Comments on

INPUT METHODOLOGIES (EDS) DRAFT REASONS PAPER

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1. Introduction

This paper seeks to review the estimate of the market risk premium in the Commerce Commission's Input Methodologies Draft Reasons Paper for the Electricity Distribution sector (Commerce Commission, 2010), the submission on this from PricewaterhouseCoopers (PwC, 2010), and the Australian Energy Regulator's (AER, 2009) estimate of 0.65 for the utilisation rate on imputation credits. In respect of the first two such papers, the review excludes (where possible) the question of an appropriate (temporary) adjustment to the market risk premium arising from the Global Financial Crisis (GFC).

2. Review of the Commission's Analysis

Footnote 468 refers to a figure of 7.2% that should instead be 7.1%.

Para 6.8.23 refers to a number of limitations with the DCF model. This model can be applied at the individual firm level to generate a cost of equity, or at the macro level to estimate the market risk premium. The first of the five limitations referred to (firms must be listed and paying dividends) is relevant when the model is applied at the individual firm level to estimate the cost of equity, but is not relevant when the model is applied at the macro level to estimate the market risk premium. In addition, the second of the limitations referred to (firms must be mature, consistent with the constant growth assumption) may be relevant if the model is used to estimate the cost of equity for a firm, and then only if the constant growth assumption is invoked, but is not relevant when the model is applied at the macro level to estimate the market risk premium.

In para 6.8.30, the suggestion that serial correlation is only a problem for arithmetic but not geometric means is not correct, i.e., both methods suffer in the presence of serial correlation. Remarkably, footnote 489 makes this very point.

In para 6.8.33, the rationale offered in support of the arithmetic mean (most other regulators use it) is minimal. A stronger argument (Lally, 2010) would be that it generates a value for the regulated entity whose expectation matches the initial

investment, i.e., the NPV = 0 test is satisfied. By contrast, use of the geometric mean would generate a value for the regulated entity whose expectation was less than that of the initial investment.

Para 6.8.39 claims that the use of multiple TAMRP (one for each possible regulatory period) would increase uncertainty amongst suppliers. This would only be true if the Commission failed to disclose the relationship between the TAMRP and the regulatory period, and therefore the concern could be eliminated by such disclosure. A stronger argument for avoiding multiple TAMRP is that they are inconsistent with the underlying model (the CAPM), which prescribes one TAMRP of unspecified term.

The Ibbotson and Siegel estimates presented in Table 6.5 are based upon data up to 2006. However, in seeking to estimate the effect on these results of switching from a ten to a five year risk free rate as shown in paras 6.8.50 and 6.8.51, risk free rate data up to 2010 is used. This is inconsistent. Since the Commission seeks a TAMRP estimate from Table 6.5 that predates the GFC, consistency should be achieved by modifying the period for which the risk free rate data is collected so as to match the period underlying the Ibbotson and Siegel estimates presented in Table 6.5, although the latter estimates could be extended to 2008.

Para 6.8.51 discusses the effect on the Ibbotson-type estimate of the TAMRP for NZ arising from US data if the five year risk free rate were used in substitution for the ten year rate. Using ten year rates, the US MRP is estimated at 6.30% and converted to 8.40% for the TAMRP for NZ. It is implied that the longest period for which yields on both five and ten year US bonds are available is from 1962, that the differential is 0.25%, and that the TAMRP for NZ should then be raised from 8.40% to 8.65%. However, data from 1953 on both bonds is presented on the website of the Federal Reserve Bank of St Louis although the resulting differential is almost identical at 0.24%.[1] More significantly, it would also be necessary to invoke NZ bond yields in converting the estimate of the MRP for the US (6.30%) to that of the TAMRP for NZ

[1] The relevant data are the constant maturity series GS5 and GS10 (www.research.stloiusfed.org/fred2/), with average yields of 6.09% and 6.33% for five and ten year bonds respectively.

