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Estimating the Required Rate of Return on Equity for a Gas Transmission Pipeline

An update for DBNGP

NERA

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Executive Summary

DBNGP (WA) Transmission, the operator of the Dampier to Bunbury Natural Gas Pipeline, is required to submit a revised access arrangement proposal for its transmission network for the period 2011 through 2015. A critical element in determining its revenues during the access period is the return allowed on equity. DBNGP has engaged NERA Economic Consulting (NERA) to estimate the current cost of equity for a gas transmission business. The current report updates the results of our March 2010 report. The results that we report here, which use data to March 2011, differ little from the results contained in our March 2011 report, which used data to December 2009.

There are a range of financial models available to estimate the cost of equity that measure the risk of owning equity in a variety of different ways. We use four different pricing models to estimate the cost of equity. The model that has traditionally been employed by Australian regulators to estimate the cost of equity is the Sharpe-Lintner (SL) Capital Asset Pricing Model (CAPM) and is the first model considered.

The SL CAPM states that an asset's risk should be measured by its beta and that an asset with a zero beta should earn the risk-free rate. Although the SL CAPM is an attractively simple model, there is a large body of evidence against it.

Empirically, the SL CAPM tends to underestimate the returns to low-beta stocks, value stocks and low-market-capitalisation stocks. Since the equity of a gas transmission business has both a low beta and behaves like a value stock, it follows that one can expect the SL CAPM to *underestimate* the return required on the equity.

A more general version of the CAPM, the Black version, states that while an asset's risk should be measured by its beta, an asset with a zero beta need not earn the risk-free rate. This is the second model used to estimate the required return on equity for a gas transmission business. Empirically, the Black CAPM does not tend to underestimate the returns to low-beta assets. In fact, a zero-beta rate is chosen, essentially, to ensure that this is so. The Black CAPM, though, like the SL CAPM tends to underestimate the returns to value stocks and low-market-capitalisation stocks. Therefore one can expect the Black CAPM, like the SL CAPM, to *underestimate* the return required on the equity of a gas transmission business.

The third model is the Fama-French three-factor model (FFM). This model is designed to correctly price value stocks and the equities of small firms. The ability of the Fama- French three-factor model to correctly price on average the equities of small firms and value stocks has meant that it has become the standard model for estimating required returns in the academic finance literature. However, recent evidence indicates that the FFM, like the SL CAPM, tends to underestimate the returns to low-beta stocks. Thus one can expect the FFM, like the Black CAPM and SL CAPM, to *underestimate* the return required on the equity of a gas transmission business.

So the fourth model considered is a zero-beta version of the FFM.

Consistent with the existing approach of the ERA and the Australian Energy Regulator (AER), we compute estimates of the cost of equity for a gas transmission business using domestic versions of the four models. We compute the risk-free rate using mid-rates for

Commonwealth Government Securities (CGS) from the Reserve Bank for the 20 trading days of February 2011 and the methodology described by the AER in its review of the *WACC* parameters for electricity lines businesses.[1] Also, we use the same delevering and relevering scheme that the AER endorses in its review.[2] Finally, we have followed the advice of DBNGP and use a market risk premium (MRP) of 6.5 per cent per annum.

To estimate parameters not shared with the SL CAPM, we primarily use data provided by Dimensional Fund Advisors Australia Ltd (DFA), an investment group affiliated with Fama and French.

Table 1, sets out our estimates of the parameters and required return on equity for each of the financial models considered by NERA.

Table 1
Estimates of the return required on an Australian utility stock computed using weekly DFA data

Model	Risk-Free Rate*	Zero-Beta Premium	Beta			Risk Premium			Return On Equity
			Market	*HML*	*SMB*	Market	*HML*	*SMB*	
Sharpe-Lintner CAPM	5.71		0.53			6.50			9.16
Black CAPM	5.71	6.50	0.53			0.00			12.21
Fama-French	5.71		0.56	0.40	0.30	6.50	5.90	-0.08	11.72
Zero-Beta Fama-French	5.71	6.50	0.56	0.40	0.30	0.00	5.90	-0.08	14.56

* *Computed using the AER methodology and CGS mid-rates for the 20 trading days of February 2011.*

AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

The four financial models provide a plausible range for the return on equity required by an Australian regulated gas transmission business of between 9.16 per cent and 14.56 per cent.

[1] AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

[2] AER, *Explanatory Statement: Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters*, December 2008, page 202.

1 Introduction

This report has been prepared for DBNGP (WA) by NERA Economic Consulting (NERA). DBNGP operates the Dampier to Bunbury Pipeline in Western Australia. DBNGP was required to submit an access arrangement proposal to the Economic Regulation Authority of Western Australia (ERA) in early 2010. The revised access arrangement will cover the period January 2011 through December 2015.

DBNGP has asked NERA to update its March 2010 report in which we examine a number of financial models to estimate a plausible range for the return on equity required by an Australian regulated gas transmission business. Specifically, DBNGP has requested that we use:

- the Sharpe-Linter CAPM, and any other identified well accepted financial models, to provide proper statistical estimates of the return required on equity for an Australian regulated gas transmission business from available current Australian data.

The remainder of this report is structured as follows:

- Section 2 – describes the underlying assumptions, data and methodology used to estimate the parameters of each model;
- Section 3 – estimates the required return on equity for an Australian gas transmission business using the four identified financial models and weekly data;
- Section 4 – sets out the conclusions of this report.

Appendix A describes an alternative data source that could be used to populate the FFM. Appendix B attached the instructions to us from DBNGP.

1.1 Statement of Credentials

This report has been jointly prepared by **Simon Wheatley** and **Brendan Quach**.[3]

Simon Wheatley is a Special Consultant with NERA, and was until recently a Professor of Finance at the University of Melbourne. Since 2008, Simon has applied his finance expertise in investment management and consulting outside the university sector. Simon's expertise is in the areas of testing asset-pricing models, determining the extent to which returns are predictable and individual portfolio choice theory. Prior to joining the University of Melbourne, Simon taught finance at the Universities of British Columbia, Chicago, New South Wales, Rochester and Washington.

Brendan Quach is a Senior Consultant at NERA with ten years experience as an economist, specialising in network economics and competition policy in Australia, New Zealand and Asia Pacific. Since joining NERA in 2001, Brendan has advised a wide range of clients on regulatory finance matters, including approaches to estimating the cost of capital for regulated infrastructure businesses.

[3] If requested a complete curriculum vitae can be provided for each of the authors.

We have read the Guidelines for Expert Witnesses in Proceedings of the Federal Court of Australia. A copy of these guidelines is attached at Appendix C to this report. We confirm that all inquiries that we believe are desirable have been made and no matters of significance which we regard as relevant have, to the best of our knowledge, been withheld.

