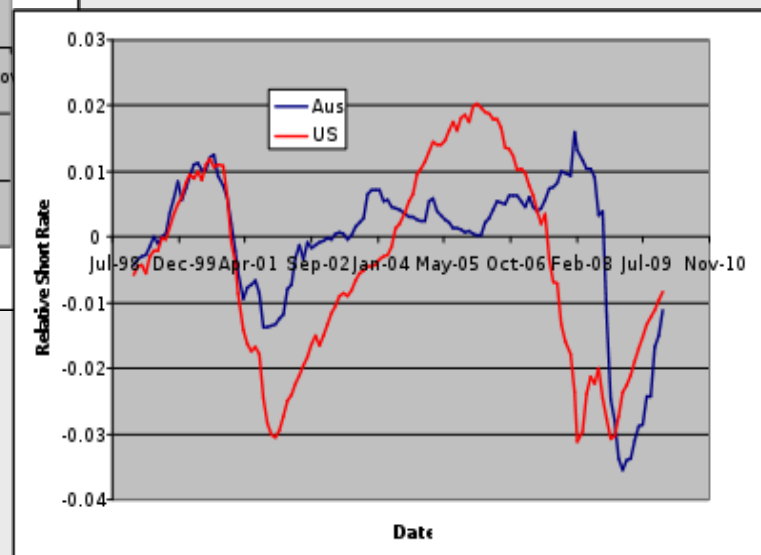
Indicators of the price of risk

- The asset pricing literature has also identified other variables that have historically been correlated with the price of risk:
 - Slope of term structure of interest rates (high slope indicates that economic conditions are expected to be better in future than they are now);
 - Relative short rate (low rate relative to recent past indicates that present economic conditions are poor, in which case risk premiums are high).

These indicators also suggest that current risk premiums are high



Source:
RBA



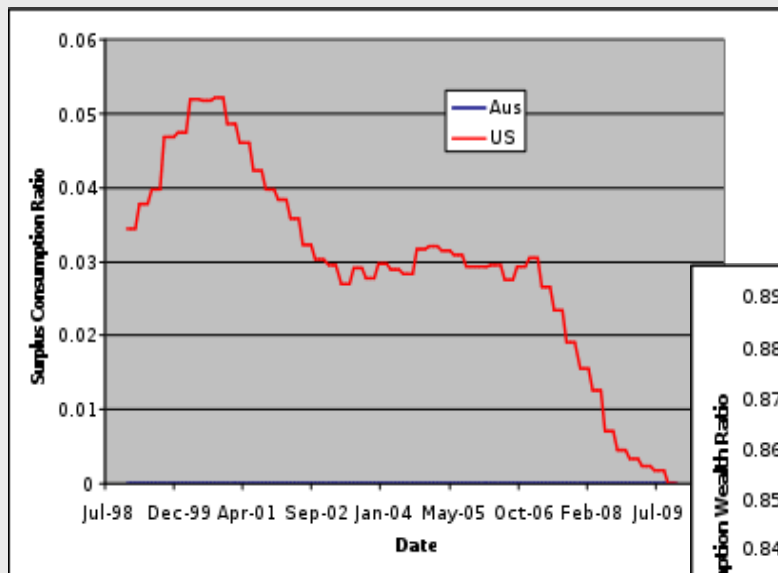
Source:
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Market risk premium – higher premium for risk?

