MAJOR ELECTRICITY USERS' GROUP

24th March 2016

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Manager, IM Review
Commerce Commission
By email to regulation.branch@comcom.govt.nz

Dear Keston

Comments on advice by Dr Lally to the Commerce Commission on WACC issues

1. This is a submission by the Major Electricity Users' Group (MEUG) on Dr Lally's advice to the Commerce Commission, "Review of WACC issues"[1] ("Lally February 2016").

2. MEUG members have been consulted in the preparation of this submission. This submission is not confidential. Some members may make separate submissions.

Advice sought from Dr Lally in the context of price-quality regulation

3. The Commerce Commission has asked for advice from Dr Lally on asset beta related to gas and airports, form of regulation and Black's Simple Discounting Rule (BSDR).

4. This submission has two overall themes:

   a) The Commerce Commission should exercise judgement in setting asset beta because the potential empirical data is variable and restricted; and

   b) Dr Lally confirms BSDR is at least theoretically as useful a cross check on using the Capital Asset Pricing Model (CAPM) to estimate WACC for regulation and valuation. The Commerce Commission must decide if the benefits of further investigating the applicability of BSDR as a cross-check outweigh the costs given the three reservations identified by Dr Lally. MEUG believe the cost of seeking further academic advice on implementation will be minimal compared to the insights BSDR may bring as a cross-check especially given the general concern about the model and parameter estimation issues.

[1] Dr Lally's advice was dated 25th February 2016 and published by the Commerce Commission 29th February 2016, document URL http://www.comcom.govt.nz/dmsdocument/14108 at http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/input-methodologies-review/cost-of-capital-im-review/.

Asset beta adjustment for gas pipeline businesses

5. The current Input Methodologies (IM) specifies a 0.1 mark-up to the asset beta for gas distribution compared to electricity distribution businesses. Dr Lally concludes that:

> "… I do not favour a differential between the asset betas for the New Zealand electricity distribution and gas pipeline businesses in the present regulatory situation."[2]

6. MEUG agrees. Dr Lally's analysis comprises a conceptual view and of the results of empirical evidence. We consider both in the next few paragraphs.

7. Dr Lally's view is that asset beta for a service is a function of the income elasticity of demand for that service.[3] Income elasticity of demand in relation to systematic risk used in CAPM fits well with Dr Lally's analysis of expected gas pipeline beta's before and after introduction of price-quality regulation. Essentially before regulation those businesses had an option to expand and earn revenues in excess of costs and a higher proportion of non-household customers more prone to changes in GDP than the electricity sector. Dr Lally considered the expansion option the more important factor. After regulation the opportunity to realise higher revenues than costs with expansion was removed leading to Dr Lally's advice asset beta should now decrease. MEUG agrees with this conceptual argument.

8. Dr Lally reviews empirical evidence and submissions by other parties on this topic. Dr Lally prefers a longer duration sampling of historic beta rather than say, two years as proposed by Colonial First State.[4] The analysis is difficult because there are few if any comparable listed entities in terms of similar scope and regulatory regime, to the New Zealand gas distribution line businesses.

9. Bernado et al. in a recent paper derived a method for unlevering asset betas for growth options leverage in order to properly assess project risk. The results for 38 industry groups from 1977 to 2009 are included as an attachment as Table 1. The ratio of asset beta to project beta for "Utilities" is close to 1 reflecting the absence of growth options. The results of Bernado et al. provides empirical support for Dr Lally's views.[5]

Asset beta adjustment for the form of control

10. The concluding paragraph of the advice from Dr Lally notes the unsatisfactory situation of empirical evidence seemingly contradicting theory:

> "In summary, and notwithstanding the theoretical expectation that price-capped businesses have higher asset betas than both ROR regulated and revenue-capped businesses, there is no empirical study that provides a clear conclusion on the effect of regulation on beta. In the face of this uncertainty, and until better evidence becomes available, I consider that one should keep an open mind." and
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> "In addition, in the absence of a sufficiently large set of suitable firms to assess the beta differential between price capped and revenue capped firms. I recommend using the same asset beta for the revenue-capped business as for the price-capped (DPP) ones. Although this matches the Commerce Commission's 2010 view, my recommendation arises in spite of my belief that there is very likely to be a beta

[2] Ibid, p3, paragraph 2.
[3] Ibid, p8, paragraph 3.
[4] Ibid, p9, paragraph 3.
[5] Bernardo, A. E., Chowdry, B., and Goyal, A. (2012), Assessing Project Risk. Journal of Applied Corporate Finance, 24:94-100.

