Response to the Submission of the South Australian Treasurer to ESCoSA's Electricity Price Determination

REPORT PREPARED FOR

ETSA Utilities

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1. EXECUTIVE SUMMARY AND RESPONSE

Context

1.1 We have been retained by ETSA Utilities to respond to the Submission of the Treasurer of South Australia to ESCOSA's Electricity Distribution Price Determination (the Treasurer's submission) in so far as it relates to our report of 17 April (the Gray-Officer Report). In particular, the Treasurer's submission addresses the determination of an appropriate equity beta for ETSA Utilities, which was the subject of the Gray-Officer Report. Much of the Treasurer's submission on this issue is based on a paper prepared by a consultant retained by Treasury (the Lally paper). This report specifically addresses the arguments raised in the Treasurer's submission and the Lally paper.

Use of international data

1.2 Lally rejects ESCOSA's conclusion that "Australian regulated entities are likely to provide the most reliable source of beta estimates." In contrast, Lally concludes that the set of Australian comparables "is far too small to place any great reliance upon."[1] Our view is more consistent with that of ESCOSA in that we recommend that data from foreign comparables be examined as one element in a full analysis (bearing in mind the important differences between national markets) and not relied on exclusively. We advocate using a range of statistical techniques to account for outliers, the technology bubble, other statistical issues, applied to various data sets, informed by qualitative considerations such as economic reasonableness and commercial common sense.

1.3 Lally obtains data from Damodaran and conducts his own analysis, which is not described or tabulated in his paper. Using the published version of the Damodaran data, we perform a range of analyses that are transparent and replicable and fully tabulated in this report.

1.4 Our analysis demonstrates that the Damodaran data for US comparable firms supports an equity beta (re-geared to 60%) substantially above one. If the Blume adjustment is reversed from the Damodaran data, the re-geared equity beta is still slightly above one.

Use of the Blume adjustment

1.5 The Gray-Officer Report proposes the use of Blume-adjusted betas as a means of correcting the measurement error that is well known to contaminate raw equity beta estimates. Blume-adjusted betas are common in publicly available equity beta measurements.

Blume-adjusted betas are widely used

1.6 Most commercial data services use a Blume type adjustment. Advocates of this approach include Merrill Lynch, Barra, Value Line, Standard and Poor's, Morningstar, and Bloomberg.

[1] Lally, M., The Equity Beta for ETSA Utilities, May 6, 2005, p. 9.

Blume-adjusted betas are empirically superior in that they have better forecast qualities than unadjusted betas.

1.7 Recent Australian empirical evidence demonstrates that Blume-adjusted betas outperform raw betas in estimating expected returns on equity. When used in the CAPM, as is the case in regulatory determinations, Blume-adjusted betas provide superior forecasts of future returns than do raw betas. Regardless of any conceptual arguments (of doubtful relevance), Blume-adjusted betas perform better in the purpose for which they are to be used. This is, no doubt, why they have been adopted by a whole range of top-tier commercial data services.

1.8 The Lally paper and the Treasurer's submission repeat a criticism of the use of Blume-adjusted betas when the adjustment is used as a means of incorporating mean reversion in betas driven by conscious managerial decisions with regard to corporate diversification and leverage. However, this line of argument is irrelevant as the Blume adjustment is not used for this purpose in our analysis.

1.9 The Lally paper and the Treasurer's submission further argue that if the Blume adjustment is to be employed as a means of controlling measurement error, a reference beta of one should not be used. Rather a reference beta equal to the average beta of a group of comparable firms should be used. This must be rejected as it is both impractical as well as unnecessary.

1.10 Specifically, there are too few Australian comparable firms for this approach to be practical. The approach recommended by Lally is appropriate if we are confident about our estimate of the mean beta estimate of comparable firms, but seek to control estimation error for an individual firm. The case at hand is quite different – we are trying to estimate the mean beta for a portfolio of companies that is likely to reflect the riskiness of ETSA Utilities business, the beta that is appropriate for the average electricity distribution business (re-geared to 60%). Thus, the Lally approach is not helpful as it requires us to assume the answer before we can begin to implement the procedure – if we already knew the reference beta, there would be no need to invoke the procedure in the first place.

1.11 The Lally approach is particularly inappropriate where there are a small number of comparable firms, such as the case here. This is because the entire set of comparable firms may be systematically subject to estimation error so that using the mean beta as a reference point would compound, rather than mitigate, estimation error. In any event, the logical reference beta for electricity distribution firms would be one, based on a wealth of regulatory precedent which consistently has established an equity beta for electricity and gas transmission and distribution businesses of about one.

