Rate of Return

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Approval and Amendment Record

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1. Purpose of this document

This document discusses our approach to the estimation of the rate of return, inflation and debt and equity raising costs. In so doing, we are cognizant of the Rate of Return Guidelines, the decisions taken by the AER since the release of the Guidelines, the determinations made by the Australian Competition Tribunal in the various cases before it in 2015 and 2016 and finally new empirical information pertaining to market parameters not before the AER at the time of its Guidelines. All of these elements are combined to create estimates of the rate of return, inflation and debt and equity raising costs which meet the National Gas Rules (NGR) and Revenue and Pricing Principles (RPP).

This document is structured as follows:

- Chapter 2 discusses rate of return matters, divided first into equity, debt and gearing, and then the various component arguments of each of these main arguments. It closes with a final estimate of the overall rate of return. This chapter is the most substantive in this document
- Chapter 3 covers the appropriate method of determining inflation, noting in particular the need for consistency between the rate of inflation in the WACC, and the rate of inflation in the AER's PTRM as inconsistent forecasts between these two elements cannot result in a decision which meets the RPP.
- Chapter 4 covers inter-relationships between the various elements of this chapter, and between those elements and gamma (covered in Chapter 17 as part of the assessment of tax).
- Chapter 5 covers debt and equity raising costs.

2. Rate of return

In this chapter, we provide our arguments in respect of the return on equity and return on debt, as well as evidence pertaining to cross-checks, and a final WACC estimate. Return on equity, where arguments are the most extensive, and where the most significant departure from the values for equity risk premia provided by the AER in recent decisions occurs, is presented first.

2.1. Overview of the rate of return

The NGR provides that our return on capital should be calculated as the allowed rate of return multiplied by the Regulatory Asset Base. Our allowed rate of return should be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services. In other words, the allowed rate of return objective should be satisfied.[1] In addition, the rate of return must be calculated as the weighted average of the return on equity and the return on debt, determined on a 'nominal vanilla basis' that is consistent with an estimate of the value of imputation credits.[2]

We need to earn an appropriate and fair rate of return so that we can continue to invest in our $1.2 billion network in a manner that best supports the long-term interests of our customers. The return on capital aims to compensate our debt and equity holders for the opportunity cost of either lending or investing their funds in our network — and these funds are essential to deliver safe and reliable electricity distribution services to our customers.

For the forthcoming regulatory period, we propose an allowed rate of return of 6.12 per cent per annum, which has been derived using the formula for a standard, nominal vanilla WACC.[3] The overall return on capital is comprised of a proposed return on debt of 4.67 per cent, a proposed return on equity of 8.31 per cent, and a proposed gearing of 60 per cent. Table 1 details the key components of our proposed rate of return.

Table 1: Elements of WACC Estimate

Element	Value
Return on equity	8.31%
Risk-free rate	1.92%
Market risk premium	7.50%
Beta	0.7
Bias adjustment (alpha)	1.14%
Return on debt	4.67%
Gearing	0.6
Post-tax nominal WACC	**6.12%**
Inflation	1.68%

Our approach in respect of the cost of debt follows the Guidelines in respect of the tenor, the use of third party BBB-band indices and the transition from the on-the-day approach which presently prevails. Our gearing level also follows the Guidelines at 60 percent. Our only departure in respect of the Guidelines is that we rely upon three third-party indices (from Bloomberg, Thomson Reuters and the RBA) rather than the two relied upon in the Guidelines (Bloomberg and the RBA). We note that the Thomson Reuters index was not available at the time of the Guidelines, and we have adopted it for two reasons. Firstly, all indices are imperfect, and we consider the addition of a third

[1] NGR 87(2)

[2] NGR 84(4(b))

[3] That is, the WACC is the sum of gearing*(cost of debt) + (1-gearing)*(cost of equity)

index may assist in ironing out some of the imperfections in the two currently relied upon by the AER. Secondly, the NGR (87(5)) requires us to consider market data, and many market players get their bond information from Thomson Reuters, so including its index would appear to be more in keeping with NGR 87(5)) than relying on only one commercial index from Bloomberg.

In respect of the cost of equity, we follow the approach the AER took in its Guidelines of relying primarily upon the SL-CAPM, but making adjustments to compensate for known problems in the model, such as the downward bias it exhibits in respect of low beta stocks. Likewise, we make use of historical (or Ibbotson) estimates as well as those from the dividend grown model (DGM) to estimate the MRP, and do so in the same way the AER suggests it does in the Guidelines.

Our issue, however, is that the Guidelines are now three years old, and markets have moved. Like the AER, we believe that approaches to the WACC need to be flexible to changing market conditions and allow new information to be incorporated.[4] Our point of departure is not, essentially, methodological, but merely reflects an update of the numbers used, following as best we can the AER's approach for deriving those numbers in the Guidelines.

In respect of the MRP, the AER's approach at the time of the Guidelines yields 6.5 percent, but that same approach now yields 7.5 percent. We acknowledge that the AER has used an MRP of 6.5 percent in recent decisions, but contend that this represents a change from the Guidelines as it would be mathematically impossible to give the same weight to the same information as the AER did in the Guidelines and still obtain an MRP estimate of 6.5 percent.

In respect of beta, at the time of the Guidelines, the mean estimate was a little over 0.5, and the AER took the top end of its then reasonable range, 0.7, as an appropriate estimate given problems with the model such as the downward bias of the SL-CAPM model; an approach the Tribunal subsequently endorsed. However, beta has moved and the current mean estimate of beta, following the same approach relied upon by the AER in 2013, is now 0.7 or greater, and thus the point estimate of beta, adjusted for the same factors the AER considered at its Guidelines, can no longer be 0.7.

Although the Guidelines are clear what informed the AER's use of regulatory judgement, they do not say how the AER reached its conclusion about the particular point estimate it chose for beta in such a way that the judgement exercise could be repeated when the mean estimate of beta has changed. We thus needed to develop our own way to make the same adjustment the AER did in its Guidelines, and sought to do so in a transparent, objective fashion that uses a minimum of judgement, and this meant looking at market information from actual returns.

As a final point, the AER's own advisors have suggested that, if one were to make an adjustment for bias, it would be better to make an adjustment based on alpha or the intercept in an empirical SL-CAPM model, rather than in beta.[5] We see merit in this view and thus our adjustment for the very same issue both the AER and the Tribunal have considered (the downward bias of the SL-CAPM for low beta stocks) manifests itself in an alpha, not a beta adjustment. We also make an adjustment to beta for comparison with the alpha adjustment in Table 1, and obtain roughly the same answer.

Thus, in respect of debt, we follow the Guidelines almost exactly, with the only departure being the addition of a third index. In respect of equity, we follow, as best we can, the approach of the Guidelines, but derive different numbers because the market has changed in the intervening years between the publication of the Guidelines and the present, and this requires us to update some of the numerical estimates shown in the Guidelines. We now discuss our approach in more detail, starting with the return on equity, then the cost of debt, gearing and finally our overall WACC estimate.

2.2. Return on equity

In this section, we discuss our approach to the return on equity. In broad terms, we follow the approach outlined in the Guidelines, whereby the SL-CAPM is used as a "foundation model" but with some of its elements informed by other information. We also adjust the results of the SL-CAPM for the same reasons the AER does, chiefly the potential for the downward bias of the model in respect of beta and informed by the DGM and Wright CAPM in the case of the MRP.[6] However, our results are different from those in the Guidelines in respect of the equity risk premium (we follow the AER's approach in respect of the risk-free rate, which changes through time) for two key reasons:

[4] AER, *Rate of Return Guidelines*, December 2013, p6

[5] Satchell, S and Partington, G, *Report to the ERA: The Cost Of Equity and Asset Pricing Models*, May 2016, pp 11 & 14

[6] Note that we do not explicitly consider information about beta from international energy companies.

- Whilst the relevant range for beta may have been 0.4 to 0.7 at the time of the Guidelines, this is no longer the case; beta has changed and now the mean beta estimate (formerly 0.52 as an average across all firms[7]) is around 0.7. Were the AER to remake its Guidelines today, following the same approach it took in the Guidelines, it would no longer choose the value of 0.7 and, accordingly, we must attempt to establish how the AER would treat this new information were it to be following the same process it followed in its Guidelines in order to develop a point estimate for beta.
- Likewise, data informing the MRP has also changed. Following the approach of the Guidelines for the MRP results in a very different range for the MRP than prevailed at the time of the Guidelines, and the unprecedentedly low government bond rates, coupled with a range of evidence about downward-sticky required market returns suggests that the point estimate of the MRP in the Guidelines (6.5 percent) can no longer be the best estimate based on the approach followed in the Guidelines and we, accordingly, updates this estimate.

The discussion on the return on equity proceeds in five parts. In the first section below, we summarise the evidence in respect of beta and how it has changed. In the second section, we summarise how we have attempted to adjust the new mean beta estimate to take account of the same factors the AER considered in its Guidelines, chiefly the potential for downward bias in respect of the SL-CAPM model. In the third section, we consider evidence in respect of the MRP. In the fourth section, we consider a series of cross-checks of the return on equity and in a fifth and final section, we consider an appropriate overall return on equity.

In coming to the conclusions below in respect of the return on equity, we rely upon the following expert material:

- CEG, *Replication and Extension of Henry's Beta Analysis,* November 2016 – Supporting Document 16.2 of this submission
- HoustonKemp, *The Cost of Equity and the Low Beta Bias*, October 2016 – Supporting Document 16.3 of this submission
- Frontier, *The Market Risk Premium: A report prepared for AGN, Multinet Gas, Ausnet Transmission and Ausnet Gas*, September 2016 – Supporting Document 16.4 of this submission.[8]

2.2.1. New evidence on beta

The AER bases its findings on beta on the work of Henry.[9] It has not sought to update these estimates for subsequent decisions. We are not taking issue with Henry's work, the AER's decision to either form a "reasonable range" of 0.4 to 0.7 based on that work or its decision to choose the top end of that range as the best estimate of beta. Our issue is simply that beta has changed and, were Henry to be commissioned to repeat his analysis again today, he would not make the same findings he did in 2014. As the AER itself notes, the use of market information needs to be:[10]

> *sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate*

We agree with the AER on this point and have, accordingly, commissioned CEG to update Henry's work. The detail of CEG's analysis is contained in Supporting Document 16.2. CEG were instructed, in undertaking this work, to follow as closely as possible the approach which Henry took. This does not infer that the approach taken by Henry is the only way in which to estimate beta, but the instruction was given in order to provide a degree of consistency with this earlier work, and to ensure that the new results are not driven by some difference in methodology.

CEG finds that beta has increased in the last few years, since Henry undertook his analysis. This can be seen both in the results for the longest available time series and the five-year time series considered by Henry, and shown in Table 2.

[7] See Henry, *Estimating Beta: an Update*, April 2014, p53

[8] We note that this report has previously been put before the AER by Ausnet Transmission

[9] Henry, *Estimating Beta: an Update*, April 2014

[10] AER, *Rate of Return Guidelines*, December 2013, p6

Table 2: CEG results for re-levered OLS weekly individual beta estimates

	Longest available period	Longest available period (excl. tech boom and GFC)	Last five years
Henry original results	0.52	0.56	0.46
CEG extension results	0.60	0.66	0.69
Change	**0.08**	**0.10**	**0.23**

Source: Supporting Document 16.2 p2

It is also apparent when one considers the portfolios developed by Henry. Table 3 shows portfolio results for the longest time period and Table 4 shows the same results for the most recent five years; note that these involve fewer portfolios as the component stocks of several of Henry's portfolios are no longer trading in the relevant time period. Note that CEG has added a portfolio to Henry's five to take account of changes in the firms which inform the BEE. This is discussed in more detail in Supporting Document 16.2.

Table 3: CEG results for re-levered Henry OLS weekly portfolio beta estimates to longest time series

	P1	P2	P3	P4	P5	P6
Equal weighted						
Longest available period	0.55	0.52	0.52	0.53	0.54	0.55
Increase vs Henry	0.09	0.00	0.01	0.05	0.15	N/A
Longest available period (excl. tech boom and GFC)	0.61	0.52	0.58	0.60	0.63	0.65
Increase vs Henry	0.11	0.00	0.03	0.07	0.17	N/A
Value weighted						
Longest available period	0.63	0.70	0.45	0.47	0.56	0.57
Increase vs Henry	0.13	0.00	0.01	0.05	0.17	N/A
Longest available period (excl. tech boom and GFC)	0.69	0.70	0.54	0.57	0.66	0.68
Increase vs Henry	0.16	0.00	0.02	0.06	0.19	N/A

Source: Supporting Document 16.2 p3

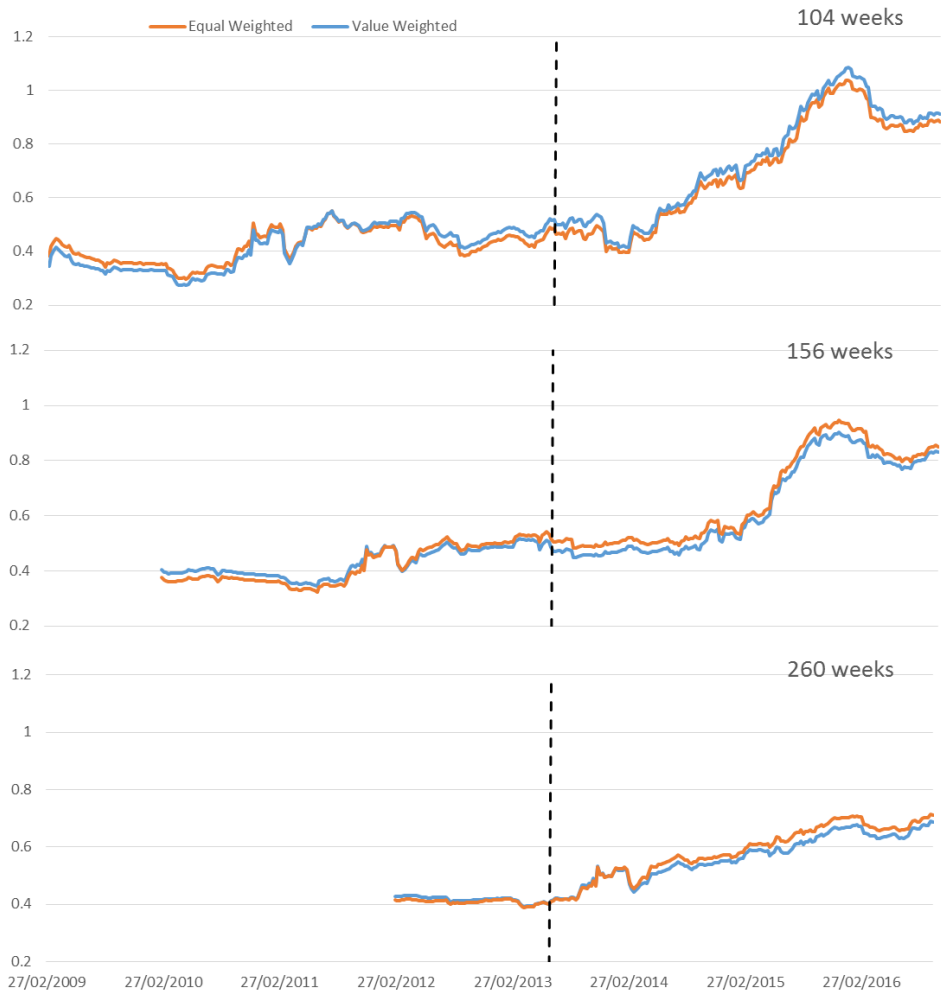
Table 4: CEG results for re-levered Henry OLS weekly portfolio beta estimates – five-year time series

	P1	P5	P6
Equal weighted			
Most Recent 5 Years	0.75	0.67	0.69
Increase vs Henry End Date	0.25	0.27	0.29
Most Recent 5 Years (exc. Tech Boom and GFC)	0.75	0.67	0.69
Increase vs Henry End Date	0.20	0.20	0.22
Value weighted			
Most Recent 5 Years	0.78	0.70	0.71
Increase vs Henry End Date	0.24	0.30	0.31
Most Recent 5 Years (exc. Tech Boom and GFC)	0.78	0.70	0.71
Increase vs Henry End Date	0.19	0.22	0.22

Source: Supporting Document 16.2 p3

The rise in beta is a recent phenomenon; this is why the five-year betas have increased by substantially more than the longest available time series. This can be seen clearly in Figure 1. The recent rise on beta is an important consideration because it implies that the market may well have changed in recent years, and thus that stale information from more than a decade ago, as in the longest available time series, is not reflective of measures of risk for regulated energy businesses in the current circumstances, and thus not reflective of the forward-looking systematic risk that the AER must reflect if it is to meet the ARORO.

Figure 1: Weighted portfolio rolling weekly recursive re-levered equity beta



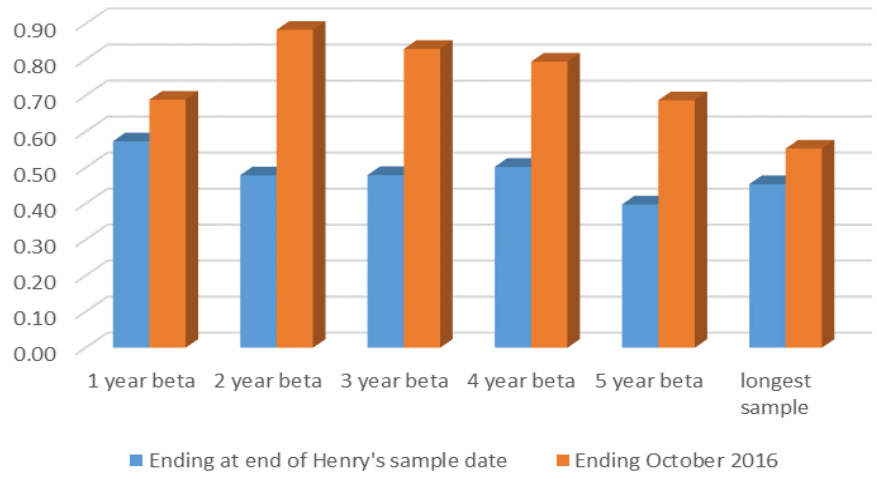
Source: Supporting Document 16.2 p22

The recent rise on beta is an important consideration because it implies that the market may well have changed in recent years, and thus that stale information from more than a decade ago, as in the longest available time series, is no longer reflective of the market going forwards, and thus could not be reflective of the forward-looking systematic risk that the AER must reflect if it is to meet the ARORO.

Formally, one tests for an indication of changes in "states of the world" (here in the systematic risk exposure of the BEE) by examining structural breaks in the data. CEG has done so, and finds strongest evidence for a structural break in August 2009, following the GFC. It also finds strong evidence for breaks in 2012 and 2014, with the latter being stronger than the former. These results suggest that using a data series longer than five years (back to 2011) will almost certainly introduce stale data no longer relevant to the forward-looking systematic risk of the BEE, and that the AER really should be considering only the most recent data which can inform a beta with the requisite degree of statistical reliability.

At the time of Henry's report, the length of the time series used to form beta was not a critical consideration, because most of his results pointed to roughly the same answer irrespective of the time period examined. However, this simply is not true anymore. This is shown to be true in the formal sense by the results of CEG's structural break test, but can also be seen clearly in a simple analysis of five, four, three, two and one-year betas, formed with Henry's timeframe as the end-point and with the present as an end-point. These are shown for equal weighed and value weighted portfolios of the BEE in Figure 2 and Figure 3 note that the horizontal axis represents the end of the sampling period (e.g., the 260 weeks ending on the relevant date).

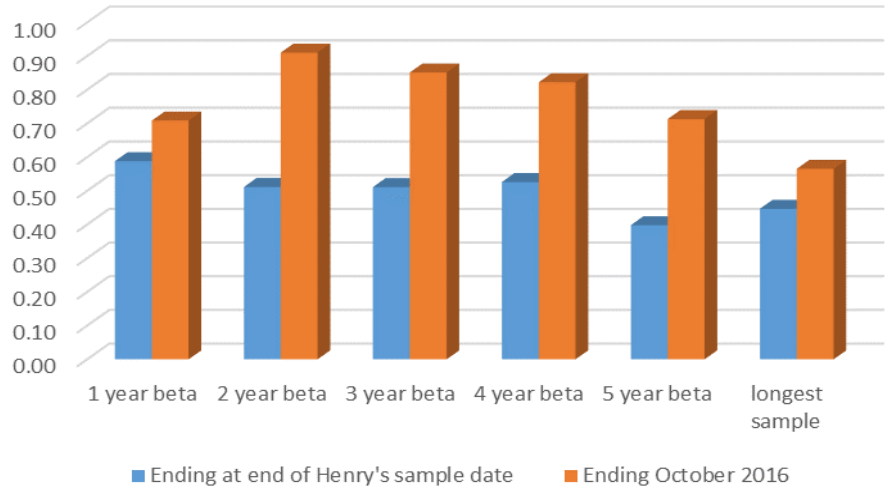
Figure 2: Effect of time-series length - equal weighted portfolio



Source: Supporting Document 16.2 p20

The blue bars, from Henry's time period, are all roughly the same, and do not exhibit any particular pattern. However, the orange bars show a clear pattern; beta rises substantially, to almost 0.9 using only the most recent two years of data, before falling to 0.7 with only the last year of data considered. Clearly, the time series used matters, and a decision needs to be made which time period to use.

Figure 3: Effect of time-series length - value weighted portfolio



Source: Supporting Document 16.2 p21

Although the formal structural break tests suggest a two-year beta would be most appropriate we note that the relevant statistical measures for a structural break, e.g., see Figures 10 and 11 of the CEG report, are also elevated from 2012 onwards (it is just that 2014 is where that measure reaches its peak). On his basis CEG states:

> *However, Figure 10 and Figure 11 illustrate that there are high F-statistics from late 2012 to late 2014 suggesting that discernible differences in asset beta began presenting in the data up-to two years prior to the maximum F-statistic observed for August 2014. This suggests that, when attempting to arrive at a post-break asset beta estimate it is reasonable to also have regard to 3 and 4-year beta estimates.*

Nonetheless, out of an abundance of caution we propose to use the lower still 5-year beta estimates (which we note are also consistent with the most recent one year beta estimates). We also note that adoption of the most recent 5 year beta estimate is a common practice amongst regulators such as the ERA.[11]

Our five-year estimate, and our result has some support in the work of other regulators. The ERA, in its Guidelines, undertook to re-estimate beta for each determination and did so, by its own reckoning, by following the methodology of Henry.[12] The ERA's original "reasonable range", although formed based on a slightly different approach to the AER's, was 0.5 to 0.7 in its Guidelines (para 140), but by the Final Decision of June 2016, it was reporting a "95 percent confidence interval" of between 0.479 and 0.870.[13] The various different *mean* estimates of beta made by the ERA as part of its 2016 study which formed the basis of the Final Decision for DBP are shown in Table 5.

