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23 September 2013

Dr Duc Vo
Rate of Return Guidelines Review
Economic Regulation Authority
Level 4, Albert Facey House
469 Wellington Street
PERTH WA 6000

Dear Duc

DBP DRAFT RATE OF RETURN GUIDELINES REVIEW SUBMISSION

Please find enclosed DBP's submission in response to the Draft Rate of Return Guidelines (DG) and the accompanying Explanatory Statement (ES). Thank you for providing us with a couple of extra days to make our submission.

There are two key, inter-related points made in our submission. The first is that the DG do not describe how the proposed methodologies meet the ARORO. As we have pointed out in our submission, the AEMC (in its final determination that led to the implementation of new Rule 87), concluded that the adoption of prior approaches by regulators, which involve a prescriptive and formulaic approach, would not meet the objectives of the National Gas Law and that there needed to be a greater focus on assessing how the overall rate of return objective is met when assessing the rate of return. The AEMC concluded that this is to be done not just when looking at each rate of return parameter but also when assessing the overall rate of return – effectively a "circling back" is required.

However, there are several examples in both the DG and the ES where the ERA has:

1. simply replicated its past prescriptive and formulaic approaches and either not assessed whether they will seek to meet the ARORO, the NGO and the RPPs or assessed them against the ERA's own criteria without undertaking an assessment of whether the ERA's own criteria will seek to meet the ARORO, the NGO and the RPPs; and

2. not demonstrated how, when the methodologies and approaches in the DG are applied, they will result in the determination of an overall rate of return that meets the ARORO.

The second key point is that the ERA's decision to not use a wider range of evidence (which is contrary to what the AER has done in its draft guidelines) will result in outcomes which are not meeting the ARORO. This is best highlighted in the ERA's approach to the estimation of the equity beta. As a result it also highlights problems with the continued reliance on solely the CAPM to estimate the rate of return on equity.

By simply changing the day of the week a weekly beta is estimated, or choosing a monthly beta estimated on a certain day of the month, the range of potential beta outcomes is much wider and higher than the ERA (who only looked at weekly betas on one day of the week) suggests in the Draft Guidelines. There is nothing within the CAPM framework that allows a regulator to point to a particular beta amongst those estimated on different days of the week or month and suggest that that beta is correct whilst the others are not.

Moreover, there is nothing in the DG to indicate that adopting data from a particular day in the week and using a weekly beta data set as the basis for estimating the beta (as opposed to monthly data) best achieves the ARORO. In fact, because of the significant broadening of the range of results that occurs by making slight changes in the assumptions, a reasonable person would assume that the ARORO is not achieved by following the ERA's approach.

The problem however can be overcome by stepping outside the CAPM framework and through the use of other models and/or data from other jurisdictions to indicate which beta provides a return on equity that meets the ARORO, as the NGR requires.

This more structured framework for considering a wider range of evidence is what we believe was intended by the AEMC.

The likely consequence of the DG being replicated in the final guidelines is that it is likely to create uncertainty and delay - service providers are likely to submit access arrangement proposals that are at significant variance with the guidelines but are demonstrating rate of return proposals that meet the ARORO. This would be an unfortunate outcome as it is not what was intended by the AEMC in requiring guidelines to be developed as part of the new Rule 87.

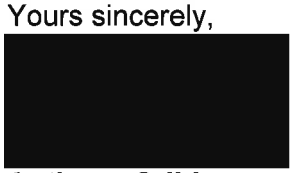
We consider that it would be much more efficient if the ERA gave recognition to the issues above (and the other issues raised in our submission) before the Access Arrangement revision process begins next year, and amended its Draft Guidelines to avoid these issues being expensively challenged through the Tribunal process.

Given the matters raised in this letter and in the accompanying submission and the importance of the guidelines to service providers, we would like to work with the ERA to ensure that the final guidelines deliver greater certainty to stakeholders. In our submission we have expressed our preparedness to work with the ERA on certain key issues perhaps in a series of targeted workshops. We also suggest that there would be merit in having the ERA's econometric modeling work peer reviewed by an independent professional econometrician.

We look forward to final guidelines being issued that meet the requirements of the NGR, and address the issues raised above, and in our submission.

As a final matter, please note that the last attachment to our submission contains information which is confidential and commercially sensitive to DBP. Accordingly, it is subject to the confidentiality claims attached to this letter. Other than this confidential attachment, we do not object to the submission being placed on the ERA's public register.

Yours sincerely,



Anthony Cribb
General Manager Corporate Services
Company Secretary

Confidentiality requirements

1.1. The confidential attachment to this submission (being the last attachment to the submission) is provided to the Regulator to assist it in its assessment of its proposed Draft Rate of Return Guidelines.

1.2. Information contained in the confidential attachment which is provided to the Regulator as part of the submission, is confidential and commercially sensitive.

1.3. It is provided to the Regulator on the following conditions:

(a) it is to be used by the Regulator solely for the purposes of assessing its proposed Draft Rate of Return Guidelines;

(b) it is not to be disclosed to any person other than the following without Operator's prior written approval:

(i) those staff of the Regulator who are involved in assisting the Regulator in its assessment process; and

(ii) those of the Regulator's consultants who are involved in assisting the Regulator in its assessment process and who have appropriate confidentiality undertakings in place.

Attachment 1: DBP's Submission to the Draft Rate of Return Guidelines

ERA Draft Rate of Return Guidelines:

DBP Response

Date Submitted: 23 September 2013

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CEG BETA STUDY

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DBP CONFIDENTIAL ATTACHMENT

1. INTRODUCTION

1.1. This paper outlines DBP's response to the Economic Regulation Authority's (ERA's) recent Draft Rate of Return Guidelines (DG), incorporating its Explanatory Statement (ES). It is structured as follows:

(a) Section Two deals with a number of overarching issues relevant to all of the DS and ES.

(b) Section Three responds to the parts of the DG and ES that deal specifically with incentive regulation.

(c) Section Four responds to matters raised in the cost of equity sections of the DG and ES.

(d) Section Five responds to matters raised in the cost of Debt sections of the DG and ES.

(e) Finally, Section Six responds to matters raised in the Gamma sections of the DG and ES.

1.2. A series of appendices contain reports from expert consultants who have provided particular pieces of technical advice to support various points raised by us in this paper.

1.3. There are aspects of the ES and DG which represent areas of alignment between the ERA and DBP. For example:

(a) The ERA has introduced the possibility of what the US Federal Energy Regulatory Commission calls "risk matching" to the process of establishing the Benchmark Efficient Entity, and have not sought to have a single benchmark across all energy firms.

(b) The ERA has allowed a wider range of debt costs for benchmark entities.

(c) By maintaining its support for an on-the-day approach to debt estimation, the ERA has provided an opportunity for regulated firms to make use of a variety of approaches for estimating the cost of debt.

(d) The ERA has allowed for more sophisticated techniques to be used in the estimation of gamma, in line with best practice.

1.4. However, despite these points of agreement, we believe there is a need for substantial revision of the Draft Guidelines in order that they might meet the requirements of the new Rule 87 of the National Gas Rules (NGR). In particular, it is DBP's view that:

(a) The DG does not explain how the application of the various rate of return models and methodologies that are in the DG are proposed to result in the determination of a rate of return in a way that is consistent with the allowed rate of return objective (ARORO) (as required by Rule 87(14)).

(b) Some of the methodologies and models included in the DG and ES, and the results that are likely from applying them, may well not result in outcomes that are consistent with the ARORO or the National Gas Objective (NGO) and the Revenue and Pricing Principles (RPPs) of the NGL.

(c) Simply replicating the approaches that had been used by regulators under the old Rule 87 ("old Rule 87 approaches") in determining both key aspects of the rate of

return calculation and the overall rate of return itself does not meet the requirements of the new Rule 87, the NGO and RPPs.

(d) Using criteria the ERA has assessed against the NGR as the deciding factor in respect of methodologies is, we believe, insufficient. As Section 87(14) of the NGR makes clear, there is a need for direct assessment of the methodologies against the ARORO.

1.5. In forming this view, DBP wishes to draw the ERA to two important parts of the reasoning of the AEMC in its final determination on the Rule 87 rule change. Firstly, the AEMC concluded in its final determination (AEMC, 2012, p42) that:

(a) While there was considerable flexibility afforded to regulators in determining rate of return under the old Rule 87, they had adopted a prescriptive approach which involved reducing the range of information that could be used in estimating the rate of return.

(b) This prescriptive approach led to the adoption of relatively formulaic approaches to determining the rate of return rather than focusing on the overall estimate.

(c) Such approaches would not be likely to deliver outcomes that meet the NGO and RPP.

1.6. Since the ERA has made almost no changes at all to its pre-existing approaches, and since the AEMC has already ruled that these do not meet the NGO and RPP, it may be concluded that the DG does not either. This is a key reason that we believe it requires substantial revision for the Final Guidelines.

1.7. Secondly, the second part of the AEMC's final determination reasoning relates to the roles of the ARORO and the other relevant factors that the regulator must consider and have regard to in the determination of the rate of return under the new Rule 87. In this regard, the AEMC made two important points:

(a) "While the regulator may choose to determine the rate of return by estimating other values to contribute to the allowed rate of return, the [AEMC] considers that assurance that the [ARORO] is met can only be gained by considering whether the overall rate of return arrived at meets the stated objective."[1]

(b) The ARORO "should indicate to the regulator how the [other] factors should influence its decision. The regulator should not assume that it may consider the factors (or other relevant provisions) and that this will of itself mean that the objective has been achieved. The overriding consideration for the regulator is the objective."[2]

1.8. Interestingly, the AER has acknowledged these issues in its draft guidelines determination (AER ES, p17).

1.9. However, there are several examples in both the DG and the ES where the ERA has simply replicated its past prescriptive and formulaic approaches and either:

(a) Not assessed whether they will seek to meet the ARORO, the NGO and the RPPs.

[1] Australian Energy Market Commission Final Rule Determination - National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012 and National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012, 29 November 2012, page 38 (AEMC 2012),

[2] AEMC (2012), p 37

(b) Assessed them against criteria which have not themselves been assessed by the ERA as being consistent with the NGR, removing even the indirect linkage between methodologies and the ARORO.

1.10. These examples will be identified in this paper.

1.11. It is also not apparent that the ERA has demonstrated how, when the methodologies and approaches in the DG are applied, they will result in the determination of an overall rate of return that meets the ARORO. It is also not apparent to DBP how we could show that our own access arrangement proposal would meet the ARORO, and thus comply with the NGR, if it followed the DG. We understand other regulated businesses have expressed similar concerns.

1.12. In addition to concerns about the how the proposed methodologies meet the ARORO and NGR, there is the more practical issue of how workable the Guidelines will be, and the extent to which they provide scope for regulatory gaming. This pertains particularly to beta; the narrow, formulaic approach adopted by the ERA, combined with its rejection of data and methodologies even as a cross-check to a CAPM estimation means that regulated firms can game the ERA's approach by choosing the time period, frequency and estimation day to manufacture a high beta which cannot be shown to be inconsistent with the ARORO unless one steps outside the CAPM framework.

1.13. Thus, we perceive two problems will arise if the DG is replicated in final guidelines and implemented in access arrangement proposals (noting that three such proposals fall due for submission to the ERA in the next 18 months):

(a) Firstly, there will be challenges on many aspects of the guidelines on the grounds that they have not met the ARORO.

(b) Secondly, regulatory gaming on beta will force the ERA to move outside its preferred framework outlined in the DG to allow it to distinguish between genuine and ambit claims on the part of regulated firms.

1.14. The net result of this may well be a regulatory regime which more properly meets the requirements of the NGR, but the process is likely to involve uncertainty and delay. This is not what was intended by the AEMC in making the new Rule 87. While we acknowledge that the guidelines are not binding, the AEMC's stated reason for giving them this status, was to allow for changes in the evidence and circumstances, between when a guideline was finalized and when an access arrangement was proposed, to be reflected in the access arrangement proposal.[3]

1.15. This paper also outlines issues with the empirical estimation processes undertaken by the ERA in relation to a number of the elements used to estimate the rate of return. These issues can be categorized as follows:

(a) Errors in the analysis; some of which we highlight here and some of which have been highlighted in submissions made by others (which we will refer to in this paper).

(b) There doesn't appear to have been adequate sensitivity testing of the approaches used for key elements. Some of the analysis appears to be very sensitive to small changes in inputs – which results in significant ranges in the values for these elements. This is particularly pertinent in respect of the ERA's approach to estimating beta estimates. We will outline examples of this in this paper.

[3] AEMC(2012), p 46

1.16. To address these issues, we encourage the ERA to undertake at least the following before the final guidelines are released:

(a) Work with stakeholders (through workshops and the like) to undertake more fulsome sensitivity testing; and

(b) Undertake an independent peer review by a professional econometrician for all of the ERA's empirical work.

1.17. Furthermore, given the importance of the final guidelines to the credit-worthiness (and thus cost of debt) of service providers like DBP - even before the next revisions to the access arrangement are due to take effect - and therefore also to the incentives to invest, we encourage the ERA to ensure that the final guidelines:

(a) contain adequate sensitivity testing of the approaches the ERA intends to use;

(b) include approaches which we have confidence, if applied, should result in a rate of return that meets the ARORO; and

(c) demonstrate very clearly how both the approaches and the overall rate of return that results from the adoption of these approaches are likely to meet the ARORO, the NGP and the RPPs.

2. OVERARCHING ISSUES

2.1. This section covers some overarching issues which apply to the ERA's approaches to both rate of return on equity and on debt. We address seven key issues:

(a) The fact that the guidelines ought to guide stakeholders in interpreting the ERA's thinking.

(b) The degree to which the DG meets the requirements of the National Gas Rules (NGR); incorporating comments on the ERA's fulfillment of the requirement in the NGR to demonstrate how each element of the Draft Guidelines meets the Allowed Rate of Return Objective (ARORO).

(c) The need for a specific consideration of the interactions between debt and equity costs to ensure consistency.

(d) The ERA's use of criteria, and its place under the NGR.

(e) The construction of the Benchmark Efficient Entity (BEE) and the data used to inform it.

(f) Risk and the meaning of the term "similar" in the ARORO.

(g) The problems associated with the ERA's NPV=0 criteria.