Our conclusion on the Blume adjustment:

1.12 Blume-adjusted betas are widely used by credible data service providers. Their empirical performance as a forecaster of returns is superior to raw beta estimates. The Lally paper rejects a motivation for the Blume adjustment that is irrelevant. The Lally paper recommends that if the Blume adjustment is to be applied, it must be done in a manner that in effect requires the result to be assumed before it is calculated. This would be circular. For all of these reasons, we confirm our conclusion that Blume-adjusted betas are appropriate. Nevertheless, we illustrate the impact on our results of removing the Blume adjustment from our analysis.

Elimination of outliers

1.13 Lally does not object to the removal of statistical outlier observations from the analysis, but prefers to use a strict criterion that results in very few outliers being eliminated. Our analysis shows that even when applying the types of estimation techniques advocated by Lally, individual firm betas and portfolio betas support the use of an equity beta of at least one.

The technology bubble

1.14 Lally appears to support the notion that the technology bubble was an unusual period that resulted in an underestimation of equity betas for utilities. However, he concludes that removal of the data from this period would lead to an over-estimation of beta. This is because removal of the bubble period effectively results in an estimate based on zero probability of a bubble, whereas the true probability of a bubble is positive. To omit the bubble period is to assume that a technology bubble will not occur in the next five years. In this case, beta estimates are biased upward only to the extent of the probability of a technology bubble actually occurring within the regulatory period. To the extent that this possibility is remote at best, any bias is absolutely negligible.

Consistency of positions

1.15 In an analysis of the same data used in the Lally paper, and using the same de-levering procedure, the same author, Lally, has recently concluded that the appropriate point estimate of the asset beta for New Zealand electricity and gas distribution firms is 0.4 and 0.5, respectively. Using the same re-gearing procedure adopted in the Lally paper (that used by ESCOSA), these asset betas imply equity betas of 1.00 and 1.25, respectively. Of course, the New Zealand market differs from the Australian market so these values are not directly comparable but are useful overseas benchmarks.

Conclusions

1.16 Lally's arguments in relation to the Blume adjustment are flawed. However, even after reversing the Blume adjustment, the available US and Australian data still supports an equity beta (re-geared to 60%) of at least one. As concluded in our earlier report our conclusion is that it is appropriate to use a range of statistical techniques to account for outliers, the technology bubble, other statistical issues, and qualitative considerations such as economic reasonableness and commercial common sense. This response to the arguments raised in the Treasurer's submission and the Lally paper, confirms that the available data, when properly analysed and considered in its totality, supports an equity beta of at least one.

2. RESPONSE TO THE SUBMISSION OF THE TREASURER OF SOUTH AUSTRALIA

Re-statement of Lally paper

2.1 In so far as it relates to our report of April 17, 2005[2], the Treasurer's submission[3] is based almost entirely on the arguments raised in a paper prepared by its consultant (the Lally Paper[4]). We deal with each of these arguments in the subsequent section.

Interaction between parameters

2.2 First, the Treasurer's submission argues that:

> "It is appropriate for ESCOSA to consider the level of systematic risk faced by ETSA Utilities when considering an appropriate beta."[5]

and that:

> "Clearly, there exists a strong interconnectivity between the equity beta and the systematic risk faced by ETSA Utilities."[6]

2.3 Indeed there is a strong interconnectivity between beta and systematic risk – they are the same thing. Beta is simply the way that systematic risk is quantified. This is equivalent to arguing that there is a strong interconnectivity between how tall a person is and their height.

2.4 Nevertheless, the Treasurer's statement draws further conclusions from the fact that systematic risk is interconnected with systematic risk:

> "Accordingly, this provides further evidence that it is not appropriate to consider single components of the WACC in isolation from other input components."[7]

Relationship with MRP

2.5 This leads to an argument which suggests that ESCOSA has over-estimated the market risk premium (MRP) which, by implication, justifies its under-estimation of the equity beta.

> "For instance, declines in the real interest rate and the introduction of dividend imputation in 1987 have produced capital gains which could not have been anticipated. Together, they have boosted excess returns by about 1 percentage point over the 30 years to 2003. Taking these biases into account, the MRP over the last 30

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[2] Gray, S. F. and R. R. Officer, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities, April 17, 2005.
[3] Submission of the Treasurer of South Australia, Review of the Essential Services Commission of South Australia, Electricity Distribution Price Determination.
[4] Lally, M., The Equity Beta for ETSA Utilities, May 6, 2005.
[5] Submission of the Treasurer of South Australia, Review of the Essential Services Commission of South Australia, Electricity Distribution Price Determination, p. 24.
[6] Ibid, p. 24.
[7] Ibid, p. 24.