2 Underlying Assumptions, Data and Methodology

In this section we describe the assumption that we make about the impact of the imputation system on the returns required on stocks and the data that we employ. We also outline the methodology we have adopted to estimate the parameters of the four financial models.

When determining allowable revenues and prices Australian regulators have assumed that equity investors place a value, gamma, on the creation of a one dollar imputation credit that can be attached to a dividend. To ensure consistency between the assumption used to set regulated revenues and our assessment of the required return on equity we have increased observed market and firm returns to take account of the value that the market places on imputation credits created. For the purposes of this report we have been instructed by DBNGP to assume that gamma, the product of the distribution rate and the market value of a one dollar credit distributed, is 0.2.

To estimate the parameters of the four asset pricing models, we use data on the nine regulated energy businesses that the AER employs in its review of the *WACC* parameters for electricity lines businesses.[4] We also use data provided by Dimensional Fund Advisors Australia Ltd (DFA). DFA is a fund manager with whom Fama and French are affiliated. To compute the risk-free rate, we use mid-rates for Commonwealth Government Securities from the Reserve Bank for the 20 trading days of February 2011 and the methodology described by the AER in its *WACC* review.[5] On the advice of DBNGP, we use an MRP of 6.5 per cent per annum.

We follow Henry (2009) and estimate the betas of the nine regulated energy businesses using both ordinary least squares (OLS) and least absolute deviations (LAD).[6] We also compute estimates using an equally weighted and a value-weighted portfolio of the businesses and by averaging estimates across firms. NERA (2009) point out that it is unclear whether OLS or LAD estimates will be most precise and unclear whether estimates computed using an equally or value-weighted portfolio or computed by averaging across firms will be most precise.[7] So we use all beta estimates. In particular, for each asset pricing model we use the means of each set of six beta estimates that we produce.[8]

2.1 Australian Imputation Tax Regime

In Australia, investors face taxes on capital gains and dividends but also receive imputation credits. Officer (1994) derives a version of the CAPM in which imputation tax credits can

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4 AER, *Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, page 255.

5 AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

6 Olan T. Henry, *Estimating β*: Report for the Australian Energy Regulator, 23 April 2009.

7 NERA, *Cost Of Equity - Fama-French Three-Factor Model*, Report for Jemena, August 2009.

8 We compute estimates in two ways (by OLS and LAD) and we aggregate individual security estimates in three ways (we compute estimates using an equally weighted and a value-weighted portfolio and by averaging estimates across securities). So for each asset pricing model we compute a set of 2 × 3 = 6 estimates.

reduce the return the market requires from firms.[9] The Officer form of the CAPM maintains assumptions (i), (ii), and (iv) set out above. However, instead of assumption (iii) it assumes that:

(vi) investors may be taxed differently but each investor faces the same rate of tax on capital gains and dividends; imputation credits are attached to the dividends that some assets deliver, that some investors can redeem for cash; and investors face no other taxes and no transaction costs.

Under this assumption, investors receive returns in three forms: as capital gains, as dividends and as imputation credits. The assumption that each investor faces the same rate of tax on capital gains and dividends implies that these taxes will not affect the investor's decision about what portfolio to hold. An investor's ability to use imputation credits, though, will affect his or her portfolio choice. Australian utility regulators have consistently used Officer's model to determine the cost of equity for regulated businesses.

The only difference between the SL CAPM and the Officer CAPM is that the latter adds a fraction of the imputation credits that a firm delivers to the firm's return. Thus, generating an estimate of the return required on equity for a gas transmission business that uses the Officer CAPM and incorporates the value of credits delivered is straightforward.

The other three pricing models can be modified in a similar manner to take into account the impact of imputation credits. To do so, one must add a fraction of the imputation credits that a firm delivers to the firm's return. So, for example, when we estimate the Fama-French risk premiums, we must adjust the premiums to take into account the impact of imputation credits. We describe in detail how we do this later in the section.

2.2 Australian Financial Data

To estimate the return required on equity for a gas transmission business using the four models, we require the following data:

- the risk-free rate;
- the zero-beta premium;
- the betas of a comparable group of Australian regulated energy businesses; and
- the means of the three Fama-French factors.

We use a risk-free rate of 5.71 percent per annum computed using mid-rates for Commonwealth Government Securities from the Reserve Bank for the 20 trading days of February 2011 and the methodology described by the AER in its review of the *WACC* parameters for electricity lines businesses.[10] For the SL CAPM and FFM, we follow the

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9 Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

10 AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision*, May 2009, pages 129-131 and pages 168-169.

advice of DBNGP and use an MRP of 6.50 percent. For the two zero-beta models, we use a zero-beta premium of 6.50 percent per annum and a MRP of zero percent per annum. This choice is motivated by the evidence that Lewellen, Nagel and Shanken (2008) and Lajbcygier and Wheatley (2009) provide.[11] In US data from 1963 through 2004, Lewellen, Nagel and Shanken estimate the zero-beta premium to lie between 8.12 and 11.60 percent per annum for the Black CAPM and between 8.84 percent and 11.96 percent per annum for the zero-beta FFM. They estimate the MRP to lie between -1.76 and 0.40 percent per annum for the Black CAPM and between -5.68 and -1.96 percent per annum for the zero-beta FFM. In Australian data from 1979 through 2007, Lajbcygier and Wheatley estimate the zero-beta premium to be 9.96 percent for the Black CAPM and 9.00 percent per annum for the zero-beta version of the FFM. They estimate the MRP to be -2.64 percent per annum for the Black CAPM and -1.68 percent per annum for the zero-beta FFM. Relative to these estimates a choice for the zero-beta premium of 6.50 percent per annum and a choice for the MRP of zero percent per annum are conservative. They are conservative in that these choices will lead to lower estimates of the return required on a gas transmission business than one would produce using the estimates that Lewellen, Nagel and Shanken and Lajbcygier and Wheatley report. On the other hand, theory suggests that the zero-beta premium should not exceed the difference between the rates at which investors can borrow and lend and some might view 6.50 percent as being higher than one would expect this difference to be.

To estimate the betas of a comparable group of Australian regulated energy businesses, we use weekly with-dividend returns for the nine Australian regulated businesses that the AER employs in its review of the *WACC* parameters for electricity lines businesses.[12] We use weekly data for two reasons. First, estimates of betas computed using weekly data are approximately twice as precise as estimates computed using monthly data over the same period.[13] Second, the use of weekly data all but eliminates any problems linked to infrequent trading that can affect estimates computed using daily data.[14] The nine businesses, their tickers and the period over which returns are available for each company appear in Table 2.1.

