Submission to the Australian Energy Regulator's

Rate of Return Guidelines May Consultation Paper

June 2013

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1. Executive Summary

The AER's Rate of Return Guideline Consultation Paper provides industry participants with a wide range of issues that reflect the many considerations in deriving a regulated rate of return that is consistent with the requirements of the new Rule 87 of the NGR. APIA is of the view that the following are most significant.

The AER's decision making 'criteria' are sound and reflect principles associated with sound economic assessment, based on rigorous analysis and commonsense. However, one of the criteria has potential for misapplication and that is the criterion "Promote simple over complex approaches where appropriate". It is critical to the application of this criterion that there is clarity about what "where appropriate' means. In APIA's view simple approaches should only be applied where there is no material benefit to be gained from more complex approaches. It is essential that the AER justifies such decisions.

In particular, the apparent preference for use of a single benchmark entity, is a simplification of the real world that must be soundly justified. APIA is particularly concerned, because of the very different risk profiles of gas transmission businesses when compared to electricity transmission and distribution businesses. It is clear to APIA that the risks that affect both the rate of return on equity and the rate of return on debt for pipelines are not similar to those of the electricity businesses; nor are they similar to each other. If the AER is to apply the same benchmark efficient entity to gas pipelines it must demonstrate that it has adequately evaluated the risk profiles and that they are clearly similar. APIA is confident that if this task is undertaken rigorously the AER will not reach this conclusion. The work done to date by the AER and its consultants on assessing risk profiles is insufficient and more rigorous analysis is required.

The new Rule 87 introduced to the NGR (with its similar Rules in the NER for electricity transmission and distribution) represent a clear and deliberate move away from a formulaic approach to the determination of the regulated Rate of Return. It brings in a clear intention to use all relevant information, approaches, models and methods in determining the rate of return. In particular there is a move away from determination based on the Sharpe-Lintner Capital Asset Pricing Model (Sharpe-Lintner CAPM) to one that recognises that neither the Sharpe-Lintner CAPM nor any other model for estimating the rate of return on equity is sufficient, on its own, to deliver a reliable estimate of the efficient financing cost of the relevant regulated entity.

It is essential that the AER adopts an approach that properly and fully takes into account the available information. Any form of truncation of this will result in poor estimates of the return on capital and will not comply with the spirit of the new Rule 87, or the letter. APIA urges the AER to embrace a comprehensive approach to consideration of multiple models as proposed in its Approach 4 described in the Consultation Paper, and urges that this approach be applied to both equity and debt estimation.

2. Overview – Overarching Issues

2.1 Relationship of this submission to the AER's consultation process

APIA notes that the AER's consultation process of workshops and expert reports is occurring in parallel to the response to the AER's Consultation Paper. While APIA includes in this submission some references to the expert reports by McKenzie and Partington and Frontier Economics and references to discussions at the workshops, this does not represent any attempt on APIA's part to respond fully to those separate processes. APIA is expecting that the AER will provide an opportunity to formally respond to the expert reports and looks forward to that opportunity.

2.2 Broad context of the Rate of Return Guideline

As recognised by the Consultation Paper the return on capital represents the most significant component of regulated revenue in Access Arrangement decisions. This is more so for pipelines than any other segment of the energy infrastructure industry. Consequently, estimating a regulated rate of return that accurately reflects the efficient cost of capital for pipelines becomes even more important.

APIA understands that setting regulated revenue at a level in excess of efficient costs is undesirable in terms of both economic efficiency and the long term interest of energy consumers because prices will be higher than needed to enable efficient operation of a gas transmission business. However, while pipelines only represent a small portion of delivered costs it also needs to be recognised that pipelines are a critical link in the gas supply chain,

The effect of setting regulated revenues for pipelines below the efficient costs (including the efficient cost of capital) will also be deleterious to economic efficiency and the long term interest of consumers. Underestimating regulated revenues can be expected to affect the reliability and availability of transmission capacity as debt and equity providers become less inclined to make capital available for ongoing operations and capacity expansion to meet new demand. Gary Banks, former Chairman of the Productivity Commission, summarised the problem well in his October 2003 paper when he discussed the need for better recognition of the:

> *tradeoff between cheap services today and inadequate services tomorrow.*[1]

It is therefore crucial that the return on capital determined by the regulators be as close as possible to the actual efficient cost of capital of pipeline businesses, and provide confidence to investors that commercial returns will not endanger future investment through estimation errors resulting in rates of return lower than the efficient cost of capital.

In the light of this APIA is of the firm view that the AER must use all relevant evidence in determining the regulated rate of return, and apply rigorous analysis of the breadth of information and apply sound critical reasoning both in the

[1]The good, the bad and the ugly: economic perspectives on regulation in Australia, October 2003, Gary Banks

development of its Rate of Return Guideline and in making its various regulatory decisions in respect of the rate of return.

2.3 Assessment criteria

The Consultation Paper applies the term 'criteria' to the 'principles' discussed in the AER's Issues Paper. APIA is not concerned by the term applied, but by a clear understanding of what the purpose of the criteria is and how they relate to the AER's role under the NGL and NGR. In APIA's view the 'criteria' are principles and/or tests of analysis and reasoning that seek to ensure both rigour and commonsense. That is they guide the thinking process to be applied by both the AER, service providers and other stakeholders to the regulatory process.

APIA broadly supports the 'criteria' and the conscious articulation of them. However, it has a concern about the 'criterion': "promote simple over complex approaches, where appropriate". While APIA agrees with this 'criterion' in principle we have a concern that there is scope for its misapplication. That is, the determination of when a simple approach should be applied over a complex one. In APIA's view simple approaches must not be chosen as a matter of convenience. It needs to be demonstrated that the benefit of a complex approach is not material before a simple approach is chosen over a complex one.

2.3.1 Key example of inappropriate use of simple over complex 'criterion 'One Benchmark Efficient Firm

A key example of the inappropriate use of the simplicity criterion is the in the choice of the benchmark efficient entity, where it appears to that the AER proposes to adopt a single benchmark efficient firm regardless of differences in the risks associated with the provision of Reference Services. In APIA's view to do so would be to not be consistent with Rule 87(3). For reasons that are set out in Section 3 below there are clearly significant differences in the risks that are factored into the rate of return on equity and the rate of return on debt of electricity distribution and transmission businesses when compared to the risks of gas transmission businesses, as well as differences between individual gas pipelines and electricity utilities.

Electricity transmission and distribution businesses have a large proportion of their assets dedicated to supply of residential energy users for whom electricity is essentially a non-discretionary energy source. This contrasts with gas pipelines that have the majority of their assets dedicated to serving large end users for whom gas is typically a discretionary energy source.

These differences must be properly taken into account in the determination of the allowed rate of return. In APIA's view this requires more than consideration of systematic risk and the beta in a single CAPM model applied to the whole energy sector. Estimation of the rate of return on equity and the rate of return on debt must be properly grounded in the risks to which each service provider is exposed in its provision of reference services (as Rule 87(3) indicates). We further examine

this issue in our discussion of the benchmark efficient entity in Section 3 of this submission.

In any event, the level of systematic risk generally reflected in the rate of return on equity and the credit risks associated with the rate of return on debt are very different for pipelines than for electricity transmission and distribution. While this may be an inconvenient truth, it is one that should not be simplified away. APIA submits that if the AER were to adopt a single benchmark, it would first have to positively demonstrate that there was no material difference in the risks between pipelines and electricity transmission and distribution businesses. The work done by Frontier Economics does not justify this conclusion.

Moreover, the AER must also recognise that the risks that are priced into the rate of return equity and the rate of return on debt are not the same. The rate of return on equity may reflect systematic risk. However, as McKenzie & Partington [2] note while there may be some correlation between the systematic risks captured in the rates of return on equity and debt, the rate of return on debt also captures the specific risks of business. These business risks are different as between pipelines, and between pipelines and other utility businesses.

In APIA's view the AER must articulate how it will recognise the different risks factored into the rate of return on equity and the rate of return on debt as part of its Guideline, and clearly indicate how it will avoid inappropriate simplification in determining the "benchmark efficient firm with a similar degree of risks in providing the reference services".

Where the AER decides to consider use of a simple over a complex approach, to be consistent with this 'criterion' it must demonstrate that a simpler approach better achieved the ARORO than a complex one, ie that it is not sacrificing any material benefits that can be expected to flow from the use of a more complex approach which takes more information into consideration.

2.4 Accurate reflection of Brattle Report

APIA is appreciative that the AER has recognised a number of the arguments and positions proposed by Brattle in its February Report. However, the Consultation Paper does not fully reflect the content of the Brattle Report.

In particular we note:

- Some substantive arguments put forward by Brattle appear are not considered. In particular, the critique of the AER's proposed reasonableness checks
- At some points the Brattle report appears to have been misconstrued. In particular the Consultation Paper construes Brattle as supporting its Approach 3 in respect of the use of multiple models for the cost of equity. This is clearly not the case as will be evidenced by a second report by Brattle attached to this submission.

[2] Risk, Asset pricing Models and WACC, McKenzie and Partington, June 2013

2.5 Sharpe-Lintner CAPM Preference

While not explicit, the AER appears to favour the use of the Sharpe-Lintner CAPM as the single model and the primary model in Approaches 1 and 2 for dealing with multiple models for the cost of equity. This preference was also exhibited in the workshop on multiple models on June 4th, where it was apparent that the AER was using the Sharpe-Lintner CAPM as its "benchmark of truth" to assess other models. The Sharp-Lintner CAPM is not a suitable benchmark for assessing other models, as it is no more likely (in fact it is arguably less likely) to be reflective of actual rate of return expectations than any other model. Moreover, for the reasons articulated in Section 2 and the appendix to this submission APIA is of the view that continued preference for the Sharpe-Lintner CAPM is inconsistent with Rule 87, Revenue and Pricing Principles and the National Gas Objective.

3. Multiple Models Methodology

APIA is strongly of the view that the proper application of rule 87 requires use of a "multiple models methodology".

In accordance with rule 87(4)(a), the allowed rate of return is to be a weighted average of the rate of return on equity and the rate of return on debt. Each of the rate of return on equity and the rate of return on debt is to be estimated such that it contributes to the allowed rate of return objective (rules 87(6) and 87(8), respectively). That is, each must contribute to a rate of return which 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 respect of the provision of reference services (rule 87(3)).

The rate of return on equity and the rate of return on debt are not, then, the observed or actual rates for a specific service provider. They are to be rates which contribute to a rate of return which is commensurate with the efficient financing costs of the benchmark efficient entity, and must be established accordingly.

These rates of return are also to be "forward-looking"; they are to be rates which apply in the future. The rate of return on equity used in determining the allowed rate of return for a regulatory year is to be the rate of return on equity for the access arrangement period in which that regulatory year occurs, and the rate of return on debt is to be the rate of return on debt for that regulatory year (rule 87(4)(a)). Forward-looking rates of return on equity and debt, which contribute to a rate of return commensurate with the efficient financing costs of the benchmark efficient entity, cannot be observed in financial markets. They must be estimated (as rules 87(6) and 87(8) require). Estimation necessarily involves approximation to unknown true values, and must be determined through the application of relevant theory and practice. Accordingly, rule 87(5) requires that, in determining the allowed rate of return, regard must be had to relevant estimation methods, financial models, market data and other evidence.

We refer to the use of relevant estimation methods, financial models, market data and other evidence, for the purpose of estimating the rate of return on equity and the rate of return on debt used in determining the allowed rate of return, as a "multiple models methodology".

Rule 87 requires a multiple model methodology.

As the AER notes in section 5.5 of the Consultation Paper, the use of a multiple models methodology – the use of information from multiple sources – raises a key question: how is the relevant information to be combined; how should it be distilled into a single point estimate?

In the context of estimation of the rate of return on equity, the AER has identified four broad approaches to the use of models, including the use of multiple models. These are:

(1) use of a single model;

(2) use of a primary model with reasonableness checks;

(3) use of several primary models with quantitative but non-complicated fixed weighting; and

(4) use of multiple models and other information.

The AER asks: which of the four broad approaches to combining information to determine a return on equity is preferred and why?

APIA responds to this question, and to the other questions which the AER has asked on multiple models methodology, in this section of this submission.

We note that the AER's questions on multiple models methodology have been asked in the context of estimating the rate of return on equity, and our responses are generally framed in that context. However, we see the requirement of the NGR to adopt a multiple models methodology as not being limited to estimation of the rate of return on equity. The requirement to use multiple models also extends to the estimation of the rate of return on debt. Rules 87(9), 87(10) and 87(11) require consideration of a number of matters when estimating the rate of return on debt which are not matters to be considered in estimating the rate of return on equity. The requirements to consider those matters do not limit the overall requirement to have regard to relevant estimation methods, financial models, market data and other evidence when determining the allowed rate of return.

Approach (1): use of a single model

The Consultation Paper advises that, were a single model to be used to estimate the rate of return on equity, other models would not form part of the estimation, and there would be no adjustment to the model outcome. Estimation of the rate of return on equity would be simple, transparent and easily replicated. The resulting estimate would be easily predicted in advance. However:

(a) the benefit that might be brought by estimates from a wider pool of evidence and information would be lost; and

(b) no account would be taken of the fact that no single model is perfect and all models have uncertainty.

We concur with the AER's assessment of the use of a single model, and note that current practice, favouring the use of a particularly simple model (the Sharpe-Lintner CAPM) has precisely these shortcomings. We discuss other shortcomings associated with the CAPM in the Appendix to this submission.

Within academia, the shortcomings of the Sharpe-Lintner CAPM has provided a spur to research into different models of asset pricing. Although none of these models are perfect, the evolving thought within the literature provides useful insights for regulators endeavouring to understand what gets missed out when simplistic single model approaches are used.

Since the early 1970s, a large number of asset pricing models has been developed using the standard model of intertemporal choice from economic theory. The use of intertemporal choice theory allowed one of the strong assumptions required for

derivation of the Sharpe-Lintner CAPM – the assumption of a single time period – to be dropped, and opened the way to explicit consideration of the role of time in asset pricing. When time is explicitly taken into account, the expected rate of return must not only compensate investors for bearing market risk (the key insight of the CAPM); it must also compensate them for the bearing of the risk of unfavourable shifts in the set of investment opportunities over time.

That other risks may be important in the explanation of asset prices is indicated by the growing number of pricing models developed within a dynamic general equilibrium framework incorporating consumption and production as well as the buying and selling of financial assets. Some of these models have incorporated information asymmetries and heterogeneity in investor expectations. In these circumstances, optimal portfolios may not be well diversified, and idiosyncratic factors may play a role in explaining expected rates of return.

Dissatisfaction with the naïve psychological foundations of the rational actor framework within which these models have been developed has also led to the emergence of behavioural finance. Behavioural finance challenges the adequacy of current "strictly economic" explanations of the processes through which asset prices are generated.

A now vast literature on asset pricing points clearly to the fact that no single model is perfect (for either estimation of the rate of return on equity or the rate of return on debt). This was reinforced by Professor Myers in his report attached to APIA's initial submission in the Guideline development process.

APIA was not surprised, then, when the AEMC found that the reduction of rate of return determination to a mechanical process was flawed.

The AEMC formed the view that achieving the National Gas Objective (NGO), and satisfying the revenue and pricing principles of the NGL, required the best possible estimate of the rate of return. That estimate could only be achieved when the estimation process was of the highest possible quality, and this meant that a range of estimation methods, financial models, market data and other evidence had to be considered. A wider pool of evidence and information were required to inform rate of return determination. At the same time, the regulator needed discretion to give appropriate weight to all of the evidence and analytical techniques considered.[3] The AEMC therefore restructured the rules of the NGR governing rate of return determination to require the regulator to have regard to relevant information on estimation methods, financial models, market data and other evidence, and to provide the regulator with the flexibility and capacity to achieve the NGO. The AEMC amended the NGR with the express intention of having the regulator implement a multiple models methodology for rate of return determination.

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[3] Australian Energy Markets Commission, Rule Determination, National Electricity *Amendment (Economic Regulation of Network Service Providers) Rule 2012, National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, 29 November 2012, pages 43-44.

Approach (1), use of a single model, is neither appropriate under rule 87, nor is in consistent with the intentions of the AEMC when it amended the rule in November 2012.[4]

Approach (2): use of a primary model with reasonableness checks

A second approach to estimating the rate of return on equity would rely on one primary model, supported by reasonableness checks which might include comparisons with the results from other financial models and with information from, for example, broker reports. Where the checks indicated that the result obtained from the primary model was not reasonable, the regulator would use its judgement in setting a rate of return on equity, and this use of judgement would mean that the weighting of the primary model and the results of the reasonableness checks would be qualitative. There would, in consequence, be reduced reliance on a single model (with its particular weaknesses), and a degree of simplicity and transparency would be retained in estimation of the rate of return on equity.

Were it to be adopted, APIA would be concerned that both the choice of the primary model and the form of the reasonableness checks would limit the applicability of Approach (2).

There is no single model of equity returns which can provide an estimate of a rate of return on equity that can contribute to the allowed rate of return objective: there is no obvious candidate for the primary model of Approach (2). All relevant models have flaws and, in consequence, use of a primary model with reasonableness checks is an inadequate strategy for estimation of rate of return on equity.

Moreover, the use of reasonableness checks is, itself, open to question.

These checks, the AER notes, may use:

(a) RAB acquisition and trading multiples;

(b) brokers' or takeover valuation report discount rates;

(c) other regulators' rates of return;

(d) comparison of return on equity and return on debt; and

(e) financeability and credit metrics.

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[4] Use of a single model might be justified if there were a single model which was superior to the available alternatives. In these circumstances, the AER advises that, when considering multiple models, it will continue to have regard to its earlier views on the limitations of models other than the Sharpe-Lintner CAPM. Those limitations are well understood. However, the scrutiny which was applied to those other models must now be applied to the Sharpe-Lintner CAPM. Those other models have been developed because the Sharpe-Lintner CAPM has serious limitations. Now that the criterion of "a well-accepted financial model must be used" has been removed from the rules governing rate of return determination, explicit recognition must be given to the limitations of the Sharpe-Lintner CAPM, and to the way in which they prevent its use from providing an estimate of the rate of return on equity which can contribute to achievement of the efficient financing costs of the benchmark efficient entity.

APIA is concerned that, when these checks have been used in the past, there has been no discrimination between the rate of return and other factors that might be contributing to the measures used for assessing "reasonableness".

There is, in our view, no place in the application of rule 87 for a vaguely defined check on the reasonableness of overall rate of return, or for such a check on any of its components. Rule 87(3) clearly sets out the "test" which a candidate rate of return must pass. It must be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services (the allowed rate of return objective). Rule 87(6) further requires that the rate of return on equity be estimated such that it contributes to the achievement of the allowed rate of return objective. The test to be applied to both a candidate rate of return and to its component rate of return on equity is, then, more than a test of reasonableness. The rate of return must be determined such that it achieves the allowed rate of return objective, and the rate of return on equity must be such that it contributes to the achievement of the allowed rate of return objective. Before any reasonableness check could be used, the AER would have to demonstrate that the check was capable of yielding results, which were consistent with achieving the allowed rate of return objective.

Furthermore, even if the reasonableness checks could be structured to accord with the requirements of rule 87, they would either support or invalidate use of the primary model. (If they were incapable of potentially invalidating the use of the single model, the so-called reasonableness checks would be quite "unreasonable".) If the primary model were to fail the reasonableness checks, the rate of return on equity would be left indeterminate.

In practice, reliance on a primary model for estimation of the rate of return on equity (albeit one with reasonableness checks) would not be substantially different from the use of a single model. Use of a primary model with reasonableness checks would, therefore, be similarly inconsistent with the AEMC's express intentions when amending rule 87. It would be inconsistent with the AEMC's intentions of requiring that the regulator have regard to relevant estimation methods, financial models, market data and other evidence, and of requiring that the regulator use a wider (than was previously the case) pool of evidence and information to inform rate of return determination.

In APIA's view, Approach (2), the use of a primary model with reasonableness checks, is not consistent with rule 87. The use of multiple models and other evidence is essential in determining the rate of return on equity. An approach, which uses several primary models is step in the right direction.