> years would appear to lie in the range of 4½ to 5 percent, rather than the 6 assumed by ESCOSA."[8]

Lally approach to regulatory conservatism

2.6 On this issue, Lally argues against the Treasurer's submission. He states that:

> "I agree that regulators should err on the high side but this adjustment should be made at the level of WACC rather than at the level of each individual parameter. By doing so at the WACC level, the regulator can choose WACC so as to control the probability (at some specified level such as 10%) of choosing a WACC value that is too low. By contrast, if that control level were applied to each individual parameter, the resulting control level at the WACC level is liable to be considerably less."[9]

That is, Lally argues that individual parameters should each be estimated as precisely and accurately as possible. One should not trade off an over-estimate of one parameter against an under-estimate of another.

2.7 Moreover, Lally supports the notion that "regulators should err on the high rate" but suggests that this should be made "at the level of WACC." The way this would be done is to recognise the estimation uncertainty surrounding a number of WACC parameters by using a range or probability distribution rather than a point estimate for these parameters. This parameter estimation uncertainty can then be aggregated into a probability distribution for the WACC – rather than a single point estimate. The regulator can then choose a regulated return from, say, the 90th percentile of that distribution. This achieves the objective that Lally discusses of allowing only a 10% probability of the regulated return being lower than the entity's true cost of funds.

2.8 Indeed, the New Zealand Commerce Commission (NZCC) has recently used exactly this approach in its regulation of gas distribution, based on advice from Lally[10]. In its Final Report, the NZCC notes that:

> "The point estimate on WACC reflects five parameters over which there is significant uncertainty i.e., the market risk premium and the four components of the asset beta. Such parameter uncertainty results in uncertainty over WACC and this can be formalised in a probability distribution for WACC."[11]

They then display a table of percentiles[12] for the WACC distribution and select a value at the 75th percentile. Presumably, it is this approach that Lally has in mind when advocating that the regulator "err on the high side" at "the level of the WACC."

2.9 Regardless of the merits of this approach, it is different from that which ESCOSA has adopted. The ESCOSA approach has no mechanism for erring on the high side at the level of WACC. Rather, ESCOSA adopts a single point estimate for each parameter and mechanically aggregates them into a single WACC estimate. Thus, the only way that the social costs of insufficient investment incentive can be avoided is via conservative estimation of every individual parameter.

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[8] Ibid, p. 24.
[9] Lally, M., The Equity Beta for ETSA Utilities, May 6, 2005, p. 22.
[10] Commerce Commission, Gas Control Inquiry Final Report: Public Version, 29 November 2004 (www.comcom.govt.nz).
[11] Ibid, p. 9.19.
[12] Ibid, Table 9.2, p. 9.19.

2.10 In this context, the Treasurer's argument that one parameter can be underestimated because another may have been overestimated is extraordinary. It is difficult to see how a regulatory framework in which parameters are deliberately mis-estimated in order to balance the mis-estimation of other parameters can possibly protect the long-term interests of South Australian consumers with respect to price, quality, and reliability of essential services.

Treasurer's estimate of 30-year MRP demonstrably false

2.11 In any event, the Treasurer's claim that:

> "The MRP over the last 30 years would appear to lie in the rage of 4½ to 5 percent." [13]

is demonstrably false. The mean observed MRP over various historical periods is documented in Table 1.

Table 1: Observed Australian MRP

Period	Mean Observed MRP
30 years	7.7%
50 years	6.4%
75 years	6.6%
100 years	7.2%

Source: Mean observed MRP, computed as the difference between stock index returns and the yield on 10-year government bonds.

2.12 Moreover, none of these values has been adjusted for the assumed value of franking credits and would therefore be even higher if this were done. The claim that the observed MRP has declined to less than 5% over the last 30 years is simply false.

[13] Submission of the Treasure of South Australia, Review of the Essential Services Commission of South Australia, Electricity Distribution Price Determination, p. 24.

3. RESPONSE TO LALLY PAPER

Issues to be addressed

3.1 The Lally Paper makes two main arguments in relation to our report of April 17, 2005. The first is that the Australian data is too scant and unreliable to produce precise estimates and therefore caution should be exercised when interpreting and using these estimates. He therefore advocates that primary reliance should be placed on US comparables. Lally's second point is that the Blume adjustment should not be used. In this section, we begin by addressing each of these substantive arguments in turn. We also address Lally's comments on the exclusion of outliers and the technology bubble.

