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Dr Malcolm Roberts
Chairman
Queensland Competition Authority
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Via Email: seqwater@qca.org.au
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28 March 2013

Dear Dr Roberts

SEQ Distributor Retailers' response to the Authority's Weighted Average Cost of Capital (WACC) Discussion Papers

Unitywater as one of the SEQ Distributor Retailers (the DRs) welcomes the opportunity to provide this first joint submission to the Queensland Competition Authority's (QCA) 2012-13 cost of capital methodology review. The DR's have co-operated and jointly worked to prepare this submission. While the DRs are not currently subject to deterministic price regulation under the QCA Act, the regulatory cost of capital still has a large impact on our operations under the existing price monitoring arrangements.

We also consider that a stable benchmark cost of capital will be a critical element of the permanent price monitoring framework that is expected to be developed by the Authority over the next 12 to 18 months.

Our submission is structured as follows:

a. First, we identify a number of contextual issues that we think are important for the Authority's cost of capital methodology review;
b. Second, we briefly outline our expectations for this review and its outcomes;
c. Third, we address a number of concerns we have about the way in which the Authority is undertaking its review, including proposing a possible framework for the review to provide greater certainty for regulated entities as to the review's scope; and
d. Finally, we have engaged SFG Consulting, Education and Management Consulting Services (EMCS) and Synergies Economic Consulting to provide their expert views on the two QCA discussion papers released so far on: Risk and the Form of Regulation and; The Risk-free Rate and the Market Risk Premium. However, we reserve our position on specific matters raised in the two papers until we better understand the scope and end-point of the Authority's review.

Context for this cost of capital review

We support the Authority undertaking a comprehensive review of its cost of capital methodology at this time.

The last comparable review undertaken by the Authority was in 2003-04. Moreover, the global financial crisis (GFC) and subsequent uncertain and volatile financial market conditions have had a significant impact on the outcomes of regulatory cost of capital methodologies applied across Australia, including those of the Authority.

In our view, the impact of the GFC appears to have been the primary driver of a number of current and completed reviews of existing cost of capital methodologies by Australian regulators. This includes major changes to the cost of capital rules recently implemented by the Australian Energy Market Commission (AEMC) in December 2012 under the national energy framework.[1]

The Australian Energy Regulator (AER) has subsequently commenced a process to develop the prescribed rate of return guidelines. As part of this process, the AER is holding a series of forums and working groups for all stakeholders to discuss issues and identify common views. Similarly, the AEMC adopted an extensive consultative process as part of its consideration of the original rule change requests that culminated in the December 2012 network rules changes. We are attracted to this process and support the Authority undertaking a similar approach.

The Independent Pricing and Regulatory Tribunal (IPART) is also currently reviewing certain aspects of its methodology for estimating the costs of debt and equity for the entities that it regulates. The Economic Regulation Authority of WA (ERA) has also recently commenced reviews of its cost of capital methodologies as they relate to the gas and rail entities that it regulates.

We would expect the important issues raised during these reviews to be thoroughly considered during the Authority's comprehensive review including:

a. The need for regulators to take into account a broader range of methods, models and evidence, as well as taking into account the overriding reasonableness of outcomes, when setting the regulated cost of capital;
b. The strong likelihood that a 'one size fits all' or mechanistic approach to estimating the cost of debt in the post-GFC environment will be inappropriate for a diverse range of network businesses with likely very different funding arrangements;
c. The possibility for a wider range of approaches to be considered in estimating the cost of equity than has occurred in the past;
d. How current, historical and forward-looking market data is incorporated into the respective cost of debt and equity estimates, including the internal consistency of these estimates and consistency of the cost of debt and equity estimates more broadly; and
e. The rejection of different Weighted Average Cost of Capital's (WACC) for government-owned and private network service providers.

Unitywater's and QUU's expectations for this review

The DRs are currently subject to price monitoring arrangements administered by the Authority under direction from the Queensland Government. Consequently, the significance of the

[1] The changes have been reflected to both the National Electricity Rules and National Gas Rules with the intention of creating a consistent framework for the setting of the rate of return across the electricity and gas network sectors and between distribution and transmission service providers within these sectors.

regulatory WACC is its use as a benchmark against which actual returns are assessed to determine whether monopoly returns are being earned.

The price monitoring arrangements have so far have been applied on a rolling basis. The Authority has estimated a WACC benchmark of 6.57% in post-tax nominal ("vanilla") terms for the two-year price monitoring period from 1 July 2013 to 30 June 2015[2]. However, the DRs retain control over their actual WACC assumptions and prices during the monitoring period.

It intended that a permanent price monitoring framework be established by the Authority for the period after 30 June 2015. The DRs consider that this cost of capital methodology review should provide clear guidance as to how the WACC benchmark will be set under the permanent framework.

Uncertainty created under existing price monitoring framework

For the DRs, the challenges posed by the impact of more uncertain financial market conditions on regulatory cost of capital methodologies since the GFC have not been reflected in the WACC benchmarks set by the Authority.

For example, the 2012-13 'vanilla' WACC benchmark for SEQ DRs of 9.35% includes a cost of equity estimate (8.85%) that is lower than the cost of debt estimate (9.69%). This appears to contradict the well accepted finance concept of risk and return, such that equity holders bear more risk than debt holders and should be compensated accordingly. We do not accept that this anomaly is explained by the possible difference between the promised and expected return on debt, as previously suggested by the Authority.[3]

Moreover, we do not consider that the allowed cost of debt is a maximum return whereas the cost of equity is an expected return such that the respective returns are not directly comparable. In our view, the expected return on debt is only likely to be lower than the allowed return if there is a material chance of default (i.e. financial distress of the regulated entity). We assume that the Authority is not setting its WACC benchmark based on this assumption.

In addition, the recently announced 'vanilla' WACC benchmark for 2013-15 of 6.57% has almost equivalent costs of equity (6.69%) and debt (6.49%). Moreover, this represents around a 30% fall from the previous WACC benchmark. As discussed in the SFG response to the Authority's Risk-free Rate and Market Risk Premium discussion paper, this reduction is occurring in circumstances where dividend growth models currently indicate that required returns on equity are above their long-run average.[4]

Moreover, this outcome is consistent with observed debt risk premiums, which are undoubtedly at elevated levels. In SFG's view, it is illogical to expect that investors would require risk premiums several times higher when buying equity securities, but then require lower risk premiums when buying equity securities.

[2] The QCA estimates a nominal post-tax WACC using the Officer (1994) WACC3 model. This approach defines cash flows in nominal, post-tax terms and modifies the cash flows, as opposed to the discount rate, for the debt interest shield and tax, where the latter reflects the effects of dividend imputation.
[3] Queensland Competition Authority (2011). Final Report SEQ Interim Price Monitoring for 2010/11, Part B Detailed Assessment.
[4] Debt risk premiums are effectively observable whereas equity risk premiums are compiled from assumptions and estimates of economic models, such as the dividend growth model.

In our view, these cost of capital outcomes raise legitimate questions about the robustness of the QCA's existing cost of capital methodology, which need to be considered as part of any comprehensive review.

More broadly, changes of this magnitude in cost of capital outcomes significantly undermine the integrity of the WACC benchmark as a basis for determining whether excess returns are being earned. This is because the WACC value directly affects a DR's maximum allowable revenues (MAR) under the Authority's price monitoring arrangements, so a DR's prices could become linked to movements up and down in the WACC as financial market conditions change to ensure actual revenues do not exceed the MAR.

We consider large implied MAR reductions reflecting short term financial market conditions and which are likely to subsequently reverse, to be unhelpful in managing our businesses and customers' price expectations. Moreover, the potential price volatility is inconsistent with the stability one would expect to accompany the use of long life assets financed by long term capital.

In this regard, Unitywater has engaged EMCS to assist it identify potential solutions in the context of setting the benchmark WACC for the permanent price monitoring framework to be developed by the Authority and applied to the SEQ DRs. Recognising the importance of the issue, EMCS identify a number of alternative ways in which the current inconsistency in the timing of estimated inputs to the Authority's WACC methodology could be addressed.

In our view, what is needed is for the Authority to develop a benchmark WACC range for price monitoring purposes based on paragraph 168A(a) of the QCA Act.[5] This provision is quite explicit in stating that the regulated entity is entitled to a return that *at least* compensates it for its 'commercial and regulatory risks'. That is, the Authority should set the allowed return in line with returns that are actually required in the market. In our view, the actual required returns are much more stable over time than the outcomes currently being generated by the Authority's mechanistic approach.

It is only from a longer term perspective that sound judgement can be exercised about excess returns being earned by a DR. Moreover, all DRs would benefit from the certainty of knowing what the Authority considers to be an acceptable range of returns from a medium to long term perspective.

We consider that the Authority's cost of capital methodology review is the best vehicle for establishing a WACC value range for DRs under the permanent price monitoring framework to apply beyond June 2015.

Key aspects of future cost of capital methodology

Further to our view that the Authority should develop a stable benchmark WACC range for price monitoring purposes, we see a number of desirable features of the cost of capital methodology as it will be applied to DRs.

[5] The s168A pricing principles in the QCA Act are taken from section 2.4 of the Competition and Infrastructure Reform Agreement (CIRA) signed by the Council of Australian Governments (COAG) on 10 February 2006. These principles formed part of the primary intent of CIRA to achieve a simpler and consistent national approach to the economic regulation of significant infrastructure.

Cost of debt

We consider that the Authority's methodology must recognise that both a trailing average approach (as proposed by Queensland Treasury Corporation (QTC)) and 'on the day' approach (as currently used by the Authority) to estimate the cost of debt can be consistent with efficient financing practices. This will depend on a regulated entity's circumstances, including size, ownership structure, and financing task. Consequently, the Authority's task should be to develop efficient benchmarks for both these approaches, not to choose one or the other as part of its cost of capital methodology.

Moreover, a DR should be able to choose the approach it assesses to be efficient for it, which would then be assessed against the benchmark. Adoption of this approach would be consistent with the recently amended National Electricity Rules, which provides for the return on debt to be estimated based on either of these two approaches.[6] In this regard, QTC has made strong arguments in support of the trailing average approach as an efficient financing practice in the context of the national energy network regulatory framework. In our view, the Authority needs to give consideration to how a trailing average approach could be operationalised as an efficient benchmark.

We would envisage operational detail on the trailing average approach being included in the Authority's cost of capital methodology. We note that under the QTC approach, the regulated entity cannot simply choose the approach that delivers the highest value at the time of each determination.

Cost of equity

As noted above, we consider there to be a significant flaw in the way in which the Authority is currently estimating the cost of equity, which has resulted in historically low regulatory cost of equity estimates.

In our view, the main issue that needs to be addressed is the problem that is created when combining a spot estimate of the risk-free rate with a long-term average market risk premium in volatile market conditions.

In this regard, we do not consider that the Authority's existing approach to estimating the market risk premium is forward-looking. The SFG response to the Risk-free Rate and Market Risk Premium paper discusses this issue in more detail and shows that the Authority's current approach (including the rounding adjustment to the nearest full per cent) means that there is unlikely to ever be an estimate other than 6%, as reflected in the Authority's estimate of 6% in every decision it has made so far.

Possible solutions to this problem of mixing spot and historical average rates is to estimate either a spot market return and deduct a current risk free rate to obtain an estimate of the expected market risk premium or to estimate an expected market risk premium directly. Another solution could be to adjust the long run average market risk premium for changes in the risk free rate relative to the average. Or alternatively one could use historical averages for all variables. Each of these alternatives has its advantages and disadvantages and the DRs consider that they need to be given consideration by the Authority as part of this

[6] National Electricity Rules, Chapter 6, paragraph 6.5.2(i).

comprehensive methodology review. Other economic regulators have either used or are considering using the various alternatives.

The consistency or not of terms in the cost of equity calculation and the consequences thereof is discussed in more detail in SFG's response to the Authority's Risk-free Rate and Market Risk Premium paper. Dr Stephen Bishop and Professor Bob Officer have also published papers on this issue of estimating the market risk premium in an environment where there has been greater market variability and economic uncertainty than has typically been experienced over at least the past 50 years.[7]

Bishop and Officer consider that because of large increases in debt premiums following the global financial crisis, there is a substantive disconnect between the risk spread on debt and equity when the historical average market risk premium is used to estimate the cost of equity. In their view, and consistent with the findings of SFG's paper, this process substantially under-estimates the required return on equity.

Questions for consideration

In light of our expectations regarding this cost of capital review, there are a number of questions that immediately arise from the Authority's two discussion papers that we would appreciate the Authority commenting upon in responding to stakeholders:

a. Does the Authority consider that the pricing principles in section 168 of the QCA Act apply to all entities regulated under the Act and, in particular, does the Authority consider that the requirements of paragraph 168A(a) regarding the setting of regulated rates of return that at least compensate an entity for its 'commercial and regulatory risks' are relevant to this comprehensive review of its cost of capital methodology?[8]
b. Does the Authority consider that it should seek to set the allowed return on equity and debt to be consistent with the efficient cost of equity and debt of an efficient benchmark firm at the time of each determination? And if so, on what basis will that benchmark efficient firm be defined in relation to the diverse entities regulated by the Authority?
c. The Authority's current cost of equity methodology implies that, in the period since the onset of the GFC, equity capital has been cheaper than at any time on record. Can the Authority reconcile this position with the weight of market evidence to the contrary?
d. Has the Authority fully considered the investment incentive, market value and equity investor implications of the split cost of capital concept it has raised as part of its risk and form of regulation discussion? And how does the Authority reconcile the material regulatory risks inherent in the concept with its view that economic regulation as applied in Australia is 'relatively low risk'[9]?

The Authority's cost of capital review framework

The Authority has indicated that it is undertaking a comprehensive review of its cost of capital methodology and that it will be preparing discussion papers on various topics relevant to

[7] Examples include: Bishop S. & Officer B (2009), Market Risk Premium Estimate for January 2010 – June 2014 Prepared for WestNet Energy (December); Bishop S. & Officer B (2009), Market Risk Premium, Further Comments, Prepared for Energy Networks Association, Australian Pipeline Industry Association and Grid Australia (January).
[8] The s168A pricing principles in the QCA Act are taken from section 2.4 of the Competition and Infrastructure Reform Agreement (CIRA) signed by the Council of Australian Governments (COAG) on 10 February 2006. These principles formed part of the primary intent of CIRA to achieve a simpler and consistent national approach to the economic regulation of significant infrastructure.
[9] Queensland Competition Authority (2012), Risk and the Form of Regulation, Discussion Paper, p vii.

determining the cost of capital. These papers, in conjunction with stakeholders' submissions, will inform the Authority's position on a particular topic.

The Authority will then prepare position papers on the key parameters for its cost of capital methodology.

However, there are no further details on how the Authority will undertake its review, including scope, objectives and time frames. In our view, there is a need for an overarching framework to guide the Authority's analysis and decision-making.

Moreover, elements of the two discussion papers released so far read more like position or decision papers with the Authority appearing to have settled on its preferred approach. We do not consider this to be appropriate in the context of a comprehensive review of its cost of capital methodology.

In addition, the DRs do not believe that undertaking this review using a piecemeal approach, in isolation of discussions on other WACC parameters and the financial and economic issues that drive these parameters to be a prudent approach. Consequently, as a starting point, we consider it imperative that the Authority's review has regard to the requirements of 168A(a) of the QCA Act. This provision is quite explicit in stating that a regulated entity is entitled to a return that at least compensates it for its 'commercial and regulatory risks'.

Within the context of this requirement, the scope of the regulated cost of capital is narrower (than 'commercial and regulatory risks'), and is simply to provide a return on equity that is commensurate with the relevant systematic (or non-diversifiable) risks, and a return on debt that reflects the prevailing cost of funds based on the assumed notional credit rating.

However, the regulated cost of capital does not address diversifiable risks (which may or may not be otherwise compensated in the cash flows), nor does it address asymmetric risks, such as asset stranding. It also does not address regulatory risk. In our view, these issues should be acknowledged and addressed as part of the Authority's review.

We also see merit in the Authority developing guiding principles/objectives to guide how it will assess and approve regulated entity's rate of return proposals. The Authority has significant discretion under the QCA Act in assessing rate of return proposals and a small number of guiding principles would provide greater predictability to regulated entities regarding its approach. As previously noted, the AER must develop such guidelines under the national energy regulatory framework and has arranged stakeholder forums to enable broad ranging input into their development.

In particular, a principle to identify and explain clearly where and when the Authority has made the necessary trade-offs between precision in its estimates of parameter values and the overall reasonableness of its cost of capital estimates would directly address the issue of the exercise of regulatory discretion.

Given the discretion the Authority has under the QCA Act, there appear good grounds for going one step further and the Authority developing guidelines to set out its approach to setting the cost of capital for the diverse range of entities it regulates. This approach is adopted under the national energy framework, which also provides for overarching rules to guide the regulator's cost of capital determinations and mandatory three yearly reviews of the guidelines. In

prescribing this three year timeframe, the AEMC noted that it would allow stakeholders to consider new evidence or analytical techniques that may allow better estimates of the rate of return to be made.[10]

In conclusion, we consider there is a need for a framework for the current cost of capital review that should, at a minimum, address the following matters including:

a. The objectives of the review;
b. The exact scope of issues that the review will address, as well as how the outcomes of the review will impact on the different entities regulated by the Authority;
c. The merits of developing guiding principles and/or guidelines to indicate how the Authority will apply its cost of capital methodology in the future;
d. Evaluation criteria regarding how feasible cost of equity and cost of debt options will be evaluated during the review and reflected in the final methodology; and
e. Structured consultation and publication time frames, including workshops with the entities it regulates.

Should you have any queries in relation to the matters raised in our submission please contact Damian Platts, Manager Regulatory Affairs on 07 5431 8235.

Yours sincerely

[redacted]

George Theo
Chief Executive Officer

CC: Pauline Thomson, Chief Financial Officer

Attachment 1: Synergies - Response to QCA's Risk and Form of Regulation paper
Attachment 2: SFG Consulting – Response to the QCA discussion paper on risk free rate and market risk premium
Attachment 3: SFG Consulting – Response to the QCA approach to setting the risk free rate
Attachment 4: EMCS – Options for estimating a weighted average cost of capital for water utilities, a preliminary discussion paper

[10] Australian Energy Market Commission (2012), Draft National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012 Draft National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012, Draft Determinations, p 21.

