

22 April 2004



Mr Paul Bilyk
Queensland Competition Authority
Level 19, 12 Creek Street
Brisbane QLD 4000

Dear Paul

Comments on *The Cost of Capital for Regulated Entities Report* Prepared by Associate Professor Martin Lally

Envestra welcomes the opportunity to provide input to the Queensland Competition Authority technical review of the cost of capital methodology. Attached is a critique of the Associate Professor Martin Lally report "The Cost of Capital for Regulated Entities" prepared by our advisers Ernst & Young. The key issues we would like to draw to the attention of the Queensland Competition Authority in considering cost of capital and related issues are:

- The Brennan-Lally approach advocated by Associate Professor Lally is a combined cost of capital and revenue calculation methodology. The two cannot be disentangled. However, the lack of acceptance of this approach by practitioners and academics makes it unsuitable for use in determining revenue for regulated entities.
- Associate Professor Lally states that the Officer model, as is currently employed by the Queensland Competition Authority, understates the cost of equity by up to 200 basis points¹. Moreover, Associate Professor Lally is in concurrence with Envestra and the Productivity Commission regarding the adverse affects of under-investment caused by artificially low regulated rates of return:

Any decisions in this area [cost of capital] can give rise to revenues that are overstated or understated, and the latter is the more serious error because it gives rise to the problem of underinvestment.²

Given the asymmetry in the costs of under and overcompensation of facility owners, together with informational uncertainties facing regulators, there is a strong in principle case to 'err' on the side of investors.³

¹ Lally, M, *The Cost of Capital for Regulated Entities Report prepared for the Queensland Competition Authority*, 26 February 2004, pp24

² *ibid*, pp8

³ Productivity Commission (March 2001), p.71

- No departure is warranted from the current practice of using (i) a Market Risk Premium in the 6 – 8 percent range and (ii) the yield on 10 year Commonwealth Government Bonds as the proxy for the Risk Free Rate.
- It is inconceivable to entertain the notion that investors ignore capital gains tax and only consider dividend imputation in their investment decisions. Yet, the standard regulatory practice of adjusting the regulated entity's forecast tax payment cash flows only for dividend imputation (gamma) gives effect to this presumption. Intuitively, the two forms of personal taxation offset each other. The Reserve Bank of Australia supports this view. The implication therefore, is that no adjustment to the regulated entity's forecast tax payment cash flows is warranted.

*The package of tax changes that introduced imputation made a number of other changes including the introduction of a real capital gains tax. That is **there was an offsetting change to the taxation of equity which by itself might have raised the cost of equity** [emphasis added]. One interpretation would be that dividend imputation has simply changed the incentives from paying out returns as capital gains which were untaxed at the personal level, to paying out dividends which are now also only taxed once. As it turned out, Australian stock prices actually fell on the day that dividend imputation (and the rest of the tax package) was announced, so this interpretation may not be entirely incorrect.⁴*

These inter-related issues must be rectified if the required infrastructure is to be made available to consumers and the State of Queensland is to continue to prosper. Please call me on (08) 8227 1500 if you wish to discuss any aspects of this letter.

Yours sincerely

Andrew Staniford
Commercial Manager

⁴ Reserve Bank of Australia, *The Cost of Equity Capital in Australia: What Can We Learn From International Equity Returns?*, RDP 9107

ENVESTRA LTD

REGULATORY COST OF CAPITAL

CRITIQUE OF THE LALLY REPORT TO THE QUEENSLAND COMPETITION AUTHORITY

22 APRIL 2004

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Introduction

Ernst & Young Financial Services Pty Limited (hereafter “E&Y”) has been requested by Investra Ltd to provide comment on the paper titled “The Cost of Capital for Regulated Entities” prepared for the Queensland Competition Authority (hereafter “the Authority”) by Martin Lally dated 26 February 2004 (hereafter “the Lally report”).

In conducting this engagement E&Y has:

- Undertaken an assessment of the implications of the Lally report for Queensland’s regulated entities;
- Undertaken an assessment of the implications for the measurement of individual cost of capital parameters arising from the proposed methodology in the Lally report; and
- Provided a critique of the proposed methodology.

E&Y’s examination of the Lally report has led us to conclude that the standard Capital Asset Pricing Model (“CAPM”) and Officer approach should be retained by the Authority but adjusted for the understated cost of equity as identified by Lally¹.

E&Y considers that an important outcome of the regulatory process is that the weighted average cost of capital (“WACC”) is correctly estimated so as to reflect the rate of return required by a regulated entity to attract funds from competing investment opportunities with comparable risk. This correct estimation of WACC is critical relative to engagement in debates about the academic soundness of alternative approaches for the estimation of CAPM using unpublished² and published sources.

E&Y notes that the Officer approach is subject to limiting assumptions regarding the treatment of personal taxes and that numerous unpublished and published alternative models exist for the measurement of return on equity – all of which are subject to theoretical assumptions which may limit the ability to estimate the returns in a timely and efficient manner. E&Y considers that the marginal benefits of moving to alternative models needs to be weighed against the additional cost and time involved at each regulatory review to identify parameters for the alternative models. Movement between approaches to the return on capital exposes regulated firms to significant regulatory risk if regulators engage in alternative model choice at each reset.