Table 2.1 also reports each company's debt-to-value ratio. Since book values of debt are typically updated semi-annually, this ratio has been computed as the average net debt-to-value ratio sampled semi-annually over the period for which data for each company are available. Specifically, the ratio is calculated at the end of each June and the end of each December. Firm value is calculated as the sum of net book debt and the market value of equity. The data for the nine Australian regulated energy businesses are from Bloomberg information service.

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11 Lewellen, J., S. Nagel and J. Shanken, *A skeptical appraisal of asset pricing tests*, Journal of Financial Economics, 2008, forthcoming.

Lajbcygier P. And S. M. Wheatley, *An evaluation of some alternative models for pricing Australian stocks*, Working Paper , Monash University, 2009.

12 AER, *Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, page 255.

13 In other words, the standard errors of the weekly estimates are around half the size of the standard errors attached to the corresponding monthly estimates.

14 We have also computed estimates using monthly data and produced very similar results. These estimates are available on request.

To estimate the betas of the nine Australian regulated energy businesses, we also use data on the following three factors:

- the excess return to the market over the risk-free rate;
- the Fama-French *HML* factor; and
- the Fama-French *SMB* factor.

Table 2.1
Sample of regulated energy businesses

Company	Ticker	Period	Debt-to-Value
Alinta Limited	AAN	1/1/2002 – 17/8/2007	0.337
The Australian Gas Light Company	AGL	1/1/2002 – 11/10/2006	0.295
APA Group	APA	1/1/2002 – 25/3/2011	0.564
Duet Group	DUE	12/8/2004 – 25/3/2011	0.766
Envestra Limited	ENV	1/1/2002 – 25/3/2011	0.727
GasNet	GAS	1/1/2002 – 14/11/2006	0.641
Hastings Diversified Utilities Fund	HDF	10/12/2004 – 25/3/2011	0.389
Spark Infrastructure Group	SKI	1/3/2007 – 25/3/2011	0.527
SP AusNet	SPN	15/12/2005 – 25/3/2011	0.615

We use as the with-dividend market return the percentage change in the *S and P All Ordinaries Accumulation Index*. Monthly data for the other two Fama-French factors have been provided by DFA.

From January 1980 through June 1989, DFA compute the *HML* factor as the difference between the with-dividend returns to the *Fama-French Australian Value Index* and the *Fama-French Australian Growth Index*. From July 1989 through December 2009, DFA compute the *HML* factor as the difference between the with-dividend returns to the *S and P Australian BMI Value Index* and the *S and P Australian BMI Growth Index* and we have updated the data to March 2011. BMI stands for Broad Market Index. The index is described as being broad because it includes both large firms and small firms.

From January 1980 through December 1990, DFA compute the *SMB* factor as the difference between the with-dividend returns to an *ASX Ex-50 Leaders Simulated Index* and the *ASX 50 Leaders Index*. The term ‘ASX Ex-50’ means outside of the ASX 50. The Simulated Index was sourced from John Nolan and Associates (now JANA). From January 1991 through December 2009, DFA compute the *SMB* factor as the difference between the with-dividend returns to the *S and P ASX Small Ordinaries* and the *S and P ASX 100 Index* and we have updated the data to March 2011.

Weekly values of the *HML* and *SMB* factors are computed for the period from January 2002 to March 2011 to correspond with the monthly values provided by DFA. Weekly values for the *HML* factor are computed as the difference between the weekly with-dividend returns to the *S and P Australian BMI Value Index* and the *S and P Australian BMI Growth Index*. Weekly values of the *SMB* factor are computed as the difference between the weekly with-dividend returns to the *S and P ASX Small Ordinaries* and the *S and P ASX 100 Index*. The weekly data are taken from either Bloomberg or FactSet information services.

2.3 Methodology

The use of each model requires that we produce estimates of risk premiums and betas.

2.3.1 Risk premiums

Again, we have followed the advice of DBNGP and use as an estimate of the MRP a figure of 6.50 per cent per annum. So the only premiums we must estimate are the means of the Fama-French *HML* and *SMB* factors. The *HML* factor is the difference between the return to a portfolio of high book-to-market stocks and the return to a portfolio of low book-to-market stocks. The *SMB* factor is the difference between the return to a portfolio of small cap stocks and the return to a portfolio of large cap stocks.

Unlike the MRP, the *HML* and *SMB* risk premiums are not required by the CAPM and so estimates of the premiums have not previously been used by Australian regulators. We find that the DFA *HML* premium is economically and statistically significantly different from zero. The DFA *SMB* premium, on the other hand, is neither economically nor statistically different from zero.

Using the raw data provided by DFA we carry out the following steps to estimate the *HML* and *SMB* risk premiums.

- First, we calculate the arithmetic average of the differences between the annual returns to a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks. Similarly, we calculate the arithmetic average of the differences between the annual returns to a portfolio of small cap stocks and a portfolio of large cap stocks.
- Second, we adjust these averages to reflect an assumption that investors place a positive value on distributed franking credits.

Thus the *HML* and *SMB* risk premiums that we use are the historical averages of the imputation credit-adjusted annual returns to the *HML* and *SMB* zero-investment portfolios created by DFA. The use of arithmetic averages of historical annual returns is consistent with the approach adopted by Handley (2009) in his report to the AER on the *WACC* parameters of electricity lines businesses.[15]

To determine the maximum quantity of franking credits that can be attached to the dividends that each portfolio pays out each year, we use the statutory corporate tax rates in effect at the

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15 John C Handley, Further Comments on the Historical Equity Premium: Report for the Australian Energy Regulator, 14 April 2009, pages 4-6.

time. To compute the quantity of franking credits distributed, we follow Handley and Maheswaran (2008) and assume that 75 percent of dividends are franked.[16] Finally, to compute the value the market places on these franking credits, we have been instructed to assume that the market places a value of 20 cents on a dollar of franking credits created. To be conservative, we assume that all credits created are distributed so that the value the market places on a dollar of credits distributed is also 20 cents – not higher. The assumption is conservative because we find that the dividend yield of the high book-to-market portfolio exceeds the yield of the low book-to-market portfolio and the dividend yield of the portfolio of small firms exceeds the yield of the portfolio of big firms.

Thus, for example, in 2008 the statutory corporate tax rate was 30 percent and so 43 cents of franking credits would have been attached to a fully franked dividend of one dollar in that year. If 75 percent of 2008 dividends were franked, on average 32 cents of franking credits would have been attached to a dividend of one dollar. Finally, if the market placed a value of 20 cents on a dollar of franking credits distributed, the market would have placed a value of six cents on the franking credits attached on average to a 2008 dividend of one dollar.

In 2008, the dividend yields on the value and growth portfolios were 7.38 and 4.44 percent, measured as the sum of the dividends paid out over the year divided by end-of-year price. So we assume that the credits attached to the dividends paid out by the value and growth portfolios were 0.43 × 0.75 × 7.38 = 2.37 percent and 0.43 × 0.75 × 4.44 = 1.43 percent of the end-of-year price. The *HML* factor, exclusive of franking credits, in 2008 was – 3.33 percent. It follows that, with the assumptions we make, the factor inclusive of the value of franking credits was – 3.33 + 0.2 × (2.37 – 1.43) = – 3.14.