(8.40%). Since the estimate of 8.40% is based upon a conversion to the TAMRP using the Dec 2007 average yield on ten year NZ bonds (Lally, 2008, page 21), and the contemporaneous average yield on five year NZ bonds is 7.30%, the adjusted estimate of the TAMRP for NZ should be as follows:

$$TAMRP = MRP + R_r T_c = (.063 + .0024) + .073(.33) = .0895$$

Similar issues arise in respect of the Ibbotson-type estimate of the TAMRP for NZ arising from "other" markets. However, since these two results are the highest in the set, the upward adjustment to them would not raise the median in Table 6.5.

3. Review of PwC's Submission

PwC (2010) raises three distinct lines of argument. The first involves contesting the Commission's adjustments to the TAMRP estimates in the Commission's Table 6.5 to reflect the use of five rather than ten year bond yields (ibid, paras 6.10-6.14). However, PwC's results are almost identical to those of the Commission and PwC are effectively reduced to arguing for an estimate for the TAMRP of 7.1% rather than 7.0%, on the basis of rounding to 0.1% rather than to the 0.50% presumably used by the Commission. However I do not think that precision down to the level of 0.1% in this area is possible and therefore favour rounding to a higher unit of measure. Accordingly, the appropriate figure is 7.0% rather than 7.1%.

PwC's second line of argument involves rejecting the Commission's resort to estimates of the Siegel and Cornell type, coupled with updating the US survey-based estimates, leading to a current estimate of 8.0% for the TAMRP (ibid, paras 6.15-6.17).[2] I have the following reservations about this analysis. Firstly, although PwC argues that Siegel-type estimates of the TAMRP should be discarded on the grounds that they are "ad hoc" (para 6.15), PwC also favours an adjustment to the TAMRP to reflect the GFC in a subsequent line of argument (paras 6.20 and 6.27), and this GFC adjustment could more properly be described as "ad hoc", thereby undercutting PwC's rationale for rejection of the Siegel-type estimates. Secondly, PwC argues that

[2] This estimate implicitly embodies an estimate of the impact of the GFC. Since the latter is not explicit, I include this analysis in my review.

Cornell-type estimates should be rejected because they are outdated (para 6.15). However, this is not an argument for rejection but for updating and PwC does update the US survey-based estimates invoked by the Commission.

Thirdly, in respect of PwC's updating of the US survey-based estimates of the TAMRP for NZ, PwC calculate the updated figure to be 6.23% (para 6.15) but mistakenly invoke the figure of 6.73% in their subsequent analysis (para 6.16). Fourthly, in respect of PwC's updating of the US survey-based estimates of the TAMRP (para 6.15), they fail to update the NZ risk free rates and the NZ tax rate and they use a ten rather than a five year risk free rate throughout their analysis. In respect of Welch (survey dated Jan 2009 and based on three month US bonds), the adjustment ought to have used the contemporaneous differential between the three-month and five year US risk free rates (0.13% and 1.60% respectively, with a differential of 1.47%), the five year NZ risk free rate for Jan 2009 (4.07%) and the NZ corporate tax rate at that time (30%), leading to an estimate for the TAMRP as follows[3]

$$TAMRP = MRP + R_r T_c = (.060 - .0147) + .0407(.30) = .0575$$

In respect of Graham and Harvey (survey dated Feb 2009 and based on ten year US bonds), the adjustment ought to have used the contemporaneous differential between the five and ten year US risk free rates (1.87% and 2.52% respectively, with a differential of 0.65%), the five year NZ risk free rate for Feb 2009 (3.92%) and the NZ corporate tax rate at that time (30%), leading to an estimate for the TAMRP as follows:

$$TAMRP = MRP + R_r T_c = (.0474 + .0065) + .0392(.30) = .0656$$

Averaging over these two estimates yields 6.18% compared to the figure of 6.23% calculated by PwC and the figure of 6.73% used by them. However, Graham and Harvey (2010) present quarterly results from June 2000 to June 2010, and the February 2009 result is the highest one. Given PwC's desire to update results as much as possible, Graham and Harvey's latest result of 3.0% (June 2010) should be