Table 5: ERA Mean Beta Estimates – Estimates of equity beta for individual firms and the two weighted portfolios

	APA	AST	DUE	SKI	Mean Asset	EW	VW	Mean Portfolios
Gearing	0.440	0.562	0.627	0.277	0.476	0.476	0.484	0.480
OLS	0.682	0.671	0.170	0.716	0.560	0.638	0.665	0.652
LAD	0.662	0.705	0.243	0.724	0.584	0.740	0.778	0.759
MM	0.665	0.675	0.268	0.776	0.596	0.703	0.715	0.709
T-S	0.647	0.661	0.263	0.713	0.571	0.669	0.681	0.675
Mean: OLS, LAD, MM,T-S	0.664	0.678	0.236	0.732	0.578	0.687	0.710	0.699
ARIMAX	0.683	0.636	0.164	0.690	0.543	0.620	0.651	0.636
GARCH	0.618	0.673	0.254	0.731	0.569	0.677	0.681	0.679
Mean of all above methods	0.660	0.670	0.227	0.725	0.570	0.675	0.695	0.685

Source: ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return, June 30 2016, Table 2*

The OLS estimates for the equal weighted (EW) and value-weighted (VW) portfolios are a little smaller than the estimates of CEG, which may be reflective of slightly different time periods or methodological differences. The ERA itself concludes that its "central best estimate" is 0.699,[14] and that:[15]

> *Based on its own analysis and the other evidence before it, together with the recognition that estimates of equity beta from empirical studies exhibit a high level of imprecision, the Authority is of the view that the point estimate of equity beta of 0.7 (rounded) provides a conservative and appropriate central best estimate for beta for use in the SL-CAPM.*

2.2.2. Adjusting for downward bias and other factors

[11] See, for example, ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return, June 30 2016, p193

[12] See, for example, *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, p191

[13] See *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 473 and Table 22. Note that its confidence interval is actually the range from the 2.5th percentile of a confidence interval around beta from equal weighted portfolios in one LAD regression to the 97.5th percentile of value weighted portfolios in a different LAD regression, and a confidence interval is more properly attached to a particular model. In earlier Decisions and the Guidelines published by the ERA, the 95 percent confidence interval appears to range from the 2.5th to 97.5th percentile of different models to its Final Decision for DBP, and the "reasonable ranges" the ERA finds at different times do not always line up to a particular confidence interval.

[14] *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 473

[15] *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 474.

In the Guidelines, the AER took the view that a "reasonable range" for beta, based on the work of Henry was between 0.4 and 0.7. Moreover, considering information pertaining to the downward bias of the model (suggested by the "theoretical principles underpinning the Black CAPM" and other information such as that from international estimates of beta for utilities, it elected the top end of that range as the most reasonable estimate of beta.[16] The Competition Tribunal endorsed this approach, noting firstly that an adjustment for the downward bias of the model was necessary,[17] secondly that the approach the AER had taken was reasonable[18] and thirdly that making no adjustment, as suggested by PIAC, was in fact in error.[19]

The practical upshot is that, if 0.7 is now the mean, unadjusted beta, it can no longer represent the adjusted value found in the Guidelines and endorsed by the Tribunal, and would in fact represent a departure from the Guidelines for which we would need to provide a justification were we to use this figure. To maintain consistency with the Guidelines, we propose to make an adjustment, as the AER did, and not simply make use of a mean beta of 0.7 within the SL-CAPM framework. The issue for us is what adjustment to make and how to make this adjustment, in order to encapsulate the same issues that the AER did when it made its Guidelines. In addressing this issue, however, we face two complications.

[16] AER, *Rate of Return Guidelines: Explanatory Statement*, December 2013, p86

[17] 2016 ACompT 1 [779]

[18] 2016 ACompT 1 [749]

[19] 2016 ACompT 1 [779]

Box 1 - Should beta be adjusted?

In its DBP Final Decision, the ERA faced the same issue faced by Multinet; a mean estimate of beta of 0.7, which had formerly been the top end of its range. It's response was a finding that there was in fact no downward bias in the SL-CAPM model (in contrast to its own Guidelines and previous decisions) and that the mean estimate of beta was in fact the best estimate to use. It also found that, were one to make an adjustment for model bias, a more appropriate adjustment would be an "alpha adjustment" (adding a constant to the return on equity estimate) rather than changing beta.

The ERA relied upon was three arguments. Firstly, its experts (Partington and Satchell) arguing that it is the equilibrium return which is important, suggested that it may be more appropriate to subtract "alpha" from long-run average returns than to add an adjustment for alpha (or bias) to the SL-CAPM, a model that they note is in "widespread use". Secondly, it noted that evidence from DBP's industry portfolios failed to reject the SL-CAPM, and thirdly, it noted that, were statistically significant bias to emerge, it would soon be arbitraged away by market players, and should thus not be considered further in regulatory revenue allowances.[20]

The ERA's approach is currently subject to challenge before the Tribunal, and it clearly has issues. Firstly, the notion of equilibrium expected returns as a goal for regulators creates several problems, covered in the main body of the text. Secondly, the industry portfolio results were set aside by DBP because of their low statistical power, and the beta-sorted portfolio results clearly reject the hypothesis of no downward bias for the SL-CAPM; a finding which is consistent with the wider empirical literature over 40 years (which the ERA ignored). Moreover, within the industry portfolio results, one of the industries where the SL-CAPM is rejected is utilities; the sector that contains all the firms in the BEE. Thus, whatever conclusions the ERA draws (but DBP does not) from the industry results in general, in the one industry sector closest to the BEE, the SL-CAPM is actually rejected. Finally, in respect of arbitrage opportunities in the market, the ERA is correct that an observed "abnormality" could be bid away if that anomaly were to represent an arbitrage or profit opportunity, but it misses the point that the statistically significant intercept term (representing the downward bias of the model for low beta stocks) first appeared more than 40 years ago, and continues to appear in study after study. This suggests either that investors continually under-estimate the returns to low beta stock time and time again, which seems implausible, or that investors are not actually using the SL-CAPM in the naïve fashion the ERA implicitly assumes and the statistically significant intercept found in Henry-style SL-CAPM regressions indicates that the model is defective. The latter explanation seems more plausible.

In its Guidelines, the AER notes:[21]

"Adopting a point estimate around the mid-point would be more reasonable if our intention was to base the allowed return on equity on the Sharpe-Lintner CAPM and empirical estimates alone. However, the rules require us to have regard to relevant estimation method, financial models, market data and other evidence when determining the allowed rate of return. When this information is taken into account, we consider it reasonable to select a point estimate from the upper end of the range of empirical beta estimates."

Although we would disagree that simply selecting a beta from the top of an empirical range is sufficient in respect of having regard to financial models, market data and other evidence, we would agree with the AER that it is not appropriate to simple use the mean estimate of beta, as the ERA has done. The ERA is clearly in error, but the AER is not.

The first of these is relatively minor. Conceptually, to adjust the results of the SL-CAPM for the potential downward bias of the model, one could either adjust beta (as the AER has done) or "alpha"; the intercept in a regression such as that of Henry.[22] Partington and Satchell suggest that, if one was to invoke the theory of the Black CAPM (as the AER does), then it would be theoretically more correct to adjust alpha and not beta.[23] The ERA also notes that, were it to make an adjustment, it now believes that it should be an alpha, and not a beta adjustment.[24] We believe there is merit in the ERA's approach, if only because it makes the adjustment being made clear, and avoids confusion about whether one believes it is the estimate of beta which is biased or whether one believes the issue is with the SL-CAPM itself.[25]

[20] *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 293

[21] AER, *Rate of Return Guidelines: Explanatory Statement – Appendices,* December 2013, pp76-77

[22] Henry, *Estimating Beta: an Update*, April 2014

[23] Satchell, S and Partington, G, *Report to the ERA: The Cost of Equity and Asset Pricing Models*, May 2016, pp 11 & 14

[24] *ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 436. We note that neither the ERA nor Partington and Satchell actually advocate making an adjustment; Partington and Satchell in particular are particularly strident in their opposition to any adjustment based on the Black CAPM. The issue of whether to make an adjustment or not is a separate issue addressed elsewhere in this chapter; the issue here is, if it were decided that an adjustment ought to be made, what might one adjust.

[25] The term "low beta bias", introduced by Handley (Handley, J., *Peer Review of Draft Report by Davis on the Cost of Equity*, University of Melbourne, January 2011, page 2) refers to the downward bias of the SL-CAPM model, and has been used in this context by service providers subsequently. However, as Partington and Satchell note (Partington, G. and S. Satchell, *Report to the AER: Cost of Equity Issues 2016 Electricity and Gas Determinations*, April 2016, pages 8 and 40-41.) it can cause confusion about whether it is the estimate of beta which is biased, which is not argument being made.

The second issue is more fundamental; the Guidelines provide no guidance as to how we should make an adjustment for downward bias and other factors as the AER did in its Guidelines. We can see what information the AER considered and did not consider (empirical information from the Black CAPM, Fama-French model and DGM, for example, are out) but we cannot see how this information was used in order to get from a mean estimate of 0.55 to a best estimate of 0.7. Apart from something mechanistic, like adding 15 basis points or, as NERA do, giving a two-thirds weight to the mean and a one-third weight to one,[26] the Guidelines provide no information as to how we should adjust our new mean beta estimate of 0.7; it is not even clear what the new range should be. Whilst we recognise that the AER is within its rights under law to use judgement, and that judgement is necessary at some point, we concur with Partington and Satchell that this makes it very difficult to follow what to do, particularly as input information changes.[27]

Before going any further, it is useful to define some terms in respect of returns, because the plethora of terms can make the discussion confusing, leading readers astray. We do so in Box 2.

Box 2 - Defining returns

A *realised* return is the return that an investor realises (or actually receives) on his or her investment over some period. If the investment is risky, the realised return will not be known in advance.

An *expected* return is the expected value of a future realised return. While the expected return to an asset will, in principle, be known in advance (at least to the investor forming the expectation), it typically cannot be observed, because it is generally impossible to see inside the heads of investors and understand what expectations they are making.

A *required* return is the return that investors require on an investment. While the required return to an asset will also, in principle, be known in advance, it too typically cannot be observed; for the same reason. A required return is not synonymous with an expected return. An investor might make an assessment of a stock and decide she requires a return of ten percent in order to bear the risks associated with that stock, but might assess conditions in the marketplace and conclude that the likely returns (ie – here expected returns) are 12 percent. Only under certain conditions will expected and required returns be equal, and only under more restrictive conditions will they be equal to the returns predicted by any particular asset pricing model.

If markets are in equilibrium, then the expected return to holding an asset will equal the return that investors require on the asset and the common return can be labelled the *equilibrium* return to holding the asset. Like the expected and required returns, the equilibrium return will, in principle, be known in advance, but will typically not be observed.

Regulators often use asset pricing models to estimate the return that investors require on an asset. A measure of the required return produced by an asset pricing model can be labelled a *modelled* return. If all of the assumptions underpinning a particular asset pricing model are correct, then the modelled return will equal the expected return. The asset pricing model, however, may not be correct and the modelled return may differ from the expected return it seeks to measure. The difference between the expected return and the modelled return to a portfolio is typically referred to as the portfolios *alpha*.

To avoid relying solely on judgement, we propose to rely upon the one source of information open to us that can be incorporated in a transparent fashion into the relevant adjustments. This is information on realised returns. In doing this, we in no way confuse realised returns with expected returns (which is what the Rules require regulators to consider). Instead, noting the tautology that realised returns are expected returns plus unexpected returns (with the latter having a mean of zero over a long enough time period), we adopt an assumption that, even though realised returns and expected returns may be different in each period being considered, they are drawn from the same distribution, and thus one can draw inferences about expected returns by using information from realised returns. Without adopting this assumption, there is no ability to make use of realised return data at all (including in estimating the parameters of asset pricing models – see below) and indeed empirical finance itself becomes an impossible discipline. We thus consider this assumption not to be a particularly strong one.

Since the AER uses the SL-CAPM as its "foundation model", and since we also use this model as our own point of departure, it makes sense to investigate the modelled returns that this model produces in the first instance. On the question of whether these modelled returns predict realised returns, there is little debate between us, the AER and its advisers; the model does a terrible job at predicting realised returns.

[26] NERA, *Empirical Performance of Sharpe-Lintner and Black CAPMs: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Ergon Energy, Powercor, SA Power Networks, and United Energy*, February 2015, p34.

[27] Partington, G. and S. Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015, page 22

By way of an example, the AER notes that:[28]

> *'We acknowledge that the Sharpe-Lintner CAPM tests poorly using ex post returns data, and appears to underestimate the ex post returns for businesses with an equity beta less than one.'*

One of the AER's advisors, Satchell, in work with Muijsson and Fishwick, is more explicit and states that:[29]

> *'One of the observations over the cross section of stocks is that the historical risk-return trade-off is flat or inverted: within the CAPM, we would expect that stocks with high systemic risk would outperform their low risk counterparts, but results have shown otherwise.'*

The Australian Competition Tribunal (ACT) also acknowledges that evidence of a low-beta bias exists. The ACT, in its 2016 Public Interest Advocacy Centre (PIAC) and Ausgrid decision, states that: [30]

> *'It is … correct that the three parameters for the SL CAPM – equity beta, risk free rate, and MRP – are recorded as giving a low beta bias for businesses with a beta (that is, the risk of the asset relative to the average asset) of less than 1.0.'*

The point of difference arises when we consider what this failure to explain realised returns means in respect of expected or ex-ante returns, which are the returns the AER is in the business of measuring for the forthcoming AA period. Partington and Satchell appear to believe that the complete failure of the SL-CAPM to explain realised returns is entirely irrelevant to the purpose of regulation, and indeed, paying attention to these forecasting problems that the model has may unnecessarily distract the AER from its core task. For example, Partington and Satchell say that the model adequacy test used by DBP is:[31]

> *…….a masterpiece of marketing that could easily lead the unwary reader into believing that the purpose of asset pricing models was to forecast returns and that therefore the test of an asset pricing model's adequacy is whether it predicts subsequent returns.*

In a similar vein, they warn that "strong claims about the empirical performance of asset pricing models should be taken with a big dose of salt" and that, if we "let the data speak….the data speaks in many tongues and does not provide one unambiguous answer, or even approximately similar answers".[32]

Partington and Satchell go further than simply dismissing data on realised returns, however, and point to what they believe the task of the regulator ought to be, noting:[33]

> *It would be unwise to use the ability to forecast subsequent realised returns as the sole criterion for selecting an asset pricing model. Forecasting stock returns and determining equilibrium expected returns (asset pricing) are two different tasks.*

and further:[34]

> *The SLCAPM is based on a theoretical model of equilibrium expected returns. Equilibrium expected returns are what we want to measure when determining the cost of capital.*

In a later paper for the ERA the same authors (after pointing out the folly of using forecast ability as a criterion) note:[35]

> *So let us be absolutely clear that the purpose of asset pricing models is to determine the ex-ante return that investors require. When prices are in equilibrium this required return is equal to the expected return.*

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[28] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, page 167. The AER then go on to say that this does not necessarily mean the Black CAPM is a better model. We are not claiming it necessarily is, but are rather focussing attention on the failings of the SL-CAPM itself

[29] Muijsson, C., E. Fishwick and S. Satchell, *The Low Beta Anomaly and Interest Rates*, in J. Emmanuel (ed.), Risk-based and factor investing, Elsevier, 2016, page 305.

[30] Australian Competition Tribunal, *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016] ACompT 1*, paragraph 731.

[31] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p7

[32] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016,pages 39 and 43

[33] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p38. However, Satchell, at least is far more supportive of using data to both test and modify models and his co-authors in his academic literature use this research to advise investment clients as to how best place their investments (see Supporting Document 16.3 pp42-45)

[34] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p40

[35] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p7

The authors make it clear that they are not simply talking about single period cases, where a particular realisation of unexpected returns is not zero (as we note above, is likely to be the case in each individual time period) and nor are they talking about periods of time when one might be concerned that recent data are from some kind of abnormal period such as the GFC, but they rather suggest:[36]

> *The 'problem' thrown up by many SL CAPM tests is that they have a positive intercept. The financial industry tends to regard this as 'smart beta' i.e. low risk stocks outperform high risk stocks; this outperformance is often understood in behavioural terms. In this context, if an adjustment is necessary, it would be to subtract the intercept rather than adjust beta. This merits some explanation as it contrasts with the usual claim for a need to adjust the risk free rate upwards, as in the usual arguments for adopting the Black CAPM.*
>
> *This usual argument for the Black CAPM is based on the premise that actual returns are equal to equilibrium returns on average and thus a positive intercept in tests of the SL CAPM are assumed to be driven by the SL CAPM underestimating (overestimating) realised returns for low (high) beta stocks. An alternative premise is that the results are a consequence of actual returns outperforming (underperforming) equilibrium returns for low (high) beta stocks. In the parlance of funds management such outperformance is expressed as alpha. Thus low beta stocks have positive alphas. In this case an estimate of the equilibrium return is obtained by subtracting alpha from the actual return.*[37]

Of course, if one runs an empirical SL-CAPM regression, finds a statistically-significant alpha in said regression and then subtracts this from long run average realised returns, then this is identical to simply implementing the SL-CAPM with no adjustment at all for the downward bias of the model (or any other flaw). The ERA understand this, and directly quotes the passage above as a rationale for using the mean value of beta, and making no adjustment for potential downward bias or any of the potential flaws of the model.[38]

To date, the AER has not endorsed such an extreme view about the SL-CAPM, and nor has the Tribunal; both still accept adjustments for bias. However, the AER apparently sees some merit in these views:[39]

> *Testing of an asset pricing model involves how well it describes ex-ante expected returns when security prices are in equilibrium. Empirical work attempts to examine how well the asset pricing model explains ex-post realised returns which 'may not be a particularly good test.*

And further:[40]

> *Fischer Black has previously suggested that testing of model performance using ex-post realised returns 'might be telling…more about the shocks to the expected returns (volatility) rather than the equilibrium expected returns.*

In the context of Box 2 above, this concept of an "equilibrium expected return", could be conceptualised as realised returns being equal to the equilibrium return from some asset pricing model which is an equilibrium model (such as the SL-CAPM, or Black CAPM, for example; so the "modelled return" from Box 2), plus a statistically-significant or systematic alpha which represents the consistent predictive errors the model makes, plus a random unexpected return with a zero mean. This is in fact how Partington and Satchell conceptualise it, and in the context of our discussion above, the expected returns component would be the equilibrium return plus the (statistically significant) alpha.[41] Thus, when Partington and Satchell talk about the "expected equilibrium return", it is clear that what they mean is what we define as the modelled return, and specifically the modelled return of the SL-CAPM.

We consider that this "equilibrium expected returns" framework not only means that information about realised returns cannot be used to inform any adjustment process associated with a model (because it effectively shifts the goal to

[36] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p15

[37] Partington and Satchell (2016, April, p9) make a similar claim in work for the AER, noting that it would be "perfectly sensible" to subtract alpha from average realised returns to obtain what they term an "empirical estimate of required returns, and claiming that realised returns are not expected returns plus unexpected returns as we suggest above, but are rather equilibrium returns plus an alpha term plus a random error (with zero mean). The work for the ERA quoted in the main text provides a better background as to the authors' viewpoints in respect to subtracting the systematic bias of an SL-CAPM regression from long run average realised returns, but the viewpoint is consistent across both reports.

[38] ERA*, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016, para 290

[39] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016,p3-152

[40] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-153

[41] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p9

something entirely unobservable about which empirical data can inform nothing) but that it also represents a profoundly retrograde step for Australian regulators because it means that the regulatory process considers nothing further than the inputs to models deemed appropriate by regulators (currently only the SL-CAPM), which is direct contradiction of the reasoning behind the rule change of 2012 by the AEMC.[42] We, accordingly, do not use this framework, and do consider information from realised returns in a transparent way in order to make an adjustment to the SL-CAPM for the same potential downward bias that the AER considers in its Guidelines and has considered ever since.[43] However, before we get to the adjustment process, it behoves us to explain the problems that an adoption of an "expected equilibrium returns" framework might cause to explain why we do not use it. We see five problems.

The first of these pertains to its rejection of the validity of information from realised returns, by moving the goal of regulators away from anything that can be informed by realised returns. Do Partington and Satchell actually believe that real-life investors make no use whatsoever of realised returns when forming expectations about future period returns, but rather base their expectations solely upon what a particular model says about equilibrium returns? This seems highly unlikely; there is an entire investment analysis industry devoted to combing through past data to find new patterns and anomalies which might represent arbitrage opportunities, which clearly means that not everyone is simply using the SL-CAPM, and expecting its equilibrium prediction. The AER appears to realise this, at least at the time of its Guidelines, as the quote in Box 1 above attests.

Additionally, the AER relies heavily on realised returns in order to form its estimate of the MRP; something which Partington and Satchell endorse ahead of giving weight to modelled returns from the DGM.[44] It would be somewhat illogical to suggest that realised returns are irrelevant when forming expected return estimates at the level of an individual stock, but that they are the only factor of relevance, or a significant factor of relevance when forming the expected returns for the aggregate of all stocks.

The second problem with the framework is conceptual. The SL-CAPM may well be an equilibrium model, but it is not the only one; as Partington and Satchell note,[45] the Black CAPM, like the SL CAPM, is an equilibrium model, and each model describes an equilibrium which one might observe if all of the assumptions underpinning the relevant model were true. There are, in addition, a very large number of other models that exist that relax the assumptions that underpin the Black CAPM and SL CAPM. By way of an example, Hong and Sraer show that,[46] by relaxing the assumption made by the Black CAPM and SL-CAPM wherein all investors have the same beliefs and the assumption made by the Black CAPM that there are no short-sale constraints, one can obtain a modelled return which encapsulates the same downward-sloping relationship between mean return and beta that Muijisson, Fishwick and Satchell note is commonly found in empirical tests of the SL CAPM.[47] Thus, if the AER does decide to use Satchell and Partington's "equilibrium expected return" framework, it is by no means clear that it should expect a positive relationship between beta and return as a model outcome. This is discussed in more detail in Supporting Document 16.3, which also shows that the evidence against the SL CAPM in US data that Hong and Sraer illustrate and summarise also appears in Australian data.

Thus, if the AER's role really were to provide "equilibrium expected returns", it would need to explain which equilibrium it is aiming for and why. A reasonable view is that to distinguish between these models, one must ask whether the models work and it is difficult to see that this can be done through introspection, or by the kind of "principle-based" analysis which dominated the debate during the formation of the Guidelines. We believe that it is preferable that one distinguish between models by determining which of the models makes predictions that are borne out by data, if for no other reason than to avoid the interminable debates between experts with reasonable, but conflicting, views. As the Tribunal points out, arguments based on expert opinions are problematic in respect of determining answers, noting:[48]

> *The conflicting expert opinions, and supporting contentions based on other material, do not – in the Tribunal's assessment – get beyond showing that there are reasonable arguments for an alternative foundation model.*

[42] See 2016 A CompT 1 [650-651] for the Tribunal's views on the AEMC's reasoning about flawed models and the need to consider wider evidence.

