

CECG

Competition and Regulatory Economists



Choosing a proxy for the nominal risk free rate

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CEG Melbourne +61 (3) 9504 6027
CEG Sydney +61 (2) 9328 3895

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1. PRELIMINARIES

1. My name is Thomas Nicholas Hird, a Director of the Competition Economics Consulting Group, 9 Hartpury Avenue Elwood, Melbourne. I have sixteen years experience as a professional economist, largely specialising in cost of capital issues. My full curriculum vitae is at Attachment A.
2. My name is Bruce David Grundy, a Professor of Finance at the University of Melbourne, Parkville, Melbourne. I have 30 years of experience as a finance academic and practitioner. My full curriculum vitae is at Attachment B.

Terms of reference

3. We have been asked by Envestra, SPAusnet and Multinet to review the ESCV's methodology for calculating the nominal risk free rate for the purpose of setting the cost debt and the cost of equity within a CAPM framework.
4. Specifically we have been asked:
 - a) "Whether the characteristics of CGS provide the best proxy when establishing the risk free rate in the context of the CAPM as applied by the businesses and the Commission.
 - b) "What other instruments can be used as proxies for the risk free rate instead of CGS and are less likely to suffer from the supply demand effects that CGS suffer from?
 - c) "Which instruments are likely to give the best estimate of the risk free rate?

"Consistent with our earlier discussions and instructions we seek from CECG a report that considers the validity of the issues raised, what, if anything, is the appropriate response to the issues raised, including whether the Commission's methodology for calculating the nominal risk free rate is appropriate for purposes of setting the cost of debt and the cost of equity within a CAPM framework and, if not, an alternative methodology which is appropriate."

2. SUMMARY OF CONCLUSIONS

5. A key input into the ESCV's WACC calculation is the required return on zero systematic risk corporate equity. In the terminology of the CAPM, this value reflects the relevant 'risk free rate'.
6. The issue we address in this report is that there is more than one proxy for the risk free rate. In particular, Commonwealth Government securities (CGS), state government bonds, insured corporate bonds and fixed for floating swaps are all very low default risk and potential proxies for the CAPM 'risk free rate'.
7. However, despite having very similar default risk these assets do not have the same yields. It is a well documented fact in the finance literature that: a) government bonds trade at different yields to the other proxies for the risk free rate; and b) the differences in yields can not be explained by differences in risk. In the terminology of the finance literature this non-risk related difference in yields is a 'convenience yield' on government bonds. That is, it is the amount investors are prepared to pay (in the form of a lower return) for the 'convenience' associated with the special non risk characteristics of government bonds (eg, their simplicity and liquidity).
8. It is also the case that this convenience yield is currently at historically high levels for CGS. This may reflect, as detailed in our earlier reports, historically low levels of supply of CGS relative to GDP and relative to other debt instruments issued in the Australian financial sector. More recently, it may also reflect a globally heightened willingness to pay for the convenience of government bonds associated with developments in the US subprime mortgage market.
9. Whatever the reason, it would be wrong to assume that the corporate cost of capital will fall when rises in the convenience yield depress observed CGS yields and *vice versa*. This assumption would not reflect "prevailing conditions in the market for funds" as required under Section 8.30 of the Gas Code. The reason is simple and follows directly from the definition of the convenience yield. Changes in the convenience yield on CGS reflect changes in the value placed by investors on the special characteristics associated with CGS that are not shared by corporate debt/equity. By definition, changes in the value of the special characteristics of CGS will not have any impact on changes in the cost of corporate debt or equity.
10. The ESCV's methodology *does not* impose changes in the convenience yield on its estimated cost of corporate debt. In this regard, the ESCV's methodology for setting the cost of debt does reflect "prevailing conditions in the market for funds". However, the ESCV's methodology *does* impose changes in the convenience yield on its estimated cost of corporate equity. In this regard, the ESCV's methodology for setting the cost of equity does not reflect "prevailing conditions in the market for funds".

11. The reason the ESCV's draft decision does not make an error in its estimate of the cost of debt is that the risk free rate chosen by the ESCV plays no role in its estimate of the cost of debt. Rather, the ESCV observes the cost of corporate debt directly in the market for funds and sets the cost of debt accordingly. The debt premium awarded by the ESCV is simply a balancing item – being the difference between the observed cost of debt and the observed yield on CGS. Thus, increases (decreases) in the convenience yield on CGS show up immediately and directly in increases (decreases) in the debt premium rather than reductions in the cost of debt.
12. By contrast, the ESCV sets the cost of equity equal to the observed yield on CGS plus a fixed equity premium. This means that changes in the yield on CGS flow directly through into changes in the estimated cost of equity – even if the changes in the CGS yield are driven by changes in the convenience yield. This is despite the fact that the cost of equity is, by definition, independent of changes in the convenience yield.
13. In our opinion, correcting this error in the ESCV's methodology would have required a minimum adjustment to the cost of equity of 49bp estimated on 13 September 2007 (holding all other elements of the draft decision constant).
14. We also note that ACG advised the ESCV to have regard to the relative liquidity of CGS in choosing which CGS is the appropriate risk free rate. This implicitly accepts that non-risk characteristics are relevant to choosing the risk free rate. However, once this fact is accepted then the inevitable logical conclusion is that CGS themselves are poor proxies for the risk free rate (because they have very different non-risk characteristics to both corporate debt and equity).

3. BODY OF STATEMENT

15. The purpose of this statement is to summarise and update the results of the analysis in our two prior reports:
- a) NERA, Hird and Grundy, *Bias in Indexed CGS Yields as a Proxy for the CAPM Risk Free Rate* (March 2007)
 - b) NERA, Hird and Grundy, *Absolute Bias in (Nominal) Commonwealth Government Securities* (June 2007)
16. Both reports have been submitted to the ESCV and both reports detail our analysis of the bias in indexed and nominal CGS yields as a proxy for the unobservable CAPM (real and nominal) risk free rates. However, the ESCV draft decision considers only our analysis of the bias in indexed CGS as a proxy for the real risk free rate.
17. The draft decision accepts that there is a bias in indexed CGS as a proxy for the real risk free rate in the CAPM. The ESCV proposes that indexed CGS yields are no longer used to set the real risk free rate. The ESCV goes on to argue that the real risk free rate should be estimated by:
- a) Starting with an estimate of the nominal risk free rate; and
 - b) Deducting an estimate of expected inflation.
18. We agree that this is an appropriate methodology. However, we disagree with the implementation of this methodology. Tom Hird separately provides a statement detailing his view on errors the ESCV has committed in implementing step b) above. In this statement we explain why we believe that the ESCV has also committed an error in implementing step a) above.
19. Specifically, the ESCV has chosen to use the estimated yield on a nominal CGS as the proxy for the nominal risk free rate. This is inconsistent with the advice in both of our previous reports where we argue, on the basis of the finance literature, that the yield on CGS will be a downward biased estimate of the correct CAPM risk free rate.

More than one nominal risk free rate – regulators need to consciously choose one

20. The 'correct' risk free rate is context specific. In a world with zero transaction costs, perfect information and identical liquidity for all assets then the CAPM suggests that all differences in expected yields (returns) will reflect differences in risks.
21. However, in the real world all of these assumptions are violated and this can and does lead to instruments that have near identical risks having different

expected yields. This can most easily be seen by examining the yields on very low risk assets. Commonwealth Government Securities (CGS) are one such very low risk instrument but so also are: a) the fixed rate component of AAA-rated fixed-for-floating swaps; and b) corporate bonds that are insured against default through the use of credit default swaps (CDS). Another example of a very low risk instrument is debt issued by Australian State Governments (such as Queensland).

22. While all of these instruments are very low risk, they have materially different yields – with the difference most pronounced between CGS and the other assets. Moreover, it is an unambiguous finding of the finance literature that the differences in yields between government bonds and other low risk instruments (such as swaps and CDS insured bonds) can not be explained by differences in risk (the literature is summarised below).
23. Consider the yields described in the table below.

Table 1: Yields and Spreads on 1 August 2007

	1-Aug-07	Spread to CGS
10 year CGS		0.00
10 year Qld government bond		0.53
5 year CDS insured corporate bond		0.78
10 year swap		0.88

Source: Bloomberg, RBA, AFMA data and CBA Spectrum data. CECG analysis.

24. In reality, all of the above instruments are potential proxies for the correct risk free rate. The finance literature on this issue is clear: differences in default risk can only account for around 10bp of the spread between these assets. The great majority of the differences in yields must be explained by investors' willingness to pay for other 'non-risk' characteristics of the low risk instruments.
25. Put simply, when we observe differences in yields on these instruments what we are primarily observing are different "risk free rates". The question then becomes which of these is the risk free rate that should be used when attempting to price the equity and debt of regulated businesses? Before we turn to this question we summarise the literature that we had regard to in our March 2007 report.

Differences in yields are not explained by differences in risk

Explaining spreads between CGS and State Government bonds

26. Table 1 states that on 1 August 2007 a 10 year Queensland Government bond was trading at a yield 53bp in excess of the CGS yield on the same date. This means that if one was attempting to price a 10 year Queensland government bond using a 10 year CGS as the appropriate risk free rate then it would be necessary to assume that the Queensland Government had about a 5% ($0.53\% \times 10$) probability of default over the next 10 years. We believe that it would be difficult to find experts or market participants who believe that this is the case.

27. To put this in perspective, the ESCV has estimated that the spread between a 10 year BBB+ corporate bond and a 10 year CGS is 115 to 125bp.

“On the basis of the above evidence, the Commission considers that capital market evidence indicates a debt margin consistent with that indicated by Bloomberg is an (sic) appropriate. Noting the issues associated with the dataset and wider capital market evidence the Commission has assessed that the cost of 10 year debt to an infrastructure business with a BBB+ rating would be likely to be in the range of 115bp to 125bp.” (Page 407)

28. However, this spread to CGS is only a little over double the 53bp spread between 10 year CGS and 10 year Queensland government debt reported in Table 1 above. Updating the Spread to BBB+ bonds to the 1st of August implies a spread to CGS of 159bp. If we are to believe that all of these spreads reflect differences in probability of default relative to the CGS rate then we would have to also accept that lending to the Queensland government was in fact one third as risky as lending to a BBB+ corporate (53bp is one third of 159bp). Consistent with the findings of the finance literature, this does not appear to be a credible explanation of the relative spreads. Australian State Governments have never defaulted on their debt. By contrast, the historical average is that 6.1% of BBB rated corporate bonds default over 10 years. We believe that it would be difficult to find experts or market participants who believe that default risk on Queensland government bonds is fully one third as high as default risk on BBB+ corporate bonds.