Approach (3): use of several primary models with quantitative but non-complicated fixed weighting

In Approach (3), the estimates of the rate of return on equity made using several primary models would be combined by applying a set of quantitative, but non-complicated, fixed weights. The AER maintains that this would reduce reliance on a single model (with its particular weaknesses), that simplicity and transparency

would be retained, and that the impression of false accuracy created by a complex weighting scheme would be avoided.

The Consultation Paper notes that examples of this approach were provided in the Brattle Group report submitted by APIA in its response to the AER's Issues Paper on the rate of return guidelines (Brattle Report).

Certainly, use of several primary models with fixed weights would not involve significantly more calculation than the use of a single model. However, the simplicity and transparency achieved would be largely illusory. Irrespective of the number of primary models, the fixed weights would, at best, be the outcome of a complex process of assessment of the significance to be attributed to each of those models (at worst, they would be arbitrary). APIA does not see how a simple set of weights might be assigned to rates of return on equity estimated using, say, the Sharpe-Lintner CAPM, the Fama-French three factor model, and a dividend growth model. Each of these models has a different conceptual basis, and each requires use of (different) parameters which are estimated in different ways. How these differences might be translated into a set of non-complicated fixed weights, which might then be set out in guidelines is not clear to us.

Moreover, we can see no reason for expecting that a scheme of non-complicated fixed weights, specified in advance in guidelines, would, on every occasion on which it was applied, deliver an estimate of the rate of return on equity which was consistent with prevailing conditions in financial markets. Were a prior set of non-complicated fixed weights to be used, regard would not be had to the prevailing conditions in the market for equity funds at the time the rate of return on equity was to be estimated. This would be contrary to the requirement of rule 87(7).

That consideration be given to prevailing conditions at the time the rate of return on equity was estimated was a key point made in the Brattle Report. We agree with the AER that the different models, which are available for estimating the rate of return on equity, may not have been designed around specific and limited circumstances. However, we do not agree that no account needs to be taken of the circumstances prevailing when those models are applied. It is not the models themselves that necessitate consideration of the circumstances; it is the data used in applying those models. Those data do not exist in isolation. They have been generated in particular firm, industry and market circumstances. In applying the models, consideration must be given to the implications of the circumstances in which the data have been generated for the results obtained. The Brattle Report advises on how this might be done, and points to the way in which it has been done by regulators in other jurisdictions.

We note that the AEMC was clear on the inappropriateness of assigning quantitative weights to alternative models (and to other information):

> *Similar problems* [to those which arise when a relatively mechanistic approach to estimating the rate of return is adopted] *exist with assigning weights that must be given to relevant estimation methods, financial models, market data and other evidence. In many circumstances it could be the case that the likelihood of achieving the NEO or the NGO may be increased by examining a range of methods and data and making judgments aided by, for*

example, the location and/or clustering and/or statistical precision of estimates. That is, formulaic rules such as giving particular methods a fixed weighting may not be the best way to assess the information.[5]

The use of multiple models as proposed in Approach (3) is, in our view, essential. However, it involves a complex process of assessment of the significance to be attributed to each of the models which draws on understandings of the models themselves, the circumstances in which they are applied, and other information relevant to estimating a rate of return on equity which can contribute to a rate of return commensurate with the efficient financing costs of the benchmark efficient entity. A more considered use of multiple models and other information – as proposed in Approach (4) – is required when applying rule 87.

Approach (4): use of multiple models and other information

Under Approach (4), the AER would estimate a rate of return on equity using multiple models and taking into account other information. Both the models and the other information would be given qualitative weightings. Explicit quantitative weights would not be assigned, and each decision by the AER would describe in (different) detail how the relevant market information had been used, together with regulatory discretion and judgement, to make the process transparent for all stakeholders.

There would, in consequence, be reduced reliance on any single model or source of information (with its attendant weaknesses), and qualitative weighting would remove any false precision associated with fixed quantitative weighting. Other information could be used to guide the choice of a point estimate from within a range. If a primary model approach were to be adopted, then results from other financial models could be used informatively to assess the result obtained from the primary model.

All of this, the Consultation Paper advises, would require the exercise of regulatory judgement in a way which promotes transparency. Regulatory judgement, and the AER's criteria, would be applied to assess the relative merits of models and other information which would inform choice of an estimate of the rate of return on equity.

In APIA's view, this approach – Approach (4) – is consistent with the requirements of rule 87, and with the intentions of the AEMC as they were explained in the November 2012 Rule Determination.

Rule 87 requires that, in the estimation of the rate of return on equity, regard be had to relevant estimation methods, financial models, market data and other evidence. It requires the use of multiple models and other information. The rule does not limit the methods, models, data and evidence to which regard must be had, beyond requiring that the estimate of the rate of return on equity contribute to the achievement of the allowed rate of return objective.

5 AEMC, Rule Determination, pages 57-58.

The AER indicates, in the Consultation Paper, that one way of implementing Approach (4) would be through use of a primary model, with results from other financial models used informatively to assess the result obtained from the primary model. This way of implementing Approach (4) would, we believe, not be consistent with the requirements of rule 87. There is no primary model upon which such an implementation could rely.

Through its requirement to use a multiple models methodology, guided by a specific requirement that the rate of return be commensurate with the efficient financing costs of the benchmark efficient entity, and guided by the more general requirements of the revenue and pricing principles and the NGO, the AEMC has now placed rate of return determination on firmer foundations. However, multiple models cannot be mechanically applied and regulatory judgement will have to be exercised:

> *As part of the framework, the Commission has not included any preferred methods for estimating components of the rate of return consistent with the overall objective. Instead the Commission has provided high-level principles to guide the estimation and left the judgement as to the best approach to the regulator to make, consistent with achieving the overall allowed rate of return objective. This involves the regulator making judgements about methodologies, analytical techniques and evidence to use to make the estimate of the rate of return.*[6]

The AER indicates a role for its proposed criteria in the exercise of this judgement, and we would not disagree. The criteria are, however, subsidiary to the requirements of the NGR and the NGL. Their role in guiding the AER's judgement must be limited to assisting the resolution of essentially technical issues which may not be covered by the relevant criteria established in the NGL and the NGR.

The major issues in applying a multiple models methodology must be decided by reference to the specific requirements of rule 87 and, in particular, by reference to the allowed rate of return objective. Furthermore, the application of rule 87 sits within a broader regulatory context which requires that rate of return determination be consistent with the revenue and principles of the NGL and contribute to the achievement of the NGO.

In the Consultation Paper, the AER seems concerned that the exercise of regulatory judgement required in the application of a multiple models methodology will preclude transparency. Stakeholders, the AER advises, have been unable to clearly explain how, in the context of the multiple models methodology, the various information sources could be brought together transparently. This concern is, we believe, borne out of long experience with the mechanistic approach to rate of return determination which the AEMC has sought to displace through its amendment of rule 87. We note further that international experience with multiple models (discussed in the accompanying Brattle Report) does not reflect the AER's concerns with transparency; in fact, where multiple models are used, regulators are able to bring together multiple sources of information in a way that is transparent to stakeholders.

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[6] AEMC, *Rule Determination*, page iv.

Determination of the allowed rate of return will be a strategic decision by the AER, with significant consequences for pipeline service providers and for the users of pipeline services. It will have significant and long term effects on business performance and economic well-being. Like all strategic decisions, irrespective of whether they are decisions made in the implementation corporate strategy or in the implementation of public policy, determination of the rate of return will involve complex and multifaceted considerations in circumstances where causes and consequences are not necessarily well known or understood. When the multiple models methodology now required by rule 87 is adopted, rate of return determination will not be reducible to a previously prepared algorithm or script.

Judgement and transparency should not be viewed by the regulators as a problematic exercise, but one which is part and parcel of the regulatory role. In this context judgement will involve the application of a series of logical steps and inferences from the information and analysis of the data, models, and methods. APIA would expect that would include an assessment of the strengths, weaknesses, biases and level of certainty about the results of application of the data, models and methods from which it will become clear which of the results should be given greater weight.

The role of the Guideline will be to explain how the regulators envisage they will apply that process. Given the logical and analytical nature of the judgement process it is amenable to explanation, both in the Guideline and in an Access Arrangement Decision, and we would point to hundreds of decisions by North American regulators, made available on their websites, in support of this point.

The AEMC, we believe, fully understood this, and saw the regulator's task, in these circumstances, as being more complex:

> *To determine the rate of return, the regulator is also required to have regard use relevant estimation methods, financial models, market data and other evidence. The intention of this clause of the final rule is that the regulator must consider a range of sources of evidence and analysis to estimate the rate of return. In addition, the regulator must make a judgement in the context of the overall objective as to the best method(s) and information sources to use, including what weight to give to the different methods and information in making the estimate. In doing so, the regulator should also have regard to taking an internally consistent approach and, to the greatest extent possible, use consistent estimates of values that are common across the process, as well as properly respecting any inter-relationships between values used.*[7]

In place of a relatively mechanistic approach to estimation of the rate of return, the AER and the ERA must, in discharging their economic regulatory functions:

> *. . . consider their decisions in terms of achieving the NEO, the NGO and the RPP. The regulator should be expected to follow good administrative decision-making practice. In this context, such practice requires a full and considered*

7 AEMC, Rule Determination, page 68.

explanation for decisions and adherence to due process, rigour and objectivity required under administrative law principles.[8]

While the final rule gives the regulator discretion in the factors it must have regard to, the Commission considers that the regulator must undertake the rate of return estimation process with rigour and transparency. In this regard, the Commission expects the regulator to use estimating practices that are robust and rely on transparent data sources. It is also expected that the regulator will clearly articulate how it has considered the factors it must have regard to in making its decision on the allowed rate of return that meets the overall objective.[9]

APIA is strongly of the view that the proper application of rule 87 requires use of a multiple models methodology. It requires the application of the AER's Approach (4). Rate of return determination cannot, in these circumstances, be reduced to "a formula", and will necessarily involve the careful and considered exercise of judgement by the regulator.

APIA's submission on the AER's Issues Paper advised that regulators in other jurisdictions have adopted multiple model methodologies to address the limitations which reliance on a single model for estimation of the rate of return on equity imposes on rate of return determination. That advice was drawn from comment in the Brattle Report.

The Brattle Group has advised the APIA that regulators in North America generally do not adhere to specific models and methods in the determination of allowed rates of return on equity. Instead, they examine and assess evidence from alternative models and methods put to them, often by experts engaged by stakeholders, during regulatory hearings. It is rare for regulators, the Brattle Group explained, to precisely specify the way in which this examination and assessment leads to allowed rates of return. However, the regulators commonly provided insight into what was given the greatest weight, what was ignored, and why.

The approaches of these other regulators are examined in greater detail in a further report which the APIA has commissioned from the Brattle Group, and which is appended to this submission (Brattle Further Report).

In several instances North American regulators have made explicit their reasoning for relying on, and combining the results obtained from, multiple models for estimating the rate of return on equity. The Brattle Further Report provides three case studies which examine situations in which regulators have made their reasoning explicit: determination of the rate of return on equity for regulated railway businesses by the U.S. Surface Transportation Board, determination of the rate of return on equity for regulated utilities by the British Columbia Utilities Commission, and calculation of the target rate of return on equity required for implementation of Mississippi Power's Performance Evaluation Plan by the Mississippi Public Service Commission.

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8 AEMC, Rule Determination, page 55.

9 AEMC, Rule Determination, pages 68-69.

We note that two of these three case studies combine the results from estimation of the rate of return on equity using quantitative fixed weights. The Brattle Group advises against this approach, as it did in the Brattle Report.

The three case studies were limited by the extent of the information in reported regulatory decisions. A more detailed insight into the way in which multiple models might be used is provided in the form of advice, which the Brattle Group, as expert advisor, provided in support of a cost of capital application by the California American Water Company to the California Public Utilities Commission. The advice covered the selection of comparable companies for rate of return determination, model selection and weighting, the influence of market conditions, specific industry conditions (in particular, merger and acquisition activity which may have influenced data used in rate of return determination), the ranges of the results obtained from alternative models, and determination of a point estimate for the rate of return on equity.

Questions

Question 5.1 - Which of the four broad approaches to combining information to determine a return on equity is preferred and why? Are there additional broad approaches that we should consider?

Neither approach (1), nor approach (2), can be used to estimate the rate of return on equity. Neither approach is consistent with the requirements of rule 87, and neither is consistent with the intentions of the AEMC when amending that rule in November 2012.

Approach (3), the use of several primary models with fixed weightings is not consistent with the requirement of 87(4). tThere is no reason to expect that a scheme of non-complicated fixed weightings, specified in advance in guidelines, would, on every occasion it was applied, deliver an estimate of the rate of return which was consistent with prevailing conditions in financial markets. Were a prior set of non-complicated fixed weighting to be used, regard would not be had the prevailing conditions in the market for equity funds contrary to the requirement of rule 87(7).

In APIA's view, only approach (4) is consistent with the requirements of rule 87, and with the intentions of the AEMC as they were explained in its November 2012 Rule Determination.

Question 5.2 - How can the various information sources relevant to estimating the return on equity be brought together transparently?

Transparency will be achieved, as the AEMC indicated, by the regulator clearly articulating how it has considered the factors to which it must have regard in making decisions on the allowed rate of return that meets the overall objective. It will not be achieved by reliance on a single model or by reliance on fixed quantitative weightings, both of which obscure the complexity of the issues surrounding estimation of the rate of return on equity (and the rate of return on

debt). As identified about the process of judgement and its transparent articulation should fit naturally into the Guideline and Access Arrangement Decisions.

Question 5.3 - Do stakeholders agree with our preliminary position that it is not feasible to change the weights placed on different return on equity models (over time) based on differing market conditions, industry segments or firms?

APIA does not agree with the AER's preliminary position that it is not feasible to change the weights placed on different return on equity models (over time) based on differing market conditions, industry segments or firms, and would point to the evidence prepared by Brattle (see appendices of this report) of several regulators doing precisely this in support of our position.

Although the relevant models for estimating the rate of return on equity are general propositions applicable to all firms, and applicable in all industries and markets, the choice of values for the parameters used in those models places model use in specific firm, industry and market circumstances. In these circumstances, it is appropriate to look beyond the internal logic of a particular model to the circumstances in which that and other models are applied, and to change the weighting given on different models in different circumstances.

As the Brattle Group has advised in its initial report and in its Further Report this is recognised North American regulatory practice.

Question 5.4 - What are the benefits of using financial models to estimate the return on equity for an average firm before estimating it for the benchmark firm?

APIA addresses this question in Section 6, Return on Equity.

4. Risk and the Benchmark Firm

This chapter deals with APIA's responses to Chapter Four of the Consultation Paper, which addresses risk and the benchmark firm. Both issues are important for the rate of return on equity and the rate of return on debt, and we note that our comments in this chapter carry over to Chapter 2 (dealing with the rate of return on equity and multiple models) and Chapter 6 (dealing with the rate of return on debt).

Consideration of risk and the construction of the benchmark efficient entity (BEE) are crucial issues for regulators under the newly-formulated NGR, and the requirements of rule 87(3) in particular. However, neither has been considered adequately, in APIA's view, by the AER. In respect of risk, the recent Frontier (2013) report has a great deal of detail about what Frontier thinks in respect of particular risk factors and their relationship to the energy industry and regulation in general.[10] However, quite apart from the fact that, as McKenzie and Partington (2013, p17) point out, these opinions are empirically unverifiable and thus of limited use as "objective" input from independent experts, Frontier was directed to answer the wrong question. Rule 87(3) is not concerned with risks as they might affect energy firms or regulated entities in general, but is rather concerned with establishing risks that are similar to those faced by the relevant service provider in the provision of reference services. On this question, the report is almost totally silent.

In respect of the formation of the benchmark firm, the situation is, if anything, much worse. As we detail further below, the AER's only conclusions in this regard appear to bebe based on inconsistent logic, and .

In order to meet the requirements of rule 87(3) properly, the AER will need to devote a lot more effort than it has to date in consideringissues of risk and operationalizing benchmarks. We would suggest that the following approach is much more likely to meet the requirements of rule 87(3) than what appears to be a continuation of the status quo in the Consultation Paper and in the various workshops held to date:

- firstly, define the risks which are relevant in the context of the firm being regulated; not with reference to particular methods of pricing equity or debt, but in a general sense;
- secondly, make an assessment of the materiality of the risks to eliminate those whose scale of impacts does not warrant detailed analysis;
- thirdly, define the BEE with reference to the set of risks developed in the first two steps, and to a properly-defined notion of similarity;[11]

[10] We have issues with several of Frontier's conclusions, but the amount of time between the release of the report and the submission paper for this response is inadequate to do them justice.

[11] It may well be that, in practice, the first and third steps are interchanged; the benchmark firm with its set of (well-described) risks is developed first, and actual regulated firms are assessed against it through a risk-matching process, which we describe in more detail below. The same basic notions in regards to risk apply, and the same outcome ought to ensue; the re-ordering is a practical response to data availability.

- fourthly, choose the models which will be used to price the equity and debt of the BEE; and
- fifthly, parameterise the models using data from the BEE, and actually estimate the rate of return on equity and the rate of return on debt.

This process is rather different to that which has been applied in the past and is, in particular, much less mechanistic. Consideration of risk and assessment of the BEE are intertwined, but we present the two issues in two separate sections below, for methodological clarity. We end this chapter with a section providing answers to the AER's questions in Chapter Four of the Consultation Paper.

4.1 Risk in the context of Section 87(3) of the NGR

APIA concurs with the AER's view that the requirements of rules 87(2) and 87(3) set determination of the allowed rate of return in the context of the degree of risk to which a service provider is exposed. The allowed rate of return objective of rule 87(3) requires that the rate of return be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services. This definition is key, and we return to it several times below.

The Consultation Paper advises that the AER's prior requirement to use the Sharpe-Lintner CAPM when estimating the rate of return on equity implied that the only risk to which consideration was given in establishing the rate of return on equity was the non-diversifiable or systematic risk captured by the beta factor in that model.

Risk, and the way risk feeds in to the allowed rate of return, are complex matters and the Consultation Paper advises that an important issue for the AER in developing the guidelines is whether different return on equity models differ in the way in which they account for the same risks.

We agree. But we see the issue of risk and the way in which it feeds in to rate of return determination, through models for estimating not only the rate of return on equity but also the rate of return on debt, as requiring more than consideration of whether different models differ in the way in which they account for the same risk. It requires consideration of risk itself.

The starting point for consideration of risk is rule 87(3): the risk of the benchmark efficient entity, which is required to be similar in degree to the risk of the service provider in respect of the provision of reference services.

Financial economists distinguish between risk as measured by the variability, or variance, of returns, and the risk premiums required by the buyers of financial assets. A major insight, provided through development of the Sharpe-Lintner CAPM, is that the premium for risk incorporated in the price of an asset traded in financial markets may not be related to risk in the sense of variability of returns on the asset,

but is instead related to the its covariance with market returns; a point developed in more detail in McKenzie and Partington[12].

The risk to which rule 87(3) refers to is not, in our view, the risk premium which is captured by the Sharpe-Lintner CAPM, or by any other asset pricing models developed by financial economists. In our view, the term "risk", as it is used in the rule, has its common meaning of variability in returns. It does not refer to the premium for risk (covariance) in the market prices of financial assets when those prices are viewed through the lens of the Sharpe-Lintner CAPM and other asset pricing models. If the AEMC had intended that the term "risk", when used in rule 87(3), meant the risk premium in asset prices, in all likelihood it would have made this explicit in the rule. If the AEMC had meant the risk premium in asset prices, it would not used the term "risk" without qualification to avoid the possibility that the term would be read with its common meaning.

This, in our view, is fundamental. Irrespective of what models might be used to estimate the rate of return on equity and the rate of return on debt, the application of those models must be grounded in the circumstances (pertaining to risk) of an efficient service provider. If their application were not to be grounded in those circumstances, the requirements of the revenue and pricing principles of the NGL would not be satisfied, and achievement of the national gas objective would not be possible:

- the service provider would not be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing reference services;
- a reference tariff determined using the allowed rate of return would not provide a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates; and
- efficient investment in, and operation and use of, natural gas services for the long term interests of consumers would not be promoted.

Therefore, we would suggest that what is required in respect of the satisfaction of rule 87(3) is that the regulator needs to focus on risk; not some measure of risk as defined in a particular model of investor behavior, but risk itself. Moreover, in order to ensure that the requirement of "similar risks" is fulfilled in a transparent fashion, the regulator needs to describe the risks faced by the regulated firm and the BEE in detail. How can the risks of the BEE be shown to be similar to those of the regulated firm if these risks are not clearly described?