2.3.2 Betas

We compute beta estimates for the nine individual securities and for two portfolios of the securities, one equally weighted and the other value-weighted, using weekly data. To compute estimates, we regress the with-dividend returns on the nine utilities and two portfolios on the market return either alone or together with the *HML* and *SMB* factors. Like Henry (2009), we ignore the franking credits that a firm may deliver.[17]

Table 2.1 shows that none of the nine utilities has a debt-to-value ratio of precisely 0.6, ie, the ratio that the ERA assumes a benchmark utility should have. We have therefore adjusted (relevered) all of our beta estimates to reflect this benchmark assumption. More specifically, we have followed Henry (2009) and multiplied the return to the equity of each benchmark utility by $(1 - L_j)/(1 - 0.6)$, where L_j is the average net debt-to-value ratio over the period for which net debt and market capitalisation data are available for the utility.[18] If the utility follows a strategy of issuing or retiring debt to ensure its leverage is constant through time, then relevering in this way is appropriate.

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16 Handley J. and Maheswaran K., A Measure of the Efficacy of the Australian Imputation Tax System, *The Economic Record*, Vol 84 No 264, March 2008, page 91.

17 Olan T. Henry, Estimating *β*: Report for the Australian Energy Regulator, 23 April 2009.

18 Olan T. Henry, Estimating *β*: Report for the Australian Energy Regulator, 23 April 2009.

We compute estimates of betas in two ways. First, we compute OLS estimates and, second, we compute LAD estimates. LAD estimates can be more efficient if a sufficient number of outliers are present. We compute LAD estimates using the LAV routine in SAS/IML.

Estimates of individual security betas can be imprecise. We combine the individual security data in three ways. First, we compute simple averages of the security beta estimates. Second, we form an equally weighted portfolio of the nine securities and estimate its beta. Since six of the nine utilities either listed or delisted over the sample period, there are often fewer than nine utilities in the portfolio. When a new firm is listed we sell some of what we have invested in the other listed securities and invest the proceeds in the newly listed entity. When a firm delists, we sell the security and invest the proceeds in the remaining listed securities. Third, we form a value-weighted portfolio and estimate its beta.

We do not report the standard errors attached to the average of the LAD estimates for the individual securities as computing these standard errors is a complicated task when data are missing. We are not aware of an analytical formula for the standard error of the average of the LAD estimates when data are missing. Computing the standard error of the average by simulation would require we make an assumption about the distribution of returns and the incidence of outliers.

In the absence of missing data, the average OLS estimate will be identical to the OLS estimate of the beta of an equally weighted portfolio. It is not in general true, on the other hand, that the average LAD estimate will match the LAD estimate of the beta of an equally weighted portfolio, even in the absence of missing data. The question then arises as to whether it is better to use the average LAD estimate or the LAD estimate of the beta of an equally weighted portfolio or whether it is not possible to conclude without further information. NERA (2009) investigate the behaviour of the average LAD estimator, the LAD estimator for an equally weighted portfolio and the OLS estimator for the portfolio by conducting simulations.[19]

Their results suggest that if there are large industry-wide outliers it is best to use LAD to deal with the outliers at the portfolio level while, if there are large firm-specific outliers, it is best to use LAD to deal with the outliers at the firm level. On the other hand, if there are few outliers, it is best to use OLS.

Thus their simulations show that there are circumstances where the average LAD estimator is most efficient, there are other circumstances where the portfolio LAD estimator is most efficient, and there are yet another set of circumstances where the portfolio OLS estimator is most efficient. Since trying to identify which set of circumstances is best described by our data is difficult, we use all of the average and portfolio estimates that we produce.

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19 NERA, *Cost Of Equity - Fama-French Three-Factor Model*, Report for Jemena, August 2009.

3 Estimated Rate of Return on Equity

We have estimated the required return on equity for an Australian gas transmission business using the following four financial models:

1. the SL CAPM;

2. the Black CAPM;

3. the FFM; and

4. a zero-beta version of the FFM.

Table 3.1 sets out our estimates of the parameters and required return on equity for each of the financial models.

Table 3.1
Estimates of the return required on an Australian utility stock computed using weekly DFA data

			Beta			Risk Premium			
Model	Risk-Free Rate*	Zero-Beta Premium	Market	*HML*	*SMB*	Market	*HML*	*SMB*	Return On Equity
Sharpe-Lintner CAPM	5.71		0.53			6.50			9.16
Black CAPM	5.71	6.50	0.53			0.00			12.21
Fama-French	5.71		0.56	0.40	0.30	6.50	5.90	-0.08	11.72
Zero-Beta Fama-French	5.71	6.50	0.56	0.40	0.30	0.00	5.90	-0.08	14.56

* *Computed using the AER methodology and CGS mid-rates for the 20 trading days of February 2011.*

AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

The four financial models provide a plausible range for the return on equity required by an Australian regulated gas transmission business of between 9.16 per cent and 14.56 per cent.

3.1. Sharpe-Lintner CAPM

An estimate of the return required on equity for a gas transmission business that uses the SL CAPM requires three inputs: the risk-free rate, the MRP and the equity's beta. Table 3.2 provides OLS and LAD estimates of the betas of the equities of the nine regulated energy utilities. The table shows that the some of the estimates are imprecise and that there is partly for this reason, a significant variation across the estimates. Also, the LAD estimates tend to be lower than their OLS counterparts.

Table 3.2
Individual security beta estimates computed using weekly data from 1 January 2002 to 25 March 2011

	AAN	AGL	APA	DUE	ENV	GAS	HDF	SKI	SPN
OLS	1.10	0.71	0.63	0.32	0.32	0.35	1.31	0.47	0.21
	(0.21)	(0.17)	(0.07)	(0.05)	(0.04)	(0.09)	(0.19)	(0.09)	(0.07)
LAD	0.69	0.55	0.64	0.27	0.30	0.27	0.90	0.32	0.20
	(0.18)	(0.21)	(0.07)	(0.06)	(0.03)	(0.10)	(0.10)	(0.08)	(0.06)

Standard errors are in parentheses.

Table 3.3
Average and portfolio beta estimates computed using weekly data from 1 January 2002 to 25 March 2011

	AV	EW	VW
OLS	0.60	0.56	0.50
	(0.05)	(0.05)	(0.05)
LAD	0.46	0.52	0.53
		(0.04)	(0.04)

Standard errors are in parentheses.