¹ The Lally report, Page 24

² Typically unpublished working papers have not been subject to academic or significant peer review.

Content of the Lally report

Introduction

The Queensland Competition Authority (“the Authority”) commissioned Dr Martin Lally from the Victoria University in New Zealand to undertake an independent review of the Cost of Capital methodology applied by the Authority and prepare a report for the Authority’s Secretariat.

A covering letter from the Authority to Envestra Ltd dated 5 March 2004, stated that:

- In some recent regulatory decisions, stakeholders and other interested parties had commented on aspects of the Authority’s approach to determining the cost of capital for regulated entities;
- The Authority is seeking to address these comments as part of its assessment of the draft access undertaking for Dalrymple Bay Coal Terminal (DBCT);
- The Lally review has involved a comprehensive, technical analysis of all aspects of the Authority’s approach to determining the cost of capital. The review seeks to address past concerns and to reflect new research and, where appropriate, makes recommendations for changes to the Authority’s approach;
- The Lally review also took into account submissions on the DBCT draft access undertaking, although it does not assess DBCT-specific cost of capital issues (e.g. parameter values) raised by, or in submissions in response to, the undertaking.
- As at 5 March 2004 the report had not been considered by the Authority.
- The Authority was seeking comments from stakeholders to assist the Authority in coming to a view about its future assessment of cost of capital issues.

Major findings of the Lally report

The Lally report³ acknowledges that decisions with respect to the cost of capital will have direct implications for revenues. Rather than result in understatement of revenues, which is a more serious error than overstatement due to the potential problem of underinvestment, Lally states that one should err on the side of higher revenues.

The Lally report proposes two alternative methods for the estimation of cost of capital and recommends adjustments to methods currently applied by the Authority for the estimation of parameters included in those models. In particular, Lally recommends⁴:

- the use of the Lally-van Zijl model which incorporates both dividend imputation and capital gains taxation. Lally acknowledges its complexity relative to the Officer model. The Lally-van Zijl model can be expressed in a modified form as the Brennan-Lally model. (For the purpose of this report E&Y shall refer to the

³ Page 8

⁴ Pages 116 to 118

Brennan-Lally model reported as equation 18 on Page 25 as the Lally-van Zijl model).

- the use of an alternative simplified model called the Simplified Brennan-Lally model which does not incorporate the taxation of imputation credits. Lally acknowledges its simplicity relative to the Officer model. (For the purpose of this report E&Y shall refer to the Simplified Brennan-Lally model reported as equation 20 on Page 26 as the Brennan-Lally model).
- the utilisation rate for imputation credits that is embedded within gamma should be set close to one;
- the ratio of attached imputation credits to company tax paid is close to one thus implying an estimate of gamma that is at or close to one;
- the term of the risk free rate should equal the period of the risk free rate;
- the Authority should set the debt beta to zero;
- the Authority should adopt the following practices in estimating asset betas:
 - asset betas should be deduced from equity betas using the average debt-equity ratio over the estimation period;
 - foreign betas should correct for differences in market leverage;
 - Blume adjustments should not be applied but rather Vasicek betas should be applied.

The Lally report states that the Officer model, as currently applied by the Authority, and subject to certain assumptions, is likely to understate the cost of equity capital for regulated entities by up to two percentage points⁵. It also states that adoption of the Brennan-Lally model along with other recommendations will result in a modest increase in revenues for regulated firms. He also states that the Lally-van Zijl model will result in a smaller increase in revenues relative to the Officer model.

⁵ Page 24

Implications of the Lally report for Queensland regulated entities

General Implications

The Authority is responsible for a range of activities including monopoly prices oversight, competitive neutrality and third party access arrangements. The Lally report will have greatest effect for third party access arrangements. However, if its recommendations are adopted in general by the Authority and not just specifically for the DBCT regulatory assessment, the Lally report will have effect wherever a rate of return or cost of capital is estimated.

The Authority is responsible for third party access arrangements in a range of infrastructure industries in Queensland including gas, electricity, ports, and some rail and water businesses. The estimation of the cost of capital is critical to the estimation of revenues during any regulatory period for each of these businesses. Therefore the cost of capital should be set at a level that is equal to the cost of attracting capital to the particular asset whilst providing the appropriate level of return for the systematic or market risk to which the investor is exposed. If the cost of capital is underestimated it may result in underinvestment in the asset. This will occur because investors will not be appropriately compensated for risk taking and capital investment will flow to assets providing superior returns for similar levels of expected risk.

Generally the most recognised method for estimating the rate of return is to estimate a weighted average cost of capital (“WACC”). This is equivalent to the rate of return and reflects the costs of equity and debt capital used to finance the assets of the regulated entity.

Post Tax Nominal WACC

The Authority’s current approach to WACC estimation is a post tax nominal approach. This approach assumes that provided cash flows are expressed as the levered cash flow available to service debt and equity, after allowing for the tax deductibility of interest and the value of any imputation tax credits, the post-tax nominal WACC for an entity (assuming that taxation and allowances for dividend imputation credits are included in the entity’s cash flows) can be calculated as follows:

$$WACC_{post\ tax} = R_{equity} \frac{E}{V} + R_{debt} \frac{D}{V}$$

where

R_{equity} = the return on equity (the cost of equity)

R_{debt} = the return on debt (the cost of debt)

V = the total market value of the firm

E = the market value of the equity

D = the market value of the debt

This approach results in no taxation parameters in the WACC equation but requires their inclusion in the taxation calculation in assessing the level of regulated revenue.