> margin (of unknown degree) for price-capping over revenue-capping, because those subject to it bear an additional source of risk (volume) that would elevate beta." [6]

11. Dr Lally says that even though there is no empirical evidence he is aware of the status quo should hold trumping the Commerce Commission exercising judgement in deciding if a beta adjustment should apply for the form of control. MEUG does not agree. In circumstances where there is a strong line of argument on theory but empirical evidence is less than ideal MEUG recommends the Commerce Commission exercise judgment governed by, but not constrained by, the available empirics.

12. That the empirical analysis is not conclusive or that helpful is not surprising and not just because of the potential sample size of suitable comparator companies. At a wider perspective the theory of CAPM and testing of the theory in capital markets is also inconclusive. Professor Yarrow in advice to the Commerce Commission in February 2016 noted:

> "In relation to WACC estimates, it can be noted that these themselves are derived from a series of propositions that contain significant, speculative elements. Among these are the validity of the CAPM model variant that is used in the process and the assumptions that the WACC will remain the same over the relevant assessment period, neither of which has much substantive underpinning in empirical research on financial markets (the evidence leans toward conclusions that each of the propositions in unlikely to be true)" [7]

13. MEUG is not suggesting no empirical analysis is needed; rather the empirical analysis will provide the range within which the expected asset beta lies but the Commission must then consider wider factors including changing economic contexts. Professor Yarrow's advice to the Commerce Commission in February 2016, in relation to a changing optimal information disclosure regime including specification of WACC for airports referred to:

> "… economic contexts change over time".[8]

14. MEUG is also not suggesting the Commerce Commission cease work on investigating analytical approaches to shed light on these issues and use only judgement. An analytical approach based on a bottom up approach to assess specific business risks should be undertaken for Transpower. Transpower is a reasonably representative example because it is approximately a third of the aggregated regulated asset base value of regulated electricity distribution and transmission services for which the Commerce Commission currently assume have identical systematic risk. An initial illustration of that approach was outlined in advice from Ireland, Wallace & Associates (IWA) for MEUG on BSDR.[9] The output of a table for Transpower allocating risk and where borne by Transpower assigning it as systematic or non-systematic could be used to test the hypothesis that the rest of the assumed population of regulated electricity line businesses had an identical risk profile in spite of having different forms of control and features to allocate risk. In constructing such a table it will be evident there are differences between Transpower and distributors. The intuition that Transpower has lower systematic risk because of the form of control can be tested. The question is whether those actual differences in allocation of risk net out? If not then the asset beta should be different; certainly not the same.

[6] Lally February 2016, Ibid, p24 and 25.
[7] Yarrow February 2016, p5, paragraph 4, document URL http://www.comcom.govt.nz/dmsdocument/14090,
[8] Ibid, p4, paragraph 5.
[9] IWA report for MEUG, IM Review, BSDR a cross check on the IM cost of capital, 19th August 2015, document URL http://www.comcom.govt.nz/dmsdocument/13971

Asset beta adjustment for airports

15. The issues for Dr Lally are the Commission's 2010 approach to estimating the average proportion of airport value arising from that of regulated services and average asset beta for the unregulated services of the comparator airports. Dr Lally estimates these as being 39% (value) and 0.67 (comparator average asset beta) for his estimate of a downward asset beta adjustment of 0.03 to derive an implied 0.62 regulated asset beta.