A requirement to describe risks raises the issue of the form and nature of that description. This is not a new problem, and has indeed been faced by regulators and financial economists for decades. A useful framework, we believe, is that used by Arrow and Lind (1971) in their seminal work on discount rates.[13] That is, risk is

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[12] McKenzie, M & Partington, G, 2013, *Risk, Asset pricing Models and WACC,* , Report for the AER, June 2013

[13] Arrow, K.J & Lind, RC, 1970, "Uncertainty and the Evaluation of Public Investment Decisions", American Economic Review, 60(3), 364-78. The risk-positioning approach favoured by North American regulators (discussed in the following section) makes use of just such a framework,

described with reference to states of the world and consequences in those states of the world; for example, the consequences for a firm in a state of the world where interest rates are high.

Therefore, the first of our five steps above involves a description of risks in the context of states of the world and consequences that are faced by the regulated firm. The second involves passing a "materiality" filter over these risks to eliminate those with very small consequences. The third involves choosing a BEE on the basis of "similarity", and here this concept can be easily operationalized by noting that firms which face the same consequences in the same state of the world have, by definition, a similar risk profile. This, to our minds, meets the requirements of rule 87(3) in a way that simple, mechanical application of a credit rating and a beta does not. We note, however, that data availability may mean that "similar" needs to be rather loosely defined, and the focus shifts from finding suitable benchmarks to including consideration of some kind of risk positioning process to account for the loose definition. This is common in North America, and we discuss how it could work below.

Once these three steps have been taken, a choice must be made among relevant models for the pricing of equity and debt, followed by a final step of parameterizing the models based on data for the BEE.

The discussion above on risk makes it clear that properly accounting for risk within the context of the requirements of rule 87(3) is much more complex than simply choosing a beta for equity holders and a credit risk for debt holders. In the first instance, there is the issue of the definition of risk in rule 87(3), which is deliberately (in our view) broader than the narrow confines of the risk premiums in asset pricing models, and in the second instance there is the issue of ensuring that the "similarity condition" is met when constructing the BEE. It is to the construction of the BEE that we now turn.

4.2 Construction and use of a BEE

Rule 87(3) of the NGR requires that the allowed rate of return be commensurate with the efficient financing costs of the BEE. However, apart from noting that it must have a similar risk profile to the regulated firm, it is otherwise silent on what goes into establishing the BEE. The Consultation Paper advises that there was broad agreement on the nature of the benchmark entity. In the AER workshop of the 18th of June, it was suggested by the AER that that entity should be a pure play regulated electricity or gas network business operating within Australia with parental ownership providing the same scale and scope of regulated services to the same customer base at the current time.

We are perplexed by this definition of the BEE.[14] The purpose of the BEE, as we understand the AER's position, is to avoid rewarding regulated firms for

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without necessarily using the same terminology. McKenzie and Partington (2013) also note the importance of considering states of the world in the context of understanding risk.

[14] As a separate issue, we are confused by the requirement that the BEE be a business that operates with parental ownership. The AER has not provided any evidence to suggest that firms that

inefficiencies that would not be sustained in a competitive marketplace, and which might manifest themselves if actual data from regulated firms were used to estimate the various parameters of equity and debt pricing models. However, if the BEE is to reflect "efficient financing costs", and it is comprised of data from regulated energy firms, then it follows that the AER believes that, collectively, the energy firms which it regulates have information about efficient financing costs that they do not possess individually. We assume that the AER must either have a some form of envelopment or frontier analysis model in mind with which it proposes to construct the relevant efficiency frontier (that is, collect the relevant information about efficient financing costs from a collection of firms that must each be at least partially efficient), or that it is unaware of the fairly basic logical flaw in its proposed construct of the BEE. We assume the former is the case, and look forward to the opportunity to comment on the model the AER proposes.

At a more fundamental level, however, there is an issue of data availability. Is there sufficient data pertaining to the BEE, however it is constructed, to permit robust estimation of the rate of return on equity and the rate of return on debt? The issue hinges around the definition of "similar"; the more tightly this is defined, the closer together the firms that comprise the BEE need to be to the relevant service provider (more specifically, the particular asset) in terms of the consequences they face in similar states of the world. This brings with it not only the issue of needing more benchmarks, but also the risk that there will be no firms which are sufficiently similar.

The AER is not the first regulator to face this basic problem; North American regulators have been doing so for decades, and have adopted a solution which they refer to as "risk positioning".[15] Risk positioning, in essence, trades off similarity for data availability in the formation of the BEE, and then, recognizing that the risks faced by the BEE are not necessarily very similar to those faced by the regulated firm, works through a formal process of adjusting the rate of return estimates from the BEE to match the risk profile faced by the service provider. The NEB, in particular, has a well-developed matrix approach which makes this process transparent.

The risk-positioning process is an imperfect, imprecise process. Examining its use in the US and Canada, one does not find statements such as "we determined that the exposure to risk X in the regulated firm was 57 percent lower than in the BEE, and through econometric estimation established that this translated into a reduction in the beta of 0.2". The reason for this is the same as the reason for the use of the risk-positioning approach in the first instance; data availability. If there were enough data to confidently make statements such as the statement above, then there would be enough data to ensure that a BEE with a high degree of similarity to the regulated firm (and to easily compare multiple BEEs) could be robustly calculated. The use of the risk positioning response is a pragmatic response to the imperfection that are faced in the real world.

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operate with parental ownership are more efficient than those which operate without it. Absent of such evidence, we believe that the AER exceeds its mandate with this requirement, by favouring particular business structures for regulated utilities, and engaging in quasi-industry policy, rather than regulation.

[15] This risk positioning was described in section IV.D of the Brattle Report.

We note that the risk positioning approach would require the regulator to make use of discretion and judgement. However, in so doing, we would reiterate our comments in Chapter 2 examining multiple models. Risk positioning will require careful evaluation of the evidence and the circumstances of the service provider. It will not be reducible to a previously prepared algorithm or script. The appearance of precision will be sacrificed for a result which better contributes achievement of the allowed rate of return objective.

Questions

Question 4.1 - Set out the risk factors that you consider should be compensated through the rate of return. How can we assess whether different companies are exposed to materially different degrees of these risks?

The risk factors to be compensated through the rate of return are those which the relevant financial models for estimating the rate of return on equity and the rate of return on debt indicate should be compensated.

It is not clear that the question can be definitively answered in respect to the rate of return on equity, at least in a general sense, based on the comments of McKenzie and Partington[16]which throws into question the basic utility of the collection of opinions provided by Frontier.[17]

Question 4.2 - Do different return on equity models account for systematic risk differently, or do they also account for non-systematic risk? If the latter, is it appropriate for the AER to set allowances that remunerate risks that could be diversified away from?

Different return on equity models account for systematic risk differently, and some may also account for non-systematic risk. Our views on models for estimating the rate of return on equity are summarized in the appendix to this submission.

All relevant material risks must be captured, either through the financial models for rates of return on equity and rates of return on debt (with parameters estimated using data pertaining to the BEE), or through explicit allowance in the total revenue calculation.

Question 4.3 - Do you agree that the AER should seek to utilise the smallest number of benchmarks that capture materially different degrees of risk? How do we utilise different benchmarks while retaining the objectives of incentive-based regulation?

As noted in the discussion above, there is a fundamental tension between the strictness with which "similarity" is defined and the number of benchmarks. Data availability is a key concern; with perfect data, one can have many benchmarks, and

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[16] McKenzie &Partington, (2013, p17)

[17] The Frontier report cannot be taken as factual; if something cannot be empirically verified, then it is by definition only a theory or an opinion; the Nobel Committee can decide not to award Einstein a Nobel Prize for his theories of relativity for want of experimental evidence, then stakeholders ought to take a similar perspective concerning the Frontier report, particularly when the companion piece is the document which highlights the impossibility of empirical verifiability.

compare them easily. However, as we note in our discussion above, increasing the number of benchmarks is not the only way to deal with the tension in rule 87(3). Another way to do so is to make use of a single (or small number of) benchmark, and a risk-positioning process. This is the pragmatic compromise which North American regulators, facing essentially the same problem, made.

5. Overall Rate of Return

Section 3 of the Consultation Paper discusses a range of issues associated with determining the overall rate of return. This submission addresses those of greatest significance.

5.1 Ranges and/or point estimates

When regulators make assessments of the efficient cost of finance, they are making estimates; firstly of the parameters in a cost of equity or debt model, and then of the overall weighted cost of capital. These estimates are based (hopefully, at some level) on market data, and as such, they are statistical estimates. This insight makes clear how point estimates and ranges ought to be used.

Any process of statistical analysis with multiple steps needs to incorporate the (statistical) errors of each step into subsequent steps, which has the practical effect of making confidence bands larger.[18] This means, in turn, that using point estimates at any point in the process save the last discards information (in the errors) which is an integral part of the estimation process. It is not clear why the regulator would wish to discard market information in such an ad-hoc fashion by using point-estimates part-way through the process.

More than this, however, it is not possible in a process of statistical analysis to say A=B (or indeed, 7.56 percent equals the efficient financing cost). This is because the errors in the estimation process do not allow such precision. Instead, the only thing which can be done is to formulate a hypothesis and then ascertain whether it ought to be accepted and rejected, based on some critical value (say the 95th percentile; a common benchmark).

Thus, the "point estimate" that the regulator forms at the last step of the process is not an "A=B" type statement. Instead, it is the critical value in a statistical hypothesis test; the regulated firm proposes a rate of return which it asserts is the efficient financing cost, and the regulator accepts or rejects this hypothesis depending upon whether it is above or below the critical value. This is, in essence, the approach that is taken in New Zealand,[19] and it takes into account the information that the regulator actually has to make a decision, rather than pretending it is able to make more precise estimations than it can actually make.

The discussion above is not merely one of statistical formality, but represents the requirements of the NGR. Rule 74(1) of the NGR states that "Information in the

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[18] Thus, a rate of return comprised of the 75th percentile point estimates for each of the parameters of the CAPM will be lower than the 75th percentile on the distribution of a rate of return constructed by accounting for estimation errors correctly at each stage of the estimation process.

[19] In New Zealand, the 75th percentile of the distribution is used as the critical value. This is pre-set, but the actual value it takes differs from estimation to estimation based upon input data. The regulator could choose a different cut-off, but we note that the mean is both statistically incorrect and violates the Revenue and Pricing Principles which states that "*A service provider should be provided with a reasonable opportunity to recover at least the efficient costs of the service provider".*

nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate", and rule 75 goes on to say that "Information in the nature of an extrapolation or inference must be supported by the primary information on which the extrapolation or inference is based". These clauses collectively mean that the regulator needs to be able to demonstrate a link between the primary data and the conclusions, and the only way in which it can do so adequately is to make use of appropriate statistical techniques; simply choosing ad-hoc point estimates from different distributions violates the requirements of these two sections of the NGR.

5.2 Reasonableness tests

Rule 87 (3) sets out the allowed rate of return objective (ARORO). The sub-rules that follow sub-rule 3 put the detail on how the rate of return is to be estimated. One function of the ARORO is to provide the overarching guidance on what the specific elements in rule 87 should deliver. The concept of reasonableness checks is consistent with the existence of the ARORO.

Accordingly, APIA sees that there can be a place for reasonableness checks against which the outcomes of the detailed processes under Rule 87 can be tested. However, consistent with APIA's submission in response to the AER's Issues Paper we have considerable concerns about the limitations of the sorts of reasonableness checks so far identified by the AER.

Rather than repeat the very significant criticisms of the various reasonableness checks proposed by the AER in our February submission[20] and in the Brattle Report submitted with our submission, we will highlight a common problem with each of the reasonableness checks is that the actual cost of capital is only one of a range of factors that drive each of the reasonableness checks and make their ability to demonstrate reasonableness of each indicator as at best poor.

It is somewhat concerning that the Consultation Paper makes no reference to the substantive arguments presented by APIA and Brattle about the weaknesses and limitations of the AER's reasonableness checks. Instead the Consultation Paper repeats analysis it has applied in past regulatory decisions in appendix D and indicates the AER's intention to continue to apply the checks it has identified.

As indicated above, APIA is in favour of using reasonableness checks, where their limitations are identified and appropriately taken into account. It is preferable to APIA that only those reasonableness checks, which can be demonstrated as having as few limitations as possible be applied to avoid misleading interpretations of reasonableness of rate of return determinations. Specifically, APIA proposes that where reasonableness checks are to be used their limitations should be specifically identified in the Guideline, and where possible quantified.

[20] Submission in response to Issues Paper on the Rate of Return Guideline, APIA, February 2013, pp 34 - 36

5.3 Term of the WACC

The term of the WACC should reflect the costs of debt and equity to the Service Provider over the period of the Access Arrangement.

5.3.1 Term of debt

APIA is of the view that he term of debt should reflect the practice of efficiently financed firms. This is consistent with the requirement in rule 87(3) to determine the cost of capital for the benchmark efficient firm. In this case it should be the efficient practices of firms with long lived assets. Firms with long lived assets generally seek to finance debt using long term instruments, typically ten years or longer. PWC/Incenta[21] estimates that the average term of debt at issue for ASX listed regulated energy businesses at 10.0 years and longer terms for US and UK businesses.

In general, shorter term debt has a lower interest costs, it also creates risks that translate into cost associated with the need for more frequent refinancing that exposes the business to the potential for insolvency costs. Use of shorter term debt instruments would have to have coupled with it, either an insurance cost for the increased risk, a decrease in credit rating or an increase in the cost of equity to satisfy the Modigliani-Miller Propositions.

Clearly it is much more sound to reflect actual practice by using long term debt. Ten years continues to be a reasonable benchmark.

5.3.2 Term of equity

The term of equity is only an issue where asset pricing models are applied that estimate the excess return above the risk free rate. The risk free rate has almost universally been based on ten year government bonds. This includes almost all practitioners and this fact was the basis of the Australian Competition Tribunal's decision on the Final Decision on GasNet's Access Arrangement in its 2002[22].

Moreover, as for the cost of debt it is appropriate that the risk free rate also reflect the life of the assets. The AER has noted that the UK regulators have recognised this view.

The arguments used by Lally, IPART and the ERA about matching the risk free rate to the regulatory term is invalid because they introduce a construct that is not relevant to Rule 87. The question to be answered is how do the cost of equity models achieve the ARORO? In the case of the CAPM the cost of equity has no term structure. The MRP typically adopted to calculate the MRP is referenced to ten year bonds. This makes it clear that a ten year bond rate of such models should apply, to be consistent with models of the cost of debt.

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[21] PwC report for ENA

[22] Australian Competition Tribunal, Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT, 23 December 2003

Questions

The following brief answers to questions reflect the detailed views in the section above.

Question 3.1 - Do stakeholders agree with our proposition that we should continue to determine the rate of return by ultimately selecting point estimates (possibly from within ranges) of the return on equity, the return on debt, and gearing?

No; see our summary above for the approach we believe to be correct.

Question 3.2 - What is the appropriate term for the return on equity? Do stakeholders support Lally's recommendation based on the present value principle that the appropriate term should be consistent with the regulatory period?

The appropriate term for the cost of equity is ten years. Lally's net present value principle is irrelevant

Question 3.3 - What is the appropriate term for the return on debt? Do stakeholders agree with the view that a specific term is not required, if we apply an approach that is similar to the ERA's 'bond-yield approach'? Is there a case for the same term for the return on equity and return on debt?

The appropriate term fort the return on debt as identified above is ten years.

Question 3.4 - For parameter estimates, should we adopt point estimates, ranges, or point estimates from within a range?

As identified above parameter estimates should be ranges with a rigorous statistical basis.

Question 3.5 - At what stage (during a determination or the guidelines process) should point estimates or ranges of the return on equity, return on debt and parameter estimates, be established?

As explained above, point estimates should only apply to the final cost of equity and cost of debt, and as a critical value in a hypothesis test, not an A=B type statement.

Question 3.6 - Should we make annual adjustments to the return on debt?

Where a trailing average approach is applied APIA considers annual adjustments on the return on debt to be reasonable approach.

6. Return on Equity

APIA's comments on issues about the use of multiple models are set out above in Section 3 of this submission. Other matters covered in Section 5 of the Consultation Paper follow.

6.1 Stability of returns

The Consultation Paper raises the issue of desirability of stability of returns on the return on equity estimate. Two effects are proposed:

- It would smooth prices imposed upon consumers
- It would provide service providers and investors with greater certainty about the outcome of the regulatory process.

While the first of these statements is demonstrably true, the second may be true, but it is not so clear that this is desirable. This is because stability of returns may not may not be economically efficient and therefore not in the long term interests of consumers. What is important is that the return on equity accurately reflect conditions in the market for funds. This is what promotes efficient investment, and efficient investment is in the long term interest of consumers.

The important question in relation to stability of returns on equity relates to the fact that in fact they may be considerably more stable that the approach to application of the Sharpe-Lintner CAPM by the AER. That is the return on equity has reflected short term movements in the risk free rate, but applied a long term average of the MRP. There has been significant work to demonstrate the inverse relationship between the risk free rate and the MRP[23].

The logic of this relationship is easily understood, in that during times of bear markets and high market volatility Commonwealth Government bonds become a favoured investment driving down the yield on Government securities. At the same time the risk premia on both equities and bonds are driven up as the market requires increased returns for taking risk.

The consequence is that the net effect on required equity returns is much more stable with the countervailing effects of movements in the Government Bonds and required returns in the market. This stability in equity returns can be achieved if this inverse relationship between the MRP and the risk free rate is properly recognised. There are two approaches to achieve this:

1. Apply the short term forward looking estimates of the MRP and the risk free rate; or
2. Apply the longer term more backward looking estimates.

[23] Proposed AEMC changes to National Gas Rule 87, CEG, October 2012, attached to DBP submission to ERA Consultation Paper on its Rate of Return Guideline

Either way is more likely to result in a more stable cost of equity, but more importantly, it will result in a return on equity that reflects the prevailing conditions in financial markets as required by Rule 87 (7).

The approach adopted from these two may depend on the fact that the Rate of Return is intended to be a forecast for the period of an Access Arrangement, typically five years. Moreover in the case of the return on equity it is to reflect the prevailing conditions in the market for equity funds. The correct understanding of "prevailing conditions in the market for equity funds" has not be established as a matter of law. However, APIA is of the view that it is the conditions prevailing in the market at the time of the Access Arrangement decisions and forecast to prevail during the Access Arrangement period.

Given this, it would appear that either of the two approaches above would achieve this result, but the approach historically applied by the AER, would not.

An important point for the AER here is that stability in estimates of equity returns will also be promoted by the use of the AER's Approach 4 to use of multiple models, because the volatility that may result from anyone model is likely to have the effect smoothing out the estimated return on equity because of the informing and balancing influence of each model. An example of this cited in the Further Brattle Report[24] can be found in the US Surface Transportation Board's use of multiple models has assisted it "avoid substantial variations in the allowed return on equity from year to year and modified the effect of the sharp drop in government interest rates". This provides a further reason to adopt Approach 4.

6.2 Appropriateness of different return on equity models in different circumstances

The Consultation Paper[25] comments that "weights placed on different return on equity models should not differ dependent on market conditions, industry or firm. The Brattle Group would not seem to disagree with this point though it is unclear"[26].

The Consultation Paper's rationale for this is flawed and its interpretation of Brattle's February Report is incorrect.

The Consultation Paper argues that because the various models are designed to apply across a range or market conditions that any weights applied to the models should be fixed regardless of the market conditions. This may be true, but it misses the point, because it does not eliminate the fact that different models are better predictors of the required equity returns under different market conditions, as would be expected where different models are developed with different theoretical underpinnings.

Brattle makes it abundantly clear[27] in its February report that a range of factors can affect the efficacy of the various models. To illustrate the point Brattle quotes,

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[24] Further Report, The Brattle Group, June 2013, p12

[25] AER, Rate of Return Consultation Paper May 2013, p 44

[26] AER, Rate of Return Consultation Paper May 2013, p 44

"Professors Berk and DeMarzo: '[a]ll the techniques … are imprecise' and ' practitioners apply the technique that best suits their particular circumstances'". More specifically in Tables 3, 4 and 5 it sets out the conditions under which each models performs the best. It is wrong to suggest that Brattle is discussing the ease for application when it is discussing the likely accuracy under arrange of market conditions.