Table 3.3 displays our average and portfolio estimates. Two observations may be drawn from the results in the table. First, the standard errors of the average and portfolio estimates are typically lower than their individual security counterparts, that is, the average and portfolio estimates are more precise than the individual security estimates. Second, the standard errors attached to the average of the OLS estimates for individual firms are higher than their equally weighted portfolio counterparts, albeit marginally so.

Table 3.4 provides estimates of the risk premium on the equity of a gas transmission business computed using the estimates in Table 3.3 and the SL CAPM. The mean risk premium is only 3.45 percent per annum. This low estimate is the result of an estimate of the beta of the equity of a gas transmission business of only 0.53, an estimate that is consistent with the estimates that Henry (2009) provides and that appear in the ERA's *Final Decision on Proposed Revisions to the Access Arrangement for the South West Interconnected Network Submitted by Western Power* but that is substantially below the value of 0.8 that both the ERA and AER have used in recent decisions.[20]

[20] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the South West Interconnected Network Submitted by Western Power*, 2009.

Table 3.4
Risk premiums computed using weekly data and the Sharpe-Lintner and Black CAPMs

			Risk Premium	
		Beta	SL	Black
OLS	Firm Average	0.60	3.91	6.50
	Equally Weighted Portfolio	0.56	3.64	6.50
	Value-Weighted Portfolio	0.50	3.28	6.50
LAD	Firm Average	0.46	2.99	6.50
	Equally Weighted Portfolio	0.52	3.41	6.50
	Value-Weighted Portfolio	0.53	3.45	6.50
	Mean Value	**0.53**	**3.45**	**6.50**

3.2. Black CAPM

The assumption that we make that the zero-beta risk premium is 6.50 percent per annum and that the MRP is zero makes the predictions of the Black CAPM particularly simple to interpret. With these assumptions, the Black CAPM says that the returns required on all stocks should be identical. Thus, as Table 3.4 shows, the Black CAPM provides an estimate of the risk premium on the equity of a gas transmission business of 6.50 percent per annum. This estimate is identical to the estimate that one would produce were one to use the SL CAPM and set the beta of the equity to one.

3.3. Fama-French Three-Factor Model

An estimate of the return required on equity for a gas transmission business that uses the FFM requires seven inputs: the risk-free rate, the three Fama-French premiums and the equity's three Fama-French betas.

Table 3.5 provides estimates of the *HML* and *SMB* premiums computed using the data supplied to us by DFA. The time period of 1975 to 2010 is the longest period over which data on the Fama-French factors are available in Australia. The *HML* estimate is significantly greater than zero at conventional levels and of the same order of magnitude as the market risk premium. The *SMB* estimate is negative, although not significantly different from zero.

Table 3.5
Fama-French risk premiums computed using DFA data

	HML	***SMB***
Australia	5.90	–0.08
	(2.91)	(2.24)
Period	1975 – 2010	1980 – 2010
US	5.36	1.83
	(2.41)	(1.96)
Period	1975 – 2010	1980 – 2010
US	4.99	3.72
	(1.52)	(1.55)
Period	1927 – 2010	1927 – 2010

Premium estimates in percent per annum are outside of parentheses. Standard errors are in parentheses

For comparison, we also report US estimates computed with data taken from Ken French's web site over the same periods that we use to estimate the Australian premiums, as well as over the period from 1927 through 2010, the longest period over which data on the Fama-French factors are available in the US. The US *HML* and *SMB* estimates are similar to their Australian counterparts over matching periods. On the other hand, the US *HML* estimate computed over the longer period is lower than its Australian counterpart while the US *SMB* estimate computed over the longer period is substantially higher than its Australian counterpart. The US *SMB* estimate computed over the longer period is both economically and statistically significantly different from zero.

Table 3.6 provides OLS and LAD estimates of the betas of the equities of the nine regulated energy utilities. The table shows that many of the individual security beta estimates are imprecise. The table also shows that estimates of the *HML* and *SMB* betas tend to be less precise than their market counterparts. The reason for this difference is that the precision with which a slope coefficient in a regression is estimated is typically inversely related to the volatility of the corresponding regressor and the *HML* and *SMB* factors are less volatile than the market return.

Table 3.6
Individual security Fama-French beta estimates computed using weekly DFA data from 1 January 2002 to 25 March 2011

	AAN	AGL	APA	DUE	ENV	GAS	HDF	SKI	SPN
					Market				
OLS	1.19	0.68	0.65	0.32	0.35	0.39	1.53	0.49	0.25
	(0.23)	(0.19)	(0.07)	(0.05)	(0.04)	(0.10)	(0.19)	(0.09)	(0.07)
LAD	0.72	0.72	0.66	0.28	0.28	0.34	0.96	0.39	0.21
	(0.22)	(0.18)	(0.07)	(0.05)	(0.03)	(0.11)	(0.09)	(0.06)	(0.05)
					HML				
OLS	0.34	-0.29	0.24	0.17	0.37	0.06	2.17	0.50	0.39
	(0.45)	(0.35)	(0.12)	(0.08)	(0.07)	(0.19)	(0.31)	(0.15)	(0.11)
LAD	0.02	-0.03	0.32	0.21	0.22	0.27	1.10	0.40	0.26
	(0.43)	(0.34)	(0.12)	(0.08)	(0.05)	(0.20)	(0.15)	(0.10)	(0.08)
					SMB				
OLS	0.27	0.13	0.32	0.26	0.43	0.19	0.96	0.41	0.09
	(0.30)	(0.24)	(0.12)	(0.09)	(0.07)	(0.13)	(0.34)	(0.17)	(0.13)
LAD	0.24	0.49	0.43	0.35	0.24	0.32	0.43	0.19	0.28
	(0.29)	(0.24)	(0.12)	(0.08)	(0.05)	(0.14)	(0.16)	(0.11)	(0.09)

Standard errors are in parentheses.

Table 3.7 displays our average and portfolio estimates of the three Fama-French betas. Two observations can be made about the results. First, the evidence indicates that the returns to utility stocks are related to all three Fama-French factors. Second, the standard errors of the average and portfolio estimates are typically lower than their individual security counterparts, that is, the average and portfolio estimates are more precise than the individual security estimates.

Table 3.8 provides estimates of the risk premium on the equity of a gas transmission business computed using the estimates in Table 3.7 and the Fama-French three factor model. The mean risk premium is 6.01 percent per annum, almost twice as large as its Sharpe-Lintner counterpart. This larger risk premium is primarily a result of the positive exposure a gas transmission business has towards the *HML* factor. The DFA estimate of the HML premium is almost as large as the MRP and our estimate of the *HML* beta is almost as large as our estimate of the market beta.