16. Dr Lally concludes

> "… the estimates of the two underlying parameter values are very imprecise, and the point estimate of the average weight on regulated services is also low, leading to an extremely imprecise estimate for the beta deduction."[10]

17. MEUG has tested the estimated current value weights on Auckland International Airport Limited (AIAL). As at 30th June 2015 the enterprise value of AIAL was about $7.8 billion (calculated as total assets less cash and sundry creditors and with a share price of $4.94 (current share price is $6.51)). The regulated value is assumed to be equivalent to the Regulatory Asset Base (RAB including capital work in progress). The RAB is a proxy for the current valuation of the regulated assets which are assumed to just earn the cost of capital set by the Commerce Commission for disclosure purposes. On this basis the regulated assets are about 16% of the AIAL enterprise value. In contrast Dr Lally considers a 39% weighting for regulated assets is low. A 16% weighting for regulated assets in Dr Lally's example would increase the downward asset beta adjustment to 0.07.[11]

18. For AIAL, where some 84% of the value is in the unregulated businesses, inappropriate adjustments have the potential to be exaggerated relative to the residual 16% for regulated business.

19. Both Dr Lally and MEUG have illustrated issues with determining the regulated asset beta. MEUG also has concerns that the same issues may potentially apply in the comparator analysis for gas and EDB businesses.

Black's Simple Discounting Rule

20. The opening sentence of Dr Lally's concluding advice is:

> "In summary, although Ireland Wallace does not explain how Black's model could be applied to a price cap regulatory situation, this model could be applied." [12]

21. Dr Lally therefore accepts BSDR can be applied as IWA has suggested. Although we think IWA partially explained how BSDR could be applied as a cross-check on WACC used for price-quality regulation, Dr Lally helpfully explains how he would bridge the gap in the following succinct summary of the BSDR and CAPM approaches with underlining of text added by MEUG:

> "So, just as there are two approaches to valuation, corresponding to equations (6) and (7), there are two approaches to setting the price cap, corresponding to equations (9) and (11). Black's model in (7) will be superior to the conventional approach in (6) if the cash flow is linear in market returns and it is easier to estimate the conditional cash flow expectation than it is to collectively estimate the unconditional cash flow expectation plus the MRP and beta. Similarly, Black's approach to regulation as shown in equations (10) and (11) will be superior to the conventional approach in (8) and (9) if the output level is linear in market returns and it is easier to estimate the conditional expectation of the output level than it is to

[10] Lally February 2016, p28, paragraph 1.
[11] Ibid, using methodology in p27, in table 1.
[12] Ibid, p25, paragraph 3.

> collectively estimate the unconditional expectation of the output level plus the MRP and beta."[13]

22. BSDR is therefore potentially "superior" to CAPM for both valuing a project and as an approach to regulation subject to a number of reservations which may be resolved by empirical analysis. Those matters need to be addressed before BSDR can be applied. The three reservations set out in the advice from Dr Lally follow.[14] To aid clarity and the analysis that follows each sentence from Dr Lally's advice has been separated:

> "However, there are three significant limitations in doing so.
>
> Firstly, the model requires that the output of the regulated business be linearly related to the market return and no evidence has been presented on this matter.
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> Secondly, the regulator would have to estimate the probability distribution for output without the assistance from the regulated business, because the latter would have a vested interest in the result.
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> Thirdly, a process for estimating the expected output conditional on the market return being equal to the risk-free rate would underestimate that parameter, possibly to a very significant degree." [15]

23. The first reservation noted by Dr Lally is that BSDR requires the output of the regulated business to be linearly related to the market return. Dr Lally states that IWA have nothing to say about this. IWA did comment on the potential implementation by citing the academic context and concluding:

> "The paper [Loderer] speaks for itself".[16]

So when Loderer states

> "The simple discounting rule does not work, however, when the NCFs are a non-linear function of the benchmark returns – but neither do the traditional valuation models", [17]

IWA does too. Further it is common ground that the precondition for BSDR is finding a benchmark index (market or sector or stock) that correlates with this regulatory cash flow (and without pure idiosyncratic error).

24. Loderer et al. tested data for risk free percentiles for 10 countries including Australia. It would be expected that the inclusion of New Zealand would be unlikely to materially change the general results. MEUG's recommendation is for the Commission to seek advice from Professor Loderer on extending and developed his analysis for the New Zealand regulatory context. Determining the appropriate market or industry or stock benchmark which correlates with the risk free percentiles would be part of that analysis.