Response to QCA's Risk and Form of Regulation Paper

A report prepared for Queensland Urban Utilities and Unitywater in the context of the QCA's cost of capital methodology review

March 2013

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Contents

1 Summary of QCA's position

The thrust of the Authority's discussion paper as we understand it is that the building block form of regulation as applied in Australia, including by the Authority "implies relatively 'low risk' for several reasons".[1]

According to the Authority, this is due to the strong certainty of revenue recovery (particularly under a revenue cap control) and the limited nature of cost benchmarking applied, which is "only modest and sometime minimal" compared to the regulated entity's cost proposal.[2]

The Authority then uses the purported low risk nature of building block regulation to raise the proposition that the risks associated with the regulated entity's regulated asset base (RAB) are lower than the risks associated with its operating and maintenance and capital expenditure activities. Consequently, the RAB should earn a return at or close to the entity's cost of debt because it entails only passive asset management, while the other activities should earn a return at the WACC because there is equity risk associated with them.

The Authority also argues that the form of regulation should ideally allocate risks in an optimal manner between the regulated entity, its customers and taxpayers, with the relevant beta and cost of capital outcomes to follow from this allocation. The Authority notes that a key finding of risk allocation literature is that some form of cost sharing is always more efficient than no sharing.

Finally, the Authority proposes to develop a further paper that will present principles and a framework that enables the Authority to make explicit allowances for the form of regulation on the regulatory cost of capital.

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1 QCA, Risk and the Form of Regulation, p vii

2 QCA, Risk and the Form of Regulation, p vii

2 Implications of QCA's position

2.1 Use of CAPM as analytical framework

The Authority's analysis of risk and the form of regulation has been undertaken within the CAPM framework for estimation of the cost of equity. The Authority has always used the CAPM framework to estimate the cost of equity but has not previously attempted to adjust the cost of equity for the form of regulation it applies.

Under the CAPM model, the equity beta measures the systematic (or non-diversifiable) risks of the relevant entity, which represents the risk that cannot be avoided through the holding of a diversified portfolio of assets. Technically, the non-diversifiable risk for an asset will reflect the covariance of the particular asset's returns with the economy as a whole.

The value of the equity beta is one of the most important parameters in regulatory cost of capital setting and has proven contentious in regulatory decision-making, including because it is not possible to directly observe a regulated entity's beta, rather it must be estimated based on historical market data.

There are two key determinants of an entity's equity beta:

- business risk arising from the sensitivity of an entity's cash flow to overall economic activity; and
- financial risk arising from proportion of debt borrowing (choice of capital structure), where a higher level of debt implies a higher beta.

The asset beta represents the systematic risk of the ungeared entity (and as such includes no financial risk – only business risk). A key consideration in assessing an infrastructure provider's risk profile in order to identify its systematic risk factors is operating leverage, the level of fixed cost as a proportion of total costs. Fixed costs are cash outflows that occur regardless of the economic cycle and are an important characteristic of infrastructure providers. If revenue declines as a result of systematic issues, variable costs decline (as demand falls) but fixed cost obligations still need to be met. All things being equal, operational leverage increases the asset beta.

The equity beta incorporates both business and financial risks. Only systematic risks are rewarded under CAPM because it is assumed that investors will diversify their exposure to business-specific risks.

Consequently, the regulated cost of capital set by the Authority does not address diversifiable risks (which may or may not be otherwise compensated in the regulated entity's cash flows), nor does it address asymmetric risks, such as asset stranding and

regulatory risk. In our view, these issues should have been acknowledged more directly and addressed as part of the Authority's discussion paper because of their relevance to its findings and conclusions. In particular, in arguing that regulated entities are low risk businesses, a number of material risk factors have been completely ignored.

2.2 Importance of regulatory risk in infrastructure service provision

Across infrastructure sectors such as water, electricity and gas, many assets used to provide services are specialised and have limited, if any, alternative uses. In economic terms, these assets are known as sunk assets. The scale of investment in essential infrastructure mean that regulatory risk can be a critical factor in regulated entity's investment decisions and can delay and/or deter projects.

In a regulatory context, given essential infrastructure assets generally have only a low value in alternative uses, it could be expected that earning a relatively low rate of return will ensure that the assets are retained in their existing use. In other words, a low rate of return would not result in the assets being removed and put to a different more profitable use. Prices for use of these assets would be correspondingly low.

The temptation to adopt such an approach in regulatory cost of capital setting in relation to sunk assets and the risks this poses to the regulated entity investing in these assets has been summarised as follows:[3]

> To fulfill its obligation to serve, the utility must make substantial investments in long-lived plant and equipment that is highly immobile and has little value in alternative uses. … Once a public utility has made sunk investments in facilities, it is open to being held up by regulators trying to keep prices as low as possible.

From an economic efficiency perspective, low user prices would be unlikely to promote efficient use of the infrastructure services in the short run, with allocative inefficiency resulting from over-use likely to be encouraged. More significantly, poor returns to the regulated entity would be unlikely to encourage any further investment in the assets in the medium to long term when mobile capital could be directed to more profitable opportunities elsewhere.

Consequently, in establishing the cost of capital for sunk assets, the Authority must be careful to ensure the rate of return is consistent with the regulated entity setting prices

[3] Joskow, Paul (1991) —The Role of Transactions Cost Economics in Antitrust and Public, Utility Regulatory Policies,‖ Journal of Law, Economics and Organization, 7: 53-83 pp 67-68.

that promote efficient use of infrastructure services, while ensuring investment incentives are maintained. We consider this to be a fundamental obligation of the Authority under the Council of Australian Government's Competition Principles Agreement, the Competition and Infrastructure Reform Agreement and the QCA Act.

Section 168A(a) of the QCA Act is quite explicit in stating that a regulated entity is entitled to a return that at least compensates it for its 'commercial and regulatory risks':[4]

> The pricing principles in relation to the price of access to a service are that the price should—
>
> (a) generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment commensurate with the regulatory and commercial risks involved

It has been recognised that regulatory error tends to have asymmetric consequences. The Productivity Commission stated:[5]

> Over-compensation may sometimes result in inefficiencies in timing of new investment in essential infrastructure (with flow-ons to investment in related markets), and occasionally lead to inefficient investment to by-pass parts of the network. However, it will never preclude socially worthwhile investments from proceeding. On the other hand, if the truncation of balancing upside profits is expected to be substantial, major investments of considerable benefit to the community could be forgone, again with flow-on effects for investment in related markets.

In the Commission's view, the latter is likely to be a worse outcome.

In other words, the consequences of setting WACC too low, and discouraging efficient investment in essential infrastructure, are considered worse than setting it too high. This in turn risks compromising the relevant revenue and pricing principles in the QCA Act, in particular, the reference in paragraph 168A(a) that the regulated entity is entitled to a return that *at least* compensates it for its 'commercial and regulatory risks'.

In our view, the estimation of the WACC is inherently imprecise and hence the probability of specifying a WACC other than the 'true' value is high. For key parameters such as beta, gamma and the market risk premium, there is likely to be a range of reasonable estimates rather than a precise value. The Australian Competition

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4 Queensland Competition Authority Act 1997, p 140

5 Productivity Commission (2001). Review of the National Access Regime, Report no. 17, AusInfo, Canberra, p.83.

Tribunal ('the Tribunal') recognised the range of reasonable outcomes within which a Reference Tariff determination could fall:[6]

> …there is no single correct figure involved in determining the values of the parameters to be applied in developing an applicable Reference Tariff. The application of the Reference Tariff Principles involves issues of judgement and degree. Different minds, acting reasonably, can be expected to make different choices within a range of possible choices which nonetheless remain consistent with the Reference Tariff Principles.

Given the asymmetric consequences of regulatory error, it is therefore important to lower the risk that the 'true' WACC value is higher than the estimated value as this is considered to have more severe social and economic implications.

In contrast, it appears to us that the Authority's consideration of making allowances for the form of regulation would increase rather than lower risks for the entities it regulates, given that beta estimates are inherently imprecise and there is simply not enough sample firms under different regulatory approaches to even come close to being able to detect a statistical difference between regulated entities operating under different forms of revenue/price control.

In this regard, the empirical evidence presented in the Authority's discussion paper regarding the impact of the form of regulation on risk is not compelling and indicates that it would be difficult to estimate an allowance for the form of regulation in anything other than an arbitrary way.[7]

This has become even more apparent in recent times. During recessions and financial crises government bond yields are low and the Authority's mechanistic approach estimates the cost of equity to be correspondingly low. However, the true required return on equity is quite high. This means that the business is under-compensated during bad times and (symmetrically) over-compensated during good times. This has the effect of increasing systematic risk. In addition, the allowed return on debt is based on the business issuing 5-year debt at the start of each regulatory period. This either causes material refinancing risk, or the regulated entity issues longer-term debt (as would be commercially efficient) and pays a higher rate that is uncompensated.

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6 Application by GasNet (Australia) Operations Pty Ltd [2003] AcompT 6, para 29.

7 QCA, Risk and the Form of Regulation, pp 29-30

We agree with the Joint Industry Association's view, referred to by the Authority, that regulation creates risk and these risks are non-diversifiable. Moreover, the impact of the form of regulation is a second order consideration.[8]

In our view, the reasonableness of the overall rate of return earned by the regulated entity having regard to the consequences of regulatory error should be a higher order consideration in the regulatory cost of capital setting process.

2.3 Economic regulation as applied in Australia

The Authority provides a relatively detailed explanation of how economic regulation is applied in the US, UK and Australia, recognising the alternative forms of regulation on the broad continuum from onerous cost of service regulation at one extreme to pure index-based price cap regulation at the other extreme.

The Authority further argues that building block regulation as applied in Australia is closer to cost of service regulation than pure price cap regulation. This is because, in its view, there is strong certainty of revenue and cost recovery (under both revenue and weighted average price cap controls). Allowed costs are only partially de-coupled from actual costs due to the limited benchmarking applied and due to cost pass-through mechanisms that reduce material cost variations that arise during a regulatory period.

While agreeing with the Authority that the revenue cap and weighted average price caps applied in Australia are best characterised as intermediate controls somewhere between the cost of service and index-based price cap extremes, we are concerned about the Authority's characterisation of certain aspects of the Australian regulatory precedent.

Our main concern is that the Authority's analysis is essentially one-sided, presenting the application of economic regulation as completely advantageous to the regulated entity because it materially lowers cash flow risk (on both the revenue and cost sides). In contrast, there appears to be little or no recognition of the existence of regulatory oversight and approval processes and what impact they have on cash flows and investment incentives. As noted above, we consider both commercial and regulatory risks need to form a key part of the Authority's analysis in this cost of capital methodology review.

[8] QCA, Risk and the Form of Regulation, pp 38-39

2.3.1 Building block regulation

It is important to note that under the building block approach, the regulator determines each of the following cost building blocks, which sum to a total revenue earning requirement for the regulated services in each year of the revenue and/or price-setting period:

- return on capital (return earned on the RAB)
- return of capital (depreciation)
- operating and maintenance costs
- tax.

These cost components for the regulated entity are summed to derive an annual revenue requirement (ARR) (also known as maximum allowable revenue) sufficient to recover these costs for each year of the relevant regulatory period. The ARR becomes the maximum allowable revenue that can be earned under the revenue cap control or is converted into a maximum weighted average price based on forecast demand under the weighted average price cap control.

Under the building blocks approach, the regulator exercises control over each element of the allowable revenue stream of the regulated entity. Hence, there is no guarantee that the costs proposed by the regulated entity will be approved by the regulator.

One of the key points to note about the building block approach is that given the size of essential infrastructure assets, the return on capital is generally the most significant building block of the ARR. Importantly, in determining the return on capital, the regulator approves the:

- RAB value;
- forecast capex over the regulatory period and subsequently the actual capex that is rolled into the RAB; and
- WACC it applies to the RAB value to calculate the ARR.

Not surprisingly, the regulatory cost of capital is a contentious issue under building block regulation because of its large impact on the ARR. As we discuss further in our response to the Authority's Risk-free Rate and Market Risk Premium discussion paper, we consider the Authority is mechanistically applying the CAPM to estimate the cost of equity notwithstanding that the outcome of this approach is a required return on equity that is lower than at any time in recorded history. This is contrary to market evidence that required returns on equity in the Australian market are not currently so

low. In other words, the Authority's approval of the regulatory cost of capital is a fundamental determinant of the ARR and as a result this clearly presents a cash flow risk to the regulated entity.

In contrast, in emphasising the potential 'upside' of economic regulation in terms of cash flow risk mitigation, the Authority gives the impression that all cost risk of the regulated entity is almost completely mitigated. This is because regulator-approved costs are only 'partially decoupled' from those proposed by the regulated entity.[9]

Hence, the regulator's power to approve or not approve capital and operating expenditure forecasts of regulated entities as part of the standard prudency and efficiency tests and the associated implications appears to be glossed over. Moreover, if the regulator-approved costs are even partially de-coupled from actual costs what does this mean for the cash flow risks of the business, including if the regulator misjudges what it deems to be the efficient cost level?

In addition, under Australian building block regulation, regulated entities also bear cost risk associated with cost escalation in capex and opex inputs during the relevant regulatory period being greater than that approved by the regulator at the start of it.

Finally, given maximum allowable revenues reflect the regulator's judgement of prudent and efficient capex, opex and tax costs, this could clearly be expected to undermine any revenue certainty provided to the regulated entity from the revenue or price cap control. In other words, if the regulator-approved costs are below the efficient costs of the service provider, then the revenue certainty provided by the revenue cap (and to a lesser extent weighted average price cap) ensures only that something less than the full efficient costs will be recovered.

2.3.2 Cost pass-through mechanisms

The Authority also refers to the operation of cost pass-through mechanisms and suggests that these are subject to 'automatic pass-through to customers, where price adjusts immediately to reflect revised costs'.[10] In our view, this mischaracterises the cost risk exposures of regulated entities. Under building block regulation in Australia, including that applied by the Authority, there is no such automatic pass-through mechanism operating. As far as we are aware all cost pass-through mechanisms, including those approved by the Authority, are subject to materiality thresholds. In other words, there is a sharing of unanticipated cost risk between the regulated entity

[9] QCA, Risk and the Form of Regulation, p 22

[10] QCA, Risk and the Form of Regulation, pp 11

and its customers. The extent of sharing of this risk being dependent on the level at which the threshold is set. The Authority also fails to acknowledge that not all cost pass-through applications are approved in part or full by regulators.

In relation to cost pass-through mechanisms, it should also be noted that allowable pass-through events generally relate to force majeure situations, such as natural disasters. In our view, it is doubtful that these events are positively correlated with the business cycle, such that the existence of the pass-through mechanism reduces the systematic risks of the regulated entity. In other words, pass-through events are more likely to relate to non-systematic risks, which are not recompensed under the regulatory cost of capital if it is calculated using the CAPM framework.

Finally, in support of its position of the low risk nature of Australian regulated entities, the Authority also notes that merits review mechanisms are favourable for regulated entities in terms of mitigating cash flow risks. However, there is no merits review mechanism under the QCA Act so it does not appear to be a relevant consideration in the context of the QCA's cost of capital methodology, beyond recognition that a greater level of regulatory risk exists in relation to the Authority's various regulatory arrangements than under regulatory frameworks where such mechanisms apply.

3 Split cost of capital proposal

Of most concern to us is in the Risk and Form of Regulation discussion paper is the Authority's apparent support for a split cost of capital, which proposes that regulated entities should receive only a return on debt in relation to their RAB.

The Authority intends to explore the approach advocated in a series of unpublished working papers and conference presentations by Dieter Helm even though 'to date there has been minimal recognition of Helm's view'.[11] Under this approach, once an asset goes into the RAB it would only be allowed a return equal to the government bond rate, perhaps with a small premium based on the business having a 'regulatory duty to finance.'[12]

It is not clear if the Authority is seriously intending to head down this path or is rather undertaking a 'kite flying' exercise to test the reaction of regulated entities to the Helm proposal.

Regardless, we agree with the Authority that Helm's proposal would have fundamental implications for both regulated entities and their customers. Unfortunately, it is not clear that the Authority has fully considered the implications of this proposal, including the likely views of equity investors who could potentially find the basis upon which certain of their very large existing investments were undertaken would be completely undermined. Rather, the theoretical appeal of the argument appears to be driving the Authority.

In this regard, it should be noted that we are not aware that any economic regulator in Australia has given this proposal serious consideration. Moreover, even considering this approach indicates that the Authority is both bold and novel. Other things being equal, it could be argued that having a bold and novel regulator is likely to increase required returns for the entities it regulates.

As far as we are aware and not surprisingly, the participating councils of the DRs certainly expect more than a return on debt in relation to the existing and prospective investments made in their respective water businesses. The Authority also does not appear to have considered the potential of creating a different class of infrastructure assets in Queensland within the broader infrastructure class of assets in Australia, nor of the effect on investment incentives that the Helm proposal would have. In flagging the proposal, it does not appear that the Authority has approached asset managers or equity investors to test their views as to its reasonableness.

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[11] QCA, Risk and the Form of Regulation, p 25.

[12] QCA, Risk and the Form of Regulation, p 23.

Moreover, if the return on the RAB was constrained to simply a return on debt approved by the Authority, it would result in a significant reduction in the market value of all the entities it regulates, reflecting the lower expected cash generating capacity of the assets over their economic lives. In so doing this could raise material financial viability concerns. We consider it highly likely that they would have to write down asset values to reflect the future materially lower expected revenue stream, which would then have implications for credit ratings amongst other things.

In our view, the Helm proposal is a prime example of the regulatory risk issue in relation to sunk assets that we previously discussed. A key to promoting investment in essential infrastructure in the future is to provide potential investors with the confidence that the returns they can expect to earn under the regulatory regime will adequately compensate them for the risks associated with the investment at the time it is made. Consistency and credibility in decision making is crucial for providing that confidence.

Consequently, we think that the Helm proposal should be considered no further by the Authority given the adverse investment incentives and destruction of market value it would lead to if implemented. However, if the Authority intends to pursue the proposal further, we consider it needs to very carefully consider its obligations under the QCA Act in relation to the entities it is regulating, including the risks and consequences of error.