2.2. We address each of these below.

Guidelines should guide

2.3. DBP notes that Rule 87(14) specifies the content of the rate of return guidelines. While this rule requires that the ERA set out its methodologies for estimating the return on debt and equity (and gamma), outline how each meets the ARORO and set out the estimation methods, financial models, market data and other evidence it intends to take into account, further guidance can be found from the AEMC's final determination as to what should be included in the guidelines. There, the AEMC states that the guidelines should have "*as much detail as possible….to provide stakeholders with an ability to make a good estimate of the rate of return for a particular business at particular points in time*."[4]

2.4. So, it is clear that the AEMC intended the guidelines to be a detailed, coherent, readable account which explains the ERA's thinking for interested stakeholders such that they can form a view as to likely regulatory outcomes.

2.5. In some aspects, the DG is quite clear; it is clear, for example, that the ERA intends to use a gearing of 60 percent, a gamma established via the dividend drop-off method (which is likely to be between 0.25 and 0.39) and a risk free rate based (albeit erroneously) on the prevailing rate for a five-year Commonwealth Government Security.

2.6. However, elsewhere, the ERA's approach is not as clear and does not enable us to "make a good estimate of the rate of return for a particular business at particular points in time". For example, it is not clear what bonds will be used to price debt (or even from the part of the economy these bonds will be sourced), and on beta, we are only informed that the ERA "*..considers that its 2013 study, as reported in the companion (ES), satisfies its criteria for choice of methodology for the equity beta"* (DG para 82). It is not clear whether the methodology in the 2013 study will be the sole methodology the ERA proposes to use to estimate the equity beta.

[4] AEMC (2012), p 57

2.7. It also does not explain how the ERA is taking account of the inter-relationships between the financial parameters relevant to the cost of debt and equity (as per the requirements of Rule 87(5)(c)).[5]

2.8. Most importantly, the DG contains no indication of how all of the various estimates will be tied together (the discussion on the use of point estimates, which shows only how they will be summed, notwithstanding) to result in a rate of return that meets the ARORO nor is there any indication of what cross checks will be used to have confidence that the overall rate of return will meet the ARORO. This is not merely a conceptual or theoretical issue; it has real, practical implications for the workability of the ERA's proposed approach, as we highlight in our discussion on beta below.

2.9. We note that the AER's draft guidelines appear to be much closer to containing the level of information that was envisaged by the AEMC, at least in so far as the issues of the criteria the regulator plans to use when exercising its judgment, and how it is going to use and assess various different sources of information to arrive at an outcome which it believes will meet the ARORO are concerned. While we do not agree with everything the AER has said in preparing its map, it provides a degree of clarity and transparency which is absent in the ERA's DG . We look forward to the ERA, in its Final Guidelines, providing a similarly clear framework which shows how it proposes to combine the various elements of debt and equity costs into a final rate of return, and how it will ensure they all meet the ARORO.

Meeting the NGR and ARORO

2.10. A key requirement of the Guidelines is that they show how the methodologies proposed by the ERA meets the ARORO; see Rule 87(14) of the NGR.

2.11. As outlined earlier in this paper, in the AEMC's final determination, two important points were made as to the role of the ARORO, in particular its relationship with the other factors and criteria to be considered and applied by the regulator:

(a) "While the regulator may choose to determine the rate of return by estimating other values to contribute to the allowed rate of return, the [AEMC] considers that assurance that the [ARORO] is met can only be gained by considering whether the overall rate of return arrived at meets the stated objective."[6]

(b) The ARORO "should indicate to the regulator how the [other] factors should influence its decision. The regulator should not assume that it may consider the factors (or other relevant provisions) and that this will of itself mean that the objective has been achieved. The overriding consideration for the regulator is the objective."[7]

2.12. While the DG contains certain introductory statements about efficiency and incentives and how important both of these are for effective regulation, there is very little said about how the ERA's methodologies actually meet the ARORO.

2.13. Instead, the ERA has developed a set of criteria that it believes are relevant to assessing methodologies and approaches (see discussion below) and applied these criteria in

[5] Moreover, as discussed in Section 5 failure to do so in the ES has resulted in decisions on credit ratings which do not match the beta it has calculated.
[6] AEMC (2012), p 38
[7] AEMC (2012), p 37

deciding which methodologies and approaches to adopt. There is no direct link between the methodologies and the ARORO.

2.14. We would have expected, and welcomed, the following in the DG and ES:

(a) A section that seeks to explain how the ERA's own criteria meet the ARORO;

(b) Some concluding paragraph or discussion, in every chapter of the DG and ES, which specifically references how the particular conclusion of the ERA meets the ARORO; and

(c) A section that seeks to explain how, when the methodologies and approaches in the DG are applied, they will result in the determination of an overall rate of return that meets the ARORO.

2.15. Until there is such clarity in the Guidelines we, and indeed any other stakeholder, have little clarity on this key question, which influences how we are able to effectively develop our Access Arrangement proposals.

2.16. Despite this lack of clarity, our initial assessment is that the DG are yet to contain methodologies, models and approaches which, when applied, will be likely to result in a determination of a rate of return that is consistent with and which meets the ARORO. This is detailed in various sections of our submission below, and also in both the APA and ATCO submissions, which we endorse in this regard.

2.17. As outlined in the introduction, one of the likely consequences of the above, if it is replicated in the final guidelines, is that service providers will be forced to choose between submitting revised access arrangement proposals which propose rates of return and use approaches to determine the rate of return that are consistent with the guidelines but inconsistent with the NGR and NGL or submitting a proposed rate of return that varies from the final guidelines in many material respects but which is consistent with the NGR and NGL.

2.18. This has the potential to create delay and additional cost for all stakeholders, at a time when there are three access arrangement proposals due to be submitted in the next 15 months. This goes directly against what the AEMC intended of the guidelines.

Consistency between the cost of debt and equity

2.19. As noted above, in the DG and ES, the ERA has devoted considerable effort towards econometric estimation of individual components of the cost of debt and equity (Rule 87(14)(b) of the NGR), but insufficient regard to the overall methodological framework (Rule 87(14)(a)) and how it meets the ARORO.

2.20. The result of the ERA's approach is a "silo-effect" in the approach outlined in the DG, one consequence of which is that the part of the Guidelines which explains how the inter-relationships between the cost of debt and equity have been considered (as is required by Rule 87(5)(c) of the NGR) is missing.

2.21. This is not a matter of simply making over-arching statements about efficiency, but instead requires a specific process of "circling back" to ensure that the individual findings on the cost of equity and of debt do not contradict each other, and nor that they either fail to account for or double-count, a particular risk.

2.22. The reason for considering the inter-relationship is clear from the Modigliani-Miller (1958) theorem which the ERA itself cites; risk does not simply go away as one slices and dices the compensation of debt and equity, but instead simply moves around.[8] The decision about which party ought to bear risks associated with debt has ramifications for the cost of equity, and decisions on beta have ramifications for the choice of the cost of debt (see Section 5). Failure to account for inter-relationships risks lowering rates of return, and influencing future investment.

2.23. An example of this is in relation to the ERA's approach to the estimation of the equity beta in the DG. Should the range of values outlined in the ERA's 2013 Study in the ES be included in the final guidelines and applied by the ERA in the revisions to the DBNGP access arrangement, there is a real risk that it will result in this RPP not being achieved. Our confidential attachment to this submission outlines this issue in more detail as it pertains to DBP and the DBNGP

2.24. Another consequence of the "silo effect" in the DG, as noted above, is that there is no assessment as to how, when the methodologies and approaches in the DG are applied, they will result in the determination of an overall rate of return that meets the ARORO. Given the importance placed on this by the AEMC in its final determination, we urge the ERA to outline this in the final guidelines.

2.25. We look forward to a more concrete explanation of how the ERA attends to these requirements in the Final Guidelines.

The ERA's criteria

2.26. In adopting certain methodologies, approaches and values in the DG and ES, the ERA has relied heavily on a set of criteria which it introduces at paragraph 35 of the DG and discusses in more detail in Appendix 3 of the ES. Appendix 3 of the ES provides a discussion as to how each is appropriate within the context of the NGR. We do not suggest that to introduce additional or more specific criteria, of itself, gives rise to any inconsistency with the ARORO or the other requirements set out in Rule 87 NGR. However, we do not agree with every aspect of the ERA's assessment of congruence between the criteria and the NGR, and endorse APA's detailed treatment of this issue in the APA group submission.

2.27. Where we have particular concern in respect of the criteria is in their use. Frequently, the ERA makes reference to its criteria when justifying a particular position; its choice of CAPM and the methods used for assessing beta, to take just two examples from several in the ES. The ARORO is conspicuous by its absence in the DG and ES. It appears to us that the chain of logic the ERA is following is that its criteria are consistent with the NGR (and, by extension, the ARORO), a position it argues in Appendix Three of the ES, and that if its decisions meet its criteria, they must therefore also meet the ARORO. As mentioned above in paragraph 2.11(b), the AEMC explicitly cautioned against such an approach in the final determination[9] - "*The ERA should not assume that it may consider the factors (or other relevant provisions) and that this will of itself mean that the objective has been achieved. The overriding consideration for the regulator is the ARORO*".

2.28. This is further reinforced in Rule 87(14) of the NGR which asks the ERA to show in the guidelines how the methodologies are proposed to result in rates of return on equity and of debt which are consistent with the ARORO; the link is direct.

[8] Grundy (2001) provides a more detailed account of this, including a summary of Miller's own thoughts on the matter.
[9] AEMC (2012), p37

2.29. Moreover, the ERA has also introduced additional criteria to those in paragraph 35 of the DG and uses them to make some key decisions about certain rate of return parameters. We see two problems with the introduction and use of these additional criteria:

(a) Firstly, they have not been explicitly assessed against the NGR or ARORO (ie – they are not discussed in Appendix Three of the ES). These are again discussed in detail in the APA submission and DBP endorses APA's submissions in respect of them.

(b) Secondly, these criteria appear, in some instances, to be inconsistent with the NGR requirements (including the ARORO). One example is the criteria introduced in paragraph 72 of the DG to determine whether firms will be included in the set of firms the ERA is using to assess appropriate credit ratings and thus the appropriate cost of debt. They are not assessed against the ARORO but appear to be inconsistent with the requirement in the NGR that similarity in risk levels be clearly identified; an issue we discuss in more detail below.

2.30. While we do not have an objection to the use of additional criteria by the ERA, we are concerned at their arbitrary introduction, the fact that they intercede between the methodologies and the ARORO and the potential for being inconsistent with the requirements of the NGR. The ERA notes that criteria are intended to be subordinate to the NGR, but as the example above shows, this does not always occur in practice. We would suggest that the appropriate way to avoid this from happening would be to ensure that each aspect of the methodology is directly linked to the ARORO (not through the criteria), which would allow the ERA to demonstrate both that it is meeting the ARORO (as required by the NGR) and that individual criteria are not subverting the requirements of the NGR. This appears to be the AEMC's intention.

The construction of the benchmark efficient entity

2.31. The next issue is the construction of the benchmark efficient entity (BEE). DBP does not have any particular issue with the BEE itself; we believe that it ought to be, as the ERA suggests (DG paragraph 53):

"A 'pure-play' regulated gas network business operating within Australia without parental ownership, with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services."

2.32. Where we have issue, however, is in respect to where the data to inform the BEE will come from (we believe that international information must be included, to support efficiency goals, to increase the size of the sample set and alleviate statistical concerns and to guard against regulatory gaming), and in respect of the need for a structured process to identify risk, and thence establish similarity.

2.33. Paragraph 54 of the DG says that estimates of efficient financing costs will be based on "averages derived from samples of comparator firms with efficient financing costs" that are judged to be similar in terms of risk. This means, presumably, that any firm being used to inform the BEE must itself have efficient financing costs. It also raises issues in respect of similarity, which we address below.

2.34. For the parameter of gearing (paragraph 58) the ERA is quite specific about the comparison set (the samples referred to above); it has to be a utility, listed on the marketplace and have data on debt and equity levels. We note that these are criteria that the ERA has not assessed against the ARORO, and which potentially subvert it by allowing the ERA to ignore the requirement to demonstrate similarity.

2.35. However, for the cost of debt parameters, paragraph 63 says that the "debt risk premium will be derived based on that from an observed sample of comparator firms with similar credit ratings as the BEE". It is not clear which sector of the economy these firms will come from, although we note in the past that the ERA has made use of businesses as diverse as banks, gas exploration and production companies, airports and car dealerships to proxy the cost of debt of a gas pipeline. Unless the ERA has been able to demonstrate that these comparator firms exhibit risk levels that are similar to the service provider, we question whether the continued use of this same group of businesses would be permissible under the new Rule 87 given the requirements of the ARORO that risk levels are demonstrably similar (see below). We would, in fact, consider it more appropriate for the ERA to make use of gas pipelines from the US than banks from Australia, and we would support a large number of comparison firms to ensure that statistical robustness can be enhanced.

2.36. In DG paragraph 72, the ERA suggests that firms in the comparator set to work out the benchmark credit rating must be a utility in Australia and have their credit rated by S&P or Moodys. It appears, to us at least, that the ERA will use utilities to establish the credit rating, but then calculate the cost of debt (paragraph 63) using a wider range of firms which happen to have the same credit rating.

2.37. Just why the ERA draws information from differing data sets for different rate of return parameters is not clear from the DG. Presumably the basis for considering the utilities to establish the appropriate credit rating is that they have similar risk levels. If the net then widens to consider firms from elsewhere in the economy with the same credit rating, and this is on the basis that they also have similar risk levels, then why are they not included in the first step? Moreover, if credit rating is directly related to levels of risk in the sense that firms with the same credit rating ought to have the same cost of debt (as the ERA suggests), then what information is being added by considering firms after the first step? Either they have the same cost of debt as the firms in the first step, and thus the average does not change, or they have a different cost of debt, which means that the conclusion that firms with the same credit rating face the same risk level is false. The problem is exacerbated by the wide range of debt costs the ERA deems similar (see discussion below).

2.38. The problem underlying these issues appears to be the lack of a basic "theory" of risk. By this we mean something more than general statements about systematic risk. This is an issue we return to again in the discussion on similarity below and which we would encourage the ERA to be much clearer on in the final guidelines.

Sources of information for the BEE

2.39. A key issue in relation to the BEE is where the information that informs it is sourced; which sectors of the economy and, more particularly, which country. This matters because there are very few comparable energy infrastructure firms in Australia, and narrow datasets make any form of empirical estimation very difficult; as is clear in further discussion below when such difficulties are highlighted. Here we explore where the ERA proposes to source information for the BEE, and its reasoning for doing so.