[43] See AER, *Rate of Return Guidelines: Explanatory Statement*, December 2013, pp86-88, and page 76 of the Appendices to the Explanatory Statement.

[44] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p27-28

[45] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p40

[46] Hong, H. and D.A. Sraer, *Speculative Betas*, Journal of Finance, 2016, pages 2095-2144

[47] Muijsson, C., E. Fishwick and S. Satchell, *The Low-Beta Anomaly and Interest Rates*, in J. Emmanuel (ed) Risk-Based and Factor Investing, 2016, p305

[48] [2016]ACompT 1, *Applications by PIAC and Ausgrid*, February 2016, [735]

And further:[49]

> *The opinions of the experts have not been tested by any process of joint exchange of views, whether before the AER or before the Tribunal. The sequential exchange of written opinions, and the variety of views expressed, suggests that views of experts genuinely held might indicate that there is no clearly correct view, but that matters of fine judgment are involved.*

The third problem with the framework is legal. The regulatory task is to estimate the efficient financing costs of the BEE with a similar degree of risk as that faced by the service provider.[50] The Rules say nothing about requiring returns which are "*equilibrium returns*" or returns which are based upon the equilibrium forecast by a particular model.

The relevant framework under the National Gas Rules can be summarised as follows:

- The allowed rate of return is to be determined such that it achieves the allowed rate of return objective.[51]
- The allowed rate of return objective requires that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services.[52]
- The allowed rate of return is to be estimated as the weighted average of the return on equity and the return on debt.[53]
- In determining the allowed rate of return, regard must be had to relevant estimation methods, financial models, market data and other evidence.[54]
- Further, the return on equity is to be estimated such that it contributes to the achievement of the allowed rate of return objective. In estimating the return on equity regard must also be had to the prevailing conditions in the market for equity funds.[55]

The scheme of the rate of return rules directs the best estimate of the "*efficient financing costs*" of the BEE with a similar degree of risk to the service provider, arrived at having regard to relevant estimation methods, models of data and other evidence.

The Tribunal in its recent decisions noted that, in respect of the changes to the Rules made in 2013;

> "*In principle, the AEMC sought to achieve a process by the AER to get the best estimate of the rate of return that can be obtained which reflects efficient financing costs of the service provider at the time of the regulatory determination …"*

and further:

> *"It is apparent also that the AEMC did not consider that the rate of return estimate should be driven by a single financial model, whether the SLCAPM or another model, or by one estimation method the available relevant evidence should be considered. As the DNSP and JGN pointed out, the AEMC recognised that, in any event, other models may be useful as all have weaknesses to some degree, including that they are all based on certain theoretical assumptions, so that no one model can be said to provide the right answer."*[56]

Further, the Tribunal noted that it is commonly accepted that the AEMC's view that "*Estimates are more robust and reliable if they are based on a range of estimation methods, financial models, market data and other evidence*" is a sensible one.[57]

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[49] [2016]ACompT 1, *Applications by PIAC and Ausgrid*, February 2016, [728]

[50] NGR, Rule 87(2)

[51] NGR, Rule 87(2).

[52] NGR, Rule 87(3).

[53] NGR, Rule 87(4)(a)

[54] NGR, Rule 87(5)(a).

[55] NGR, Rules 87(6) and (7)

[56] [2016] ACompT 1, *Application by PAC Ausgrid*, paragraphs 646, 648 and 650.

[57] [2016] ACompT 1, *Application by PAC Ausgrid*, paragraph 651.

What must be estimated is the "*efficient financing costs*" of the BEE. Equilibrium returns forecast by a model are not an estimate of the BEE's efficient financing costs. A model, such as the SL-CAPM, may be one relevant estimation method to which regard must be had, but it does not follow that that model gives rise to an estimate of the rate of return which is commensurate with the efficient financing costs of the BEE, because, like all models, it is based upon a specific set of assumptions, and these assumptions may not be true in a given market. As the AEMC and the Tribunal have noted, there will be other evidence that is also relevant to that question and indeed the AER takes into account other evidence in arriving at its return on equity estimate.

The fourth problem has to do with how the parameters of a model are to be chosen. Suppose that one follows the recommendations of Partington and Satchell quoted above and one estimates the return on equity to be the sample mean return to the equity of a benchmark efficient entity less an estimate of the corresponding alpha or intercept term, which may differ significantly from zero.[58] Then the result will be exactly the same as if one had used the SL-CAPM. If, however, the estimate of alpha differs significantly from zero, one must conclude that if the SL CAPM is true, the market did not find its equilibrium during the estimation period. However, if the market were to have been out of equilibrium, the parameters of the SL-CAPM, which is, as Partington and Satchell point out, an equilibrium model, will have been empirically estimated using data from a market which the analyst considers not to have been a reflection of the SL-CAPM (equilibrium) framework. It will then be unclear whether a beta estimated over a period when the market is judged to have been in dis-equilibrium will be the same as that for a market exhibiting the particular equilibrium of the SL-CAPM. If it is not, then the beta estimate will have to be discarded and the AER would be reduced to essentially making beta up from "first principles" and would lose the ability to use the empirical evidence it has collected which has led it to the empirical beta estimates in its Guidelines. Moreover, because beta would be entirely constructed using regulatory judgement, the nature of the Rules and the discretion they offer the AER would mean neither the Tribunal nor the Federal Court would be able to assess any decision the AER chooses to make. This hardly seems likely to be conducive to the kind of stable, predictable regulatory approach the AER professes to favour.

The fifth problem has to do with trying to determine whether the market is in or out of equilibrium. Since expected and required returns are unobservable, any test for equilibrium must be a joint test of equilibrium and of a pricing model. A test that rejects may indicate that the market has been out of equilibrium or that the model is untrue; one will never know.

The problems outlined above lead us to the view that an "expected equilibrium return" framework in particular, or the failure to consider information about realised returns when making adjustments to a particular model in general is likely to cause far more problems for the AER than it might solve. We acknowledge that it is possible (or as Partington and Satchell more colourfully point out;[59] for data to "speak in many tongues") for stakeholders to seek to manipulate the results of empirical tests through forming portfolios in particular ways or selectively reporting results, but we consider that their concerns are rather overblown; whatever empirical process using realised returns is followed can be replicated, far more easily than regulatory judgement can, and chicanery uncovered. Since the alternative is to simply make up numbers, or to carry on the debate about which model is best without ever moving beyond the judgement of experts (which is equally pointless), we consider our approach to be far preferable to the alternative.

We turn now to an explanation of the approach we have used to make adjustments to the SL-CAPM to take account of the potential for the downward bias of the SL-CAPM, using the new information about beta.

Our approach is relatively simple, and related to the approach previously used by NERA and DBP to test models.[60] That is, we take a set of data for a portfolio, use it to parametrise different versions of the SL-CAPM, make a forecast using the relevant model, compare the forecast with actual returns, record the forecast error, and then move on to the next time period. We do this repeatedly over many time periods, and then test whether the forecast error is statistically significantly different from zero. To avoid the problem of choosing, by chance, an atypical time period which might suggest an adjustment to the SL-CAPM which is too large or too small compared to the broader historical record, we make use of the longest continual time series available to us; the SPPR database produced by SIRCA.

The actual mechanics of the process are similar to the approach adopted by NERA and DBP in that we make use of portfolios formed on the basis of past estimates of beta and we use two methods of estimating the MRP. We use

[58] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p15

[59] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, page 42.

[60] See NERA, *Empirical Performance of Sharpe-Lintner and Black CAPMs: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Ergon Energy, Powercor, SA Power Networks, and United Energy,* February 2015, and DBP, *2016 – 2020 Regulatory Period, Rate of Return Supporting Submission: 12*, December 2014

portfolios formed on the basis of past estimates of beta because the AER measures risk using only beta.[61] Partington and Satchell for the ERA, suggest that industry results might be more useful.[62] The SL CAPM, however, provides no role to industry membership – risk in the model is measured solely by beta – and there is no evidence of which we are aware that shows that deviations from the SL CAPM are industry specific. Additionally, quite apart from data issues (the power of the test and problems of survivorship bias in the portfolio data),[63] as the AER points out, taking industry data into consideration in this way, quite apart from the possibility of different risks, raises the issue of including firms which are similar to the BEE, but unregulated and thus potentially earning monopoly rents, which the AER makes clear it does not want to do.[64]

In respect of the MRP, this is a parameter which is exogenous to the SL-CAPM. We use two "methods" of determining the MRP. The first is to simply take the historical average which forms the bulk of the information considered by the AER in forming its own estimate of the MRP (an issue we discuss below). However, variation in the MRP from period to period, not explained or intended to be explained by the SL-CAPM, may affect the results. We therefore also consider a second method which uses actual realised market risk premia, that is, realised returns to the market in excess of the risk-free rate. In so doing, we in no way assert that the AER, or other investors, are clairvoyant or actually know what the market returns will be in coming time periods. Instead, we make no assumption at all about how investors actually form a proxy of the MRP (as distinct from the first method, which assumes they use historical averages) but instead assume only that they are rational, meaning their forecasts are unbiased in the long run. The use of realised risk premia to test asset pricing models is common in the literature.[65]

In its Final Decision, the ERA criticised the use of proxies for the way it forms the MRP used by DBP on the basis that any proxy which did not exactly replicate the way the ERA forms the MRP meant that DBP was not actually testing the model used by the ERA, and hence the test was meaningless.[66] However, the ERA used judgement to form its estimates of the MRP and it is impossible for any outsider to replicate how a regulator would exercise judgement about a particular parameter under a wide range of economic conditions, particularly when there are only a handful of observations of said regulator estimating judgement. It makes sense, in such circumstances, to develop an heuristic which replicates the result of the exercise of regulatory judgement in a transparent way that can be widely applied, rather than trying to replicate the process of regulatory judgement.

At a deeper level, any requirement to exactly replicate the process of regulatory judgement in order to challenge a regulatory decision where such judgement is used has much wider ramifications. Service providers are not the only ones seeking to test what regulators have done; other stakeholders may wish to do so as well (and indeed have done so; witness the recent PIAC challenge before the Tribunal), and it is a fundamental task of both the Tribunal and the Federal Court to test the findings of the AER when called upon to do so in a challenge. If any test must be predicated upon replicating exactly the process of regulatory judgement followed by the AER, then clearly it is impossible to effectively test, unless the AER specifies exactly, and in great detail, how it would exercise its judgement in every conceivable environment under which a test might be applied. The AER could never reasonably do this, and thus it should not, reasonably, deny any test which does not meet a requirement to replicate exactly how its judgement would have been exercised in a situation where no evidence of such judgement being exercised is available. This merely renders regulatory judgement impervious to testing, which is a poor regulatory outcome.

The full detail of the analysis is contained in Supporting Document 16.3 and the expert report by HoustonKemp. Essentially, having found that an SL-CAPM model with no adjustment is downwards biased for a firm with a systematic risk level similar to the BEE (roughly 0.7), we then employ two "fixes". The first of these is to add to an estimate generated by the SL CAPM a portion of an estimate of alpha, that is, a portion of the error with which the SL CAPM has in the past estimated the return to a portfolio with a systematic risk level similar to the BEE. We start by adding one percent of an estimate of alpha, move to two percent and so on, until we get to a point where the

[61] If one were to use industry portfolios, one would need to posit that firms from a similar industry ought to have a similar exposure to systematic risk. By contrast, using beta-sorted portfolios, one can ensure that the exposure to systematic risk is the same. Moreover, since the firms in a given beta-sorted portfolio will come from a range of industries, there will be no systemic effects due to issues which affect solely a particular industry, such as levels of market concentration or the incidence of regulation.

[62] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p18. We note that Muijsson, C, Fishwick, E and Satchell, S, *The Low Beta Anomaly and Interest Rates* in J. Emmanuel (ed), Risk-based and Factor Investing, Elsevier, 2016, use US data to form industry portfolios, but then characterise those portfolios based upon their relative levels of beta, not their particular industry characteristics

[63] DBP, *Model Adequacy Test Background: Submission 12 Appendix D*, December 2014, p2, available from https://www.erawa.com.au/gas/gas-access/dampier-to-bunbury-natural-gas-pipeline/access-arrangements/proposed-access-arrangement-for-period-2016-2020

[64] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-24

[65] see, for example, Gibbons, M., Ross, S. and Shanken, J. (1989), *A Test of the Efficiency of a Given Portfolio*, Econometrica, 12, 497-507

[66] ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4*, June 2016, [271-278]

resultant return on equity "model" (which is just an adjusted form of the SL-CAPM) can be shown to be unbiased at the five percent level.

We are mindful of the AER's comment that the:[67]

> *service providers have not shown that low beta bias exists on an ex-ante basis and that it reflects a priced factor that contributes to the ARORO.*

We emphasise again that each realised return is the sum of an expected return and an unexpected return (see Box 2, and note the discussion above about "expected equilibrium returns", which imply expected returns are equal to modelled returns plus a statistically-significant alpha). If a model provides biased estimates of realised returns (so alpha is not zero), it must also provide biased estimates of expected returns. So we do not agree with the AER's claim that service providers have not shown that a low-beta bias exists on an ex-ante basis; that is what the statistically significant alpha means. We also do not agree that the ARORO requires us to name the factors that are priced in determining a return on equity. We note that our alpha adjustment (like our second fix, which employs an adjustment to beta) simply uses what the data tell us about the ability of the SL-CAPM to predict realised returns and so expected returns. We note that the AER itself does not motivate its choice of a beta of 0.7 when the mean estimate of beta was 0.55 by delineating the factors that it believes are being priced (let alone showing that these factors are indeed priced) but rather refers in a general sense to the "theoretical principles underpinning the Black CAPM".[68]

Additionally, apart from not elucidating which factors it considers meet the ARORO, it is not clear whether it is treating new information on an level playing field with the SL-CAPM. The SL-CAPM prices systematic risk, but this is an abstract concept, tied mathematically to the covariance of a stock with the market. The AER has sought to tie it to specific factors it believes are systematic, such as demand risk or interest rates, but it has not been able to "price" these factors which it believes are systematic, and indeed McKenzie and Partington note:[69]

> *We strike a fundamental difficulty at this point as there is no reliable way to determine the nature of the relationship between any risk factor in Table 1 and systematic risk factors (or more formally, how any of the risk factors in Table 1 covary with systematic risk factors). As we explain in Section 2, it is so difficult to directly measure the risk of investments, that we measure the risks and returns of securities instead. All of the risks in Table 1 get bundled up into the business cash flow through effects on the mean, variance and covariance of the cash flows. The covariance then determines the required return on the securities. In general, provided the expected returns on securities are correctly measured, any risks from Table 1 relevant to the discount rate are captured in the total required return in the capital market for the investment's risk class.*

If the AER is unable to tie the abstract concept of systematic risk to specific risk factors which can be identified and priced in the market, then it is unclear, even if the Rules actually required this as a test how it expects other stakeholders to do so, particularly when it has roundly rejected the only asset pricing model presented to it which does, arguably, "price" other risk factors besides the market (the Fama-French Model) on the basis that these factors are not grounded in theory.

The results of this first "fix" are shown in Figure 4 and Figure 5.

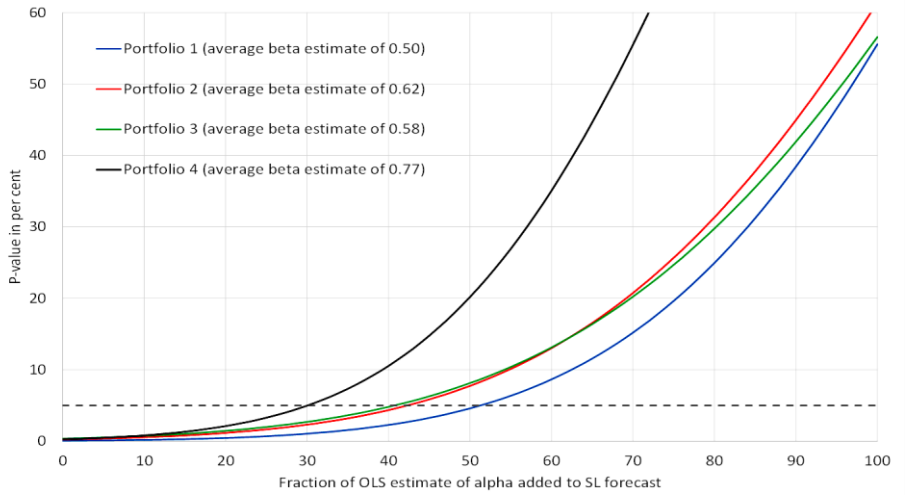
Figure 4 shows the results for individual portfolios, and is based on a t-test. Note that the different portfolios each have different required adjustments, with smaller adjustments required, in general, as the portfolio in question has a beta closer to one.

[67] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-169

[68] AER, *Rate of Return Guidelines*, December 2013, p 15. We could, of course, claim as the AER does that its departure from the mean beta estimate reflects the "theoretical principles underpinning the Black CAPM".

[69] McKenzie, M and Partington, G, *Risk, Asset Pricing Models and WACC: Report to the AER*, June 2013, p17

Figure 4: Adjusting alpha – portfolio-by-portfolio



Source: Supporting Document 16.3, p29

The key indicator is the horizontal red dotted line; the point at which each curve crosses this line indicates the smallest proportion of an estimate of the relevant portfolio's alpha that must be added to an estimate of the required return to the portfolio, produced by the SL-CAPM, to ensure that similar estimates of the return would have exhibited no significant bias in past data. Note that while the SL CAPM presumes that each alpha is zero, if the model is false, each alpha can take on a different value. Note also that the result for a single portfolio is not based on an evaluation of a single forecast. Instead, the result is based on an evaluation of a series of forecasts made over many periods – from the early 1970s to the present. Each forecast is generated by a regression that uses – relative to the forecast – past data. Each regression uses as its dependent variable, the return to a portfolio in excess of the risk-free rate, and as its independent variable, the return to the market portfolio in excess of the risk-free rate. An estimate of the intercept is an estimate of the portfolio's alpha and an estimate of the slope coefficient is an estimate of the portfolio's beta. [70] Successive forecasts use regressions that have been updated to use the most recent set of past data. Forecasts are generated by adding a proportion of an estimate of alpha to the product of an estimate of beta and the realised excess return to the market portfolio. Using the realised excess return to the market portfolio and not a forecast of the return may suggest that the regulator is presumed to be clairvoyant. This is not the case, however. The use of the realised excess return to the market portfolio presumes only that the regulator is rational. Each forecast is then compared to the excess return to the portfolio that is realised and the forecast errors are averaged over many periods to examine whether the forecasts exhibit significant bias. It is not the case, therefore, that the size of the adjustment necessary to eliminate evidence of significant bias is driven by idiosyncratic events.

For Portfolio One, for example, one would need to add slightly over half of an estimate of alpha to remove significant evidence of bias, while for Portfolio Four, one would need to add slightly less than 30 percent.

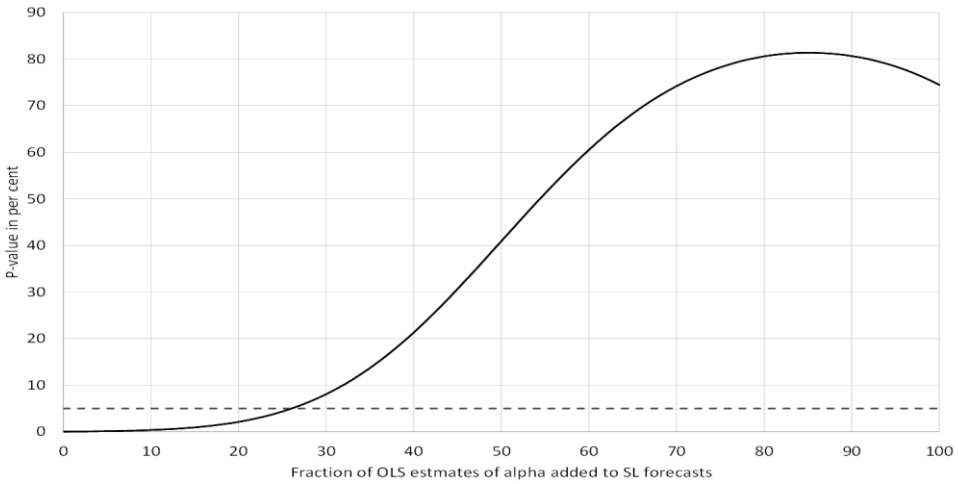
None of the portfolios formed has a beta of exactly 0.70. So interpolation is used. Consider using Portfolios Three and Four, which have betas of 0.58 and 0.77 respectively.[71] For Portfolio Three, at least 41 percent of an estimate of alpha must be added to an estimate of the return required on the portfolio, produced by the SL-CAPM, to ensure that similar estimates of the return would have exhibited no significant bias in past data. This equates to 1.61 percent (0.41 × 3.92) per annum. For Portfolio Four, at least 31 percent of an estimate of alpha must be added to an estimate of the return required on the portfolio, produced by the SL-CAPM, to ensure that similar estimates of the return would have exhibited no significant bias in past data. This equates to 1.37 percent per annum (0.31 × 4.42). Interpolating between the two numbers gives 1.46 percent per annum (1.61 + (1.37 – 1.61) × (0.70 – 0.58) ÷ (0.77 – 0.58)) as the relevant alpha adjustment required to deliver an estimate that exhibits no significant bias.

[70] Another label for alpha is 'abnormal return' because it represents the portion of the mean return to a portfolio that the SL-CAPM deems to be abnormal. Partington and Satchell use this label. Everything, however, is relative. Estimates of alpha that are significantly different from zero suggest that it is not the portion of the mean return that is abnormal but the SL-CAPM that is deficient as a model of mean returns. Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues* 2016 electricity and gas determinations, April 2016, p9

[71] We could also have used Portfolios Two and Four, which likewise straddle 0.70, but using Portfolios Three and Four gives rise to a slightly smaller, and so conservative alpha adjustment.

This is one approach which could be taken, but it focusses only on two straddling portfolios, and it may be considered prudent to also take into consideration information gleaned from all of the portfolios. This can be done by considering the results of the Wald tests, which are shown in Figure 5.

Figure 5: Adjusting alpha - overall



Source: Supporting Document 16.3, p31

Here, the curve intercepts the dashed line at 27 percent. Using Portfolios Three and Four and interpolation, an estimate of the alpha of a portfolio that has a beta of 0.70 is 4.24 percent per annum (3.92 + (4.42 – 3.92) × (0.70 – 0.58) ÷ (0.77 – 0.58)). It follows that the resultant alpha adjustment is 1.14 percent (0.27 × 4.24) per annum. Thus, the evidence is suggestive of an alpha adjustment of between 1.14 and 1.46 percent per annum.