Using Foreign Comparables

3.2 In relying primarily on beta estimates for comparable industry groupings in the US, the Lally Report is at odds with the Final Determination, where ESCOSA states that:

> "The difficulty of making comparisons of beta estimates across countries suggests Australian regulated entities are likely to provide the most reliable source of beta estimates, although overseas entities are often relied upon as a secondary source of information."[14]

3.3 In contrast to the position of ESCOSA, Lally[15] states that:

> "As revealed in ESCOSA (2005), there are only six Australian companies of this type. In my view, this is far too small a set to place any great reliance upon. Consequently, it is necessary to consider foreign firms."

Our view is more consistent with that of ESCOSA in that we recommend that data from foreign comparables be examined as one element in a full analysis (bearing in mind the important differences between national markets) and not relied on exclusively or primarily. We advocate using a range of statistical techniques to account for outliers, the technology bubble, other statistical issues, applied to various data sets, informed by qualitative considerations such as economic reasonableness and commercial common sense. We state in our earlier report that:

> "As a general rule, one cannot directly use as an estimate of a domestic company's beta, the beta of a comparable company from another market or economy. The different composition of the markets is likely to lead to different estimates of beta and the assumptions required to make them equivalent are usually violated. However, given the lack of domestic comparables for energy distribution firms, it would be improper to pay no attention at all to the foreign comparables."[16]

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[14] The Essential Services Commission of South Australia, 2005-2010 Electricity Distribution Price Determination: Part A - Statement of Reasons, April 2005, p. 140.
[15] Lally, M., The Equity Beta for ETSA Utilities, May 6, 2005, p. 9.
[16] Gray, S. F. and R. R. Officer, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities, April 17, 2005, p. 29.

3.4 Lally's analysis of US data is based on information published on-line by Aswath Damodaran[17]. The relevant information we have used is the most recently available data, currently available from Damodaran's web site and is summarized in Table 2. These beta estimates are based on the most recently available five years of data. We examine this data for four reasons.

1. It is the primary data source cited in the Lally paper.

2. It is available in published form from a reputable source.

3. In adopting an equity beta substantially lower than its previous estimate and substantially lower than the Australian regulatory precedent, ESCOSA clearly assigns considerable weight to the most recent evidence.

4. This data has not been adjusted for statistical outliers or the effects of the technology bubble. Therefore these estimates can be considered to be conservative, and allow us to examine the US evidence in the absence of any statistical adjustments.

Table 2: US Comparable Industry Betas

Industry Name	Number of Firms	Average Beta	Market D/E Ratio	Tax Rate	Unlevered Beta
Electric Utility (Central)	25	0.76	91.24%	29.29%	0.46
Electric Utility (East)	31	0.72	81.86%	28.04%	0.45
Electric Utility (West)	16	0.79	82.23%	27.26%	0.50

Source: http://pages.stern.nyu/~adamodar/New_Home_Page/datafile/Betas.html

3.5 Lally's approach is to take asset betas constructed in this way and re-gear them to 60% gearing using the procedure adopted by ESCOSA. When this is done to the (unlevered) asset betas in Table 2, the results are as summarized in Table 3.

Table 3: Re-geared US Comparable Industry Betas

Industry Name	Number of Firms	Average Beta	Market D/E Ratio	Tax Rate	Unlevered Beta	Re-geared Equity Beta (60%)
Electric Utility (Central)	25	0.76	91.24%	29.29%	0.46	1.15
Electric Utility (East)	31	0.72	81.86%	28.04%	0.45	1.13
Electric Utility (West)	16	0.79	82.23%	27.26%	0.50	1.24

Source: http://pages.stern.nyu/~adamodar/New_Home_Page/datafile/Betas.html
Re-geared to 60% using the ESCOSA re-gearing procedure.

[17] http://pages.stern.nyu/~adamodar/New_Home_Page/datafile/Betas.html

3.6 However, Lally does not use the data as presented by Damodaran. Rather, he performs his own adjustments (without supplying any details) and reports lower asset betas. He concludes that "the discrepancy (of about .20) is primarily attributable to the use of the Blume betas."