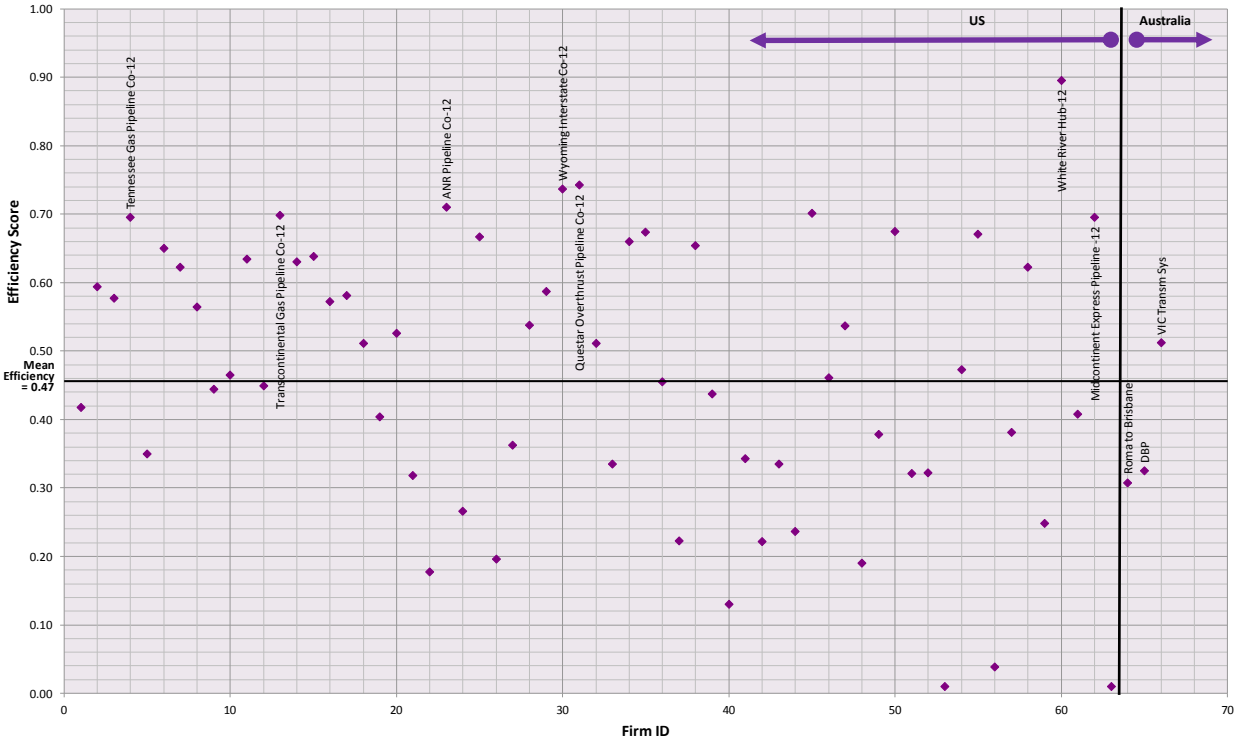
2.40. Although the AER suggests that it will consider information from firms overseas as a means of cross-checking different aspects of the rate of return, the ERA states in the ES that it has considered the costs and benefits of using this information, and found that the costs outweigh the benefits. We cannot make any comment on this assessment process undertaken by the ERA, which will presumably form part of the Final Guidelines, as there

is no information about it in the DG or ES, save for a brief discussion about some of the problems the ERA perceives might arise in using overseas data.

2.41. We have commissioned independent research from ACIL Allen Consulting (see appendices) to examine Australian and US gas pipelines in the context of efficiency. We acknowledge the possibility for some divergence between the US pipelines and those in Australia (although that proposition is equally true of comparisons between Australian utilities and even more so in respect of businesses within different sectors which share only a credit rating range in common). However, what the US Pipelines do possess is very good data, available from the FERC website, which facilitates empirical analysis. In future, a wider range of gas pipelines from other jurisdictions might also be examined, but the analysis undertaken by ACIL Allen suggests that even a comparison involving just US pipelines adds considerable value.

2.42. ACIL Allen has made use of stochastic frontier analysis; a technique widely used in efficiency analysis, including in a regulatory context (see, for example, Coelli & Lawrence, 2006). The results of the analysis are summarized in Figure 1.

Figure 1: Efficiency Frontier Analysis of US and Australian Pipelines



2.43. Since public data were only available for three Australian pipelines on a consistent basis, the analysis is necessarily incomplete. However, these preliminary results show the Australian pipelines in the analysis sit roughly in the middle of the range of efficiency scores. We did not ask ACIL Allen, given the short timeframe, to explore reasons why differences in efficiency arise; but smaller nodes of demand, relatively concentrated population centres far from sources of gas and the terrain over which pipelines run may be three "natural" explanations for some of the differences shown. However, what Figure 1 makes clear is that, if one wants to understand more about efficiency in the gas pipeline industry, and therefore to provide incentives to promote efficiency in Australian pipelines, there are likely to be considerable benefits in making use of information from the US.

Moreover, it is likely to be to the benefit of the long-term interests of consumers; something we address in more detail below.

2.44. Given our own analysis suggests that considerable advantage can be gained by considering a wider set of information, we have supported our findings, where appropriate, with information from other jurisdictions.

Risk and similarity

2.45. The ARORO requires that the return to a service provider is 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 the provision of reference services. This places significant importance on what is meant by "a similar degree of risk" and requires the regulator both to explain how it will define the term "similar", and how it will apply that definition when applying methodologies which are consistent with the ARORO. This is missing from the DG but we believe it must be outlined in the final guidelines in order to ensure the guidelines meet the requirements of the NGR.

2.46. The ERA does deal with similarity in paragraphs 201 to 205 of the ES, but they do not attempt to define the term; the ERA simply notes the trade-off between sample size for inference and differences between entities making such samples less relevant, and it notes that the similarity requirements of the ARORO will be met provided there "*is not a material difference between that of the benchmark efficient entity and that associated with providing the reference services* (ES paragraph 201)*"*. These paragraphs also do not outline how the ERA proposes to make use of its judgment in this regard. Establishing similarity is a core requirement of the ARORO, and thus we look forward to the ERA addressing this omission in the Final Guidelines.

2.47. The only real insight into how the ERA might apply its understanding of similarity is contained in Chapter 8 of the ES, where it asserts, but does not show, that utilities in Australia face similar risks and therefore this set of firms is suitable for establishing the credit risk range which will then be used to assess the cost of debt. One might also infer that the ERA has the same belief about utilities in respect of equity by the fact that this is the set of firms it chooses for the calculation of beta in Chapter 12 of the ES. However, it does not make the point of similarity explicitly in this context.

2.48. Chapters 8 and 12 highlight inconsistencies in the application of the criteria of similarity by the ERA. In respect of debt, the ERA considers that any bonds with a credit rating of BBB- through to BBB+ are sufficiently similar that they are suitable for calculating the cost of debt. Based upon recent information on corporate debt issuance in Australia from March 2012 to the present day provided to us by ANZ, the largest premium over the BBSW for a BBB- bond (the lowest rating that is still investment grade) is 295 basis points. The smallest premium for a BBB+ bond, it is 145 basis points, while the smallest premium for an A-rated bond (the highest rating we were able to obtain from recent data), is 80 basis points. Thus, the ERA appears to be suggesting that fully two-thirds of the total range of premiums for investment grade bonds represents similar levels of risk for holders of debt in an efficient firm providing the reference service. This is a very wide range, and we do not believe it represents a particularly apt working definition of the word "similar" for regulatory purposes. Instead, we would consider it more appropriate to make use of a wider sample of overseas firms (for statistical robustness) and preserve similarity by applying the steps below to the sample.

2.49. In contrast, when examining beta, the ERA implies a preference for a range between 0.4 and 0.56 (for its equally-weighted portfolio) or 0.42 to 0.53 (for its value-weighted

portfolio).[10] The equity results suggest a much narrower definition of "similar" than is applied for debt, and suggests that the ERA is being inconsistent between debt and equity in applying this term; despite the explicit requirement that in Rule 87(5b) for consistency in the estimation of the cost of equity and debt.

2.50. We urge the ERA to address this matter in the final guidelines in order to meet the requirements of the NGR.

2.51. There are two core problems which underpin the ERA's thinking on similarity and risk levels, and we believe that these may underpin the reason why it has been unable to explain what it proposes to do in respect of risk and similarity and why it exhibits inconsistencies between the two in its ES. The first is, as APA points out in its submission, the ERA does not really have a model of the BEE. It has a description (DG paragraph 53), but it then moves straight into discussion on how it is going to establish the debt and equity costs, stepping over and ignoring the key issue of first establishing, as Rule 87(2) requires, what the risk profile of the BEE is, and thus which comparator firms might have similar risk levels. The only consideration the ERA appears to have given to this question is an assertion (but with two new, totally arbitrary criteria, introduced in ES paragraph 480) that other utilities ought to be used for both the cost of equity and debt because they face similar risks.

2.52. This is not enough, as APA points out, the ERA needs to go through a careful, structured process, which might be summarized in the following steps:

(a) Develop (not just describe) the BEE, ensuring that it is efficient.

(b) Describe the risks it faces, ignoring in the first instance whether they fall into buckets associated with certain asset pricing models, such as systematic risk for the CAPM.[11]

(c) Determine what other firms might face similar risks (see below).

(d) Decide, given the asset pricing model(s) being used, how these risks ought to be compensated, and the value of that compensation, based on information from the comparator firms.

2.53. The second problem is that neither the DG nor the ES appear to outline any real "theory" of risk, upon which to enable the ERA to base any assessment of similarity in risk levels; meaning it cannot effectively do the first two steps above. In its submission to the AER's Consultation paper, APIA suggests a framework for considering risk and similarity which has its roots in the seminal work on discounting theory by Arrow and Lind (1970), wherein risk is defined as consequences in states of the world, and similarity between two firms as similar consequences (for both firms) in the same states of the world. Although we do not pretend this solves the problem in terms of similarity, it may form a useful first step, and a first step is needed if the ERA is to meet the requirements of the NGR in its Final Guideline.

[10] The range for individual companies is larger, but the ERA notes (correctly) the problems in estimating beta for individual firms, and thus its preference for portfolios. This preference is not the issue; the implication for what the ERA regards as similar in respect of equity costs is.

[11] In this context, we would note that the ERA has ignored many pertinent risks. For DBP, these include upstream risk (the risk of supply outages and longer-term risks to supply security as a result of gas being dedicated to LNG) and mid-stream risk (including bypass risk, particularly in the Pilbara). There will be debate about whether these are "systematic" or not within the narrow context of the CAPM, and for some, the AER approach of examining them as "asymmetric non-systematic risk" may be appropriate. However, they need to be enumerated and dealt with, which is difficult in the context of the current approach that omits this key step.

2.54. Issues of a "theory" of risk aside, we note that the ERA does have an extensive, qualitative discussion on systematic risk (ES, paragraph 224-49) which it uses to motivate its conclusion that only downstream demand risk is a relevant consideration in respect of systematic risk. We disagree with the ERA's assessment of systematic risk (concurring with the APA submission and its more detailed assessment of the topic in this regard[12]) and note that the ERA is incorrect in asserting that only systematic risk matters for the cost of debt (see Section 5 below). We also believe that the ERA is in error in interpreting the ARORO to refer only to systematic risk when it quite clearly states that regulators are to look to a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in the provision of reference services (NGR, 87(3)). Note that the NGR does not refer to "systematic risk", but "risk", and no such limitation can be found in the AEMC's explanatory materials either. Indeed, this must be the case as the AEMC has left open the possibility of other models for assessing the cost of capital which contemplate both systematic and other risks.

2.55. However, if the ERA proposes to use its assessment of systematic risk as its "theory" of risk, and it has concluded that only downstream demand risk is important (a position we do not agree with), then it needs to use this risk to assess similarity. Whether it does so at the start of the process (DG paragraph 54) or at the risk-matching procedure it describes at the end of the process (DG paragraphs 55 and 56) is possibly immaterial. However, it needs to show that the firms it will use to inform the BEE have a similar level of downstream demand risk (if this is the only risk the ERA is prepared to consider derived from its assessment of systematic risk). The ERA has not done this in its Draft Guidelines. Nor has the ERA explained how the it proposes to measure downstream demand risk such that it might assess similarity.

2.56. If downstream demand risk is the only risk the ERA considers relevant, the ERA cannot (as part of paragraph 85 of the DG) choose any firm which has the same credit risk in order to assess the cost of debt. Instead, it must demonstrate (not assert) that each firm chosen to measure the cost of debt has similar downstream demand risk as is incurred in the provision of the reference service. This might be more easily done if information from US pipelines is incorporated into the cost of debt calculations, but we suspect it might be rather more difficult in the context of an Australian bank or a car dealership (two bonds used by the ERA in the past to assess DBP's efficient cost of debt).

2.57. If the ERA intends to use similar credit risk as the basis for the cost of debt, then this may not be a problem, but only if the factors that credit rating agencies use in determining risk are applied across the board in determining similarity; the ERA would need to show in its cost of equity calculation that the firms being assessed (presumably the same firms) face similar levels of the same risk factors, and then ensure these costs are incorporated. In the context of equity costs as measured by the CAPM, this might not necessarily be in the rate of return, if the risks are not systematic, but the ERA would need to make sure they are picked up somewhere. If other models are used to estimate the cost of equity that do admit the relevant risk factors, then they would need to be included. This includes, naturally, where such other methods are used to check the results of a CAPM calculation.

[12] We note further the conclusion of McKenzie and Partington (2013) who were asked to look at the question of systematic risk by the AER and who concluded there is no reliable way to determine how any one of the risk factors (contained in the AER's list provided for that review) covaries with the systematic risk factor in the CAPM, and we therefore question the wisdom of the effort both the ERA and the AER has put to this aspect of their Draft Guidelines. If it is impossible to work out how much of beta is constituted by a particular risk, then a discussion about whether a particular risk is in or out leads nowhere in understanding if beta is "right" or needs to be adjusted. To do this, one would need to step outside the CAPM framework, and we note APA's comments on the APT in this regard.

The NPV=0 criteria

2.58. Both the ERA and the AER have made extensive use of an NPV=0 criterion to assess various aspects of their decisions in respect of their respective Guidelines. In particular, it would appear that the ERA has, in some instances, used this criterion as a proxy for the ARORO. However, this criterion needs to be used with caution, and its effects clearly understood.