29. Another way of illustrating the point is to consider what it means for the ESCV to award a 125bp “risk premium” on 10 year corporate debt issued by regulated businesses. For simplicity, we abstract from the time value of money and any systematic element to default risk. If 100% of this spread is explained by default risk then a corollary is that investors assess the probability of default is at least 1.25% per annum. Considered over the 10 year life of the bond, this implies an at least 12.5% probability of default.

30. We say 'at least' 12.5% because, in reality, default events do not result in 100% default on the entire principle of the loan. However, the 12.5% compensation for default is expressed as a percentage of the entire principle of the loan. If the average default event only results in 50% loss of principle then it follows that the expected probability of default required to justify a 12.5% margin over ten years is actually 25%. An even higher probability of default is implied using the 159bp spreads on 1 August 2007.
31. We do not believe that this reflects reality. We also note that it would be inconsistent to simultaneously believe that the underlying business is low risk but that the probability of default is so high. We also note that when debt default occurs the entire value of equity capital has already been wiped out (even if it is only a relatively minor debt default).

Explaining spreads between CGS and swaps

32. Fixed for floating swaps are very close to being "risk free" because there is no principle at stake only a notional amount of principle. In a ten year fixed for floating swap one party agrees to pay another party a short term floating rate (generally the 3 month bank bill swap rate) on that notional principle in exchange for a fixed periodic payment over 10 years. The ten year swap rate is calculated as the implied yield on the notional principle associated with the fixed payment.
33. The question then becomes what is the potential for loss if the party making the fixed payment defaults? In this scenario the party buying the fixed payment loses no principle (as no principle was ever paid). That party does lose the value of all of the future fixed payments they would otherwise have been entitled to. However, on the flipside, they are no longer obliged to make the floating payments. So the net loss at default is limited to the difference between the expected present value of fixed and floating payments over the remaining life of the swap – which may be either positive or negative. Only in a circumstance where forward looking fixed rates have fallen relative to previously agreed fixed rates would there be any loss from default.
34. Table 1 states that on 1 August 2007 the yield on a 10 year swap was yielding 88bp more than the 10 year CGS.
35. If one was attempting to price a 10 year swap using the 10 year CGS yield as the appropriate risk free rate then one would have to assume that, even though it is impossible for there to be default on the principle of a swap the risk of default on the interest component justifies an 0.88% higher yield. Again, to put this in perspective, if there was principle at risk in a swap an 0.88bp risk premium implies something like 8.8% probability of default over ten years ($0.88\% \text{ pa} \times 10 \text{ years}$). However, there is no principle at risk only the possibility that at the time of default interest rates are lower than implied

by the fixed rate. Taking this into account means the probability of default must be more like 50% (see appendix B).

36. Again, we believe that it would be difficult to find credible experts or market participants who believe that this is the case for swap agreements.
37. The finance literature has examined this issue much more carefully than the above rough illustrative example. The unambiguous finding is that spreads between government bonds and swap rates can not be explained by differences in default risk. We summarise this finding in relation to swaps on page 35 of our March 2007 report where we state:

“Duffie and Singleton (1997) show how to price the credit risk inherent in the fixed rate component and conclude that the spread between the swap rate and the Treasury rate has a significant non-default component. Liu, Longstaff and Mandell (2006) and Feldhütter and Lando (2006) have subsequently reached the same conclusion. Feldhütter and Lando (2006) conclude that “A convenience yield from holding Treasuries is by far the largest component of spreads” between swap rates and Treasury rates. These papers conclude that the reference risk-free rate used in capital markets when pricing swaps is only around 10 basis points below the rate on similar maturity AAA bond.”

38. We use this terminology (“convenience yield”) to refer to the difference between government bonds and corporate debt instruments that can not be explained by differences in risk. Conceptually, a positive convenience yield is reflected in a lower CGS yield because the owner of CGS is, in effect, accepting the “convenience” of CGS in exchange for a lower yield on CGS.
39. These authors take into account any potential for default to have positive systematic risk. Precisely the same sort of analysis can be used to determine whether spreads between CDS insured bonds and Government bonds can be explained by differences in risk. CDS insured corporate bonds have very similar fundamental structures as do swaps because in both cases the principle is not at risk. For swaps this is because there is no principle (only a notional principle) while for CDS insured bonds the principle is insured by a third party. This means that for both instruments the primary risk is that, at the time of default, the yields on reinvesting the principle will be lower than the yields promised in the swap/insured bond. The only additional risk associated with CDS insured bonds is associated with the very small probability of simultaneous default by the corporate bond issuer and the CDS issuer.
40. We note in our March report that the finance literature has examined these risks and found that they can not explain the spread to CGS of CDS insured corporate bonds.

“Grinblatt (2001) and Hull, Predescu and White (2004) are careful to recognize two features of a CDS agreement: (1) a CDS agreement only insures the principal and not the accrued interest on a bond and (2) counterparty risk. Counterparty risk is the low risk that not only does XYZ Corp default, the seller of the insurance policy also defaults. Taking both these features into account these authors conclude that the benchmark risk-free rate on a default-free security that lacks the unique features of Treasury securities was on average about 10 basis points lower than the swap rate over the period January 1998 to May 2002.

Blanco, Brennan, and Marsh (The Journal of Finance, 2005) examine the efficiency of the CDS market in pricing credit risk. They find that CDS prices lead spreads to swaps in the price discovery process and that there is parity between CDS and spreads to swaps in equilibrium. Importantly, in the context of our report, they note that:

“...it is well known that government bonds are no longer an ideal proxy for the unobservable risk free rate”¹

Nonetheless they test this empirically in their sample and find:

“We compute credit spreads using swap rates rather than government bonds as the proxy for the default-free interest rates in our subsequent analysis”²

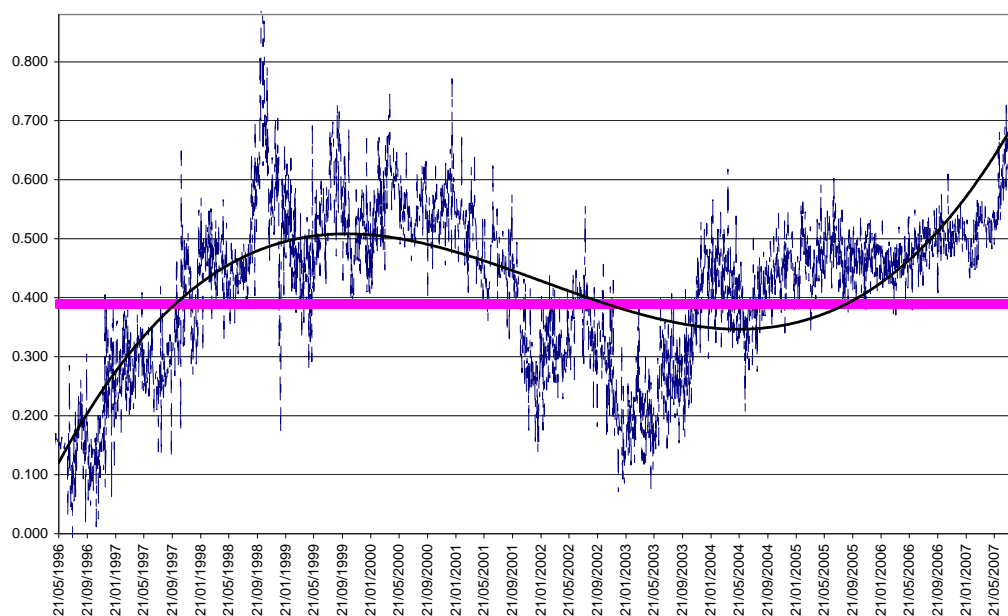
Spreads between risk free rates are not constant over time

41. It is important to note that the spread between CGS and alternative measures of the risk free rate is not constant over time. Figure 1 below illustrates the movements in the spread between 10 year CGS yields and 10 year swaps over the longest period that data is available.

¹ Blanco, Brennan, and Marsh, *An Empirical Analysis of the Dynamic Relation between Investment-Grade Bonds and Credit Default Swaps* The Journal Of Finance Vol. LX, no. 5 October 2005, p2261.

² Ibid, p2265.

**Figure 1: Spread between 10 year CGS and swaps
1996 to 2007**



Source: Bloomberg and RBA data, CECG analysis.

42. An important implication of the above figure is that the spread between CGS and swaps is currently at historically high levels. On the 13th of September the swap spread to CGS was almost double the historical average represented by the flat pink line (76bp versus 39bp). The true historical average is likely to be something materially less than 39bp given that spreads to swaps were under 20bp in 1996 before which data is not available. This phenomenon has been commented on by the RBA.

“The fall in CGS yields was not matched by movements in other long-term yields, such as swap yields. The spread between yields on 10-year swaps and CGS widened significantly in July – it is now around 70 basis points, having been steady at around 50 basis points over the past few years (Graph 52). This is the widest spread over the past decade. A widening of this spread is normally associated with periods of heightened financial uncertainty, when investor demand for the security of risk-free assets increases.