The Lally report also supports the use of a post tax nominal WACC. Lally applies the same WACC formula to estimating the cost of capital but adjusts the return on equity to reflect the Lally- van Zijl and the Brennan-Lally model assumptions.

Alternative approaches to estimation of the cost of capital

The Lally report is critical of the Authority’s current approach of using the Officer model and standard Capital Asset Pricing Model (“CAPM”) method. In particular it is critical of the Officer model’s treatment of the taxation of dividends, interest and the absence of consideration of capital gains tax.

To account for the effects of differential taxation of interest and capital gains taxes, Lally proposes an adjustment to the CAPM estimation of the return on equity. The Lally-van Zijl⁶ model adjusts the standard CAPM to incorporate the effects of the dividend imputation, interest and capital gain taxation. This model significantly extends the number of input parameters required for estimation some of which are assumed rather than market observed values. This approach also requires the estimation of dividend imputation adjusted taxation in the numerator of the revenue equation - thereby mixing taxation terms between the WACC and revenue calculations.

The Brennan-Lally model⁷ simplifies the Lally-van Zijl model by removing the effects of dividend imputation from the return on equity calculation. The model accomplishes this by assuming certain terms, which were deemed necessary for the Lally - van Zijl model to zero (for example, T_d and T_m , the extent to which cash dividends are taxed more heavily than capital gains at the entity and the market levels). This results in the effects of dividend imputation being dismissed from the return on equity estimation.

The Lally report⁸ provides comparative estimates of the return on equity and WACC arising from each of the alternative models. The following table shows estimates arising from the use of each of the models:

Assumptions	Model	Return on Equity	WACC
Base model	Officer	11.30%	9.20%
	Lally- van Zijl	12.48%	9.79%
	Brennan-Lally	10.47%	8.78%

The table shows that the Lally - van Zijl model produces the highest return on equity and WACC estimates and that the lowest results are produced by the Brennan-Lally model. It is acknowledged however that when these inputs are placed into the Lally report⁹ revenue model that the Brennan-Lally model produces the highest revenue estimate. However, E&Y notes that the estimated parameters applied by the Lally report are

⁶ Pages 22 to 25. The model is expressed in equation 15 on page 22

⁷ Pages 25 to 27. The model including dividend imputation is expressed in equation 18 on page 25 and the simplified Brennan - Lally model without the effects of dividend imputation is expressed in equation 20 on page 26.

⁸ Pages 107 to 116

⁹ Pages 107 to 108

inconsistent with parameter inputs used in recent regulatory reports by the Authority and therefore overstate revenues.

The Lally report clearly demonstrates that any change to the approach used to estimate the WACC would also require an associated amendment to the revenue estimation equation, else the lower estimate of WACC may lead to an undesirable underestimate of revenues.

Implications of parameter estimates

The Lally report identifies a number of suggested changes to the Authority's current approach to estimating parameters such as the risk free rate, gamma, and debt betas.

The Lally report recommends adopting a risk free rate with a term equal to the regulatory period. This is a significant change from the Authority's current approach of using a 10 year risk free rate. In an environment of ascending or normal yield curves this will have a significant negative impact on the return on equity estimates for all of the models. This will result in a lower WACC and a decline in the level of revenues available to regulated entities.

The Lally report recommends changing gamma from 0.50 to 1.0. The impact of this change will effect both the WACC and associated revenue arising from the Officer model and the Lally-van Zijl model. It will also reduce the revenue available to regulated entities.

The Lally report also recommends reducing the debt beta to zero for the purposes of de-levering and re-levering equity betas. This change is recommended due to the difficulties in estimating debt betas. The Authority should undertake empirical work to assess the appropriate level for the debt beta. Given a fixed level of equity beta, a zero debt beta will reduce the asset beta below the level it would achieve with a positive debt beta. For example, assuming an equity beta of 1.10 and a debt beta of zero results in an asset beta of 0.44 if leverage is assumed to be 60 percent of assets. At a debt beta of 0.25 the resulting asset beta is 0.59. In testing for comparable asset betas this may lead to the Authority identifying an asset beta at below its true level in the presence of debt.

Critique of the Lally report

Introduction

This section of the report provides specific critiques of the alternative approaches and parameter estimation mechanisms advocated in the Lally report.