Table 3.7
Average and portfolio Fama-French beta estimates computed using weekly DFA data from 1 January 2002 to 25 March 2011

	Market			***HML***			***SMB***		
	AV	**EW**	**VW**	**AV**	**EW**	**VW**	**AV**	**EW**	**VW**
OLS	0.65	0.62	0.54	0.44	0.60	0.37	0.34	0.39	0.23
		(0.04)	(0.05)		(0.07)	(0.09)		(0.07)	(0.08)
LAD	0.51	0.52	0.55	0.31	0.44	0.26	0.33	0.36	0.13
		(0.04)	(0.05)		(0.06)	(0.09)		(0.06)	(0.09)

Standard errors are in parentheses.

3.4. Zero-Beta Fama-French Three-Factor Model

Again, we assume that the zero-beta risk premium is 6.50 percent per annum and that the MRP is zero. With these assumptions the zero-beta model will deliver a larger risk premium for low-beta stocks than the FFM. Consistent with this observation, we compute an estimate of the risk premium on the equity of a gas transmission business of 8.85. This estimate is almost three times as large as the estimate delivered by the SL CAPM.

Table 3.8
Risk premiums computed using the Fama-French three-factor model and weekly DFA Data

		Beta			Risk Premium	
		Market	*HML*	*SMB*	FF	Zero-Beta
OLS	Firm Average	0.65	0.44	0.34	6.78	9.06
	Equally Weighted Portfolio	0.62	0.60	0.39	7.51	10.00
	Value-Weighted Portfolio	0.54	0.37	0.23	5.67	8.66
LAD	Firm Average	0.51	0.31	0.33	5.09	8.29
	Equally Weighted Portfolio	0.52	0.44	0.36	5.94	9.07
	Value-Weighted Portfolio	0.55	0.26	0.13	5.10	8.02
	Mean Value	**0.56**	**0.40**	**0.30**	**6.01**	**8.85**

4 Conclusions

DBNGP Transmission (DBNGP), the owner of the Dampier to Bunbury Natural Gas Pipeline, is required to submit a revised access arrangement proposal for its transmission network for the period 2011-2015. A critically important element in determining its revenues during the access period is the return allowed on equity.

There are a range of financial models available to estimate the cost of equity that measure the risk of owning equity in a variety of different ways. We use four pricing models to estimate the cost of equity. The model that has traditionally been employed by Australian regulators to estimate the cost of equity is the SL CAPM and is the first model considered.

The SL CAPM states that an asset's risk should be measured by its beta and that an asset with a zero beta should earn the risk-free rate. Although the SL CAPM is an attractively simple model, there is a large body of evidence against it. Empirically, the SL CAPM tends to underestimate the returns to low-beta stocks, value stocks and low-market-capitalisation stocks. Since the equity of a gas transmission business has both a low beta and behaves like a value stock, it follows that one can expect the SL CAPM to underestimate the return required on the equity.

A more general version of the CAPM, the Black version, states that while an asset's risk should be measured by its beta, an asset with a zero beta need not earn the risk-free rate. This is the second model used to estimate the required return on equity for a gas transmission business. Empirically, the Black CAPM does not tend to underestimate the returns to low-beta assets. The Black CAPM, though, like the SL CAPM tends to underestimate the returns to value stocks and low-market-capitalisation stocks. Thus one can expect the Black CAPM, like the SL CAPM, to underestimate the return required on the equity of a gas transmission business.

The third model is the FFM. This model is designed to correctly price value stocks and the equities of small firms. The ability of the Fama- French three-factor model to correctly price on average the equities of small firms and value stocks has meant that it has become the standard model for estimating required returns in the academic finance literature. However, recent evidence indicates that the FFM, like the SL CAPM, tends to underestimate the returns to low-beta stocks. Thus one can expect the FFM, like the Black CAPM and SL CAPM, to underestimate the return required on the equity of a gas transmission business.

So the fourth model considered is a zero-beta version of the FFM.

The recent evidence on the performance of the four models we use indicates that among the four the zero-beta version of the FFM best fits the data. An enthusiasm for this model, though, should be tempered by the fact that empirical estimates of the difference between the zero-beta and risk-free rates are higher than perhaps theory might lead one to expect. Empirical estimates from the last 40 years or so of Australian and US data are no less than 6.50 percent per annum while theory suggests that the difference should not exceed the difference between the rates at which investors can borrow and lend.

Estimates of the cost of equity for a gas transmission business have been computed using domestic versions of the four models. We compute the risk-free rate using mid-rates for

Commonwealth Government Securities from the Reserve Bank for the 20 trading days of February 2011 and the methodology described by the AER in its review of the *WACC* parameters for electricity lines businesses.[21] Also, we use the same delevering and relevering scheme that the AER endorses in its review.[22] Finally, we have followed the advice of DBNGP and use a market risk premium (MRP) of 6.50 per cent per annum.

To estimate parameters not shared with the SL CAPM, we primarily use data provided by Dimensional Fund Advisors Australia Ltd (DFA), an investment group affiliated with Fama and French.

Table 4.1 sets out our estimates of the parameters and required return on equity for each of the financial models considered by NERA.

Table 4.1
Estimates of the return required on an Australian utility stock computed using weekly DFA data

			Beta			Risk Premium			
Model	Risk-Free Rate*	Zero-Beta Premium	Market	*HML*	*SMB*	Market	*HML*	*SMB*	Return On Equity
Sharpe-Lintner CAPM	5.71		0.53			6.50			9.16
Black CAPM	5.71	6.50	0.53			0.00			12.21
Fama-French	5.71		0.56	0.40	0.30	6.50	5.90	-0.08	11.72
Zero-Beta Fama-French	5.71	6.50	0.56	0.40	0.30	0.00	5.90	-0.08	14.56

* *Computed using the AER methodology and CGS mid-rates for the 20 trading days of February 2011.*

AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

The four financial models provide a plausible range for the return on equity required by an Australian regulated gas transmission business of between 9.16 per cent and 14.56 per cent.

21 AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

22 AER, *Explanatory Statement: Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters*, December 2008, page 202.

Appendix A. Alternative Data Sources

A.1. Summary

In this appendix we investigate the impact of using alternative measures for the Fama-French factors. In particular, we examine the impact of using factors constructed from data supplied by Morgan Stanley Capital International (MSCI).

We use as a proxy for the market return the gross return to the MSCI Australian Standard Core portfolio. We compute the *HML* factor as the difference between the returns to the MSCI Australia Standard Value and MSCI Australia Standard Growth portfolios. We compute the *SMB* factor as the difference between the returns to the MSCI Australian Small Core and MSCI Australian Large Core portfolios. Data on the MSCI Australian Standard Core portfolio are available from January 1970 through March 2011, data on the MSCI Australian Standard Value and Growth portfolios are available from January 1975 through March 2011 while data on the MSCI Australian Small and Large Core portfolios are available from June 1994 and from January 2001 through March 2011. The short time series of small company returns makes it difficult to estimate the *SMB* premium precisely.