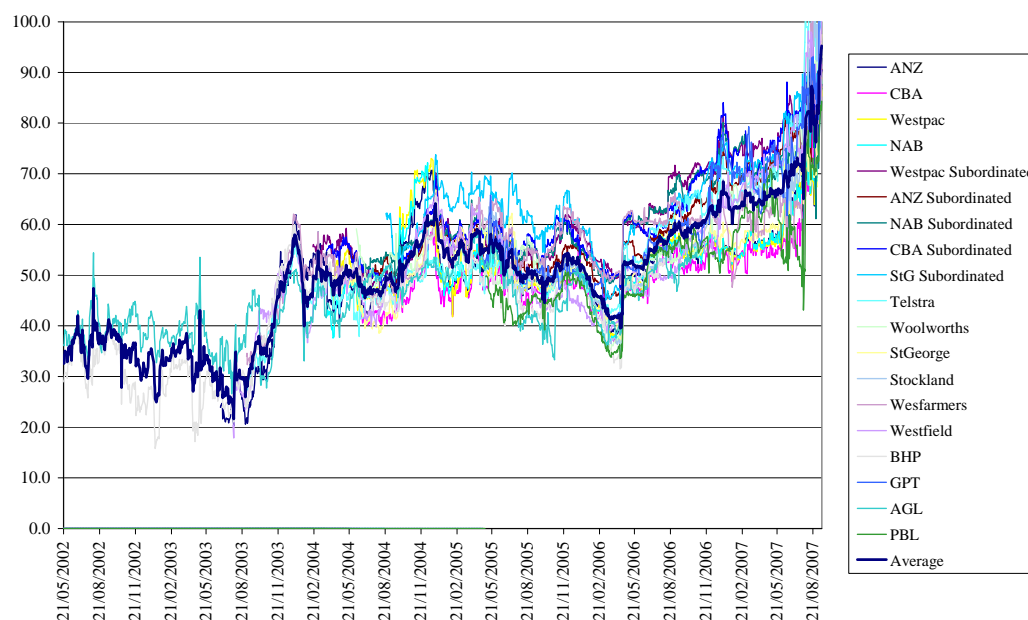
“As with CGS yields, the widening in swap spreads tracked that in the US. Yields on state government securities (semis) have moved with the swap rate rather than with CGS yields. The semis’ spread to CGS yields has also widened by around 20 basis points. With most states’ credit ratings at AAA, however, credit risk considerations do not appear to be a factor.” (RBA, August 2008 Statement on Monetary Policy, Page 48)

43. In the above quote the RBA refers to an increase in “investor demand for the security of risk-free assets” in times of heightened financial uncertainty. It

should be noted here that the RBA uses the term 'risk free' in its common usage – namely that returns are certain. This should not be confused with the specific technical meaning of the term under the CAPM (zero systematic risk). The RBA's observation is best interpreted as describing investors' desire for *certainty* rather than zero systematic risk in times of financial upheaval. This is apparent in the statement that "*credit risk considerations do not appear to be a factor*" in explaining the widening spread between CGS and State Government debt.

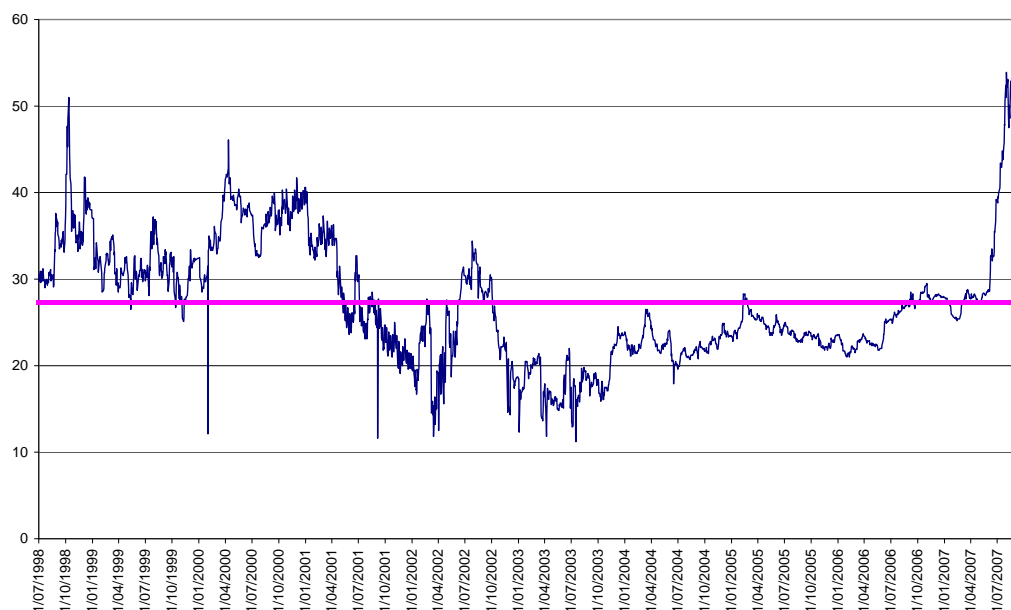
44. The same trend in spreads to CGS is demonstrated by examining the spread to CGS for CDS insured corporate bonds (although again over a different time period due to data restrictions). Figure 2 below shows the spread between CGS yields and yields on insured corporate bonds.

**Figure 2: Spread between CGS and CDS insured corporate bonds
2002 to 2007**



45. The above graph is simply an update of the same graph in our June 2007 report (using the same methodology and data sources). It shows the same general pattern for the yield on CDS insured bonds as for swaps - consistent with the findings of Blanco, Brennan, and Marsh (The Journal of Finance, 2005) discussed above.
46. Once more, a similar recent trend in spreads to CGS is demonstrated by examining the spread to CGS for State Government debt (although again over a different time period due to data restrictions). Figure 3 below shows the spread between CGS yields and yields on State Government debt.

**Figure 3: Spread between CGS and Vic/NSW/QLD Government debt
1998 to 2007**



Source: CBA Spectrum

The ESCV accepts the need to account for non-risk characteristics when choosing the risk free rate

47. On page 381 of the Draft Decision the ESCV noted that ACG had advised it that relatively low liquidity of short dated indexed CGS may make the yields on these instruments inappropriate as a proxy for the risk free rate.

“In this situation, ACG indicated two possible approaches to determining a value for the real risk-free rate to be applied in the CAPM and WACC models:

- *using a value equal to the observed yield on the shortest-dated real government bond, although noting that this may overstate the true risk-free rate of return due to possible liquidity premia in the value of these bonds due to limited trading, or*
- *using the 10-year nominal government bond rate as the nominal risk-free rate, and subtracting a value of the forecast rate of inflation that is derived from another source.”³*

48. The relevant section of the ACG report is provided below.

³ Page 381.

“Turning to the first of these methods, problems with the short dated real government bonds (i.e. those expiring in August 2010) still remain.

- a. First, the term of these bonds will be less than three years at the start of the regulatory period, and so it is questionable whether the bonds will provide a forecast that is appropriate for the whole of the regulatory period.*
- b. Secondly, there is also a risk that the bond yields may include a premium for the lack of liquidity of these instruments, given that they are of too short a term to be of great interest to the parties who demand the instruments (i.e. as they are not a particularly useful asset to offset long term inflation-related liabilities, such as indexed annuities).”*

49. This statement precisely acknowledges the issues that surround the choice of the risk free rate. In the real world, differences in yields are explained by both differences in risk and differences in non systematic risk factors – such as liquidity. Consistent with the position of ACG, we believe that accounting for these non-risk characteristics is critical when selecting the appropriate risk free rate.
50. However, if we accept (as the ACG and ESCV do) that differences in non-risk characteristics between one CGS and another CGS are relevant then we must also accept that differences in non-risk characteristics between CGS and corporate debt/equity are also relevant.
51. A problem with the ACG advice to the ESCV is that it automatically assumes that the most liquid CGS is, other things equal, the best proxy for the risk free rate. However, ACG does not explain why or how it reached this conclusion. In our view, this is not a generally correct conclusion. If we were constrained to choose between more and less liquid CGS as the proxy for the risk free rate (ignoring all other potentially relevant non-risk factors) then we would choose the CGS whose liquidity most closely matches that of the equity/debt we are attempting to price.

How should the right risk free rate be chosen

52. In general terms, if one accepts the proposition that there is more than one “risk free” rate then the question becomes how should the risk free rate be chosen in any given application of the CAPM? The conceptual answer is relatively simple, and can be summarised as:

Selecting the Correct CAPM Risk Free Rate

The correct risk free rate to use when estimating the required return on asset "X" is the return investors expect for investing in an asset with zero systematic risk but otherwise the same non-risk characteristics as asset "X".

53. Put simply, the CAPM is all about pricing systematic risk. The reward for bearing a particular level of systematic risk is the difference between expected return on assets with that level of systematic risk and the risk free rate – the expected return on an asset that has zero systematic risk. If you are attempting to estimate the required return on asset "X" you need to start with a risk free return that otherwise has the same non-risk characteristics as asset X. If you start from some other risk free rate you will inevitably estimate the wrong required return.
54. In practical terms, when we are estimating the risk free rate for equity we are really attempting to estimate the expected return that investors would require if that equity had zero systematic risk (but nonetheless had all the other characteristics of equity). Similarly, the correct risk free rate for corporate debt is equal to the expected return that investors would require if that debt had zero systematic risk (but nonetheless had all the other characteristics of corporate debt).
55. If an investor would not require the same return on equity with zero systematic risk as they would on a *certain* Government bond then the Government bond yield is the wrong place to start when pricing equity.
56. A conservative assumption for the purpose of this paper is that the required return on equity with zero systematic risk will be at least as high as the required return on zero systematic risk corporate debt. This is conservative because equity returns are more complicated to estimate and less certain than corporate debt returns. In addition, trading equity also has much greater exposure to the (non systematic) risk that investors will lose in trades with better informed participants than does trading in debt.⁴

⁴ As noted in our companion report, zero beta stock differ from risk-free bonds in a number of important ways. Understanding the potential future cash flows to a share and whether that share is appropriately priced is a much more complex task than understanding the cash flows and valuation of government bonds. Stocks have lower liquidity than government bonds: Stocks have wider bid-ask spreads and a given dollar trade will move prices by more for stocks than for government bonds. Spreads and the price impact of trades reflect market-maker inventory costs and the relative informational advantage of more-informed traders over market-makers. Market-makers set their bid and ask quotes more widely apart

57. In the remainder of this statement we will assume that the risk free rate for corporate equity is equal to the risk free rate for corporate debt (noting that this is a conservative assumption).
58. In the context of pricing corporate debt the correct risk free rate has already been identified with considerable precision in the finance literature. That is, the risk free 'starting point' when analysing corporate debt will be very close to the swap rate and the CDS insured corporate debt rate.
59. Of course, it is true that in the idealised theoretical model of the CAPM first expounded by Sharpe these non-risk characteristics are assumed away (there are no transaction costs, no bid ask spreads, no asymmetric information, no Government preferences for holding only other Government's bonds etc). However, in the real world these non-risk characteristics are clearly important to pricing. We understand that section 8.30 of the Gas Code requires the ESCV to have regard to 'prevailing' (as opposed to theoretically idealised) conditions in the market for funds. On this basis we believe that the ESCV needs to have regard to these non-risk factors when selecting an appropriate risk free rate (as it has already done in relation to liquidity of CGS as discussed above). See also our response to the Lally critique of our earlier work at attachment A.