3.7 Two points need to be made in this regard. First, Damodaran is unclear about whether his beta estimates are Blume-adjusted. His data definition for beta estimates states:

> "Estimated by regressing weekly returns on stock against NYSE composite, using 5 years of data or listed period (if less than 5 years). If data is available for less than 2 years, the beta is not estimated)."[18]

3.8 Second, even if the published beta estimates are Blume-adjusted, this adjustment can be transparently reversed.

3.9 When this adjustment is applied to the set of US comparables, the results are as follows.

Table 4: Re-geared US Comparable Industry Betas After Removing the Blume Adjustment

Industry Name	Number of Firms	Blume-adjusted Beta	Raw Beta	Asset Beta	Re-geared Equity Beta (60%)
Electric Utility (Central)	25	0.76	0.65	0.40	0.99
Electric Utility (East)	31	0.72	0.59	0.40	0.93
Electric Utility (West)	16	0.79	0.70	0.44	1.09
Mean		0.76	0.65	0.41	1.00

Source: http://pages.stern.nyu/~adamodar/New_Home_Page/datafile/Betas.html
Re-geared to 60% using the ESCOSA re-gearing procedure.

$$\frac{Raw}{Beta} = \left[\frac{Blume}{Beta} - 0.33\right]/0.66. \qquad \frac{Asset}{Beta} = \frac{Raw}{Beta}\Big/\left[1+(1-\tau)\frac{D}{E}\right]. \qquad \frac{\text{Re-}geared}{Beta} = \frac{Asset}{Beta}/0.4.$$

3.10 That is, even after removing the possible effects of a Blume adjustment, the data from US comparables are still consistent with a re-geared equity beta of at least one. Moreover, the results in Table 4 are based on the most up to date published data and transparent and replicable calculations.

3.11 For all of these analyses, we use the data published by Damodaran for the reasons described in Paragraph 3.4. This is based on data from the most recently available five year period. The Lally report uses this same data (but subjects it to unreported analysis) and also considers data from various other sources that relates to various periods over the last 15 years.

[18] http://pages.stern.nyu/~adamodar/New_Home_Page/datafile/Betas/datafile/variable.html

The Blume adjustment

3.12 In relation to the Blume adjustment, Lally makes a number of arguments, most of which are repeated from previous work and irrelevant to the present context. Each of these is dealt with in turn.

Cause of mean reversion in beta estimates

3.13 Lally repeats the argument that regulators have historically used to reject the use of Blume-adjusted betas. This is based on the notion that the mean reversion in beta estimates is due to conscious managerial choices in relation to diversification and gearing that drive the firm's true beta to one over time. We do not employ the Blume adjustment for this reason. Our report clearly explains that our use of the Blume adjustment is motivated as a means of correcting estimation error. In Paragraph 4.4.7 of our report, we state that

> "the observed phenomena is that simple OLS beta *estimates* revert toward one. The above explanation assumes that true betas (the firm's actual systematic risk) revert towards one over time. It is, however, possible that beta *estimates* may revert toward one even though *true* betas are stable. The fact that beta estimates are potentially contaminated by significant measurement error is well accepted. A very low beta estimate is more likely to be contaminated by negative measurement error and a high beta estimate is more likely to be contaminated by positive measurement error. If measurement error is random over time, this would manifest itself as beta *estimates* regressing toward one over time even if true betas are constant. That is, Blume-type adjustments should be interpreted in the context of measurement error rather than a conscious decision undertaken to move the firm's true beta toward one."[19]

3.14 That is, there are two reasons why beta estimates may revert toward one. The first is that it may be due to conscious managerial decisions that drive the true beta toward one. This, by itself, is not an appropriate justification for using Blume-adjusted betas in a regulatory context. However, in that context it is appropriate to use the Blume adjustment to correct for non-persistent measurement errors which explain the observed mean reversion of equity beta estimates. This is the basis on which we use and support the use of the Blume adjustment. Whether or not true betas change over time, the Blume adjustment can be used to control the effects of measurement error.

3.15 We agree that, in a regulatory setting, the Blume adjustment should not be motivated by conscious managerial choices that change the true beta and that Australian regulators have been correct to reject that motivation. Australian regulators, including ESCOSA, have also been correct to note the considerable estimation error involved in determining an appropriate equity beta. It is this estimation error, and not conscious managerial decisions, that justifies the use of the Blume adjustment.

3.16 Consequently, Lally's discussion of reversion in true betas is irrelevant. The use of Blume adjustment is quite independent of any movement in true betas; it is motivated by estimation error.