Critique of the alternative approaches to estimation of return on equity and the weighted average cost of capital

The Lally report recommends that the standard CAPM equation should be replaced by either the Lally-van Zijl model or the simplified version of the Brennan-Lally model. This view is not supported by E&Y for the following reasons:

- It is our understanding that no Australian firms apply either the Lally-van Zijl model or the Brennan-Lally models for return on equity or WACC calculations. The standard CAPM is typically used in return on equity and WACC calculations;
- No regulatory body in Australia has applied either of the two proposed models;
- The simplified Brennan-Lally model excludes the impact of dividend imputation. The Australian equity market issues dividends subject to dividend imputation. Alternative specifications for post tax CAPM models exist which include the impact of dividend imputation such as Dempsey's 1996 model¹⁰;
- The number of parameters requiring estimation and consideration by regulated entities and the Authority has increased considerably from the Authority's current approach. This will lead to increased time and cost requirements at each regulatory review.
- A number of the input parameters are sensitive to assumptions regarding their measurement. The Lally report identifies a number of the parameters that are highly sensitive and can potentially take on quite a range of outcomes which can materially affect the models estimates. For example, the Lally report¹¹ states that in the Lally-van Zijl version of the CAPM the term DT_d can result in a range of values from 0.004 to -0.005 with a typical value close to zero. The paper also says T_m is also close to zero. However, no ranges are provided.
- Both of the Lally models assume a relationship exists between systematic risk, dividend yields, the level of dividend franking, and the relative relationship between the taxation of interest and capital gains. Whilst appearing robust relative to the assumptions made, the models and their assumptions have not been subject to rigorous empirical testing to demonstrate that the factors are explanatory variables of the return on equity of Australian shares.

¹⁰ Dempsey, M., (1996) "The Cost of equity capital at the corporate and investor levels allowing a rational expectations model with personal taxation", *Journal of Business Finance and Accounting*, v23, pp1319-1331

¹¹ See Footnote 13 on Page 26

- The models developed in the Lally report are highly contingent on a clear understanding of the relationship between the quantity of the differential between capital gains tax and taxation of interest and also between dividend imputation and capital gains tax. No empirical evidence is shown in the report to support the assertions made regarding these relationships;
- An important aspect of capital gains tax that is overlooked in the Lally model is that capital gains tax can be either positive or negative in any particular year. It is not clear from the Lally models how the delaying of capital gains tax, negative capital gains tax or the carry forward of imputation credits are captured in the models;
- The Lally-van Zijl and Brennan-Lally approaches have strong foundations in there being strong clientele effects whereby differences in personal taxation will influence decisions regarding holding debt and equity. As noted by Graham¹², very little is known about the tax status of marginal investors and deducing this information is very difficult.

Critique of parameter estimation techniques

Market risk premium

The Lally report recommends a market risk premium that reflects the Officer base model market risk premium of 6.00% with adjustments for the assumptions of the various models.

It should be noted though that the market risk premiums estimated for the Lally-van Zijl and the Brennan-Lally models are presented as adjustments to the unadjusted market risk premium. As shown below, both models are highly sensitive to the level of the risk free rate in their estimation (assuming an underlying market risk premium of 6.00 per cent).

Level of the risk free rate	Market Risk Premium for Lally-van Zijl model	Market Risk Premium for Brennan-Lally model
4.00%	6.1728 %	6.8714 %
5.00 %	6.4028 %	7.1014 %
6.00%	6.6328 %	7.3314 %
7.00%	6.8628 %	7.5614 %
8.00 %	7.0928 %	7.7914 %
9.00 %	7.3228 %	8.0214 %
10.00%	7.5528 %	8.2514 %

Both adjustment processes are highly contingent on measures for the tax rate, the market dividend yield, utilisation and the ratio of imputation credits to dividends at the market level. Each of these parameters requires individual estimation which may not be possible

¹² Graham, J.R., "Taxes and Corporate Finance: A Review", Working Paper, Duke University, May 2002.

due to the multicollinearity between the market risk premium and the market dividend yield and also between the risk free rate used to estimate the adjustment to the market risk premium.

E&Y considers that the use of a long term historical measure of the market risk premium in the range of 6 to 8 per cent should be applied – rather than a market risk premium that reflects short term risk free rate effects.

Risk free rate

The Lally report endorses the use of a government bond yield for the risk free rate and recommends averaging over a 20 business day period prior to the regulatory reset date. The report also endorses the term of the risk free rate as being equivalent to the term of the regulatory period. For example, a five year reset would require a five year risk free rate. The Lally report uses an example to demonstrate that the term of the risk free rate must be consistent with the regulatory period for the risk free rate to reflect a level where the net present value of the assets is equal to the present value of the revenue stream generated from the assets. The Lally report also does not support the need for consistency between the term of the market risk premium and the risk free rate.

From the Lally report it is observed that:

- Whilst Lally's analysis refers to the rate of return it appears it is being treated as the rate of return being equivalent to the nominal risk free rate. The analysis has not commented on issues related to the risk premium expected in a WACC analysis and is therefore incomplete as cash flows will not be discounted by the risk free rate but rather by the WACC.
- the approach adopted by Lally directly links the prevailing interest rate for the current regulatory period to the assumed long term investment horizon. This has the impact of distorting the benchmarks to be applied for long term investments and suggests that the cost of debt as experienced by firms can be automatically reset to current market levels at the beginning of each regulatory period;
- the approach used also assumes that the life of the asset can be neatly packaged as five year intervals which thereby converts the CAPM model to a multi-period model;
- the analysis has not conceded the market observation that investors prefer financing at long term interest rates reflecting the life of the assets rather than a series of short term reinvestments linked to the timing of the regulatory cycle;
- the extended implication of the approach adopted by Lally is that investors are assumed to make capital budgeting decisions using short term rates even though they are investing for long term horizons;
- the analysis performed by Lally uses the example of only a one year regulatory period with the life of the asset being two years – the regulatory period applied by the Authority is currently longer than two years and the average life of the assets in the utilities industry can be as high as one hundred years. The robustness of Lally's analysis is therefore questionable;