Why getting the risk free rate right matters (given the ESCV's methodology)

60. The overwhelming evidence, supported by rigorous examination in the finance literature, is that investors pay a premium for the non-risk characteristics that attach to Government bonds. Chief amongst these non-risk characteristics is the certainty and simplicity of returns when investing in government bonds.

the greater the informational disadvantage they are at. One reason someone will want to buy from (sell to) them is that the would-be buyer (seller) has information that the market-maker does not have that leads the would-be trader to deduce that the share is under-priced (over-priced). The bigger the desired trade the bigger the potential loss to the market-maker from being on the other side of the trade and the more they will adjust their quotes for future trades. For both the reasons of the relative complexity of shares and the informational advantage of informed traders in the share market, stock will be less attractive than government bonds for many less sophisticated and relatively uninformed traders even if the stock has zero equity beta. Zero beta shares will tend to be less valuable than risk-free

bonds per dollar of expected future payoff; i.e., $E(\tilde{r}_Z)$ will exceed the yield on government bonds. Tirole (2006) and Swan (2001) observe that at least part of the equity premium

(defined as $E(\tilde{r}_M) - r_f$) is not a risk premium, but an illiquidity premium that reflects the stock market's lower liquidity relative to the market for government bonds.

61. This means that using the Commonwealth Government Security (CGS) yield as the risk free rate will materially underestimate the true return on zero systematic risk debt and equity. This will, in turn, lead to an underestimate of the required return on risky debt and equity unless a compensating overestimate of the relevant risk premium is made.
62. The ESCV's current approach to setting the cost of debt provides for just such an offsetting over-estimate of the risk premium (debt margin). This is because the ESCV sets the compensation for risk equal to the observed yield on corporate debt less the assumed risk free rate. Consequently, it does not matter if the ESCV underestimates the cost of debt – any such underestimate will automatically be associated with an overestimate of the risk premium.
63. Thus, the Commission commits no error when estimating the cost of debt. That is, it does not reflect changes in the convenience yield on CGS in changes in the cost of debt estimated for corporations.
64. By contrast, the ESCV sets the cost of equity equal to the observed yield on CGS plus a fixed equity premium. This means that changes in the yield on CGS flow directly through into changes in the estimated cost of equity – even if the changes in the CGS yield are driven by changes in the convenience yield. This is despite the fact that the cost of equity is, by definition, independent of changes in the convenience yield.
65. This fact can be explained mathematically. The ESCV sets the estimated cost of equity equal to:
- $$\text{Estimated cost of equity} = \text{yield on CGS} + \beta_e * \text{MRP} \quad (1)$$
66. However, the yield on CGS is equal to the true risk free rate less a convenience yield. This means that the Commission's estimate of cost of equity can be written as:
- $$\text{Estimated cost of equity} = R_f - \text{convenience yield on CGS} + \beta_e * \text{MRP} \quad (2)$$
67. Thus, variations in the convenience yield are fully reflected in variations in the estimated cost of equity. (Neither the MRP nor the β_e vary with changes in the convenience yield on CGS.)⁵ This is despite the fact that, by definition, changes in the convenience yield have no impact on the true cost of equity.
68. It might be argued that the 6% MRP used by the Commission already includes the historical average convenience yield on CGS. This will be the case if the

⁵ The ESCV and most other Australian regulators have set the MRP equal to 6% in all there regulatory decisions including in the draft decision. β_e is set independent of considerations regarding the convenience yield on CGS.

6% is based on observed differences between market returns and returns on CGS. In this sense, the Commission's MRP will be an overestimate of the "True historical MRP" ($R_m - R_f$). In this case, the Commission's estimate of MRP can be written as:

$$\begin{aligned} \text{Commission MRP} &= \text{Historical avg } [R_m - (R_f - \text{convenience yield})] \\ &= \text{Historical avg } [R_m - R_f + \text{convenience yield}] \\ &= \text{True MRP} + \text{historical avg convenience yield} \end{aligned} \quad (3)$$

69. If this is substituted into equation 2) above then the Commission's estimate of the cost of equity becomes:

$$= R_f + \beta_e * \text{True MRP} + \beta_e * \text{historical avg convenience yield} - \text{current convenience yield} \quad (4)$$

70. So, if the MRP already captures the average historical convenience yield then the cost of equity will only be in error by the amount " $\beta_e * \text{historical average convenience yield} - \text{current convenience yield}$ " rather than by the full amount of the current convenience yield.

Our best estimate of the required adjustment

71. In order to ensure consistency with Section 8.30 of the Gas Code the ESCV should set the risk free rate by reference to either the 10 year swap rate and/or the CDS insured bond rate. If it did this there may be an argument that the MRP used should also be lowered (to the extent that the current estimate of a 6% MRP captures the average historical bias in CGS). However, given the historically high current bias, any adjustment to the MRP would need to be less than the increase in the risk free rate.

72. Let us make the assumption that swap spreads are the best proxy for the risk free rate when pricing equity. We note that the convenience yield for in CGS (as measured by the spread between CGS and swap rates at 10 year maturity on 13 September 2007) was around 76bp but the historical average is something less than 39bp. This suggests the current convenience yield is around 37bp higher than the average bias. If the MRP used by the ESCV is based on the historical average market returns in excess of CGS returns then it is reasonable to assume that, at most, 39bp of the current convenience yield is reflected in a higher MRP.

73. Taking these factors into account, and using equation 4 above, we estimate using CGS yields today will result in a minimum underestimate of the cost of

equity of 49bp (assuming an the Commission has accurately estimated relative risk at 0.7). This is equal to:

- a. 37bp due to the fact that the bias in current CGS yields as a proxy for the risk free rate is higher than the historic average bias in CGS yields as a proxy for the risk free rate; plus
 - b. 11.7bp ($0.3 \times 39\text{bp}$) due to the fact that, with an equity beta of 0.7, only 70% of 39bp overestimate in the MRP is 'given back' in the estimated risk premium.
74. If one believes that relative risk is better estimated at 1.0 (consistent with our advice in our companion statement) then only the first adjustment (37bp) is required.
75. However, the above estimate is based on the assumption that the risk free rate for corporate debt is equal to the risk free rate for corporate equity. This is itself a conservative assumption.

76. We have read and considered the Federal Court Guidelines on Expert Witnesses. We have made all inquiries that we believe are desirable and appropriate to answer our terms of reference. No matters of significance that we regard as relevant have to our knowledge been withheld.

Thomas Nicholas Hird

Bruce David Grundy

26 October 2007

APPENDIX A: LALLY CRITIQUE

77. In a report for the EUAA and submitted to the AER Associate Professor Martin Lally made the following three criticisms of our June report

“Firstly, a reduction in the supply of an asset or an increase in the demand for it has no bearing upon its suitability as a proxy for the risk free asset within the context of the CAPM. Changes in the demand for or supply of assets, and therefore in the equilibrium prices for them, are simply part of the financial landscape and are entirely consistent with the CAPM.

“Secondly, the relevant criteria for choosing a risk free asset within the context of the CAPM are that the asset is risk free, liquid, that there are no restrictions upon the purchase of the asset by investors, and that investors are not attracted to or repelled from the asset for reasons other than the probability distribution over its return. Nominal government bonds trivially violate the first requirement, and also the fourth requirement on account of their value as collateral. Indexed government bonds may also violate the second requirement on account of relatively low liquidity. However, NERA’s preferred alternative (insured corporate bonds) violates all of these requirements. Thus, government bonds would seem to be a much better proxy for the risk free asset than NERA’s preferred alternative.

“Thirdly, even it were true that insured bonds were a better proxy for the risk free asset than government bonds, this conclusion would both raise the risk free rate within the CAPM and lower the market risk premium. NERA wrongly judges the latter effect to be zero and therefore overestimates the increment to the cost of equity for a firm.”

78. Concerning the first two criticisms, we agree with Lally provided that by “within the context of the CAPM” he means in a world where the only factor that determines all relative required returns is relative risk (as per the original model of the CAPM developed by Sharpe). In this hypothetical model, the correct selection of risk free rate is as described by Lally. However, what Lally fails to recognise is that the reason this is correct is because *all* assets in that hypothetical model have those attributes.
79. In the actual world in which we find ourselves (and in which the ESCV is charged to estimate *prevailing conditions in the market for funds and the risk involved in delivering the Reference Services*) the empirical literature is clear. Factors other than risk explain the difference between CGS yields and the cost of financing corporate debt and equity.
80. The flaw in Lally’s conclusion is highlighted by the below quote from directly under heading 3.2 “The appropriate choice of the CAPM risk free rate”.

*“To assess this question, it is necessary to consider the context within which the risk free rate is being sought. This context is that of the Capital Asset Pricing Model (CAPM: see Sharpe, 1964; Lintner, 1965; Mossin, 1966). The CAPM embodies the concept of a risk free asset, but it does not designate any particular asset of this type. In choosing an asset to provide the risk free rate, the only explicit requirement within the CAPM is that the rate of return on that asset be free of risk. There is an implicit requirement relating to liquidity, i.e., a very illiquid asset would be unsuitable **because illiquidity is (inter alia) a manifestation of high transaction costs and the CAPM assumes that there are no transactions costs.** In addition, there is an implicit requirement that no investor faces restrictions upon the purchase of this asset **because the model assumes that no such restrictions exist.** In addition, there is an implicit requirement that investors are not attracted to or repelled from the asset for reasons other than the probability distribution on its return, **because the model assumes that investors choose portfolios solely according to their return distributions.**”⁶ (Emphasis added.)*

81. The fact that a particular model of the CAPM assumes that there are zero transaction costs does not mean regulators can safely ignore the existence of transaction costs. This may be the case if the regulator’s task was to estimate the cost of capital under the hypothetical and stylised assumptions of the model. However, the regulators task is to estimate the cost of capital that actually does exist. If transaction costs are relevant to this then they cannot simply be ignored. Neither can other non-systematic risk characteristics (some of which Lally identifies above).
82. With respect to the third criticism. We note that Lally’s analysis assumes an equity beta of 1.0 which is not the ESCV’s position in the draft decision. At an equity beta of 0.7, any under-estimate of the risk free rate will result in under-estimate for the cost of equity – even if the MRP has been overestimated by the same amount. We also note that, assuming we are right concerning the existence of a bias, Lally only argues that we have overestimated the difference between the current bias and the historical average bias.
83. Finally, we note that Lally’s drafting may give a misleading impression to some readers concerning the consequences of default on a CDS insured corporate bond. On page 6 he states:

“In respect of default risk, Hull et al (2004) note that “insured bonds” are not insured against loss of accrued interest and are subject to the possibility of default by the “insurer”. They go on to argue that the latter effect is extremely small (ibid, page 2800) but they do not characterise the former

⁶ Page 4.

effect in that way. Consequently, insured bonds may be subject to non-trivial default risk. The yield on these bonds therefore overestimates the risk free rate."