The Consultation Paper suggests that the imprecision of the models makes it infeasible to determine which models perform best in particular circumstances. The fact that Brattle is able to does is ample proof that this assertion is unsustainable. Brattle has clearly demonstrated the workability of that approach in its discussion and the examples it cites. Moreover, in a second report for APIA Brattle provides a number of worked examples where North American regulators have done so.

The Consultation Paper notes an inconsistency between Brattle's tables identifying when particular models are best applied. Brattle, in its second report has identified an error in Table 2 of the original report that when corrected removes the objection that the Consultation Paper makes to taking into account changing market circumstances in giving varying weight to models.

Overall there are no sound reasons for not adopting a thorough and rigorous consideration to the performance of cost of equity models under changing market circumstances. In contrast the benefits of determining a cost of equity that meets the intent of the Rules are significant.

6.3 Appropriateness of determining the return on equity for the average firm

Where the AER uses the term 'average firm' it is referring to ENA's use of the term which actually means the market portfolio, not an average firm.

The Consultation Paper questions the value of the ENA's proposal that part of the determination of the return on equity should be to determine the return on equity of the average firm in the market for each of the cost of equity models to be considered in determining the rate or return on equity. APIA supports this concept and sees considerable benefit from its application.

Estimation of the cost of equity for each model will provide very useful perspectives in two ways:

- It will provide points of comparison about how each model performs in estimating the cost of equity for the market.
- It will provide benchmarks to compare returns estimated for regulated businesses (effectively a reasonableness check)

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[27] Estimating the Cost of Equity for Regulated Companies, Villadsen et al, 17 February 2013, pp 59 - 67

Using the cost of equity for the average firm also provides a useful staging point in the determining the rate of return in relation to the risks of the service provider in provision of reference services.

In APIA's view there is much to be gained in estimating the cost of equity for the average firm with minimal cost, given that the regulators will be applying each of the models in any event.

7. Return on Debt

In this section, we respond to issues associated with the cost of debt, outlined in Chapter Six of the Consultation Paper. In doing so, we refer back to our discussion of the BEE and of risk in Section 3 of this submission, and note that the same conclusions therein apply to debt; that is, the process of forming the BEE should apply in respect of debt as well as of equity, as should consideration of risks. In fact, the discussion of risks faced by the BEE provided by the regulator should quite explicitly deal with risks faced by debt-holders. Moreover, we would also note that the notion of a multiple-model framework, to alleviate problems in a single approach (that we discuss in Section 3 in respect of equity) also has application in respect to the cost of debt.

Before answering the relevant questions in this section, it is important to pause and address an assertion made by the AER in its Consultation paper (pages 50-1) that monopolists respond only to regulatory incentives to be efficient in their cost of debt; the AER appears to imply that, absent of regulation, monopolists would be inefficient in their sourcing of debt.

It is true, in a general sense, that monopolists suffer from managerial or "X-inefficiency" because managers in the firm, not subject to competitive pressures, and instead only subject to imperfect oversight from owners are able to award themselves an "easier life". What is effectively happening is that managers (and workers) are appropriating some of the rents that would have gone to owners in the form of higher profits. They are able to do this because of a basic principal-agent problem whereby owners are only able to judge performance imperfectly.

However, banks are not internal stakeholders to the firm, and in seeking "lax" lending, managers are not appropriating rents for themselves, but handing them to a party outside the firm. It is not clear why managers would choose to do this; absent of financing being a particularly onerous task involving considerable disutility, or outright corruption, or an assumption that monopolies are not profit-maximisers.

Beyond the (very brief) principled argument above is an empirical question; if monopolists source capital inefficiently, then one ought to be able to observe this in their debt rates. That is, all else being equal, an increase in market power ought to be associated with an increase in debt rates. We are not aware of any empirical studies in an Australian context, but Valta (2012)[28] provides an example in the context of US manufacturing. Far from a positive association between industry concentration and debt rates, he finds a negative association; firms with more market power pay less for their debt.

We do not assert on the basis of the arguments made above that inefficiency has no role in the price a particular monopolist pays for debt. However, we would suggest that any assertion that inefficiency is the primary driver of differences in debt rates between regulated utilities carries with it a burden of proof that other factors are

[28] Valta, P, 2012, "Competition and the cost of debt", *Journal of Financial Economics*, 105(3), 661–82

not at play. We would suggest that differences in risk profiles are one other potential factor; and one which rule 87(3) insists must be accounted for in assessing the efficient cost of (here debt) finance. In practical terms, the conclusion of the discussion above is that, if the regulator intends upon applying a single cost of debt across the whole industry, the burden of proof would be on the regulator to show that this was a valid response to differentiation caused by inefficiency. Otherwise, the regulator would need to require different costs of debt.[29]

Questions

Question 6.1 - Do you support our proposal of having a single approach for estimating the return on debt should be used for the definition of the benchmark efficient entity (or for each definition, if more than one benchmark is used)?

In respect of the different approaches to debt in the NGR; "on the day" versus a trailing average or hybrid approach, we note the concerns of the AER are two-fold; firstly that this may open up opportunities for regulatory gaming and secondly that it would not promote allocative efficiency to have different pipelines using different methodologies.[30]

In respect of the first problem, the AER has indicated (at the debt workshop on June 3rd) that both the on the day and trailing average approaches meet its NPV=0 criterion, and are thus proofed against gaming. We understand that there is some lack of clarity about whether current proposed transition mechanisms met the same NPV=0 approach, but that this is an issue that the AER is working on. To the extent that a transition mechanism can be found that meets the NPV=0 condition, then regulatory gaming is not a concern, so long as only one switch between regimes is permitted. Since the NPV=0 condition is a long-run condition, there are clearly gaming opportunities if firms are allowed to switch between methods at each determination. However, there is no compelling reason, from a perspective of preventing regulatory gaming, to require all firms to switch methodologies at the same time, and thus to deviate from Section 87(10) and mandate one approach.

This leaves concerns about allocative efficiency if different firms are using different approaches. This may or may not be a concern, but we note that allocative efficiency is not one of the factors that the AER must give regard to in determining the return on debt (see Section 87(11) of the NGR). Thus it is not clear that this is an appropriate reason to prevent firms from retaining the current on-the-day approach in preference to switching.

Drilling further down to the weights applied to different years in a trailing average, there is very little justification to requiring a single set of weights. Evidence collected by CEG as part of the ENA submission to this consultation paper shows a very wide variety of weights on debt tranches for energy firms, both here and overseas. It is simply not the case that firms adopt a even weighting of the same

[29] Even for firms with the same credit ratings. In our previous submission, Brattle provided evidence (Estimating the Cost of Debt, Brattle Group, February 2012, Table 1 p 17) of utilities with the same credit ratings and different costs of debt, and vice versa.

[30] The former is mentioned in the Consultation Paper, the latter was discussed at the debt workshop on the 3rd of June.

sized tranche of debt each year (the AER's preference, as we understand it), or indeed any other weighting. Further, the same statements above in regard to the cost of debt apply in this instance as well; the AER would need to show that the only reason why different firms have different weights to their tranches of debt is because they are inefficient. Failure to do so would render the AER in breach of rule 87(2) of the NGR, because it would leave open the possibility that different weights merely reflect different risk profiles at the relevant firms.

Question 6.2 - How do the "on the day" approach, trailing average portfolio approach, and hybrid approach to estimating the return on debt compare in terms of promoting efficiency?

The same arguments made in relation to debt rates in the introduction to this chapter apply in respect of these different approaches; unless the AER can show that usage of different approaches by regulated and non-regulated firms (that is, differences in weightings between debt tranches; the "on the day" approach is just an extreme weighting of one in one time period and zero elsewhere) are due to inefficiencies at the relevant firms, then it must conclude that there is no single answer to this question. Except to say that both are equally likely to be efficient, dependent upon the context of the risk profile.

Question 6.3 - What are the considerations that we should have when setting the gearing level?

In its discussion about gearing in the Consultation Paper, the AER makes reference to the work of Modigliani & Miller (1958) which shows that gearing levels are not a determining factor of the cost of capital. Like any other model, their model is based upon a number of assumptions, and relaxation of one or more of these assumptions as one moves from a theoretical rule could result in this invariance being altered. For this reason, we are happy for the AER to set a particular gearing level, based upon its assessment of how well each of the Modigliani & Miller (1958) assumptions hold true in the real world.

However, we would make two points:

- If the regulator is going to set a particular gearing level, then it needs to be clear about which of the Modigliani & Miller (1958) assumptions it believes does not hold, and why such a belief would lead it to conclude that a particular gearing level is appropriate.
- If the regulator is going to do this, it needs to be consistent, as per Section 87(5c) of the NGR in its treatment of debt and equity.

Our first point is fairly obvious. Our second point can be made clear by examining the assumptions underpinning the CAPM and Modigliani & Miller (1958) side-by-side, as we do in Table 1.

Table 1. Comparison between assumptions in CAPM and Modigliani-Miller Propositions

Assumption	CAPM	Modigliani-Miller
Investors aim to maximize utility	✓	✓
Investors are rational and risk averse	✓	✓
Investors can broadly diversify	✓	
Investors are price takers	✓	✓
Investors can borrow and lend without limit at the risk free rate	✓	Partial match
Trade occurs with taxes or transactions costs (including bankruptcy)	✓	✓
Securities can be divided into small parts	✓	
Information is equally available across the market	✓	✓
Equivalence in borrowing costs for firms and investors	Partial match	✓
No effect of debt on EBITDA		✓

As can be seen, several of the assumptions are common between the two models. If the AER is going to relax an assumption and set gearing, and that same assumption holds in the derivation of the CAPM, then it must also relax the assumption (if it continues to use the CAPM) when estimating the cost of equity, and adjust the cost of equity accordingly.[31] In other words, the regulator must be consistent across the different aspects of any decision it makes, in terms of the assumptions which underpin its reasoning. Comparing CAPM and Modigliani-Miller in this way makes the issue particularly clear, but we would argue that this requirement should hold in general.

Additional questions on the cost of debt and gearing can be found at the end of appendix G.

- Question G.1 - How should we address the issues regarding annual updating of the return on debt estimate?

[31] This is a special case of the more general argument that changes in the cost of debt or level of gearing ought to be reflected in appropriate changes in the cost of equity, recognising the inter-linkages between them, as per the requirements of Section 87 (11b) of the NGR.

APIA is of the view that there is a potential for prices shocks when using a true-up at each Access Arrangement Review. A method for annual adjustment should be a relatively easy inclusion in the annual price variation approval process and, to the extent that it avoids price shocks at the Review stage, may be beneficial..

- Question G.2 - What should be our considerations when deciding whether transition between benchmarks is required? How should we apply transition while retaining the properties of incentive-based regulation?

Transitional approach should be based on the simple proposition that it should emulate what a business would do if it was moving from one approach to debt financing to another, with the proviso that different firms may adapt in different ways (depending upon individual circumstances) and still be efficient; we can see no reason to insist on one transition approach. This would preserve the benchmark efficient firm requirement and would inherently preserve the incentive properties required by the NGR.

- Question G.3 - To what extent does the estimation method need to incorporate the different types of debt available to a business in order to be consistent with the Rate of Return Objective?

It would be ideal to be able to capture information about the different types of debt financing. However, the nature for arbitrage should eliminate the need, because it should eliminate any material differences between the cost of debt for the various types of finance. Use of bonds as a proxy for all debt types is a reasonable simplification.

- Question G.4 - Should we develop our own dataset for estimating the return on debt or use a third-party source such as Bloomberg? What would be the key considerations in developing our own dataset and how should they be addressed?

- The criterion for the information/data on debt rates should be the same as for the risk free rate: the source is independent and expert - and perceived to be so. This strongly suggests the use of an independent service that is respected and used by the finance markets, which is what the Bloomberg service is. It would be inadvisable for the AER to attempt as a part-time exercise what Bloomberg does "for a living". It would also not be helpful to the regulatory process if the AER were to develop a dataset, because it is a participant in the regulatory process. Question G.5 - When selecting bonds for use in the estimation—either in an AER-developed dataset or a third-party dataset—what should be our selection considerations in terms of maturity, credit rating, industry sector and country of issuance?

Bonds should be ten years to maturity, with credit ratings based on the appropriate benchmark efficient firm that has the similar risk profile in providing the reference services. However, the AER should recognize that not all firms with the same credit rating pay the same price for their debt (and vice versa), but pay different prices based on differing risk profiles. This militates against simply using the average of the relevant credit rating. In respect of country of issuance, Australian bonds should be used wherever possible. International bonds should only be used if the AER

develops a methodology for resolving the cost of exchange rate risk. We suspect this task may be very difficult.

8. Value of Imputation Credits (Gamma)

The Consultation Paper raises a number of conceptual issues in respect of the estimate of gamma. APIA makes the following comments on those issues.

8.1 Definitive source of evidence

Consistent with its views about all aspects of the rate of return, APIA holds the view that all relevant evidence should be considered in estimating gamma. However, as for all aspects of the rate of return, the evidence used to estimate gamma must be properly evaluated, as to its statistical, theoretical and empirical validity and the strengths, weaknesses and biases around methods of estimating the components of gamma.

In this regard we note that the most rigorous estimates of the theta component of gamma is derived from dividend drop-off tests as recognised by the Australian Competition Tribunal. Other methods, including simultaneous trading of shares with and without entitlements and simultaneous trading of shares and futures contracts, have been evaluated to be of little relevance or less robust than the latest dividend drop off estimates.

If new research delivers alternative robust estimates, these should be taken int0o account. However, APIA's view is that at present the dividend drop off analysis provides the best estimates.

8.2 Face value or Market Value

It is somewhat surprising that the Consultation Paper considers the use of face value of imputation credits as a measure for the utilisation rate. The clear issue to be determined in estimating the value of imputation credits is their value of imputation credits of investors. If there is a market value to investors that is different to the face value, clearly this is the value that should be applied. Use of face value for imputation credits would be akin to applying the par value of shares rather than those established by trading on the stock market.

8.3 Representative investor

The Consultation Paper makes the distinction between the marginal investor and the average investor. It is APIA's understanding that it is appropriate that the marginal investor – that is the price setting – investor is the one to considered in establishing the value of imputation credits. Therefore the value estimated using dividend drop-off tests is the correct one. In any event, even if it were appropriate to use the value of imputation credits for the average investor, it would be necessary to demonstrate that there was a difference between the average and the marginal investor and what that difference is in a statistically valid way. Given the statistical

complexity in estimating gamma for the market as whole, separating the gamma for marginal and average investors is likely to prove problematic.

8.4 Scope of gamma benchmark

It is clearly appropriate to consider any differences that investors may have in different industry segments. However, there remains an essential problem of being able to determine if there is a difference in valuing of imputation credits between industry groupings, and if there is, to rigorously determine what the difference is.

The task of determining an industry-specific gamma would require an appropriate characterisation of the benchmark firms to isolate the relevant data. We note that one of the factors that influences the value of imputation credits is whether an investors is resident in Australia or not. Non-residents cannot capture the value of imputation credits and therefore give them no value. Moreover, energy utilities have a high proportion of non-resident investors, generally a higher proportion than the average Australian firm. This suggests that an industry-specific gamma would be lower than that for the average for the market.

Importantly, before an industry-specific gamma could be applied it would be necessary to demonstrate using appropriate statistics that the industry-specific estimate was in fact different to that for the whole of the market.

While APIA supports a consideration of all relevant evidence it is important to note that recent work by NERA[32] on the payout ratio (F in the Monkhouse formula for gamma) and SFG Consulting on the Utilisation Rate (Theta in the Monkhouse formula[33] for gamma) fully supports the decision of the Australian Competition Tribunal applied by the AER since 2011 that:

- F = 0.7
- $\Theta = 0.35$

[32] NERA Economic Consulting, the payout ratio, May 2013, p123

[33] Updated Dividend Drop-off Estimate of Theta, SFG Consulting, June 2013

9. Debt and Equity Raising Costs

In APIA's view the cost of raising debt and equity are material costs that are incurred by gas transmission businesses (as for all energy infrastructure businesses) in the course of efficient financing. Therefore the regulator must include an allowance for these costs in determining the efficient costs of the service provider.

APIA is not particularly concerned whether these cost are recognised in the rate of return (ie the return on debt and the return on equity) or as elements of capital expenditure or operating expenditure. However, it is concerned that theses cost are included in the costs used to derive the regulated revenue and that an appropriate allowance that reflects the efficient practices of industry is included in the service providers costs.

The costs associated with efficient debt raising are set out clearly in a report by PWC[34]. These include direct transaction costs and indirect transaction costs. PWC estimates that these costs can vary between 23.8 and 24.4 basis points per debt single raising for a BBB+ rated business depending on the amount to be raised. It also estimates that where there is an annual debt raising assuming ten equal tranches of debt to be raised the cost per trance would be reduced by 0.5 basis points.

It will be important to recognise that in adopting a trailing average approach to estimating the return on debt that the need to include an allowance for debt raining in each year of an Access Arrangement will be necessary.

The cost of equity raising also needs to be properly calculated reflecting the amortisation of the raising of initial capital plus the cost of any new equity raining needed to fund new capital expenditure and growth the capital base (ie RAB)

[34] Debt Financing Costs, PWC, June 2013

10.Forecast inflation

APIA is of the view that the method of applying the Fisher equation to indexed and nominal Commonwealth Government securities (CGS) Fisher Method)was reasonable and effective while there were sufficiently liquid and undistorted markets for them, up to about 2006/07. At this time it became clear that there was a major problem around indexed CGS liquidity, it was necessary to move away from this method. This first manifested itself in 2005 when some distortions in the pricing of indexed Commonwealth bonds began to emerge during the two months leading to an issue reached maturity. During 2007 it became clear that these distortions were growing as the number of indexed CGS reduced as the Commonwealth Government elected not to replace them, because Commonwealth debt had been eliminated and there was not need for it to continue to raise debt in this way.

Since that time the AER and other regulators have recognised that the price differential between indexed and nominal CGS does not provide an accurate estimate of the markets forecast of inflation. The method that has been adopted since that time based around the RBA's forecast of inflation and its charter inflation target between 2.0 and 3.0 per cent remains the best available. This method has significant benefits because it utilizes the expertise and independence of Australia's central bank. This means it is likely to be one of the best available forecasts and will not have any inherent biases.

If there were no distortions in the yields on indexed and nominal CGS, it would be debatable as to whether the Fisher Method is likely to be better than the RBA-based forecast. The Fischer Method effectively becomes an amalgam of the bond market's views of inflation and should therefore be expert and independent. However, while there is any uncertainty about the distortions in the yields on CGS the RBA- based forecast must be considered superior.

In APIA's view it must be affirmatively demonstrated that there are no distortions in the yields on CGS before the Fisher method can be applied again. In APIA's view the issue of $17 billion indexed CGS is unlikely to deliver the required confidence.

APPENDIX: Asset Pricing Models

Asset Pricing Models

The rates of return on equity and debt which are to be used in determining the allowed rate of return of rule 87(2) of the National Gas Rules (NGR) are to be forward-looking rates (rule 87(4)(a)). They cannot be observed in financial markets, and must be estimated (as rules 87(6) and 87(8) require). These estimates will be approximations to unknown true values, and must be determined through the application of relevant theory and practice.

Commercial and regulatory practice, in Australia and elsewhere, has favoured use of the Sharpe-Lintner Capital Asset Pricing Model (Sharpe-Lintner CAPM) in the estimation of the rate of return on equity. (Theoretically, that model could also be used to estimate the rate of return on debt, but the limited availability of data on traded debt securities often precludes its use in practice.) However, research by financial economists has shown, and continues to show, the limited power of the Sharpe-Lintner CAPM to explain rates of return. This has been attributed to fundamental conceptual weaknesses in the model.

Research has not yet identified a replacement for the Sharpe-Lintner CAPM, but a number of options may be emerging. A now vast literature on asset pricing points clearly to the fact that no single model is perfect for either estimation of the rate of return on equity or the rate of return on debt. We briefly summarize some of the issues raised by that literature in the paragraphs which follow.