The relationship between alpha and the zero-beta premium is described by Partington and Satchell.[72] The AER has noted that estimates of the zero-beta premium made of 3.34 percent per annum appear "more plausible" than other estimates put forward by different experts,[73] and its own shift from a beta of 0.55 to 0.70 represents a zero-beta premium of 2.50 percent.[74] These values for the zero-beta premium correspond to an alpha adjustment of between 1.12 and 1.50 percent per annum were the Black CAPM to be true.[75] Whilst we are not using the Black CAPM or seeking to endorse an estimate of the zero-beta premium, we note that our results are similar, at least numerically, to adjustments that the AER has suggested are reasonable in the past.

The second "fix" noted above is the same as that which has been employed by the AER in the past; adjusting beta estimates. Using the straddling portfolios, this gives rise to an adjustment to beta of 0.27.[76] Alternatively, following the approach based on Wald statistics, this gives rise to an adjustment of 0.17.[77] By contrast, the AER adds 0.20 to its "best" Guidelines estimate of 0.50 to come up with the adjusted beta estimate it actually uses. Since the empirical bias associated with the SL-CAPM declines as one gets closer to a beta of one, one would expect a smaller adjustment for a portfolio with a beta of 0.70 compared to one with a beta of 0.70, and we see this only for the adjustment based on the Wald statistic. However, we note that the AER did not seek to test its adjustment against any empirical data, basing it solely upon regulatory judgement. When the adjustment was tested, it was found that it failed to remove evidence of a significant bias attached, in past data, to estimates of the cost of equity produced by the SL-CAPM (the same was true of a similar adjustment made by the ERA).[78] Whatever one's conclusions as to the veracity of the assessments of the work of the AER and ERA, one should not conclude that, because the adjustment is slightly bigger than that made by the AER, it is wrong, because the comparison is not

[72] Partington, G. and S. Satchell, *Report to the ERA: The cost of equity and asset pricing models*, May 2016, p17.

[73] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-24, referencing SFG, *Cost of Equity in the Black Capital Asset Pricing Model*, May 2014, p. 3.

[74] AER, *Rate of Return Guideline: Explanatory Statement (Appendices)*, December 2013, page 71.

[75] Based on the mean beta estimate of 0.55 which was current at the time of both of these zero-beta premium estimates.

[76] See more detailed discussions in Supporting Document 16.3, pp 31 to 34

[77] Converted into alpha adjustments (with an MRP of 6.5 percent) this leads to adjustments of 1.75 and 1.10 percent respectively.

[78] See NERA, *Empirical Performance of Sharpe-Lintner and Black CAPMs: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Ergon Energy, Powercor, SA Power Networks, and United Energy,* February 2015, and DBP, *2016 – 2020 Regulatory Period, Rate of Return Supporting Submission: 12*, December 2014 for the AER and ERA cases respectively.

like with like. However, the fact that the adjustments are not vastly different does provide some comfort that both assessments are delivering broadly comparable results.

Drawing together the evidence summarised above and detailed in Supporting Document 16.3, we believe that an appropriate alpha adjustment is 1.14 percent. This is based upon the results of the Wald test, which covers all portfolios, rather than the t-test results which cover just the straddling portfolios. It may well be argued that the t-test results are the more logical results to use, as they relate directly to the level of systematic risk of the BEE (a beta of 0.7), whereas the Wald test results relate to bias across all portfolios.

However, whilst we would not ascribe to the "many tongues" view of data suggested by Partington and Satchell,[79] we are cognizant of the variable nature of finance data and the limits to which data alone can deliver a precise answer. We thus adopt the most conservative of the results found in our testing on the grounds that none of the evidence we have been presented with is consistent with an adjustment for the systematic downward bias of the SL-CAPM that is smaller than 1.14 percent. We consider this to be a prudent and appropriate use of the empirical evidence we have considered in reaching our conclusions in respect of making appropriate adjustments for the downward bias of the SL-CAPM.

2.2.3. Determining the MRP

We note that the MRP is not determined by the SL-CAPM, but is instead exogenous to the model. To date, we have considered only the performance of the SL-CAPM conditional on assumptions made about how an MRP estimate is formed, and we turn now to the task of how to estimate the MRP itself. The Guidelines suggest 6.5 percent but, like beta, market information has changed since this estimate was made, and we do not consider that the AER has adequately updated its estimates in recent decisions based upon new market data. In this section we therefore do so following the approach the AER itself follows in its Guidelines.

The AER relies, or purports to rely, upon two pieces of evidence; from historical market returns and from the DGM. The former forms the lower bound and the latter the upper bound for the MRP, and the AER proceeds to choose a value between the two bounds. We update this process for this proposal

Turning first to market returns which form the lower bound of the AER's range, in the Guidelines and its decisions up to April 2015 the AER's view was that the mean historical excess returns supported an MRP range of 5.0% to 6.5%. The bottom of that range was set to 20 basis points above the highest geometric mean estimate and the top of that range was set slightly above the highest arithmetic mean estimate. However, in recent decisions, the AER appears to have changed its approach to reporting the evidence from historical excess returns. The AER says, for example:[80]

> *Historical excess returns provide our baseline estimate and indicates a market risk premium of approximately 5.5 to 6.0 per cent from a range of 4.8 per cent to 6.0 per cent. We consider both geometric and arithmetic averages of historical returns. However, we consider there may be evidence of bias in the geometric averages. Therefore, our range for historical returns is based on arithmetic averages.*

The AER provides no explanation of why it now adopts 6.0% rather than 6.5% as the top of its range based on arithmetic averages when the arithmetic averages that it has recently reported range between 5.2% and 6.2%, depending on which historical period is considered.[81], and when two of the five arithmetic mean estimates are above 6.0% and four of the five are above 5.7%. The 4.8% figure is a geometric mean estimate and is therefore irrelevant to a range that is based on arithmetic averages.

Frontier Economics has proposed a corrected arithmetic mean point estimate range of 5.5% to 6.5%. Frontier Economics notes that its range is consistent with the estimates recently reported by the ERA for corresponding time periods. For the reasons set out in section 4.2 of the Frontier Report, we adopt a range for historical excess returns of 5.5% to 6.5%.[82]

Turning now to the DGM which forms the upper bound of the AER's range, we follow the same approach, with updated data, that the AER followed in its Guidelines. The DGM estimate is set by using the AER's most recent

[79] Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, page 42.

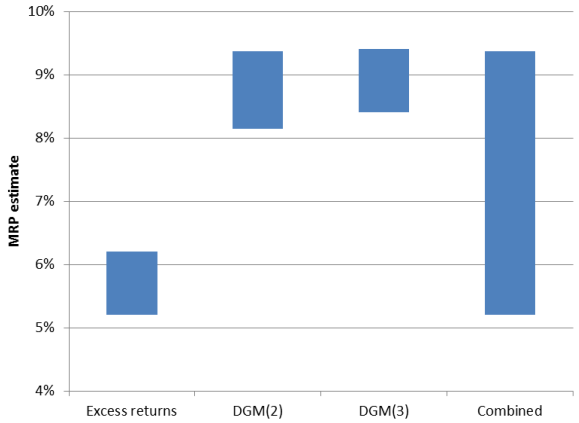
[80] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p.59, and AER, *Draft Decision Powerlink Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, September 2016, p.40,

[81] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, Table 3-22, pp.191-192 and AER, *Draft Decision Powerlink Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, September 2016, pp104-105 and Table 3-16

[82] Supporting Document 16.4 p 29, paragraph 115.

DGM estimates of the required return on the market and subtracting the current 10-year government bond yield of 1.9%. This gives a range for the three-stage DGM of 8.4% to 9.4%.[83] Following the Guidelines approach, a combination of information from historical market returns and the DGM establishes the combined range set out in Figure 6 below.

Figure 6: Range for MRP based on historical MRP and DGM



Source: Supporting document 16.4, p 11, paragraph 35

Having established the combined range, the next step is to select a point estimate for the MRP. The AER's Guideline approach was to select a point estimate from within the combined range where:

> *This point estimate lies between the historical average range and the range of estimates produced by the DGM. This reflects our consideration of the strengths and limitations of each source of evidence.*[84]

Box 3 - The AER's changing views on the DGM

In the Guidelines, the AER showed a clear preference for the use of the DGM in the determination of the MRP. However, more recently the AER appears to have altered its approach. This seems to primarily arise from the AER's view that the DGM estimates are not reliable on their own, but that they provide some support for a point estimate above the range from historical returns. The AER says:[85]

> *"We are not confident that the recent increases in estimates of the market risk premium from these models necessarily reflect an increase in the 'true' expected ten-year forward looking market risk premium. We consider our, and other, dividend growth models are likely to produce upward biased estimates in the current market. We also consider our, and other, models may not accurately track changes in the return on equity for the market. For these reasons, we do not consider that the dividend growth model estimates are reliable on their own, but that they do provide some support for a point estimate above the range from historical returns."* [footnotes removed]

It is not clear why the AER's view on its own DGM approach has changed so markedly since the Guidelines. At that time, the AER stated that the DGM approach has the attractive features of being a forward-looking estimate that is more likely to reflect the prevailing market conditions than other approaches and that its then expressed concerns about the reliability of input parameters were mitigated by its preferred implementation.

For the reasons expressed in section 7.2 of the Frontier Report, we submit that the concerns the AER raises in recent Decisions are not new or have not intensified since then and there is no reason to suggest that the AER's concerns are any more or less important than at the time of the Guidelines. Since the Guidelines, the only thing that has changed in relation to the AER's DGM estimates is that they are now higher.

Even if the DGM estimates only provide some support for a point estimate above the range from historical returns, once that range is corrected to be 5.5% to 6.5%, it is clear that on the AER's own analysis a MRP estimate of 6.5% is too low. We consider that the DGM should continue to play the same role it played in the Guidelines, and the AER's subsequent downgrading of this evidence has been an error.

[83] Supporting Document 16.4, p 72, paragraph 273.

[84] AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p. 97.

[85] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, p3-59

In order to produce a point estimate of the MRP from the range in Figure 6 above, Frontier Economics has identified the sorts of considerations that the AER applied when selecting its Guideline MRP of 6.5%, and then sought to make the same considerations in the same manner as the AER did in its Guidelines, but using the new data. Frontier identifies the following factors that appear to be relevant to the AER's adoption of a point estimate MRP of 6.5% in the Guidelines at that time:

a) The AER's historical excess returns mid-point estimate is 6.0%[86] and its mid-point three-stage DGM estimate is 7.1%.[87] The mid-point of these two estimates is 6.55%;
b) The AER adopted an upper bound of 6.5% from its historical excess returns approach and a lower bound of 6.7% from its three-stage DGM approach. The mid-point of this gap between the two ranges is 6.6%;
c) The AER's historical excess returns range and two-stage DGM range overlapped in the region of 6.1% to 6.5%. The mid-point of this region of overlap is 6.3%;
d) The combined range adopted by the AER was 5.0% (the lower bound of the excess returns range) and 7.5% (the upper bound of the DGM range). The mid-point of the combined range is 6.3%; and
e) If the historical excess returns range is based on arithmetic means (which is consistent with the AER's subsequent decisions) the combined range is 5.7%[88] to 7.5%, with a mid-point of 6.6%.

Frontier reaches an estimate for the MRP adopting these factors as follows:

a) The AER stated that its preferred historical excess returns estimate is 6.0%[89] and its mid-point three-stage DGM estimate is now 9.0%. The mid-point of these two estimates is 7.5%;
b) The upper bound of the AER's historical excess returns approach is 6.5% and the lower bound from the AER's three-stage DGM approach is 8.4%. The mid-point of this gap between the two ranges is 7.5%;
c) At the time of the Guideline, the AER's historical excess returns range and its two-stage DGM range overlapped. In the current market conditions, the upper bound of the historical excess returns range is 6.5% and the lower bound of the two-stage DGM range is 8.2%. The mid-point of the gap between these two ranges is 7.4%; and
d) The combined range is from 5.5% (the lower bound of the excess returns range) and 9.4% (the upper bound of the DGM range90). The mid-point of the combined range is 7.5%.

Applying these considerations, Frontier concludes that the appropriate MRP estimate is 7.5 percent. This is supported by evidence the AER considers in recent determinations, once this evidence is interpreted correctly.

To begin, with, we note that the AER has recently said:[91]

> *Survey evidence supports a market risk premium around 6.0 to 6.5 per cent. Other regulators' estimates are used as a cross check and indicate a market risk premium estimate of around 6.5 per cent is reasonable. Conditioning variables indicate that there has not been a material change in market conditions since our October and November 2015 decisions.*

In our view, this material should either be given no weight or alternatively regarded as supporting an MRP of 7.5%. Survey evidence is unreliable and should be given no material weight because of methodological shortcomings relating to such issues as the nature of the respondents, the survey response rate and any potential bias in the response rates of different groups, when the survey was conducted and the level of government bond yields at the time, the content and relevance of the questions asked and how and for what purpose the MRP is used.

Moreover, the MRP figures reported in surveys are ex-imputation estimates – they have not been grossed-up to reflect the AER's assumed value of imputation credits. Consequently, before they can be compared to the AER's (with-imputation) 6.5% allowance, they must be adjusted. By way of example, the QCA has concluded that this adjustment requires the addition of 83 basis points[92].

The AER also considers decisions by other regulators, but other regulator's decisions do not indicate a market risk premium estimate of around 6.5 per cent is reasonable. To the contrary, when regulatory decisions made under

[86] AER *Rate of Return Guideline, Explanatory Statement*, December 2013, p93.

[87] The AER has subsequently stated its preference for the three-stage specification of the DGM. See, for example, AER, *JGN Draft Decision, Attachment 3: Rate of Return*, November 2014, p.3- 222.

[88] AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p93.

[89] AER, *Rate of Return Guideline, Explanatory Statement*, December 2013, p97.

[90] Note that the upper bound is currently the same for the AER's two-stage and three-stage DGM approaches.

[91] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-59.

[92] Supporting Document 16.4, pp 34-35, paragraph128-130

regulatory regimes with characteristics similar to the Rules (or decisions are adjusted to be comparable to decisions made under the Rules) are given appropriate weight, these decisions support a MRP of over 7% and in some cases over 8%[93].

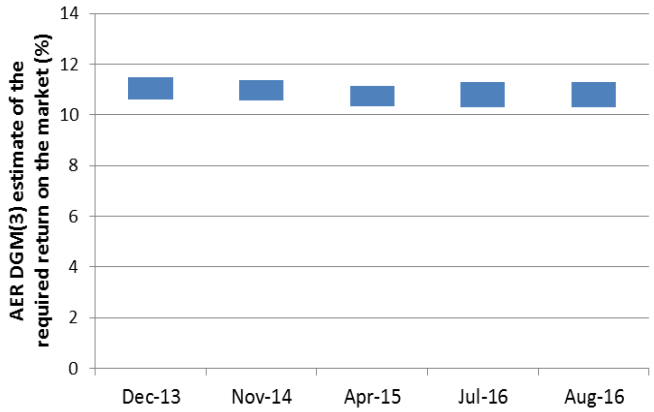
The AER, finally, places weight on evidence from so-called "conditioning variables", and we submit that no reliance should be placed on the conditioning variables in the absence of a formal econometric mapping by the AER of these conditioning variables to a point estimate of the MRP. This is most particularly because the only formal mapping exercise undertaken to date of similar conditioning variables used by the ERA shows that they do not have the forward-looking properties the AER considers important.[94] Moreover, in market conditions of record low government bond yields, the challenge of mapping conditioning information to a point estimate of the MRP is particularly difficult. This is because some of the conditioning variables relate to required returns whereas others relate to risk premiums. For example, the dividend yield is related to overall required returns – a higher yield implies that a given set of dividends is being discounted at a higher rate. By contrast, corporate bond spreads relate to risk-premiums.

When government bond yields are near their long-run average levels, this distinction is much less important as risk premiums in the current and the historical data are computed by subtracting the same base risk-free rate. The analysis in the prevailing market conditions is complicated by the fact that current government bond yields are so far below the historical average over the period for which conditioning information is available.[95]

However, to the extent reliance is placed on conditioning variables, they are generally consistent with a stable required return on equity and a higher MRP than estimated by the AER. The MRP estimate of 7.5 percent, which gives rise to a more stable return on equity estimate (comparing the present day to the overall return on equity from previous AA decisions at the outset of the last AA period) than adopting the AER approach of a constant MRP and thus producing a return on equity estimate which rises and falls with the risk-free rate, is also more consistent with evidence that the AER has either downplayed or not considered at all.

Turning to the DGM, which the AER has downplayed; a decision which we believe is in error for the reasons discussed above. Applying the DGM suggests that the overall required return on equity has remained stable since the Guideline, even as government bond yields have fallen sharply. This is illustrated in the Figure 7.

Figure 7: AER three-stage DGM estimates of the required return on the market



Source: Supporting Document 16.4 , p30

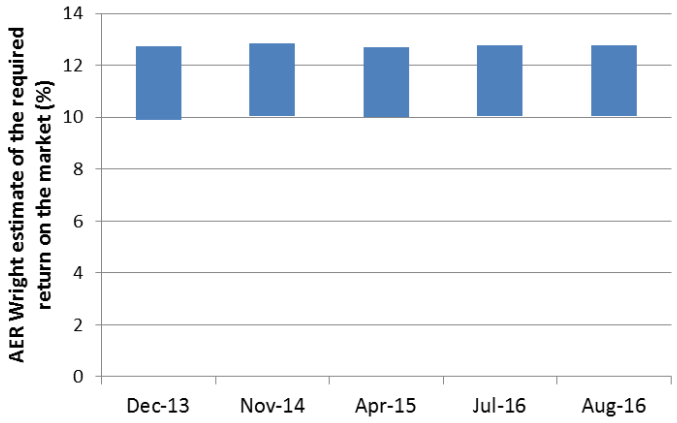
The AER also reports that its Wright estimates of the required return on the market have remained stable since the Guideline, as summarised in Figure 8.

[93] Supporting Document 16.4, p 13, paragraph 39.

[94] See ESQUANT, *Estimating the Market Risk Premium: DBP Submission 12 Appendix E,* December 2014. In its Final Decision (Appendix 4 [495-505], the ERA characterises the analysis undertaken by ESQUANT as being focussed on fixed weights (the ERA had used a weighted index of its indicators in the decision ESQUANT were referring to) for the index when the ERA did not fix weights, suggesting that its index could not be tested because it changed the weights each decision. However, the ERA misses the point. Firstly, each of the indicators had problems, in respect of being a forward-looking indicator; the way the ERA (and AER) use these indicators now. Secondly, the only weighting which could be shown statistically to be forward-looking had negative weights on some of the indices, which is nonsensical.

[95] Supporting Document 16.4, p 41, paragraph 149

Figure 8: AER Wright estimates of the required return on the market



Source: Supporting Document 16.4 , p31

The evidence in respect of the error associated with an MRP estimate of 6.5 percent is not limited only to the results of the DGM and Wright models; evidence from a range of respected market participants is consistent with the weight of evidence set out above – that the required return on equity has remained relatively stable even as government bond yields have fallen. This position is supported by, for example[96]:

a) Central banks such as the Reserve Bank of Australia and the Federal Reserve Bank of New York;

b) Other regulators such as Ofgem, FERC, the ERA, and IPART;

c) Corporate advisory firms such as McKinsey and NERA-US; and

d) Independent expert firms such as EY, KPMG, Deloitte, and Lonergan Edwards.

The Rules requires a forward-looking estimate of the MRP that is commensurate with the prevailing conditions in the market for equity funds, and in this context, the AER's sole reliance on historical excess returns, ignoring all of the evidence set out above to the contrary gives rise to an approach which is illogical and irrational.

The historical excess returns approach estimates the MRP by taking the mean excess return over a long historical period. Self-evidently, this estimate must reflect the average market conditions over the historical period that was used. Logically, this approach can only produce a forward-looking estimate that is commensurate with the prevailing conditions in the market in two circumstances:

- Investors always require the same MRP in all market conditions; or
- The current market conditions are the same as the average market conditions over the historical period.

Neither of these conditions is likely to hold.

The prospect that investors always require the same risk premium in all market conditions is inconsistent with the generally accepted view that risk premiums are higher during recessions and financial crises and lower during economic expansions. It is also inconsistent with the AER's view that the MRP likely varies over time.[97]

The alternative motivation for the use of mean historical excess returns is that the current market conditions are the same as the average market conditions over the historical period. However, the prevailing market conditions are very different from the average historical conditions in that the current government bond yield (to which the MRP is added to produce the allowed return on equity) is at historical lows.

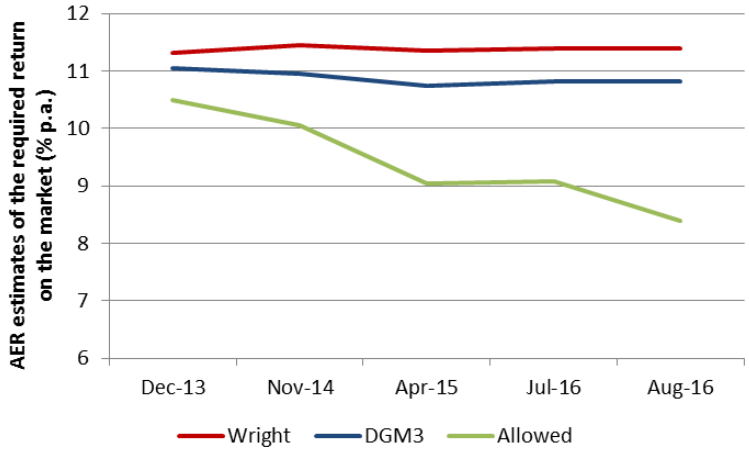
For the reasons set out in section 3.3 of Supporting Document 16.4, in those circumstances it is irrational to use historical excess return estimates in the manner adopted by the AER. There is no reason to conclude that the AER's use of a consistent historical excess returns approach would, in the current circumstances, produce a forward-looking MRP that is commensurate with the prevailing conditions in the market for equity funds. Since the Guideline, the AER has allowed an MRP of 6.5% in every one of its draft and final decisions.

[96] Supporting Document 16.4 pp 46-54, paragraph 170-199.

[97] AER, *Rate of Return Guideline: Explanatory Statement*, December 2013, p. 91.

As Frontier discusses in Supporting Document 16.4, the consequence of this is that the allowed return on equity falls one-for-one with government bond yields. The AER adds its risk premium to the contemporaneous government bond yield and the sum is adopted as the allowed return on equity. Since government bond yields have fallen sharply since the Guideline, the AER's allowed return on equity has also fallen correspondingly. However, as shown above, the evidence is that the required return on equity has remained stable since the Guidelines. The distinction between the AER's estimates and its regulatory allowance is summarised in Figure 9.