84. Lally states that, while a CDS may insure the principle of a corporate bond, the fact that it doesn't insure the coupon payments means that investors lose the entire value of coupon payments in the event of default. While this is true, it ignores the fact that the principle (paid out under the CDS) can be reinvested. Thus, it is only to the extent that interest rates are lower at the time of default than implied by the bond's coupon that any default risk exists from this source (and, symmetrically, if interest rates are higher then the insured investor actually benefits from default).

APPENDIX B: A ROUGH CALCULATION OF THE IMPLIED PROBABILITY OF DEFAULT IN A SWAP MARGIN OF 88BP

85. If the entirety of a the 88bp spread between swaps and CGS is to be explained by default risk this must be explained by the potential loss of fixed interest payments in excess of floating payments (a value much less than the value of the notional principle) multiplied by the probability of default divided by the notional principle. That is, the following relationship must be satisfied:

$$0.0088*(1-P)*(Notional\ Principle)*10 = E(NPV\ of\ fixed\ less\ floating\ payments\ at\ default) \times P$$

where "P" is the probability of default

86. The left-hand-side of the above equation represents the amount of default compensation that will be paid in the event of no default over ten years multiplied by the probability of no default (1-P). The first term on the right-hand-side of the above equation is the expected loss that the party buying the fixed payment will incur if there is a default. A loss only exists if default occurs at a time when floating rates are lower than the contractually agreed fixed payment. The last term is simply the probability of default.
87. Now consider how these terms could possibly give rise to an 88bp annual risk premium. The actual swap rate on 1 August was 6.79%. Even if we aggressively assume that there is a 50% probability that interest rates will be half of 6.79% at the time of default and that any default will occur in five years time this only makes the first term on the right hand side roughly equal to 0.085% of the Notional Principle (=half of 6.79% * probability that interest rates are half of 6.79 * 5 years remaining after default = $\frac{1}{2} * 6.79\% * \frac{1}{2} * 5 = 0.085$).
88. Solving for P, the probability of default must be around 50% (remembering that there is a "P" term on the left hand side also) if this is to explain the observed spread to CGS.

89. We have read and considered the Federal Court Guidelines on Expert Witnesses. We have made all inquiries that we believe are desirable and appropriate to answer our terms of reference. No matters of significance that we regard as relevant have to our knowledge been withheld.

Thomas Nicholas Hird

Bruce David Grundy

26 October 2007

C E C G*Competition and Regulatory Economists*

Tom Hird is a founding Director of CECG's Australian operations. Tom has a Ph.D. in Economics from Monash University. Tom is also an Honorary Fellow of the Faculty of Economics at Monash University. Tom has 18 years professional experience in the economic analysis of markets and the provision of expert advice in litigation, business strategy, and policy contexts.

Prior to forming CECG Tom was an Associate Director at NERA economic consulting and prior to that was a senior officer in the Australian Commonwealth Treasury.

Tom's clients include private businesses and government agencies, including the World Bank and national regulators. Tom has advised clients on matters pertaining to: valuation, cost of capital, competition policy issues, merger clearance processes, restraints of trade, vertical and horizontal effects of transactions, access to bottleneck facilities.

Tom's industry experience spans the, aviation, electricity and gas transport, electricity generation, finance, ports, rail transport, retailing, industrial packaging, telecommunications and tourism sectors. In terms of geographical coverage, Tom's clients have included businesses and government agencies in Australia, Europe, New Zealand, Macau, Singapore and the Philippines. Selected assignments on the cost of capital include:

2007

Advising the Energy Networks Association on the appropriate estimation technique for the risk free rate used in CAPM modeling.

Advising on the cost of capital for ACTEW's water and waste water operations.

Advising on the cost of capital for Victorian electricity distributors' metering operations.

2006

Advising the Australian Energy Regulator on the cost capital issues in relation to the RBP pipeline access arrangement.

Advising on the cost capital issues in relation to the cost modeling of Telecom New Zealand's TSO obligations

2005

Advising on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

Advising the Australian Competition and Consumer Commission, Australia on the potential for asymmetric costs of errors in WACC estimation.

Advising Prime Infrastructure on the relative merits of the QCA's draft cost of capital decision for Queensland electricity distribution.

2004

Advising the Australian Competition and Consumer Commission, Australia on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

Advising TransGrid on CBASpectrum's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

Provided a report for Prime Infrastructure the weighted average cost of capital for its regulated activities (coal shipping terminal).

2003

Critique of the ACCC's statistical interpretation of historical proxy beta in its review of the Statement of Principles for the Regulation of Transmission Revenues.

Tom Hird | Director | C E C G
 | T: + 61 3 9504 6027 | M: 0404 506 891
 | E: tom.hird@cecg.com.au

Detailed Project Experience (Updated Dec 2006)

Market Design and Competition Analysis

2006 Melbourne Water Industry, Australia
Market Design – Bulk Water Sector

Developing reform proposals to facilitate the introduction of tradeable bulk water rights to the Melbourne system – including the specification of operational market rules.

2006 Australian Competition and Consumer Commission, Australia
Merger Analysis – Electricity Industry

Providing expert opinion as well as strategic guidance to the Australian Competition and Consumer Commission (ACCC) on the competitive implications of a merger.

2006 Confidential, Australia
Section 46 of the TPA - Telecommunications

Providing expert opinion in relation to an action under Section 46 of the Trade Practices Act.

2006 Australian Competition and Consumer Commission, Australia
Merger Analysis - Transport Industry

Providing expert opinion as well as strategic guidance to the Australian Competition and Consumer Commission (ACCC) on the competitive implications of proposed merger between Toll and Patrick.

2005 Confidential, Australia
Merger Analysis - Telecommunications Industry

Providing expert opinion as well as strategic guidance to the merging firms on the competitive implications of that merger.

2005 AirServices Australia (ASA), Australia
Review of Pricing Conduct

Providing expert opinion to ASA on pricing for its services at Australian Airports. Including an examination of allegations that pricing contravened National Competition Agreements.

2001-2005 TransGrid, Australia
Market for transmission

Analysis of the design of the National Electricity Market (NEM) and its implications for efficient investment in generation and transmission assets. This work has involved providing private advice to TrnasGrid as well as public policy documents such as drafting TransGrid's submission to the US energy regulator (FERC) on market design.

2005 Confidential, Australia
Competition Assessment of Pricing Strategy

Advising a large corporate on the economic implications of the Trade Practices Act for its pricing conduct.

2005 Australian Competition and Consumer Commission, Australia
Competition Assessment of Electricity Generation Merger

Advised the ACCC on the competition concerns (and potential remedies) associated with a specific proposed merger of electricity generation interests.

2004 Australian Competition and Consumer Commission, Australia
Competition Impact of Exclusive Rights to Content

Provided a public report to the ACCC on the competition concerns (and potential remedies) associated with the use of exclusive rights to content by incumbent telecommunications infrastructure owners.

2004 Australian Competition and Consumer Commission, Australia
Empirical Evidence of Predatory Pricing in Telecommunications

Provided the ACCC with an expert report that developed an imputation test framework and empirical model to test allegations of predatory pricing of broadband services.

2003/04 Singtel Optus, Australia
Expert Report on Market Definition and Existence of Market Power in Mobile Termination

Provided Optus with an expert report on the appropriate market definition to use in analysing competition between mobile network operators in providing terminating access.

2003/04 Singtel Optus, Australia
Expert Economic Advice on Competition Complaint

Providing Optus advice on a confidential competition complaint relating to the exercise of market power by one of Optus' competitors.

2001-03 QANTAS

Advice on Competition Law and Predation Allegations

Provided input into NERA's advise in relation to allegations of anticompetitive behaviour under section 46 of the Trade Practice Act.

2002 National Competition Council (NCC), Australia

Exploitation of Market Power by a Gas Pipeline

Provided a report to the NCC in which we developed a number of tests for whether current transmission prices were evidence of the exploitation of market power by a gas transmission pipeline. Also provided a separate report that applied these tests. This analysis was used to inform the NCCs decision on whether to recommend the pipeline in question be subject to regulation under the Australian Gas Code.

Cost of Capital Issues

2006 ACTEW Corporation, Australia

Cost of Capital

Advising on the cost of capital for ACTEW's water and waste water operations.

2006 AER, Australia

Cost of Capital

Advising on the cost capital issues in relation to the RBP pipeline access arrangement.

2006 Integral Energy, Australia

Cost of Capital

Advising on the cost of capital for Integral's retail operations.

2006 Telecom New Zealand, New Zealand

Cost of Capital

Advising on the cost capital issues in relation to TSO.

2005 Energy Networks Association, Australia

Debt Margin

Advising on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2005 The Victorian ESC, Australia

Cost of Capital

Advice on the cost of capital for electricity distribution network assets.

2005 The Australian Competition and Consumer Commission, Australia
Cost of Capital

Advice on asymmetric costs of errors in WACC estimation.

2005 Prime Infrastructure, Australia

Weighted Average Cost of Capital

Provided a report for Prime Infrastructure critiquing the QCA's draft cost of capital decision for Queensland electricity distribution.

2004 The Australian Competition and Consumer Commission, Australia
Cost of Capital

Provided a report advising on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

2004 ETSA Utilities, Australia
Weighted Average Cost of Capital

Provided a report for ETSA examining the use of historical proxy betas.

2004 ActewAGL, Australia
Weighted Average Cost of Capital

Provided a report for ActewAGL estimating its weighted average cost of capital for regulated activities (gas distribution).

2004 TransGrid, Australia
Debt Margin

Provided a report critiquing CBASpectrum's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2004 Prime Infrastructure, Australia
Weighted Average Cost of Capital

Provided a report for Prime Infrastructure the weighted average cost of capital for its regulated activities (coal shipping terminal).

2004 ActewAGL, Australia

Debt Margin

Provided a report for ActewAGL advising on the appropriate calculation of debt margins for BBB+ ten year bonds.