- the regulated entity is assumed to face zero volume risk with revenue achieved in each regulatory period consistent with expectations at time zero which is consistent with a revenue cap rather than price cap form of regulation;
- The model does not acknowledge that in the presence of incentive mechanisms (i.e. efficiency carryovers as implemented by the Victorian Essential Services Commission¹³) that it will not be feasible for the present value of the revenue cash flows to equal the present value of the assets.
- The goal of economic regulation to set the present value of the regulated revenue cash flows to the present value of the regulated assets should not take precedence over the requirements of modern portfolio theory that the risk free rate should be consistent with the life of the asset. Assets rarely reach the end of their economic life at the end of each regulatory period. Thus the 10 year rate or longest observable term risk free rate should be applied.

E&Y considers that:

- in selecting assets for investment investors have regard to both the risk and return of assets. If selecting assets of similar risk, the return on the asset becomes a critical input to the decision process. In determining the returns expected from an asset, investors will have regard to the returns they expect to get relative to the opportunity cost of capital from comparable term to maturity risk adjusted investments. In determining the return on assets investors will have regard to the size and timing of the expected cash flows obtained from the operation of the assets. From this information, investors will assess the present value of the expected cash flow stream from the assets to allow a suitable comparison. Thus the timing of the expected cash flows and the choice of an appropriate discount rate become critical to this calculation. It is imperative that the maturity of the discount rate be matched directly to the timing of the expected cash flows else the analysis will under or over value the present value of the expected cash flows.

Further, the review period for an investment is not relevant to the return expected from holding an asset over its life. To highlight that it is inappropriate to use shorter dated securities as the proxy for the risk-free rate consider the following example. Assume an investor held a bond portfolio with an expected life of 10 years and monitors the portfolio daily. The benchmark applied would be the 10-year bond rate as opposed to the official overnight cash rate.¹⁴ To apply the daily rate would be inconsistent with the life of the asset and the risk in the equity risk premium.

In a regulatory setting, typically the assets have economic lives that are greater than the regulatory periods. Thus to apply a discount rate linked to the regulatory period to the expected cash flows will result in an incorrect interpretation of the rate of return on the assets.

¹³ Victorian Essential Services Commission in the *review of Gas Access Arrangement's Final Decision*, October 2002, pp 155 - 180

¹⁴ Comments by Dr Neville Hathaway at ACCC and ORG, 'Public Forum on the Weighted Average Cost of Capital (WACC) in the Victorian Gas Access Arrangements', 3 June 1998, p. 82.

Given the long-term nature of the investment it is important that the rate applied for discounting purposes also reflects this long term feature. Thus the most commonly used proxy for the risk free rate is the 10 year government bond yield. This view is supported by a number of leading academics. For example as noted by Damodaran¹⁵:

‘For an investment to be risk free, two conditions have to be met:

- *There has to be no default risk, which generally implies that the security has to be issued by the government.*
- *There can be no uncertainty about reinvestment rates, which implies that there are no intermediate cash flows.*

Thus, the risk-free rate is the rate on a zero coupon government bond matching the time horizon of the cash flow being analysed. Theoretically, this translates into using different risk free rates for each cash flow on an investment – the one year zero coupon rate for the cash flow in year one, the two year zero coupon rate for the cash flow in year two and so on. Practically speaking, if there is substantial uncertainty about expected cash flows, the present value effect of using time-carrying risk-free rates as opposed to using an average risk free rate is generally so small that it is not worth the trouble. Using a long term government rate (even on a coupon bond) as the risk free rate on all of the cash flows in a long term analysis will yield a close approximation of the true value. For short term analysis, it is entirely appropriate to use a short term government security rate as the risk free rate.’

This view is also supported in Samuels¹⁶ et al who argue that

‘in most instances projects will extend over several years rather than just a single short period. In these circumstances the risk free return could be related to a government security having the same maturity as the life of the project. For example, with a five year project the risk free rate could be related to the yield to maturity on a five year government security.’

- the risk free rate should reflect a rate of return that allows investors to preserve the initial capital expended in their investment. Central to the notion of the return being risk free is that it will allow investors to recover their principle or to maintain their capital intact. In order for this to occur the rate must reflect the economic life of the asset. The argument for using a regulatory period linked rate of return would only be true if the owner of the asset could be sure that they

¹⁵ A. Damodaran, ‘Applied Corporate Finance: a user’s manual’, John Wiley and Sons, Inc., 1999, p. 65.

¹⁶ J.M. Samuels, F.M Wilkes and R.E. Brayshaw, ‘Management of Company Finance’, Fifth Edition, Chapman & Hall, 1991, pp 206-207.

would be fully compensated if the asset was stranded or abandoned at the end of the regulatory period.