25. The second reservation noted by Dr Lally is estimating the probability distribution for output, that is forecast revenues, is problematic because it relies on the assistance of the regulated entity and they would have a vested and biased view. The evidence of IWA illustrated that for Transpower at least the problem of insufficient or biased forecasting of cash flows and estimating the probability distribution of those was not a barrier given the wealth of information and final IPP determination set in 2015.

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[13] Ibid, p32, paragraph 1.
[14] We use the noun "reservations" whereas Dr Lally used the noun "limitations". The latter could be interpreted as absolute limitations that make further work on BSDR as a cross check redundant. We don't think that is what Dr Lally meant; hence we use "reservations" instead.
[15] Lally February 2016, p35, paragraph 3.
[16] IWA August 2015, paragraph 2.4.
[17] Loderer 2008, p8.

26. For a cross-check the most data rich forecast of Transpower's revenues and risks is the 5 year Individual Price-Quality Path (IPP) that commenced 1st April 2015. This was not a forecast reliant on the whims of Transpower's management. It was an agreed forecast "negotiated" by Transpower and the Commerce Commission with the final point estimates of cash flows and understanding of the uncertainties involved. Both the Commerce Commission and Transpower know these estimates and hence reasonably the implied probability distribution applicable around every assumption and every calculation.

27. A comparison of the net present values of the net free cash flows over the 5 year IPP using SBL CAPM/WACC and BSDR would test the hypothesis of whether they were equivalent. If not then that would assist the Commerce Commission understanding why not and that may lead to further changes to SBL CAPM/WACC presently and for future regulatory periods.

28. The third reservation noted by Dr Lally is that, with emphasis on underlined text inserted by MEUG that a

> "… process for estimating the expected output conditional on the market return being equal to the risk-free rate would underestimate that parameter, <u>possibly</u> to a very significant degree."[18]

29. The caveat "possibly" is important. Dr Lally does not say this issue is fatal. Indeed the answer to this implementation reservation is answered by Lally himself:

> "The solution is to generate a probability distribution for cash flow (or output in a regulatory case) that reflects only systematic risk."[19]

30. MEUG believe the implementation reservations advised by Dr Lally are worth further investigation subject to the Commerce Commission weighing the potential benefits of effectively applying BSDR as a cross-check on WACC derived using SBL CAPM against the costs of that further investigation.

31. Dr Lally's final two sentences in his concluding paragraph are:

> "In view of these limitations, I do not favour this approach. Accordingly, there is no relief from the beta estimation problems discussed in section 2.

32. As noted in paragraph 22 above we would caution interpreting Dr Lally's advice and use of the noun "limitations" as being unequivocally the end of the road for considering BSDR as a cross-check. Hence, we describe Dr Lally's limitations as reservations. All three reservations were identified by MEUG and IWA in prior submissions as needing further work and Dr Lally himself has suggested next steps to address the reservations. Dr Lally's advice on further work on BSDR is in terms of whether he favours it or not. This is a matter of judgment not a view based on clear cut empirics. For the Commerce Commission to reach a view it should weigh the minimal costs to engage with academics that have been working in this field with the potential benefits.

33. Given small differences in WACC have material effects on line charges paid by consumers the costs of further investigation and probability of BSDR not being capable of being implemented would both need be high to lead to a decision not to proceed with further work.

[18] Lally February 2016, p35, paragraph 3.
[19] Ibid, p34, last paragraph.

34. The final sentence quoted in paragraph 23 above links Dr Lally's view of not favouring BSDR with a view that BSDR has no bearing on assessing asset beta in relation to whether there should be an adjustment for gas pipeline businesses, an adjustment for the form of control and an adjustment for airports as discussed in section 2 of his report. Dr Lally is responding directly to the terms of reference set by the Commerce Commission published 22nd December 2015:

> "What role if any can BSDR add to the consideration of the asset beta in topic 2a?" [20]

35. Referring to this terms of reference MEUG's submission on 5th February 2016 on the Cost of Capital Update Paper of 30th November 2015 stated:

> "It would be more useful if a more open question were asked as follows:
>
> 'What role if any can BSDR add to the consideration of WACC in topic 2a?'" [21]

36. MEUG believe Dr Lally has, despite the narrow terms of reference given him, provided a fair view of the IWA and MEUG proposition that BSDR be considered as a cross check for WACC.