2003 Electricity Transmission Service Providers, Australia
Expert Report on the Use of Historical Proxy Betas

Critique of the ACCC's statistical interpretation of historical proxy beta in its review of the Statement of Principles for the Regulation of Transmission Revenues.

2003 Orion, New Zealand
Cost of Capital

Critique of Associate Professor Lally's advice on the Cost of Capital for New Zealand Electricity Distribution .

2003 TransGrid, Australia
Expert Report on TransGrid's WACC

Advising TransGrid on the appropriate weighted average cost of capital (WACC) for its regulated assets

2003 EnergyAustralia, NSW, Australia
Advice on Financial Capital Maintenance

Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2002 Rail Access Corporation, Australia
Hurdle Rates of Return

Advising rail access corporation on the appropriate hurdle rates of return that should be applied when assessing competing investments.

2002 Integral Energy, Australia
Return on Capital

Advising Integral Energy on what risk adjusted regulatory return on capital is necessary to provide sufficient incentive to invest in new infrastructure assets.

2001 TransGrid, Australia
Advice on ACCC's Powerlink WACC decision

A report critically appraising the ACCC's decision regarding Powerlink's weighted average cost of capital (WACC).

2001 Optus, Australia
Affidavit on Telstra's PSTN WACC

Providing expert testimony to the Australian Competition Tribunal on Telstra' use of the CAPM model to determine an appropriate rate of return on PSTN assets.

2001 Australian Competition and Consumer Commission, Australia
International Comparison of WACC Parameters

Preparation of a report on international and domestic WACC parameters and the potential impact of variations in declared WACCs on incentives to invest in various regulatory jurisdictions.

General Regulatory Analysis

2006 GDSE, Macau, SAR PRC
Efficient Electricity Tariff Reform

Advise the Macau regulator (GDSE) on efficient tariff reform for the vertically integrated generation and network provider. This involved estimating the LRMC on maximum demand and translating this into efficient tariff designs given relevant constraints (eg, metering constraints).

2005/06 Integral Energy, Australia
Efficient Electricity Tariff Reform

Advise Integral Energy on its LRMC of meeting growing network demand and on how this could be reflected in efficient tariff design (including design of critical peak pricing).

2005 Telecom New Zealand, New Zealand
Modelling of New Entrant Costs for TSO

Provide expert reports on the correct methodology for calculating the cost of providing the TSO (universal service obligation) using new entrant costs.

2005 Telecom New Zealand, New Zealand
Operating Cost Benchmarks

Advised Telecom on appropriate operating cost benchmarks for telecommunications services

2005 TransGrid, Australia
Capital Expenditure Indexation

Advised TransGrid on the development of a price index to reflect movements in the unit costs of inputs into its capital expenditure program.

2005 TransGrid, Australia
Forecast of Capital Expenditure

Advised TransGrid on appropriate adjustments to forecast capital expenditure to take account of material increases in demand for investment in future Australian electricity infrastructure.

2005 TransGrid, Australia
ACCC's Capital Expenditure Regime

Advised TransGrid on the ACCC's proposed regulatory regime to apply to capital expenditure.

2005 Actew, Australia
Financing of New Infrastructure

Advised Actew on options for financing new infrastructure.

2004 Telecom New Zealand, New Zealand
Avoided Retail Cost Study

Developing an avoided cost study associated with Telecom's fixed line retail activities.

2004 TransGrid, Australia
Fair Sharing of Efficiency Gains

Provided a report to TransGrid advising on whether the ACCC's draft decision was consistent with the National Electricity Code's requirement that there be a 'fair sharing' of efficiency gains.

2004 Australian Competition and Consumer Commission, Australia
Asset Valuation Report

Provided an expert report to the ACCC on the calculation of depreciated optimised replacement cost (DORC) in the context of the EAPL's appeal of the ACCC's valuation of its Moomba to Sydney pipeline.

2004 ESCOSA, Australia

Incentive Regulation

Provided ESCOSA with a report on the appropriate mechanism to provide ETSA Utilities with an incentive to achieve cost reductions in operating and capital expenditure.

2004 Perisher Blue Ltd, Australia
Review of Municipal Services

Assisted PBL with its submission to IPART on the review of municipal services (roads, waste, water and sewerage) at the Perisher Blue Resort.

2004 TransGrid, Australia
ACCC Regulatory Review

Assisted TransGrid in drafting its Application to the ACCC for regulated revenues and in its response to the ACCC's draft decision.

2003 Telecom New Zealand, New Zealand
Expert Report on Efficient Recovery of CSO Costs

Provided Telecom with a report stepping through all the information necessary to administer recovery of CSO costs in a manner consistent with "Ramsey efficient" pricing. The purpose of this was to inform the NZ Commerce Commission of the practical difficulties associated with pursuing such an outcome.

2003 EnergyAustralia, NSW, Australia
Advice on Financial Capital Maintenance

Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2003 Optus, Australia
Critique of Telstra's Access Undertaking for PSTN Services

Advising Optus in relation to the reasonableness of Telstra's cost modelling assumptions underlying its access undertaking for PSTN services.

2003 Optus, Australia
Indicative Pricing Principles

Advising Optus in relation to appropriate pricing principles the ACCC should adopt when establishing indicative prices for access to PSTN services.

2003 Optus, Australia
Estimation and Recovery of Telstra's Access Deficit

Provided a report to the ACCC on behalf of Optus addressing the appropriate measurement of any 'access deficit' that may exist between the cost to Telstra of its access network and the revenues associated with that network. Also examined the most appropriate recovery methodology for any access deficit.

2003 Rail Infrastructure Corporation, NSW, Australia
Expert Report on Hurdle Rates of Return

Advising RIC on the appropriate WACC each division should use as a hurdle rate of return when assessing competing capital projects.

2003 Telecom New Zealand, New Zealand
Expert at Commerce Commission Hearing

Provided expert testimony to the NZ Commerce Commission on the appropriate calculation of a wholesale discount for regulated services.

2002 Telecom New Zealand, New Zealand
'Intelligent' Wholesale Benchmarking Report

Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted wholesale prices in the United States for differences in cost drivers (in terms of the cost of capital and labour) compared to New Zealand.

2002 Telecom New Zealand, New Zealand
Interconnection Pricing

Advised Telecom New Zealand on the potential forms of price control the New Zealand Commerce Commission could adopt in regulating PSTN interconnection prices.

2002 Telecom New Zealand, New Zealand
'Intelligent' Interconnection Benchmarking Report

Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted interconnection prices in Europe, Australia and the United States for differences in cost drivers (in terms of switching and transmission economies of scale, transmission link lengths and the cost of capital and labour) compared to New Zealand.

2002 SPI PowerNet, Australia

Design of Efficiency Carryover Mechanism

Advised SPI PowerNet on the appropriate design of an efficiency carryover mechanism intended to share efficiency gains between a regulated business and its customers.

2002 SPI PowerNet, Australia
ReOptimisation of Transmission Assets

Advised SPI PowerNet on the appropriate approach to calculating the value of assets previously optimised out of its regulatory asset base and now being “un-optimised” due to greater utilisation levels of those assets.

2002 SPI PowerNet, Australia
Strategic Adviser on Revenue Reset Application

Advised SPI PowerNet on a range of high level issues in relation to their regulated revenue reset application, including appropriate drafting and consistency of argument throughout the document. Presented aspects of SPI PowerNet’s application to the ACCC and in an ACCC sponsored regulatory public forum.

2002 Telecom New Zealand, New Zealand
Review of Interconnection Benchmarking Report

Advised Telecom New Zealand on issues arising out of an Interconnection Benchmarking report commissioned by the Commerce Commission of New Zealand for the purpose of setting interim interconnection charges. This role included the submission of a report to the Commerce Commission and presentation of the findings of that report at a Commerce Commission hearing.

2002 Australian Pipeline Trust, Australia
Expert Advice on CPI Indexation

Advised APT in relation to a dispute with customers on the appropriate CPI indexation adjustment of prices for the impact of the GST required under the Trade Practices Act.

2002 EnergyAustralia, Australia
Pricing Strategy Under a Price Cap

Advised EnergyAustralia on the commercial implications for pricing strategies under a weighted average price cap.

2001 IPART, Australia
Minimum Standards in Regulation of Gas and Electricity Distribution

Advised the NSW regulator on the appropriate role of minimum standards in regulatory regimes and how this could be practically implemented in NSW.

2001-03 Rail Infrastructure Corporation, New South Wales
Preparation of access undertaking

Advised on all economic aspects arising in the preparation of an access undertaking for the New South Wales rail network. Issues arising include: pricing principles under a 'negotiate and arbitrate' framework, asset valuation, efficient costs, capacity allocation and trading, and cost of capital.

2001 Australian Competition and Consumer Commission, Australia
Determination of Local Call Resale Prices

The ACCC's expert regarding the determination of local call resale prices from Telstra's fixed line network. This involved the application, and manipulation, of the Australian incumbent's (Telstra's) regulatory accounting framework to determine appropriate wholesale prices.

2001 All NSW electricity distribution businesses, Australia
Form of Price Control

Advice on the economic efficiency implications of various forms of price control that can be applied under the National Electricity Code.

2001 Wesfarmers, Australia
Expert Advice on Reasonable Cost Recovery

Advising Wesfarmers in relation to a dispute with customers on reasonable recovery of costs of coal production.

2001 Integral Energy, Australia
Pricing Strategy Paper

Advising on appropriate pricing strategy for Integral's electricity distribution business, including advice on an appropriate regulatory engagement strategy.

2001 TransGrid, SPI PowerNet and GPU GasNet, Australia
CPI Indexation Adjustment

Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2001 All NSW gas and electricity distribution businesses, Australia
CPI Indexation Adjustment

Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2000 One.Tel, Australia
ULL Pricing

Advising OneTel in their arbitration with Telstra on pricing for access to the unbundled local loop.

2000 Electricity Supply Association of Australia and Australian Gas Association,
Adjusting the Regulatory Regime for the Impact of Tax Reform

Advised the peak energy bodies on the implications of tax reform on their members under the Trade Practices Act.

2000 Victorian Department of Treasury and Finance, Australia
State Business Tax Reform

Advised the Department of Treasury and Finance on State business tax reform including in relation to the relative economic costs associated with payroll, stamp duty and other transaction taxes.

1999 Independent Pricing and Regulatory Tribunal of NSW
Various energy regulation issues

Advice on a range of issues in regulation of the NSW energy sector.