In our view, the Authority's cost of capital methodology review presents an ideal opportunity to get stakeholders together to jointly improve the robustness and reliability of the regulatory framework used to set regulated rates of return. However, such a radical change as the helm proposal, if it were to be implemented, would cause the process to descend into one of legal challenge and political lobbying before it even gets properly started.

4 Optimal risk allocation

It is well accepted in a contractual and transactional context that risks should be allocated to the party best available to manage them. This concept also translates well in a regulatory context.

It is well known that one of the major differences between revenue cap and weighted average price cap controls is the allocation of volume risk between the regulated entity and its customers. As a result, we are surprised about the Authority's reaction to the NSW distribution network service providers' view that they are best able to manage volume risk (rather than their customers).[13] The Authority appears to see this as a compelling acknowledgement because 'it reduces the controversy to the optimal form of control for allocating risk and the associated adjustments to the regulated firm's beta that are required to reflect the firm's actual, non-diversifiable risk.'[14]

In contrast, in our view, it is true and well-accepted that different forms of economic regulation affect the allocation of risk between the regulated entity and its customers. This, in turn, may affect the cash flow profile of regulated entities. The problem, however, is how to measure this impact. The practical difficulties of what the Authority is proposing, including attempting to decompose risk into its diversifiable and non-diversifiable components for the purpose of adjusting betas, is likely to overwhelm any theoretical merit of its arguments, again having regard to the risks and consequences of error.

In the context of the SEQ DRs and the optimal allocation of risk with their customers it is worth noting that in recent years:

- in 2011-12 and 2012-13, the DRs have been subject to legislated CPI-capped price rises for the DR component of charges for water and sewerage services supplied to residential and small business customers, regardless of their expenditure requirements over this period;
- strict water restrictions on their customers were imposed by the State Government;
- financial incentives were provided to water customers by governments to encourage the installation of water tanks (effectively a form of water network bypass); and

[13] QCA, Risk and the Form of Regulation, p 40

[14] QCA, Risk and the Form of Regulation, p 40

- there are no take-or-pay contracts in relation to water consumed by the DRs' customers.

In light of this, it should be apparent that the issue of which party is best able to manage volume risk under economic regulation is not necessarily a straight forward one.

5 Conclusion

The main conclusion that we draw from the Authority's discussion paper is that, in general, it considers the cost of capital of the entities it regulates is too high and that entities subject to revenue cap controls should receive a lower regulated rate of return than those subject to weighted average price cap controls. However, how the Authority intends to adjust equity betas for the form of regulation it applies, specifically, to estimate the impact of different forms of regulation on non-diversifiable risk, is not yet clear.

In stating its position, the Authority appears to ignore the difficulties associated with estimating equity betas, regardless of the form of regulation applied. Effectively, it appears the Authority is suggesting making an adjustment to beta estimates based on imprecise/unreliable data sets. In our view, the Authority is implying a false precision in the beta estimates and its ability to adjust them in a robust manner to account for the impact of different forms of economic regulation. Consequently, in our view, there would be a major risk of arbitrary adjustments being made to beta estimates by the Authority if it were to go down this path.

In our view, additional uncertainty arises from the exercise of regulatory discretion and the Authority has many non-trivial decisions to make in relation to the entities it regulates. As a consequence, the outcomes from its regulatory decision making processes cannot be predicted with certainty, including this cost of capital methodology review. However, the Authority has completely ignored the issue of regulatory risk in arguing that the entities it regulates are low risk, including how it presents under the QCA Act, where it has a relatively large discretion given the non-prescriptive nature of much of the Act.

In addition, there is no merits review mechanism under the Act. This represents a major difference with the national energy framework that the Authority frequently references in its discussion paper.

To conclude, based on the findings of the discussion paper, we see merit in the Authority doing the following:

- set out what it thinks the QCA Act requires it to do in terms of establishing a cost of capital methodology for the entities it regulates;
- more clearly establish the scope of and process it intends to follow for the remainder of this comprehensive methodology review, including document releases and timeframes;

- establish stakeholder forums as part of the review process to facilitate broad ranging discussion of key issues and identification of common ground on these issues;
- provide more details than implied by 'principles and a framework'[15] to explain how it proposes to estimate the adjustment to beta for the features of regulation that decrease systematic risk, so that the DRs can apply the same approach for estimating the adjustment for features of regulation that increase systematic risk; and
- consider the split cost of capital proposal no further.

[15] QCA, Risk and the Form of Regulation, p 41

Response to the QCA Discussion Paper on risk-free rate and market risk premium

Report for Unitywater and Queensland Urban Utilities

25 March 2013

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1. Background and conclusions

Overview and instructions

1. SFG Consulting (**SFG**) has been retained by Unitywater and Queensland Urban Utilities to provide our views on the discussion paper *The risk-free rate and the market risk premium*, published by the Queensland Competition Authority (**QCA**) in late November 2012. Throughout this report, we refer to this discussion paper as the **MRP Discussion Paper**.

2. The QCA is currently undertaking a comprehensive review of its cost of capital methodology for regulated businesses. It plans to release a series of discussion papers covering various aspects of the cost of capital for public comment. The QCA will then prepare position papers on the key parameters in the cost of capital.

3. The MRP Discussion Paper sets out the QCA's current approach to estimating the risk-free rate and the market risk premium. In particular, the QCA estimates the risk-free rate as the yield on five-year Commonwealth government bonds, and it has adopted a market risk premium (**MRP**) estimate of 6% in every decision it has issued since its inception.

4. The MRP Discussion Paper also notes that:

    a) Government bond yields have been at or near their historical lows since the onset of the global financial crisis (**GFC**); and

    b) The QCA's current approach for estimating MRP would again produce an estimate of 6% in the current market conditions.

Summary of conclusions

The QCA's current approach

5. The QCA currently sets MRP as the average of the estimates from four different approaches:

    a) Ibbotson historical excess returns;

    b) Siegel adjusted historical excess returns;

    c) Cornell dividend growth model; and

    d) Survey responses.

6. Only the Cornell method is based on current market data. Under this approach, the QCA would only move from its 6% estimate for MRP in circumstances where current market data indicated an MRP in excess of 10%. Even in such circumstances, the median of the four estimates is highly likely to remain within the QCA's 6% rounding range. Consequently, it seems highly unlikely that in any market circumstances the current QCA approach would ever produce an estimate other than 6%.

7. In every one of its determinations to date, the QCA has adopted an MRP estimate of 6%. Even at the height of the GFC when other regulators had increased their estimates of MRP, the QCA still adopted an estimate of 6% based on its current approach.

8. Consequently, the QCA approach to estimating the required return on equity can be summarised as:

a) Using the Sharpe Lintner CAPM, with

b) The risk-free rate estimated as the contemporaneous yield on five-year Commonwealth Government bonds; and

c) MRP fixed at 6%.

9. The outcome of the current QCA approach is estimates that suggest that the required return on equity has, since the onset of the GFC, been lower than at any time in recorded history.

Implications of the current QCA practice for determining the allowed return on equity

10. The current practice of the QCA is to determine the allowed return on equity by adding a constant premium of 6%, scaled up or down according to the estimated equity beta, to the contemporaneous estimate of the risk-free rate of interest. This approach has the following implications:

a) Since the onset of the GFC, the estimate of the required return on equity has been lower than at any time on record. This implies that, since the onset of the GFC, equity investors have been more prepared to make equity investments requiring lower returns than ever before;

b) Whereas debt risk premiums are currently three- to four-fold higher than pre-GFC levels, equity risk premiums have not increased at all. That is, a market that requires a three- to four-fold increase in risk premiums when investing in debt securities in the benchmark firm, requires no additional risk premium at all when investing in riskier equity securities in the same firm;

c) A material number of investors will require lower returns on residual equity in the firm than they would require on first-ranking investment grade debt in the same firm; and

d) The firm could materially lower its cost of capital by employing 100% equity finance.

Ibbotson historical mean excess

11. There is broad agreement that the risk premiums that equity investors require vary over time. That is, the MRP is not constant, but varies over time.

12. The mean of historical excess returns is only capable of providing an estimate of the long-run average level of the MRP – commensurate with the average conditions in the market over the historical period. This does not necessarily provide a contemporaneous estimate of the MRP that is commensurate with the prevailing conditions in the market. The best illustration of this point comes from the AER's last WACC Review. It is common ground that during 2008 and early 2009 financial risk premiums increased materially. The AER specifically recognised this point in its WACC Review and accordingly increased its estimate of MRP.[1] At the same time that risk premiums were materially increasing, global stock markets plummeted. This, in turn, has the effect of reducing the historical

[1]AER (2009), Final Decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, May 2009; pages 237-238. "The AER also notes that there may be an inverse relationship between the short term historical excess return and the short term forward looking MRP."

mean of excess returns. That is, just when financial risk premiums are going up, the mean of historical excess returns is going down.

13. In general, the mean of historical excess returns moves in the opposite direction to the risk premiums that are commensurate with the prevailing conditions in the market for funds. When risk premiums rise, stock prices fall and the historical mean falls, and when risk premiums fall, stock prices rise and the historical mean rises. Consequently, the mean of historical excess returns does not provide an estimate of MRP that is commensurate with the prevailing conditions in the market for funds, but rather one that is commensurate with the average conditions in the market over the historical period.

Siegel adjusted historical mean excess

14. The Siegel approach is based on the hypothesis that, in the historical sample period prior to 1990, inflation turned out to be higher than expected, and that this caused real returns on government bonds to be lower than they would otherwise have been. The Siegel approach is also based on the further hypothesis that the low real yields on government bonds that were observed in the historical data will not be again observed in the future.

15. In effect, the Siegel approach results in an estimate of approximately 2% below the Ibbotson historical average estimate. Since the historical average and the Siegel approach are each given a 25% weighting in the final MRP estimate, the net effect is that 50% of the QCA's estimate of MRP is based on the historical average minus one per cent.[2]

16. In our view, there are a number of reasons why the use of (or at least the weight applied to) the Siegel approach should be revised:

    a) The Siegel approach is based on the notion that real government bond yields will be higher in the future than they have been in the past. But there are many features of past stock returns that some would argue are likely to be different in the future. There are many "it'll be different this time" arguments that one could consider. In our view, it is generally better to use historical data as it is, rather than an estimate of what it would have been if a particular event or phenomena had not occurred;

    b) Siegel's prediction in the early 1990's that future real risk-free rates would be materially higher in the future has turned out to be spectacularly wrong;

    c) The QCA appears to still be using an estimate of 4% for the current forward-looking real risk free rate based on Lally (2004). That estimate was provided during the middle of one of the longest and largest stock market rallies of all time. Real rates since that time (at least as estimated using the yield on inflation-indexed government bonds) have never approached the predicted value of 4% and are currently approximately one quarter of that figure;

    d) If the Siegel approach is to be used, current data should be used. The yield on inflation-indexed government bonds indicates that the current forward-looking real risk-free rate is approximately 1%. If this figure is used in place of the Lally estimate of 4% from 10 years ago, the Siegel adjustment would be to increase the historical average by approximately 1% (being the difference between the historical estimate of 2% and the current estimate of 1%). Such an approach would have the advantage of increasing the historical estimate during

[2] That is, 25% weight applied to the historical average and 25% weight applied to the historical average less 2% is equivalent to 50% weight applied to the historical average less 1%.

recessions and financial crises and decreasing it during expansions – in line with the actual movement in risk premiums; and

e) No other Australian regulators use the Siegel approach. Moreover, the respondents to the Fernandez (2011) survey (which the QCA proposes to use as the basis for its survey estimate of MRP) were also asked to identify books or articles that they use to support their estimate. On this question, less than half of one per cent indicated that their estimate was informed in some way by the Siegel approach.

The Cornell dividend growth approach

17. It is well accepted, including by the QCA,[3] that dividend growth models currently indicate that required returns on equity are above their long-run average. The QCA has regard to the Cornell dividend growth model, however the way the QCA processes this information results in it maintaining its MRP estimate of 6%. This in turn results in the allowed return on equity since the onset of the GFC being lower than at any time on record.

The use of survey information

18. The Australian Competition Tribunal recently indicated[4] that three conditions must be met for survey responses to be given any material consideration:

    a) The survey must be timely – there must have been no change in the prevailing conditions in the market for funds since the survey was administered;

    b) There must be clarity about precisely what respondents were asked so that there is no ambiguity about how to interpret their responses; and

    c) The survey must reflect the views of the market and not a sample that is small, unresponsive, or without sufficient expertise.

19. None of these requirements are met by the survey on which the QCA has relied in the Discussion Paper:

    a) It is not timely, in that respondents were surveyed in market conditions that were materially different from those at the time of the MRP Discussion Paper;

    b) It is unclear, in that there is no information about what the respondents used the MRP estimate for, how they used it, or how its value might be related to other parameters such as the risk-free rate; and

    c) It is unrepresentative, in that there were only 40 respondents and no information about the non-response rate.

20. In our view, the best information about the prevailing conditions in the market for funds comes from traded prices drawn from the market for funds, rather than from survey responses. We note that this view is consistent with the recent directions from the Tribunal.

[3] QCA MRP Discussion Paper, Table 3.1, p. 11.
[4] Application by Envestra Ltd (No 2) [2012] ACompT 3.

The direction of regulatory practice in Australia

21. IPART has recently concluded that "there may be an inconsistency between using short term data for the risk free rate and using long term data for the MRP…there may be an inversely proportional relationship between the MRP and the risk free rate,"[5] and that "In the current market circumstances, there is some evidence to support the view that expectations for the MRP have risen as bond yields have fallen,"[6] and further that "we recognised that there may be a discrepancy between the use of short term yields on the risk free rate and long term averages for the MRP, particularly in the current market."[7]

22. In a series of recent cases, IPART has worked within its regulatory constraints to allow a return on equity above that which would be obtained by adding a fixed premium to the government bond yield. In these cases, IPART has allowed a return on equity that is close to its long-run historical mean estimate of the required return on equity. This allowed return on equity can be obtained by:

    a) Increasing the risk free rate from the contemporaneous estimate to a longer-term average estimate of 5.2 to 5.4%; or

    b) Adopting a contemporaneous MRP estimate of 7.5 to 7.8%.

23. In its recent rule change process, the Australian Energy Markets Commission (**AEMC**) made a number of significant changes to the National Electricity Rules (**NER**) and National Gas Rules (**NGR**) to prevent the AER from continuing to adopt that approach. The key changes that the AEMC made were:

    a) To introduce an "overall rate of return objective" to ensure that the focus is on the reasonableness of the allowed return on equity – eliminating the silo approach that focused separately on each individual parameter; and

    b) Requiring the regulator to have regard to all relevant approaches and evidence – eliminating the focus on a single model (CAPM) that could be used without having regard to a weight of evidence suggesting that the way the regulator implemented that model produced an estimate of the required return on equity that was implausible in the circumstances.

24. The AEMC rule changes effectively rule out the mechanistic implementation of the CAPM as a method for estimating the required return on equity.

25. In the context of its cost of capital review, the QCA has an opportunity to follow the current direction of regulatory practice in Australia:

    a) The **AEMC** has changed the NER and NGR to require energy network regulators to have regard to all relevant methods, models, data and evidence and to have a primary focus on achieving an estimate of the required return on equity that is reasonable in the circumstances. It has ruled out the previous mechanistic implementation of the CAPM using the current government bond rate and MRP=6%;

[5] IPART (2012), p. 107.
[6] IPART (2012), p. 107.
[7] IPART (2012), p. 107.

b) The **AER** and **ERA** are required to follow the path set out by the AEMC and are currently in the process of consulting with stakeholders and developing guidelines to explain their new approach. The new approach of the AER will undoubtedly have some influence on the practice of the **ACCC**;

c) **IPART** has already departed from the mechanistic CAPM due to their conclusion that it does not produce sensible estimates of the required return on equity in the current market conditions. IPART is also conducting a review to determine how to best estimate the required return on equity going forward; and

d) In its most recent decision, the Independent Competition and Regulatory Commission (**ICRC**) has departed from the mechanistic CAPM and used a range of evidence to determine the allowed return on equity.[8]

26. In summary, Australian regulatory practice has already moved beyond the mechanistic implementation of the CAPM. The QCA has a present opportunity to move in the current direction of regulatory practice in Australia.

27. Whereas a WACC review in the context of the continued mechanistic implementation of the CAPM would be structured with independent work streams for individual parameters, the current approach of other regulators involves widespread consultation on issues about the range of methods, models, data and evidence that is relevant, and the process by which it should all be distilled into an allowed return on equity.

[8] We would not advocate following the specific ICRC approach, but simply note here that the ICRC is another regulator that has already moved beyond the mechanistic CAPM.

2. The current approach of the QCA

Sharpe-Lintner CAPM

28. In every decision of the QCA to date, the estimate of the required return on equity has been based on the Sharpe-Lintner Capital Asset Pricing Model (**CAPM**).

QCA approach for estimating risk-free rate

29. The QCA currently estimates the risk-free rate as the contemporaneous yield on five-year Commonwealth government bonds – that is, the yield at (or close to) the beginning of the regulatory period.

QCA approach for estimating market risk premium

30. The QCA's approach for estimating MRP is based on four estimates:

    a) **Ibbotson**: An historical average of market excess returns (annual observations of the difference between the return on a broad stock market index and the government bond yield);

    b) **Siegel**: An historical average of market excess returns adjusted downwards by approximately 2%[9] "based on the premise that (a) historically, unanticipated inflation artificially reduced the real return on bonds but not the real return on equities, and (b) such unanticipated inflation will not recur in future and real bond yields in the future will be higher than they were in the past;

    c) **Cornell**: A version of the dividend growth model (**DGM**) where the estimate of MRP is derived from dividend yields and expected dividend growth rates; and

    d) **Surveys**: The self-reported views of those "academics, financial analysts and company managers" who respond to surveys.

31. The QCA then takes an equally-weighted average of the four estimates and rounds to the nearest whole per cent. This approach has led the QCA to adopt an MRP estimate of 6% in every one of its determinations to date. The MRP Discussion Paper also indicates that the current QCA approach would continue to produce a value of 6% in the current market conditions. Current QCA estimates are set out in Table 1 below, with the mean of 6.26% being rounded down to 6.00%

[9] That is, an estimate of 6% would be adjusted downwards to an estimate of 4%.