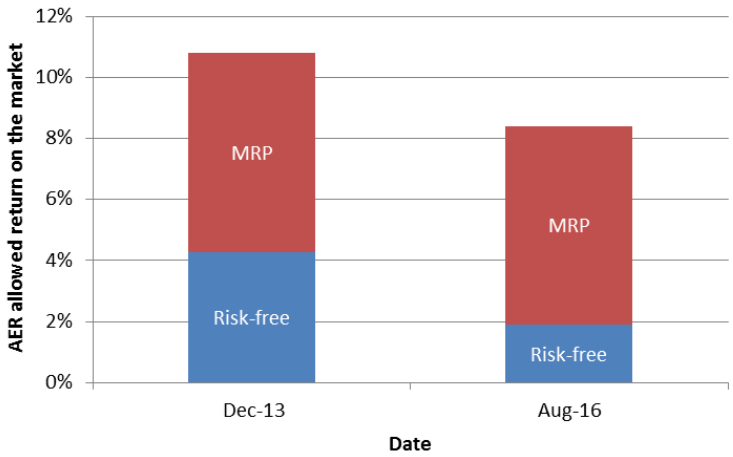
Figure 9: The required return on the market – AER estimates and allowances



Source: Supporting Document 16.4, p8.

Since its Guideline in December 2013, the yield on 10-year government bonds has fallen from 4.1% to 1.9% in September 2016, before rising to 2.5 percent in November.[98] The AER has maintained the same 6.5% MRP in its decisions since December 2013. Thus, the AER considers that the required return on equity for the average firm has fallen from 10.6% in December 2013 to 8.4% by September 2016. This represents a decline of more than 25% over the last two and a half years, as illustrated in Figure 10.

Figure 10: AER estimate of the required return on equity for an average firm



Source: Supporting Document 16.4, p56.

By contrast, there is a substantial body of evidence to support the propositions that:

a) Real-world investors do **not** determine the return that they require by simply adding a constant figure to the contemporaneous government bond yield; and

b) The required return on equity has **not** fallen by over 25% in the last two and a half years.

[98] http://www.rba.gov.au/statistics/tables/xls/f02hist.xls

The AER's approach to setting the MRP allowance produces implausible outcomes. These implausible outcomes arise because the AER's estimation approach produces a consistent estimate of the MRP. This results in an allowed return on equity that is volatile – it rises and falls one-for-one with every change in government bond yields.

In some market conditions, the true required return on equity may well fall when government bond yields fall. However, in other market conditions the required return on equity may stay constant, or even rise, as government bond yields fall. It depends on the reasons why the government bond yield has fallen.

The application of the AER's approach assumes that the required return on equity always falls one-for one with every decline in government bond yields. This assumption leads to implausible estimates in some market conditions, including the current market conditions.

Cross checks on the return on equity

The AER employs five cross checks to its return on equity estimates:

- The Wright CAPM (which it now affords limited weight).[99]
- The estimates of other regulators.
- Comparison with the cost of debt.
- Comparison with independent expert reports.
- Conditioning variables.

Additionally, service providers have previously provided cross checks based on hurdle rates and price to earnings ratios, though the AER has afforded these limited weight.

Turning to the five tests the AER does consider, we note two issues. Firstly, it is not clear how a particular test could result in a particular return on equity estimate being discarded. For example, when considering the cost of debt, the AER has considered, in all recent decisions, that the difference between the cost of debt and equity (or rather their premia) suggests that its return on equity results are reasonable. However, the actual differences are not the same from decision to decision, and it begs the question of what would be an unreasonable return on equity result based on this test; would a difference of 50 basis points suggest the return on equity estimate is too low, and 500 basis points suggest it is too high? Without understanding the conditions under which this test (or indeed any test) can point to a finding that the return on equity estimate is unreasonable, then the validity of the cross check is somewhat problematic.[100]

Secondly, as Frontier notes, there is a concern that focussing solely on the equity risk premium may be problematic, because the Rules (NGR 87(6) and (8) for equity and debt respectively) make it clear that it is the return on equity and return on debt, not the premia, which need to be consistent with the ARORO.[101] Even if it were the case that the equity risk premium allowed by the AER were consistent with that adopted by some market practitioners, the task would not finish there – it would still be necessary to consider the other elements of the return on equity. There is evidence that market practitioners regularly adopt higher risk-free rates and apply other uplifts to the return on equity. Moreover, these adjustments and uplifts tend to increase in frequency and magnitude as government bond yields fall – as they have in the prevailing market conditions. Thus, a cross check that ignores these elements will be incomplete.

With these caveats in mind, we turn to a consideration of our return on equity estimate, firstly in light of the AER's five tests and secondly in light of hurdle rates and price to earning ratios, which appear to have been mistakenly downgraded as evidence by the AER.

Of the AER's five tests, two (the Wright CAPM and conditioning variables) apply at the level of the market as a whole only, and we have addressed these above in respect of the MRP; the former is suggestive of much higher allowances for the return on equity than allowed by the AER, and the latter should only be used with caution because the different indicators point to different things. In a broader context, Frontier also provide significant evidence pertaining to the issue of whether the return on equity overall has declined as precipitously as the AER's implementation of the SL-

[99] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-79

[100] We are not suggesting an immediate change in respect of cross checks, but note that this would be an issue that could usefully explored in the next iteration of the Rate of Return Guidelines to make the process more robust and transparent for stakeholders.

[101] Supporting Document 16.4, p 44, paragraph 165

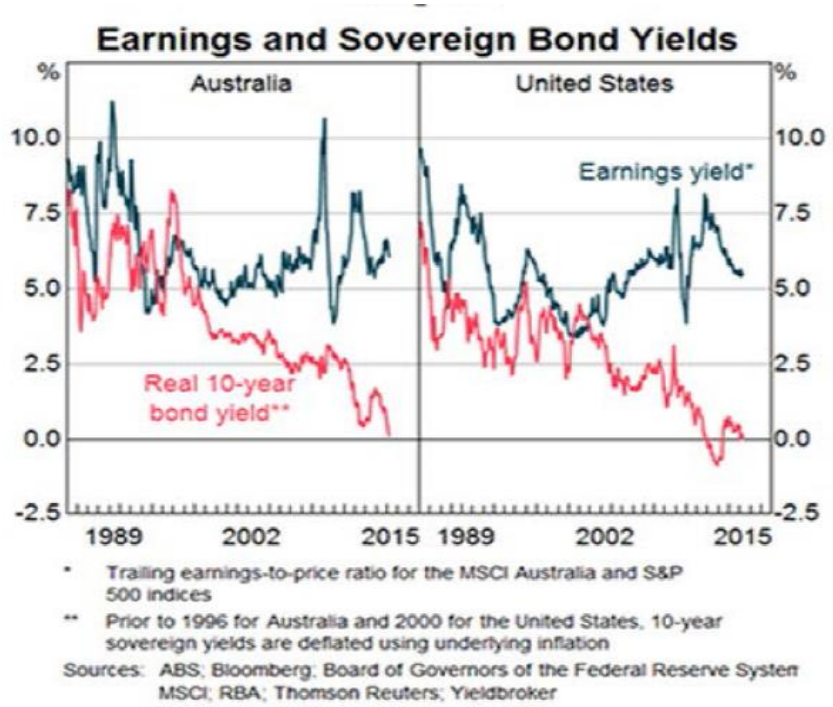
CAPM implies; by around 25 percent.[102] The overwhelming conclusion is that, for the market as a whole, the required return on equity has declined only slightly over the past few years, and certainly nothing like 25 percent.

The remaining three do have relevance at the level of an individual company. We examine firstly the difference between debt and equity premia. With a cost of debt of 4.67 percent and a risk-free rate of 1.92 percent, our debt risk premium estimate is 275 basis points. By contrast, our equity risk premium est9imate is 639 basis points; a difference of 364 basis points. We note that this is higher than differences the AER has found reasonable in recent decisions (which are all below 200 basis points). However, as noted above the AER has provided no information at all about what difference between debt and equity risk premia it would consider to be unreasonable, and we consider this difference of 364 basis points to be reasonable at the current time.

There are two reasons for this. Firstly, our return on equity estimates are supported by considering actual returns of firms with levels of systematic risk similar to the BEE (this is how alpha is formed above), and the relevant tests are done based on excess returns (above the risk-free rate). This suggests that an equity risk premium of 639 basis points reflects what firms with a systematic risk level similar to the BEE actually earns; in fact it is a lower bound to actual earnings. By contrast, the AER's finding that equity risk premia of 455 basis points is reasonable is based upon nothing but regulatory judgement. Indeed, one might argue that it is incumbent upon the AER to explain why it is reasonable to conclude that investors expect to earn almost 200 basis points less than the lower bound of an expectation informed by actual returns.

Secondly, as noted above, Frontier provides evidence about returns to the market as a whole not declining since the time of the Guidelines in 2013, and certainly not declining by anywhere near as much as the 25 percent implied by the AER's approach. The corollary of this finding is that, if beta had remaining constant, this would imply that the change in the required return on equity for the BEE would have been the same, proportionately, as for the market as a whole, so again, much less than a 25 percent decline. In fact, as outlined above (and in Supporting Document 16.2), beta has increased for the BEE, which should give rise either to a smaller decline relative to a few years ago than is the case for the market as a whole, or indeed a slight increase. In this light, consider Figure 11 below.

Figure 11: Australian earnings yields and government bond yields



Source: Supporting Document 16.4, p46.

At the time of the Guidelines, the risk free rate was 4.25 percent.[103] The AER determined that the appropriate MRP was 6.5 percent and that the appropriate beta was 0.7, giving rise to a return on equity allowance of 8.8 percent. The

[102] Supporting Document 16.4, pp 46 to 59

[103] Based on the average of the RBA F2 series. We acknowledge that the use of the AER's interpolation approach from straddling bonds will give a slightly different answer, but our purpose here is illustration, not precision.

trend in Figure 11 is slightly upward from 2013 to the end of the series, but even assuming it was flat, investors paying attention to this series ought to have been expecting a return on equity higher than was the case for December 2013 for the BEE, because the market required returns are roughly flat and beta has increased. Our estimate for the return on equity, of roughly 8.31 percent is thus likely to be an understatement of expected returns, which is consistent with it being the minimum unbiased answer, based on market data.

The next test we consider from the AER is the views of independent experts. Frontier note a number of problems with the AER's approach in respect of considering evidence from independent expert reports and give two examples[104]. Firstly, the AER's conclusion that its allowed equity risk premium lies within the Grant Samuel range fails to recognise that Grant Samuel specifically disavowed its mechanistic range as being inappropriate for current market conditions and for use in its valuation. Grant Samuel corrected that mechanistic range to one (adjusted for imputation) that the AER's equity risk premium (455 bps) falls outside and below. Second, an example is given of an adjustment to the risk-free rate which, when taken into account, also produces a premium materially above the AER's allowance.

The AER's stated reasons for disregarding this material is based upon supposition that these adjustments may be made in a manner that is inconsistent with the ARORO. However, the AER's conjecture is without foundation, whereas the evidence is clear that market practitioners make uplifts to mechanistic CAPM estimates and risk free rates in order to reflect prevailing conditions in the market for equity funds.

When the adjustments are ignored, the Grant Samuels range for the equity risk premium is between 5.8 percent and 8.2 percent,[105] and the Macquarie Research premium is six percent.[106] Our estimate of the equity risk premium, 6.39 percent, sits in the range for Grant Samuel, but slightly above the figure used by Macquarie. It therefore appears reasonable.

The final cross check the AER considers is the decisions of other regulators. This is largely circular exercise if undertaken in Australia, because all Australian regulators employ a similar check, and thus tend to follow each other. The real focus should remain on the market for funds, and not the regulatory sphere.

This caveat aside, we note that the AER has recently considered evidence on the equity risk premium from a range of recent regulatory decisions in Australia.[107] Around two-thirds of the results shown by the AER sit above its allowed equity risk premium for Ausnet, and around seven sit (or appear to sit, given the scale on the figure) above our proposed equity risk premium of 639 basis points. From this perspective, our proposed return on equity does not appear to be out of step with regulators around Australia.

Looking overseas, we consider UK and North American regulators for a wider regulatory picture. In so doing, we note that differences in timing and relative risk country-by-country mean that one should not expect comparisons to be exact. Table 6 below shows the results from a series of recent UK decisions. These are expressed as real pre-tax WACC (not return on equity) estimates. By way of a comparison, our proposed real pre-tax WACC is 5.33 percent, whilst the recent Ausnet Draft Determination implies a real pre-tax WACC of 4.4 percent and the recent Powerlink and TasNetworks Draft Determinations imply a real pre-tax WACC of 3.7 percent.

[104] Supporting Document 16.4, pp 41-43, paragraph154-160.

[105] Supporting Document 16.4, pp 42-43, paragraph 157

[106] Supporting Document 16.4, p 43, paragraph 160

[107] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-325, Figure 3-15

Table 6: Recent UK WACC estimates

2010	*CAA:NATS*	*NIAUR:PC10*		
	5.70%	4.80%		
2011	*Ofcom:MCT*	*SONI*	*Ofcom:WBA*	*Ofgem:TPCR4Rollover*
	4.50%	4.70%	5.06%	4.75%
2012	*Ofgem:RIIOT1/GD1*	*NIAUR:PNG*	*NIAUR:BGE*	*NIAUR:RP5*
	4.3%-4.8%	8.55%	5.83%	4.10%
	NIAUR:PC13			
	4.09%			
2013	*ORRCP5(NetworkRail)*			
	4.31%			
2014	*Ofwat:PR14*	*CAA:Heathrow(Q6)*	*CAA:Gatwick(Q6)*	*CAA:NERL(RP2)*
	3.74%	5.35%	5.70%	4.25%
	Ofcom:LLUWLR	*Ofcom:WBA*	*Ofgem:RIIOED1*	*NIAUR:PC15*
	3.88%	5.62%	3.76%	3.44%

Source: http://www.ukrn.org.uk/wp-content/uploads/2016/07/2015DecMarketReturnsAndCoC-ARefresh.pdf Appendix 3

Noting the caveats about international evidence, our proposed WACC sits towards the top end of recent UK decisions, whilst the AER sits towards the bottom end.

We now consider North American evidence, which focusses more directly on return on equity allowances. This is shown in Table 7 below.

Table 7: Recent North American return on equity estimates

	Return on equity		
	2013	2014	2015
Canadian Gas Distributors			
Alta Gas Utilities Inc	8.3	8.3	8.3
ATCO Gas	8.3	8.3	8.3
Enbridge Gas Distribution Inc.	8.93	9.36	9.3
Enbridge Gas New Brunswick	10.9	10.9	10.9
Fortis BC Energy Inc.	8.75	8.75	8.75
Fortis BC Energy (Vancouver Island) Inc.	9.25	9.25	—
Fortis BC Energy (Whistler) Inc.	9.5	9.5	—
Gaz Métro Limited Partnership	8.9	8.9	8.9
Gazifère Inc.	7.82	9.1	9.1
Heritage Gas Limited	11	11	11
Pacific Northern Gas Ltd.	9.5	9.5	9.5
Pacific Northern Gas (N.E.) Ltd. (Fort St. John/Dawson Creek)	9.25	9.25	9.25
Pacific Northern Gas (N.E.) Ltd. (Tumbler Ridge)	9.5	9.5	9.5
Sask Energy Inc.	8.75	8.75	7.74
Union Gas Limited	8.93	8.93	8.93
Average	9.17	9.29	9.19
Median	8.93	9.25	9.1
U.S. Gas Distributors			
Average of all Rate Cases Decided in the Year	9.68	9.78	9.48
Median of all Rate Cases Decided in the Year	9.72	9.78	9.28
Canadian Electric Distributors			
ATCO Electric Ltd.	8.3	8.3	8.3
ENMAX Power Corporation	8.3	8.3	8.3
EPCOR Distribution Inc.	8.3	8.3	8.3
Fortis Alberta Inc.	8.3	8.3	8.3
Fortis BC Inc.	9.15	9.15	9.15

	Return on equity		
	2013	2014	2015
Hydro-Québec Distribution	6.19	8.2	8.2
Maritime Electric Company Limited	9.75	9.75	9.75
Newfoundland Power Inc.	8.8	8.8	8.8
Nova Scotia Power Inc.	9	9	9
Ontario's Electric Distributors	8.98	9.36	9.3
Saskatchewan Power Corporation	8.5	8.5	8.5
Average	8.17	8.72	8.72
Median	8.4	8.5	8.5
U.S. Electric Distributors			
Average of all Rate Cases Decided in the Year	10.02	9.75	9.66
Median of all Rate Cases Decided in the Year	9.9	9.75	9.72
Canadian Electric Transmission Companies			
Alta Link Management Ltd.	8.3	8.3	8.3
ATCO Electric Ltd.	8.3	8.3	8.3
ENMAX Power Corporation	8.3	8.3	8.3
EPCOR Transmission Inc.	8.3	8.3	8.3
Hydro One Networks Inc.	8.93	9.36	9.3
Hydro-Québec Trans Énergie	6.41	8.2	8.2
Average	8.09	8.46	8.45
Median	8.3	8.3	8.3

Source: http://www.cga.ca/wp-content/uploads/2015/07/2015-Authorized-Return-on-Equity-Newsletter.pdf

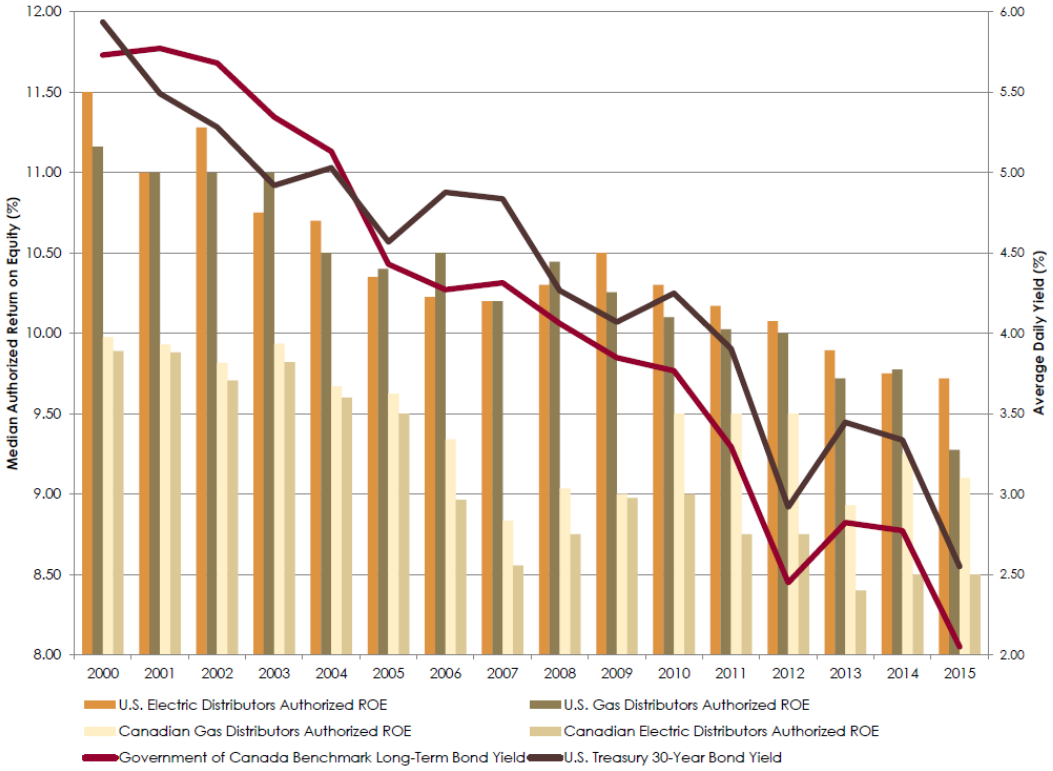
Our proposed return on equity allowance sits at the bottom end of allowances made in Canada, and around 100 basis points below the median allowed for US gas distributors. Given that US and Canadian government bond rates were below the current Australian government bond rate throughout the time period shown,[108] and both markets are arguably more mature and stable than Australia, this suggests our estimate is conservative.

Perhaps more interesting than the levels for return on equity allowances is their movement through time. In Australia, since the publication of the AER's Guidelines, allowed return on equity allowances have declined in lock-step with the government bond rate. However, Canadian rates in 2015 are almost all the same as they were in 2013. This can be seen more clearly in Figure 12 below, which shows Canadian and US regulatory decisions superimposed over the relevant bond rates used by regulators in both jurisdictions. Since 2008, as rates have declined in the US, regulatory allowances have declined much more slowly, and in Canada, they have sometimes even risen. It would

[108] See the RBA F3 time series, which compares official overnight rates in various countries. The current official overnight rate in Australia is 1.5 percent, whilst it has been below one percent in Canada since 2009, and below one percent in the US since 2008.

appear from Figure 12 that the AER's approach of moving allowed return on equity in lock step with the prevailing government bond rate is out of step with approaches used by regulators in North America.

Figure 12: Regulatory return on equity allowances and government bond rates – US and Canada



Source: http://www.cga.ca/wp-content/uploads/2015/07/2015-Authorized-Return-on-Equity-Newsletter.pdf

We now turn to evidence from hurdle rates and price-to-earning ratios. The AER gives these cross checks little weight, but we believe they deserve more weight, and we accordingly discuss them below.

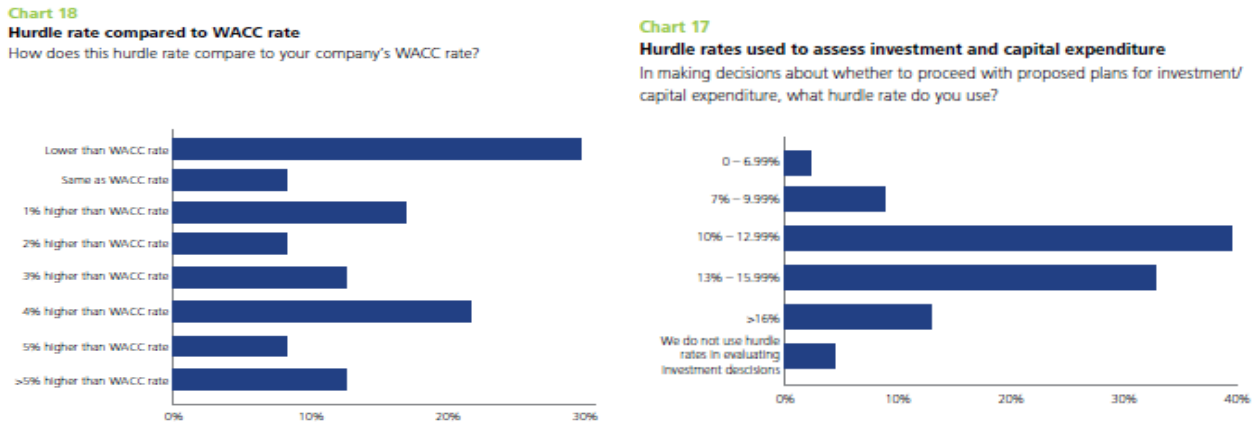
In respect of hurdle rates, the AER has deemed this information to be irrelevant because the RBA and Deloittes have indicated that firms often have hurdle rates well above the cost of capital, and that these don't change very frequently, with JP Morgan echoing the second point.[109] The AER then goes on to posit a number of reasons why hurdles rates may be high or inflexible. In respect of inflexibility, we note that this is only relative; the AER may well change its estimate of the cost of capital in lock step with movements in the risk-free rate, but this does not mean that investors do the same. In fact, the evidence from Figure 11 suggests that they do not.