Table A.1
Estimates of the return required on a portfolio of Australian utility stocks computed using MSCI data

			Beta			Risk Premium			
Model	Risk-Free Rate*	Zero-Beta Premium	Market	*HML*	*SMB*	Market	*HML*	*SMB*	Return On Equity
Fama-French	5.71		0.57	0.22	0.41	6.50	3.38	5.99	12.58
Zero-Beta FF	5.71	6.50	0.57	0.22	0.41	0.00	3.38	5.99	15.39

* *Computed using the AER methodology and CGS mid-rates for the 20 trading days of February 2011.*

AER, *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, Final Decision,* May 2009, pages 129-131 and pages 168-169.

Table A.1 provides estimates of the return required on the equity of a regulated energy business computed using these data. The MSCI *HML* premium and *HML* beta estimates are lower than their DFA counterparts. On the other hand, the estimate of the *SMB* premium is higher than its DFA counterpart. As a result, the estimates of the return required on the equity of a regulated energy business that Table A.1 provides do not differ substantially from the DFA estimates that appear in Table 3.1.

A.2. Results

A.2.1. Risk premiums

As with the DFA data, we use, on the advice of DBNGP, an estimate of the MRP of 6.50 per cent per annum. Again, this estimate includes an amount that recognizes the value of franking credits to the investor.

To estimate the risk premiums on the *HML* and *SMB* factors we first form annual returns from the monthly MSCI data that we assemble. We then compute the arithmetic mean of the difference between the annual returns to the high book-to-market and low book-to-market portfolios and the arithmetic mean of the difference between the annual returns to the portfolios of small companies and big companies. We then, as with the DFA data, adjust these mean differences to take into account the value an investor places on franking credits distributed.

Table A.2 shows estimates of the *HML* and *SMB* premiums computed using the MSCI data. Both the *HML* and *SMB* estimate are positive but neither estimate is significantly different from zero at conventional (5 per cent) levels.

Table A.2
Fama-French risk premiums computed using MSCI data

	Market	*HML*	*SMB*
Australia	6.50	3.38	5.99
		(2.69)	(3.44)
Period		1975 – 2010	2001 – 2010

Premium estimates in percent per annum are outside of parentheses. Standard errors are in parentheses

A.2.2. Beta estimates

We compute beta estimates for the nine individual securities and for two portfolios of the securities, one equally weighted and the other value-weighted, using weekly data as before.

Table A.3 shows estimates of the betas of the nine utilities relative to the three Fama-French factors. Again, the individual security estimates are typically not very precise.

Table A.3
Individual security Fama-French beta estimates computed using weekly MSCI data from 1 January 2002 to 25 March 2011

	AAN	AGL	APA	DUE	ENV	GAS	HDF	SKI	SPN
					Market				
OLS	1.29	0.85	0.62	0.31	0.35	0.29	1.42	0.48	0.23
	(0.22)	(0.18)	(0.07)	(0.05)	(0.04)	(0.10)	(0.18)	(0.09)	(0.07)
LAD	0.87	0.82	0.64	0.24	0.32	0.25	0.92	0.36	0.24
	(0.23)	(0.28)	(0.04)	(0.04)	(0.03)	(0.13)	(0.11)	(0.07)	(0.06)
					HML				
OLS	0.25	0.17	0.07	0.07	0.20	-0.15	1.26	0.33	0.28
	(0.24)	(0.18)	(0.08)	(0.06)	(0.05)	(0.10)	(0.22)	(0.11)	(0.08)
LAD	0.10	0.21	0.17	0.09	0.12	-0.15	0.59	0.20	0.23
	(0.25)	(0.29)	(0.06)	(0.05)	(0.04)	(0.13)	(0.14)	(0.09)	(0.08)
					SML				
OLS	0.83	0.46	0.38	0.32	0.43	0.09	1.35	0.38	0.21
	(0.25)	(0.19)	(0.10)	(0.08)	(0.07)	(0.11)	(0.32)	(0.16)	(0.12)
LAD	0.79	0.36	0.48	0.35	0.29	0.08	0.63	0.20	0.31
	(0.26)	(0.31)	(0.07)	(0.07)	(0.05)	(0.14)	(0.19)	(0.12)	(0.11)

Standard errors are in parentheses.

Table A.4 displays the average and portfolio estimates that use the MSCI data. The evidence indicates that a utility stock has exposure to all three Fama-French factors. The standard errors of the average and portfolio estimates are typically a great deal lower than their individual security counterparts. In other words, the average and portfolio estimates are more precise than the security estimates. So, partly for this reason, there is for each parameter less variation across the estimates.

Table A.4
Average and portfolio Fama-French beta estimates computed using MSCI data from 1 January 2002 to 25 March 2011

	Market			***HML***			***SMB***		
	AV	**EW**	**VW**	**AV**	**EW**	**VW**	**AV**	**EW**	**VW**
OLS	0.65	0.60	0.53	0.28	0.32	0.22	0.49	0.50	0.39
		(0.04)	(0.05)		(0.05)	(0.06)		(0.06)	(0.07)
LAD	0.52	0.56	0.55	0.17	0.17	0.17	0.39	0.37	0.30
		(0.04)	(0.05)		(0.05)	(0.06)		(0.06)	(0.08)

Standard errors are in parentheses.

Table A.5 shows estimates of the risk premium on the equity of a regulated energy business computed using the FFM and the data supplied by Morgan Stanley Capital International. As discussed in Section 2.3, it is unclear whether OLS or LAD estimates will be most precise and unclear whether estimates computed using an equally or value-weighted portfolio or computed by averaging across firms will be most precise. So we use all beta estimates. In particular, we use the means of each set of six beta estimates and the two versions of the FFM to estimate the risk premium.

Using MSCI data, an estimate of the risk premium computed using the FFM is 6.87 percent per annum while using the zero-beta version of the model, it is 9.68 percent per annum. These estimates are not substantially different from their DFA counterparts in Table 3.8 of 6.01 percent for the FFM and 8.85 percent per annum for the zero-beta model. Thus we conclude that our estimates are robust to the use of alternative sets of data.