Table 1. Current QCA estimate of MRP

Method	Current estimate
Ibbotson	6.21%
Siegel	4.32%
Cornell	8.70%
Surveys	5.80%
Mean	6.26%
Median	6.00%

Source: MRP Discussion Paper, p. 11.

32. The Ibbotson figure is an estimate of the risk premium that investors have actually received, on average, from the Australian market. Because it is a long-term historical average, it is an estimate of the MRP that investors should expect during average market conditions. Because it is a backward-looking long-term average, it will be very slow to move – every additional year that passes provides only one additional data point. Moreover, any variation in this estimate will be in the wrong direction – during financial crises when financial risk premiums are at their highest, stock prices tend to fall materially, causing a small reduction in the historical average.

33. The Siegel figure is an estimate of the risk premium that investors would have received, on average, from the Australian market, but for the assumed effect of unanticipated inflation on bonds but not stocks. Because it is also a long-term historical average, it too is an estimate of the MRP that investors should expect during average market conditions, if the assumed past effects of unanticipated inflation do not apply in the future. It implies that, in average market conditions, investors should have a forward-looking expectation that the risk premium will be approximately 2% less than what is has been historically. Because it is a long-term average, it too will be very slow to move.

34. The Cornell method uses current market data only. It is an estimate of the market risk premium that equates the present value of expected future dividends with current market prices. Relative to the two previous methods, the Cornell method has the advantage of being forward-looking, but the disadvantage of requiring estimates of another parameter (expected dividend growth). It also has the advantage of increasing (rather than decreasing) during financial crises when risk premiums are undoubtedly at elevated levels.

35. The survey figure is difficult to interpret as it depends on how many surveys are examined, the sample size and response rate, the identity and qualifications of respondents, the particular question asked, and so on. Nevertheless, the survey values the QCA has relied upon have always been very close to 6%. For example, in its 2010 QR Network Decision the QCA used a survey value of exactly 6% and in the MRP Discussion Paper it proposes a value of 5.8%. The survey estimate must remain fixed at least until the publication of a new survey that the QCA considers to be more reliable than the one (or more) that it currently uses. This means that the survey estimate is also likely to be very slow-moving.

36. In summary, the QCA places 25% weight on the historical average, 25% weight on two-thirds of the historical average, 25% weight on the forward-looking Cornell method and 25% weight on survey responses. The historical and survey estimates collectively receive 75% weight and are likely to be very slow-moving over time. The average QCA estimate from these three approaches in the MRP Discussion Paper is 5.4% and the QCA assigns 75% weight to this value. Consequently, the forward-

looking Cornell estimate would need to be higher than 10% for the QCA's mean estimate to exceed 6.5% and not be rounded back down to 6.0%.[10]

37. Moreover, to the extent that the QCA places weight on the median estimate, the current 6% estimate will be even more entrenched. For example, in periods of financial crisis when risk premiums are elevated it will inevitably be the case that the Cornell method (being the only one that is based on current market data) will produce the highest estimate of the MRP and that the Siegel method (which adjusts the historical data downwards) will be the lowest. In this case, the median will, by definition, be the mean of the Ibbotson and survey approaches with the Cornell approach effectively receiving no weight at all.

38. In summary:

    a) Under its current approach, the QCA would only move from its 6% estimate for MRP in circumstances where market data indicated an MRP in excess of 10%. Even in such circumstances, the median is highly likely to remain in the QCA's 6% rounding range. Consequently, it seems highly unlikely that in any market circumstances the current QCA approach would ever produce an estimate other than 6%; and

    b) In every one of its determinations to date, the QCA has adopted an MRP estimate of 6%. Even at the height of the GFC when other regulators had increased their estimates of MRP, the QCA still adopted an estimate of 6% based on its current approach.

39. Consequently, the QCA approach to estimating the required return on equity can be summarised as:

    a) Using the Sharpe Lintner CAPM, with

    b) The risk-free rate estimated as the contemporaneous yield on five-year Commonwealth Government bonds; and

    c) MRP fixed at 6%.

[10] That is, $0.75 \times 5.4\% + 0.25 \times 10.0\% = 6.6\%$.

3. Implications of the current QCA approach

Overview

40. In this section, we set out the relevant requirements of the Queensland Competition Authority Act 1997 and evaluate the outcomes of the current approach for determining the allowed return on equity with the requirements under the Act.

Requirements of QCA Act

41. The Queensland Competition Authority Act 1997 states that in relation to access arrangements, the objective is to:

> promote the economically efficient operation of, use of and investment in, significant infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets.[11]

and that:

> The pricing principles in relation to the price of access to a service are that the price should generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment commensurate with the regulatory and commercial risks involved.[12]

42. In this report, we focus on the allowed return on equity and we summarise the requirements of the QCA Act in testing whether the allowed return is commensurate with the prevailing conditions in the market. If the allowed return is materially less than that which is commensurate with the prevailing conditions in the market, it would not promote the economically efficient investment in infrastructure – as capital would not be provided if the returns on offer were below what is required by investors given the prevailing conditions in the market. Moreover, if the allowed return is materially less than that which is commensurate with the prevailing conditions in the market, it cannot be said to be at least enough to provide a return on investment that is commensurate with the commercial risks involved.

The QCA's current approach

Required return on equity

43. As set out above, the current QCA approach to estimating the required return on equity can be summarised as:

    a) Using the Sharpe Lintner CAPM, with

    b) The risk-free rate estimated as the contemporaneous yield on five-year Commonwealth Government bonds; and

    c) MRP fixed at 6%.

[11] QCA Act, s.69E.
[12] QCA Act, s.168A.

44. Many regulated infrastructure businesses are assigned an equity beta of 0.8 by their regulators, so we use that value for the sake of our examples and illustrations below.

45. These parameter estimates currently combine to produce an allowed return on equity of 7.46% p.a.:

$$r_e = r_f + \beta_e \times MRP$$
$$= 2.66\% + 0.8 \times 6\% = 7.46\%.$$

Required return on debt

46. One useful point of comparison is between the QCA's allowed return on equity and its allowed return on debt in the same firm. The current QCA approach[13] is to set the allowed return on debt as the sum of:

    a) An estimate of the yield to maturity of 10-year BBB+ corporate bonds;[14]

    b) An allowance for the use of interest rate swaps; and

    c) An allowance for debt refinancing costs.

47. The QCA determined the allowed return on debt on the basis of the firm raising 10-year BBB+ debt finance from investors, and then converting that 10-year debt into 5-year debt using a combination of interest rate swaps and credit default swaps. The QCA noted that the regulated business is not *required* to raise and manage its debt finance in this manner, but rather this was the QCA's estimate of an efficient means of raising and managing debt.

48. In the analysis that follows, we make a number of comparisons between the returns that would be available to debt and equity investors in the regulated firm. In this regard, we note that debt investors would receive the yield to maturity, but not the allowance for interest rate swaps or debt refinancing costs. Consequently, our focus is on the yield to maturity of 10-year BBB+ corporate bonds.

49. We note that the Australian Energy Regulator (**AER**) has recently estimated the yield to maturity of 10-year BBB+ corporate bonds to be 6.74%. For the purposes of our comparative analysis, we take this as an estimate of the current return to be paid to debt investors in the regulated firm.

The current QCA approach implies that equity capital is now cheaper than ever before

50. Figure 1 below shows the current allowed return on equity is at its lowest level ever, materially lower than historical allowances. This figure has been constructed by applying the current QCA approach. In particular:

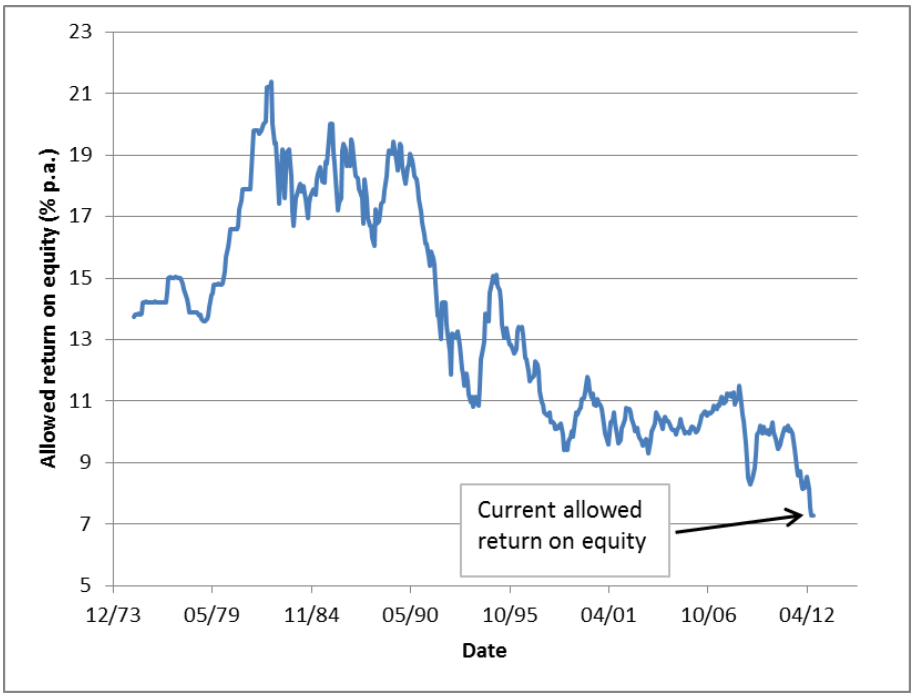
    a) The risk-free rate has been set to the yield on 5-year Commonwealth Government securities;

[13] See the QCA's 2010 QR Network Decision. We note that these values are consistent with the equity beta of 0.8 for the purposes of our comparisons (i.e., The QCA adopted and equity beta of 0.8 and a BBB+ credit rating in that decision).
[14] The QCA disaggregated this into three components – the yield on 5-year government bonds, the difference between the yields on 5-year corporate and government bonds, and the difference between the yields on 10-year and 5-year corporate bonds. The sum of the three components is the yield on 10-year corporate bonds.

b) The market risk premium has been fixed at 6%; and

c) Equity beta has been fixed at 0.8.

Figure 1.Allowed return on equity under the current QCA approach



Source: Reserve Bank of Australia.
Estimates of the return on equity are computed as the return that the QCA would have adopted if it had applied its approach and current parameter estimates to the government bond market data at the time.

51. Figure 1 above implies that equity capital is currently cheaper than at any time since 1975 – that investors are more prepared to make equity investments requiring lower returns than ever before. That is, the current estimate obtained by applying the current QCA approach could only be said to be commensurate with the prevailing conditions in the market for funds if those prevailing conditions were such that equity capital really was now cheaper than at any time since records have been kept.

Is equity capital really cheaper than ever before?

52. The application of the current QCA approach implies that equity capital is now cheaper than ever before. This allowed return would only be commensurate with the prevailing conditions in the market for funds if market investors really were requiring lower returns on equity capital than ever before. But any reasonable analysis would conclude that they are not.

53. For example, Zenner and Junac (2012) note that US government bond yields are currently low, but conclude that the cost of equity is now relatively high – and certainly not the lowest on record:

> So even with a relatively low Treasury rate, the currently high equity risk premium leads to a cost of equity higher than it has been historically. The cost of equity has been lower

> almost 68% of the time, primarily driven by a market risk premium that has been lower 97% of the time.[15]

54. Zenner and Junac (2012) reach this conclusion by comparing, over time, a number of relatively simple methods for estimating the prevailing cost of equity and the prevailing equity risk premium. They do not suggest that these methods produce accurate or definitive point estimates of either. Rather, they compare current values with historical values to determine whether the current cost of equity and the current equity risk premium are likely to be high or low relative to historical levels. Their conclusion is that:

> The debt risk premia (i.e., credit spreads) for both investment grade and high yield debt remain elevated relative to history. More strikingly, the equity risk premia, however estimated, have rarely been this high.[16]

55. They go on to conclude that the MRP is currently higher than in 97% of their sample period – the record highs in MRP more than counteract the record lows in government bond yields.

56. Although the Zenner and Junac analysis relates to the US market, we note that the relevant conditions are the same in the Australian financial markets – government bond yields are at historical lows and corporate debt spreads remain at elevated levels.

57. Of course this is just one example of an analysis that leads to the conclusion that equity capital in the market for funds is not cheaper than ever before, and we consider a further range of evidence below. Our point here is simply that no reasonable analysis would conclude that equity capital is now cheaper than ever before. Yet that is the inevitable conclusion from the current QCA approach.

58. In our view, it is reasonable to conclude that required returns on equity in the Australian market are *not* currently lower than at any time on the historical record. That is, the current QCA approach may have produced estimates of the required return on equity that were plausible in other market conditions, but the outputs are implausible in the current market conditions (as explained further below). Moreover, we also show below that Australian regulatory practice is moving away from the current QCA approach. This provides the QCA with an ideal opportunity to revise its approach for estimating the required return on equity to an approach that is consistent with Australian regulatory developments, and which provides reasonable estimates in a range of market conditions.

Under the current approach, regulatory estimates of debt and equity risk premiums are inconsistent

59. Figure 2 below shows:

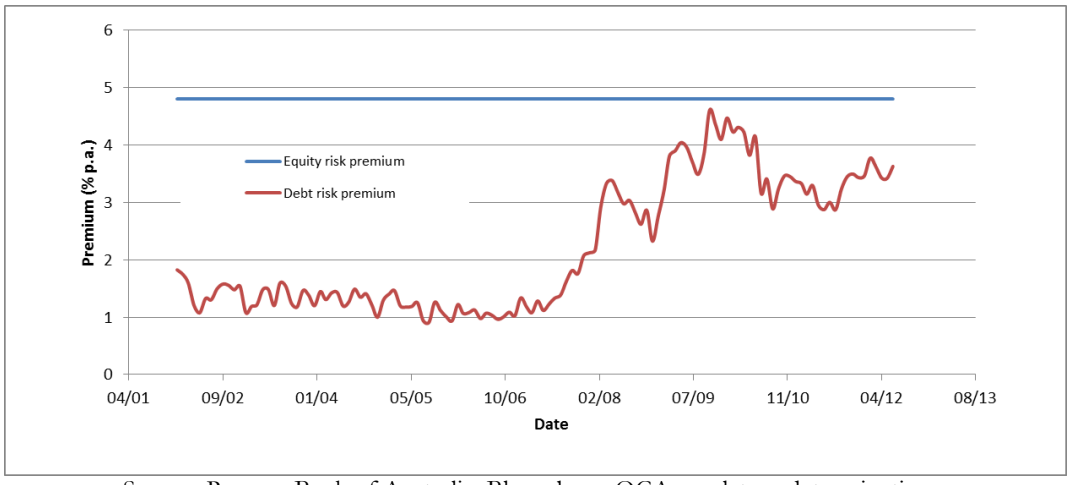
    a) The allowed regulatory equity risk premium (computed as set out in Paragraph 50 above); and

    b) An estimate of debt risk premium computed as the difference between the 10-year government bond rate and the 10-year Bloomberg BBB fair value rate, where the Bloomberg

[15] Zenner and Junac (2012), p. 3.
[16] Zenner and Junac (2012), p. 3.

fair value curve has been extrapolated as required on the basis of the Bloomberg AAA fair value curve).[17]

Figure 2.Allowed risk premiums on equity and debt under QCA approach and parameter estimates



Source: Reserve Bank of Australia, Bloomberg, QCA regulatory determinations.
Estimates are computed as the risk premiums that the QCA would have adopted if it had applied its approach to the relevant market data at the time.

60. Figure 2 shows that the debt risk premium has increased materially since 2008. Prior to 2008, the DRP largely varied within the range of 1-2%, with some observations below 1%. In recent years, the DRP has generally varied within the range of 3-4%, with some observations above 4%. That is, the DRP is 3-4 times greater than what it was prior to 2008.

61. By contrast, the QCA's estimates of the premium that investors in the benchmark firm would require for bearing equity risk has not increased at all over the same period.

62. It is unlikely that there could be any circumstances whereby debt investors would be requiring materially higher risk premiums, but equity investors would be requiring lower risk premiums. These are the same investors in the same market for funds. It is illogical to expect that they would require risk premiums several times higher when buying debt securities, but then require lower risk premiums when buying equity securities. McKenzie and Partington (2011) provide similar advice to the AER:

> Similar to the equity premium, bond spreads also have fundamental determinants and the directional relationships are likely to be such that spreads and risk premiums are positively correlated. Given these commonalities, it is possible that the equity market risk premium might be related to the corporate bond spread, Damodoran (2011) finds that while a relationship clearly exists, the noise in the ratios is too high for any useful rule to be developed. He does argue that there is enough of a relationship however, that this approach may be useful to test to see whether the equity risk premiums make sense, given how risky assets are being priced in other markets.[18]

[17] We use this extrapolation method as a close approximation of the paired bonds method to illustrate the relative movements in the regulatory DRP over time.
[18] McKenzie and Partington (2011), Paragraph 106.

63. That is, even if it is not possible to construct a precise mathematical link between debt and equity risk premiums, information about debt risk premiums (which are more directly observable) can be used to "see whether the equity risk premiums make sense."

64. Finally, we note that debt risk premiums are effectively observable whereas equity risk premiums are compiled from assumptions and estimates of economic models. Consequently, it is the debt risk premium that provides the more direct and objective evidence about the prevailing conditions in the market for funds. Figure 2 above shows that the prevailing conditions in the market for funds require higher risk premiums. In this case, a reduction in the assumed equity risk premium is not commensurate with the prevailing conditions in the market for funds.

65. To put this into perspective, and consistent with Figure 2 above, prior to the GFC the regulatory premium for taking on equity risk was approximately 500 basis points higher than the regulatory premium for debt risk.[19] The QCA approach would currently imply that the premium for taking on equity risk is now approximately 100 basis points.[20] In our view, the suggestion that the premium for equity risk has fallen to this extent is implausible.

The return on equity is below the return on debt for some investors[21]

Return net of imputation credits

66. Under the QCA's regulatory model, the CAPM estimate of the required return on equity includes the assumed value of dividend imputation franking credits. The proportion of the total return that is assumed to come in the form of imputation credits is:

$$\frac{\gamma T}{1-T(1-\gamma)},$$

where T is the relevant corporate tax rate and γ represents the extent to which dividend imputation is assumed to affect the cost of equity capital.