2.59. We note first of all that the Revenue and Pricing Principles do not require an NPV=0 criterion, instead saying that "*a service provider should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing reference services and in complying with a regulatory obligation or requirement or making a regulatory payment."*

2.60. As the Australian Competition Tribunal observed in *Re Appln by Energy Australia* [2009] ACompT 8 (*Energy Australia*):[13]

> "*It is well accepted in the literature of regulatory economics and in regulatory practice that all these efficiency objectives are in principle met by setting prices for services that allow the recovery of efficient costs, including the cost of capital commensurate with the riskiness of the investment in the assets (infrastructure or 'system', as the term is used in the NEL) used to provide services.*
>
> *It might be asked why the NEL principles require that the regulated NSP be provided with the opportunity to recover at least its efficient costs. Why 'at least'? The issue of opportunity is critical to the answer. The regulatory framework does not guarantee recovery of costs, efficient or otherwise. Many events and circumstances, all characterised by various uncertainties, intervene between the ex ante regulatory setting of prices and the ex post assessment of whether costs were recovered. But if, as it were, the dice are loaded against the NSP at the outset by the regulator not providing the opportunity for it to recover its efficient costs (eg, by making insufficient provision for its operating costs or its cost of capital), then the NSP will not have the incentives to achieve the efficiency objectives, the achievement of which is the purpose of the regulatory regime.*
>
> *Thus, given that the regulatory setting of prices is determined prior to ascertaining the actual operating environment that will prevail during the regulatory control period, the regulatory framework may be said to err on the side of allowing at least the recovery of efficient costs. This is in the context of no adjustment generally being made after the event for changed circumstances*."

2.61. This also reflects sound economic principles found in the incentive regulation literature, which are summarized very briefly in Section 3 of this paper. The basic problem is that regulation is applied ex-poste and investment is assessed ex-ante, when information about demand is uncertain. If demand is greater than expected, the regulator will curtail the upside, but if it is below expectations, it will not compensate the downside, and this well-known asymmetry leads to rational investors reducing or delaying investment. In fact, as Dobb (2004) shows, a simple price cap cannot jointly optimize investment incentives and post-investment pricing; there is, as Vogelsang (2010) outlines, a trade-off between the two.

[13] See http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/cth/ACompT/2009/8.html?stem=0&synonyms=0&query=title%28%222009%20ACOMPT%208%22%29 – paragraphs 80 to 83.

2.62. There are various ways of dealing with this problem. The Revenue and Pricing Principles do so by specifying that investors be able to recover "at least" the efficient costs of their operation. Use of an NPV=0 criterion cuts across this goal by removing the ability to deal with the asymmetry outlined above. The AER, in its Draft Guidelines, has outlined a willingness to accept compensation for what it calls "asymmetric non-systematic risk" in cashflows, and Hausman and Myers (2002) provide a real-options model which might be used to implement this aspect of the AER's Draft Guidelines. This might provide a counter-veiling measure to the investment-chilling effects of an NPV=0 condition.

2.63. The ERA, in contrast, has introduced no counter-veiling mechanism which overcomes the investment-curtailing effects of applying its NPV=0 condition. This not only risks contravening the Revenue Pricing Principles but, more seriously, may have a chilling effect on investment in Western Australia vis-à-vis the Easter States. We look forward to the ERA addressing this issue in its Final Guidelines.

3. INCENTIVE OR RATE-OF-RETURN REGULATION?

3.1. The ERA devotes considerable attention in the DG to discussing incentive regulation. Its discussion of what this constitutes reflects what Vogelsang (2010) terms Non-Bayesian incentive regulation; which focuses on improvements to welfare (rather than optimisation) and has no strong theories about investment incentives.[14] However, Vogelsang (2010) also highlights what he calls "Bayesian Incentive Regulation", which is based on the seminal work by Baron & Myerson (1982) and Laffont & Tirole (1993), and focuses on welfare optimization within the constraints caused by the principal-agent problem that exists between regulators (who can never have full knowledge of the marginal costs) and regulated firms (the agents who do).

3.2. Both aspects of incentive regulation are important, and thinking about them has the potential in the longer term to advance regulatory practice in Australia; a process which is ongoing in the UK at the moment as part of the RIIO process being undertaken by OfGem (see OfGem, 2010, for a "handbook", summary). However, APA notes that these more fundamental considerations are arguably somewhat irrelevant when it comes to the Guidelines, which are the product of a rule-making process that is itself the more suitable forum for debate on issues such as incentive regulation. However, they are still worthy of consideration by regulators, if only to avoid problems such as the NPV=0 issue highlighted at the conclusion of the last chapter.

3.3. Within the context of the ERA's discussion on what Vogelsang (2010) refers to as Non-Bayesian incentive regulation, the main focus of incentives is incentives to beat benchmarks set by the regulator, as the ERA points out. This is, in itself, an important goal of regulation. However, even within the narrow context of beating benchmarks, we are given to wonder whether the direction taken by regulators in Australia might not be reducing the power of incentives.

3.4. The AER proposes to make use of data primarily from Australian utilities, and the ERA (apart from potentially allowing non-energy Australian firms for calculating the cost of debt) almost entirely so. If Australian utilities are all very different in their cost levels, and these differences are driven by different levels in efficiency then,[15] at least until the Australian efficiency-frontier is reached, each has an incentive to increase its efficiency levels. However, if (or when) each utility is roughly the same,[16] then the average of the set will approximate each firms own actual costs. Thus, firms will effectively be rewarded for their own costs. This is not quite rate of return regulation, as firms can still keep any efficiency gains (for a time), but as these decrease in scale, incentives weaken. This ought to concern regulators who place importance on incentive regulation as a suitable practice for regulators.

3.5. Bayesian incentive regulation does not directly inform regulatory practice in Australia, at least not yet. However, its findings are important; most particularly its focus on information asymmetries and their resolution (alluded to by the ERA) and the trade-off between investment or dynamic efficiency and allocative efficiency.

[14] Contrary to the ERA's assertions, getting the "right" price cap does not automatically mean that investment incentives are optimised. Vogelsang (2010) covers this issue in more detail, commenting on the trade-of between tight price caps and poor investment incentives.

[15] This is a key concern. The dataset in Australia is so small that it is almost impossible for a regulator to ascertain if a perceived difference in cost is due to inefficiency, or to some idiosyncratic and unalterable aspect of a given pipeline (running through a desert, compared to a city, say, and the differences this produces in operating costs). This is a key reason to consider wider datasets.

[16] Within the context of their "natural" characteristics, such as their length, the distance between nodes of demand, their terrain and so on; it is obviously not the case that every pipeline would have, say, the same vegetation clearing costs.

3.6. To take the second issue first, the basic problem is that a tighter price cap results in more efficient use of existing assets, but may reduce incentives for future investment; a fact that leads Vogelsang (2010) to suggest a less stringent cap. In particular, it alters the incentives for timing of investment, resulting in investment happening later than is socially optimal. Dobbs (2004) shows how simple price caps cannot meet the requirements to optimize both investment incentives and optimal post-investment pricing. Other instruments need to be used. This does not necessarily mean handing over rents in the hope of inducing earlier investment, and much work has gone into ascertaining schemes to solve the timing problem. Gans & King (2004) and their proposal for "access holidays" are on example in the Australian context. Broer & Zwart (2103) provide a more recent summary of this literature (which we do not even attempt to do here) and rely upon insights from real options to propose a scheme whereby prices decline with demand to provide a socially optimal investment timeframe whilst minimizing the current allocative efficiency losses that come from handing over some rents now to compensate firms for the symmetric risks price caps impose on investment as part of the scheme.

3.7. The second issue is more complex; regulators can never know as much about the marginal costs of the firms they regulate as the firms themselves. This is not a matter of more invasive regulatory information notices, which are in fact an indication that the regulatory scheme is not incentive compatible (in the Baron & Myerson, 1982, sense), because the regulator who has no way of knowing what the marginal costs are, equally has no way of knowing whether the information provided upon demand is truthful or not. Instead, it is about recognizing that the information has value and must be "purchased" by allowing some allocatively inefficient monopoly rents now in exchange for fewer such rents in the future as more becomes known about marginal costs. This, in turn, requires the regulator to commit to allowing allocatively inefficient prices even when it has information that could allow it to reduce such prices. Such commitment is hard; indeed, Crew & Kleindorfer (2006) refer to it as the "impossibility theorem" of incentive regulation. However, this does not mean that it is not worthwhile for regulators to try it; OfGem, in particular, is attempting a menu approach which is directly informed by incentive-compatible regulation theory.

3.8. The point of this chapter is not to suggest change, but is rather to warn against complacency. In the first instance, regulators ought not be complacent about whether they are maintaining strong incentives in the practical application of regulation; focusing only on Australian regulated firms to determine what is efficient for Australian regulated firms may be counter-productive in this regard. Secondly, regulators ought not assume that simply getting a price-cap "right" will solve all problems of allocative and dynamic efficiency, when the lesson from the literature is in fact that this does not occur. Instead, regulators need to consider more sophisticated mechanisms, which are beginning to move from theory to practice elsewhere in the world.

4. RETURN ON EQUITY

4.1. Our response to the ERA's considerations concerning the cost of equity cover four broad topics:[17]

(a) The use of different models

(b) The risk-free rate and the market risk premium.

(c) Beta and its calculation.

The use of different models

4.2. As stated, the ERA has used its criteria (not the ARORO) to discount the use of any models other than the CAPM. In so doing, the ERA has drawn conclusions about other models that appear to be not only well out of step with both the mainstream finance literature, but also with the conclusions of the AER in its draft guidelines. APA has raised more detailed concerns with this aspect of the ES (and we have made numerous similar representations to the ERA in the past) and we would concur with this assessment.

4.3. Failure to consider a wider range of models will likely cause the ERA significant problems. As our discussion below makes clear, the large range of beta results which result from making only small changes in the inputs to a regression on historical returns data (as used by the ERA) present a clear problem with the reliance solely on the CAPM; there is nothing within the CAPM theoretical framework which can allow the ERA to determine where in the range the "true" value of beta might lie.

4.4. Averages might be used as a practical compromise,[18] but the averages (or indeed any figure in the range) would still need to be justified, as per Rule 87(6) of the NGR with reference to how it supports the ARORO. To do this, the ERA will need to step outside the confines of the CAPM (as applied to historical data of a handful of firms; the key cause of the beta problem) which has no more information the ERA can use to address the regulatory gaming that is likely to result if beta is so sensitive to small changes in input data.

4.5. In our view, stepping outside beta necessarily means considering data from overseas, where greater availability of data reduces the range of results one obtains for beta, or considering other asset pricing models or other market data which are not subject to the same estimation problems as the CAPM. Thus, we believe that the ERA must, in the final guidelines, make use of the flexibility which the AEMC has explicitly provided it with in the NGR. This is the practical implementation problem we refer to in our introduction which makes the ERA's proposed approach unworkable.

The risk-free rate and the market risk premium

4.6. At a very basic level, it appears that, whatever relationship may or may not have existed between the risk free rate and the return on the market prior to the Global Financial Crisis, evidence has emerged in recent times which suggest they are, currently, moving independently of one another. This can be seen graphically by comparing the AER's figure on returns to the market (page 222 of its Draft Explanatory Statement) with the ERA's figure on risk free rates (ES p283; which also shows market returns and risk free

[17] The term for the risk free rate is also an issue, but since the same term is proposed for debt and equity, we address this point in Chapter 5 on debt.

[18] These are no more "accurate" than any figure in the range; which is precisely the point of statistical uncertainty.

rates diverging); from about 2010, the former is relatively stable while the latter is downward-sloping.

4.7. This kind of relationship has caused several overseas regulators (see FTI, 2012 p38-9 in advice to OfGEM, and the Alberta Utilities Commission, 2011, p11-13) to make changes to their approaches of simply adding an historical market risk premium to the current risk-free rate. The AER has also considered the issue through its proposed use of Wright's approach to the CAPM as a check on its "fundamental model", and other Australian regulators, such as IPART, have likewise changed MRP estimates in light of flight to quality issues (IPART, 2012). The Competition Tribunal (2012) has also concluded that using an averaging period (for risk free rates; in the context of the market risk premium) is unlikely to produce a rate of return appropriate for the regulated firm. Finally, the Governor of the Reserve Bank (Stevens, 2102, p2) has also briefed Parliament on flight to quality issues. Despite noting that flight to quality issues caused a "significant bias in the implied inflation expectation (ES p216), the ERA has determined that it ought not take the RBA at its word, but should instead first test this "flight to quality" issue, and whether market returns and government bonds are inversely correlated.

4.8. This has clearly taken a lot of effort on the part of the ERA; it has devoted one chapter of the Explanatory Statement, and four appendices covering the different econometric tests. We appreciate the importance of the issue, and of attempting to understand its empirical basis. However, the approaches the ERA has taken do not seem to be addressing the issue; one appears to not be relevant to the development of the guidelines, one answers the wrong question, and two both have econometric issues and deviate from the literature in terms of approach.

4.9. The piece of analysis with respect to which we question for relevance is the Granger Causality test work undertaken in Appendix 16 with the aim of understanding whether changes in yields Granger-cause changes in market risk premia or vice versa. There has never been any argument about what might drive what, and even if there had been, it does not matter which variable changes first; what matters is whether or not they move together. The Granger Causality tests do not appear to add anything to this debate.

4.10. The piece of analysis which answers the wrong question is the analysis of flight to quality. The ERA cites a number of papers within this literature, but then makes use of the methodology of just one, by Gulko (2002). The window Gulko examines is around ten days before and after the crisis occurs. This is markedly different from the general literature on the flight to quality since the Global Financial Crisis (GFC); see, for example, the timeline of the GFC developed by the Federal Reserve Bank of St Louis that covers the two years from February 2007 to July 2009.[19] We note also UED Multinet's more detailed submission on this issue, and would endorse its conclusions.

4.11. We are not suggesting that there are any major flaws in Gulko's (2002) paper, or that the ERA has applied his methodology incorrectly.[20] Instead, what we are suggesting is that the ERA has simply asked the wrong question. Even if the ERA had found evidence of a "decoupling" (to use the term from Gulko's own work) between stocks and bonds for a 20 or 30-day period in 2008), this would not have meant there was any kind of requirement for a change in regulatory practice for any determination outside that very narrow time period. Even for future crises, all it would mean is that regulators would need to avoid the short crisis periods when setting risk free rates; something which ought to be easily done

[19] See http://timeline.stlouisfed.org/index.cfm?p=timeline.
[20] We have not, in fact, sought to replicate this aspect of the ERA's work.

given the long time common between draft and final decisions. This is what we mean when we say that the ERA has answered the wrong question.