In respect of hurdle rates being high relative to the firm's cost of capital, it is not clear that this is correct either. This is shown in Figure 13.

.

[109] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, p3-91

Figure 13: Hurdle rates and the cost of capital

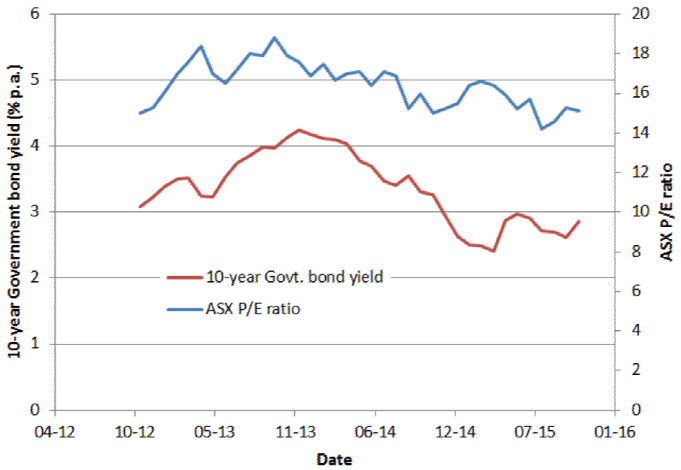


Source: Deloitte, CFO Survey: Looking beyond the clouds Q3 2014, p18.

From the left-hand side of Figure 13, around a third of firms use hurdles rates lower than their cost of capital, and around two thirds have a hurdle rate that is less than two percentage points above their WACC rate, which would not appear to constitute being "well above" their WACC. Turning to the right hand side of Figure 13, and noting that the hurdle rates may include debt and equity (Deloittes are not specific) and are thus likely to be lower than the equivalent expected return on equity, around ten percent of the firms in question have hurdle rates below ten percent. Even if rates have come down with the risk-free rate since 2014 when the survey was published (which broader evidence suggests they have not), the fact that most firms have hurdle rates two percentage points or less higher than their WACC, and almost all firms have hurdle rates higher than ten percent, suggests that our proposed return on equity of 8.31 percent is reasonable or, as with the other evidence above, may slightly understate investors required return on equity.

Finally, service providers have also provided evidence on price to earnings ratios, which the AER has determined does not satisfy it of the presence of an inverse relationship between the risk-free rate and market risk premia.[110] As the AER notes, if the required rate of return falls and earnings expectations remain unchanged, then market prices and P/E ratios should increase. Frontier previously presented evidence to the AER showing ratios remaining relatively stable, but the AER has dismissed this evidence in part because it is not Australian evidence. Frontier has collected Australian evidence, and this is summarised in Figure 14.

Figure 14: P/E ratios and government bond yields



Source: Supporting Document 16.4, p49

As Frontier point out, P/E ratios have fallen with government bond yields, rather than increasing, which is suggestive of recent increases, not decreases, in required returns. Thus, as with the evidence around Figure 11 above, if 8.8 percent was the correct return on equity estimate at the time of the Guidelines in 2013, the current cost of equity

[110] AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 3 – Rate of return*, July 2016, p3-91

estimate ought to be higher than this. On this basis, our estimate of 8.31 percent would appear to be overly conservative.

The overall conclusion from all of the evidence considered above, apart from evidence from other regulatory decisions, is that the return on equity estimate of 8.31 percent is either about right or too low. This provides us with a high degree of confidence that we have not over-estimated the overall return on equity.

2.2.4. Estimating the overall return on equity

The overall return on equity, under Mutlinet's adjustments, is equal to the risk-free rate (the ten-year CGS) plus an "alpha adjustment" to capture the downward bias of the SL-CAPM, plus beta times the MRP, where in this instance, beta is its mean estimate and not an estimate adjusted for the potential downward bias of the SL-CAPM model as per the Guidelines.

As noted above, the mean estimate of beta is, conservatively, estimated at 0.7 and the MRP at 7.5 percent; the product of the two is 5.25 percent. We have adopted an alpha adjustment of 1.14 percent, and the risk-free rate during the indicative averaging period adopted for this proposal (August 8th to 19th) is 1.92 percent. This gives rise to a return on equity estimate of 8.31 percent.

2.3. Return on debt

Our approach to the cost of debt aligns to the Guidelines with one small exception; we believe the AER should consider an additional third-party index (from Thomson Reuters) in addition to the Bloomberg and RBA curves it currently considers. Importantly, we have accepted the AER's proposed transition approach.

In accepting the AER's approach, this does not imply that we necessarily consider it best from the perspective of the ARORO, nor that all of the reasoning behind it is sound. However, we consider that it is not in the best long-term interests of our consumers to agitate these arguments during this AA process, but rather consider that this should be done as part of the next Guidelines.

We now turn to a discussion of the on minor changer we make from the Guidelines, before discussing our proposed credit rating, gearing and assessment of the cost of debt.

2.3.1. Consideration of information from the Thomson-Reuters index

The AER determined in its Guidelines (and continues to argue) that it should apply a simple average of Bloomberg and RBA curves, on the basis that:

- Both curves have their unique strengths and weaknesses, but the AER is not satisfied that either is clearly superior to the other;
- Both curves require adjustments from their published form to make them fit-for-purpose, and the AER is not satisfied that either can be more simply or reliably adjusted to estimate the annual return on debt that the other;
- The AER's approach is consistent with expert advice from Dr Lally (from 2014) that it adopt a simple average of the BVAL and RBA curves, subject to the necessary adjustments to each curve;
- The two curves have regularly produced materially different results at particular points in time. Both curves have their strengths and shortcomings, but it is not clear to the AER that one approach is clearly superior to the other. When the curves depart, the AER considers it is not easily discernible which curve produces estimates that better reflect the efficient financing costs of a BEE. The BVAL curve has produced estimates both higher than, lower than, and similar to, the RBA curve, so there is no clear indication that one curve produces systematically higher or lower estimates than the other;
- The AER's approach is consistent with the Tribunal's decision in Application by ActewAGL Distribution [2010] ACompT 4; and
- The AER's approach is will reduce the likely price shock if either curve becomes unavailable or produces erroneous estimates during the period.[111]

[111] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, pp 3-112 to 3-113.

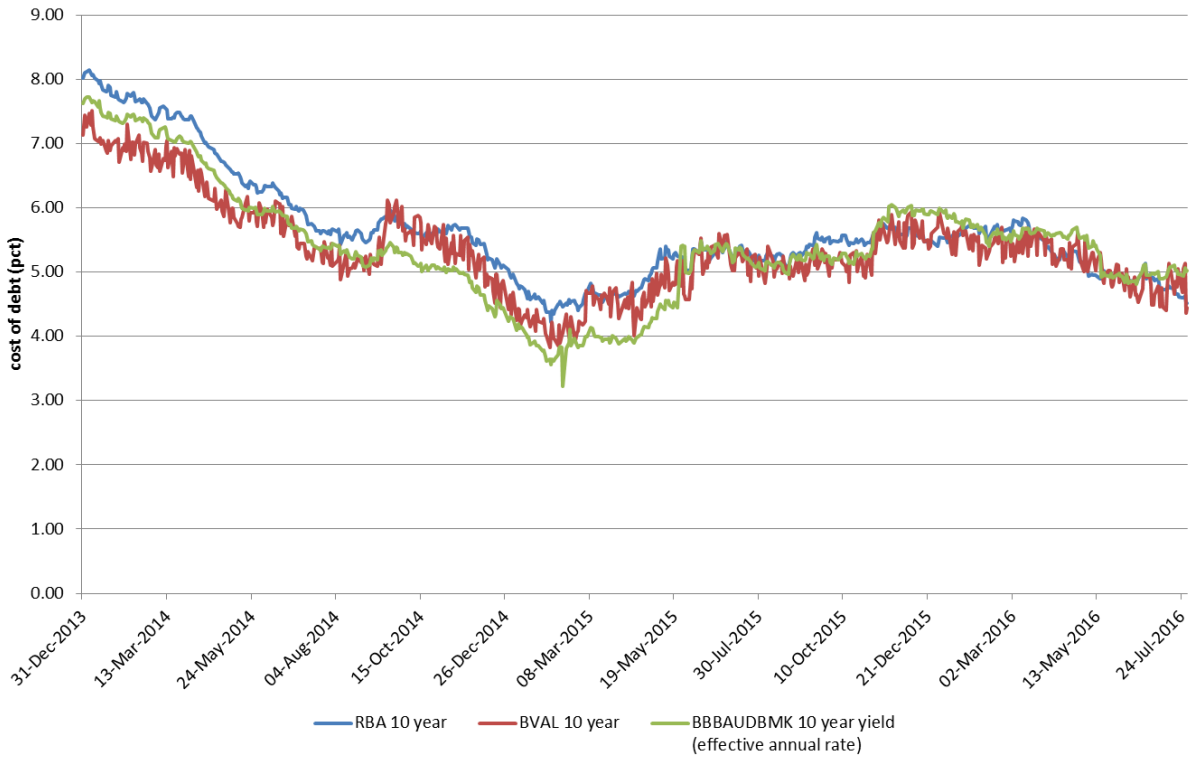
We consider that the current approach could be enhanced by also having regard to the Thomson Reuters BBB Corporate Credit Curve (BBBAUDBMK), hereafter referred to as the TR Curve. We note that the AER has previously considered the TR Curve in its UED Final Decision and, although it did not accept its use then (in part due to the timing of its introduction, and in part due to it not producing materially different results in general to Bloomberg), it did not reject the TR Curve categorically but suggested it would be willing to consider the TR curve further provided stakeholders were able to be consulted on the curve.[112] We suggest it should do so now

To consider the three curves and their differences further, consider

Figure 15, which compares Bloomberg, Thomson Reuters and the RBA over the past two years. In considering

Figure 15, it is important to note that Thomson Reuters only publishes its ten-year curve when it has at least one bond meeting its criteria with a tenor of ten years; in other words, it does not extrapolate from smaller tenors. This criterion was met from May 2015 to May 2016, and has been met since the beginning of October 2016.[113] Where Thomson Reuters does not have data for its 10-year BBBAUDBMK curve, we extrapolate from the seven year version of the curve, following the AER's approach developed for the BVAL curve in the event that it faces the same issue.[114]

Figure 15: Thomson Reuters, Bloomberg and RBA curves compared



Source: Multinet calculations based on RBA, Thomson Reuters and Bloomberg data

Whilst the Thomson Reuters curve is currently above the other two, this is clearly not always the case; on average, it gives the lowest cost of debt in the period considered in Figure 15. Importantly, we obviously cannot predict which curve will be relatively high or low at the time of the Final Decision, which is when the cost of debt will be set, or in subsequent updates.

[112] AER, *Final Decision United Energy Distribution Determination 106-2020: Attachment 3 – Rate of return,* May 2016, pp3-325 to 3-328

[113] Thus, it was not met in the indicative averaging period of August 8th to 19th used in this AA proposal.

[114] In fact, we have simply adapted a spreadsheet provided to us by the AER which calculates the cost of debt for the RBA and Bloomberg indices, and we use the same functions the AER uses for Bloomberg extrapolation to extrapolate for Thomson Reuters. We note that Thomson Reuters does have a nine-year BBBAUDBMK curve from which we could extrapolate, but we have sought to preserve the AER's existing methodology, developed for the BVAL curve. This could obviously be the subject of further discussion as this AA proposal is considered, and we would be happy to provide our spreadsheet model to the AER upon request.

We accept that the TR Curve and Bloomberg do use similar methods for determining whether bonds should be included and similar methods (to the best that these can be ascertained by third parties) in the construction of both the index and the relevant curves. This has the result that the two curves usually move together very closely, as the AER has pointed out. However, they do not always do so. In the UED Decision, the AER highlighted one instance (November 2015 to January 2016) and more recently, CEG has highlighted another time period.[115]

It is this latter example which is particularly illuminating in respect of the utility of including a third index. As explained by CEG, a large part of the difference between the two curves recently has been down to a single bond issued by Jemena. This bond has been rated differently by different agencies, and it appears Bloomberg has included in in its BBB curve (used by the AER) and TR has included it in its A curve. We do not seek to argue whether Bloomberg or TR was correct in assigning this bond, but clearly, even very similar methodologies can give rise to quite different results when the universe of bonds at a particular tenor is small. This is precisely the case here, as there are relatively few bonds issued in Australia with a tenor of ten years.

One response to this issue is to drop indices which may be engaging in questionable, or at least highly sensitive bond selection processes, and rely solely upon indices which have more bonds at the relevant tenor. This has been the approach Ausnet has proposed. However, this has the issue of reducing the number of indices to one, and even the RBA index is not perfect. Another option is to develop a bespoke index, as the ERA has done, but this is a complex process exposing the regulator to a great deal more debate than the use of third party indices and stretches the definition of an "automatic" update (NGR Rule 87(12)) almost to breaking point. It also represents a considerable departure from the AER's existing approach.

It is in this context that we propose a third option; to include the TR Curve, and weight each curve at one-third. In this manner, when issues such as the Jemena bond arise, their effects are somewhat ameliorated by the presence of a third index and, since no index is perfect, this appears likely to give rise to a more robust result overall. Additionally, since market players are likely to be using the TR Curve in addition to Bloomberg (many market players, after all, have a Thomson Reuters terminal instead of or in addition to a Bloomberg terminal) or indeed the RBA curve, adding this third curve gives a better approximation of the opportunity cost of funds in the marketplace, or, in the parlance of NGR Rule 87(5), the "market data" used to assist in determining an allowed rate of return which meets the ARORO.

We further submit that, by proposing this index now, at the AA Proposal stage, the timing issue in the UED Final Decision does not arise, and stakeholders have ample opportunity to be consulted and to have their say on the inclusion of this index.

2.3.2. Credit rating

In its Guideline and recent decisions, the AER continues to adopt a BBB+ benchmark credit rating to estimate the return on debt.[116]

We maintain the view expressed by UED that the BEE should have credit rating of BBB, rather than BBB+. However, we note that, in the AER derives the trailing average data from the broad BBB rated curves published by the relevant third parties and the AER's determination in this respect therefore has no direct impact upon the estimate return on debt at present.

We do, however, object to the AER's proposed contingency approach to adopt a BBB+ curve in place of the provider's existing curve in the event that either the RBA or Bloomberg commences to public a BBB+ specific yield curve.[117] No such change should occur during the regulatory control period; rather, if a BBB+ specific yield curve is published during the regulatory control period, its suitability should be properly assessed through the next transmission determination process.

2.3.3. Term

We propose to adopt a 10 year benchmark term in estimating the return on debt.

[115] See CEG, *Criteria for Assessing Fair Value Curves: An update,* September 2016, submitted as part of the response to Ausnet's Draft Determination.

[116] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, p 3-106.

[117] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, p 3-335.

2.3.4. Averaging period

We have used an indicative averaging period for the figures shown in this AA proposal of the 8th to the 19th of August 2016. This has been used to calculate the risk free rate (for equity), the cost of debt and the inflation expectation. All three will be updated prior to the Final Decision.

2.3.5. Determination of the return on debt

Based on the discussion above, and the indicative averaging period of August 8th to 19th 2016, we consider an appropriate return on debt to be 4.67 percent.

2.4. Gearing

The AER has used a gearing level of 60 percent debt 40 percent equity in its Guidelines and all subsequent decisions. We do not propose to deviate from this aspect of the Guidelines and, accordingly, adopts the same assumption for gearing.

2.5. Overall WACC estimate

The overall WACC estimate is 6.12 percent. This is an indicative estimate, based upon relevant market data for the time period August 8th to 19th, which has been used consistently as the illustrative time period throughout this AA Proposal. The various elements of this estimate are shown in Table 8.

Table 8: Elements of WACC Estimate

Element	Value
Return on equity	8.31%
Risk-free rate	1.92%
Market risk premium	7.50%
Beta	0.7
Bias adjustment (alpha)	1.14%
Return on debt	4.67%
Gearing	0.6
Post-tax nominal WACC	6.12%

3. Inflation

The estimate of expected inflation influences the determination of a number of building blocks, including the depreciation and the return on capital. If the estimate of expected inflation used to derive the building blocks is not accurate and consistent with investors' inflation expectations, the result will be a potential under-recovery of costs (if the forecast of inflation is too high) or an over-recovery (if the forecast is too low).

Under the AER's current approach using its PTRM, the estimate of expected inflation is an estimate of inflation expectations in the nominal WACC. It is used to convert the nominal WACC to a real WACC and (through a negative adjustment to depreciation) to avoid the double counting that would otherwise arise from applying a nominal rate of return to an inflation-adjusted capital base. If the estimate of expected inflation used in one part of the building block determination (to make negative adjustments through the AER's PTRM) is significantly different from inflation expectations used in other parts (the nominal WACC), there will be a mis-match and a potential under or over-recovery of revenue. The estimates of inflation used in the building block determination must be consistent. As is explained below, basing all estimates on the inflation rate implicit in bond rates is the most consistent and appropriate course to take. We have therefore not used the AER's PTRM, as this is not a requirement under the National Gas Rules. Rather we have used a tailored model called MG AAR Pricing Model which ensures a consistent use of inflation.

The AER's current approach to estimating inflation, relying on RBA short term inflation forecasts and long term inflation targets, does not produce an estimate of expected inflation which is consistent with inflation expectations in the market, and would in fact implies real bond rates significantly less than (and until recently, negative) indexed bonds are available in the marketplace. The consequence is that the (negative) adjustment made to total revenue for expected inflation is larger than the compensation the market expects we will receive for inflation during the course of the coming AA period. As a result, we cannot expect to recover at least our efficient costs and the AER's decision will not contribute to the achievement of the NGO.

Our proposal is to estimate expected inflation by reference to a market-based approach (the break-even approach) which we submit gives rise to an estimate of expected inflation which is consistent with market expectations, most particularly those implicit the nominal WACC as reflected in bond rates and gives rise to the best estimate of expected inflation possible in the circumstances.

We rely upon the following expert reports submitted in support of this proposal:

- CEG: Inflation compensation, addendum to September report, December 2016 – Supporting Document 16.28
- CEG: *Best estimate of expected inflation,* September 2016 – Supporting Document 16.29.

We also submit and rely on the following earlier CEG reports:

- CEG Measuring expected inflation for the PTRM June 2015
- CEG *Measuring expected inflation for the PTRM,* January 2016.

3.1. Legislative Framework and the operation of the AER's PTRM

Under Rule 76 of the NGR, the annual building block revenue requirement for each regulatory year of a regulatory control period must be determined using a building block approach, under which the building blocks include a "return on the projected capital base" and "depreciation on the projected capital base" (return of capital).

Pursuant to the rate of return rules, the allowed rate of return is to be determined on a nominal vanilla basis.[118] This nominal rate of return is applied to an indexed RAB. However, the effect of this combination is a double compensation for inflation, once through the nominal rate of return and once through the indexation of the RAB across regulatory periods. The AER addresses this in its PTRM by taking expected inflation (estimate) out of the annual revenue requirement for the forthcoming period (through the depreciation building block), and then returning it by indexing prices to actual inflation through the forthcoming period, and indexing the RAB to actual inflation at the commencement of the next AA period. Importantly, any estimates, including the estimate of expected inflation, must be arrived at on a reasonable basis and must represent the best forecast of estimate possible in the circumstances. (NGR 74(2)). Rule 89(1) of the NGR governs the design of the depreciation schedule. As noted above, the AER's approach in its PTRM is to make the negative adjustment to revenue using the estimate of expected inflation through

[118] NGR Rule 87(4(b)).

the depreciation building block. The AER's discretion under Rule 89(1) is limited. The effect of this is that, by application of Rule 40(2) of the NGR, the AER must not withhold approval to an element of an AA proposal that is governed by the relevant provision if the AER is satisfied that it complies with applicable requirements of the Law (including the NER), relevantly in this case if it complies with NER 74(2).

As CEG explain,[119] the AER's PTRM and RAB roll forward model work together to deliver compensation for inflation as follows:

1. Take a nominal input for the cost of debt and equity.
2. Deduct the estimate of expected inflation to arrive at a real return which is then embedded in the real regulated revenue path;
3. Provide nominal compensation that is equal to:
    - The real return derived in step 2; plus
    - In the RAB roll forward, compensate for the inflation that actually occurs (out-turn inflation) over the regulatory control period.[120]

The real revenue path in Step 2 is the final output of the AER's PTRM. In the AER's Draft Decision for AusNet Services distribution, the AER recognised that the objective of the expected inflation estimate is to convert the nominal return to a real return (step 2 above).[121] As noted above, this is necessary to avoid a double counting of inflation.

The AER further explained the operation of its PTRM and RFM and the role of expected inflation in its recent Explanatory Statement- Proposed amendments to electricity distribution roll forward model of 31 August 2016:

> *A nominal WACC, not a real WACC, is the input to the PTRM at the start of each AER final decision. The real WACC (which drives PTRM outcomes) is derived from the nominal WACC by deducting the expected inflation rate. Hence, an overestimate of inflation means the real WACC will be too low (and vice versa). However, the forecast inflation and the nominal WACC are jointly estimated on consistent terms.[122] Directly using the real WACC in the model means we have assumed that this pair of inputs is correctly matched. For example, if forecast inflation is overestimated, but this overestimate of inflation is already included in the nominal rate of return, the real WACC will still be correct. Hence, the construction of the model means we isolate changes in revenue outcomes that reflect the difference between forecast and actual inflation, not errors in the forecast inflation embedded in the WACC.*

In this statement the AER acknowledges that if expected inflation is overestimated, the real rate of return delivered in the current period (by way of the negative adjustment to the building block using expected inflation) will be too low and vice versa. In other words, if the estimate of expected inflation does not reflect market expectations of inflation built in to the nominal rate of return, the deduction from annual revenues will be too high and the network under-compensated for inflation.

Finally and by way of context, we note that, although the National Electricity Rules mandate the use of the AER's PTRM, which includes a methodology for estimating expected inflation, no such requirement exists in the National Gas Rules. NGR 73(1) requires only that service providers provide financial information on a nominal, real or some other recognised basis that deals with the effects of inflation, that the basis must be stated in the Access Arrangement Information (NGR 73(2)) and be consistent across all financial information (NGR 73(3)). This is important in the context of the recent SA Power Networks decision by the Australian Competition Tribunal, where the Tribunal found that the AER had not erred because under the National Electricity Rules, the PTRM (which specifies the AER's method for estimating expected inflation) was binding on SAPN and the AER such that the AER could not consider inflation outside of the PTRM.[123] This is not the case under the NGR.

[119] Supporting Document 16.29, section 3.

[120] This is compensated primarily in the RAB roll forward used to set the opening RAB at the beginning of the next regulatory period but also (to a small extent) in the form of price escalation for inflation during the regulatory period.

[121] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016,p 3-154

[122] The AER's footnote 8 reads "As noted above, this is why forecast inflation in the AER's PTRM is a constant inflation rate with a 10 year horizon."