67. It then follows that the proportion of the return from sources other than imputation credits (i.e., from dividends and capital gains) is:[22]

$$\frac{1-T}{1-T(1-\gamma)}.$$

68. Using the values for γ and T from the QCA's 2010 QRN Decision, for example, the return to equity holders from dividends and capital gains is:

[19] With an equity beta of 1.0 and MRP of 6%, the premium for equity risk is 6%. Prior to the GFC the DRP was in the order of 1%.
[20] With an equity beta of 0.8 and MRP of 6%, the premium for equity risk is 4.8%, to be compared with a current DRP of 3.67%.
[21] This section introduces other WACC parameters into the comparison. Later in this report we submit that all parameters should be considered holistically with a focus on the final outcome, rather than a siloed independent focus on individual parameters. This section is an example of why a holistic approach, rather than a siloed approach should be adopted.
[22] This adjustment factor is derived in Officer (1994) and is common across the Australian regulatory framework. For example, Appendix 1 shows that this exact adjustment to the required return on equity is embedded within the National Electricity Rules and the AER's post-tax revenue model.

$$r_e\left[\frac{1-T}{1-T(1-\gamma)}\right]=7.46\%\left[\frac{1-0.3}{1-0.3(1-0.5)}\right]=6.14\%.$$

Return available to non-resident investors

69. It is generally agreed that non-resident investors receive no benefit from Australian imputation tax credits. Consequently, that class of investors receives an expected return on equity of only 6.14% from the benchmark firm. By contrast those same investors can receive a fixed rate of return of 6.74% from investment grade debt in the same benchmark firm.

70. Debt holders in the benchmark firm receive a fixed rate of return. They will receive a fixed return of exactly 6.74% p.a., so long as the firm is able to remain solvent. At this stage, we note that:

    a) The QCA assumes that the regulated firm has a strong investment grade credit rating; and

    b) Although debt holders have provided only 55% of the benchmark firm's finance, they are entitled to first-ranking claim over 100% of the firm's cash flows.

    For these reasons, we consider it reasonable to assume that debt investors would invest in the benchmark firm reasonably expecting to receive the fixed return of 6.74%. This applies to resident and non-resident investors alike.

71. Those same non-resident investors also have the opportunity of investing in equity in the benchmark firm. An equity investment is clearly much riskier than a fixed rate investment grade loan. Lenders have the first claim over all of the firm's cash flows and assets. Equity investors have the last-ranking residual claim – whatever is left after debt holders are paid in full. A materially greater risk requires a materially greater expected return.

72. However, under the QCA's current approach, non-resident investors would be allowed a (risky) expected return of 6.14% on their equity investment. That is, the QCA's 2010 approach implies that a material number of investors will invest in residual equity in the benchmark firm for a lower return than they could receive on first-ranking investment grade debt in the same firm. In our view, this is neither reasonable nor plausible.

The current QCA approach produces estimates that are inconsistent with assumed capital structure

73. By way of example, the QCA adopted an asset beta estimate of 0.45 in its 2010 Rail Decision. This represents the QCA's estimate of the systematic risk facing equity holders if the firm was financed entirely by equity. The QCA's estimate then implies that, if the firm was financed entirely by equity, shareholders would currently require a total return of:

$$\begin{aligned} r_e &= r_f + \beta_e \times MRP \\ &= 2.66\% + 0.45 \times 6\% = 5.36\%. \end{aligned}$$

74. This also represents an estimate of the WACC, as it would be if the firm was currently financed entirely by equity. But this estimate of WACC is materially below the QCA's estimate of WACC based on the QCA's assumed efficient financing structure. That is, according to the QCA's estimates, the regulated firm's cost of capital could be materially reduced if it employed 100% equity financing.

75. That is, the current QCA approach suggests that the regulated firm could materially reduce its cost of capital by removing all debt financing. This is another feature to support the notion that the current approach should be revised.

4. Ibbotson historical mean excess returns

76. There is broad agreement that when using historical excess returns data to estimate MRP a long data series is required to obtain statistically reliable results. This consideration, together with considerations of data quality, has led to analysis focusing on the period from 1958 – slightly more than 50 years of annual data. An analysis of long-run historical data produces (indeed, is only capable of producing) an estimate of the long-run average level of the MRP.

77. There is also broad agreement that the risk premiums that equity investors require vary over time. That is, the MRP is not constant, but varies over time. In some conditions in the market for funds, investors will require a higher premium for bearing equity risk, and in other conditions in the market for funds they will require a lower premium for bearing equity risk. Similarly, the debt risk premium changes over time as conditions in the market for funds change. For example, McKenzie and Partington (2011) have recently advised the AER that:

> the market risk premium has fundamental determinants (whatever they may be) and these may change over time, in which case the market risk premium changes.[23]

78. The use of CAPM parameter estimates that are conditional on the relevant information that is available at the time (i.e., conditional on the prevailing conditions in the market for funds) is also consistent with the framework adopted by the AER. In a recent report for the AER, Davis (2011) concludes that:

> The AER approach could, I suggest, be viewed as an "implicit conditional CAPM" approach in which there is regular review of beta, the risk free rate and the MRP.[24]

and

> there is some support for a "conditional" CAPM in which forward looking expected returns depend on some stochastic factor(s) additional to the expected Market Risk Premium (which itself may be variable).[25]

79. The AER accepts this interpretation of the framework it uses to estimate the required return on equity:

> As noted by Professor Davis, the AER is using an 'implicit conditional CAPM' approach.[26]

80. Within this framework, there is a long-run unconditional mean estimate of MRP and a conditional mean estimate that varies above and below the long-run unconditional mean over time. The conditional estimate is based on (statistically speaking, it is "conditional" on) all relevant information that is available at the time.

[23] McKenzie and Partington (2011), Paragraph 5.
[24] Davis (2011, p. 9).
[25] Davis (2011, p. 11).
[26] Envestra Queensland Gas Network, Final Decision, June 2011, Appendix B, p. 41.

81. The fact that the AER increased its estimate of MRP to 6.5% in its last WACC Review is further support for the notion that there is broad agreement that the risk premiums that equity investors require vary over time – that is, that the estimate of MRP that is commensurate with the prevailing conditions in the market for funds changes over time as the conditions in the market change.

82. In its MRP Discussion Paper, the QCA notes that the MRP is "forward-looking"[27] and may vary over time so that it would be conceptually incorrect to ex-ante fix the estimate of MRP at a constant 6%.[28]

83. The mean of historical excess returns is only capable of providing an estimate of the long-run average level of the MRP – commensurate with the average conditions in the market over the historical period. It is not capable of providing a contemporaneous estimate of the MRP that is commensurate with the prevailing conditions in the market. The best illustration of this point comes from the AER's last WACC Review. During 2008 and early 2009, global stock markets plummeted. Adding the large negative returns from this period to the existing sample of historical excess returns causes the mean to fall. But in such market conditions, risk premiums are higher, not lower. Indeed a primary cause of the stock price declines was an increase in risk premiums. The AER recognised this point in its WACC Review and increased its estimate of MRP even though the mean of historical excess returns had fallen.

84. The QCA also noted this point in its 2010 Decision for QRN. In particular, the QCA noted that the dramatic falls in stock prices would have actually led to the historical average estimate of MRP being lower, at a time when risk premiums in financial markets were clearly not lower.[29]

85. In general, the mean of historical excess returns moves in the opposite direction to the risk premiums that are commensurate with the prevailing conditions in the market for funds. When risk premiums rise, stock prices fall and the historical mean falls, and when risk premiums fall, stock prices rise and the historical mean rises. Consequently, the mean of historical excess returns does not provide an estimate of MRP that is commensurate with the prevailing conditions in the market for funds, but rather one that is commensurate with the average conditions in the market over the historical period.

[27] QCA MRP Discussion Paper, p. 9.
[28] QCA MRP Discussion Paper, p. 16.
[29] QRN 2010 Draft Decision, p. 41.

5. Siegel adjustment to historical average

Implementation and effect of Siegel approach

86. In its MRP Discussion Paper, the QCA explains that the Siegel approach is based on the hypothesis that, in the historical sample period prior to 1990, inflation turned out to be higher than expected, and that this caused real returns on government bonds to be lower than they would otherwise have been. The Siegel approach is also based on the further hypothesis that the low real yields on government bonds that were observed in the historical data will not be again observed in the future. In particular, the QCA parameterises the Siegel approach as:

$$MRP_S = MRP_I + \left(\overline{r_r} - r_r^e\right)$$

where $\overline{r_r}$ is the long-run historical real risk-free rate and r_r^e is the expected future real risk-free rate.[30] That is, the historical average MRP estimate is adjusted by the extent to which the future real risk-free rate is expected to be higher than the historical real risk-free rate.

87. The MRP Discussion Paper further explains that it uses an estimate of the future real risk-free rate of 4% p.a. from Lally (2004a). The QCA's average historical estimate of the real risk-free rate is approximately 2% (depending on when the estimate was taken), so the Siegel approach essentially reduces the historical estimate of MRP by 2%. Since the historical average and the Siegel approach are each given a 50% weighting in the final MRP estimate, the net effect is that 50% of the QCA's estimate of MRP is based on the historical average minus one per cent.[31]

Issues to consider with the Siegel approach

The "it'll be different this time" argument

88. The Siegel approach is based on the notion that real government bond yields will be higher in the future than they have been in the past. But there are many features of past stock returns that some would argue are likely to be different in the future. For example, some have argued that technological advances are likely to be slower in future than they have been in the past. Others have argued that financial crises are likely to be more frequent in the future due to spill-overs between integrated capital markets. There are many "it'll be different this time" arguments that one could consider. It is not clear why unexpected inflation is the only one that the QCA considers and why it receives so much weight in the MRP estimate. The whole reason for using a long-term historical average is that there are some surprises that cause stock prices to go up and others that cause stock prices to go down. Over a long period these surprises average out. Once the process of making ex-post adjustments to historical averages for events or phenomena that we don't think will occur again, it is difficult to know when to draw the line. In our view, it is generally better to use historical data as it is, rather than an estimate of what it would have been if a particular event or phenomena had not occurred.

[30] QCA MRP Discussion Paper, p. 22, Equation 11.

[31] That is, 25% weight applied to the historical average and 25% weight applied to the historical average less 2% is equivalent to 50% weight applied to the historical average less 1%.

It hasn't been different so far

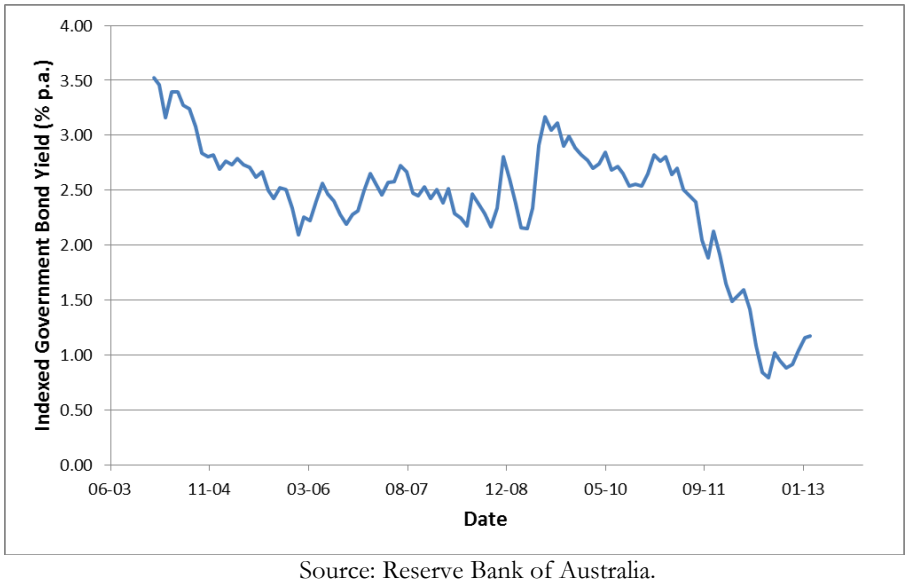
89. Siegel's prediction in the early 1990's that future real risk-free rates would be materially higher in the future has turned out to be spectacularly wrong. By way of example, the Economic Regulation Authority of Western Australia (**ERA**) recently had to find a new way of estimating the real risk-free rate because its existing method produced a *negative* estimate. In its Western Power Final Decision, the ERA stated:

> The Authority notes the real risk free rate derived by using Fisher's equation is negative when the nominal risk free rate is estimated using linear extrapolation from 5-year CGS observed yields and the expected inflation rate is estimated using the geometric mean of the RBA's inflation forecasts.[32]

90. That is, the ERA's approach of estimating the real risk-free rate from nominal government bonds and RBA inflation forecasts produced a negative estimate of the real risk-free rate. The ERA then turned to the yield on inflation indexed government bonds as an alternative estimate.

91. The QCA appears to still be using an estimate of 4% for the current forward-looking real risk free rate based on Lally (2004). That estimate was provided during the middle of one of the longest and largest stock market rallies of all time. Real rates since that time (at least as estimated using the yield on inflation-indexed government bonds) have never approached the predicted value of 4% and are currently approximately one quarter of that figure, as set out in Figure 3 below.

Figure 3. Real risk-free rates



Source: Reserve Bank of Australia.

Updated estimates should be used

92. If the Siegel approach is to be used, current data should be used. The yield on inflation-indexed government bonds indicates that the current forward-looking real risk-free rate is approximately 1%.

[32] ERA, Western Power Final Decision, Paragraph 1414.

If this figure is used in place of the Lally estimate of 4% from 10 years ago, the Siegel adjustment would be to increase the historical average by approximately 1% (being the difference between the historical estimate of 2% and the current estimate of 1%). Such an approach would have the advantage of increasing the historical estimate during recessions and financial crises and decreasing it during expansions – in line with the actual movement in risk premiums.

No one else uses the Siegel approach

93. The final issue to be considered in relation to the Siegel approach is that no one else uses it. No other Australian regulators use the Siegel approach. Moreover, the respondents to the Fernandez (2011) survey (which the QCA proposes to use as the basis for its survey estimate of MRP) were also asked to identify books or articles that they use to support their estimate. On this question, less than half of one per cent indicated that their estimate was informed in some way by the Siegel approach.

6. Dividend growth models

QCA approach

94. In its 2010 Draft Decision for QRN,[33] the QCA examined two versions of the dividend growth model – the Cornell method and the discounted dividends model. The QCA provided more detail on these two models in the 2009 Draft Decision for QRN:

> *Cornell method* – forward-looking approach where short term forecasts of the growth rate in earnings per share converge upon the forecast long-run GDP growth rate over time;
>
> *discounted dividends model* – forward-looking approach where expected growth rates in earnings per share for all future years are assumed to be equal and convergence is immediate.[34]

95. In its 2010 Draft Decision, the QCA referenced its 2009 Draft Decision and used the same estimates of MRP from the Cornell method and the discounted dividends model. The QCA's practice had been to place more weight on the Cornell method and in its MRP Discussion Paper it refers exclusively to the Cornell method.

Recent estimates

96. In its recent Draft Decisions for Victorian Gas Businesses, the AER reviewed a range of dividend growth model estimates and concluded that:

> The AER notes DGM analysis is producing high positive MRP estimates.[35]

97. A number of commercial market practitioners have also reached the conclusion that DGM-type methods are currently pointing toward materially higher than average required returns on equity. As noted above, Zenner and Junac (2012) conclude that:

> the equity risk premia, however estimated, have rarely been this high.[36]

and that:

> even with a relatively low Treasury rate, the currently high equity risk premium leads to a cost of equity higher than it has been historically. The cost of equity has been lower almost 68% of the time, primarily driven by a market risk premium that has been lower 97% of the time.[37]

98. Nelson, Ferrarone and McGuire (2012) use a multi-stage DGM (similar to the Cornell method) to estimate the implied market risk premium. Their methodology is summarised in Appendix 2. They

[33] QRN 2010 Draft Decision, p. 41.
[34] QRN 2009 Draft Decision, p. 14.
[35] Envestra Draft Decision, Appendix B, p. 39.
[36] Zenner and Junac (2012), p. 3.
[37] Zenner and Junac (2012), p. 3.

report a current MRP estimate for the Australian market of approximately 7.5%. This estimate does not include any assumed value of dividend imputation tax credits. If gamma is set to 0.5 as in the QCA's 2010 QRN Decision, the total implied required return on equity for the average firm (equity beta of 1.0) is approximately 11.5%, with an implied MRP (including imputation credits) of approximately 8.5%.[38]

Response to Discussion Paper

QCA consideration of dividend growth model evidence

99. We note that the QCA gives 25% weight to the Cornell method in determining its estimate of MRP. The QCA also notes that this is consistent with the advice that it has received from its consultant Lally (2011), who recommends that some form of dividend growth model should be considered as part of a range of evidence when estimating MRP.[39]

100. Although the QCA performs an estimate of MRP using the Cornell method, and those estimates vary across different market conditions, the outcome is that the QCA has set the MRP to 6% in every determination it has made. That is, under the current QCA approach, the estimate of MRP will inevitably be 6% regardless of the estimate from the Cornell method.

101. Despite this, the Discussion Paper sets out the QCA's view that it does not adopt a long-term MRP of 6%, but rather that it also considers forward-looking evidence:

> Dr Lally also rejects CEG's third claim, specifically that the general practice of Australian regulators is to estimate a long term market risk premium (of 6.0%). Dr Lally observes that the AER and QCA both estimate a market risk premium that reflects both current and long term factors. For example, the Authority applies two methods that involve long term historical data but two other methods that are forward-looking. As a result, CEG's claim in this respect is significantly less relevant for the AER and QCA than for regulators who estimate a strictly long term market risk premium (Lally, 2012b: 12).

102. This view is difficult to reconcile with the fact that, in practice, the QCA had set MRP to 6% in all of its determinations to date – even when other Australian regulators are adopting different values. This may give risk to a semantic debate about whether or not the QCA really has "had regard to" the evidence from dividend growth models, but the more important question is whether the current QCA approach of applying an *effectively* fixed MRP of 6% to the contemporaneous government bond yield is appropriate.