Sharpe-Lintner CAPM

Work by William Sharpe, John Lintner and others during the 1960s initiated current thinking on the pricing of financial assets and, in particular, on the estimation of expected rates of return on equity. The principal result of this work, the Sharpe-Lintner CAPM, explains the expected rate of return, $E(r_i)$, on any financial asset i in terms of the rate of return on a risk free asset and a premium for risk:

$$E(r_i) = r_f + \beta_i \times (E(r_m) - r_f).$$

r_f is the return on the risk free asset, βi (the beta of asset i) is the covariance of return on that asset and the return on a market portfolio of assets, and $E(r_m)$ is the expected rate of return on that market portfolio. The term $E(r_m) - r_f$ is referred to as the market risk premium.

The Sharpe-Lintner CAPM is derived by assuming that investors choose, at a point in time, portfolios of financial assets which yield returns one period later. The return on a portfolio is not known with certainty at the time the portfolio is chosen, but all investors are assumed to know the true probability distribution of returns at the end of the period. That is, all investors have the same information; there are no information asymmetries.

Each investor is assumed to be able to rank all of the available portfolios of financial assets in terms of the means and variances of the uncertain returns on those portfolios. Each investor is also assumed to be risk averse, trading off higher returns for lower risk, by choosing a portfolio which has minimum return variance given the mean – or expected – return.

In choosing their portfolios, investors act as price takers in competitive asset markets. In transacting in these markets they do not incur transaction costs or taxes. Investors are constrained by their wealth but they are otherwise unrestricted in choosing the portfolios which they prefer. An investor may take a long or short position of any size in any financial asset, including the risk free asset, and every investor may borrow or lend any amount at the risk free rate of return.

Early empirical work on the Sharpe-Lintner CAPM indicated that it broadly explained the behaviour of asset prices: high beta shares tended to have higher returns than low beta shares, and the relationship between rate of return and share price was "roughly linear".[35] However, the slope of the relationship between rate of return and beta appeared to be less than the slope implied by the Sharpe-Lintner CAPM, and the model appeared to "explain" only a small percentage of the variation in rates of return.[36]

Subsequent studies, using more refined statistical methods, continued to show that the Sharpe-Lintner CAPM was not a particularly good model of asset pricing.[37]

Black's CAPM

In 1972, Fischer Black derived, within the mean-variance framework within which the Sharpe-Lintner CAPM was derived, a capital asset pricing model (Black's CAPM) without assuming the existence of a risk free asset, and without assuming unrestricted borrowing and lending.[38]

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[35] See, for example, Irwin Friend and Marshall Blume (1970), "Measurement of Portfolio Performance Under Uncertainty", American Economic Review, 60(4): 561-575; Fisher Black, Michael C. Jensen and Myron Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests", in Michael C. Jensen (ed.), *Studies in the Theory of Capital Markets*, New York: Praeger; Marshall E. Bloom and Irwin Friend (1973), "A New Look at the Capital Asset Pricing Model", Journal of Finance, 28(1): 19-33; Marshall E. Bloom and Frank Husic (1973), "Price, Beta, and Exchange Listing", Journal of Finance, 28(2): 283-299; and Eugene F. Fama and James D. MacBeth (1973), "Risk, Return, and Equilibrium: Empirical Tests", Journal of Political Economy, 81(3): 607-636.

[36] See, for example, Ravi Jagannathan and Zhenyu Wang (1996), "The Conditional CAPM and the Cross-Section of Expected Returns", Journal of Finance, 51(1): 3-53, and Nick Durack, Robert B Durand and Ross A Maller (2004), "A best choice among asset pricing models? The Conditional Capital Asset Pricing Model in Australia", Accounting and Finance, 44: 139-162. Jagannathan and Wang note that the Sharpe-Lintner CAPM explains only 1% of the cross sectional variation in average returns on 100 portfolios constructed from US stock market data. In a study estimating alternative asset pricing models using Australian share price data, Durand, Durack and Maller report that the Sharpe-Lintner CAPM explained only 7.25% of return variation.

[37] See, for example, Rolf W. Banz (1981), "The Relationship Between return and Market value of Common Stocks", Journal of Financial Economics, 9: 3-18; Marc R. Reinganum (1982), "Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market Values", Journal of Financial Economics, 9: 19-46; Michael R. Gibbons (1982), "Multivariate Tests of Financial Models: A New Approach", Journal of Financial Economics, 10: 3-27; Robert F. Stambaugh (1982), "On the Exclusion of Assets from Tests of the Two Parameter Model: A Sensitivity Analysis", Journal of Financial Economics, 10: 237-268; Jay Shanken (1987), "Multivariate Proxies and Asset Pricing Relations: Living with the Roll Critique", Journal of Financial Economics, 18: 91-110; and Eugene F. Fama and Kenneth R. French (1992), "The Cross Section of Expected Stock Returns", Journal of Finance, 47(2): 427-465.

[38] Fischer Black (1972), "Capital Market Equilibrium with Restricted Borrowing", Journal of Business, 45(3): 444-455. See also M J Brennan (1970), "Capital Market Equilibrium with

In Black's derivation, the return on a portfolio for which return is uncorrelated with the return on the market portfolio acts as the equivalent of the risk free rate of return. Black called this portfolio the zero-beta portfolio, and denoted its expected return $E(r_z)$. When there is no risk free asset, and there is no riskless borrowing or lending, the expected return on any asset i is a linear function of β_i:

$E(r_i) = E(r_z) + \beta_i \times (E(r_m) - E(r_z))$.

This is Black's CAPM.

Black also showed that when there is a risk free asset available, but investors are not able to take short positions in that asset, $r_f < E(r_z) < E(r_m)$. In these circumstances:

- when β is low, the expected return predicted by the Sharpe-Lintner CAPM is less than the expected return predicted by the Black's CAPM; and
- when β is high, the expected return predicted by the Sharpe-Lintner CAPM is greater than the expected return predicted by Black's CAPM.

This seemed to accord with the findings from work by Black, Jensen and Scholes using US share price data for the period 1926 to 1966. Black, Jensen and Scholes found that expected returns on portfolios of shares with low βs were consistently higher than the expected returns predicted by the Sharpe-Lintner CAPM, and expected returns on portfolios of shares with high βs were consistently lower than the expected returns predicted by the Sharpe-Lintner CAPM.[39]

Intertemporal Capital Asset Pricing

Not only were the assumptions required for the Sharpe-Lintner CAPM being questioned by the early 1970s. There were also concerns about the mean-variance framework within which asset pricing theory was being developed. The assumption that an investor is able to rank all of the available portfolios in terms of the means and variances of their uncertain returns is valid only if further assumptions are made about the shape of the probability distribution of returns and about the mathematical form of the utility function used to rank uncertain prospects. These further assumptions about the shape of the returns distribution and about the form of the utility function were seen by many economists as being unnecessarily specific.

Robert Merton summarised the position in 1973:

Although the model [the Sharpe-Lintner CAPM] *has been the basis for more than one hundred academic papers and has had a significant impact on the non-academic financial community, it is still subject to theoretical and empirical criticism. Because the model assumes that investors choose their portfolios according to the Markowitz*

Divergent Borrowing and Lending Rates", Journal of Financial and Quantitative Analysis, 6(5): 1197-1205.

39 Fischer Black, Michael C Jensen and Myron Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests", in Michael C Jensen (ed.), *Studies in the Theory of Capital Markets*, New York: Praeger.

mean-variance criterion, it is subject to all the theoretical objections to this criterion, of which there are many.[40]

Merton sought to avoid the theoretical objections to the mean-variance framework within which the Sharpe-Lintner CAPM (and Black's CAPM) had been derived, by deriving a general form of the asset pricing relationship using the standard model of intertemporal choice from microeconomic theory. His use of intertemporal choice theory allowed another of the strong assumptions required for derivation of the Sharpe-Lintner CAPM – the assumption of a single time period – to be dropped, and opened the way to explicit consideration of the role of time in asset pricing.

Since the early 1970s, a large number of asset pricing models have been developed within the framework of intertemporal choice theory, although none of these models has gained the status of being "well-accepted". The use of intertemporal choice theory allowed one of the strong assumptions required for derivation of the Sharpe-Lintner CAPM – the assumption of a single time period – to be dropped, and opened the way to explicit consideration of the role of time in asset pricing. When time is explicitly taken into account, the expected rate of return must not only compensate investors for bearing market risk (the key insight of the CAPM); it must also compensate them for the bearing of the risk of unfavourable shifts in the set of investment opportunities over time. That other risks may be important in the explanation of asset prices is indicated by the growing number of pricing models developed within a dynamic general equilibrium framework incorporating consumption and production as well as the buying and selling of financial assets.[41]

Some of these models have incorporated information asymmetries and heterogeneity in investor expectations. In these circumstances, optimal portfolios may not be well diversified, and idiosyncratic factors may play a role in explaining expected rates of return.[42]

Behavioural finance

Intertemporal choice theory uses a conceptual framework in which investors are assumed to maximise expected utility subject to constraints on investment and

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[40] Robert Merton (1973). "An Intertemporal Capital Asset Pricing Model", Econometrica, 41(5): 867-887.

[41] See, for example, John H. Cochrane (1996), "A Cross-Sectional Test of an Investment-Based Asset Pricing Model", Journal of Political Economy, 104(3): 572-621; Urban J. Jermann (1998), "Asset pricing in production economies", Journal of Monetary Economics 41: 257-275; Joao F. Gomes, Leonid Kogan and Lu Zhang (2003), "Equilibrium Cross Section of Returns", Journal of Political Economy, 111(4): 693-732, Leonid Kogan (2004), "Asset prices and real investment", Journal of Financial Economics, 73: 411-431; and Joao F. Gomes, Leonid Kogan and Motohiro Yogo (2009), "Durability of Output and Expected Stock Returns", Journal of Political Economy, 117(5): 941-986.

[42] See, for example, George M. Constantinides and Darrell Duffie (1996), "Asset Pricing with Heterogeneous Consumers", Journal of Political Economy 104(2): 219-240; John Y. Campbell, Martin Lettau, Burton G. Malkiel and Yexiao Xu (2001), "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk", Journal of Finance, 54(1): 1-43; Alon Brav, George M. Constantinides, Christopher C. Geczy (2002), "Asset Pricing with Heterogeneous Consumers and Limited Participation: Empirical Evidence", Journal of Political Economy, 110(4): 793-824; Fangjian Fu (2009), "Idiosyncratic Risk and the cross-section of expected stock returns", Journal of Financial Economics, 91: 24-37; Francis A. Longstaff (2009), "Portfolio Claustrophobia: Asset Pricing in Markets with Illiquid Assets", American Economic Review, 99(4): 1119-1144.

consumption opportunities, including constraints on wealth and on the availability of information. It uses the "rational actor" framework of standard microeconomic theory. This was the framework within which the CAPM was derived.

Periodically, concern has been expressed over the naivety of the psychological foundations of the rational actor framework and, more specifically, over the presumption of expected utility maximization. During the 1980s, these concerns, and the fact that rational actor models did not seem to provide adequate explanations of financial markets, drove the emergence of a new conceptual framework – behavioural finance – based on more realistic psychological foundations, and supported by experimental and empirical analysis.[43]

After reviewing the then recent research on asset pricing models which relates a stochastic discount factor to macroeconomic risks, and nearly two decades of work in behavioural finance, Campbell concluded his 2000 survey of asset pricing:

Despite the promise of such [stochastic discount factor] research, in my opinion it is unrealistic to hope for a fully rational, risk based explanation of all the empirical patterns that have been discovered in stock returns. A more reasonable view is that rational models of risk and return describe a long-run equilibrium toward which financial markets gradually evolve. Some deviations from such models can be quickly arbitraged away by rational investors; others are much harder to arbitrage and may disappear only after a slow process of learning and institutional innovation.[44]

[43] A brief history of behavioural finance and a review of the earlier literature is provided by Robert J Shiller (2003), "From Efficient Markets Theory to Behavioral Finance", Journal of Economic Perspectives, 17(1): 83-104. See also Nicholas C Barberis and Richard H Thaler (2003), "A Survey of Behavioral Finance", in George M Constantinides, Milton Harris and Rene M Stulz (eds.), *Handbook of the Economics of Finance, Volume 1B: Financial Markets and Asset Pricing*, Amsterdam: Elsevier North Holland.

[44] John Y Campbell (2000), "Asset Pricing at the Millennium", Journal of Finance, 55(4): 1515-1567.

ATTACHMENT: Further Report by The Brattle Group on use of Multiple Cost of Equity Models

The Brattle Group

Estimating the Cost of Equity for Regulated Companies: Followup Report

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Prepared for

Australian Pipeline Industry Association

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EXECUTIVE SUMMARY

This report is best viewed as a follow-up to the report, "Estimating the Cost of Equity for Regulated Companies," by *The Brattle Group* (Brattle Report), which was submitted to the Australian Energy Regulator (AER) by the Australian Pipeline Industry Association (APIA). In this follow-up report, we address three issues. First, we discuss three regulatory jurisdictions in more detail and provide information about how the British Columbia Utilities Commission, the U.S. Surface Transportation Board, and the Mississippi Power Performance Evaluation Plan combine various models, methods, and other information to determine the allowed cost of equity. Specifically, we discuss the British Columbia Utilities Commission's decisions regarding the weight placed on various methods over time. Similarly, we discuss the industry conditions that preceded the Surface Transportation Board's change in methodology and demonstrate how the models have performed over time. Finally, we address the Mississippi Power Performance Evaluation Plan, which is based on a combination of several cost of equity estimation methods.

Second, we provide an illustrative example of how to determine the relative weights to assign to various models, methods, and other information. This section discusses a recent matter before the California Public Utilities Commission (CPUC), where Brattle provided cost of equity testimony and used market and industry information to determine which models and methods to rely upon for the assessment of the range of cost of equity. Further, the target utility's recommended cost of equity depended on the company's risk relative to the risk of the companies used to estimate the benchmark cost of equity.

Third, Section IV of the report provides some clarifications on the Brattle Report and addresses issues raised by the AER in its Consultation Paper on Rate of Return Guidelines. We address the concern that the Brattle Report did not provide specific guidelines regarding what weight to assign to the various models, methods, and other information, along with a discussion of the inherent imprecision in estimated figures. Finally, this section clarifies our tables that illustrate the directional movement of the weight on models depending upon economic factors (e.g., risk-free rates and market volatility) and industry factors.

Overall, we emphasize in this report that most North American regulators look to multiple models, methods and a range of other information and evidence in order to set the cost of capital for a given industry or company. The relative weightings assigned to different models are determined by informed judgment on the part of the regulators, and are a function of market, industry and company-specific factors that are fluid across time. Looking to several models, methods and other information is important not only for North American regulation but worldwide. The financial crisis has demonstrated that no single model or method is capable of capturing all relevant information – otherwise, we would not have seen several regulators for the first time recognize new models or methods since the crisis. While the regulatory approaches taken to adapt to the new economic environment differ, regulators as far apart as Canada and New Zealand have recognized that changes are needed and added to or modified the methods, models, or other information they rely on. As these changes were implemented in the 2009-10 time frame, no conclusive studies of the impact have been published. We agree with the approach of taking market, industry and company-specific factors into account when determining the cost of equity, and the fact that this approach has worked in many jurisdictions for years indicates that it is workable strategy across jurisdictions - it is imperative to take economic conditions, industry developments, and company-specific issues into consideration when determining the cost of equity.

We provide examples of changing regulatory practices via the three specific case studies mentioned above, as well as via the illustrative example of Brattle's own methodology in the CPUC matter, and a discussion of how this approach was received by the regulator. In our first report, we quoted MIT professor Stewart C. Myers as an academic who acknowledges that using multiple models is useful.

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.

We also agree with regulators who have implemented this approach and acknowledged the usefulness of multiple methods. For example, the Ontario Energy Board in 2009 commented

> **"the use of multiple tests to directly and indirectly estimate the [cost of equity] is a superior approach to informing its judgment than reliance on a single methodology."** [bold in the decision]

We believe that the AER should take these comments to heart and embrace using all relevant estimation methods, financial models, and market data as well as considering the "prevailing conditions in the market for equity funds."

I. INTRODUCTION

This is a follow-up to *The Brattle Group*'s report "Estimating the Cost of Equity for Regulated Companies" (Brattle Report).[1] This report first discusses in more detail than the Brattle Report three regulatory jurisdictions that routinely use multiple models for estimating the cost of equity. Second, we provide an illustrative example of how we have used economic and industry-specific information to assess the weighting of different models in recommending the cost of equity for a regulated utility, in the context of a proceeding to set the revenue requirement and regulated prices. Finally, we clarify certain recommendations made in the Brattle Report.

II. REGULATORY JURISDICTIONS THAT ROUTINELY USE MULTIPLE METHODS

A. INTRODUCTION

To illustrate how regulators use multiple models, methods and other information to arrive at an allowed return on equity, we examine the practices of regulatory jurisdictions that have used this approach to determine the cost of equity for regulated utilities. We focus on North American regulators, who, with few exceptions, do not have a specific method or combination of methods that they consistently rely upon. Instead, most regulators in North America hear evidence on multiple models, methods and other information from stakeholders (e.g., the regulated entity and consumers), and stakeholders are usually free to present any evidence thought to be relevant, which will be judged on its merits. The regulator then considers the evidence presented and exercises judgment to determine an allowed return on equity. It is rare for the regulator to assign a specific numerical weight to each model, method or other information to arrive at the final allowed return on equity, although it is common for regulators to provide insights into what evidence was given most weight and what was ignored and why.

[1] This report was attached to the Australian Pipeline Industry Association's "Response to Issues Paper" dated 20 February 2013.

Thus, while most North American regulators look to multiple models and other evidence, there are only a few jurisdictions that provide exact guidelines on how they weighted the evidence provided. Among the regulators that do provide such guidance are the British Columbia Utilities Commission (BCUC), the U.S. Surface Transportation Board (STB), and the Mississippi Public Service Commission (MSPSC) (in the context of Performance Evaluation Plan (PEP) approvals). We examine each of these three case studies in turn below. The purpose of presenting these case studies is to shed light on how regulators have combined multiple models, methods and other evidence in order to determine the cost of equity, and, additionally, how the relative weightings on these models can change as a function of shifting market or industry factors.

Before we discuss the three specific jurisdictions, we note that the National Energy Board (NEB), which is an independent Canadian federal agency that regulates international and interprovincial aspects (including rates) of the oil, gas, and electric industries. The NEB has traditionally relied on the Sharpe-Lintner CAPM, but in a recent decision the NEB endorsed the use of multiple models in determining the cost of capital to generate a more reliable range of results. In doing so, the NEB recognized the impact of the recent financial crisis on the estimates from the Shape-Lintner CAPM and therefore used a version of the DDM to bring the combined estimates more in line with what the NEB considered a reasonable range. Thus, the key reason for the NEB's decision to rely on multiple methods was that the economic conditions had changed. In making this decision, the NEB stated:[2]

> Historically, the Board has not relied on the DCF [DDM] model to estimate cost of capital, primarily due to the perceived difficulty in accurately estimating growth rates. We note that the recent financial market turmoil generates utility betas lower than their historical average and evidence from both expert witnesses noted that DCF [DDM] results, in the current environment, were yielding cost of equity estimates higher than those resulting from the CAPM. In the current circumstances, we are of the view it is appropriate to give weight to the multi-stage DCF [DDM] results in this proceeding. Further, we note that growth rates for relatively stable industry such as utilities are more reliable, which somewhat mitigates concerns about the reliability of analysts' forecasts…
>
> Both the CAPM and DCF [DDM] models, in our view, have some shortcomings and some advantages in their application. We believe that giving weight to both models in this case provided a more accurate estimate of the Mainline's cost of capital than would

[2] *NEB*, Reason for Decision: RH-3-2011, March 2013 (RH-3-2011), pp. 182-183.

> have been provided by the application of either model on its own. We are of the view that by giving weight to both models, the effects of beta decoupling and interest rate sensitivity inherent in the CAPM should be largely accounted for. Further, concerns about the analyst-estimated growth rates used in the DCF [DDM] model are counterbalanced by lower CAPM results.

This quote also makes it clear that the NEB recognizes that at certain times, a specific model such as the CAPM might provide lower (or higher) results than other methods and that market conditions merit the assignment of more or less weight to versions of the DDM.

The three case studies in the next section provide guidance to how to implement an approach that incorporate multiple models, methods, and other evidence in the determination of the cost of equity for regulated entities. We have chosen these three regulators because they, relative to other jurisdictions, either have engaged in specific public consultations to arrive at their methodology (BCUC and STB) or have a long-standing successful implementation of the methodology (MSPSC).