- the risk free rate should also reflect a rate consistent with signalling the efficient cost of debt. In so doing it should reflect the rate at which new investment in the asset should be compensated. The 10-year bond rate is a signal for long term investment – it represents the expected return from holding a risk-free security for the next 10 years.
- If the incorrect rate is applied, by using an inappropriate maturity, then this will cause resource allocation distortions. For example, if too low a risk-free rate is set, the firm would not be adequately compensated for its investment. Whilst this would lower prices in the short term, the firm would be unlikely to undertake further investment in the network, leading to congestion and an inability of shippers to deliver their product to their market in the longer term. The rate of return allowed as part of a regulatory decision is not important only to provide a return on past investment. It also provides a signal for long term decision making. Accordingly, the use of shorter term securities as benchmarks for decisions affecting long term assets could distort these investment decisions.
- a rate linked to the regulatory period will distort this process as the period over which debt is financed will typically exceed the regulatory period and will be linked directly to the economic life of the assets being financed.
- the use of a long maturity for the risk-free rate is also supported by the finding in the empirical literature that there is no base level to which both short and long term nominal interest rates in Australia and international markets systematically return.¹⁷ In other words, interest rates exhibit non-stationarity.¹⁸
- in setting the market risk premium (i.e. the difference between the return on the market portfolio and the return on the risk free asset) to be applied for estimation of the CAPM, the market risk premium should reflect the maturity of the economic life of the assets. To do otherwise would be inconsistent with the CAPM assumption that the model is a one period model and will bias the estimate of the market risk premium.
- The market risk premium can be estimated in a number of ways including survey based approaches, derived from asset pricing models such as price earnings multiplier analysis, derived from consumption based models or directly from historical data. The preference applied and used by regulators is to have regard to historical measures. In the Australian context the Officer study is regarded as

¹⁷ Australian examples of the empirical evidence include Ann, A.T.H. & L. Alles (1999) 'An Examination of the Causality and Predictability between Australian Domestic and Offshore Interest Rates', Working Paper No. 99-09, Department of Economics and Finance, Curtin University (examined bank accepted bills and AUD-Euro deposits); Mishkin, F.S. & J. Simon (1995), 'An Empirical Examination of the Fisher Effect in Australia', *The Economic Record*, vol. 71(214), pp. 217-229 (examined treasury notes); Moschos, D.M. (1995), 'The Information Content of the Yield Curve in Australia' *Journal of Macroeconomics*, vol 17(1), pp. 93-109 (examined cash rates, Treasury notes and 2,5 and 10-year bonds).

¹⁸ Typical visual characteristics of non-stationarity include that the series either grows in a secular way over long periods of time (such as time series representing aggregate economic behaviour such as GDP), or the series gives the appearance of wandering around as if it has no fixed population mean (typically found in asset prices such as share prices). Alternatively, a time series may give the appearance of non-stationarity due to structural changes in the underlying economy which cause sharp and sudden shifts in mean levels.

the benchmark analysis where comparisons are made over a long history of the Australian market to conclude that an average rate between 6 to 8 percent is applicable. In the Officer approach, 10 year average returns to the market are compared directly with 10 year government bond rates.

- It is an empirical as opposed to theoretical issue as to whether the market risk premium will change if the measurement interval is reduced to five years for consistency with the regulatory period. E&Y has not performed this analysis but anticipates higher volatility in the annual market risk premium measures and therefore anticipates a movement from the Officer study levels.

The argument of linking the term of the risk free rate to the regulatory period has been rejected by the Australian Competition Tribunal in their 2003 Gasnet decision. The Tribunal favoured the argument that the use of a 10 year rate is consistent with asset life rather than the regulatory cycle and for consistency with the estimation of the market risk premium.

Cost of debt

The Lally report¹⁹ supports the measurement of the cost of debt as reflecting the risk free rate plus an applicable debt margin to reflect the default premium required for the risk grading of the entities in the industry under consideration.

E&Y considers this approach to be appropriate for the measurement of the cost of debt.

Asset, Debt and Equity betas

Estimation of asset and equity betas

The Lally report²⁰ recommends that debt betas be set to zero and that the formula applied to de-lever and subsequently re-lever equity betas take no account of debt betas. This view is not supported by E&Y. The subsequent effect from this approach is that the cost of debt is assumed to have no systematic risk.

It is also noted that the equation proposed by the Lally report on page 77 to re-lever equity betas will lead to slightly lower estimates of re-levered equity betas than the equation applied in the worked examples on pages 107 to 116. Lally proposes that this difference should be ignored. Empirical testing by E&Y reveals that the Lally approach estimates an equity beta approximately 0.03 less than the equity beta estimated when the debt beta is equal to zero.

¹⁹ Pages 95 to 97

²⁰ Pages 70 to 78

Use of international equity betas

The Lally report²¹ supports the use of international equity betas and recommends they can be adjusted to reflect the covariance between industry weightings in Australian and international markets.

Any approach to the adjustment of international betas should be subjected to extensive empirical testing before implementation. It is well known that differences exist in international equity markets due to factors such as market index construction and measurement, differentials in market size, economic factors and differentials in tax treatments.

E&Y considers that the Authority should continue to treat international betas with caution in forming a view of the appropriate level of the asset beta for Australian regulated businesses.