4.12. At a more basic level, there is a need for a "sense-check". SFG (2013) in a submission to the QCA for Aurizon point out that regulators' calculated cost of equity declined to historic lows in the wake of the GFC, due to the mechanistic application of an historic MRP to declining risk free rates. At the same time, debt margins increased three or four-fold. It does not seem right that the cost of equity would reduce substantially at the same time as the cost of debt increases substantially, and this is suggestive of the constant MRP assumption being incorrect. If it is not due to a flight to quality as the ERA has defined it, it must be due to something else.

4.13. Issues about the narrowness of the window aside, that something else could have been foreign capital flows. One of the defining features of the global environment in the years following the GFC was that Australia was one of the few countries in the world to maintain its AAA credit rating, which resulted in a large influx of foreign capital (see, for example, RBA, 2012). Bond prices are not jingoistic; they will increase regardless of where the increase in demand for them originates.[21] There is therefore a need to consider the impacts of foreign capital inflows, a point made in much more detail in the UED-Multinet submission, which we would endorse.

4.14. The final piece of analysis the ERA has considered is the presence or absence of an inverse relationship between bonds and market returns. The ERA undertakes this analysis using cointegration, because it finds that each of the time series are non-stationary. This analysis does not seem to be consistent with best practice, which takes into account both the market risk premium and the volatility of market returns (increases in the latter drive future increases in the former; as many have suggested happened post-GFC).[22] Smith, Sorenson & Wickens (2005) use a GARCH model (and find evidence of an asymmetry between upswings and downswings in the business cycle in respect of the MRP), as do Kizys & Spencer (2008), whilst Jin (2013) summarises the use of jump-diffusion long run risk models. The basic point is that the story is more complex than the simple analysis undertaken by the ERA shows.

4.15. Part of the problem is that the ERA cointegration test only examines one part of its own proposition; the ERA has not provided evidence that the second part of its proposition concerning the stability of the MRP is correct. We note that the RBA (2012) has expressed its opinion that the market risk premium is unlikely to be stable in Australia, and international evidence alluded to by Wright (2012; including evidence from the same Dimson, Marsh & Staunton work that the ERA cites) makes similar findings. We suspect that the real answer is that the relationship between market returns and the risk free rate has structural breaks; that it is sometimes positive and sometimes negative.

4.16. Finally, the UED Multinet submission notes several issues with the ERA's cointegration analysis, including those associated with the use of daily data (which is not best practice) and the different conclusions which result when the more standard practice of using monthly estimates of MRP is followed. All of this suggests that a single cointegration test has not answered this key question, and that further work is required.

[21] This is true even of the much larger US market; see Chan, Karolyi & Stultz (1992)
[22] See Bansal & Yaron (2004).

Beta and its calculation

4.17. The calculation of beta is another area where the ERA has undertaken considerable econometric work. However, it would appear that this work does not address the core issues surrounding beta. Most of the analysis focusses on putting the same data through different models. This is a test of different models, to be sure, but the far more important issue is whether *any* modeling technique meets the requirements of the ERA's own criteria of being implemented in accordance with best practice, and more importantly, the ARORO itself. We have explored this more fundamental question, and the results are in sharp contrast with the ERA's own assessment.

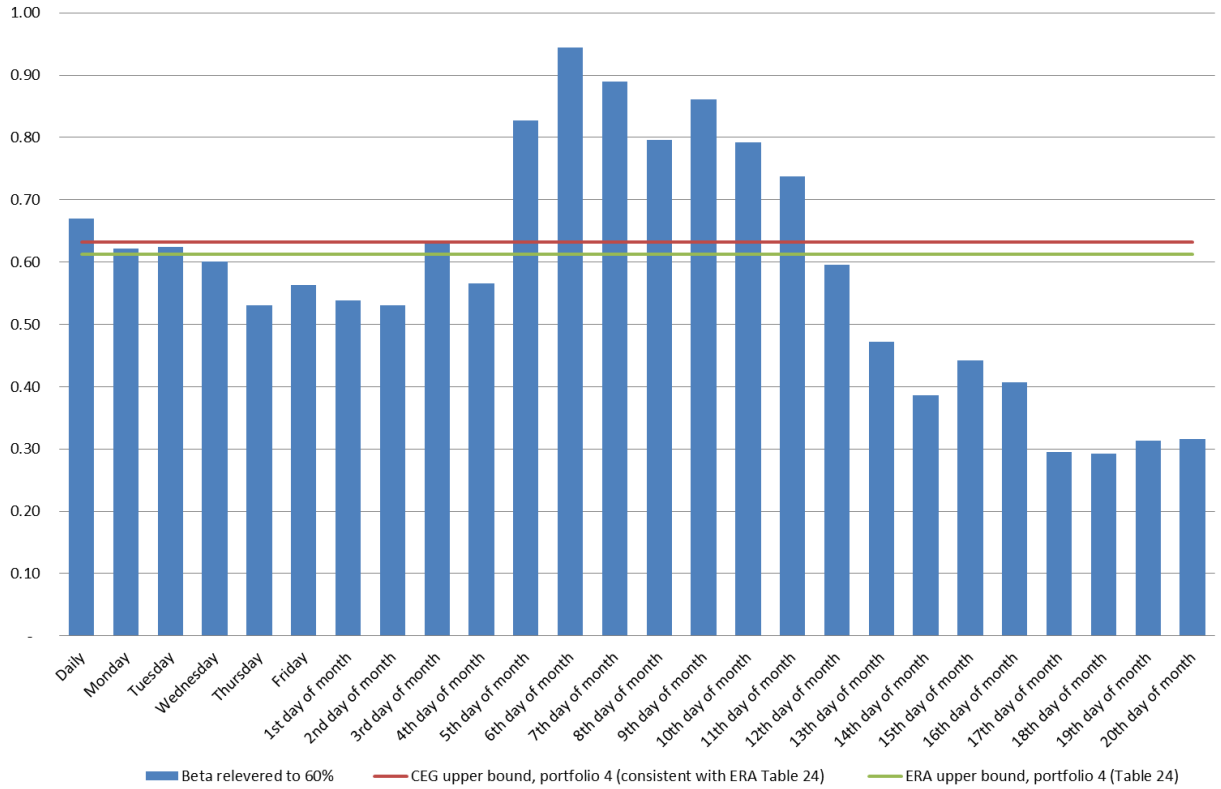
4.18. We engaged CEG to undertake a review of the ERA's work in respect of beta, instructing it to first attempt to replicate the results and then to make small changes to the inputs to ascertain how robust the results were to these small changes. The results of CEG's assessment are contained in the appendices.

4.19. In the first instance, CEG had considerable difficulties in replicating the ERA's results and have concluded that several errors have been made in econometric method. These are outlined in CEG's report attached to this paper. In light of this, we would like to work with the ERA to ensure that we have not misinterpreted the ERA's results and calculations, that there is a common acknowledgment of the errors and that the modeling will be corrected if it is to be relied upon for the purposes of the final guidelines SFG, who also undertook work for us in respect of beta, notes that LAD methods in particular are subject to systematic downward bias.

4.20. Perhaps the most striking finding of CEG's analysis is that component which makes small changes to input assumptions. These are very innocuous; we asked CEG to consider calculating beta using market returns from different days of the week, and to calculate monthly betas using market returns on different days of the month. There is nothing in the CAPM theory which favours weekly over monthly estimation; indeed monthly data is more commonly used in industry, and there is certainly nothing which suggests that a particular day of the week or month is more suitable.[23] The results of this analysis are shown in Figure 2.

[23] We note SFG's comments, summarised by the ERA, in respect of monthly data at the Henry (2009) review, but these were related to small sample sizes for monthly estimations, an issue which has largely vanished with the passage of time. The ERA itself notes only a "preference" for weekly data; which is entirely sensible on the ERA's behalf, because there is no compelling statistical reason to favour it.

Figure 2: Beta at different calculation days



4.21. Not only is the range very wide in Figure 2, but the analysis clearly shows that the confidence intervals provided by the ERA around its own estimations (using just one day of the week) give a false impression of precision. A 95 percent confidence interval is supposed to have only 2.5 percent of observations above the upper limit of the interval. Here, around 42 percent of observations of betas formed on different days fall outside the ERA's confidence interval; the ERA has not used all available information in its regression analysis, and this gives a false impression of the precision of forward-looking estimates an investor would make of beta given historical data (which is what the NGR requires). The basic message is that estimates of beta, based on historical data when only six firms are being compared is wildly variable. We note that CEG's assessment of beta amongst the much larger sample of US energy utilities does not suffer from this problem.

4.22. The basic problem associated with the approach the ERA has taken to the estimate of beta is clear; any regulated firm has an incentive to game the system by choosing the "right" day of the week/month.[24] As noted above, the only robust way the ERA has of addressing this problem of regulatory gaming is to step outside the confines of the CAPM approach and/or the use of solely Australian data to show that a particular beta provides a return on equity that meets the ARORO, as the NGR requires. This is what we mean when we suggest that the proposed Draft Guidelines are unworkable in a practical sense.

Further beta issues

4.23. The discussion above suggests that estimates of beta undertaken using historical data, within the Australian context, are highly imprecise, and therefore subject to regulatory

[24] And indeed the "right" time period; CEG's analysis shows beta is not constant through time, providing further scope for regulatory gaming.

gaming. However, there is a further reason to be cautious about relying solely on them for the purposes of estimating the beta for a BEE under the NGR; because of the composition of the ASX 200 upon which such beta calculations are based. This provides further impetus for considering a wider range of evidence.

4.24. Problems associated with the empirical estimation of beta have been known for several decades.[25]As Roll (1977) points out, part of the problem is that the market portfolio is not actually observed; the practical solution of using the stock market index might not necessarily accurately represent diversification possibilities. We do not mean to open this debate in a general sense, but rather to ask if the Australian stock market, or the ASX 200 more specifically, diversifies risk in the manner of the CAPM theory.

4.25. If beta is considered in a narrow mathematical sense as being the covariance of stock (or portfolio) returns with the market, divided by the variance of market returns, then it is of course "correct" whenever it is measured against the relevant national stock market. However, the national stock market is used as a proxy based on the assumption that investors are able to fully diversify their risks in that stock market. It is not clear that this is always true. Consider the Maldives, which has four stocks on its exchange. Clearly, if systematic risks are a "real" concept that have meaning outside the narrow (and circular) mathematical definition of beta, investors in the Maldives are unlikely to be able to diversify all of their systematic risk with only four stocks.

4.26. The interesting question is whether this is true of the Australian stock market. We note that the amount of risk that is diversified increases sharply with portfolio size; Campbell, Lettau, Malkiel & Xu (2001) suggest that, with around 50 stocks, around 95 percent diversifiable risk has already been diversified.[26] The Australian stock market, with its many thousands of companies, is clearly larger than this, and as such, an investor in Australia ought to be able to choose a portfolio which diversifies his or her risk effectively.

4.27. However, would an investor choosing such a portfolio choose stocks with the same weightings as exist in the ASX200, which is not constructed with beta or the framework of the CAPM in kind? In Australia, the ASX200 is heavily dominated by resource (26.4 percent) and finance (45.3 percent) stocks; proportions that are much larger than in more diverse markets such as the US (36.8 percent of the index collectively) and much larger than prevail in the Australian economy (see Table 1 below).[27]

4.28. There is nothing "magical" about the composition of the ASX200, and it is certainly not a theoretical requirement of the CAPM that a particular market index be used as the proxy of a diversified portfolio. Indeed, a portfolio matching the composition of the ASX 200 might not necessarily have the same diversification ability as a portfolio with similar numbers of stocks chosen at random from different sectors of the economy.

4.29. It is therefore appropriate to consider how changing the weighting of stocks in the "market portfolio" might influence beta results. We engaged SFG to consider precisely this

[25] We note that the sole source the ERA cites to support empirical estimates of the CAPM (Levy, 2012) couches his support in terms of experiments about how people form expectations about returns ex-ante, and that he does not challenge the findings that ex-poste (the way the ERA has actually done its analysis) CAPM is a poor predictor of returns.

[26] A number they note has reduced from around 20 stocks several decades earlier. We note that Brandt et al (2009), examining this work in light of more recent data suggest that the phenomenon may have been episodic, rather than evidence of a trend.

[27] This is a product of the minerals boom. Further light could be shed on this question by considering the ASX as a "portfolio" within an international market, and assessing whether its beta has ben stable over time. If it has not, this would cast further doubt on any beta findings made with reference to the ASX as a representative of the "diversified marketplace" of CAPM.

question and its detailed report (which also contains information on a wide range of other approaches regulators might use to overcome the "beta problem" alluded to above) is provided in the appendices.

4.30. To explore the consequences of re-weighting the market portfolio, SFG considered re-weightings based on the US stock market and the Australian economy. Note in the former case that SFG is not measuring Australian utilities against a US stock market index; it is still Australian market data, just re-weighted. The former was chosen because the US stock market is much more diverse than the Australian stock market and, moreover, defines industry sectors in the same way, which facilitates a simple and accurate re-weighting process. The ABS defines industry sectors differently to the ASX, and this means re-weighting the ASX200 to reflect the Australian economy is a little more imprecise than the re-weighting to match the US stock exchange. However, it is arguably more accurate conceptually, because the ASX 200 is weighted towards financial firms which does not reflect all of the investment opportunities of Australian investors.

4.31. The re-weighting of the ASX to the US stock exchange and the Australian economy as a whole is shown in Table 1.

Table 1: Re-weighting the ASX to the US stock market and Australian economy

Market	Industry	Oil & gas	Basic mat.	Ind-ustrials	Cons. Goods	Health care	Cons. svcs.	Telecom.	Utilities	Fin-ancials	Tech.	Total
ASX 200	*Mkt cap (A$b)*	67	152	51	16	31	94	20	15	368	0	815
	Mkt cap (%)	9.4	16.8	5.8	1.8	4.1	12.3	2.7	1.8	45.3	0.0	100.0
	Firms	7	16	13	6	7	19	2	3	30	0	103
United States	*Mkt cap (US$b)*	1,124	344	1,262	872	1,687	1,488	415	398	2,220	1,805	11,615
	Mkt cap (%)	9.5	2.9	10.7	7.2	15.1	12.8	3.7	3.4	19.1	15.6	100.0
	Firms	39	29	76	53	71	102	16	37	126	73	623
Australia (economy)	*Ind. val. add. (%)*	2.3	14.5	31.0	5.9	7.9	16.2	3.8	3.1	15.5	0.0	100.0

Average values from 1 January 2002 to 6 August 2013. Market capitalisation is compiled from International Classification Board indices of FTSE. The last two of the table contains a breakdown of industry value added from 2011-12 presented by the Department of Industry, Innovation, Science, Research and Tertiary Education, with our mapping of industry sectors to the FTSE industry classifications.