[3] The US data is drawn from the constant maturity series GS3M and GS5 on the website of the Reserve Bank of St Louis (www.research.stloiusfed.org/fred2/), whilst the NZ data is drawn from the website of the Reserve Bank (www.rbnz.govt.nz).

used. Adjustment to the TAMRP for NZ requires the contemporaneous differential between the five and ten year US risk free rates (2.00% and 3.20% respectively, with a differential of 1.20%), the five year NZ risk free rate for June 2010 (4.91%) and the NZ corporate tax rate at that time (30%), leading to an estimate for the TAMRP of

$$TAMRP = MRP + R_r T_c = (.030 + .0120) + .0491(.30) = .0567$$

Averaging over this estimate and that from Welch yields 5.73%, compared to the figure of 6.23% calculated by PwC and the figure of 6.73% used by them.

Fourthly, whilst PwC update the US survey-based estimates, they fail to update the Ibbotson-type estimates and these latter results would be significantly lower if they were updated. In particular, the Ibbotson-type estimate derived from US data should be 7.67% rather than the figure of 8.48% claimed by PwC (para 6.16), as follows: the US MRP estimate from Dimson et al (2010, Table 68) is 6.0%[4], the adjustment for five rather than ten year bonds is 0.24% (see previous section), the July 2010 New Zealand five year risk free rate is 4.76% (data from the Reserve Bank website), and the current NZ corporate tax rate is 30%, leading to a current estimate for the NZ TAMRP as follows:[5]

$$TAMRP = MRP + R_r T_c = (.060 + .0024) + .0476(.30) = .0767$$

A similar downward adjustment would also apply to Ibbotson-type estimates derived from "other" markets.

Finally, it should be noted that whilst PwC's updating of estimates is perfectly legitimate, it does not reflect adversely upon the Commission's approach because the Commission seeks an estimate of the TAMRP prior to the GFC, to which it adds an adjustment for this event.

[4] The primary result presented by Dimson et al uses geometric rather than arithmetic differencing of annual stock and bond returns, and is .063. However, geometric differencing is not consistent with the definition of the market risk premium. The result from arithmetic differencing was obtained by subtracting their average bond return (.053) from their average stock return (.113).

[5] The Commission estimates the "current" figure at 7.80% (Commerce Commission, 2010, Table 6.12) but this is based upon ten rather than five year risk free rates.

PwC's third line of argument is that the long-term estimate for the TAMRP is 7.50% (based upon the median estimate of participants in the Commission's Nov 2009 cost of capital workshop), to which should be added an adjustment of 0.50% for the Global Financial Crisis (paras 6.18-6.20 and 6.26-6.27). I have four reservations about this line of argument. Firstly, since an adjustment is made for the GFC, the figure of 7.50% must exclude any such adjustment and this is not the case because PwC note that one of the contributors to the figure of 7.50% has made such an adjustment (para 6.19). Furthermore, even with deduction of such an adjustment (which presumably would not alter the figure of 7.50%), PwC is coupling an estimate of the long-run TAMRP from a group of people who do not (with one exception) favour an adjustment for the GFC with an estimate of the adjustment for the GFC from a (different) group who do favour an adjustment; this is pure cherry-picking. Alternatively expressed, if the parties contributing to the estimate of 7.50% are so highly esteemed that their estimate should be used, their view about the lack of a need for a GFC adjustment cannot be any less valuable. Thirdly, the figure of 7.50% has the status of a NZ survey but one with two disadvantages relative to the NZ survey result cited by the Commission, in the form of a considerably smaller sample size and the fact that most of the contributors to the figure of 7.50% were selected by regulated entities. Finally, having favoured consideration of both Ibbotson and survey-type estimates based upon both NZ and foreign data in its second line of argument (described above), there is something of an inconsistency by PwC in using only a NZ survey-based estimate in this third line of argument.

In summary, neither the first nor third lines of argument presented by PwC support an increase in the pre GFC estimate of the TAMRP. In addition, their second line of argument does not support a current estimate for the TAMRP of 8.0%.