Use of firm-level dividend growth model

103. The MRP Discussion Paper also considers the application of the dividend growth model to individual firms to obtain a direct estimate of the required return on equity for a particular firm, or set of firms. Specifically, the firm-level DGM could be applied to the same set of comparable firms that the QCA uses to estimate beta, gearing and credit rating – to obtain a direct estimate of the required return on

[38] Assuming a risk-free rate of approximately 3% and MRP of approximately 7.5%, the required return on equity for the average firm is 10.5%. Grossing up for the assumed value of imputation credits gives: $10.5\%\left[\frac{1-0.3(1-0.5)}{1-0.3}\right]=11.5\%$ which implies a grossed-up MRP of 8.5%.

[39] QCA MRP Discussion Paper, p. 17.

equity for those firms. The Discussion Paper provides three reasons for rejecting that approach, on the basis of advice from Lally (2011):

a) Unreliable set of comparable firms: There are likely to be relatively few Australian exchange-listed infrastructure firms that are comparable to the firm being regulated. The reliability of any estimate is a concern when the sample size is small;

b) Market inefficiency: The Discussion Paper argues that the DGM "assumes that the current share price of the firm matches the present value of future dividends per share. As a result, if that price is actually less (greater) than the present value of future dividends, then the resulting cost of equity estimate will be too high (low)."[40] That is, if observed market prices are systematically biased relative to fair value, they should not be used; and

c) Corporate manipulation: The Discussion Paper argues that under the firm-level DGM "the regulated firm has an incentive to manipulate its retention rate to increase its cost of equity."[41] That is, regulated firms may replace their efficient dividend payout policies with a different policy that is designed to trick the regulator into allowing them a higher return on equity.

104. The first of these reasons is legitimate – the available sample of Australian firms is inevitably small. We agree with the QCA that a very small sample may provide unreliable results. For this reason, we would advocate that regard should be had to all relevant data rather than confining the data that can be examined to a very small sample. Of course, it is the same set of firms that is available when estimating equity beta and gearing. It would be difficult to explain how a particular sample could produce a reliable estimate of beta but could not produce any relevant information about the required return on equity.

105. The second reason is based on market inefficiency – the possibility that observed market prices may be systematically above or below their true values. There are two problems with this contention:

a) The QCA only states that there would be an issue "if" market prices are systematically biased. No evidence has been presented to suggest that prices *are* systematically biased or about the direction of the bias; and

b) The same point would apply to *all* market prices. For example, the risk-free rate would be underestimated if government bond prices were actually less than the present value of future coupon payments.

106. The third reason is that regulated firms would alter their dividend payout policies in order to trick the regulator into allowing them a higher return on equity. It is an extraordinary proposition that officers and directors of a public corporate would deliberately employ a sub-optimal dividend payout policy in an attempt to trick their regulator into allowing them unreasonably high returns. As a general rule, the design of regulatory approaches should not be based on what might happen as a fanciful theoretical possibility.

107. In summary, our view is that the regulator should have regard to all relevant models, methods, data and evidence. We consider that the dividend growth model applied to comparable firms is relevant information and that the QCA should have regard to it in determining the allowed return on equity.

[40] QCA MRP Discussion Paper, p. 17.
[41] QCA MRP Discussion Paper, p. 17.

7. The use of survey responses

Overview

108. There have been a number of regulatory developments on the appropriate use of survey data in the last two years. The use of survey data has been the subject of merits review before the Australian Competition Tribunal and has also featured prominently in the AER's recent Draft Decisions for Victorian gas businesses.

Current AER use of survey responses

109. In its recent Draft Decisions, the AER concludes that:

> Survey evidence reflects the forward looking MRP when applied in practice. It is subject to limitations, such as the uncertainty on imputation credit adjustment. However, based on its own review and the advice from McKenzie and Partington, the AER considers survey based estimates of the MRP are relevant to inform the forward looking MRP. In this decision, it considered a range of survey evidence conducted in different time periods and targeted at different respondents. The evidence supported a forward looking MRP of 6 per cent as the best estimate in the current circumstances.[42]

110. The AER sought advice on this issue from McKenzie and Partington (2011, 2012) who conclude that survey evidence suffers from "potential problems."[43] The problems with survey data include:

a) the wording of the survey questions is unclear – it is generally not known precisely what respondents were asked to provide;

b) the surveys typically do not explain how those surveyed were chosen;

c) a majority of those surveyed did not respond;

d) it is unclear what incentives were provided to ensure respondents would provide accurate responses, or whether respondents face incentives to provide self-serving responses;

e) whether respondents supplied MRP estimates that use continuously compounded or not continuously compounded returns is unclear;

f) the risk-free rate that respondents use is unclear;

g) whether the respondents supplied MRP estimates that include the assumed effect of dividend imputation tax credits is not made explicit;

h) the relevance of some of the surveys is unclear given changes in market conditions since the surveys were conducted.

111. McKenzie and Partington (2012) conclude that:

> Despite the potential problems, we give significant weight to the survey evidence.[44]

[42] Envestra Draft Decision, Appendix B, p. 34.
[43] McKenzie and Partington (2012), p. 19.

QCA recognition of the problems with survey data

112. In its MRP Discussion Paper, the QCA also properly recognises a number of problems with the use of survey data:

> The weaknesses of survey estimates are that they are sensitive to recent equity price movements. The implication is that the estimates tend to reflect the immediate past rather than the future, which is the opposite of the expectation being sought. Survey estimates are also sensitive to the way in which the survey questions are asked (i.e. 'framing bias'). Finally, survey estimates are sample-dependent. For example, surveys of academics tend to provide lower estimates than surveys of investors (Damodaran, 2012: 18).[45]

Recent guidance from the Tribunal: Requirements that must be met for survey responses to be used

113. The Tribunal has recently had regard to the use of qualitative evidence such as survey responses. In relation to surveys, the Tribunal noted that the survey evidence on which the regulator (the AER in that case) had sought to rely has been criticised for not providing a sufficient real world context to give the survey results any real meaning and concluded that:

> Surveys must be treated with great caution when being used in this context. Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.
>
> When presented with survey evidence that contains a high number of non-respondents as well as a small number of respondents in the desired categories of expertise, it is dangerous for the AER to place any determinative weight on the results.[46]

114. In essence, the Tribunal requires that three conditions must be met for survey responses to be given any material consideration:

    a) The survey must be timely – there must have been no change in the prevailing conditions in the market for funds since the survey was administered;

    b) There must be clarity about precisely what respondents were asked so that there is no ambiguity about how to interpret their responses; and

    c) The survey must reflect the views of the market and not a sample that is small, unresponsive, or without sufficient expertise.

115. None of these requirements are met by the survey responses on which the QCA has previously relied:

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[44] McKenzie and Partington (2012), p. 19.
[45] MRP Discussion Paper, p. 24.
[46] Application by Envestra Ltd (No 2), ACompT 3, Paragraphs 162-163.

a) Timeliness – the key feature of the prevailing conditions in the market for funds is the historically low government bond yield. The yield on 10-year government bonds is currently below 3%. Any surveys that were administered in materially different market conditions cannot provide any estimate of the MRP that is commensurate with the prevailing conditions in the market for funds;

b) Clarity – survey responses in relation to MRP are notoriously vague and ambiguous. On this measure, survey responses could only be considered if:

   i) Respondents were asked about what they actually do, not if they were asked to predict the future;

   ii) Respondents were also asked what estimate they used for the risk-free rate (one possible practice being to maintain a constant long-run average estimate of MRP and to match it with a long-run average estimate of the risk-free rate, such as was adopted by the Tribunal in the Energy Australia Case[47]);

   iii) Respondents were also asked whether they made any other adjustments to reflect current market conditions (one possible practice being to select a WACC value from near the top of a reasonable range, such as was adopted by IPART in the NSW Retail Electricity Price Review, 2012);

   iv) Respondents were also asked to set out the time horizon for which their response applies. To the extent that the AER is of the view that different MRP estimates apply to different time horizons, only survey responses that relate to the 10-year time horizon that is adopted by the AER would be relevant; and

   v) Respondents were also asked to specify whether their estimate of MRP was to be used in the CAPM to produce an estimate of the total required return, which would then be multiplied by $\frac{1-T}{1-T(1-\gamma)} = \frac{1-0.3}{1-0.3(1-0.25)} = 0.90$ when estimating the firm's cost of capital, consistent with the regulatory approach.

Only if all of these requirements are met will the survey response be consistent with the QCA's definition and use of MRP.

c) Sample – the Tribunal requires that the weight applied to survey data must reflect the non-response rate and the expertise of the sample respondents.

116. In its MRP Discussion Paper, the QCA relies on a single survey – the unpublished working paper of Fernandez et. al. (2011). That paper posed a single question to potential respondents on the value of MRP: "The market risk premium that I am using in 2011 for my country is X%?" The respondents were not asked what they were using the market risk premium for, how they were using it, or what values they were using for any other parameters. For example, some of the survey responses were analysts for stockbroking firms. They may be using an MRP number to assist them in making a case that their clients should buy shares in a particular firm. Many of the responses were from university lecturers who may be using an MRP number in their class examples, and so on.

[47] ACompT 8 (2009).

117. Moreover, the survey was administered in March 2011 when the yield on 10-year Commonwealth Government bonds was 5.5%. At the time of the MRP Discussion Paper, the yield had fallen to 2.95%. It is entirely possible that some of the survey respondents use a long-run historical MRP estimate together with a long-run historical estimate of the risk-free rate. It is also entirely possible that the MRP that respondents were using in a market where government bond yields are 5.5% is materially different from the estimate that would be used in a market where government bond yields are 2.95%.

118. The Fernandez et. al. (2011) survey has only 40 responses in relation to the Australian market – 15 academics, 21 broker analysts, and 4 corporate managers. Their responses ranged from 3% to 14%.

119. In summary, the Fernandez et. al. (2011) survey is:

    a) Not timely, in that respondents were surveyed in market conditions that were materially different from those at the time of the MRP Discussion Paper;

    b) Unclear, in that there is no information about what the respondents used the MRP estimate for, how they used it, or how its value might be related to other parameters such as the risk-free rate; and

    c) Unrepresentative, in that there were only 40 respondents and no information about the non-response rate.

120. It is difficult to imagine that any survey could fare worse against the criteria set out by the Tribunal.

Adjustment for imputation credits

121. Under the Australian regulatory approach, the estimate of MRP must reflect the assumed value of imputation credits. Surveys rarely include information about whether MRP estimates have been adjusted to reflect an assumed value of franking credits. Even rarer is information about precisely what adjustment (if any) has been made. On this issue, McKenzie and Partington (2012) conclude that:

> Given that we don't really know whether survey responses do, or do not, allow for imputation credits and given that any adjustment for imputation would likely lie within the margin of measurement error, it seems best to take the survey evidence at face value, but tempered by the uncertainty about whether an imputation adjustment is needed.[48]

122. The overwhelming weight of evidence is that market practitioners make no adjustment for imputation credits. The AER has recently stated that:

> The AER agrees that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits.[49]

123. In summary, we require an estimate of MRP that includes the regulator's assumed value of imputation credits. There is "clear evidence" that market practitioners make no such adjustment. Consequently an adjustment is required. The required adjustment is not complicated and does not

[48] McKenzie and Partington (2012), p. 18.
[49] WACC Review Final Decision, p. 407.

have to be estimated – it is a mechanical function of the regulator's parameter estimates. Indeed, in a report for the AER, Handley (2008) demonstrates that an estimate of the required return that does not reflect the assumed value of imputation credits (r_e^*) can be simply converted into one that does reflect the assumed value of imputation credits (r_e) by applying an adjustment factor as follows:

$$r_e^* = r_e\left[\frac{1-T}{1-T(1-\gamma)}\right].$$

124. In summary, an adjustment should be made and Handley (2008) has set out precisely how to do it. There is "clear evidence" that survey respondents make no adjustment for imputation credits, in which case the adjustment set out by Handley (2008) must be applied to avoid an apples-with-oranges comparison.

125. Moreover, even if a small number of survey respondents did indicate that they had made an adjustment in relation to imputation credits, it is highly unlikely that any would have assumed precisely the same value for gamma as the QCA proposes to use. Consequently, an adjustment would still have to be made to avoid an apples-with-oranges comparison.

Conclusions in relation to survey data

126. In our view, the best information about the prevailing conditions in the market for funds comes from traded prices drawn from the market for funds, rather than from survey responses. We note that this view is consistent with the recent directions from the Tribunal.

8. Regulatory recognition of the relationship between risk-free rates and market risk premium

NSW retail electricity prices

127. In its recent Review of Retail Electricity Prices, IPART noted that stakeholders submitted:

> that there is a negative relationship between the risk free rate and the MRP. In periods of high investor risk aversion, there is a flight from risky assets to safe assets, or a 'flight to quality'. This tends to push up the price and pushdown the yields on safe assets. For this reason, falling risk free rates tend to be associated with rising investor risk premiums (and vice versa). The use of the short term measure of the risk free rate and the long term MRP have resulted in a situation where the reduced yield on the risk free rate has been reflected in the WACC, but the corresponding increase in the MRP has not.[50]

128. After considering this issue, IPART concluded that:

> We note that there may be an inconsistency between using short term data for the risk free rate and using long term data for the MRP. As stakeholders have noted, there may be an inversely proportional relationship between the MRP and the risk free rate.[51]

and that:

> In the current market circumstances, there is some evidence to support the view that expectations for the MRP have risen as bond yields have fallen.[52]

and further that:

> we recognised that there may be a discrepancy between the use of short term yields on the risk free rate and long term averages for the MRP, particularly in the current market.[53]

Tribunal precedent

129. IPART further noted that the Australian Competition Tribunal has also previously recognised that a contemporaneous estimate of the risk-free rate would be consistent with a contemporaneous estimate of MRP (one that is commensurate with the prevailing conditions in the market for funds) and would be inconsistent with a long-run average estimate of MRP (which would be consistent with the average conditions in the market for funds over a long historical period):

> We note that the ACT varied the AER's final determination because "the Tribunal considers that an averaging period during which interest rates were at historically low levels is unlikely to produce a rate of return appropriate for the regulatory period."[54]

[50] IPART (2012), p. 104.
[51] IPART (2012), p. 107.
[52] IPART (2012), p. 107.
[53] IPART (2012), p. 107.
[54] IPART (2012), p. 108.

130. The Tribunal case that considers the relationship between government bond yields and the market risk premium is the Energy Australia Case.[55] One of the applicants in that case, TransGrid, was regulated under Chapter 6A of the National Electricity Rules, which required the risk-free rate to be estimated using appropriate market data, whereas estimates of beta and market risk premium were fixed and could not be changed.

131. TransGrid submitted that there was a clear relationship between government bond yields and risk premiums in financial markets and that adding a long-run average estimate of MRP to an historically low estimate of the risk-free rate would produce a nonsensical outcome – it would imply that equity finance was cheaper than it had ever been, right at the peak of the GFC.

132. Because the Rules required a "normal" estimate of MRP to be used, TransGrid proposed to use an estimate of the risk-free rate from "normal" times, rather than the highly unusual estimate from the time of the determination – so that the two parameters were estimated consistently in order to produce a sensible estimate of the required return on equity. The AER insisted on estimating the risk-free rate as the yield on government bonds at the time of the determination – and then adding the fixed long-run average estimate of MRP.

133. The Tribunal noted that:

> The Applicants submitted that these facts demonstrated that basing a risk free rate on the AER's specified averaging periods would not achieve the objective of an unbiased rate of return consistent with market conditions at the date of the final decision. They appealed to expert opinion that the market risk premium was far higher than its deemed value while the risk free rate was abnormally low, so that the return required by investors was much higher than the AER's specified averaging period would generate.[56]

and concluded that:

> The Tribunal considers that an averaging period during which interest rates were at historically low levels is unlikely to produce a rate of return appropriate for the regulatory period.[57]

134. The Tribunal allowed TransGrid to use an estimate of the risk-free rate drawn from more normal times, to be consistent with the long-run average estimate of MRP that was required under the Rules.

IPART approach – implicit consistency of risk-free rate and MRP

135. The regulatory framework governing IPART's review of retail electricity prices effectively requires that its previous estimate of MRP (a range of 5.5% to 6.5%) must be maintained and that a contemporaneous estimate of the risk-free rate must also be used.[58] However, as set out above, IPART recognised that:

    a) an estimate of the risk-free rate that is commensurate with the prevailing conditions in the market for funds; paired with

[55] [2009] ACompT 8.
[56] [2009] ACompT 8, Paragraph 112.
[57] [2009] ACompT 8, Paragraph 114.
[58] IPART estimated the risk-free rate and MRP with reference to the yield on 10-year Commonwealth Government Securities.

b) an estimate of MRP that is commensurate with the average conditions in the market for funds over the last 50 years

would give rise to an inconsistency that is likely to produce an inappropriate estimate of the required return on equity, "particularly in the current market."