[123] See Application by SA Power Networks [2016] ACompT 11 [553-619]

Box 4 – Approaches to inflation adjustment

The AER has expressed the view that it is preferable to consider the methodology for estimating expected inflation by way of an industrywide review rather than on a decision-by decision basis.[124] We note that it has recently commenced such a review.[125]

We support a review of the AER's approach to estimating inflation as identified in its PTRM because, for the reasons set out in this section, the AER's current methodology does not give rise to an appropriate estimate of inflation expectations. There are potentially a number of ways that the current issue that arises from the inconsistency between the estimate produced by the AER's method and inflation expectations in the nominal could be addressed. As is clear from the main text, our position is that the best method currently available is the breakeven approach. Set out in this box are some alternative approaches that could be considered further by the AER and networks in a review of the issue. In presenting these alternatives, we do not submit that any of them are a better alternative to the break-even approach or that they do not suffer from limitations. Rather, the box is presented to advance the AER's consideration of this complex issue. CEG also raise some potentially important issues in terms of how the regulatory regime compensates for deviations between actual inflation and expected inflation at the time of a regulatory determination which should also be considered further.[126]

Some options currently being considered include:

- **Updating the Estimate of Expected Inflation in the AER's PTRM each year for actual inflation –** This would involve replacing the estimate of expected inflation in each year of the access arrangement period with the actual CPI (out-turn inflation) for the relevant year. For example, at the same time the return on debt is updated each year. We understand that this alternative approach has already been proposed by APA in respect of its Roma to Brisbane Access Arrangement Proposal
- **Rolling forward the regulatory asset base in the roll forward model using the same estimate of expected inflation instead of actual inflation** – this would prevent the current mismatch that applies when the estimate of expected inflation used in the AER's PTRM differs from actual inflation used to roll forward the RAB. Under the National Gas Rules there is no limitation to such an approach being used in the roll forward model
- **Derive nominal WACC by estimating the real rate of return directly and adding AER inflation estimate-**this alternative approach was proposed (as an alternative) by AusNet Services transmission in its Revised Regulatory Proposal submitted in September 2016 and a worked example is included in section 7 Supporting Document 16.29.
- **Annual update of the AER's methodology** a further (less desirable than market based approaches) alternative may be for the AER to update its own estimates of expected inflation using RBA short term inflation forecasts for each year of the regulatory period as they become available, rather than relying on the long term RBA target bands. That is, at the same time that the return on debt is updated each year, the RBA's latest statement of monetary policy short term forecasts of inflation for the relevant year would replace in the AER's PTRM the RBA target number used in the 10 year term

None of these approaches are necessarily perfect but we encourage the AER to explore and consult on alternative methods if the break-even approach is not adopted.

3.2. The AER's estimate is inconsistent with inflation expectations and implies negative real returns for bonds which have positive real returns in the market

CEG explain that the expected inflation input to the AER's PTRM determines, in combination with the nominal cost of capital inputs to the AER's PTRM, a real rate of return that is delivered to the regulated entity. The AER's current methodology is to estimate the nominal cost of capital inputs based on:

- Nominal corporate bond yields for the cost of debt; and
- Nominal government bond yields as the risk free rate used to determine the cost of equity.

The key issue is whether the AER's estimate of expected inflation which it uses in its PTRM to make a negative adjustment to the total revenue is consistent with inflation embedded in the nominal WACC. As noted above, the nominal WACC is derived using corporate bond yields for debt and government bond yields for equity. It is logical that the same market data should be used to derive inflation expectations in both places.

As explained above, if the subtraction of expected inflation in the AER's PTRM to avoid the double counting of inflation at the outset of an Access Arrangement Period does not match and is inconsistent with market

[124] See for example *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, p 3-131.

[125] See http://www.aer.gov.au/communication/2017-review-of-expected-inflation

[126] Supporting Document 16.28, section 2

expectations about inflation, then the subtraction from total revenue will be too large (meaning a loss compared to market expectations) or to small (meaning a gain). It is therefore critical that the estimate of expected inflation is consistent with market expectations.

Under normal market conditions, the mid-point of the RBA target range may be a reasonably good proxy of inflation expectations in the market at large; the RBA is generally considered to be a credible monetary authority able to meet its targets under normal market conditions. However, current market conditions are not normal,[127] and Australia is arguably in a "low inflation trap".

As CEG explain, monetary policy loses its power to lift inflation back to target levels when interest rates approach the "zero lower bound".[128] This is because monetary policy's most direct effect on the economy and therefore on inflation is through lower interest rates. However, the RBA cannot set a cash rate below zero (or at least not materially below zero) because at those levels, businesses and households will prefer to hold cash; delivering a zero rate of interest. It follows that the potential for monetary policy to stimulate economic activity diminishes as interest rates approach zero.

There are various pieces of evidence that Australia is presently facing this low inflation trap, including:

- RBA cash rates are at record low levels of 1.5%.[129]
- Average inflation for the past two years has been 1.3%, with the June Qtr 2015 to June Qtr 2016 CPI being 1%.[130].
- In its May 2016 Statement of Monetary policy, the RBA dramatically reduced its range for forecast inflation from 2-3%, to 1.5-2.5%.[131] The RBA's August and November 2016 SoMP forecasts December 2016 CPI to be 1.5% and year ended forecast to December 2018 in the range of 1.5 to 2.5%.[132]
- Break-even inflation estimates are well below AER forecasts even at a horizon of 10 years.
- The RBA itself is forecasting inflation out to December 2018 to be below the bottom of its target range out to the end of the RBA forecast horizon.[133]
- Commentary from the RBA Governor and commentators that Australia faces a "protracted" period of "persistent" low inflation.[134]
- Evidence that in recent years inflation has been below target levels in all developed countries, including Australia.[135] This can be seen from the following chart

Figure 16: One year break-even inflation vs RBA range

[127] CEG: *Measuring Expected Inflation for the PTRM*, June 2015 section 2 and 2.1 and Supporting Document 16.29, Appendix A

[128] Supporting Document 16.29, pp22-24

[129] Supporting Document 16.29, p 22, paragraph 68

[130] ABS, CPI Australia, June 2016, released 27 July 2016

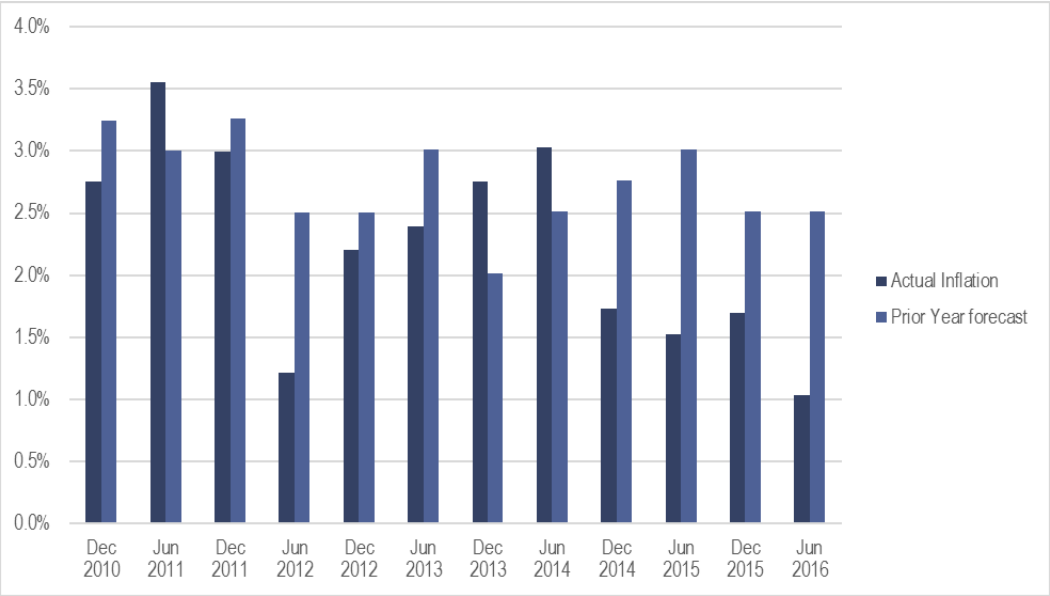
[131] RBA, *Statement of Monetary Policy*, May 2016, table 6.1

[132] RBA, *Statement of Monetary Policy*, August 2016, table 6.1, page 67, *RBA Statement of Monetary policy, November 2016, table 6.1*

[133] Supporting Document 16.29, p18

[134], Supporting Document 16.29, section5.6 and Appendix A

[135] CEG, *Measuring Expected Inflation for the PTRM*, June 2015, paragraphs 27-33.



Source: Supporting Document 16.29, p20

The AER acknowledges that if monetary policy loses its effectiveness to influence economic activity, inflation expectations may deviate from the mid-point of the inflation target range.[136] Given current market conditions inflation should be expected to be below the midpoint of the RBA target range. The AER's approach is not a direct estimate of inflation expectations prevailing at the current time.

It must also be recalled that the AER is seeking to estimate inflation expectations during the access arrangement period, over a 10 year horizon. In this context, the actual inflation environment that persists at present and during the forthcoming averaging period is highly relevant to investors' expectations of inflation over the forthcoming 10-year term. This is explained further in the supplementary note from CEG.[137]

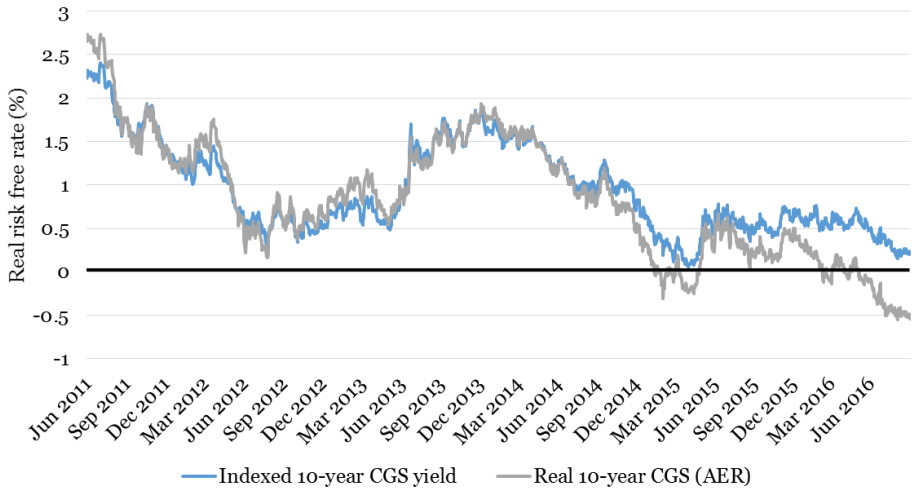
A key issue associated with the AER's inflation estimate in the AER's PTRM is that, if it were to be applied consistently across a decision, it would recently have implied a negative real interest rate on bonds, which is not consistent with the then positive rates actually available on indexed bonds (there is still a difference, but implied real rates are no longer negative), and thus cannot be reflective of market expectations of inflation. The yield on 10-year indexed CGS over the last 5 years is provided in the below figure extracted from the CEG report[138]. It is relevant to compare this yield with the estimated real risk free rate applying the AER's current methodology, which is to deduct its estimate of expected inflation from the yield on 10-year nominal CGS.

[136] AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, July 2016, table 3-19, page 3-132.

[137] Supporting Document 16.28, *section 2.3*

[138] Supporting Document 16.29, section 5.1

Figure 17: Competing 10-year real risk free rate estimates (last 5 years)



Source: Supporting Document 16.29, p14

It can be seen that until late 2014, the AER's methodology implied a real risk free rate that was similar to the yield on indexed CGS. However, since then the AER's estimate of the real risk free rate has fallen significantly and is negative 0.5 percent at the conclusion of the time period shown in

Figure 17. That is, the AER's estimate implies that investors were recently expecting to lend to the Australian government in return for receiving less in purchasing power after 10 years than they invested originally. This is inconsistent with the fact that an indexed CGS was offering guaranteed positive real returns and there is no logical explanation for this.

Given situations like the negative real rates implied by the AER's approach to inflation, and the inconsistency between these implied rates and positive indexed bond rates actually available in the market, it is clear that the AER's approach in its PTRM using RBA mid-rates cannot form a suitable estimate of inflation for consistent use across a regulatory determination, and the result of implying it in one part of the decision (the AER's PTRM) will be to deliver an expectation of under-recovery (given market expectations of inflation) of the RAB and thus an inability to recover efficient costs. In simple terms, the AER's forecast of inflation cannot meet the requirements of NGR 74(2) because it is contradicted by current market information.

This motivates the use of a different approach to the estimation of inflation, and we believe that the most appropriate approach is the breakeven approach. The break-even approach produces inflation forecasts which are based on the same market data and consistent with market expectations which inform the nominal WACC. We now turn to a discussion of this breakeven approach, including the reasons why the AER's criticisms of the approach are unfounded.

3.3. The Breakeven Approach

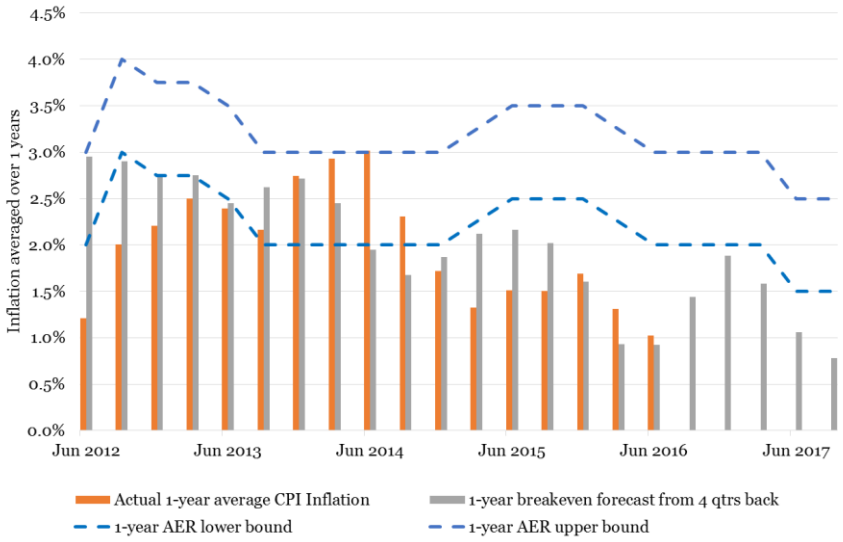
Until 2008 the AER used the break-even approach to expected inflation. This approach measures inflation by reference to the difference between the yields on nominal and real Commonwealth government bonds. After 2008, the AER changed to its current method due to concerns that post the global financial crisis, a scarcity of indexed bonds meant the results from the breakeven approach were not reliable. We agree that during this time, it was appropriate to move to a different methodology.

Equally, we contend that market conditions are now such that the AER's method relying (primarily) on RBA target inflation, in circumstances where current market conditions hamper the effectiveness of monetary policy to achieve those targets, does not represent an appropriate estimate of expected inflation and there should be a change in approach. As noted above, it is bond investors' expectations of inflation which are relevant and break-even inflation provides a measure of those expectations. This section explains the basis for estimating expected inflation using the break-even approach and why the AER's concerns with that approach in recent decisions are unfounded.

If the break-even approach was a very poor predictor of expected inflation, then this ought to give pause before considering it further; particularly if it were markedly worse forecast compared with the RBA target band approach. However, far from being a poor predictor, CEG's report demonstrates that since 2011, break-even inflation estimates have more accurately predicted actual inflation than the AER's approach. CEG show that using a 1-year, 2-year and 3-year break-even inflation rate, break-even inflation rates have typically performed best.[139]

[139] Supporting Document 16.29, section 5.3

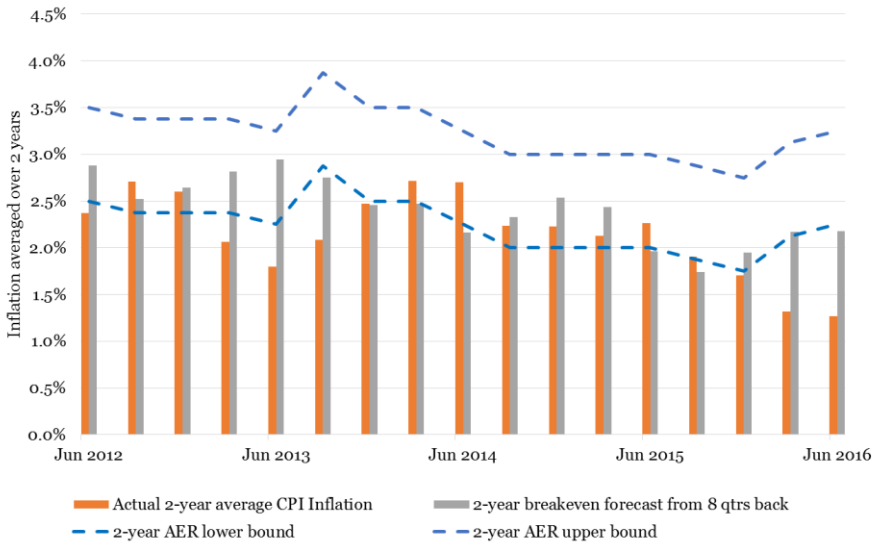
Figure 18: 1 year break-even inflation vs RBA range



Source: Supporting Document 16.29, p19

A similar story exists using 2 year inflation estimates. Once more, break-even inflation has performed materially better than the mid-point of the RBA range for the most recent years:

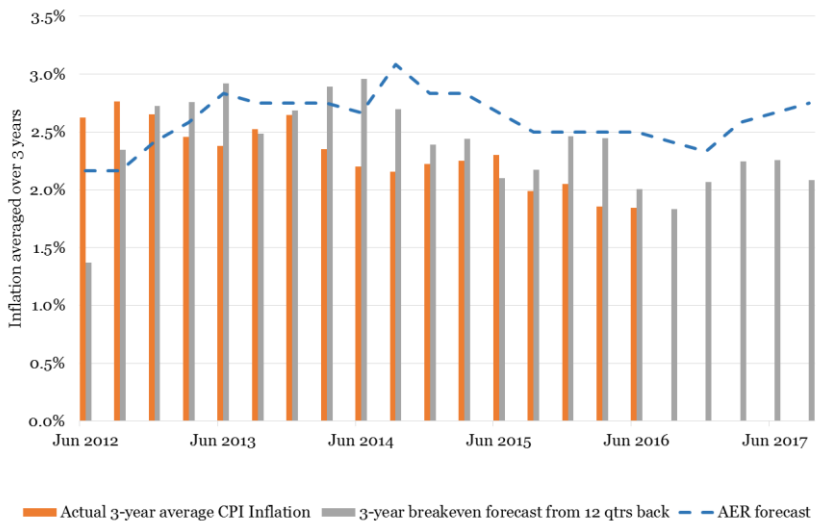
Figure 19: 2 year break-even inflation vs RBA range



Source: Supporting Document 16.29, p21

The same can be seen from the 3 year inflation estimates:

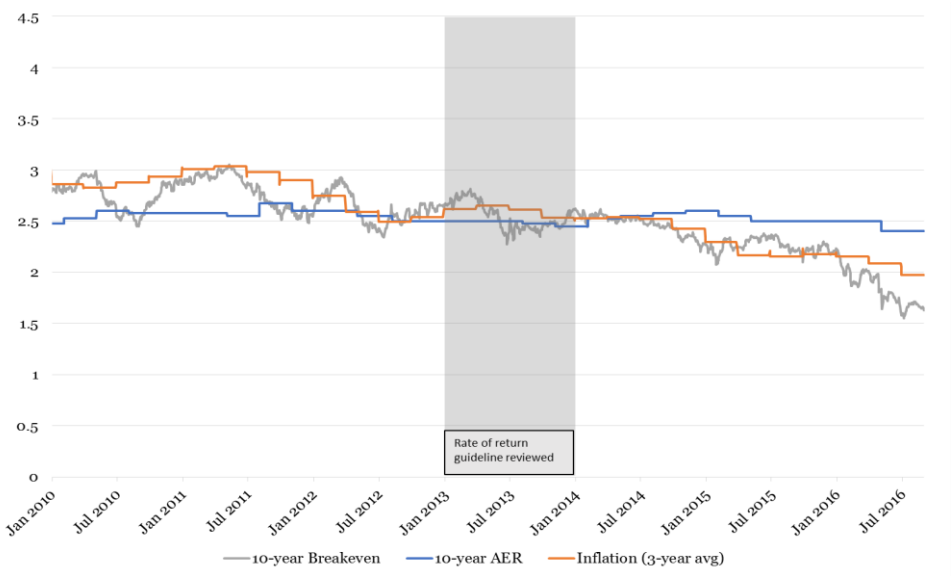
Figure 20: 3 year break-even inflation vs RBA range



Source: Supporting Document 16.29, p22

The breakeven approach also meets the AER's requirement of flexibility and allowing market conditions to be reflected in regulatory outcomes.[140] It arguably performs better than the RBA target-band approach in this respect. CEG has shown in the following chart that break-even inflation has responded quickly to actual inflation falling well below RBA targets from late 2015.[141] By contrast, the AER's measure of inflation does not respond quickly. Over the next five year period, this is likely to lead to an under-recovery of the RAB for service providers, but during the previous period (see Figure 21) it is likely to have led to an over-recovery. For consumers, therefore, prices are more volatile, too high and then too low, than they would be if the breakeven approach were used.

Figure 21: break-even inflation vs AER inflation (10 years) vs actual inflation (1 year) less 2.5%



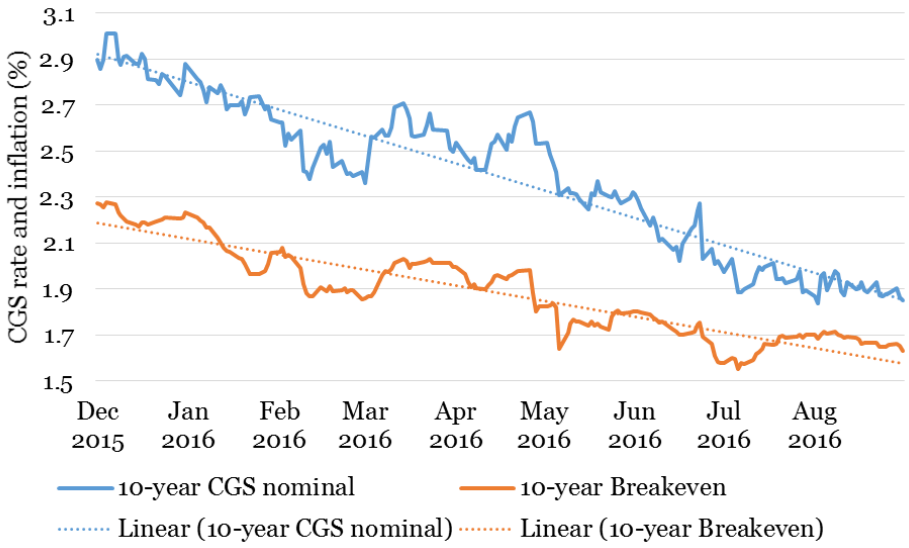
Source: Supporting Document 16.29, p16

Further, CEG's expert opinion is that falls in CGS yields over the previous 12 months have been associated with a similar fall in inflation expectations, rather than falls in real yields. This can be seen from the figure below which shows nominal CGS yields and 10 year breakeven inflation.