1990-99 Commonwealth Treasury, Australia
Various economic policy issues

Provided input in the formulation of a number of economic policies. These included: the year 2000 reforms of the Australian indirect and corporate tax regimes; reform of the social security system and labour market regulation; economic forecasting and monetary policy monitoring; reform to the regulation of the Australian financial system.

Application of Regulatory Test for Network Augmentation

2003 TransGrid, NSW Australia
Submission to the ACCC's Review of the Regulatory Test

Advised TransGrid in response to the ACCC's Discussion Paper on the review of the regulatory test. Tom prepared a report which commented both on the ACCC's proposal to amend the regulatory test to improve clarity and to ensure consistency

with the provisions in the National Electricity Code, and also on the ACCC's proposed options for incorporating 'competition benefits' in the regulatory test.

2003 Clayton Utz, TransGrid, NSW, Australia
Murraylink's Application for Regulated Status

Tom advised TransGrid and Clayton Utz in responding to Murraylink's Application to the ACCC for regulated status, and, in particular, Murraylink's use of the regulatory test to derive a regulatory asset value.

Tom also advised TransGrid in responding to the ACCC's Preliminary View on Murraylink's Application, and helped draft a further report commenting on aspects of the ACCC's approach.

2001-03 TransGrid, NSW, Australia
Application of the regulatory test to network augmentation in the Western Area

Advised TransGrid on the application of the regulatory for intra-regional network augmentation planned for the Western Area of NSW. The application highlighted issues in applying the regulatory test in a situation where an agreed reliability standard is not currently met.

Commercial Asset Valuation

2002 Screenrights, Australia

Advice on methodologies used to estimate the value of retransmitting copyright content contained in local free-to-air broadcast.

General Policy Analysis

2003 Betfair, UK
The Impact of Internet Betting Exchanges on the Racing Industry

This project involved estimating bounds for the price elasticity of demand for wagering in Australia and using these to determine the likely impact of licensing internet betting exchanges to compete with existing TAB wagering operations. This project also involved modelling the impact on wagering tax rates required to achieve revenue neutrality under various price elasticity scenarios.

2002 Marsh, Australia
The Impact of Taxation on Levels of Property Insurance

This project involved estimating the number of uninsured households destroyed in the recent NSW bushfires that would otherwise have been insured if the only tax

insurance premiums were subject to was GST. The methodology used was based on evidence from studies of the price responsiveness of demand for property insurance in the US and Australian evidence on the proportion of people without home or contents insurance.

Educational Services

2006 RMIT University, Australia
Economics Unit for MBA

Developed the course materials for the economics unit in RMIT's MBA course.

Speeches, Presentations and Testimony

2005 International Telecommunications Society regional Conference, Perth, Stepping over the Competitive Line.

2005 ACCC Regulatory Conference, Gold Coast, Exclusive Rights to Content and Competition in Telecommunications.

2005 sworn expert testimony to the South Australian District Court critiquing the ESCOSA cost of capital determination for ETSA Utilities.

2004, Office of the Water Regulator, Perth, Cost Benchmarking – Practical Pitfalls.

2004, ACCC Conference of Regulatory Principles for Electricity Transmission, Melbourne, Drawing a Line in the Sand on Cost of Capital Issues.

2004, Macquarie Bank, internal presentation on regulatory risk across jurisdictions and industries, Terrigal.

2003 ACCC Regulatory Conference, Gold Coast, Anticompetitive Pricing in Telecommunications.

2003 ACCC Conference on SPI PowerNet Regulatory Decision, presentation on the operation of the efficiency carryover.

2002 International Telecommunications Society regional Conference, Perth, TSLRIC Regulation and Leverage of Market Power.

Bruce D. Grundy

Curriculum Vita

June 2007

Department of Finance, Faculty of Economics & Commerce

The University of Melbourne, Victoria 3010 AUSTRALIA

Education

PhD, Finance, Graduate School of Business, University of Chicago. 1992.

Specialisations:

Finance and Economics. Beta Gamma Sigma. Dissertation: "Preferreds and Taxes."

Committee: Merton Miller (Chairman), George Constantinides, Douglas Diamond.

B. Com. Honours (1st Class), University of Queensland. 1977.**Academic Positions**

Professor of Finance, University of Melbourne 2005-.

Adjunct Professor of Finance, The Wharton School, University of Pennsylvania, 2005-2007.

Ian Potter Professor, Melbourne Business School, 2000-2005.

Professor of Finance, University of Melbourne, 1998-1999.

Andrew Heyer Assistant Professor of Finance, The Wharton School, University of Pennsylvania, 1991-98.

Assistant Professor of Finance, Graduate School of Business, Stanford University, 1985-90.

Visiting Positions:

Visiting Professor, Macquarie University, 1994.

Metzler Bank Professor, Johann Wolfgang Goethe-Universität Frankfurt am Main 1998.

Visiting Professor, University of Chicago, 2003.

Visiting Professor, Singapore Management University, Fall 2005.

Publications

"Combining skill and capital: Alternate mechanisms for achieving an optimal fund size," 2007, forthcoming *Pacific-Basin Finance Journal*.

"Disclosure, hidden charges and indexed pensions," 2005, *Agenda: A Journal of Policy Analysis and Reform*, 12(1), 33-46. Co-authors: Diana Beal and Sarath Delpachitra.

"Stock market volatility in a heterogeneous information economy," 2002, *Journal of Financial and Quantitative Analysis* 37(1), 1-27. Co-author: Youngsoo Kim.

"Momentum: Fact or factor? Momentum investing when returns have a factor structure,"

2001, *Review of Financial Studies* 14(1), 29-78. Co-author: Spencer Martin.

"Merton H. Miller: His contribution to financial economics," 2001, *Journal of Finance* 56(4),

1183-1206.

"Generalized properties of option prices," 1996, *Journal of Finance* 51(5), 1573-1610. Co-

authors: Yaacov Bergman and Zvi Wiener.

"Option prices and the underlying asset's return distribution," 1991, *Journal of Finance* 46(3),

1045-1070.

"Changing risk, changing risk premiums, and dividend yield effects," 1990, *Journal of Business*

63(1), 51-70. Co-authors: Nai-fu Chen and Robert F. Stambaugh.

"Optimal investment with stock repurchase and financing as signals," 1989, *Review of*

Financial Studies 2(4), 445-465. Co-author: George Constantinides.

"Trade and the revelation of information through prices and direct disclosure," 1989, *Review*

of Financial Studies 2(4), 495-526. Co-author: Maureen McNichols.

"Call and conversion of convertible corporate bonds: theory and evidence," 1986,

Seminar on the Analysis of Security Prices 31, 35-70. Co-author: George Constantinides.

"The behavior of stock prices around ex-dividend dates," 1983, *Seminar on the Analysis of Security Prices* 28, 83-114.

Edited Volumes

Selected Works of Merton Miller: A Celebration of Markets. Vol I Finance, 2002
(University of Chicago Press, Chicago, Ill).

Selected Works of Merton Miller: A Celebration of Markets. Vol II Economics, 2002
(University of Chicago Press, Chicago, Ill).

Other

"Book Review: *Pricing and hedging of derivative securities* by Lars Tyge Nielsen,"
2000, *Journal of Financial Research* 23, 391-394.

"Stock return predictability in rational markets," 2007, *Insights: Melbourne Economics & Commerce* 1, 35-40.

Under Review

"Optimal exercise and valuation of real options: The effects of uncertainty and asymmetric information," 2006, under review *Review of Financial Studies*. Co-author: Johannes Raaballe.

"The Analysis of VaR, deltas, and state prices: A new approach," 2006, under review *Review of Finance*. Co-author: Zvi Wiener.

"Leadership giving in charitable fund-raising: Matching grants or seed money?" 2007, under review, *Journal of Political Economy*. Co-author: Ning Gong

Work-in-Progress

"Valuing complex compensation packages," Co-author Steve Usher

"Macro-economic and market microstructure determinants of implied volatility," Co-author Paul Kofman

"A rational model of momentum and contrarian return behaviour," Co-authors Wei Li and Joe Zhang

"Storage and the Hotelling valuation principle: Understanding the dynamics of the oil industry," Co-author Richard Heaney

"Do socially responsible firms add value for their employees? – A theoretical examination of corporate employee matching grant programs," Co-author: Ning Gong.

"Efficiency and governance of charitable organizations," Co-author: Ning Gong.

"Multiplicative risk prudence," Co-authors: Xin Chang and George Wong.

"How much does options backdating cost shareholders?" Co-authors: Randy Heron and Rob Neal.

"Option prices, implied abnormal returns and momentum," Co-authors: Greg Clinch, John Lyon and Gary Twite.

Awards

1998 Geewax-Terker Prize

1994-95 Batterymarch Fellowship

1994 Hauck Award

1993 Outstanding Teaching Award (Wharton)

Grants

National Science Foundation Grant, "Call and conversion of convertible bonds" 1985-1987, joint with George Constantinides, US\$300,000

Australian Research Grants Council Discovery Grant, "Storage and the Hotelling Valuation Principle: Understanding the Dynamics of the Oil Industry" 2007-09, joint with Richard Heaney. \$345,000

Australian Research Grants Council Discovery Grant, "Three Decades of Financial Distress and Corporate Restructuring in Australia" 2008-10, joint with Paul Kofman and Howard Chan. \$104,537

Professional Society Activities

Director: Asian Finance Association

Founding Member: Australian Financial Integrity Research Network

Fellow: Australian Society of Certified Practicing Accountants.

Participant: Financial Integrity Research Network

Member: Asian Finance Association, American Economics Association, American Finance Association, American Mathematical Society, European Finance Association, Western Finance Association.

Reviewer: Australian Accounting Research Foundation Exposure Draft on Director and

Executive Disclosures.

Doctoral Colloquium Fellow: AFAANZ 2003 Colloquium, 2005 Colloquium.

Doctoral Consortium Fellow: AFAANZ 2004 Consortium

Asian Finance Association Doctorial Consortium 2005: Faculty Fellow

Australian Society of CPA's 1999 Research Lecture

Founding Member Financial Integrity Research Network (FIRN)

FIRN Doctoral Tutorial Discussant: 2005-07.

FIRN Local Convener: 2006-07.

Managing Editor:

International Review of Finance, 2004-present

Associate Editor:

Journal of Finance, 2000-2003

Journal of Financial Research, 1999-2006

Accounting and Finance, 1999-2002.