4.32. The results of this re-weighting are shown in Table 2 below.

Table 2: Results of re-weighting ASX to US stock exchange

	Descriptive means				ASX 200 Australian industry weights				US industry weights				Australian economy industry weights			
Name	**Mkt cap**	**Debt**	**Lev-erage**	**N**	**OLS beta**	**Vas beta**	**Re-geared**	**RSQ**	**OLS beta**	**Vas beta**	**Re-geared**	**RSQ**	**OLS beta**	**Vas beta**	**Re-geared**	**RSQ**
Gasnet	313	624	0.67	59	0.25	0.32	0.27	0.04	0.29	0.36	0.30	0.05	0.25	0.30	0.25	0.04
Alinta	1411	865	0.37	68	0.52	0.57	0.90	0.08	0.58	0.63	0.99	0.09	0.53	0.58	0.92	0.10
APA	1437	1951	0.56	142	0.57	0.58	0.63	0.20	0.70	0.71	0.78	0.23	0.61	0.62	0.68	0.21
DUET	1487	4748	0.76	108	0.59	0.61	0.36	0.16	0.69	0.71	0.42	0.16	0.66	0.68	0.40	0.17
HDUF	551	479	0.46	96	0.76	0.80	1.08	0.08	0.93	0.94	1.27	0.08	0.96	0.96	1.30	0.10
SP Ausnet	2530	4083	0.62	92	0.29	0.31	0.30	0.08	0.42	0.44	0.43	0.10	0.35	0.38	0.36	0.09
Spark	1614	1349	0.45	78	0.39	0.42	0.57	0.10	0.49	0.52	0.72	0.11	0.46	0.49	0.67	0.12
Envestra	800	2006	0.72	142	0.66	0.67	0.47	0.17	0.77	0.78	0.55	0.17	0.71	0.73	0.51	0.18
AGL	8995	1500	0.14	58	0.34	0.38	0.81	0.09	0.36	0.40	0.85	0.09	0.25	0.29	0.62	0.06
Mean	*2126*	*1956*	*0.53*	*94*	*0.49*	*0.52*	*0.60*	*0.11*	*0.58*	*0.62*	*0.70*	*0.12*	*0.53*	*0.56*	*0.64*	*0.12*
Standard error					*0.06*	*0.06*	*0.09*		*0.07*	*0.06*	*0.10*		*0.08*	*0.07*	*0.11*	
Lower bound of 95% confidence interval					*0.35*	*0.39*	*0.38*		*0.42*	*0.46*	*0.46*		*0.35*	*0.39*	*0.39*	
Upper bound of 95% confidence interval					*0.62*	*0.65*	*0.82*		*0.74*	*0.76*	*0.94*		*0.71*	*0.73*	*0.88*	
Index			0.58	142	0.53	0.58	0.61	0.25	0.64	0.69	0.72	0.27	0.60	0.64	0.67	
Standard error					0.08	0.08	0.08		0.09	0.09	0.09		0.08	0.08	0.08	
Lower bound of 95% confidence interval					0.38	0.43	0.45		0.46	0.51	0.54		0.44	0.48	0.51	
Upper bound of 95% confidence interval					0.69	0.73	0.76		0.82	0.86	0.90		0.76	0.80	0.83	

If the Vasicek adjustment is not incorporated, we would have the following estimates. Based upon ASX 200 Australian industry weights, a mean estimate across firms of 0.56 within a 95% confidence interval of 0.35 to 0.76, and a mean re-geared estimate for the equal-weighted index of 0.56, within a 95% confidence interval of 0.40 to 0.72. Based upon U.S. industry weights, a mean estimate across firms of 0.78 within a 95% confidence interval of 0.50 to 1.06, and a mean re-geared estimate for the equal-weighted index of 0.79 within a 95% confidence interval of 0.58 to 1.00. The individual re-levered estimates, without the Vasicek adjustment, can be computed according to the following computation, OLS beta ÷ [1 + Leverage/(1 – Leverage)] × [1 + 0.60/0.64].

4.33. The results are stark; if the composition of the diverse market portfolio matched the composition of the Australian economy, betas would increase by around eight basis points (for the index). If the composition of a market portfolio in Australia were the same as the composition of the US stock market, betas for Australian firms would increase by around 11 basis points. This would give them betas which are roughly comparable to their peers in the US (see CEG report in appendices) which suggests that the major difference between US and Australian utilities is the composition of industry sectors in the market portfolio used to compute their betas, rather than some key difference in "underlying" systematic risk.

4.34. The argument above is not that there is some "correct" weighting to use in forming the market portfolio. The point is rather that the ASX 200, with its dominance of financial firms, skews the results one obtains in terms of estimates of beta. This needs to be taken into account when estimating beta. However, our preferred approach would not be to search for some "ideal" industry weighting, but rather to make us of a wider dataset of gas pipelines from the US (which appear to have similar systematic risk to Australian pipelines) to inform conclusions about beta for gas pipelines in Australia. Once again, it is the narrow dataset which is the root cause of the problem.

4.35. We note that the New Zealand Commerce Commission has already adopted this solution to overcome its own beta problem, and makes use of data directly from US pipelines. This is despite Martin Lally advising it that the different regulatory regimes (rate of return in the US versus price cap in New Zealand) mean that US pipelines are likely to face less systematic risk than their peers in New Zealand.

5. RETURN ON DEBT

5.1. The ERA's treatment of the cost of debt raises several issues.

5.2. At the outset, we would like to point out that we are not necessarily in favour of a trailing average over an on-the-day approach. In fact, we believe that, provided regulators act to prevent gaming by switching from one system to another, the choice of which debt cost to use ought to lie with the regulated firm, and not with a regulator; we do not believe there is sufficient evidence to say that one is more efficient than the other.

5.3. In this section, we discuss three key issues in respect of debt:

(a) The differences between the on-the-day and trailing average approaches, and some of the unintended consequences of the ERA's proposals for annual updating.

(b) The errors associated with a five-year term for debt (and by extension, equity), which is based on a false assessment of the empirical evidence and a poorly-developed theory.

(c) The importance of considering a wide range of evidence on the cost of debt, and not assuming that a similar credit rating automatically means a similar level of risk.

5.4. We have not sought in this submission to address the issue of the ERA's bond-yield approach. We remain opposed to it for the same reasons the ERA suggests when it uses its own criteria to assess the Bloomberg yield curves; it is not transparent even on the basic issue of what firms go into it, it has proven difficult to replicate by expert, objective consultants using the same input data and it is not robust to small changes in its assumptions. The AER (page 99 of its ES) has chosen not to make use of an in-house approach due to the problems it creates in respect of debate over estimation methods and data selection.

5.5. Moreover, we note that the ERA has undertaken an assessment comparing the results of its own approach with those from yield curves. However, as the submission by UED-Multinet points out, the ERA's analysis on this issue contains a number of errors, and once these are corrected, the similarities the ERA believes exist, are not there. Once again, we would suggest that the ERA obtain objective, third-party peer review of its empirical work before allowing it to form part of a public document.

Trailing averages and on-the-day

5.6. The basic point associated with the debate on trailing averages versus on-the-day approaches is fairly simply made with reference to a trade-off between allocative and productive efficiency. If it is the case that the most efficient form of financing for an energy utility is to stagger its debt over several time periods (as seems to be the case, since most energy firms around the world do so), then an argument can be made that regulation which reflects this staggered debt supports productive efficiency. However, this support comes at the cost of allocative efficiency, because the prices charged by the regulated energy utility will reflect different interest rates than affect pricing in the economy more generally, resulting in too many or too few resources being devoted to the energy sector at that point in time.

5.7. The ERA has produced a much clearer indication of what it means in terms of "mismatch timing risk" than in its previous debt paper. If, as the ERA appears to say, it merely means that firms face a risk because the rate which the regulator uses to determine price

differs from the rate they have paid on debt, then the point is entirely uncontroversial; the AER makes precisely the same point when it refers to "interest rate risk" (AER ES, p81).

5.8. However, if this is the case, then the relevant trade-off is between any productive efficiency losses within the firm that come from the regulator not using a debt schedule that matches the staggered debt profile the firm has adopted to minimise its refinancing risks and thus its overall operating costs, and any allocative efficiency losses which occur in the economy as a whole because the rates driving utility prices are either too high or too low relative to other sectors of the economy.

5.9. This is very easy to suggest in principle, but in practice, the trade-off is very difficult to calculate, and is made more complex by the seminal work of Lancaster & Lipsey (1956-7) who show that, in an economy where imperfect competition is pervasive, moving one price towards marginal cost will have totally unpredictable effects on overall welfare and thus allocative efficiency; it may in fact be decreased, not increased.

5.10. Assuming that refinancing risk makes multiple debt tranches efficient, the stance taken by the AER in supporting a trailing average approach means either that allocative efficiency issues are small and thus focusing on productive efficiency within the firm is appropriate, or that one should accept the Lancaster & Lipsey (ibid) proposition that it is incalculable, with the same result. The ERA's position, by contrast, places more weight on allocative efficiency concerns, and ignores Lancaster & Lipsey (ibid).

5.11. We have no firm view about whether the ERA or the AER are correct in their implicit assumptions about productive and allocative efficiency, and we suspect that proving the case either way is impossible. For this reason, we do not think a prima-facie case has been made that either approach is better, and we thus support, as the NGR suggests, that the "correct" choice (absent of gaming considerations) be left to the regulated firms.

5.12. However, we do believe that there are issues with the ERA proposed annual updating mechanism, which is introduced as a kind of "fix" (see paragraphs 347-50 of the ES) to the mismatch timing risk the ERA's on-the-day approach engenders. There are two problems. The first is that, on the basis of the allocative efficiency arguments outlined above, there is no "fix" needed; the regulator has taken a view on the trade-off between allocative and productive efficiency, and has found in favour of the former. This, as we suggest above, is a perfectly reasonable position for the ERA to take.

5.13. The second is more problematic; the fix creates substantial regulatory risk, and thus raises prices for consumers. To see this, consider a pipeline with $1 billion in debt currently facing an interest rate of five percent per annum. If interest rates rise to 6 percent next year, then under the ERA's scheme, costs to consumers will rise by $10 million per annum as the whole billion dollars is revalued at the new interest rate. By contrast, the AER's scheme, if it is based on a seven-year trailing average, will see prices rise by only $1.5 million. If interest rates instead fall to 4 percent, the falls in price will have similar differences in magnitude. Thus, the ERA's scheme creates more volatile prices than that of the AER.

5.14. Our main aim as a business is to match revenues to costs (we do not speculate on interest-rate movements) and we would thus attempt to obtain 12-month hedges to maintain our debt covenants (which would need to change in light of the new regulatory environment). Consumers would therefore bear the more volatile prices.[28]

[28] The ERA's suggestion that consumers are not well-placed to bear such risks is incorrect. Energy retailers deal with far greater volatility in the NEM, and pass on relatively stable electricity prices to final consumers, and do so

5.15. This would not occur, however, if the ERA fixed consumer prices (except for CPI) during the regulatory period, and required regulated firms to bear the risk; compensating us in future periods through some form of "true-up" mechanism which the ERA appears to be contemplating would involve amortising the over or under over the following access period. What would happen is that DBP's profits would fluctuate much more substantially than they do at present, because costs would change whilst revenues would not. This would, by mathematical necessity, result in a higher beta; risk does not disappear but is simply moved between different stakeholders. This, in turn, would result in higher prices for consumers through a higher return on equity and would, incidentally, mean East Coast energy firms who are not subject to this regime would no longer be a suitable proxy for calculating beta. Since the ERA's "fix" is not necessary, it is unclear to us why the ERA is seeking to increase volatility and costs.

Predictability

5.16. There is nothing in the discussion above about predictability. This is because it is a red-herring in the debate about why an on-the-day approach might be favoured. Allocative and productive efficiency are static concepts; they refer to a state of the economy and firm (respectively) at a particular point in time; they are not inter-temporal concepts. The AER is clearly aware of this when it defines these terms thus:

(a) productive efficiency refers to least cost financing (i.e. the lowest required return on debt)

(b) allocative efficiency refers to the allowed return on debt reflecting the expected required return on debt, and

(c) dynamic efficiency refers to the existence of appropriate incentives for inter-temporal decisions of energy consumers and investors.

5.17. This can be clearly seen by recasting our example from our submission to the ERA's recent debt paper. Suppose there are two firms who borrow today (for two periods) at five and seven percent respectively. Suppose the interest rates of tomorrow are unknown today. Suppose tomorrow that interest rates turn out to be seven percent. The second firm has predicted future interest rates better than the first, but is it more productively efficient? Clearly it is not; the first firm has lower costs (purely by luck, but it has lower costs) and this is the defining factor in productive efficiency. Is allocative efficiency improved by allocating more resources (say variable, rather than fixed cost items) to the second firm? Again, the answer is no; the goods available to the wider economy will have a higher price than is possible if resources are allocated to the first firm. Indeed, in this situation, the first firm will compete the second firm out of the product market through lower market prices, and out of the input market(s) through being able to pay higher input costs.

5.18. Dynamic efficiency is an inter-temporal concept, but here too, links between predictive power and efficiency are thin at best; unless one is talking about the efficient market hypothesis (not dynamic efficiency) which highlights the difficulty of making any kind of prediction that can be usefully exploited because the "edge" will already be reflected in current prices. Dynamic efficiency is enhanced by making investment which lowers future costs. An investment made in the first period in the second firm with its interest rate of seven percent in the example above would be entirely wasted as that firm will be

through dealing with volatility through financial market instruments. This is in fact commonplace in electricity markets around the world.

competed out of existence in the second period by the firm facing an interest rate of five percent, and thus the result would be a decrease in dynamic efficiency.

As this simple example shows, predictability and efficiency are not related concepts, we are unsure why the ERA pursued this argument, nor why it continues to do so when its own position favouring the on-the-day approach is in fact supported by considerations of productive and allocative efficiency alone.