Pooling Estimates

In its discussion of alternative pooling techniques for the averaging of equity and asset betas the Lally report²² recommends the Vasicek method in preference to the Blume method.

The stability of the equity beta is an important issue in identifying the appropriate equity beta for regulated businesses. Empirical evidence from the Australian markets supports the mean reversion of beta.²³ The raw beta values, which were derived from historical data, can be adjusted based on the assumption that beta factors change over time especially in industries where there is considerable structural reform underway.²⁴

The Vasicek approach was initially intended for averaging equity betas for individual firms with weightings applied conditional on the standard errors of the equity beta estimates. To adjust for asset betas it has been proposed that the standard error of the asset beta can be approximated by replacing the equity beta with the standard error of the equity beta in the de-levering equation (with a debt beta of zero).

The Vasicek measure is expected to minimise the variance of the average beta for the proxy group. Clearly this method of estimation assumes that the equity betas have standard errors that are equivalent to those of asset betas after consideration of leverage effects.

Given that asset betas are derived with regard to both gearing and debt betas the use of de-levered equity beta standard errors as proposed in the by Lally would therefore appear

²¹ Pages 88 to 91

²² Pages 91 to 94

²³ See Castagna, A. and Z. Matolcsy (1978), 'The Relationship Between Accounting Variables and Systematic Risk and the Prediction of Systematic Risk', *Australian Journal of Management*, vol. 3, pp. 113-26 and Brooks, R. and Faff, R. (1997), 'A Note on Beta Forecasting', *Applied Economics Letters*, vol. 4, pp. 77-78.

²⁴ International studies supporting the use of adjusted betas include Sharpe, W.F., Alexander, G.J. and Bailey, J.V. (1995), *Investments*, 5th edition, Englewood Cliffs, Prentice Hall, (rationale for adjusting beta section); Blume, M.E. (1971), 'On the Assessment of Risk', *Journal of Finance*, March, pp. 1-10; and Blume, M.E. (1975), 'Betas and their Regression Tendencies', *Journal of Finance*, June, pp. 785-795.

inappropriate as each will have their own distributional properties and clearly the size of the estimated asset beta standard error should also be proportional to the interaction between the debt beta and the gearing level applied as this will effect the size of the numerator in the de-levering equation.

The approach of using the standard error of betas is an approach advocated by Vasicek, whose method assumes like the Blume method, that individual firm equity betas are misspecified when estimated by the Ordinary Least Squared (“OLS”) regression method. Vasicek does not refer to it as an approach for estimating the average of asset betas. Empirically, the equation used to estimate the weightings will give higher weightings to low standard errors as opposed to high standard errors due to the use of the squared inverse measure. This is confirmed in the example below.

Company	Standard Error (SE)	SE ²	1/SE ²	Weighting Applied to Beta
A	0.34	0.1156	8.650519	0.306906
B	0.27	0.0729	13.71742	0.486672
C	0.47	0.2209	4.526935	0.160608
D	0.88	0.7744	1.291322	0.045814
		Sum	28.1862	1

The weighting scheme as proposed is totally independent of the empirical fact that low betas tend to be overestimated and high betas tend to be underestimated under OLS. The standard error may be large or small, independent of the estimated beta size but rather as a function of the appropriateness and fit of the variable being examined. Therefore weighting by standard errors offers little extra explanatory information.

Finally, the use of a small sample is inappropriate to represent industry conditions due to the small sample biases in distributional properties. The method advocated by Vasicek has been designed for samples of greater than 20 observations.

Australian empirical evidence regarding betas stability suggests that betas do have a tendency to move over time and recent Australian empirical evidence does support the use of adjustment factors to capture the movement of betas over time. The nature of the adjustment factors suggested by Australian academic studies are consistent with the Blume type measure.

The use of adjusted betas is also supported by practitioners.

Capital gains tax

The Lally report²⁵ identifies that a shortcoming of the Officer model is that it does not take into account the impact of capital gains taxes. Capital gains taxes as applied in Australia involve the taxation of net capital gains at the investors marginal tax rate. Net capital gains are defined as the difference between total capital gains for the year and total capital losses (including capital losses from previous years) less any allowable capital gains tax discount.

The Lally models incorporate the impact of capital gains via a taxation parameter defined as:

- T for the weighted average relationship between the taxation of interest and capital gains;
- T_d for the weighted average relationship between the taxation of dividends at the entity level and capital gains;
- T_m for the weighted average relationship between the taxation of dividends at the market level and capital gains.

The Lally report does not clearly deal with the impact of capital losses nor with the deferral of capital losses. Australian Taxation Office statistics²⁶ regarding capital gains tax reveal that during the period 1996 to 2001 the level of tax paid relative to net capital gains grew from 22.32 to 27.90 per cent at an average of approximately 25 per cent.

If it assumed that tax on interest expense will remain relatively constant at an assumed level of 30 per cent the effect of continued growth in t_{gi} (i.e. tax on capital gains) will result in the gap between tax on interest and capital gains narrowing. As demonstrated below, this will cause the value of T to reduce.