B. BRITISH COLUMBIA UTILITIES COMMISSION

The British Columbia Utilities Commission (BCUC) is an independent regulatory agency of the Provincial Government of British Columbia, Canada. It operates under and administers the Utilities Commission Act, which applies to utilities subject to the province's legislative authority.[3] The BCUC operates independent of the NEB, but like the NEB, the BCUC has taken the economic environment into account in its recent weighting of the models and methods presented to the BCUC. The BCUC has included versions of the DDM among the models the BCUC has relied upon since at least 2006 although the weight assigned to the model has varied over time as economic and industry conditions have changed.

The BCUC's views on how to determine the appropriate cost of equity capital have evolved over time. While from 1994 through 2009 it updated the allowed cost of equity every year using an automatic adjustment mechanism, the BCUC has periodically reviewed how to determine the

[3] Adapted from the BCUC's website at www.bcuc.com.

base cost of equity that is relied upon in the adjustment mechanism.[4] The BCUC has consistently looked to multiple methods to assess the cost of equity for the utilities it regulates, but the relative weights on the methods have changed over time. It is illustrative to note that the BCUC in its three most recent reviews of the cost of equity for a so-called low-risk utility has weighted the methods and evidence presented to it differently. Further, the BCUC in its 2013 generic cost of capital decision explicitly recognized that

> it is up to the Panel [BCUC] to decide how much confidence it should put in various models that have unrealistic assumptions and do not explain returns perfectly. The Panel must also understand where judgment needs to be applied to the output delivered by these models.[5]

Initially, the BCUC relied primarily on versions of the CAPM,[6] whereas the "comparable earnings and DCF [DDM] test results were used primarily as a check upon reasonableness."[7] However, the BCUC, like most North American regulators, hears evidence from all stakeholders on cost of equity (and other matters) before making a decision on the allowed return on equity. It is instructive to look at how the BCUC has viewed the methods presented to it for review in recent years. For its 2006 Decision, the BCUC heard evidence on several versions of the CAPM and DDM, as well as on the Equity Risk Premium Method (ERP) and the Comparable Earnings Methodology (CE).[8] Having reviewed the evidence, the BCUC stated that it relied directly on the CAPM, DDM, and ERP methodologies although it did not specify weights. The BCUC also found the comparable earnings methodology might be useful in future proceedings although it assigned it "little or no weight."[9] The allowed ROE finally determined was within the range of

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4 The BCUC's automatic adjustment mechanism annually updated the allowed ROE by increasing or decreasing the allowed ROE by a percentage of the change in the forecasted yield on long-term Canadian government bonds.

5 *British Columbia Utilities Commission*, Decision in the Matter of British Columbia Utilities commission Generic Cost of Capital Proceeding (Stage 1), May 10, 2013 (BCUC 2013 Decision), p. 113.

6 *British Columbia Utilities Commission*, Decision in the Matter of Return on Common Equity BC Gas Utility Ltd, Pacific Northern Gas Ltd., West Kootenay Power Ltd., June 10, 1994 (BCUC 1994 Decision).

7 BCUC 1994 Decision, p. 17.

8 As noted in the Brattle Report, the ERP approach adds an estimated premium to a bond yield to assess the cost of equity. The CE calculates the accounting return on equity from a group of companies.

9 BCUC In the Matter of Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism, Decision March 2, 2006 (BCUC 2006 Decision), p. 56. BCUC In the

Continued on next page

estimates provided to the BCUC. This is illustrated in Figure 1 below, which shows the cost of equity estimates the BCUC accepted in its 2006, 2009, and 2013 decisions. The figure shows both the estimates the BCUC accepted from the CAPM, DDM, ERP, and CE methods as well as its allowed return on equity. In considering the information in Figure 1, it is worth noting that the cost of equity provided is for what the BCUC consider a "low risk benchmark utility," which the BCUC for a long period of time has identified to be Fortis BC (formerly Terasen Gas). We also note that the BCUC sometimes adds an amount to the raw cost of equity estimates from the four methods the BCUC historically has considered. This is done to reflect the cost of raising equity capital (financing flexibility) and in 2009 also to make the Sharpe-Lintner CAPM estimates fairly reflect the cost of equity capital at the time (when the financial crisis was near its height). When the BCUC adds an allowance to the cost of equity estimates we have added the amount to the bars depicting the cost of equity estimates to make the estimates comparable to the allowed return on equity.

Continued from previous page

Matter of Terasen Gas Inc. *et al.* Return on Equity and Capital Structure Decision, December 16, 2009 (BCUC 2009 Decision), pp. 44-45.

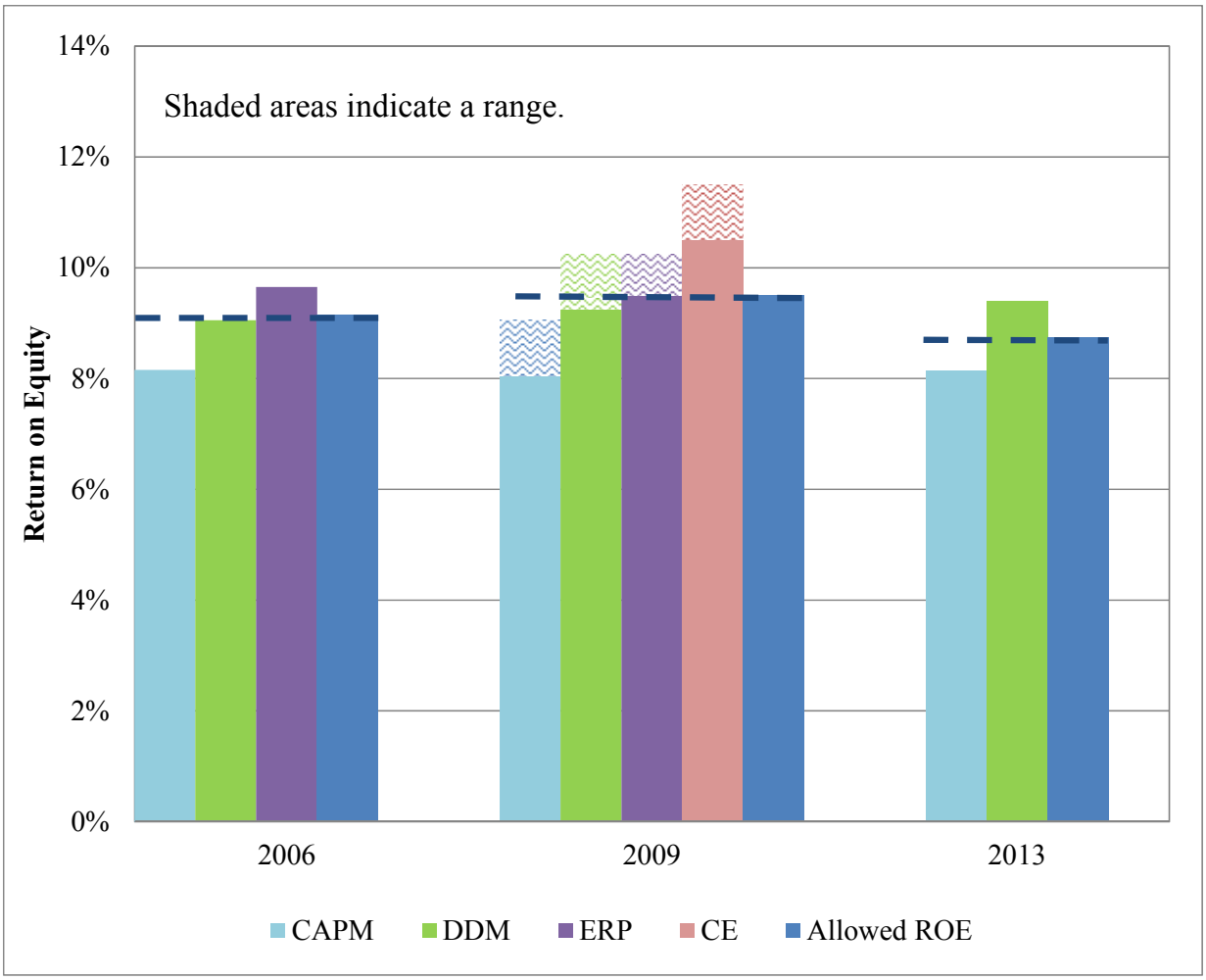

Figure 1: BCUC's Cost of Equity Decisions in 2006, 2009, and 2013

It is evident from Figure 1 above that the BCUC did not apply the same weighting in 2006, 2009, and 2013. Note that in 2009 and for the comparable earnings methodology in 2006, the BCUC identified a range of estimates rather than a point estimate for the methods considered. Note also that the BCUC ignored the ERP and CE methods in 2013.

Insights into the BCUC's decision to use its judgment in determining the allowed return on equity comes from these decisions. We therefore look at the 2009 and 2013 decisions from the BCUC to learn how the regulator arrived at the relative weighting of the models, methods, and other evidence before the BCUC.[10]

[10] (BCUC 2009 Decision) and BCUC 2013 Decision.

In 2009, the BCUC again heard evidence from stakeholders, who presented evidence to the BCUC on the Sharpe-Lintner CAPM (and a two-factor version), the ERP,[11] DDM, and the comparable earnings method in a generic cost of capital proceeding.

> The Commission Panel has considered the three approaches to determining ROE for a regulated utility and agrees with Terasen [gas distribution utility] that it should take all three into account when establishing an ROE.[12]

Additionally, the BCUC found:

> The Commission Panel agrees that a single variable is unlikely to capture the many causes of changes in ROE and that in particular the recent flight to quality has driven down the yield on long-term Canada bonds, while the cost of risk has been priced upwards.[13]

Further, the BCUC wrote

> The Commission Panel will give weight to the CAPM approach, but considers that the relative risk factor should be adjusted in a manner consistent with the practice generally followed by analysts so that it yields a result that accords with common sense and is not patently absurd.
>
> **Accordingly the Commission Panel determines that in determining a suitable ROE for TGI [Terasen Gas Inc.], it will give most weight to the DCF [DDM] approach, some lesser weight to the ERP and CAPM approaches and a very small amount of weight to the CE approach**.[14]

In deciding to adjust the CAPM estimates, the 2009 decision acknowledged the influence of recent economic events on the inputs to the Sharpe-Lintner CAPM and gave the most weight to the DDM, less weight to the Equity Risk Premium method and CAPM, and a low weight to the comparable earnings model. However, the exact weighting of the methods was a judgment made by the BCUC and was not made explicit (in terms of precise numerical weights). This is a common approach in North America, where many parties submit evidence that is then reviewed by the jurisdictional regulator. Only rarely does the regulator specify exactly what weight was assigned to each method and methodology.

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[11] CAPM and other methods that rely on a risk premium are often jointly referenced as risk positioning methods in Canadian regulation.

[12] BCUC 2009 Decision p. 44.

[13] BCUC 2009 Decision, p. 73.

[14] BCUC 2009 Decision p. 45. Emphasis in original.

The BCUC recently released its 2013 decision for its generic cost of capital proceeding. The BCUC preliminarily stated:

> The Panel finds an observation offered in the Brattle Report to be instructive:
>
> 'It is useful to recognize explicitly at the outset that models are imperfect. All are simplifications of reality and this is especially true of financial models. Simplification, however, is also what makes them useful. By filtering out various complexities, a model can illuminate the underlying relationships and structures that are otherwise obscured.'[15]

The BCUC heard evidence from stakeholders on versions of the CAPM, DDM, risk premium model, and comparable earnings method. Preliminarily, the BCUC observed:

> The key issue then in the determination of the appropriate ROE is assessing how much weight to give to each of these models and their estimates. In turn, the weight given to each estimate depends on a judgment of the validity of the conceptual base of the four broad model classes and a judgment of how reasonable the model inputs are. The Panel has based this judgment, as much as possible, on the objective of determining the opportunity cost of equity.[16]

Thus, the BCUC's 2013 decision makes it clear that it applies judgment in setting the allowed return on equity with the goal of setting the allowed return on equity as close as possible to the opportunity cost of equity.

Because the risk premium model and the comparable earnings methods lack support in the financial economics literature, the BCUC did not assign any weight to those methods.[17] However, the BCUC found both the CAPM and DDM evidence of merit and concluded that

> The Panel finds that the DCF [DDM] and CAPM should be given equal weight in determining the ROE. Moreover, the Panel finds that CE [Comparable Earnings] and other ERP [Risk Premium] models have insufficient merit to be accorded any weight in the determination of the fair ROE.[18]

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[15] BCUC 2013 Decision p. 55. The citation comes from a study commissioned by the BCUC, "Survey of Cost of Capital Practices in Canada" by Bente Villadsen, Michael J. Vilbert, and Toby Brown, May 31, 2012.

[16] BCUC 2013 Decision p. 56.

[17] BCUC 2013 Decision pp. 74 and 78.

[18] BCUC 2013 Decision p. 80.

It is also instructive that in arriving at its decision, the BCUC specifically recognizes the application of judgment. For example, the BCUC states in regard to the CAPM parameters that "the Commission Panel has applied the required judgment and accepts the CAPM estimate at 7.64 percent. This reflects a risk free rate of 3.8 percent, a risk premium of 6.4 percent, and a beta of 0.6."[19] These figures are market estimates prior to any adjustment for capital structure (Hamada-adjustment) or financing flexibility.

In conclusion, the weights the BCUC has assigned to various methods have changed over time as the BCUC judged that economic, industry, or other factors merited a change from prior practice. The BCUC's comments regarding its use of judgment to arrive at its allowed return on equity is also instructive in that the regulator explicitly recognizes it uses judgment.

C. U.S. SURFACE TRANSPORTATION BOARD

The U.S. Surface Transportation Board (STB) is an economic regulatory agency affiliated with the Department of Transportation although it is decisionally independent. The STB serves as both an adjudicatory and a regulatory body with jurisdiction over railroad rates, service issues and rail restructuring transactions.[20]

The STB and its predecessor, the Interstate Commerce Commission, relied exclusively on the single-stage DDM to estimate the cost of equity for railroads from 1982 to 2005.[21] The 1982 decision to use the single-stage DDM followed an extensive consultation process where all stakeholders submitted evidence regarding the estimation of the cost of equity for railroads.

However, in 2005, users of railroad services challenged the STB's reliance on the single-stage DDM and suggested that it be replaced with the Sharpe-Lintner CAPM. The users of railroad

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19 BCUC 2013 Decision p. 66.

20 Adapted from the STB's website at www.stb.dot.gov.

21 The *Interstate Commerce Commission* implemented the single-stage DDM in 1982 and used it estimate railroads' cost of equity with minor modifications to the exact implementation until 2005. See Surface Transportation Board, Ex. Parte No. 664, Methodology to be Employed in Determining the Railroad Industry's Cost of Capital, January 17, 2008 (STB Ex Parte 664), p. 3.

services argued that the DDM overstated the cost of equity. Specifically, the forecasted earnings growth rates increased to the upper teens (percent per annum) as shipped volumes increased substantially. Users of railroad services were concerned that the 5-year earnings forecasts were inconsistent with the perpetual (sustainable) growth of the industry.[22] The STB responded by initiating a proceeding for all stakeholders aimed at determining the methodology to be relied upon to estimate the cost of equity for railroads going forward. Following a proceeding with written and oral input from all stakeholders, the STB decided in January 2008 to rely solely on the Sharpe-Lintner CAPM to estimate the cost of equity for railroads.[23] The STB cited several reasons for switching to the Sharpe-Lintner CAPM in its 2008 decision. First, the single-stage DDM estimated a higher cost of equity than reputable finance experts could provide support for. Second, the Sharpe-Lintner CAPM was considered an acceptable and widely used method, and third, no party to the proceeding had suggested a suitable multi-stage DDM model for the STB to implement.[24] However, the January 2008 decision also initiated a proceeding to consider whether to use a multi-stage DDM as well, and if so, how the model should be implemented.[25]

The proceeding regarding the potential use of a multi-stage DDM also included input from all stakeholders and resulted in the STB deciding to use both the Sharpe-Lintner CAPM and a multi-stage DDM to estimate the railroad industry's cost of equity, and to weight the two models equally in subsequent decisions. [26]

The cost of equity estimates from the two models (as reported by the STB) as well as the STB's allowed return on equity for the railroad industry are depicted in Figure 2 below.

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22 *Surface Transportation Board*, STB Ex Parte No. 558 (Sub-No 9), Railroad Cost of Capital – 2005, September 15, 2006, p. 4.

23 STB Ex Parte 664, p. 2, and STB Ex Parte No. 558 (Sub-No. 11), pp. 5-8.

24 STB Ex Parte 664, pp. 2-3.

25 STB Ex Parte 664, *Section II*.

26 STB Ex Parte 664 (Sub-No. 1), Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital, January 28, 2009.

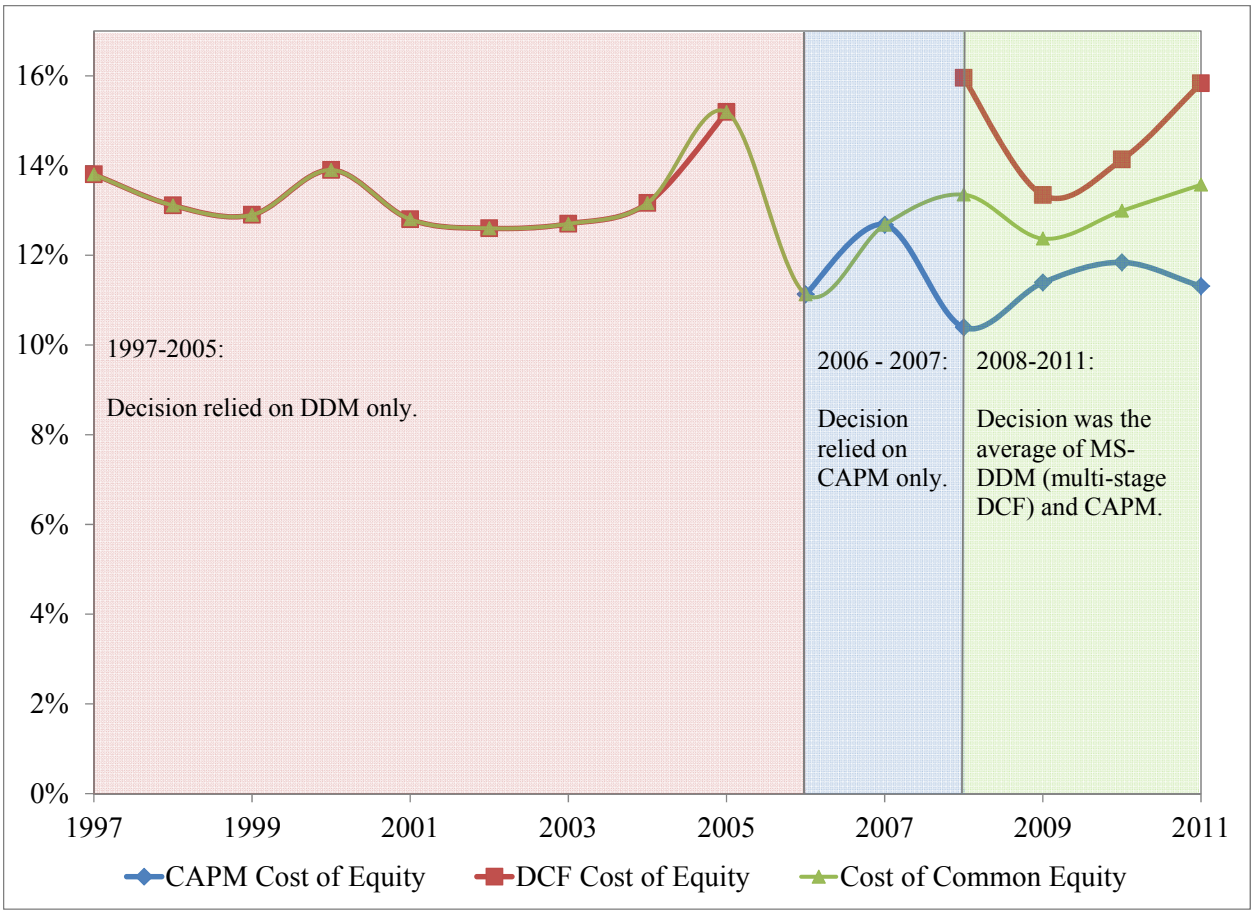

Figure 2: STB's Decisions on Railroad Cost of Equity 1997-2011

As can be seen from Figure 2 above, the estimated cost of equity for U.S. railroads was quite volatile immediately before and during the time the STB conducted a review of its cost of equity methodology. While exclusive reliance on the constant growth DDM led to a substantial increase in the estimated cost of equity in 2005, the switch to using only the Sharpe-Lintner CAPM in 2006 resulted in a substantial drop in the estimated cost of equity. The same phenomena are visible for 2011, where the multi-stage DDM increases as growth forecasts are up, while the Shape-Lintner CAPM declines due to declining interest rates in the U.S. In contrast, the use of both methods allows for a less volatile and more stable allowed cost of equity. The STB's proceedings that led to the reliance on a combination of the Sharpe-Lintner CAPM and a multi-stage DDM specified the determination of the inputs to the models including the use of the 10-year Treasury bond yield and the historically realized MRP from 1926 to today.[27] The latter

[27] STB Ex Parte No. 664.

calculation has been challenged by railroad shippers in several cases, but to date the STB has maintained the calculation of the MRP because the STB (i) has found that the use of an arithmetic rather than a geometric average is standard practice for the calculation of the MRP[28] and (ii) is "persuaded that basing the equity-risk premium on returns dating from 1926 is the superior and more standard approach."[29] In contrast, the BCUC looks to both the historically observed MRP and forecasted MRP figures for the CAPM-based cost of equity estimates.[30] The BCUC has in the past also acknowledged that "there is not a one-for-one relationship between the increase or decrease in long-term Canada bond yields and the utility equity risk premium."[31]

The decision to initiate a review of the reliance on the single-stage DDM was driven by industry-specific factors that substantially impacted the 5-year forecasted growth rate for the industry and hence the cost of equity. In the decision on the railroad industry's cost of equity for 2005, the STB noted:

> all the experts agree that the growth rate of a particular industry cannot exceed the long-term growth rate of the economy indefinitely. Thus, in years when the 5-year growth rate is very high, this model [single-stage DDM] may overstate the cost of equity. Similarly, in years when the railroads experience a downturn and the predicted 5-year growth rate is very low, the model may understate the cost of equity.[32]

and

> the single-stage DCF model [DDM] estimates a high cost of equity. It would estimate the 2006 cost of equity at 16.1%, a level for which the reputable finance experts that testified in this proceeding did not provide support.[33] [footnote omitted]

In addition, the STB acknowledged that finance theory and practice had evolved since it implemented the single-stage DDM and therefore a review was merited. The subsequent proceeding to consider including another methodology "invited interested parties to comment on

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28 STB, Ex Parte No. 558 (Sub-No. 11), Railroad Cost of Capital – 2007, p. 6.