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[19] An analogy may help to further illustrate this point. Consider the exercise of measuring the duration of television commercials, and suppose that every commercial actually lasts for exactly thirty seconds. Also suppose that we use an unreliable watch to measure the duration such that times are randomly under or over-estimated. That is, our estimates will be contaminated by random measurement error. If we measure the duration of a particular advertisement to be 25 seconds, this is contaminated by negative measurement error. If we re-measure the duration the next time that advertisement appears, we will likely record a higher measurement given that the actual duration is 30 seconds and measurement error is equally likely to be positive or negative. Thus, even though there is no change in the *actual* duration of the commercial, random measurement error causes the *estimated* duration to revert toward one, on average.

Individual project mean reversion

3.17 Lally notes that "ETSA is an individual project whose beta cannot be altered merely through the diversification behaviour of any firms within which it is embedded."[20] This is true, but irrelevant. The use of Blume adjustment has nothing at all to do with corporate diversification or gearing choices. Our report is very clear in this respect.

Regression to industry average

3.18 The Lally paper and the Treasurer's submission further argue that if the Blume adjustment is to be employed as a means of controlling measurement error, a reference beta of one should not be used. Rather a reference beta equal to the average beta of a group of comparable firms should be used. This must be rejected for various reasons: it is impractical, it is incorrect and unnecessary, and it shows evidence of a regulatory pre-disposition.

3.19 Specifically, there are too few Australian comparable firms for this approach to be practical. The approach recommended by Lally is appropriate if we are confident about our estimate of the mean beta estimate of comparable firms, but seek to control estimation error for an individual firm. The case at hand is quite different – we are trying to estimate the mean beta for a portfolio of companies that is likely to reflect the riskiness of ETSA Utilities business; the beta that is appropriate for the average electricity distribution business (re-geared to 60%). Thus, the Lally approach is not helpful as it requires us to assume the answer before we can begin to implement it.

3.20 The Lally approach is particularly inappropriate where there are a small number of comparable firms, such as the case here. This is because the entire set of comparable firms may be systematically subject to estimation error so that using the mean beta as a reference point would compound, rather than mitigate, estimation error. In any event, the logical reference beta for electricity distribution firms would be one, based on a wealth of regulatory precedent.

Blume-adjusted betas are widely used

3.21 Most commercial data services use a Blume type adjustment. Advocates of this approach include Merrill Lynch, Barra, Value Line, Standard and Poor's, Morningstar, and Bloomberg.

Blume-adjusted betas are empirically superior

3.22 Recent Australian empirical evidence demonstrates that Blume-adjusted betas outperform raw betas in estimating expected returns on equity.[21] When used in the CAPM, as is the case in regulatory determinations, Blume-adjusted betas provide superior forecasts of future returns than do raw betas. Regardless of any conceptual arguments (of doubtful relevance), Blume-adjusted betas perform better in the purpose for which they are to be used. This is, no doubt, why they have been adopted by a whole range of top-tier commercial data services.

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[20] Lally, M., "The Equity Beta for ETSA Utilities," May 6, 2005, p. 16.

[21] See the paper titled "The performance of alternative techniques for estimating equity betas of Australian firms" by Professors Gray, Hall, Bowman, Brailsford, Faff Grundy, and Officer, a preliminary version of which has been submitted as part of the Victorian Essential Services Commission's electricity distribution price review.

Our conclusion on the Blume adjustment

3.23 Blume-adjusted betas are widely used by credible data service providers. Their empirical performance is superior to raw beta estimates. The Lally paper rejects a motivation for the Blume adjustment that we do not use, and is therefore irrelevant. The Lally paper recommends that if the Blume adjustment is to be applied, it must be done in a manner that requires us to begin by assuming a value for the beta that we seek to estimate. For all of these reasons, we confirm our conclusion that Blume-adjusted betas are appropriate. Nevertheless, we illustrate the impact on our results of removing the Blume adjustment from our analysis.

What we can learn from jockeys

3.24 Lally's only substantive comment on using the Blume adjustment as a means of mitigating estimation error (as opposed to conscious managerial choices) comes in the form of an analogy based on estimating the height of jockeys. This analogy has been transferred from a paper prepared for the QCA.[22] There are three problems with this analogy.

1. The analogy is relevant if we already know, or can reliably estimate, the height of the average jockey and we are trying to best estimate the height of a particular jockey in this context. In the regulatory setting, however, our initial goal is to estimate the beta of the average electricity distribution firm. If we knew, or could reliably estimate, the beta for this average (benchmark) firm, we wouldn't need to think about the Blume adjustment; we would already have the value we are trying to estimate in the first place.