Table A.5
Risk premiums computed using the Fama-French three-factor model and MSCI data

		Beta			Risk Premium	
		Market	*HML*	*SMB*	FF	Zero-Beta
OLS	Firm Average	0.65	0.28	0.49	8.11	10.39
	Equally Weighted Portfolio	0.60	0.32	0.50	7.95	10.55
	Value-Weighted Portfolio	0.53	0.22	0.39	6.56	9.59
LAD	Firm Average	0.52	0.17	0.39	6.27	9.40
	Equally Weighted Portfolio	0.56	0.17	0.37	6.43	9.31
	Value-Weighted Portfolio	0.55	0.17	0.30	5.93	8.86
	Mean Value	**0.57**	**0.22**	**0.41**	**6.87**	**9.68**

Appendix B. Instructions

The Owner requires the Consultant to provide: -

1. An update of the paper NERA prepared in March 2010 including updated the values required in the financial models for the cost of equity relied upon in the report excluding values for Gamma and Market Risk Premium (MRP). DBP advises that it wishes NERA to proceed with its calculations based on the following values for Gamma and MRP:

(a) MRP of 6.5;

(b) Gamma 0.2

This report is to be prepared in accordance with the *Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia* (**Guidelines**). Accordingly, the report:

- is of a professional standard capable of being submitted to the ERA;
- summarises the expert's experience and qualifications and includes the expert's curriculum vitae;
- identifies any person and their qualifications, who assisted in preparing the report or in carrying out any research or test for the purposes of the report;
- summarises DBP's instructions and attaches these terms of reference;
- includes a bibliography outlining all reference sources; and
- (without limiting the points above) carefully sets out the facts that the expert has assumed in putting together his or her report and the basis for those assumptions.

Timing –

Results of NERA's updated WACC paper by Friday 8 April 2011.

Further updated & finalised Report 1 completed by Friday 29 April 2011

Appendix C. Expert Witness Guidelines

Guidelines for Expert Witnesses in Proceedings in the

Federal Court of Australia

Practice Direction

This replaces the Practice Direction on Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia issued on 6 June 2007.

Practitioners should give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see **- Part 3.3 - Opinion** of the *Evidence Act 1995* (Cth)).

M.E.J. BLACK

Chief Justice

5 May 2008

Explanatory Memorandum

The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence (footnote #1), and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

Ways by which an expert witness giving opinion evidence may avoid criticism of partiality include ensuring that the report, or other statement of evidence:

(a) is clearly expressed and not argumentative in tone;

(b) is centrally concerned to express an opinion, upon a clearly defined question or questions, based on the expert's specialised knowledge;

(c) identifies with precision the factual premises upon which the opinion is based;

(d) explains the process of reasoning by which the expert reached the opinion expressed in the report;

(e) is confined to the area or areas of the expert's specialised knowledge; and

(f) identifies any pre-existing relationship (such as that of treating medical practitioner or a firm's accountant) between the author of the report, or his or her firm, company etc, and a party to the litigation.

An expert is not disqualified from giving evidence by reason only of a pre-existing relationship with the party that proffers the expert as a witness, but the nature of the pre-existing relationship should be disclosed.

The expert should make it clear whether, and to what extent, the opinion is based on the personal knowledge of the expert (the factual basis for which might be required to be established by admissible evidence of the expert or another witness) derived from the ongoing relationship rather than on factual premises or assumptions provided to the expert by way of instructions.

All experts need to be aware that if they participate to a significant degree in the process of formulating and preparing the case of a party, they may find it difficult to maintain objectivity.

An expert witness does not compromise objectivity by defending, forcefully if necessary, an opinion based on the expert's specialised knowledge which is genuinely held but may do so if the expert is, for example, unwilling to give consideration to alternative factual premises or is unwilling, where appropriate, to acknowledge recognised differences of opinion or approach between experts in the relevant discipline.

Some expert evidence is necessarily evaluative in character and, to an extent, argumentative. Some evidence by economists about the definition of the relevant market in competition law cases and evidence by anthropologists about the identification of a traditional society for the purposes of native title applications may be of such a character. The Court has a discretion to treat essentially argumentative evidence as submission, see Order 10 paragraph 1(2)(j).

The guidelines are, as their title indicates, no more than guidelines. Attempts to apply them literally in every case may prove unhelpful. In some areas of specialised knowledge and in some circumstances (eg some aspects of economic evidence in competition law cases) their literal interpretation may prove unworkable.

The Court expects legal practitioners and experts to work together to ensure that the guidelines are implemented in a practically sensible way which ensures that they achieve their intended purpose.

Nothing in the guidelines is intended to require the retention of more than one expert on the same subject matter – one to assist and one to give evidence. In most cases this would be wasteful. It is not required by the Guidelines. Expert assistance may be required in the early identification of the real issues in dispute.

<u>Guidelines</u>

1. General Duty to the Court (footnote #2)

1.1 An expert witness has an overriding duty to assist the Court on matters relevant to the expert's area of expertise.

1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential (footnote #3).

1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

2. **The Form of the Expert Evidence** (footnote #4)

2.1 An expert's written report must give details of the expert's qualifications and of the literature or other material used in making the report.

2.2 All assumptions of fact made by the expert should be clearly and fully stated.

2.3 The report should identify and state the qualifications of each person who carried out any tests or experiments upon which the expert relied in compiling the report.

2.4 Where several opinions are provided in the report, the expert should summarise them.

2.5 The expert should give the reasons for each opinion.

2.6 At the end of the report the expert should declare that "[the expert] has *made all the inquiries that* [the expert] *believes are desirable and appropriate and that no matters of significance that* [the expert] *regards as relevant have, to* [the expert's] *knowledge, been withheld from the Court*."

2.7 There should be included in or attached to the report; (i) a statement of the questions or issues that the expert was asked to address; (ii) the factual premises upon which the report proceeds; and (iii) the documents and other materials that the expert has been instructed to consider.

2.8 If, after exchange of reports or at any other stage, an expert witness changes a material opinion, having read another expert's report or for any other reason, the change should be communicated in a timely manner (through legal representatives) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court (footnote #5).

2.9 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report (footnote #5).

2.10 The expert should make it clear when a particular question or issue falls outside the relevant field of expertise.

2.11 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports (footnote #6).

3. Experts' Conference

3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

footnote #1
As to the distinction between expert opinion evidence and expert assistance see *Evans Deakin Pty Ltd v Sebel Furniture Ltd* [2003] FCA 171 per Allsop J at [676].

footnote #2
See rule 35.3 Civil Procedure Rules (UK); see also Lord Woolf "Medics, Lawyers and the Courts" [1997] 16 CJQ 302 at 313.

footnote #3
See *Sampi v State of Western Australia* [2005] FCA 777 at [792]-[793], and *ACCC v Liquorland and Woolworths* [2006] FCA 826 at [836]-[842]

footnote #4
See rule 35.10 Civil Procedure Rules (UK) and Practice Direction 35 – Experts and Assessors (UK); *HG v the Queen* (1999) 197 CLR 414 per Gleeson CJ at [39]-[43]; *Ocean Marine Mutual Insurance Association (Europe) OV v Jetopay Pty Ltd* [2000] FCA 1463 (FC) at [17]-[23]

footnote #5
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565

footnote #6
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565-566. See also Ormrod *"Scientific Evidence in Court"* [1968] Crim LR 240.

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