Journal of Financial and Quantitative Analysis, 1992-1996.

Review of Financial Studies, 1988-1994.

Editorial Board:

Accounting and Finance, 2002-present

Business Research, 2007-present

Ad Hoc Referee:

Agenda, American Economic Review, Australian Journal of Management, Accounting and Finance, European Economic Review, European Journal of Finance, Financial Management, Financial Review, Journal of Accounting Research, Journal of Business, Journal of Business and Economic Statistics, Journal of Finance, Journal of Financial Economics, Journal of Financial Intermediation, Journal of Political Economy, Journal of Public Economics, Management Science, Mathematical Finance, Review of Accounting Studies, Review of Quantitative Finance and Accounting, Quarterly Journal of Economics.

Program Committee:

American Economics Association Meetings: 1998.

American Finance Association Meetings: 2001.

Asian Finance Association Meetings: 2004, 2005, 2006.

European Finance Association Meetings: 2000, 2001, 2002 and 2005.

European Financial Management Association Meetings: 1999.

Indiana University Symposium on Design of Securities and Markets: 1993.

Journal of Accounting Research Annual Conference: 2002, 2003.

Western Finance Association Meetings: 1990-91, 1994-95, 1997-98, 2004, 2007-08.

Review of Accounting Studies Annual Conference: 2004, 2005.

Reviewer:

Research Grants Council of Hong Kong: 1997, 2000, 2004 and 2005.

National Science Foundation Proposals: 1990, 1991, 1994 and 1997.

Australian Research Council: 1994, 1995 and 2007.

Social Sciences and Humanities Research Council of Canada: 1993 and 1994.

Discussant:

American Finance Association Meetings: 1986-900, 1994-95, 2006.

Annual Conference on Financial Economics and Accounting: 1992 and 1996.

Asia-Pacific Finance Association Meetings: 1999.

Asian Finance Association Meetings: 2004-06.

European Finance Association Meetings: 1995, 2002, 2005.

Fifth Annual Texas Finance Festival: 2003.

Ph.D. Conference in Economics and Business: 1999.

Simulation Based & Finite Sample Inference in Finance Conference: 2003.

Western Finance Association Meetings: 1993 and 1997.

Session Chair:

Accounting & Finance Association of Australia and New Zealand Meetings: 2003-05.

Asian Finance Association Meetings: 2004-06.

Australasian Finance & Banking Conference: 2003

American Finance Association Meetings: 2001.

European Finance Association Meetings: 2002, 2005.

Western Finance Association Meetings: 1995.

Keynote Speaker:

Accounting & Finance Association of Australia and New Zealand Meetings: 2003.

Australasian Banking & Finance Conference: 2002.

Organizer:

The Dollars and Sense of Bank Consolidation: MBS Conference 2002.

Risk Management and Pricing for Financial Institutions: Lessons from the Closed-End Fund Industry: Wharton Financial Institutions Center Conference 1995.

Panelist:

Tax Issues in Capital Structure and Dividends. Uni. of Chicago, GSB Conference 1994.

Conference Presentations:

34th Conference of Economists: 2005.

Asian Finance Association Meetings: 2004 and 2005.

Australasian Q-group: 1999, 2004.

HKUST Finance Symposium: 2004.

Third National Symposium on Financial Mathematics: 2004.

AGSM Finance and Accounting Camp: 1996, 1997 and 1999.

American Finance Association Meetings: 1986, 1989, 1990, 1996, 1997 and 1998.

NBER Summer Institute: 1998.

Annual Conference in Financial Economics and Accounting: 1995 and 1996.

American Mathematical Society Meetings: 1996.

European Finance Association Meetings: 1995, 2002, 2005.

NBER Financial Risk Assessment and Management Conference: 1995.

N.J.C.R.F.S. Conference in Security Design and Innovations in Financing: 1993.

Western Finance Association Meetings: 1984, 1989 and 1993.

Sixth Annual Conference MSMESB: 1991.

Australasian Banking and Finance Conference: 1989.

Finance Seminar Presentations:

Aarhus, Alberta, Australian Graduate School of Management, Australian National University, Bond University, Boston College, Carnegie-Mellon, Central Queensland University, Chicago, Columbia, Commodity Futures Trading Commission, Cornell, Dartmouth, Duke, Fields Institute, Frankfurt am Main, Hong Kong University of Science and Technology, Houston, Humboldt, Insead, London Business School, London School of Economics, Macquarie, Maryland, Massey University, Melbourne Business School, Michigan, Minnesota, MIT, Monash, Monash-Mt Eliza, National University of Singapore, New York University, Northwestern, Odense, Ohio State University, Oregon, Queens, Queensland University of Technology, Rutgers, Singapore Management University, Stanford, University of Adelaide, University of British Columbia, University of California Berkley, University of California Irvine, University of California Los Angeles, University of Illinois Champaign, University of Melbourne, University of New South Wales, University of North Carolina Chapel Hill, University of Queensland, University of Sydney, University of Technology Sydney, University of Western Australia, Vanderbilt, Victoria University, Washington University, Yale.

Teaching Experience

Derivatives-related courses: Honours, Masters and PhD courses on options, futures, swaps, mortgage-backed securities and exotics.

Corporate Finance-related courses: Honours, Masters and PhD courses on capital budgeting,

mergers and acquisitions, corporate taxation, agency problems, information asymmetries, and security design.

Corporate Governance: MBA course

Real Options and Resource Projects: MBA course

Financial Management: Executive MBA course

Executive Education:

ABN Amro, Australian Graduate School of Management, KPMG, Liechtenstein Global Trust, Melbourne Business School, PaperLinx, PWC, Susquehanna Investment Group, Telstra Risk Management and Assurance, Turkish Capital Markets Board, Wharton School Pension Funds and Money Management Program

Member of Thesis Committees.

Completed: Ken Bechmann (Copenhagen Business School), Jacob Boudoukh (New York University), Jennifer Carpenter (New York University), Adam Dunsby (Goldman Sachs), Michael Gallmeyer (Carnegie-Mellon), Pekka Heitala (Insead), Terry Hildebrand (Enron), Ron Kaniel (University of Texas), Youngsoo Kim (Alberta), Michele Kreisler (Morgan Stanley), Guan Hua Lim (University of Singapore), Spencer Martin (Ohio State), Krishnan Maheswaran (Melbourne University), Ed Nelling (Georgia State), Ian O'Connor (Melbourne University), Rob Reider (J.P Morgan), Mark Vargus (University of Michigan).

In Progress: Hui Li, Mahmoud Agha, Zhenhua Liu

External Examiner: Aarhus University, University of Technology Sydney, University of Sydney.

Administrative Positions

University of Melbourne

Cost Containment Committee, 2007-.

Business@Melbourne Coordinating Committee, 2007-.

Melbourne Business School Committee, 2006-.

University of Melbourne, Faculty of Economics & Commerce:

Deputy Dean, 2006-.

Convener Melbourne Derivatives Research Group, 2006-.

Convener Finance Seminar, 2007-.

Accounting and Finance Department Committee, 1999.

Research and Research Training Committee, 1999.

University of Melbourne, Melbourne Business School:

Director Ian Potter Center for Financial Studies, 2000-2005

Academic Planning and Development Committee, 2002-2005.

Curriculum Committee, 2002-2005.

Seminar Convener, 2000-2005.

The Wharton School:

Convenor Corporate Finance Workshop, 1995-1997.

Wharton Fellows Fund Selection Committee, 1993-1997.

Recruiting Committee, 1995-1996.

Finance Seminar Convener, 1992-1994.

Stanford Graduate School of Business:

Finance Seminar Convener, 1988-1990.

Deans Advisory Committee, 1986-1988.

Consulting experience

Bruce Grundy is an academic associate with the Competition Economics Consulting Group (CECG)

http://www.cecg.com.au/templates/cec/page/page_html_standard.php?secID=42

Consulting work since returning to Australia with entities other than CECG

1. Valuation of Complex Securities and Contracts

Minter Ellison: Report on the Residual Risk Fee Component of the Tied Contract between the Commonwealth of Australia and Macquarie

Blake Dawson Waldron: Report on Valuations Necessary for the Implementation of the Land Rich Test of the West Australian Stamp Act

ABN AMRO: Valuation of Digital Options

Warburg Dillon Read: Valuation of Asian Digital Quantos

Frontier Economics: Report on the Opportunity Cost of Capital and the Interchange Fee

Victorian Department of Treasury & Finance: Report on Potential Restructuring of Smelter Power Supply Arrangements

SG Hambros: Report on Terms of Potential Acquisition Contract

Equity Trustees: Report on Shareholders' Required Returns

Colonial Sugar Refining: Report on the Valuation of Rolling Insurance on Sugar Prices

2. Valuation of Executive Compensation Contracts

Clayton Utz: Valuation of Executive Stock Options

National Economic Research Associates (White Plains NY): Report on the Valuation of Venture Capital Contracts

BHP Billiton: Report on the Valuation of Long Term Incentive Plans

3. Regulatory Issues

Deacons: East Australian Gas Pipeline Limited v. ACCC

Freehills: Telstra PSTN Review and the Value of Real Options

National Economic Research Associates (Sydney): Critique of ICRC Draft Decision on the Cost of Capital: A Report for ActewAGL

National Economic Research Associates (Sydney): Critique of CBASpectrum Estimates of Credit Spreads on Corporate Bonds

National Economic Research Associates (Sydney): Report on Transgrid Rate Review

National Economic Research Associates (Sydney): Report on the Bias in Indexed CGS Yields as a Proxy for the CAPM Risk Free Rate

National Foods: Report on New Zealand Commerce Commissions determination of the Existence of an "Associated Parties" Relationship

4. Valuation of Real Assets

BHP Billiton: Report on the Discount Rate Applicable to the Valuation of Closure Costs

BHP Billiton: Report on the Valuation of a Gold By-Product Stream

Woodside Energy: Review of Capital Budgeting Techniques

5. Asset Management

Western Mining Corporation: Report on Superannuation Fund Investment Strategy and Structure Review

Dimensional Fund Advisors: Report on the Price of Franking Credits and Implications for Investor Preferences

Jardine Fleming Capital Partners: Trinity Best Practice Committee 2000-present

Plato Investment Management: Academic Board 2006-present

Mellon Capital Management: Academic Advisor 2000-2004