3. Review of the AER's Estimate of the Utilisation Rate

The AER (2009) favours an estimate of 0.65 for the utilisation rate on imputation credits. This figure averages over an estimate of 0.57 based upon a dividend drop-off study (Beggs and Skeels, 2006, Table 5) and an estimate of 0.74 based upon tax statistics, with the latter figure averaged over figures of 0.67 and 0.81 prior and

subsequent to the 2001 tax changes (drawn from Handley and Maheswaren, 2008). I have the following reservations about this estimate of 0.65. Firstly, since the tax changes in 2001 granted a cash refund of excess imputation credits to a large class of resident Australian investors and therefore would have raised the utilisation rate, the appropriate current estimate of it should invoke only data from 2001 and therefore the appropriate current estimate based upon tax statistics should be 0.81 rather than 0.74. Furthermore, this is consistent with the AER's claim to base its estimate of the utilisation rate "on post 2000 data only" (AER, 2009, page 466) and is also consistent with the AER's estimate of 0.57 from Beggs and Skeels being based upon data from 2001-2004.

Secondly, the AER has misinterpreted the analysis of Beggs and Skeels, and thereby significantly underestimated the utilisation rate, as follows. Beggs and Skeels formulate the following regression model

$$\Delta P = a + bD + cF + u$$

where ΔP is the share price drop-off around the ex-dividend date, D is the cash dividend, F is the franking credits, u is the regression residual, and a, b, and c are regression coefficients with b representing the value per \$1 of cash dividends and c the value per \$1 of franking credits. Beggs and Skeels estimate c as 0.57 for the period 2001-2004 (ibid, Table 5) and the AER interprets this as an estimate of the utilisation rate U. This is only true if cash dividends are fully valued, i.e., $b = 1$. However, Beggs and Skeels estimate b at 0.80 (ibid, Table 5), presumably because cash dividends are taxed more heavily than capital gains. The coefficient c must then be subject to the same phenomenon, and therefore cannot be equal to the utilisation rate. In recognition of this point, the last equation above should have been expressed as follows

$$\Delta P = a + b[D + UF] + u$$

where U is the utilisation rate. Comparison of the last two equations reveals that $c = bU$. Thus, using Beggs and Skeels's estimates for b and c of 0.80 and 0.57

respectively (ibid, Table 5), the implied estimate for the utilisation rate U is 0.72 rather than 0.57.

Recognition of the first and second points above leads to revised estimates of the utilisation rate of 0.81 from tax statistics and 0.72 from the dividend drop-off study. These two figures average 0.77 rather than the figure of 0.65 proposed by the AER.

Thirdly, the Commission's concern with this parameter U arises from the desire to convert estimates by Australian regulators of the market risk premium within the Officer (1994) model to an estimate of the TAMRP within the simplified Brennan-Lally version of the CAPM. Both of these models are domestic versions of the CAPM (in which markets are assumed to be fully segregated), and this suggests that an appropriate estimate for U should reflect the presence of only domestic investors. Most such investors can fully utilise the credits and this implies an estimate of U that is close to 1.

Finally, as noted, the Commission's concern with this parameter U arises from the desire to convert estimates by Australian regulators of the market risk premium within the Officer model to an estimate of the TAMRP within the simplified Brennan-Lally version of the CAPM, and the latter (but not the former) model explicitly assumes that U is equal to 1 (Lally, 2008, page 9). So, consistent with the latter restriction, the value for U used to make the conversion ought to be 1.

In summary, an examination of the sources for the AER's estimate of the utilisation rate reveals errors on their part and whose correction would raise their estimate from 0.65 to 0.77. In addition, the simplified Brennan-Lally and Officer versions of the CAPM both assume that markets are fully segregated and this implies an estimate for the utilisation rate of 1. Finally, the simplified Brennan-Lally CAPM explicitly assumes that the utilisation rate is 1 and this should extend to the estimate used in the present circumstances.

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