2. In the Lally analogy, it is well known that jockeys are shorter than average. This is not the case for electricity distribution firms. For example, the very strong and consistent regulatory precedent is to use an equity beta of one for the benchmark electricity distribution firm.

3. There are a relatively large number of jockeys, so the average height of all jockeys can be reliably estimated. Depending on the sample period, there are only between one and four energy distribution comparables.

For these reasons, it is not appropriate to use as an analogy the task of estimating the height of a *specific* jockey, given a reliable estimate of the height of the average jockey. A more appropriate analogy would be the task of estimating the height of the *average* person whose first and last names both begin with the letter "Z." In this case, we have a very small set and no reason to begin with a pre-disposed view about whether the average height of this group is higher or lower than the general population.

[22] Lally, M., The Cost of Capital of Regulated Entities: Report Prepared for the Queensland Competition Authority, October 12, 2004, www.qca.org.au, p.105.

The removal of outliers

Outlier removal is designed to improve the informativeness of the estimation technique

3.25 Lally does not object to the removal of statistical outlier observations from the analysis, but prefers to use a strict criterion that results in very few outliers being eliminated.[23] Of course, the reason for eliminating outliers is to increase the informativeness of the regression technique that is used to estimate betas. This informativeness is measured by the R-squared statistic from the regression, as we explain in our earlier report:

> "Another way of quantifying the impact of outliers is via the R^2 statistic from the regression that is used to compute the beta. This statistic measures the proportion of the variation in stock returns that is explained by variation in market returns. The remainder of the variation in stock returns is explained by firm-specific factors such as earnings announcements and the like. Beta seeks to measure the relationship between stock and market returns. When most of the variation in stock returns is explained by variation in market returns, the R^2 statistic is high and the regression is highly informative about beta. Conversely, when most of the variation in stock returns is driven by firm-specific factors, the R^2 statistic is low and the regression is less informative about beta – even though stock returns might be highly sensitive to market returns, this may be swamped in the data set by a series of important firm-specific events making it difficult to detect the true relationship. By analogy, it is difficult to measure the ripples that are caused when a stone is thrown into two metre waves, even though the stone does indeed cause ripples. Bowman and Bush (2004) recommend that beta estimates for comparable firms should be used only if the R^2 statistic is above 10%. They argue that in cases where more than 90% of the variation is caused by firm-specific diversifiable risk factors, estimates of systematic risk (beta) is too unreliable to be of any use.
>
> The R^2 statistics for the OLS beta regressions reported by the AGSM Risk Management Service in its most recent report (re-geared and set out in Table 1 above) appear in Table 3. This is the same type and source of data that ESCoSA uses in its Figure 10.2. These R^2 statistics are all less than 10% and would therefore all be eliminated by the Bowman-Bush criteria. The mean is less than 5%. This means that we are seeking to measure the relationship between stock and market returns, but that only 5% of the variation in stock returns is explained by market returns. The other 95% of the variation in stock returns is driven by firm-specific factors and swamps any attempt to reliably estimate beta. Finally, we note that for the largest proxy firm, AGL, the RMS reports a beta estimate that is based on a regression that explains a negligible amount of the variation in stock returns. This is consistent with our analysis of outliers below and helps to explain why the data may have produced an economically unreasonable beta estimate of essentially zero. That is, these regression estimates are swamped twenty-fold by non-market noise, they are statistically unreliable, and should not be used without first trying to improve their statistical reliability." [24]

[23] Lally, M., The Equity Beta for ETSA Utilities, May 6, 2005, p. 17.

[24] Gray, S. F. and R. R. Officer, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities, April 17, 2005, Paragraphs 4.3.21-22.

3.26 In our earlier report, we demonstrate that under the strict criterion preferred by Lally the R^2 statistics remain very low in most cases. This indicates that even after removing a small number of outliers, the regression analysis remains uninformative and should be given little weight. It is for this reason that (i) we also examine criteria that allow the removal of more outliers in order to increase the informativeness of the regression, and (ii) advocate that a whole range of analyses and qualitative considerations such as economic reasonableness and commercial common sense should be used to properly determine an appropriate equity beta.

3.27 Unlike Lally, we do not advocate focusing on one cell of our tables. Rather, we present a range of analyses that, taken together, can help inform on an appropriate beta estimate. For example, our analysis shows that as more outliers are removed, the regression analyses become more informative, and beta estimates tend to increase.

3.28 Even though Lally's arguments in relation to the Blume adjustment are flawed and that it is wrong to focus on a single data point when estimating equity betas, we present a response to Lally's arguments in this context and demonstrate that an equity beta of one is still supported.