29 STB, Ex Parte No. 558 (Sub-No. 15), Railroad Cost of Capital – 2011, p. 11.

30 BCUC 2013 Decision pp. 60-62.

31 BCUC 2009 Decision p. 60.

32 STB Ex Parte No. 664 p. 6.

33 STB Ex Parte No. 664 p. 2.

the proposal to use the two models in conjunction and on whether a simple average is the best way to integrate the two approaches."[34]

The decision on using two methods concluded that

> [the STB] can improve our cost-of-capital determination by using a multistage DCF model [DDM] in conjunction with CAPM to estimate the cost of equity for the railroad industry.[35]

The Brattle Report quoted a pertinent statement from the STB illustrating the reasons why the STB relies on more than one method. We repeat this quote from the STB below:

> if our exploration of this issue has revealed nothing else, it has shown that there is no single simple or correct way to estimate the cost of equity for the railroad industry, and countless reasonable options are available. Both the CAPM and the multi-stage DCF [DDM] models we propose to use have their own strengths and weaknesses, and both take different paths to estimate the same illusory figure. By using an average of the results produced by both models, we harness the strengths of both models while minimizing their respective weaknesses.[36]

The STB to date continues to determine the cost of equity as the simple average of the results from the Sharpe-Lintner CAPM and a specific version of the three-stage DDM.[37]

While we support the use of more than one model in estimating the cost of equity, we would not recommend adopting a fixed weighting (for example, a simple average as employed by the STB), because the weight placed on each model should be a function of macro and industry factors specific to the circumstances of an individual cost of equity determination. While not ideal, the use of two models rather than a single model has helped the STB avoid substantial variations in the allowed return on equity from year to year and has modified the effect of the sharp drop in government interest rates.[38] We note that the STB approach in practice has been revised relatively frequently in recent years as economic conditions or the industry have changed. The

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[34] STB Ex. Parte No. 664 (Sub-No. 1), p. 4.

[35] STB Ex. Parte No. 664 (Sub-No. 1), p. 5.

[36] STB Ex. Parte No. 664 (Sub-No. 1), p. 15.

[37] *Surface Transportation Board*, Decision, Docket No. EP 558 (Sub-No. 16): Railroad Cost of Capital – 2012, February 25, 2013.

[38] The second effect could also have been obtained by implementing changes to the Sharpe-Lintner CAPM.

original reason for reviewing the methodology was driven by the industry's fast paced growth and the single-stage DDM's inability to capture the long-term growth, while the second review was prompted by the realization that several models plausibly would provide more information than a single model or method.

D. MISSISSIPPI POWER'S PERFORMANCE EVALUATION PLAN

Mississippi Power is Southern Company's electric utility in Mississippi and is regulated by the Mississippi Public Service Commission (Mississippi PSC).[39] Mississippi Power has for several years operated under a Performance Evaluation Plan (PEP),[40] one element of which is that if the utility's projected or achieved return is more than 0.5% different from a target rate of return, electricity prices will either increase or decrease accordingly. This mechanism for adjusting regulated prices has the advantage, relative to traditional "historical test year" approaches, of allowing prices to adjust more quickly to changes in underlying costs, avoiding "regulatory lag". The target rate of return, return on equity, and rate base are updated annually using a specific formula.[41] The target return on equity is calculated as a simple average of the results from three models:

1. Dividend Discount Model (DDM)
2. Risk Premium Model
3. Capital Asset Pricing Model (CAPM).

Thus, each of the methods described in 1, 2, and 3 are weighted by 1/3 to obtain the final result. The models are applied to a group of comparable companies, which are selected from the group of "vertically integrated electric utilities" listed by Moody's and (i) have an investment grade bond rating, (ii) earn at least 50% of their revenue from electric services, and (iii) have not been

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[39] http://www.psc.state.ms.us/.

[40] A key element of the PEP is that Mississippi Power must meet certain performance criteria regarding costs, customer satisfaction, etc. .

[41] *Mississippi Power Performance Evaluation Plan* (PEP) of which the most recent version was put in place in November 2009. Mississippi Power, "Performance Evaluation Plan, Rate Schedule 'PEP-5' ", November 9, 2009. See, http://www.mississippipower.com/pricing/pdf/pep-5.pdf. (PEP-5)

involved in a recent merger, cut dividends, or been deregulated.[42] The calculations for each model are described below.

It is noteworthy that the Mississippi Power approach uses fixed weights. As discussed elsewhere in this paper, we would not recommend that such a mechanistic approach for determining the cost of equity should be applied for five years without review. The Mississippi Power PEP is updated annually, and there are other mechanisms through which electricity prices can be reviewed and adjusted if the results of the PEP adjustment seem unrealistic; (for example, Mississippi Power or another stakeholder can request a hearing and a more detailed investigation).

The Mississippi Power PEP relies on the single-stage DDM (see, for example, the Brattle Report Section III.E.1) and uses projected growth rates from several sources. The risk-premium model relied upon adds a utility risk premium to the long-term U.S. Treasury bond yield, where the risk premium is calculated as the difference between the return on the Moody's electric utility index (an index of electric utility stocks) and the return on long-term U.S. Treasury bonds. Specifically, the normalized yield on long-term U.S. Treasury bonds is calculated as follows: (1) calculate the average yield for Moody's "AAA" rated corporate bonds (as reported in the Mergent Bond Record)[43] for the month prior to the calculation of the PEP cost of equity; (2) add the calculation of the average of the annual spread between the yield for long-term Treasury bonds (as reported in the Morningstar Ibbotson Valuation Yearbook)[44] and Moody's "AAA" rated corporate bonds for the period 1926 to the latest year reported in the most current Ibbotson Yearbook; and (3) subtract the average annual spread from the average Moody's "AAA" corporate bond yield. To determine the *Utility Risk Premium*, the Mississippi Power PEP calculates (i) the actual return on equity capital for the Moody's Electric Utility Index for each year since 1931 to the present;[45] (ii)

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42 PEP-5, Appendix p. 25.

43 *Mergent Bond Record* is published monthly by Mergent (http://www.mergent.com/productsServices-print-bondRecord.html) and provides a review of over 68,000 bond issuers. The publication includes Moody's bond yields.

44 *Morningstar/Ibbotson*, "Stocks, Bonds, Bills, and Inflation, 2013 Yearbook: Valuation Edition," March 2013. The publication is issued in March each year with the most recent edition being 2013.

45 Moody's Electric Utility Index is available from www.moodys.com as a subscription service or from commercial data providers.

the return on long-term Treasury bonds for each year since 1931,[46] (iii) the difference between (i) and (ii) each year from 1931 to the present, and (iv) the Equity Risk premium is then the time-series average of the differences calculated in (iii).

The Mississippi Power PEP also relies on two versions of the Capital Asset Pricing Model, the Sharpe-Lintner CAPM and an Empirical CAPM, and calculates four figures for each version for a total of 8 CAPM-based estimates. These 8 estimates are weighted equally to obtain the CAPM-based figure. In these models, the risk-free rate is measured by the normalized bond yield on 30-year U.S. Treasury bonds, Beta is the average of the Value Line[47] betas for the sample companies and the MRP is calculated using two versions of the historical MRP and two versions of the forecasted MRP, for a total of four MRP values. The first historical MRP is the total return MRP provided by Ibbotson and the second is the income equity risk premium provided by Ibbotson. The total (income) return MRP is the total return on the stock market minus the total (income) return on long-term Treasury bonds for as long a period as possible (1927 to 2009 in the most recent PEP). Both these figures are obtained from Ibbotson's Yearbook.[48] The two forecasted MRPs are determined as follows. The first forecasted MRP is determined as Value Line's indicated total return on stocks minus the normalized yield on 30-year U.S. Treasury bonds. The second forecasted MRP is determined as the S&P 500 indicated total return minus the normalized yield on 30-year U.S. Treasury bonds. In addition, the PEP uses a version of the Empirical CAPM, which relies on the same parameters as described above.

The DDM, risk-premium, and CAPM-based estimates are then weighted equally to obtain the cost of equity.

E. CONCLUSIONS

The three case studies laid out above demonstrate how selected North American regulators combine multiple models, methods and other evidence in order to determine the cost of equity

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[46] The PEP uses the 30-year U.S. Treasury bonds. While the public documents do not specify a source for this information, it is available from, for example, the Federal Reserve in St. Louis at http://research.stlouisfed.org/fred2/ and from commercial providers such as Bloomberg.

[47] Value Line Investment Survey is a subscription service that provides detailed coverage of approximately 1,700 publicly traded companies. Its website is http://www.valueline.com/.

[48] Morningstar/Ibbotson, "Stocks, Bonds, Bills, and Inflation, 201 Yearbook: Valuation Edition," March 2010. The publication is published in March of each year with the most recent edition being 2013.

for an industry or company. In the case of the BCUC, the weights the commission has assigned to various methods have changed over time as the BCUC judged that economic, industry, or other factors had shifted substantially enough to merit a change from prior practice. Similarly, the U.S. STB relies upon an average of the CAPM and DDM methods in order to avoid substantial variations in the allowed return on equity from year to year. Further, the STB approach in practice has been also revised relatively frequently in recent years as economic conditions or the industry have changed. Finally, MSPSC uses a simple average of the DDM, risk-premium and CAPM methodologies to determine the cost of equity. While the STB and Mississippi Power PEP rely on fixed weights for the various models, we would not recommend such a mechanistic approach for determining the cost of equity going forward. This is because the weight placed on each model should be a function of macro and industry factors specific to the circumstances of an individual cost of equity determination. However, the use of more than one model by all these regulatory jurisdictions, even with fixed weights, provides more information and a greater degree of reliability than relying upon a single model or method. We believe, as noted in the executive summary, that from both an academic and regulatory perspective that it is important to use multiple models, methods, or other market data when determining the cost of equity. The case studies we have presented are useful examples for the AER to review in order to judge how best to combine multiple models. We see nothing inherent in the Australian regulatory regime that distinguishes the cost of equity estimation from that of North America, but from an economist's perspective find that the new Rule 87's emphasis on using relevant estimation methods, financial models, and market data as well as considering the "prevailing conditions in the market for equity funds"[49] to be consistent with the approach taken in the case studies discussed above and with the notion that the weighting of the models depend on economic and other factors.

III. ILLUSTRATIVE EXAMPLE

The section above provides a general overview of the use of multiple models in North American regulatory jurisdictions based on three specific case studies. In this section, we provide a more "hands-on" example of this type of approach in use, based on work previously conducted by

[49] Rule 87, s.7.

Brattle. In particular, we present a detailed illustrative example of the use of multiple models to determine the cost of capital for a utility, based on a recent proceeding in which two of the authors of this study submitted expert reports.[50] The ultimate outcome of the proceeding was a decision in which the regulator approved a cost of equity of 9.99%, which was arrived at as part of a negotiation. [51] The regulator's decision itself, as is common in North American jurisdictions, did not provide information on the precise methodology that underlay the cost of equity determination. However, the joint testimony from the utilities and CPUC staff, which the CPUC cites in its decision to agree to the settlement, cited Dr. Villadsen's testimony for the notion that failure to consider prevailing economic conditions will lead to biased cost of equity estimates and emphasized that

> each party [including Dr. Villadsen] relied upon the guidance of several different estimation methods. No party relied exclusively on the output of any single estimation method such as risk premium models, but rather incorporated the insights and findings of the various models based upon their best professional judgment.[52]

This example may be of interest because expert evidence offered in the proceeding provides a practical illustration of how our recommendations would work in practice.

The description which follows is based on the testimony of Dr. Bente Villadsen in the California American Water proceeding (Evidence). We first describe how the Evidence selected a set of relevant models and information to determine the return on equity for California American Water. Second, we discuss the reasoning for assigning more or less weight to each model considered. Third, we describe how the Evidence compiled an array of evidence based on the

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50 Direct Testimony of Dr. Bente Villadsen, Application of California American Water Company (U210W) for an Authorized Cost of Capital for Utility Operations for 2012-2014, filed May 2, 2011, before the Public Utilities Commission of the State of California (CPUC). See also Direct Testimony of Michael J. Vilbert on behalf of California Water Service Company Concerning Cost of Capital, dated April 26, 2011 and filed with the CPUC.

51 In North American jurisdictions it is usual for one or more bodies (sometimes with public funding) to act as "representatives" of utility customer interests. It may then be possible for the utility and customer groups to agree ("settle") a common position on the issues at stake in a regulatory proceeding, and, ultimately, on the regulated prices that should result. If there is a settlement, the parties will jointly present the settlement position to the regulator and jointly seek approval of the outcome.

52 "Joint Testimony in Support of Settlement Agreement," Application 11-05-001 before the CPUC, dated January 13, 2012. See also CPUC, "Decision Approving Settlement Agreement," Application 11-05-001, issued July 12, 2012.

return on equity ranges generated by each model. Fourth, we discuss how the Evidence distilled the multiple return on equity ranges into a single recommended point estimate for California American Water. This was a matter of judgment, based both on the relative weighting of the various models and also on a risk-positioning analysis, which compared the business risk of the California American Water relative to the average business risk of the benchmark sample. Finally, we describe how the relative weightings of the models and resulting return on equity recommendations might have differed under alternative market and industry scenarios.

A. California American Water Before the Public Utilities Commission of California

1. Choice of Models and Samples

California American Water commissioned Brattle to provide testimony recommending the cost of equity that should be used by the California Public Utilities Commission in setting the company's water rates. The testimony described here was authored by Dr. Bente Villadsen and referenced as the Evidence below.[53]

Two benchmark samples of regulated comparable-risk companies (including sub-samples of the firms that were most similar to California American Water) were selected; one sample was comprised of publicly traded water utilities and one sample of publicly traded gas distribution companies. The water utility sample was chosen to contain firms as similar as possible – in terms of business characteristics – to the regulated activities of the target company. However, because the set of publicly traded water utilities is small and the industry was experiencing a large number of mergers and acquisitions, a second sample of gas distribution companies was chosen. While the gas distribution companies operate in a different industry, many aspects of the gas distribution companies' asset composition and operational features are similar to those of water utilities. Both industries operate a large network of underground mains and pipes that supply residential, commercial, and industrial customers in a predetermined service area and both industries are regulated by the state in which the service is provided.

[53] *Op. Cit.*

Dr. Villadsen employed two versions of the Dividend Discount Model (DDM) – single and multi-stage – as well as the Sharpe-Lintner CAPM and two versions of the Empirical CAPM, where the versions differed regarding the value of the alpha parameter.[54] These models produced a range of sample company cost of equity, which, combined with an estimate for each company's cost of debt, produced a range for the after-tax weighted-average costs of capital (WACC). The corresponding range and point estimate for the cost of equity of California American Water was then calculated by adjusting the sample-average WACC with California American Water's regulated capital structure and cost of debt. This step was implemented in order to adjust the return on equity estimate for differences in financial risk between California American Water and the sample companies.

a. Model Selection

The testimony examined evidence from the two DDMs, Sharpe-Lintner CAPM and the two versions of the ECAPM for both the water utility and gas distribution samples. Other models, such as the consumption CAPM, risk premium, Arbitrage Pricing Theory models, etc., might also have been applicable although they were not used in this instance because (i) the California Public Utilities Commission typically looks to versions of the DDM and CAPM models and (ii) market conditions were such that multi-factor models would be highly volatile. In cost of capital proceedings, Brattle always submits evidence from multiple models (for example, at least two DDMs, Sharpe-Lintner CAPM, and ECAPM) because in our view it is better to base cost of equity recommendations on more than one model for the reasons set out in this paper and the Brattle Report.

In addition to the methods relied upon in the testimony of Dr. Villadsen, other witnesses submitted evidence on the risk premium approach and the comparable earnings approach.[55,56]

b. Sample Selection

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[54] These models were discussed in the Brattle Report, Section III.

[55] See the "Joint Testimony in Support of Settlement Agreement," Application 11-05-001 before the CPUC, dated January 13, 2012 (Support of Settlement Agreement) for a brief summary.

[56] See Section III.F of the Brattle Report for an explanation of the methods.

As noted above, the water industry has few publicly traded companies and the industry is experiencing a large number of mergers and acquisitions, which impact the day-to-day stock price and hence the estimation of the cost of equity. Therefore, a sample of gas distribution companies was also included. Both the water and gas distribution utilities are characterized by operating a large number of underground mains and pipes that supply residential, commercial, and industrial customers. As such, both industries are very capital intensive, have similar operating characteristics, and are regulated.

For both samples, the companies were selected to be comparable in risk to a water utility that is operating under normal conditions and not suffering from unusual financial or operational issues. Therefore, only companies with an investment grade credit rating and no recent history of substantial financial or operational issues were included.[57] For both samples, sub-samples that were considered to be closer to a "pure-play" regulated utility were also examined. These sub-samples consisted of companies with more than 80% of their assets subject to regulation and with five years of market data. The basic characteristics of the included companies are shown in Table 1 and Table 2 below.

Table 1: Characteristics of the Water Utility Sample[58]

Company	% Regulated Assets	Credit Rating	Market Capitalization ($ million)
California Water Service Group	99.2%	A+	$1,282
Connecticut Water Service Inc	99.2%	A	$337
Middlesex Water Co	98.4%	A-	$337
Aqua America Inc	98.0%	A+	$4,654
SJW Corp	90.3%	n/a	$796
American States Water Co	99.6%	A+	$963
York Water Co	100.0%	A-	$306
American Water Works Co Inc	87.2%	BBB+	$10,927

[57] For example, a company that had recently cut dividends for financial reasons or a company that recent restated its financials would not be included.