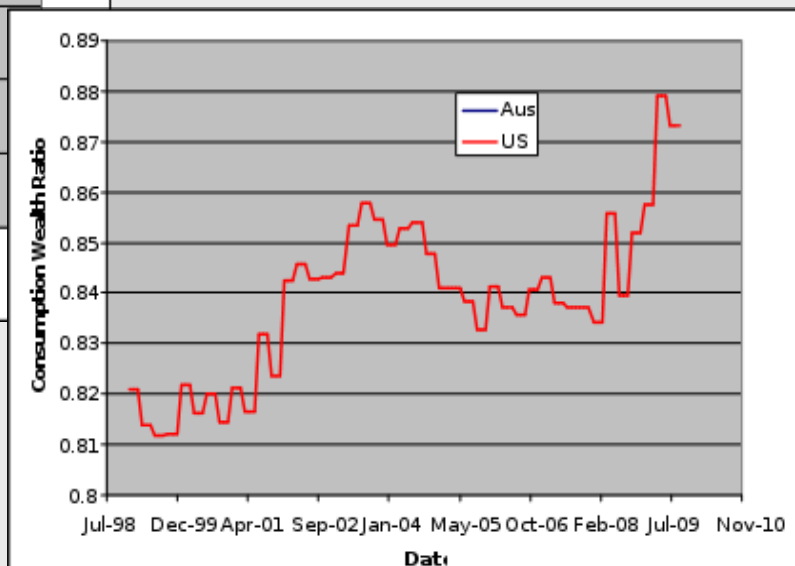
Indicators of the price of risk

- The asset pricing literature has also identified other variables that have historically been correlated with the price of risk:
 - Surplus consumption ratio (aggregate consumption is low when investors perceive high risk and higher future returns);
 - Consumption-wealth ratio (during a crisis wealth falls materially and investors perceive high risk and require higher future returns – they also try to smooth consumption and this leads to a high consumption to wealth ratio).

These indicators also suggest that current risk premiums are high



Source: Ludvigson web site



Source: Ludvigson web site

Time varying MRP?

MRP may not be constant over time

- Investors may not always require a constant 6% premium to provide equity capital.
- It may be the case that they require higher returns in some market conditions and lower required returns in others.
- A model that allows the market risk premium to vary between 4% and 8%, as a function of the variables set out above, provides superior forecasts of future excess returns relative to a constant 6%.
- Such a model is currently forecasting MRP above the long-term average of 6%.

GFC estimates

- The AER has recently adopted an estimate of 6.5%. The AER has revised its initial estimate up from 6% due to the effects of the GFC. No basis or estimation technique is provided as justification for the 0.5% increment.
- The ACCC has recently reduced this back to 6% on the basis that the GFC is over.
- Current regulatory submissions are considering proposed estimates of 7% (e.g., GGP in WA) on the basis that current market conditions still warrant a higher than usual estimate of MRP.
- A number of corporate treasuries are using MRP estimates above 6% in the current environment.
- This is a two-edged sword – if there are some periods where the MRP is above its historical long-term mean, there must be other periods when it is below...

How does a GFC affect beta and beta *estimates*?

Equity beta

- The average of all equity betas is 1.0 – by construction – beta is a measure of risk *relative* to the average firm.
- Consequently, equity betas cannot increase simultaneously for all firms.
- It may be the case that firms with more leverage experience a relative increase in systematic risk during a debt-related financial crisis.
- However, beta *estimates* are notoriously imprecise and require a long sample period to obtain even a modicum of statistical significance, so detecting these sorts of effects is very difficult.

- Even if a firm's true beta is unaffected by the GFC, its beta *estimate* may be affected. For example, the ACCC has recently suggested that beta estimates for telecom firms are likely to have been downwardly biased by data over the GFC period, and it is common to exclude the tech bubble period from beta estimates.

- The bottom line is that attempts to increase or decrease equity beta estimates to account for changes in market conditions are fraught with difficulty and may be more likely to add, rather than reduce, noise and estimation error.

Other considerations

Objective of CAPM is to estimate the required return on equity

- The whole purpose of estimating WACC is to determine the return that investors would require in order to commit capital to the firm.
- The purpose of the CAPM is (or should be) to estimate the return that equity investors would require in order to commit equity capital to the firm.
- The CAPM cannot magically compensate for poor input parameter estimates – if the input parameter estimates do not reflect current conditions, the estimate of required return will also not reflect current conditions.
- This means that the estimate of required return should be checked for reasonableness. Some recent examples from regulatory determinations are:
 - Estimated required return on equity is at 40-year minimum during peak of GFC;
 - Estimated required return on equity is less than the estimated required return on debt in the same firm; and
 - Estimated required return on equity is less than current dividend yield on comparable firms.

Contact information

Stephen Gray
Professor of Finance
UQ Business School

(07) 3346 8032
s.gray@business.uq.edu.au

For information on some of the regulatory
submissions and practice cited in this
presentation, see

www.sfgconsulting.com.au