Level of Capital Gains Tax	T
0.20	0.1250
0.225	0.0968
0.25	0.0667
0.275	0.0345
0.30	0.0000

If the value of T reduces below the Lally applied rate of 0.23, both of the Lally models react in opposing manners. The Lally-van Zijl model achieves a lower return on equity and WACC whilst the Brennan-Lally model achieves a higher return on equity and WACC. This is due to the treatment of capital gains being different in both models. For example, using all other inputs from the Lally report, if the return on equity and WACC

²⁵ Pages 21 to 27

²⁶ Australian tax office web site:

<http://www.ato.gov.au/corporate/content.asp?doc=/content/mr2003120.htm>

was estimated using $T = 0.067$, the resulting return on equity and WACC's are as follows:

Assumptions	Model	Return on Equity	WACC
Base model	Officer	11.30%	9.20%
	Lally-van Zijl	11.87%	9.49%
	Brennan-Lally	11.40%	9.25%

These results highlight that models are highly sensitive to the setting of the parameters T , T_d and T_m for what is only a margin difference in the WACC between the Officer model and the Lally models. Given the complexity in arriving at a measure of these inputs increased time and costs will be required at each review to establish the correct parameters for estimation.

Dempsey²⁷ identifies that there is a significant trade-off between the pricing, timing and taxation of a firm's cash dividends and the investors effective rate of capital gains tax. He further identifies that any reduction in capital gains tax, such as proposed by the Ralph Commission would will have the impact of bringing the personal tax system closer to being tax neutral. In such a case, the WACC formulation remains as per the Officer approach assuming no personal taxes. The Lally report²⁸ also highlights the role of personal taxes and that that the level of taxation attributable to equity is a function of the trade-off between the taxation of dividends and the taxation of capital gains.

Both the Lally report and the Dempsey paper raise a significant issue for the Authority's consideration in relation to the treatment of personal taxation. They both highlight the trade-off between taxation of dividends (including the benefits of imputation) and capital gains tax. By highlighting this relationship, both papers clearly demonstrate that any decrease in capital gains tax relative to a fixed level of dividend taxation will decrease both T_d and T_m . This will result in a decrease in the return on equity and WACC in the Lally-van Zijl model and an increase in both for the Brennan-Lally model²⁹. Conversely, if the level of capital gains tax is constant and the level of taxation on dividends increases, the level of return on equity and WACC in the Lally-van Zijl model will increase and the both will decrease in the Brennan-Lally model. Thus, personal taxes have a clear impact on WACC and also on the subsequent revenues estimated for regulated entities. This highlights that applying the Officer model without adjusting gamma in the revenue cash flows for the taxation of capital gains tax may overstate the impact of gamma (if it is used in isolation) and understate the level of regulated revenues³⁰.

²⁷ Dempsey, M., *The Cost and Allocation of Capital in the Context of the Australian Imputation Tax system: A generalised Framework*, Working paper, Griffith University.

²⁸ Page 26

²⁹ The Lally report assumption that T_d and T_m are equal to zero would not be applicable if the taxation of dividends differed from the taxation of capital gains.

³⁰ Unless both the tax on dividends and tax on capital gains offset each other.

Gamma

The Lally report³¹ recommends that the method of estimation of gamma applied reflect a utilisation rate of 80 percent and that the level of imputation credits to tax should also be set close to 1 for most industries. Based on this assessment Lally concludes that gamma should be set at or close to one.

Australian regulators have consistently applied a gamma estimate of 0.50.

Based on a sample of the 10 largest firms in Australia, The Lally report³² notes, that close to 100 percent payment of imputation credits is undertaken by Australian firms. Whilst these 10 firms may behave in such a manner, it is incorrect to deductively derive the conclusion that all firms behave in this manner. It should also be noted that not all dividends are franked. Australian Tax Office statistics³³ suggest that during the period ending June 30 1994 to 2001 that the proportion of franked dividends to total dividends issued by Australian firms was as follows:

Year	Proportion of dividends issued as franked dividends
1993-94	72.31 %
1994-95	78.67 %
1995-96	72.68 %
1996-97	100.00 %
1997-98	68.11 %
1998-99	41.08 %
1999-2000	53.28 %
2000-01	63.33 %

It should also be noted that not all firms pay taxation and therefore will be unable to issue franked dividends and most importantly, not all imputation credits must be applied by the company issuing dividends in the year in which the imputation credits are generated. Companies can retain imputation credits and issue them in future years. The Lally report does not discuss these issues.

Further, in assessing the impact of the dividend imputation, the Lally report argues that the marginal investor is not the price setter in the market. This argument is refuted. In an equilibrium price setting market, such as the equity market, the marginal investor is the source of the next market transaction contributing equity capital to the regulated entity. In forming their view the marginal investor will have regard to all aspects of the market and will be comparing entities based on a range of criteria including dividend streams and access and availability of imputation credits.

³¹ Pages 32 to 43

³² Page 117

³³ Australian tax office web site:

<http://www.ato.gov.au/corporate/content.asp?doc=/content/mr2003120.htm>

Recent Australian tax changes restricting the transfer of imputation credits and the significant holding of Australian shares by foreign rather than domestic shareholders imply that gamma will be less than historical levels of 0.50 for the average shareholder. Further as noted above, if gamma is treated without consideration of capital gains tax, then the impact of personal taxes will understate revenues in the approach currently applied by the Authority.