[58] Direct Testimony of Dr. Bente Villadsen for California American Water Company.

Table 2: Characteristics of Gas Distribution Sample[59]

Company	% Regulated Assets	Credit Rating	Market Capitalization ($ million)
Atmos Energy Corp	97.4%	BBB+	$5,524
Laclede Group Inc/The	90.1%	A	$1,280
New Jersey Resources Corp	74.3%	A	$2,216
NiSource Inc	56.9%	BBB-	$12,239
Northwest Natural Gas Co	90.0%	A+	$2,038
Piedmont Natural Gas Co	97.2%	A	$3,077
South Jersey Industries Inc	70.7%	BBB+	$2,370
Southwest Gas Corp	96.5%	BBB	$3,035
WGL Holdings Inc	89.9%	AA-	$2,820

2. Evidence and Weighting of Models

The weighting of the DDMs, the Sharpe-Lintner CAPM and the ECAPMs depends on a number of factors, namely market and industry conditions. In addition, this particular case required an adjustment to the final combined results of the benchmark samples because of company-specific risk factors, or what we discussed as risk-positioning in the original Brattle Report. Below we describe the factors that affected the weights assigned to the models in this case.

a. Market Conditions: The Credit Crisis

At the time of this filing, economic conditions were unsettled and not back to their pre-global financial crisis status. This affected the estimates of the cost of capital for several reasons. First, the spread between utility bond yields and government bond yields (the yield spread) was larger than it historically had been, and especially so for bonds at the lower end of investment-grade. This feature renders the standard risk premium model (bond yield plus premium) less reliable than usual. Second, the change in yield spread substantially affects the Sharpe-Lintner CAPM and ECAPM for two reasons. The first reason is that the downward pressure on the risk-free rate will downward bias the estimated cost of equity when government but not corporate cost of debt has declined. The second reason is that the increase in yield spreads indicates that the required equity market risk premium has increased, as the relative cost of corporate capital has increased

[59] *Ibid.*

over that of risk-free capital. Thus, the Sharpe-Lintner CAPM and ECAPM would be downward biased under these circumstances, in the absence of further adjustments for the prevailing macro conditions.

Moreover, capital markets at the time of the filing remained volatile compared to historical benchmarks, indicating higher investor risk aversion. All of these factors were considered strong arguments for increasing the estimate of the equity market risk premium used in the Sharpe-Lintner CAPM, making an upward adjustment to the risk-free rate, or to otherwise reflect the increase in the cost of capital for risky investments relative to pre-crisis conditions. As a result, several scenarios were presented that took the downward pressure on the risk-free rate and increase in market risk premium into account.

b. Industry Conditions: Mergers and Acquisitions

The simple version of the DDM model relies upon the fundamental assumption that earnings and dividend growth rates are constant in the long-run. However, at the time of this filing, the water industry was experiencing substantial acquisition activity. Another concern regarding the water utilities' growth estimates was that the industry was (and is) experiencing a very large growth in both volume and the need for capital investments, so that the industry is somewhat unsettled. Finally, several companies in the sample are small and have a limited number of analysts following them, so data on the expected growth rate was and is sporadic.

In contrast, the companies in the gas distribution sample were not experiencing any substantial merger or acquisition activity, the industry was stable, and data availability was not an issue.

Because of the factors cited above, both the single-stage and the multi-stage DDM estimates for the water utility sample were judged to be somewhat unreliable at the time and assigned little to no weight in arriving at the final recommendation. However, the multi-stage DDM results for the gas distribution company sample were deemed to be reliable.

3. Ranges of Model Results

Return on equity ranges were generated by the Sharpe-Lintner CAPM, two ECAPMs, a single-stage, and a multi-stage DDM for both the water and the gas distribution samples and sub-samples. These ROE results were calculated to be consistent with the samples' average WACC[60] at the company's regulatory capital structure.

We display the results obtained from the models in Figure 3 below.

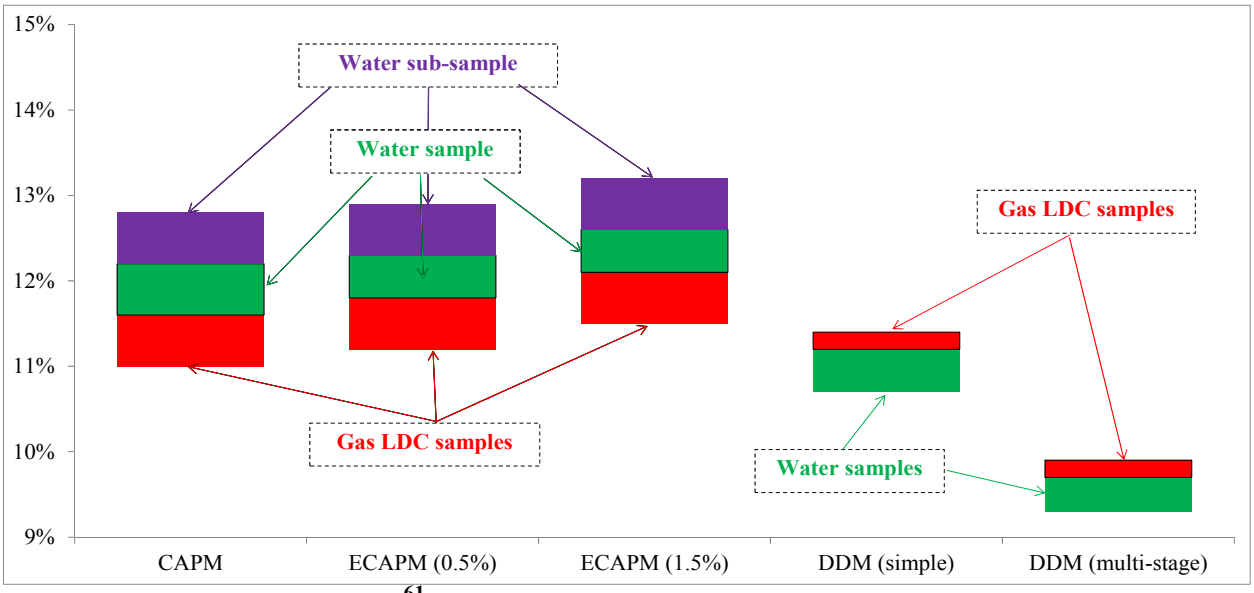

Figure 3: Return on Equity Ranges[61]

Figure 3 above summarizes the return on equity ranges generated across all parameter scenarios for the Sharpe-Lintner CAPM, ECAPM, single-stage DDM and multi-stage DDM methods for both samples and sub-samples. Figure 2 shows that the estimates from the Sharpe-Lintner CAPM, the ECAPM, and the upper end of the single-stage DDM for the gas distribution samples were reasonably in line. The estimates from the multi-stage DDMs for all samples were lower, as were the results from the single-stage DDM for the water utilities. The results indicated that the

[60] In each case, a simple average of the WACCs across the companies in the sample was calculated, and converted to a cost of equity figure at the California American Water capital structure and cost of debt. Ranges were generated by varying the model parameters (MRP for the CAPM, MRP and alpha for the ECAPM, and the growth rates for the DDMs).

[61] Direct Testimony of Dr. Bente Villadsen for California American Water Company, Tables 3a, 3b, 4a and 4b.

majority of the estimates were in the range of 11 to 12%, with the water sub-sample exhibiting higher Sharpe-Lintner CAPM and ECAPM estimates, but lower DDM estimates. In light of the considerations discussed above, Dr. Villadsen concluded that a reasonable return on equity range for the samples was 11 to 12%.

4. Determination of ROE Point Estimate Within Range of Reasonableness

Three different aspects were considered in arriving at the point estimate for the return on equity: (i) macro-economic factors, (ii) industry-specific factors, and (iii) company-specific factors. The macro-economic factors primarily affected the Sharpe-Lintner CAPM results, while the industry-specific factors mostly pertained to the DDM results for the water utility samples. Company-specific factors were also considered in determining whether the target utility was of higher or lower risk than the samples.

As noted above, economic conditions were such that the Sharpe-Lintner CAPM and the ECAPMs were implemented with a risk-free rate that was adjusted upward for an increase in the spread between utility bond yields and risk-free rates, and a market-risk premium at the high end of historical observed market risk premia. The DDM estimates for the water utility sample were not given much weight because of the substantial M&A activity in the industry. However, the DDM estimates for the gas distribution sample in general pointed to a lower cost of equity than the CAPM and ECAPM estimates. Therefore, the top range of results indicated by the Sharpe-Lintner CAPM and the ECAPM estimates was eliminated. This generated an overall range of 11-12%, which had a reasonable degree of overlap with the results from the three risk-positioning models for both samples, and the DDM results for the gas distribution samples.

As a result, Dr. Villadsen determined the best overall midpoint estimate for California American Water to be 11½ percent, with a range of 11¼ to 12 percent. The point estimate of 11½ percent was included in both the CAPM and ECAPM ranges for all the samples, and, in particular, was at the lower end of the water utility sample and around the midpoint of the lower gas distribution sample results.

Dr. Villadsen also considered the fact that California American Water faced several unique financial challenges at this time, including relatively low credit metrics compared to the sample companies, a need for continued infrastructure investments, and a failure to earn its allowed return on equity in recent years. There was evidence that, due to the way in which the revenue requirement was calculated (relating to the way in which certain regulatory assets[62] were deemed to be funded by short-term debt), it was very difficult for the utility to achieve the authorized return on equity even if all assumptions about operating costs and volume of sales were borne out. Due to the regulator's unrealistic assumptions about financing of the regulatory assets, expected returns on equity were likely to be lower than the authorized return on equity. These factors implied that the recommended ROE for the utility needed to be higher than the benchmark ROE in order to provide the utility with a reasonable opportunity to earn a return equal to the benchmark cost of equity going forward. Further, due to the ongoing economic turmoil, generally higher investor risk aversion and market volatility, Dr. Villadsen determined that the allowed return on equity should be placed in the upper end of the reasonable range, at no less than 11½ percent (as a conservative estimate).

Thus, the final recommended ROE was based on analyses of the return on equity that investors expected, considering the impact of macro-economic factors such as the heightened market volatility and industry-specific factors such as the recent consolidation in the water industry. The estimate and range recommendation also incorporated California American Water-specific analyses that examined the company's relative risk compared to the benchmark samples. All of these analyses generated a range of evidence that was weighted as discussed above in generating the final estimates. The range around the recommended ROE was asymmetric in this case because Dr. Villadsen believed the ongoing financial uncertainty was more likely to result in an increase in the ROE than a decline.

5. Alternative Scenario Analysis

In the California American Water filing, less weight was assigned to the DDM results for the water utility samples given the recent trend of consolidation and M&A in the industry. This

[62] Regulatory assets are incurred but deferred charges that the regulated entity is likely to recover in future years. Typical examples of regulatory assets are pension-related benefits paid to employees.

affected the stability of industry growth rate forecasts and most likely indicated a decoupling of water utility stock prices from fundamentals. Due to the economic turmoil, the parameters of the Sharpe-Lintner CAPM and the ECAPMs were based on estimates of the risk-free rate and an MRP in the high end of what had been observed historically. An alternative solution would have been to incorporate other models or methods in the analysis of the cost of equity. For example, the use of specific consumption-based CAPMs plausibly would have resulted in directionally similar results (see the Brattle Report Section III.B).

Under alternative market and industry environments, however, it is likely the relative model weightings described above would have shifted. Below we describe some examples.

a. Stable Water Industry

If conditions in the water industry had been more stable at the time of filing (i.e. less consolidation and industry changes), Brattle would have recommended placing relatively more weight on the DDM results for the water utility sample and sub-sample.

b. Lower Market Volatility/Higher Risk-free Rates

If economic conditions had been more settled at the time of filing (i.e. lower volatility and higher risk-free rates, due to relatively higher demand for risky equities versus risk-free bonds), Brattle would have recommended using an MRP in the middle of what has historically been observed and a current risk-free rate.

IV. CLARIFICATIONS OF RECOMMENDATIONS IN THE BRATTLE PAPER

A. WEIGHTING THE RESULTS OF DIFFERENT MODELS

In discussing how to combine the results of different models, the AER's paper states:

> in principle, we consider that the weights placed on different return on equity models should not differ dependant on market conditions, industry or firm. The Brattle Group would not seem to disagree with this point, though it is unclear from the report.

> … some models will be easier or harder to properly estimate depending on market conditions, industry or firm. For example, the Brattle Group consider that when interest rates are low, the MRP may be high, but that estimating this change in the MRP within the Sharpe–Lintner CAPM is difficult.[63]

In our view, it is neither helpful nor relevant to derive weights for the different models from an abstract theoretical perspective in developing *practical* guidelines. The fact is that estimating the cost of equity is an imprecise exercise. No model will give a certain estimate, and at different times and under different circumstances, the different models will produce results that are more or less uncertain and that could be biased. Furthermore, it is clear from regulatory experience in many jurisdictions, including Australia, that there is no one model that can safely be relied on exclusively. One model may be better than another in one set of circumstances, and worse in another, and an important benefit from considering the results of more than one model is the opportunity to compare the results and to consider what might be driving the differences. It is the interaction of the models with market and industry circumstances that determines reliability – in our view it is not helpful to rank the models or assign weights without considering the circumstances in which the models are being applied (the market and industry characteristics at the time the cost of equity is being determined). Therefore our recommendation is to review the results of *all* models[64] and weigh the results according to the market and industry factors operating at the time the cost of equity is being determined. Many regulators in North America do so on a regular basis and the BCUC recently specifically noted that it "applied the required judgment"[65]. Similarly, the CPUC settlement cited above emphasized the use of "professional judgment"[66] and the NEB decision cited in the introduction noted that

> Determining a fair return for a regulated utility is an exercise requiring informed judgment based on the evidence presented, including extensive record related to business risk assessment,

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63 AER Consultation Paper p. 45.

64 A reasonable approach might be for the AER to produce its own estimates based on several of the most commonly-used models (for example, the CAPM, the DDM and one or more CAPM variants). There might be an expectation that other models would be unlikely to bring additional information of value, but that should not preclude parties interested in a particular determination from presenting such information.

65 BCUC 2013 Decision p. 66.

66 "Joint Testimony in Support of Settlement Agreement," Application 11-05-001 before the CPUC, dated January 13, 2012, p. 13.

> comparable companies and cost of capital estimation methodologies.[67]

We doubt that, in practice, assigning quantitative weights to the results of different models in a mechanistic way would be easy to do or would lead to a transparent outcome. A weighting approach (producing a weighted average of the results of different models) presumably would require that each model first produce a single point estimate. It may be possible to do this, but in our view it is more reasonable to think of the results of any cost of equity estimation model in terms of a reasonable range. A range will by definition have a mid-point, but if a particular model might be biased, the mid-point of the range might not be a reasonable choice. However, the biggest difficulty with assigning quantitative weights to each model is the lack of areasonable way to derive weights. There may well be a situation in which it would be reasonable to put more weight on the results of the DDM than on the results of the standard CAPM, or vice versa, as described in the illustrative example above for California American Water. However, we cannot think of any reasonably objective way to determine that the weights should be 60:20:20 rather than 1/3 1/3 1/3 or some other combination.

In our view, a better approach is to express the results of each model as a range. Combining the ranges from several models to create an overall range for the benchmark cost of equity requires judgment: we have provided some examples of the factors that might be relevant in exercising that judgment. One outcome might be that the ranges from models considered as reliable overlap: in that case it would be reasonable to conclude that the benchmark cost of equity is within the overlapping region. If the ranges do not overlap, macro-economic or industry factors may help to explain why the ranges do not overlap, and hence whether the upper part of one range or the lower part of the other is to be preferred. This type of judgment was exercised in the California American Water example discussed above.

Inherent Imprecision in Cost of Equity Estimates

The AER paper discuss the difficulty in using market and industry conditions to determine how to weigh the models, methods, and other information and notes that it may "introduce an

[67] RH-3-2011 pp. 190-191.

additional layer of imprecision into estimates of the return on equity." [68] In our view, cost of equity estimates are inherently imprecise and better characterized as ranges than as precise point estimates. The BCUC explicitly recognized this in its 2013 decision as did the STB in 2009.[69] Because of the imprecision in any estimation methods, it is, as discussed above, preferable to consider each range and compare ranges before settling on a point estimate..

The Benchmarking Process

Once the estimates from the various models, methods, and other information have been used to determine a range for the cost of equity, the next step is to move from a range to a single number – the regulator's ultimate determination of the cost of equity. This single number will be used to calculate the utility's revenue requirement and hence regulated prices. This step goes to the relationship between the service provider (more precisely, the service provider's activities in the provision of reference services) and the firms used to derive the benchmark cost of equity. In theory, if the market data (used to determine the cost of equity estimates) related to a set of firms, each of which was highly similar to the regulated entity in all relevant respects, the last step might not be needed: the cost of equity for the service provider might appropriately be set equal to the benchmark (or at the mid-point of the range). However, in practice, it is highly unlikely that there will be many firms that are highly similar to the regulated entity. In some cases there may be no firms that are highly similar. In the water utility example we described above, there were only two similar firms with reliable data; in gas pipeline cases we have seen benchmark samples containing firms with 50% of the firm's assets invested in activities other than regulated gas pipeline transportation. Therefore, it likely becomes necessary to adjust the estimates for any differences between the risk characteristics of the sample(s) and those of the target utility. For example, the FERC typically sets the cost of equity for a given regulated utility at the median of the comparable company range of reasonableness; however, if there is evidence that the target company has higher-than-average business risks relative to the proxy group, then the recommended cost of equity estimate is positioned between the median and the top of the range to reflect risk matching. Similarly, the NEB engages in an extensive review of business risk and risk matching between the comparable companies and those of the target utility before

[68] AER Consultation Paper p. 45.

[69] See the quotations in Sections III.A and III.B, above.

determining where in the range of plausible cost of estimates to place the target utility. For a natural gas pipeline this usually involves and assessment of long and short-term supply and demand risk, asset composition, etc.[70]

The last step in the process is therefore likely to involve a judgment about the business risks of the service provider relative to the business risks of the benchmark sample (i.e., relative to the average business risk across the firms in the benchmark sample). This was discussed in Section IV.D of the Brattle Report and involves both a quantitative and a qualitative assessment of the relative risk of the samples vis-à-vis the target utility.

We note that the methodology the AER is to follow (and which is to be described in the AER's guidelines) must result in a cost of equity in line with the *allowed rate of return objective*, namely that the "rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services". Estimating the cost of capital of the *service provider itself* is not the object of this exercise. For example, the service provider itself might be active in other lines of business (regulated or unregulated) which do not involve the provision of reference services. To the extent that these activities have different risk characteristics, the *average* cost of capital of the service provider would be different from the cost of capital specifically associated with the provision of reference services. The object is to determine the rate of return for the "benchmark efficient entity". In our view, this construct is simply a way of saying that the rate of return should be commensurate with the risks inherent in providing the regulated (reference) services, but should not be influenced by the risks associated with other activities in which the regulated entity (or its affiliates) is engaged. In moving from the range of reasonable estimates, derived from a sample or samples of comparable companies, to the rate of return of the benchmark efficient entity, the regulator needs to consider the business risks of the sample companies relative to the risks associated with providing the reference services, as we described above.

[70] See, for example, the NEB cite above and the discussion in RH-3-2011 pp. 148-164.

B. CLARIFICATION OF THE FIRST BRATTLE REPORT

The AER paper notes on pp. 45-46 that there appears to be an inconsistency in the Brattle Report, as Table 4 suggests that the DDM may be appropriate during periods of average industry growth whereas Table 3 of the same report suggested that the DDM was not appropriate during times of average prevailing risk-free rates and average market volatility. We acknowledge that this is an oversight in Table 3 of the original Brattle Report, where the DDM should have been included as appropriate in circumstances where average risk-free rates and average market volatility coincide with average industry growth. We therefore produce a corrected version of the table below.

Table 3: Relationship Between Key Economic Conditions and Weights to be Given to Models (Corrected Version of Table 3 in the Brattle Report)

		Prevailing Risk-free Rate in Economy		
Market Volatility		**High**	**Average**	**Low**
	High	Consumption CAPM		
	Average	Consumption CAPM / DDM	CAPM / ECAPM / DDM	Consumption CAPM / DDM
	Low	Consumption CAPM / DDM		