Concluding comments

37. This submission started by observing (paragraph 4) two themes emerging from MEUG's consideration of the advice by Dr Lally. MEUG's recommended actions arising from these themes are:

a) The Commerce Commission exercise judgement in setting asset beta because the potential empirical data is potentially variable and restricted; and

b) Given that Dr Lally confirmed that BSDR is theoretically a useful cross check on using the Capital Asset Pricing Model (CAPM) to estimate WACC in the context of valuation and regulation, the Commerce Commission should develop a dialogue with Professor Loderer.

Yours sincerely

Ralph Matthes
Executive Director

[20] Commerce Commission, terms of reference, Expert advice on cost of capital topics, 22nd December 2015, paragraph 12. b), document URL http://www.comcom.govt.nz/dmsdocument/13971,
[21] MEUG to Commerce Commission, Submission on Cost of Capital Update Paper: 30 November 2015, 5th February 2016, paragraph 12, document URL http://www.comcom.govt.nz/dmsdocument/14076,

Attachment

Refer Bernardo, A. E., Chowdry, B., and Goyal, A. (2012), Assessing Project Risk. Journal of Applied Corporate Finance, 24:94-100.

Table 1 **Asset Beta and Project Beta by Industry**

This table reports the average asset beta (adjusted for financial leverage), average project beta, and the ratio of these two betas across industries. The averages are reported for the sample period of 1977 to 2009.

Industry	Asset Beta	Project Beta	Ratio
Food Products	0.59	0.54	1.09
Candy and Soda	1.08	0.94	1.14
Beer and Liquor	0.57	0.53	1.08
Recreation	0.89	0.81	1.11
Entertainment	0.82	0.58	1.42
Printing and Publishing	0.78	0.60	1.29
Consumer Goods	0.83	0.68	1.21
Apparel	0.81	0.71	1.15
Healthcare	0.97	0.56	1.73
Medical Equipment	1.07	0.75	1.43
Pharmaceutical Products	1.25	0.73	1.70
Chemicals	0.84	0.71	1.19
Rubber and Plastic Products	0.76	0.62	1.23
Textiles	0.68	0.68	1.01
Construction Materials	0.83	0.68	1.22
Construction	0.88	0.77	1.14
Steel Works Etc.	0.90	0.80	1.13
Fabricated Products	0.83	0.86	0.96
Machinery	0.95	0.78	1.21
Electrical Equipment	1.17	0.91	1.29
Automobiles and Trucks	0.89	0.78	1.14
Aircraft	0.84	0.67	1.24
Precious Metals	0.33	0.37	0.91
Metal Mining	0.89	0.88	1.02
Petroleum and Natural Gas	0.78	0.65	1.20
Utilities	0.31	0.33	0.95
Communication	0.95	0.60	1.58
Personal Services	0.80	0.64	1.25
Business Services	1.20	0.89	1.34
Computers	1.38	1.15	1.20
Electronic Equipment	1.40	1.11	1.26
Measuring/Control Equipment	1.21	0.95	1.28
Business Supplies	0.72	0.65	1.10
Shipping Containers	0.80	0.73	1.10
Transportation	0.71	0.59	1.20
Wholesale	0.87	0.76	1.14
Retail	0.86	0.71	1.21
Restaurants, Hotels, Motels	0.73	0.57	1.27

"In Table 1 we report for some 38 different industries our estimates of the average asset beta, the average beta of existing projects (or what might be called "assets in place"), and the ratio of the average asset beta to the average beta of existing projects. The table shows that for all but three industries - fabricated products, precious metals, and utilities - the asset beta overestimates the beta of existing projects. In some industries, such as healthcare and pharmaceutical products, the asset betas are more than 70% greater than the project betas. "(p96)