136. Consequently, IPART worked within its regulatory constraints to produce a more sensible and appropriate outcome. Specifically, IPART selected a final WACC estimate from near the top of the reasonable range that it had estimated. IPART explains that:

> we have not selected the midpoints of the ranges for our point estimate of the WACC values. The methodology set down in our 2010 determination required the use of short term averages for the market-based parameters, and long term averages for other parameters. As noted by some stakeholders, there could potentially be a disparity between using short term averages of market data for some parameters and long term averages for others. The risk free rate has been affected by market volatility and prolonged weak market conditions. The change in market conditions has potentially created a disparity between the risk free rate (for which we use short term averages) and the MRP (for which we use long term averages). In the current market circumstances, there is some evidence to support the view that expectations for the MRP have risen as bond yields have fallen. However, it is difficult to measure these short term variations in expectations for the MRP.[59]

137. That is, IPART has used an approach for increasing its estimate of the required return on equity by selecting a WACC estimate from above the mid-point of what it considers to be a reasonable range:

> Rather than adjusting the risk free rate or revaluing the MRP, we made a judgment when selecting the WACC point estimate from within the range.[60]

138. It is possible to reverse-engineer the estimates of the risk-free rate or MRP that would be required to produce the WACC point estimate adopted by IPART. For example, IPART adopts a pre-tax real WACC estimate of 7.1% for electricity generation businesses. This implies a required return on equity of 11.2%.[61] This estimate of the required return on equity is consistent with either:

a) Increasing the risk free rate from the contemporaneous estimate of 3.7% to a longer-term average estimate of 5.2%; or

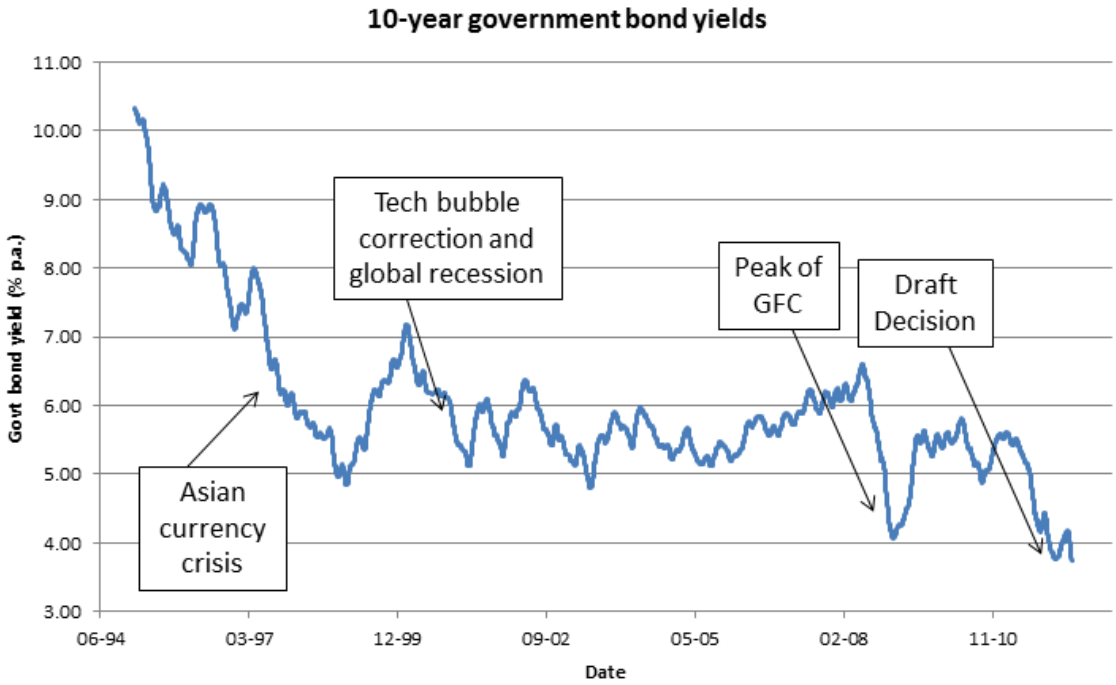
b) Adopting a contemporaneous MRP estimate of 7.5%.

Submissions to IPART

139. A number of factors led IPART to conclude that it should increase the allowed return on equity as a result of government bond yields being at historical lows. First, there is clear evidence that government bond yields tend to decline during periods of financial crisis, as set out in Figure 4 below, which shows the time series of 20-day moving average of the yield on 10-year Commonwealth Government bonds.

[59] IPART (2012), p. 102.
[60] IPART (2012), p. 107.
[61] That is, if the required return on equity is set to 11.2% and all other parameters are set to their mid-point estimates, the pre-tax real WACC estimate is 7.1%.

Figure 4. 10-year government bond yields



Source: Reserve Bank of Australia.

140. Second, it is well-known, and generally accepted by finance academics and financial market professionals, that periods of historically low government bond yields are caused by a phenomenon known as a "flight to quality." During periods of market turmoil and uncertainty, many investors are willing to pay a premium for "safe haven" assets such as government bonds in developed economies. That is, many investors sell out of higher-risk investments and "park" funds in government bonds. This bids up the price of government bonds and pushes yields down to very low levels.

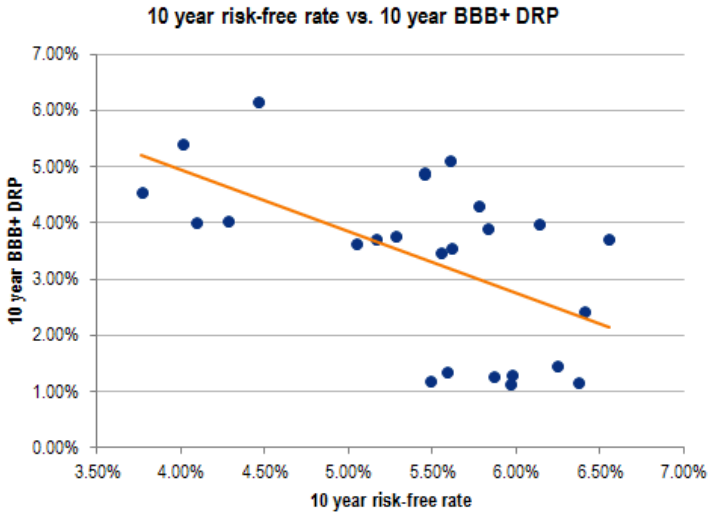
141. The flight-to-quality effect implies that government bond yields are likely to be at their historical lows at precisely the same time that risk premiums are at their historical highs. Figure 4 above shows that government bond yields were driven down sharply during the Asian currency crisis in 1997 and during the bursting of the tech bubble and global recession in early 2001.

142. The previous record low for Australian 10-year government bond yields was during the height of the Global Financial Crisis, but even that low has been surpassed in recent times due to developments in the European debt crisis.

143. Queensland Treasury Corporation (**QTC**) have also examined the relationship between 10-year Commonwealth Government bond yields and risk premiums in financial markets. Figure 5 below shows the relationship between 10-year government bond yields and estimates of the 10-year debt risk premium.[62] That figure shows that debt risk premiums are heightened when government bond yields are very low. That is, at times when investors are requiring high premiums for bearing risk, government bond yields tend to be very low – consistent with a flight-to-quality effect.

[62] The debt risk premium is based on QTC's quarterly credit margin survey data. The data in the figure is from the March 2006 to the March 2012 QTC surveys.

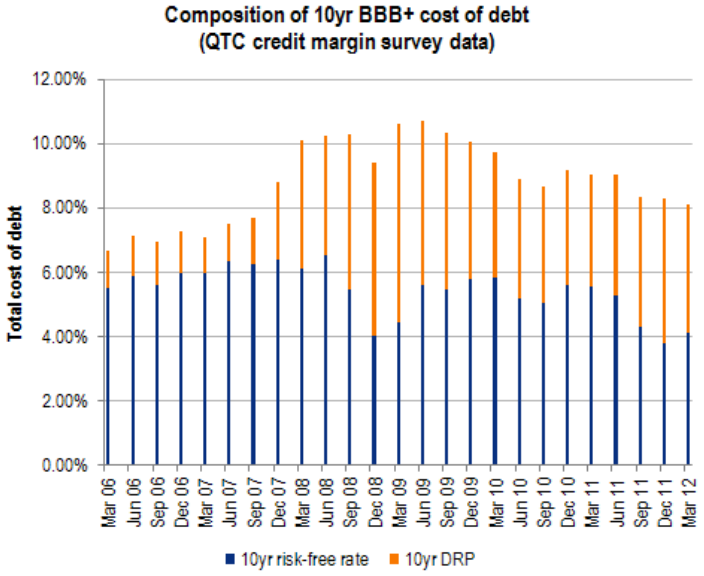
Figure 5. Inverse relationship between government bond yields and risk premiums in financial markets



Source: Queensland Treasury Corporation.
The debt risk premium is based on QTC's quarterly credit margin survey data.
The data in the figure is from the March 2006 to the March 2012 QTC surveys.

144. QTC also show that the total corporate bond yield is much more stable over time than either of its component parts – the 10-year government bond yield and the DRP. Figure 6 below shows that changes in government bond yields are largely offset by changes (in the opposite direction) in debt risk premiums and vice versa. That is, the total return required by investors has been more stable over time than either of the component pieces.

Figure 6. Offsetting effect of government bond yields and risk premiums in financial markets



Source: Queensland Treasury Corporation.
The debt risk premium is based on QTC's quarterly credit margin survey data.
The data in the figure is from the March 2006 to the March 2012 QTC surveys.

Sydney desalination plant

145. In its review of the Sydney Desalination Plant, IPART specifically recognised the disparity that may arise in certain market circumstances if a long-term historical estimate of MRP is paired with a short-term contemporaneous estimate of the risk-free rate:[63]

> The risk free rate and debt margin have been affected by market volatility and the prolonged weak market following the credit crisis of 2008. The change in these factors has potentially created a disparity between these parameters (for which we use short term average data) and the market risk premium (for which we use long term average data). However, the effects of this disparity are mitigated by our decision to use a point estimate of 6.7%, which is 80 basis points higher than the midpoint of our estimated WACC range. In doing so, we had strong regard to the calculated WACC using longer term averages for market parameters.[64]

146. IPART went on to state that the required return on equity is likely to be more stable than each of its component pieces (risk-free rate and MRP):

> We acknowledge the argument that there may be greater stability in the sum of the market risk premium and the risk free rate (ie, the expected market return) than in the individual components.[65]

147. IPART concluded that pairing a long-term historical average estimate of MRP with a contemporaneous estimate of the risk-free rate in the current Australian market would produce an unreasonable outcome, in which case a different approach would be required. IPART concluded that its:

> approach is to look at the long term averages as a reference point for the sum of themarket risk premium and risk free rate.[66]

148. The standard regulatory approach is to estimate the required return on debt as the sum of contemporaneous estimates of the risk-free rate and DRP. As set out above, risk-free rates and financial risk premiums tend to move in opposite directions, offsetting one another, so that the total required return remains relatively stable. In the Sydney Desalination case, the total required return on debt was identical whether a pair of historical estimates or a pair of contemporaneous estimates was used. The fall in the contemporaneous risk-free rate was exactly offset by the increase in the risk premium, as set out in Table 2 below.

[63] IPART used 5-year government bond yields as a proxy for the contemporaneous risk-free rate in this case.
[64] IPART, Sydney Desalination Plant Final Decision, p. 80.
[65] IPART, Sydney Desalination Plant Final Decision, p. 94.
[66] IPART, Sydney Desalination Plant Final Decision, p. 94.

Table 2. Sydney Desalination Plant: Regulatory estimates of the required return on debt

	Historical estimates	Contemporaneous estimates
Risk-free rate	5.40%	3.90%
Risk premium	2.00%	3.50%
Total required return	7.40%	7.40%

Source: IPART, Sydney Desalination Plant Final Decision, p. 95.

149. In the Sydney Desalination Plant case, IPART recognised (as set out above) that in the prevailing market conditions there would be a disparity between a contemporaneous estimate of the risk-free rate and its standard fixed estimate of MRP. Table 3 below shows that the (then) contemporaneous risk-free rate of 3.9% paired with a constant 6% estimate of MRP would imply a required return on equity of 9.9% p.a. for the average firm.[67] IPART considered this to be unreasonable and instead adopted a value of 11.4%, which is consistent with either:

    a) Increasing the risk free rate from the contemporaneous estimate of 3.9% to a longer-term average estimate of 5.4%; or

    b) Adopting a contemporaneous MRP estimate of 7.5%.

Table 3. Sydney Desalination Plant: Regulatory estimates of the required return on equity

	Mixed estimates	Historical estimates	Contemporaneous estimates
Risk-free rate	3.90%	5.40%	3.90%
Risk premium	6.00%	6.00%	7.50%
Total required return	9.90%	11.40%	11.40%

Source: IPART, Sydney Desalination Plant Final Decision, p. 95.
SFG calculations.

Sydney Water

150. In its review of Sydney Water, IPART again recognised the disparity that may arise in certain market circumstances if a long-term historical estimate of MRP is paired with a short-term contemporaneous estimate of the risk-free rate:[68]

> The risk free rate has been affected by market volatility and prolonged weak market conditions. The change in these factors has potentially created a disparity between the risk free rate (for which we use short-term average data) and the market risk premium (for which we use long-term average data). In the current market circumstances, there is some evidence to support the view that expectations for the market risk premium have risen as bond yields have fallen. However, it is difficult to measure these short-term variations in expectations for the market risk premium. To guide our decision making on

[67] That is, a firm with an equity beta of 1.0.
[68] IPART used 5-year government bond yields as a proxy for the contemporaneous risk-free rate in this case.

> the point estimate for the WACC we estimated the long-term averages of the risk free rate, debt margin, inflation adjustment and the market risk premium.[69]

151. IPART went on to explain that:

> We note that there may be an inconsistency between using short-term data for the market-based parameters and using long-term data for the MRP and the equity beta. In particular, there may be an inversely proportional relationship between the MRP and the risk free rate. In periods of high investor risk aversion, there is a flight from risky assets to safe assets. This tends to push up the price and push down the yields on safe assets. For this reason, falling risk free rates tend to be associated with rising investor risk premiums (and vice versa).[70]

152. IPART concluded that pairing a long-term historical average estimate of MRP with a contemporaneous estimate of the risk-free rate in the current Australian market would produce an unreasonable outcome, in which case a different approach would be required. IPART concluded that its:

> We have addressed the potential problem of combining a long-term average for the MRP and a short-term average for the risk free rate by having regard to the long term averages for both in choosing a WACC at the top end of the current range.[71]

153. In the Sydney Water case, IPART again recognised that in the prevailing market conditions there would be a disparity between a contemporaneous estimate of the risk-free rate and its standard fixed estimate of MRP. Table 4 below shows that the (then) contemporaneous risk-free rate of 3.6% paired with a constant 6% estimate of MRP would imply a required return on equity of 9.6% p.a. for the average firm.[72] IPART considered this to be unreasonable and instead adopted a value of 11.4%, which is consistent with either:

    a) Increasing the risk free rate from the contemporaneous estimate of 3.6% to a longer-term average estimate of 5.4%; or

    b) Adopting a contemporaneous MRP estimate of 7.8%.

Table 4. Sydney Water: Regulatory estimates of the required return on equity

	Mixed estimates	Historical estimates	Contemporaneous estimates
Risk-free rate	3.60%	5.40%	3.60%
Risk premium	6.00%	6.00%	7.80%
Total required return	9.60%	11.40%	11.40%

Source: IPART, Sydney Water Final Decision, p. 204.
SFG calculations.

[69] IPART, Sydney Water Final Decision, p. 198.
[70] IPART, Sydney Water Final Decision, p. 210.
[71] IPART, Sydney Water Final Decision, p. 210.
[72] That is, a firm with an equity beta of 1.0.

9. Alternative approaches and the way forward for the QCA

The focus of the Discussion Paper

154. The QCA's MRP Discussion Paper is written from the perspective that the required return on equity will be estimated using only the Sharpe-Lintner CAPM and that the risk-free rate and MRP can each be estimated independently. The focus of the Discussion Paper is (separately) on:

a) Whether government bond yields satisfy a set of theoretical requirements for use as a proxy for the risk-free rate in the Sharpe Lintner CAPM; and

b) Whether, in theory, a regulator should seek to estimate MRP in order to match its regulatory allowance with the efficient cost of equity at each determination; the alternative being to have periods of material under- and over-compensation that might average out over the long run.

155. For example, the MRP Discussion Paper and the Lally Report both contain detailed discussions about how a flight-to-quality has resulted in government bond yields being at historical lows, followed by theoretical assessments of whether or not this disqualifies them from being used as estimates of the risk-free rate. There is discussion of explicit and implicit requirements for a suitable proxy of the risk-free rate for use in the CAPM, and a conclusion that current government bond yields do not violate any theoretical requirement.

156. Similarly, there is a theoretical discussion about whether the regulator should seek to match the regulatory allowance with the efficient cost of equity at the time of each determination, or whether a type of NPV=0 principle applies. The MRP Discussion Paper states that:

> Dr Lally considers that the critical feature of compensation is that it should be provided over the life of the regulatory assets rather than over each regulatory cycle within the life of the assets. As a result, while a regulator's estimation process might yield a biased estimate of a parameter (e.g. the market risk premium) under certain economic conditions, the more relevant consideration is the accuracy of the method over the life of the regulated assets. In other words, a method for estimating the market risk premium should not be rejected simply because it is biased under certain economic conditions (Lally, 2012b: 13).[73]

157. This implies that periods of material over-compensation and periods of material under-compensation are acceptable, so long as they average out over time. In such a case, a theoretical mathematical derivation might be able to show that the net present value of regulatory revenues is the same whether the regulator (a) seeks to allow a fair return at every determination, or (b) has some determinations with material over-compensation and equally many determinations with material under-compensation. However, there are real-world implications if the regulatory allowance is materially different from the efficient cost of equity:

a) If the regulatory allowance is materially greater than the efficient cost, consumers will be over-paying for the regulated service. This is obviously to the short-term disadvantage of consumers and will also be to their long-term advantage if the mis-pricing leads them to take inefficient actions such as seeking a less efficient source of energy or delaying their own

[73] QCA MRP Discussion Paper, pp. 16-17.

capital investment because the inflated regulated price renders their own project uneconomical; and

b) If the regulatory allowance is materially less than the efficient cost, the regulated service provider will have an incentive to under-invest in efficient capital and operating expenditure which may lead to higher future prices and/or lower than efficient levels of service – neither of which are in the long-term interests of consumers.

158. But the key issue is that detailed theoretical tangents (about what a particular model assumes about the features of a proxy for the risk-free rate and about whether "a method for estimating the market risk premium should not be rejected simply because it is biased") misses the main point. The key question is whether one obtains a reasonable estimate of the required return on equity in the current market conditions by mechanically inserting the current government bond yield into the Sharpe-Lintner CAPM with an MRP of 6%. In our view, the answer to that question is simple – the current QCA approach gives the nonsensical result that the onset of the GFC has resulted in equity being cheaper than ever before. Thus, there is an opportunity for the QCA and stakeholders to follow other Australian regulatory developments in developing a framework that is robust to the current financial market conditions.

159. To focus on selected micro-theoretical issues in relation to individual parameters would be to miss the point entirely. Rather, all stakeholders should be considering whether a particular approach produces an estimate of the required return on equity that is reasonable and plausible in the circumstances. This is because such a focus on the reasonableness of the allowance for the return on equity is required by the Queensland Competition Authority Act 1997, which states that the regulatory allowance should:

> promote the economically efficient operation of, use of and investment in, significant infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets.[74]

and that:

> The pricing principles in relation to the price of access to a service are that the price should generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment commensurate with the regulatory and commercial risks involved.[75]

160. In our view, it is impossible to reasonably conclude that the above requirements of the QCA Act are met by setting, in the current financial market conditions, an allowed return on equity that is lower than at any time in the historical record. This conclusion holds whether or not certain technical conditions about model requirements of risk-free rate proxies are met, and whether or not there might exist certain theoretical conditions under which a material bias in the regulatory estimate of MRP might cancel out in the long run.