The reason may be because the ERA has empirical evidence which it considers points to the on-the-day approach having greater predictive power. Here too, the evidence is not compelling. In our submission to the Debt Paper we made use of a shorter debt series, and found problems in terms of the stationarity of the actual test statistic and the error vectors. Our original work contained errors (which the ERA pointed out), in that the stationarity tests we applied did not contain a trend term. This has been corrected, and the results are shown below. Note that we have not undertaken the Diebold Mariano (DM) test per se, but only examined the stationarity of the data doing into the test; an examination which shows that the analysis itself is largely pointless. We show first the stationarity of each of the averaging period forecast errors (the same information in the ERA's Table 35 on page 249 of the ES), and then show the stationarity of the DM-test statistic in each of the same eight cases examined by the ERA (equivalent to its Table 36 and 37 on para 250 of the ES); as the ERA has done, we have taken the difference of the absolute values of the relevant errors as the loss-differential to be calculated. Unlike the ERA, we have made use of both the Philip-Perron (pp) and the Dickie-Fuller (adf) tests of stationarity, because the former have more power in the presence of serial correlation. We note that the low power of stationarity tests in general mean that it is commonplace for econometricians to make use of several tests in conjunction with one another. In both cases, if the test statistic sits "inside" the critical values (ie – closer to zero in absolute value terms), then this indicates that the variable is non-stationary, and if it has the opposite sign to the critical values it indicates that the process may be explosive. Like the ERA, we consider critical values at the one, five and ten-percent levels of significance.

Table 3: Predictability for 1995-2013 data – 10 year CGS

Averaging period forecast errors stationarity tests								
	PP				**ADF**			
	Test statistic	**Critical values**			**Test statistic**	**Critical values**		
		1%	**5%**	**10%**		**1%**	**5%**	**10%**
20-day fixed (TDEF)	-1.71	-3.97	-3.41	-3.13	-2.84	-3.96	-3.41	-3.12
20-day annual update (TDEAU)	0.20	-3.97	-3.41	-3.13	0.85	-3.96	-3.41	-3.12
60-day fixed (SDEF)	-1.34	-3.97	-3.41	-3.13	-2.82	-3.96	-3.41	-3.12
60-day annual update (SDEAU)	2.31	-3.97	-3.41	-3.13	3.36	-3.96	-3.41	-3.12
1-year fixed (YEF)	0.52	-3.97	-3.41	-3.13	-1.59	-3.96	-3.41	-3.12
1-year annual update (OYEAU)	5.00	-3.97	-3.41	-3.13	5.31	-3.96	-3.41	-3.12
5-year fixed (FYEF)	7.52	-3.97	-3.41	-3.13	0.83	-3.96	-3.41	-3.12
5-year annual update (FYEAU)	12.00	-3.97	-3.41	-3.13	14.02	-3.96	-3.41	-3.12
10-year fixed (TYEF)	8.30	-3.97	-3.42	-3.13	0.26	-3.96	-3.41	-3.12
10-year annual update (TYEAU)	5.71	-3.97	-3.42	-3.13	6.38	-3.96	-3.41	-3.12
Loss differential series stationarity tests								
	PP				**ADF**			
	Test statistic	**Critical values**			**Test statistic**	**Critical values**		
		1%	**5%**	**10%**		**1%**	**5%**	**10%**
TDEF-SDEF	-5.85	-3.97	-3.41	-3.13	-10.56	-3.96	-3.41	-3.12
TDEF-OYEF	-2.60	-3.97	-3.41	-3.13	-4.95	-3.96	-3.41	-3.12
TDEF-FYEF	-2.42	-3.97	-3.41	-3.13	-4.19	-3.96	-3.41	-3.12
TDEF-TYEF	-1.44	-3.97	-3.42	-3.13	-3.24	-3.96	-3.41	-3.12
TDEAU-SDEAU	-6.83	-3.97	-3.41	-3.13	-5.55	-3.96	-3.41	-3.12
TDEAU-OYEAU	-1.78	-3.97	-3.41	-3.13	-1.06	-3.96	-3.41	-3.12
TDEAU-FYEAU	-0.15	-3.97	-3.41	-3.13	-1.26	-3.96	-3.41	-3.12
TDEAU-TYEAU	-1.01	-3.97	-3.42	-3.13	-1.55	-3.96	-3.41	-3.12

5.19. The different averaging-period forecasting errors show no evidence of stationarity. In simple terms, this means the models (ie – the different averaging periods) are simply very poor at out-of-sample prediction. Usually, an econometrician facing two poorly-performing models will not bother to test which is worse (which is what the DM test does), but will throw both out and try and find a better model.

5.20. Here, following the ERA, we instead try and find out which of the bad models is better by examining the DM-test. The validity of the DM-test (in terms of its critical values) depends upon covariance stationarity; when the test-statistic itself is stationary. Otherwise, it provides no information about which model is better. Here, there is some reasonably strong evidence (that is, both tests of stationarity agree; note that the models are still poor models) that the 20-day fixed average model and 20-day annual updating models are better than their 60-day equivalents, and some weaker evidence (only from the adf test) that the 20-day fixed average model is better than the one and five year fixed models. This is hardly the conclusive case the ERA presents; even in the shorter dataset it presents in Table 37.[29]

5.21. The ERA makes the (correct) point that in short time periods, stationarity tests are weak. Although our original work had data from 1995 to 2013, several years of data are removed

[29] This model from the ERA uses different data to that which we used in our earlier submission.

through the five and ten-year averaging processes, and many of the daily averages overlap each other. To overcome this, we made use of a longer dataset, going back to 1984.

5.22. We note that the ERA makes use of data going back to 1979, which is the total of data available from Bloomberg that is daily, for the 10-year Commonwealth Government Security. However, we note that the ERA's own consultant (see DAA, 2013) pointed out that, in such long data-sets, it is important to test for structural breaks; changes in the underlying economy which mean that relationships which held at one point in time have changed their nature at another point in time. This is a trap for econometricians using time-series data; more data means that the power of the statistics might improve, but it also means that the results might be nonsense because the analyst is failing to take underlying changes in the economy into account.

5.23. Noting the ERA's comments about short time periods in its assessment of our earlier work, we sought to look at a longer time-period, in an attempt to replicate the ERA's findings. At the same time, we note elsewhere in its ES, that the ERA proposes to use a five-year Commonwealth Government Security rather than a 10-year Security, to estimate the risk-free rate. We were therefore curious as to why the ERA has undertaken its DM-tests using the government bond which it says does not represent the proper risk-free rate for regulation. For this reason, we undertook the same stationarity tests as above using the five-year and the ten-year Commonwealth Security.

5.24. Both Bloomberg and the RBA have consistent daily data on the five-year CGS from around October 1983 onwards. This is a couple of months before the float of the A$; perhaps one of the most important monetary policy initiatives of the past 40 years in Australia, and one which is likely to have had a profound effect on interest rates. We therefore start our investigation in January 1984, just after the float. We have not examined whether the float is in fact a structural break in the series, but we have assumed that it probably was, and accordingly started our analysis it. The results are shown in the tables below.

Table 4: Predictability for 1984-2013 data – 5 year CGS

Averaging period forecast errors stationarity tests								
	PP				**ADF**			
	Test statistic	**Critical values**			**Test statistic**	**Critical values**		
		1%	**5%**	**10%**		**1%**	**5%**	**10%**
20-day fixed (TDEF)	-2.07	-3.96	-3.41	-3.13	-3.66	-3.96	-3.41	-3.12
20-day annual update (TDEAU)	-4.13	-3.96	-3.41	-3.13	-3.90	-3.96	-3.41	-3.12
60-day fixed (SDEF)	-1.50	-3.96	-3.41	-3.13	-4.42	-3.96	-3.41	-3.12
60-day annual update (SDEAU)	-2.17	-3.96	-3.41	-3.13	-1.37	-3.96	-3.41	-3.12
1-year fixed (YEF)	-1.59	-3.96	-3.41	-3.13	-3.93	-3.96	-3.41	-3.12
1-year annual update (OYEAU)	-1.53	-3.96	-3.41	-3.13	-1.46	-3.96	-3.41	-3.12
5-year fixed (FYEF)	-1.11	-3.97	-3.41	-3.13	-1.28	-3.96	-3.41	-3.12
5-year annual update (FYEAU)	-0.38	-3.97	-3.41	-3.13	-0.29	-3.96	-3.41	-3.12
10-year fixed (TYEF)	0.04	-3.97	-3.41	-3.13	-0.79	-3.96	-3.41	-3.12
10-year annual update (TYEAU)	-0.89	-3.97	-3.41	-3.13	-1.08	-3.96	-3.41	-3.12
Loss differential series stationarity tests								
	PP				**ADF**			
	Test statistic	**Critical values**			**Test statistic**	**Critical values**		
		1%	**5%**	**10%**		**1%**	**5%**	**10%**
TDEF-SDEF	-8.71	-3.96	-3.41	-3.13	-15.69	-3.96	-3.41	-3.12
TDEF-OYEF	-3.30	-3.96	-3.41	-3.13	-6.02	-3.96	-3.41	-3.12
TDEF-FYEF	-1.36	-3.97	-3.41	-3.13	-2.50	-3.96	-3.41	-3.12
TDEF-TYEF	-1.47	-3.97	-3.41	-3.13	-2.41	-3.96	-3.41	-3.12
TDEAU-SDEAU	-9.55	-3.96	-3.41	-3.13	-9.20	-3.96	-3.41	-3.12
TDEAU-OYEAU	-4.20	-3.96	-3.41	-3.13	-3.27	-3.96	-3.41	-3.12
TDEAU-FYEAU	-1.24	-3.97	-3.41	-3.13	-0.93	-3.96	-3.41	-3.12
TDEAU-TYEAU	-1.14	-3.97	-3.41	-3.13	-1.26	-3.96	-3.41	-3.12

Table 5: Predictability for 1984-2013 data – 10 year CGS

Averaging period forecast errors stationarity tests								
	PP				ADF			
	Test statistic	Critical values			Test statistic	Critical values		
		1%	5%	10%		1%	5%	10%
20-day fixed (TDEF)	-2.24	-3.96	-3.41	-3.13	-4.08	-3.96	-3.41	-3.12
20-day annual update (TDEAU)	-4.67	-3.96	-3.41	-3.13	-3.90	-3.96	-3.41	-3.12
60-day fixed (SDEF)	-1.48	-3.96	-3.41	-3.13	-4.49	-3.96	-3.41	-3.12
60-day annual update (SDEAU)	-2.39	-3.96	-3.41	-3.13	-1.43	-3.96	-3.41	-3.12
1-year fixed (YEF)	-0.97	-3.96	-3.41	-3.13	-3.11	-3.96	-3.41	-3.12
1-year annual update (OYEAU)	-0.04	-3.96	-3.41	-3.13	0.28	-3.96	-3.41	-3.12
5-year fixed (FYEF)	-1.49	-3.97	-3.41	-3.13	-1.20	-3.96	-3.41	-3.12
5-year annual update (FYEAU)	-0.52	-3.97	-3.41	-3.13	-0.43	-3.96	-3.41	-3.12
10-year fixed (TYEF)	-0.04	-3.97	-3.41	-3.13	-0.93	-3.96	-3.41	-3.12
10-year annual update (TYEAU)	-0.58	-3.97	-3.41	-3.13	-0.64	-3.96	-3.41	-3.12
Loss differential series stationarity tests								
	PP				ADF			
	Test statistic	Critical values			Test statistic	Critical values		
		1%	5%	10%		1%	5%	10%
TDEF-SDEF	-8.73	-3.96	-3.41	-3.13	-15.40	-3.96	-3.41	-3.12
TDEF-OYEF	-3.64	-3.96	-3.41	-3.13	-6.53	-3.96	-3.41	-3.12
TDEF-FYEF	-1.64	-3.97	-3.41	-3.13	-2.89	-3.96	-3.41	-3.12
TDEF-TYEF	-1.50	-3.97	-3.41	-3.13	-2.52	-3.96	-3.41	-3.12
TDEAU-SDEAU	-9.63	-3.96	-3.41	-3.13	-10.09	-3.96	-3.41	-3.12
TDEAU-OYEAU	-4.49	-3.96	-3.41	-3.13	-3.66	-3.96	-3.41	-3.12
TDEAU-FYEAU	-1.45	-3.97	-3.41	-3.13	-1.17	-3.96	-3.41	-3.12
TDEAU-TYEAU	-1.05	-3.97	-3.41	-3.13	-1.26	-3.96	-3.41	-3.12

5.25. The picture which emerges for both the five and ten-year CGS is very similar; only the 20 and 60-day averages are stationary (although the 20-day annual update comes close), meaning that almost all the models are poor models. Note that this is despite adding more than a decade of data; and only four-years less than the ERA has used. Again, there is some support for the 20-day forecast as being a better model than the sixty day model, both in terms of fixed and annual updating, but the tests do not show it is any better than some of the longer-term averages. Moreover, since the 20 and 60-day averages are poor models on the basis of their (generally) non-stationary error vectors, it is difficult to make the conclusion, based on this data, that the shorter averaging period is better.

5.26. The final question is what one is to make of all of this. One could conclude that going back to 1984 still doesn't give enough data to make the tests sufficiently powerful, and therefore one ought to go back further, as the ERA has done. However, this seems somewhat unlikely to be the case, and the problem with such an argument is that one has to explain why the premia no longer holds in two shorter time periods that arguably have more relevance to today. It is at this point that it may be best to invoke the ERA's own criteria of simplicity over complexity and note that, whilst it is possible to get a dataset which shows the answer the ERA appears to be seeking in respect of predictability, this result is highly sensitive to small changes in the input data (another ERA criteria), and thus the thesis of superior predictability does not have enough robust support to form the basis for regulatory policy. It is fortunate, therefore, that the ERA does not actually need

arguments about predictability (indeed, these hamper its case by being based on unsound economics, as argued above) to support its preference for an on-the-day approach, which can be supported by an assertion that allocative efficiency is a more important consideration than productive efficiency (as outlined above).

The problem with Lally and Davis

5.27. The ERA has come out strongly in favour of a five-year term for both debt and equity, a conclusion which differs from the AER. Interestingly, both the author of the paper the ERA uses to support its position on the market risk premium (Damodaran, 2008) and the authors of the textbook it uses in its assessment of the Arbitrage Pricing Model (Pratt & Grabowski, 2010) have been used as references by the AER to argue that the return on equity, at least, ought to be set to match the long-term nature of the assets.[30] It is interesting that two regulators could read the same literature and come to different conclusions.

5.28. The ERA offers two justifications for its idiosyncratic viewpoint. The first of these is theoretical, based on the work of Lally (2007) and Davis (2012).[31] The second is "empirical", and based on the ERA's own assessments of the term of debt actually sought by regulated firms. However, we believe that neither of these arguments are particularly compelling.