[140] AER, *Rate of Return Guidelines*, December 2013, p6

[141] Supporting Document 16.29, section 5.2

Figure 22: 10-year nominal CGS rates and 10-year breakeven inflation



Source: Supporting Document 16.29, p29

If inflation is assumed to have remained constant around 2.5% over the December 2015 to August 2016 period, this would imply that real CGS yields have fallen by the same magnitude as nominal CGS yields and that relative yields have in fact become negative. This is an anomalous result and demonstrates the issues with the AER's estimate.[142]

3.3.1. AER's concerns with the break-even approach

CEG show that most of the problems the AER has suggested exist in respect of the breakeven approach do not withstand closer scrutiny.[143]

Firstly, the AER say that the size and liquidity of the indexed CGS is still limited. Further, increased absolute liquidity in the indexed CGS market does not necessarily imply that this market has become more liquid relative to the nominal CGS market.[144]

However, the smaller size (short supply) of the indexed CGS market was previously attributed as a reason for break-even inflation overstating expected inflation (not understating it). If these 'distortions' still exist then they imply that the actual expected inflation is even lower than the break-even rate.[145]

The AER states that the size and liquidity of the indexed CGS market is still limited referencing a Treasury paper from 2012. The AER references page 7 where the following quote can be found.

> *The use of bond market break-evens is also made somewhat problematic by the limited size and liquidity of the indexed bond market in Australia.*

However, it is clear from the context that this statement applies to the historical data being used in the paper – not necessarily to the data at the time of writing.

Further, since 2012 there has been significant new issues of indexed bonds. For example, the Treasury paper states "In late 2009, however, the AOFM resumed its indexed bond issuance program and the market has since grown to just over $16 billion outstanding. There are currently five indexed bond lines on issue, with maturities ranging from 2015 to 2030."

The AER states "*Liquidity bias can be material and difficult to identify and remove from the breakeven rate—particularly as evidence indicates that it can vary considerably over time*." However, of the two papers that the AER cites one is from 2001 – when the TIPS market was in its infancy (a period when all of the rest of the AER's

[142] Supporting Document 16.29, section 5.7.

[143] See AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, p3133 to 3-136 for the AER's criticisms

[144] AER Draft Decision, AusNet Services at 3-136

[145] Supporting Document 16.29, p39, paragraph 105-106.

cited articles agrees that there was a newness/strangeness/liquidity premium) and the other paper similarly covers the period 1999 to 2008 which include the infancy of the indexed bond market and the GFC.

In relation to CPI swaps as an estimate of expected inflation, Appendix B to the CEG report shows that this measure will tend to be biased upwards to account for risk premiums and capital costs for the banks providing these products. Consistent with that, inflation swap estimates of expected inflation remain above break-even estimates and AusNet Services submits they are not an appropriate basis on which to estimate forecast inflation.

Secondly, the AER has alleged four *potential* aspects of bias in the breakeven approach. The AER relies upon a number of articles in support of its position. CEG has undertaken a review of the literature relied upon by the AER as well as papers not cited by the AER. CEG's literature review shows an overwhelming conclusion that there is no evidence to suggest the potential bias in the breakeven methodology currently exist or that if they exist, they would result in an underestimate of inflation.[146] To the contrary, CEG's opinion is that the overwhelming evidence in the literature is that any bias is likely to be positive such that breakeven inflation overstates expected inflation. In relation to the specific bias referred to by the AER:

- Convexity bias - this is said to exist because of two phenomena. Firstly, it is said that nominal security (bond) yields are more volatile than indexed bond yields, and therefore the difference between the two is not purely the inflation expectation of holders. [147] Secondly, it is said that bond investors are more sensitive to reductions in yield than to increases in yield. Therefore, it is argued, there is a bias which tends to raise nominal bond prices (and so depress their yields), relative to indexed bond prices, narrowing the spread in yields between them and so tending to underestimate the inflation estimate produced by the break-even / methodology. The source the AER cites in support of this potential bias is not an empirical study, but is a brief, high-level Bank of England Quarterly article from 2002. It does not set out any data on which the convexity bias theory might be based and does not attempt to estimate the impact of the convexity bias.[148] CEG note that Grishchenko and Huang (2012) cite literature that puts this bias at less than -1bp.[149]
- Inflation risk premium bias - the AER note this generally results in an overestimate of inflation rather than an underestimate. This is confirmed by CEG's review of the Grishchenko and Huang paper cited by the AER.[150]
- Liquidity premium bias - this is said to exist because nominal bonds have a premium in them for liquidity essentially arising from the fact that indexed bonds are relatively less liquid. The AER contends therefore that the difference between nominal and indexed bonds is not purely based on inflationary expectation.[151] The AER relies on Shen and Corning.[152] CEG find that the article provides little, if any, support for the AER's propositions.[153] in support of the existence of this potential bias. However, that paper is old and relates to the US securities market.
- Inflation Indexation lag bias - this is said to potentially be an underestimate or overestimate and it is potentially small.

Only the convexity and liquidity premium issues are said to result in a potential downward bias of expected inflation forecasts and even if such a downward bias existed, the quantum of any such bias has not been identified by the AER. CEG's review of the literature is more extensive than the AER's and confirms that breakeven inflation is more likely to overestimate expected inflation than under estimate it.[154] As CEG also point out, the AER itself did not make adjustments for any perceived bias when using the breakeven approach to estimate expected inflation prior to late 2008[155] and when it later did adjust for bias, it adopted an estimate of expected inflation that was lower than

[146] Supporting Document 16.29, Section 6. Supporting Document 16.28, section 1, in particular 1.1 and 1.6.

[147] See the AER's explanation in AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, Table 3-20 at 3-155.

[148] Scholtes, C., *On Market-Based Measures of Inflation Expectations*, Bank of England Quarterly Bulletin, Spring 2002, p71, Supporting Document 16.29, 6.1.3.

[149] Supporting Document 16.28 *section 1 and Appendix B*

[150] Supporting Document 16.29, Section 6.2.4, Supporting Document 16.28, section 1 and Appendix B and Grishchenko, O and Huang, JZ, *Inflation Risk Premium: Evidence from the TIPS market*, Finance and Economics Discussion Series Divisions of Research and Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C. 2012-06, 2012

[151] See the AER's explanation in AER, *Draft Decision AusNet Services Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return,* July 2016, Table 3-20 at 3-133.

[152] Supporting Document 16.29, Section 6.2.5 and Shen, P and Corning, J, *Can TIPS Help Identify Long-Term Inflation Expectations?*, Federal Reserve Bank of Kansas City, Economic Review, Fourth Quarter 2001, pp. 61–87.

[153] Supporting Document 16.29, Section 6.2.5.

[154] Supporting Document 16.28*, section 1* - Supporting Submission 16.29, Section 6.3.

[155] Supporting Document 16.28*, section 1.2*

breakeven inflation. That is, consistent with adjusting for an upward bias.[156] CEG also explain that the existence of positive bias is also confirmed by the existence of CPI indexed bonds.[157]

Finally, CEG find that there is clear evidence that the AER's methodology results in an upward biased estimate given that in the current low inflation and low interest rate environment, investor expectations are that there is an asymmetry of risk in inflation being less than the midpoint of the RBA's forecast and target inflation bands over 10 years than exceeding it.[158]

3.4. Summary

The AER's methodology for estimating 10-year inflation results in an estimate that is currently much higher than expectations implied in bond market prices. It has also recently resulted in a significantly negative real risk free rate which is contrary to investors being able to earn a positive guaranteed real return on inflation indexed government bonds. The AER's approach is not a direct measure of inflation expectations, is not a good estimate of the expected inflation in the marketplace and is likely to lead to under-recovery of compensation for inflation.

Break-even inflation is a better estimate of expected inflation and thus a better basis for consistent inflation estimation across the different building blocks of the regulatory decision; particularly the WACC and the AER's PTRM. The AER's methodology assumes that investors expect that inflation will be in the middle of the RBA target range (2.5%) at horizons beyond 2 years. While this may have been a reasonable assumption historically (and may be in future years) it:

- cannot always be presumed to be reasonable; and
- is not a reasonable assumption in current market circumstances.

As CEG's report shows, in current circumstances the AER's estimate of expected inflation, in particular the assumption that investors expect inflation to average 2.5% beyond 2 years, is at odds with all of the available evidence. Namely:

- The AER's estimate of expected inflation recently implied that investors expect a negative real return on the risk free rate. The fact that they could achieve a positive guaranteed real risk free return simply by buying inflation indexed CGS demonstrates this was clearly not the case.
- Break-even inflation estimates (roughly 1.7%) are well below AER forecasts (2.4%) even at a horizon of 10 years. The RBA itself is forecasting inflation out to December 2018 to be below the bottom of its target range out to the end of the RBA forecast horizon.
- In the current monetary policy environment, where policy rates are close to the zero lower bound, the greatest risks to inflation are to the downside. This risk is not theoretical, all Western developed countries currently have monetary policy settings with policy rates close to zero and all are currently undershooting inflation targets.
- Expected inflation is the actuarially expected inflation (average of all possible inflation outcomes weighted by their probability). So, even if investors perceived that the most likely expected inflation was 2.5%, expected inflation would be below this once the greater downside risks were appropriately weighted.
- Break-even inflation forecasts have been more reliable than the AER's forecasting methodology in recent years. Break-even inflation forecasts accurately predicted the recent fall in inflation below the bottom of the RBA's target range while the AER's methodology did not. They have also responded more quickly to recent changes in actual inflation than the AER approach.
- An expectation that Australian inflation will jump to 2.5% at the end of the RBA forecast period is inconsistent with the fact that Australian (and global) inflation rates have been persistently below target for many years, with instances of deflation in Australia (March quarter CPI), US, Japan, the UK and the Eurozone.
- Falling 10-year break-even inflation is a statistically significant explanatory variable when regressed against nominal CGS yields – suggesting that most of the recent fall in nominal CGS yields is due to falling inflation expectations (not falling required real returns as implicitly assumed by the AER).

[156] Supporting Document 16.28*section 1.3*

[157] Supporting Document 16.28– *section 1.5*

[158] Supporting Document 16.28*section 1.6*

Finally, CEG has shown that the AER's perceived limitations of the breakeven approach and its finding that it is not satisfied it would improve its estimate of expected inflation are unfounded and incorrect.

Based upon the considerations above, we have used breakeven inflation being the only direct and consistent measure of inflation expectations in the market, to estimate inflation for the forthcoming AA period. Based upon data on straddling indexed and non-indexed CGS instruments and the Fisher equation,[159] and using the indicative period of the 8th to the 19th of August 2016 (to be updated for the Final Decision) this gives a ten-year inflation estimate of 1.68 percent, which we submit is the best estimate of expected inflation possible in the circumstances.

[159] The ERA uses a breakeven inflation approach, and we have simply adapted the ERA's Fisher equation spreadsheet model to different dates. This spreadsheet model is available upon request.

4. Inter-relationships

NGR 87(5) requires that the cost of debt and equity be calculated in a consistent manner. This requirement extends to the estimates themselves and to the ARORO; debt and equity must be consistent with each other and with the ARORO. We approach this inter-relationship in the following way:

- We consider the relevant degree of risk faced by the service provider, for both debt and equity, to be that faced by entities operating in a workably competitive marketplace, providing services in Australia similar to gas distribution is respect of their degree of risk for investors with a similar time-horizon. Accordingly, we adopt a term of ten years for both debt and equity.
- We consider the efficient cost of financing for the BEE facing this level of risk for both debt and equity against the outcomes in a workably competitive market for facing a similar degree of risk. We use the workably competitive market as a benchmark because it is in just such a market that costs will be driven down to their efficient levels.
- Where a requirement exists to estimate parameters in a model for the cost of equity or the cost of debt, we consider data from comparators in a workably competitive market that would face a similar degree of risk to the BEE. Specifically, in respect of the cost of debt, we consider indices based upon a similar credit rating (the BBB band), whilst in the cost of equity, we inform our estimates not simply from a particular model, but also by considering the actual returns earned by firms with the same level of systematic risk as the BEE (the same beta) over a sufficiently long time horizon to iron out idiosyncratic market events such as the GFC. This allows us to ensure that the return on equity is not adversely affected by any faults which models might have which would give outcomes different from those faced in the competitive market for funds, where models are merely one means by which investors form expectations of returns.
- We make use of gearing levels of 60 percent which is consistent with the gearing levels of firms in workably competitive markets providing similar services with similar levels of risk to the BEE. In fact, our gearing level assumption is likely to be too high compared to this benchmark, resulting in a relatively low WACC estimate.[160]

In addition to this framework for considering inter-relationships, which has informed our development of WACC estimates, there are two specific inter-relationships that we consider explicitly; the relationship between gamma and the MRP and the relationship between inflation in the AER's PTRM model and inflation embedded in the WACC estimate.

Turning to the first of these, there is a recognised interrelationship between the return on equity and the value of imputation credits. Some estimates of the MRP need to be grossed up for the value of imputation credits and a higher theta estimate implies a higher required return on equity. This interrelationship is explicitly recognised in NGR 87(4).

Our proposed MRP of 7.5% takes into account this interrelationship. Frontier Economics conclude that the current evidence supports an estimate of at least 7.5% based on calculations of the MRP which assume a theta value of 0.35 as proposed by us.[161]

If the AER were to adopt an estimate of theta to 0.35, as we propose, while maintaining its current approach to estimating the MRP (which we submit to be incorrect), no adjustment to the AER's MRP estimate of 6.5% would be necessary. This is because the historic excess returns estimates on which the AER primarily relies for its MRP are relatively insensitive to the estimate of theta.[162]

A second consideration is the inter-relationship between the overall rate of return (that is, debt and equity) and the inflation forecast; there is an interrelationship between:

1. The method for and estimate of expected inflation and the amount that is deducted from the annual revenue requirement. As explained above, if actual inflation turns out to be materially lower than had been forecast, the

[160] Frontier Economics analyses average gearing ratios across a sample of listed Australian infrastructure firms, including both regulated and unregulated businesses. Frontier Notes that, while the mean gearing ratio across this sample is slightly below 60%, this is almost entirely due to the very low leverage levels of two entities – Aurizon (which began its life as a public company with very little debt and has stated its intention to increase leverage over time) and Qube (which is in the process of seeking to acquire Asciano and has maintained low leverage to preserve borrowing capacity). Refer to: Frontier Economics, *Estimating the Equity Beta for the Benchmark Efficient Entity*, January 2016, p 21, submitted as part of the United Energy Distribution regulatory process.

[161] Supporting Submission 16.4, section 8.6

[162] Supporting Submission 16.4, section 8.7.

deduction from the annual revenue requirement will be too large. This will lead to under-recovery of costs over the long-term.

2. The allowed rate of return and the estimate of expected inflation. The deduction from the annual revenue requirement for indexation is needed to avoid a “double counting” of inflation. This results from the application of a nominal rate of return to an indexed capital base. It is therefore important that the forecast of inflation that is being deducted from the annual revenue requirement is consistent with expectations which are built in to the nominal rate of return.

Our proposal to adopt a market-based estimate of expected inflation ensures consistency with how the allowed rate of return is estimated, and in current market conditions, will provide for a more accurate forecast of inflation expectations.

5. Cost of debt and equity raising

We adopt the same approach to debt and equity raising costs as accepted by the AER in respect of United Energy Distribution. That is:

- We accept the use of net capital expenditure and the use of the framework outlined in the UED Final Decision.[163]
- We accept cost of debt raising based upon transaction costs (that is, not including liquidity or three month-ahead financing costs) using the Incenta method.[164]

The equity raising costs associated with this measure above are $2.3 million. As per the MG AAR Pricing Model, assessed equity-raising costs are treated as forecast capital expenditure and added to the RAB, to be depreciated over 35 years. We also propose to undertake annual updates to the calculation of equity raising costs in each successive year of the forthcoming regulatory period. The Post-Tax Revenue Model is configured to perform revenue smoothing calculations and equity raising cost updates manually via buttons that will trigger built in macros. As the AER has reported, the estimate of equity raising costs is dependent on the smoothed revenue (or expected revenue) profile, but, in turn, the expected revenue is dependent on the estimate of equity raising costs.[165] This is because a change in the equity raising cost will change the annual revenue requirement (ARR), and expected revenue, which, in turn, will alter the equity raising cost. Therefore, equity raising costs will be iteratively updated while smoothing takes place.

For the cost of debt raising, the transaction cost is 9.1 bps per annum on an assumed debt portfolio of between $715 and $730 million (that is, 60 percent of the RAB). This gives rise to the following debt-raising costs, as part of operating costs, over the course of the forthcoming AA period.

Table 9: Debt raising costs per annum ($M, Real 2017)

	2018	2019	2020	2021	2022
Allowance	0.65	0.68	0.69	0.71	0.73

Source: Multinet calculations

As a final point, although we have accepted the AER's approach to estimating debt and equity raising costs, we believe that these approaches to determining debt and equity raising costs should be properly considered as part of the next Rate of Return or Expenditure Forecast Assessment Guideline review.

[163] See AER, *Final Decision United Energy Distribution – Attachment 3 Rate of Return,* May 2016, pp 3-383 to 3-384.

[164] Incenta Economic Consultants, *Debt Raising Transaction Costs – United Energy*, April 2015. See also AER, ibid, pp 3-384 to 3-385.

[165] AER, *Final decision, Amendment, Electricity Distribution Network Service Providers, Post-Tax Revenue Model Handbook*, 29 January 2015, page 28

6. Supporting documentation

The following documents support our forecast for the forthcoming access arrangement period.

	Document name
16.1	Rate of Return Overview Document
16.1.1	MG letter to AER re debt and equity averaging periods - CONFIDENTIAL
16.1.2	MG letter to AER re debt and equity averaging periods - PUBLIC
16.2	CEG, *Replication and Extension of Henry's Beta Analysis,* November 2016
16.3	HoustonKemp, *The Cost of Equity and the Low Beta Bias*, November 2016
16.4	Frontier, *The Market Risk Premium: A report prepared for AGN, Multinet Gas, Ausnet Transmission and Ausnet Gas*, September 2016
16.5	AER, Rate of Return Guidelines, December 2013
16.6	Partington, G and Satchell, S, Report To The ERA: The Cost Of Equity And Asset Pricing Models, May 2016
16.7	Henry, *Estimating Beta: an Update*, April 2014
16.8	*ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 –Rate of Return*, June 30 2016
16.9	AER, *Rate of Return Guidelines: Explanatory Statement – (and Appendices,)* December 2013
16.10	Handley, J., *Peer review of draft report by Davis on the cost of equity*, University of Melbourne, January 2011
16.11	NERA, *Empirical Performance of Sharpe-Lintner and Black CAPMs: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Ergon Energy, Powercor, SA Power Networks, and United Energy,* February 2015
16.12	Partington, G. and S. Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016
16.13	Partington, G. and S. Satchell, *Report to the AER: Analysis of criticism of 2015 determinations*, October 2015
16.14	AER, *Draft decision AusNet Services transmission determination 2017-18 to 2021-22: Attachment 3 – Rate of return*, July 2016
16.15	Muijsson, C., E. Fishwick and S. Satchell, *The low beta anomaly and interest rates*, in J. Emmanuel (ed.), Risk-based and factor investing, Elsevier, 2016
16.16	DBP, *2016 – 2020 Regulatory Period, Rate of Return Supporting Submission: 12*, December 2014
16.17	DBP, *Model Adequacy Test Background: Submission 12 Appendix D*, December 2014
16.18	Gibbons, M., Ross, S. and Shanken, J. (1989), 'A Test of the Efficiency of a Given Portfolio', *Econometrica*, 12, 497-507

	Document name
16.19	McKenzie, M and Partington, G, *Risk, Asset Pricing Models and WACC: Report to the AER*, June 2013
16.20	SFG, Cost of Equity in the Black Capital Asset Pricing Model, May 2014
16.21	ESQUANT, *Estimating the Market Risk Premium: DBP Submission 12 Appendix E,* December 2014, available from https://www.erawa.com.au/gas/gas-access/dampier-to-bunbury-natural-gas-pipeline/access-arrangements/proposed-access-arrangement-for-period-2016-2020
16.22	Deloitte, CFO Survey: Looking beyond the clouds Q3 2014, available from https://www2.deloitte.com/au/en/pages/media-releases/articles/cfos-looking-beyond-clouds-161014.html
16.23	CEG, *Criteria for Assessing Fair Value Curves: An update,* September 2016
16.24	Hong, H. and D.A. Sraer, *Speculative betas*, Journal of Finance, 2016, pages 2095-2144
16.25	UKRN, Market Returns and Cost of Capital: A Refresh, 11 February 2015, available from http://www.ukrn.org.uk/wp-content/uploads/2016/07/2015DecMarketReturnsAndCoC-ARefresh.pdf
16.26	Concentric Energy Advisors, *Authorized Return on Equity for Canadian and U.S. Gas and Electric Utilities Volume III*, May 1, 2015, available from http://www.cga.ca/wp-content/uploads/2015/07/2015-Authorized-Return-on-Equity-Newsletter.pdf
16.27	AER, *JGN Draft Decision, Attachment 3: Rate of Return*, November 2014
16.28	CEG, Inflation Compensation: Addendum to September report, December 2016
16.29	CEG: *Best estimate of expected inflation,* September 2016
16.30	CEG, Measuring Expected Inflation for the PTRM June 2015
16.31	CEG, Measuring Expected Inflation for the PTRM, January 2016
16.32	ABS, CPI Australia, June 2016, released 27 July 2016
16.33	Scholtes, C., *'On market-based measures of inflation expectations'*, Bank of England Quarterly Bulletin, Spring 2002, p71
16.34	Grishchenko, O and Huang, JZ, *Inflation Risk Premium: Evidence from the TIPS market*, Finance and Economics Discussion Series Divisions of Research and Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C. 2012-06, 2012
16.35	Shen, P and Corning, J, *Can TIPS Help Identify Long-Term Inflation Expectations?*, Federal Reserve Bank of Kansas City, Economic Review, Fourth Quarter 2001, pp. 61–87.
16.36	AER, *Final Decision United Energy Distribution – Attachment 3 Rate of Return,* May 2016
16.37	Incenta Economic Consultants, *Debt Raising Transaction Costs – United Energy*, April 2015
16.38	AER, *Final decision, Amendment, Electricity distribution network service providers, Post-tax revenue model handbook*, 29 January 2015

	Document name
16.39	RBA, *Statement of Monetary Policy*, May 2016
16.40	RBA, *Statement of Monetary Policy*, August 2016
16.41	Frontier Economics, *Estimating the equity beta for the benchmark efficient entity*, January 2016
16.42	AER, *Draft Decision Powerlink Transmission Determination 2017-18 to 2021-22: Attachment 3 – Rate of Return*, September 2016