Analysis of individual firm betas

3.29 Lally proposes to reverse the Blume adjustment as applied to a strict outlier removal criterion. If we do this, the average (re-geared to 60%) equity beta among the set of comparable firms is 0.96, as summarised in Table 5.

Table 5: Comparable Firm Betas, Re-geared to 60%, Strict Outlier Criterion, No Blume Adjustment, 5 Years of Data, After Removal of Technology Bubble Period

Company	Re-geared Equity Beta Estimate
AGL	0.96
Alinta	0.85
APT	1.31
Envestra	0.73
Mean	**0.96**

3.30 Our approach is to examine a range of data sets and analytical techniques and to consider relevant qualitative considerations when determining an appropriate equity beta. Conversely, Lally's response to our analysis has focused on a single cell of a single table. The equity betas of the four most comparable firms are also relevant. Table 5 indicates that even when the Blume adjustment is reversed and outlier removal is restricted in the manner that Lally suggests, the average comparable firm has a re-geared equity beta of close to one.

Analysis of comparable portfolio betas

3.31 Lally's response to our analysis has been to focus on a single cell of a single table and to adjust our results in a way that we do not believe to be appropriate. Indeed, the only way to support a beta less than one is to focus on this particular cell and perform those particular adjustments. Our approach is to consider all of the evidence in its totality. Indeed, a relevant consideration is the informativeness of the regression analyses as described above. The cell on which Lally focuses is substantially less informative than when more outliers are eliminated. These other cells support re-geared equity betas above one even without the Blume adjustment.

3.32 Moreover, if an outlier removal criterion of 1.8 is applied (so that under Lally's normal assumption, only 7% of observations would be removed rather than the 5% that he advocates) the median portfolio beta, without any Blume adjustment, is 1.0. That is, even applying the types of estimation techniques advocated by Lally, individual firm betas and portfolio betas support the use of an equity beta of one.

The technology bubble

3.33 Lally appears to support the notion that the technology bubble was an unusual period that resulted in an underestimation of equity betas for utilities. He does not, for example, suggest that this period be included in the data set without adjustment. However, he concludes that removal of the data from this period would lead to an over-estimation of beta. This is because removal of the bubble period effectively results in an estimate based on zero probability of a bubble, whereas the true probability of a bubble is positive.

3.34 Of course, the purpose at hand is to determine an equity beta to be used to set a regulated return over a five-year period. To include the bubble period in the data set is to assume that a technology bubble will occur in four of the next five years. To omit the bubble period is to assume that a technology bubble will not occur in the next five years. In this case, beta estimates are biased upward only to the extent of the probability of a technology bubble actually occurring within the regulatory period. To the extent that this possibility is remote at best, any bias is absolutely negligible.

4. CONSISTENCY OF POSITIONS

Other conclusions from analysis of the same data

4.1 The estimation of equity betas is a common issue in regulatory determinations and the available data is rather limited. For these reasons, it is instructive to examine regulatory precedent, especially where that involves the analysis of the same data set by the same consultant.

Equity beta for gas distribution: NZCC 2004

4.2 In an analysis of the same data used in the Lally paper, and using the same de-levering procedure, the same author has recently concluded that the appropriate point estimate of the asset beta for a New Zealand gas distribution firm is 0.5.[25] Using the same re-gearing procedure adopted in the Lally paper (that used by ESCOSA), this asset beta implies an equity beta of 1.25. Of course, the New Zealand market differs from the Australian market and the circumstances of gas distribution may be different, so these values are not directly comparable. Nonetheless they are useful overseas benchmarks.

Equity beta for electricity distribution: NZCC 2004

4.3 In an analysis of the same data used in the Lally paper, and using the same de-levering procedure, the same author has recently concluded that the appropriate point estimate of the asset beta for a New Zealand electricity distribution firm is 0.4.[26] Using the same re-gearing procedure adopted in the Lally paper (that used by ESCOSA), this asset beta implies an equity beta of 1.00. Of course, the New Zealand market differs from the Australian market, so these values are again not directly comparable but are further overseas benchmarks.

[25] Lally, M., "The Weighted-Average Cost of Capital for Gas Pipeline Businesses," New Zealand Commerce Commission, May 14, 2004, www.comcom.govt.nz, pp. 24-34.

[26] Lally, M., "The Weighted-Average Cost of Capital for Electricity Lines Businesses," New Zealand Commerce Commission, August 4, 2003, www.comcom.govt.nz, pp. 20-32.