5.29. In relation to the empirical evidence, in Chapter 7 of the Explanatory Statement, the ERA presents evidence that the term of debt at issue for regulated firms is, on average, around 10 years. This is actually relatively short compared with overseas jurisdictions (see, for example, CEG's paper on credit rating in our appendices or its more detailed work for the ENA in its recent submission to the AER) and is due less to a lack of desire on the part of infrastructure owners to issue long-term debt and more to a lack of market desire within Australia to buy such debt; unlike the US and UK, longer term corporate debt markets are not particularly liquid in Australia. It is an open question whether regulators ought to follow what regulated firms would prefer to do in respect of debt issuance, or what they are constrained by wider market imperfections from doing, but not one which we will pursue further here.

5.30. Having established that firms issue debt for ten years, the ERA makes the further finding that the average term to maturity is five years. This is less a finding and more of a mathematical necessity, but it is used by the ERA to justify its position that the term of debt should be five years. Whilst it is true, as the ERA suggests, that the yield to maturity is a much better forward-looking indicator of a firm's debt risk than the original debt yield (which reflects the economic conditions at the time the debt was issued, not the present), it is not true that the average term on debt has a similar forward-looking characteristic. The average term to maturity is a product of nothing more than a series of past decisions on when and at what term to issue debt; it does not even tell the analyst anything about whether the market's (or the firm's) preferences for debt tenor have changed over time, as a six-year debt issued three years ago will have the same term to maturity as a nine year debt issue six years ago. If the ERA intends to be forward looking and understand something about the future of the debt market, it needs to examine the term of the each debt issue made by a firm as it is issued, making use in particular of more recent debt issues which contain better information about current conditions.

[30] This is also the conclusion from Incenta (2013) who surveyed practitioners on this issue.

[31] As APA details in its submission (and we pointed out in our submission to the ERA's debt paper), neither Marshal et al (1981) nor Schmalensee (1989) provide the kind of support for debt and equity terms matching regulatory terms that Lally and Davis do. We note that both Lally and Davis have several papers (mostly for regulators), but these two papers outline their respective positions in the greatest detail

5.31. On the question of theory, we explore the arguments of Lally (2007) below, and note that APA also considers those of Davis (2012). We both reach similar conclusions about the validity of these models. Before we do so, we note that, even if one were to agree with Lally (2007) in his original paper, the ERA takes Lally's conclusions far further than Lally does, particularly in justifying its annual updating approach. The ERA may have satisfied itself that this still meets Lally's NPV=0 condition, but it provides no proof of this.

5.32. The basic issue with Lally's (2007) framework is that it is designed to make only his Policy One (the term of debt matches the regulatory period).[32] This has two aspects. Firstly, there is no two-year risk free rate in Lally's model; by his own construction, the risk free rate in year two is the one-year rate because there are only two time periods in his model. This means, by virtue of this one assumption on the part of Lally, only Policy One can meet his NPV=0 condition. Secondly despite Lally admitting that the owners of firms face refinancing risk and, as the AER points out (p183), the risk that the RAB will not equal its expected value with certainty, he discounts second year returns at the risk-free rate at the end of year one.[33] This is clearly wrong, if returns are uncertain in practice (for debt-holders; due to the risk of default), then they should be discounted at the two-year spot rate, not the risk-free rate.

5.33. If this is done, the outcome of Lally's (2007) Policy Four is exactly the same as the outcome of his Policy One, and the conclusion is that the term of debt used by the regulator ought to be the same as the term of debt used by the firm; precisely what regulated firms have been saying to regulators for many years. The result upon which the ERA pins much of its reasoning on the term of debt (and equity, by extension, where the argument is even weaker; see Incenta, 2013, for a more detailed treatment of these issues, or the AER's ES for a summary) rests on little more than Lally's own assumptions about interest rates; assumptions which he himself has later said are unrealistic in most practical situations.

5.34. We note further that Lally (2007) is based on a rate of return regulatory framework. The ERA misquoted DBP's submission to its debt paper; we did not say that the NPV=0 framework does not apply under a price cap approach, but rather that Lally's model was not a price cap model, and that the veracity of Lally's conclusions within a price-cap framework had not been established.

5.35. Looking just at Lally's (2007) Policy One, and converting his equation (1) and equation (4) to the type of price cap return that firms in Australia actually face gives the following:[34]

$$Rev_2 = \frac{D_2}{E_1(D_2)}[C(1-k) + C(1-k)R_{12}] \quad \text{and} \quad Rev_1 = \frac{D_1}{E_{0(D_1)}}[Ck + CR_{01}]$$

[32] Lally has written numerous papers, mostly for regulators, but this 2007 paper contains the most detailed treatment of his full model, and is published in an academic journal.

[33] Wright (2012 p2) points out that "Professor Lally's analysis is theoretically correct, ut only given his key assumption that the income stream of the regulated firm is risk free. When this assumption does not hold (which is all the time in practice) the appropriate discount rate must contain an additional risk premium". Wright also points out that Lally himself is aware of this fact.

[34] All terms are as defined in Lally (2007), with the exception of D_i which represents actual demand in period *i*, and $E_j(D_i)$, which is the expectation of demand in period *i*, made at period *j*. The formulations above reflect the fact that the price cap is found by dividing expected revenue (in Lally, 2007) by expected demand to get the price cap, and then multiplying that by actual demand as it transpires to get actual revenue.

5.36. Following the same approach as in Lally's (2007) equations (2) through (4) gives the following alternate equation (5):

$$PV_0 = \frac{1}{1+R_{01}}\left[R_{01}\left(\frac{D_1}{E_0(D_1)} - L\right) + \left(\frac{D_2}{E_1(D_2)} - L\right) + k\left(\frac{D_1}{E_0(D_1)} - \frac{D_2}{E_1(D_2)}\right)\right]$$

5.37. Under the very simplest of Lally's (2007) frameworks, Policy One, his conclusions that the term of debt ought to match the regulatory term only obtains in a price-cap framework if:

(a) The regulator is exactly right, and expected demand is identical to the regulator's expectation of demand.

(b) The regulator makes exactly the same mistake every period so that the ratio of actual demand in period one compared to the forecast matches the ratio of actual demand in period two compared to the forecast.

5.38. Only in these two extreme cases does Lally's (2007) basic result still stand for his Policy One, but in all intervening cases, it does not and, as has been the case made consistently by regulated firms all along (and recognized by the ERA, as evinced by the quotation above) demand uncertainty means that One cannot model the regulatory framework in the same simplistic way that Lally does.

5.39. We note that our criticisms above are not particularly new; they have been raised by numerous experts in submissions to regulators around Australia. Lally's work was also criticized when it was first published in 2007, in the same journal issue, for reasons analogous to those above.

5.40. In the papers by Lally (2007) and Hall (2007), fundamentally different conclusions are reached. Lally's conclusion is that the only way in which the present value of expected cash flows can equal zero is if the term to maturity is equal to the risk free rate. In contrast, Hall says there is absolutely no reason for these two terms to be equivalent. So for practical purposes, Lally says that if the regulatory period is equal to five years, the yield on debt must be set with reference to a five year term. Hall says that the terms are independent. The implication is that the term to maturity should be set with reference to the term to maturity of debt normally used upon issuance.

5.41. Why do they reach such fundamentally different conclusions? There are differences in finance theory to consider, as well as practical issues, which are considered in turn.

5.42. With respect to issues of finance theory, Lally's model is based upon the view that the firm is immunised against interest rate risk outside the regulatory period because, whatever the interest rate is next period, the regulated rate of return will be reset to match this rate. Hall, instead, states that the value of the asset in the market today will be set with reference to expectations for all interest rates over the life of the asset. There is an expectation of the regulated rate of return next period, which is used to estimate expected cash flows, and these expected cash flows are discounted today at a rate relevant to that second regulatory period. Now if the term to maturity is set equal to the regulatory period, the expected rate which is used to determine the cash flows is the five year rate expected to prevail next period. The NPV = 0 equation will only hold if these cash flows are also discounted at the expected five year rate next period. In turn, this only holds if the pure

expectations hypothesis of interest rates is correct – that forward rates today are an unbiased predictor of expected future spot rates.

5.43. So, in short, Hall's argument is that Lally's conclusion relies upon an assumption that forward rates are an unbiased predictor of future spot rates. Lally disagrees, claiming that he makes no such assumption.

5.44. With respect to practical implications, there are three implications of Lally's conclusion which the ERA needs to resolve if it continues to equate the term to maturity on debt with the regulatory period.

5.45. First, if Lally's argument is true, the regulator is no longer setting prices that are expected to prevail in a competitive market. The regulator only has a role because there is some impediment to prices being set according to competitive market forces. So it seems than a fundamental principle of regulation is to replicate competitive market outcomes. More often than not, the yield curve is upward sloping. So, on average, if we decrease the term to maturity used to estimate the cost of debt, we decrease prices. But the term of the regulatory period has nothing to do with prices expected to prevail in a competitive market. It represents a trade-off between the administrative burden of regulation, and a desire to revisit regulated prices on a timely basis. So if the regulatory period was decreased to three years, or one year, with the associated average reduction in prices, how could this be said to replicate competitive market outcomes?

5.46. Second, and building from the first point, Lally's argument relies upon an assumption that the regulator can immunise the firm from risk by shortening the regulatory period. Under Lally's approach, the lower return on debt from a shorter term to maturity is the correct discount rate, because the lower return is just right to compensate for the firm being exposed to less risk. But it seems implausible that we could lower risk, reduce prices and leave the value of the firm unchanged just by shortening the regulatory period. The ERA proposes to reset the cost of debt each year, but with reference to the five year rate. If the ERA believed the argument of Lally it would reset the cost of debt each year with respect to a one year rate, which is completely at odds with the financing of infrastructure investment.

5.47. Third, the market risk premium would need to explicitly account for the fact that a five year term to maturity is used in the estimate of the risk free rate. This is because the expected return on the market is entirely independent of the administrative decision to issue regulatory decisions over a particular time period. Suppose that on Monday the regulator thought that the best estimate of the market return, each year over the next five years, was 12%. On Tuesday the government announced that the regulatory period will be lengthened to six years. What information could possibly alter the expectation for the expected return on the market? So if the expected market return is unchanged, but the risk-free rate is altered, by necessity the market risk premium estimate should reflect this change.

Risk and debt

5.48. A final issue which we consider is the cost of debt for the BEE, and the information which informs it. We note that the ERA is not correct to suggest (ES P89) that both equity and debt holders face only systematic risk (the discussion is about the benchmark rate of return more generally, but in the context of a wider discussion about credit rating), whereas, as the AER points out, they in fact face systematic, credit and liquidity risk (AER ES, p162). This seems likely to be simply an editorial error on the part of the ERA, and we trust it will be corrected in the Final Guidelines to avoid confusion for stakeholders.

5.49. Two more substantial errors remain. The first is the consequences of a failure to include a mechanism which explicitly checks for consistency between the cost of equity and debt. The DG suggests that the ERA believes the BEE ought to have a credit risk in the band BBB-/BBB/BBB+. However, plugging the values in the ES into a financial model of the BEE, particularly the beta value of 0.5, produces an entity which would, at best, face a credit rating of BBB-. As we note above, this is likely due to the fact that the beta values in the ES are simply wrong. However, it illustrates the need to have a proper mechanism of checking consistency to ensure errors in the ES are not repeated in an Access Arrangement. We have suggested such a "circling back" mechanism in previous submissions to both the ERA and AER, and are pleased to see the AER has taken up this suggestion. We look forward to seeing a similar mechanism in the ERA's Final Guidelines.

5.50. The second issue relates to the choice of firms and the cost of debt which is calculated. We commend the ERA for not assuming a single benchmark across gas and electricity, as the AER has done, and for introducing to regulation in Australia the FERC notion of "risk-matching". However, we would urge the ERA not to adopt a naïve assumption that the same credit risk means the same cost of debt. Instead, we would suggest that several other factors are also important. This matter was addressed in DBP's initial submission to the ERA's initial issues paper.

5.51. To begin to explore this question, we engaged CEG to make use of a US database to ascertain some of the driving forces for credit ratings amongst US energy firms. This database included largely financial information, meaning CEG were not able in the short time available to examine factors such as population, customer composition or terrain and seasonality as factors driving credit risk. For this reason, its analysis opens, rather than concludes a debate and its findings should be viewed as exploratory. Nevertheless, some interesting results emerge.

5.52. The first of these is that gas transmission pipelines have a credit rating which is one notch below those of other energy firms (gas distribution, electricity transmission and distribution and mixed utilities). This confirms the ERA's own analysis in Chapter 8 of the ES.

5.53. What is more interesting is that gas transmission pipelines have lower gearing and a lower EBITDA margin volatility than other energy firms, which ought to give them a higher credit rating, all else being equal. This suggests that other factors, not contained in the dataset used by CEG, are driving the credit ratings of US gas transmission pipelines. It further suggests that, on a equal-gearing basis, such pipelines ought to be several notches below other energy firms. This means that, if the ERA has concluded that gas firms in general have a range of credit-ratings between BBB- and BBB+, then distribution systems (actually the highest rated in US data) ought to sit at the top and gas transmission pipelines ought to sit at the bottom of this range.

6. GAMMA

6.1. We do not have any in-principle concerns with the ERA's work on gamma, and would support ongoing work making use of the dividend drop-off method. In fact, this aspect represents an area where it is the AER which is deviating from best practice, by attempting to revive methodologies based on tax statistics which have previously been dismissed by the Competition Tribunal. We would urge the ERA to maintain its stance in this regard.

6.2. The only substantive comment we would make is that the ERA's work does not reflect some recent work on the topic, due largely to the fact that this later work was largely undertaken contemporaneously with that of the ERA and has only entered the public domain more recently.

6.3. We note that the ENA is currently preparing a submission for the AER's Draft Guidelines which includes some of this more recent work and provides a critique of the ERA's own work; some of which exhibited methodological errors which mean that it is actually the lower end of the ERA's calculated range for theta which is more accurate.

6.4. Although the ENA's submission will come after the close of submissions for the ERA's Draft Guidelines, we would urge the ERA to make use of it to fine-tune its approaches to gamma estimation in the Final Guidelines.

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APPENDICES (SEE SEPARATE PDF FILES)

ACIL-ALLEN EFFICIENCY STUDY

SFG BETA STUDY

CEG BETA STUDY

CEG CREDIT RISK STUDY

DBP CONFIDENTIAL ATTACHMENT