161. The MRP Discussion Paper, and the associated consultant report, devote considerable attention to independent theoretical considerations relating to individual parameters, but do not consider the

[74] QCA Act, s.69E.
[75] QCA Act, s.168A.

overall estimate of the required return on equity. However, the fact that the current QCA approach produces estimates of the required return on equity that are the lowest on record since the onset of the GFC is something that all stakeholders should consider. Determining whether the allowed return on equity is reasonable more important than setting out lists of explicit and implicit theoretical requirements of risk-free rate proxies.

The new framework in energy network regulation

162. Until recently, the Australian Energy Regulator (**AER**) had adopted an approach similar to the QCA's current approach to estimating the required return on equity in that it:

    a) Used the Sharpe-Lintner CAPM exclusively;

    b) Estimated individual parameters in isolation, resulting in it using contemporaneous government bond yields as a proxy for the risk-free rate and a 6% MRP; and

    c) Focused on the justification for individual parameters rather than on the reasonableness of the resulting estimate of the required return on equity.

163. In its recent rule change process, the Australian Energy Markets Commission (**AEMC**) made a number of significant changes to the National Electricity Rules (**NER**) and National Gas Rules (**NGR**) to prevent the AER from continuing to adopt that approach. The key changes that the AEMC made were:

    a) To introduce an "overall rate of return objective" to ensure that the focus is on the reasonableness of the allowed return on equity – eliminating the silo approach that focused separately on each individual parameter; and

    b) Requiring the regulator to have regard to all relevant approaches and evidence – eliminating the focus on a single model (CAPM) that could be used without having regard to a weight of evidence suggesting that the way the regulator implemented that model produced an estimate of the required return on equity that was implausible in the circumstances.

164. In particular, the new rules require that the allowed rate of return must achieve the **allowed rate of return objective**:

> [t]he rate of return for a [Service Provider] is to be commensurate 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 [services].[76]

165. In applying the rate of return objective, regard must be had to:

> 1. relevant estimation methods, financial models, market data and other evidence;
>
> 2. the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and

[76] For example, see Rule 87(2)(3) of the NGR.

> 3. any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.[77]

166. When determining the allowed return on equity regard must also be had to

> the prevailing conditions in the market for equity funds.[78]

167. In its Final Determination, the AEMC was very clear about its intention that the regulator should not use a narrow formulaic approach, but should have regard to all relevant evidence while keeping a focus on the reasonableness of the allowed return on equity. For example, the AEMC noted that

> The Commission also expressed concern that the provisions create the potential for the regulator and/ or appeal body to interpret that the best way to estimate the allowed rate of return is by using a relatively formulaic approach. This may result in it not considering the relevance of a broad range of evidence, and may lead to an undue focus on individual parameter values rather than the overall rate of return estimate.[79]

and that the rule changes were designed to:

> encourage the regulator to focus on whether its overall estimate of the rate of return is appropriate.[80]

168. The AEMC was also very clear about the need to ensure that the allowed return on equity is commensurate with the prevailing conditions in the market for equity funds. The AEMC stated that:

> If the allowed rate of return is not determined with regard to the prevailing market conditions, it will either be above or below the return that is required by capital market investors at the time of the determination. The Commission was of the view that neither of these outcomes is efficient nor in the long term interest of energy consumers.[81]

and:

> The second principal requirement is that the return on equity must take into account the prevailing conditions in the market for equity funds. It reflects the importance of estimating a return on equity that is sufficient to allow efficient investment in, and efficient use of, the relevant services. However, this requirement does not mean that the regulator is restricted from considering historical data in generating its estimate of the required return on equity. Rather, it ensures that current market conditions are fully reflected in such estimates to ensure that allowed rates are sufficient for efficient investment and use.[82]

[77] For example, see Rule 87(2)(5) of the NGR.
[78] For example, see Rule 87(2)(7) of the NGR.
[79] AEMC Rule Change Final Determination, p.40.
[80] AEMC Rule Change Final Determination, p.41.
[81] AEMC Rule Change Final Determination, p.44.
[82] AEMC Rule Change Final Determination, p.69.

169. The AEMC also noted that for a framework to produce an allowed return on equity that is commensurate with the prevailing conditions in the market for equity funds, it must be flexible enough to respond to changes in financial market conditions. One of the AEMC's primary concerns was that the mechanistic CAPM approach was "inherently rigid" such that the AER's implementation of the CAPM produced unreasonable results in the current market circumstances. The AER stated that:

> The global financial crisis and its continuing impact through the European sovereign debt crisis have highlighted the inherent dangers in an overly rigid approach to estimating a rate of return in unstable market conditions.[83]

and that its rule change would:

> enable the regulator to better respond to changing financial market conditions.[84]

170. In its Final Determination Guidance, the AEMC sought to address concerns that, despite its best efforts in making material changes to the Rules, the regulator would seek to continue to estimate the required return on equity via a mechanistic implementation of the CAPM. The AEMC sought to assuage these concerns, but indicated that it would not set out a list of what other information and models the regulator should consider, due to the risk that any such list *itself* would be applied in a mechanistic fashion:

> A major concern expressed in numerous submissions is that under the proposed changes the regulator would still be able to, in effect, make exclusive use of the CAPM when estimating a rate of return on equity. The Commission understands this concern is potentially of considerable importance given its intention is to ensure that the regulator takes relevant estimation methods, models, market data and other evidence into account when estimating the required rate of return on equity. As discussed above, the Commission takes the view that the balance between flexibility and prescription has been adequately achieved in the final rules. It would be counterproductive to attempt to prescribe a list of models and evidence, which would almost certainly be non-exhaustive and could lead to rigid adherence to them in a mechanistic fashion.[85]

171. Rather:

> 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.[86]

[83] AEMC Rule Change Final Determination, p.40.
[84] AEMC Rule Change Final Determination, p.23.
[85] AEMC Rule Change Final Determination, p.57.
[86] AEMC Rule Change Final Determination, pp. 67-68.

and

> Implicit in this requirement to consider a range of methods, models and information is that checks of reasonableness will be undertaken.[87]

The way forward for the QCA

172. Although the QCA does not operate under the NGR or NER, the information set out above is useful in that it indicates the direction of regulatory practice in this country. In relation to the allowed return on equity, Australian regulatory practice is moving away from the mechanistic implementation of a single model with a narrow independent focus on individual parameters. It is moving towards an examination of all relevant evidence with a primary focus on achieving an estimate of the required return on equity that is reasonable in the circumstances.

173. In the context of its cost of capital review, the QCA has an opportunity to follow the current direction of regulatory practice in Australia:

    a) The **AEMC** has changed the NER and NGR to require energy network regulators to have regard to all relevant methods, models, data and evidence and to have a primary focus on achieving an estimate of the required return on equity that is reasonable in the circumstances. It has ruled out the previous mechanistic implementation of the CAPM using the current government bond rate and MRP=6%;

    b) The **AER** and **ERA** are required to follow the path set out by the AEMC and are currently in the process of consulting with stakeholders and developing guidelines to explain their new approach. The new approach of the AER will undoubtedly have some influence on the practice of the **ACCC**;

    c) **IPART** has already departed from the mechanistic CAPM due to their conclusion that it does not produce sensible estimates of the required return on equity in the current market conditions. IPART is also conducting a review to determine how to best estimate the required return on equity going forward; and

    d) In its most recent decision, the Independent Competition and Regulatory Commission (**ICRC**) has departed from the mechanistic CAPM and used a range of evidence to determine the allowed return on equity.[88]

174. In summary, Australian regulatory practice has already moved beyond the mechanistic implementation of the CAPM. The QCA has a present opportunity to move in the current direction of regulatory practice in Australia.

175. Whereas a WACC review in the context of the continued mechanistic implementation of the CAPM would be structured with independent work streams for individual parameters, the current approach of other regulators involves widespread consultation on issues about the range of methods, models,

[87] AEMC Rule Change Final Determination, p. 69.
[88] We would not advocate following the specific ICRC approach, but simply note here that the ICRC is another regulator that has already moved beyond the mechanistic CAPM.

data and evidence that is relevant, and the process by which it should all be distilled into an allowed return on equity.

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Appendix 1: UBS dividend growth model methodology

This appendix sets out the dividend growth methodology adopted by Nelson, Ferrarone and McGuire (2012), as it appears in that publication.

Deriving the Implied Risk Premium

The equity risk premium (ERP) reflects the difference between equity market returns and the returns on the 'risk-free' asset, typically the government bond or Treasury bill rate. The premium amounts to the added compensation required to hold the riskier asset-equities. Keeping all else constant, changes in the equity risk premium have a straightforward impact on stock prices: a rise in the equity risk premium depresses stock prices, and vice versa. It follows that a high equity risk premium is associated with depressed stock prices, a low premium with elevated stock prices.

Estimates of the ERP vary according to the model employed. An important distinction must be made between historic and forward-looking measures of the equity risk premium. The basic problem with ex-post (historical) premiums, calculated as the observed difference between past returns on stocks and government bonds, is that past patterns may not hold in the future.

The alternative we employ is a measure of the *ex ante* (or 'forward-looking') risk premium, which attempts to capture investor expectations. This implied equity risk premium is derived from a discounted cash flow model, which equates discounted future streams of earnings (cash flows) to prevailing market valuations. The equilibrating factor is the discount rate, which is the sum of the risk-free rate and the equity risk premium. Subtracting the long-term bond yield from the discount rate yields the implied equity risk premium.

In order to construct a historical series for the ERP it is necessary to gather information on what investors believed the future would look like at any given point of time in the past. Since such expectations can not be known with certainty, suitable proxies must be found. The approach used here assumes that cash flows grow proportionally to earnings, whose expected growth rate at any point in time is given by the consensus IBES estimates. These earning estimates span an initial horizon of five years. Thereafter, we assume earnings (cash flow) growth decays to its long-run equilibrium growth rate, which is proportional to forward-looking, dynamic estimates for nominal GDP.

Model specification

In the context of developing a DCF model to determine the implied risk premium, it is important to identify and discuss the underlying assumptions used in its construction.

Return to Shareholders

The first assumption concerns the return to shareholders. Typically, dividends are considered as the return to shareholders. However, dividends may not fully capture the true capacity of companies to repay investors. For example, cash can also be returned to shareholders via share buy backs. We therefore assume that shareholder returns are bestproxied by free cash flow to equity (FCFE). This can be described as a model where potential dividends and share buy-backs are discounted and therefore represents a measure of what a firm can afford to pay out.

The formula for FCFE expresses the cash flows available to equity after meeting all financial commitments, including debt repayments, and after covering capital expenditure and working capital needs.

FCFE = Net Income - ((Common Equity % Total Capital) x (Capital Expenditure - Depreciation & Amortisation +(-) △ Working Capital + Acquisitions)) - Preferred Dividends

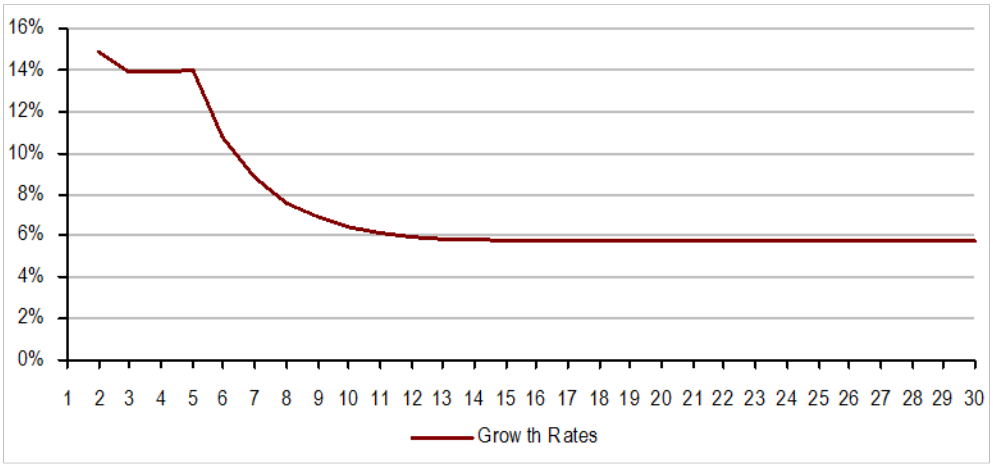
If we assume that net capital expenditures and working capital changes are financed using a mixture of debt and equity, the effect on cash flows to equity can be expressed as common equity as a % of total capital. We then take the net

income and convert it to a cash flow by deducting the reinvestment needs such as capital expenditures and acquisitions. Depreciation is added back to earnings because it is a non cash charge deducted in the accounts to arrive at net income. Changes in working capital will be deducted or added to net income depending on whether an increase or decrease has occurred. Increases in working capital drain a firms cash flow, while decreases in working capital increase the cash flow available for distribution.

Three-stage model

There exists several versions of the DCF model, from the simplest Gordon growth model to multi stage models. The Gordon growth model assumes that a company will grow at a stable rate into the future, and while this may hold true for sectors such as regulated utilities it is not representative of the future of the majority of companies. We therefore turn to a more complex three stage model, which breaks the DCF model into 3 different stages of growth.

We employ the IBES one-year and 3-5 year estimates as proxies for the first two earnings stages, respectively. In most cases, however, the 3-5 year IBES forecasts are significantly higher than reasonable estimates for long-run nominal economic growth, a condition that cannot exist in perpetuity. (Otherwise profits would gradually absorb all of national income). A transition therefore must occur between the growth rates forecast by analysts for the first five years and the long run sustainable earnings growth rate. Accordingly, from the fifth year the model fades earnings growth rates exponentially to the long run forecasts for economic growth. To make the model tractable, we must specify a terminal period, for which we have chosen 30 years.



Source: UBS

Terminal growth

A key assumption of any DCF model is the value of terminal growth. We believe that terminal growth assumptions should change with changes in expected long-run nominal economic growth (owing to shifting assumptions about factors such as labor force growth, productivity, or inflation). Instead of assuming a constant terminal value for growth, we therefore employ long-term economic forecasts to tie down terminal earnings growth estimates. In the case of the U.S., the Livingston Survey provided by the Federal Reserve Bank of Philadelphia offers long-term nominal GDP estimates from 1990. (From 1985-the beginning of the IBES series-until 1990 we employ trailing 10-year nominal GDP growth to proxy terminal growth.). For non-US countries and regions, we use the consensus forecasts for long-term economic growth provided by Consensus Economics.

Response to the QCA approach to setting the risk-free rate

Report for Unitywater and Queensland Urban Utilities.

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Contents

1. Background and conclusions

Overview and instructions

1. SFG Consulting (**SFG**) has been retained by Unitywater and Queensland Urban Utilities to provide our views on the discussion paper *The risk-free rate and the market risk premium*, published by the Queensland Competition Authority (**QCA**) in late November 2012. Throughout this report, we refer to this discussion paper as the **Risk-free Rate Discussion Paper**. In the current paper we discuss the specific issue of the term to maturity of government bonds used to estimate the risk-free rate, which forms a component of both the cost of debt and cost of equity capital.

2. The QCA is currently undertaking a comprehensive review of its cost of capital methodology for regulated businesses. It plans to release a series of discussion papers covering various aspects of the cost of capital for public comment. The QCA will then prepare position papers on the key parameters in the cost of capital.

3. The Risk-free Rate Discussion Paper sets out the QCA's current approach to estimating the risk-free rate. In particular, the QCA estimates the risk-free rate as the yield on five-year Commonwealth government bonds, because this is consistent with the term of the regulatory period and, according to the QCA is "consistent with the Net Present Value = 0 principle."[1]

4. Throughout our report we refer to the QCA approach as "term matching" whereby the term to maturity on government debt used to estimate the risk free rate matches the length of the regulatory period. We also refer to the principle that the present value of expected cash flows should equal the asset value as the "NPV neutral" principle.

5. The QCA view is that term matching is necessary to satisfy the NPV neutral principle. It presents this as a statement of fact and debates the implications of using alternative terms to maturity, despite its view that these alternatives would not satisfy the NPV neutral principle. In other words, it considers whether or not a longer term government bond yield should be used to estimate the risk-free rate, despite this providing an abnormal return to investors.

6. We disagree with this assessment and contend that it is not the case that term to maturity matching is needed to achieve an NPV neutral position. This is a technical debate relating to valuation, and we consider that the QCA view only holds under an assumption that the forward curve represents an unbiased assessment of expected future interest rates. There is general agreement that this is not true.[2]

7. However, aside from the technical debate, there are a series of direct problematic implications from the QCA approach which do not arise if the QCA relies upon longer-dated bonds in estimating the risk free rate. These are summarised below.

[1] QCA Risk-free Rate Discussion Paper, p. v.

[2] Fama (1976) provided empirical evidence that forward rates predict future interest rates no better than spot rates. Lally (2007a). Lally (2007b) agrees that the empirical evidence is that forward rates do not equal expected future spot rates.

Summary of conclusions

Implications of the current QCA practice for determining the risk-free rate

8. The current approach of the QCA is to use a term to maturity of five years in estimating the risk-free rate component of the allowed return on debt and equity. This approach has the following implications:

    a) **Prices could be lowered without any cost to the firm simply by shortening the length of the regulatory period.** On average there is an upward-sloping yield curve such that yields on longer-dated government debt are higher than yields on shorter-dated government debt.[3] The QCA rationale is that when a five-year regulatory period is used, the average lower interest rate is appropriate for the lower risk the firm bears from having prices reset every five years rather than ten years. If this rationale were true, prices and risk could be lowered even further by simply resetting the regulated return more often. But no regulator or regulated entity is advocating this. Why? The answer is that risk and the cost of capital are actually **not** systematically lower simply by reducing the length of the regulatory period.[4]

    b) **The estimate of the market risk premium must necessarily be changed.** The QCA estimate of the market risk premium places substantial weight on the historical average of equity market returns compared to government bond yields.[5] In the QCA's MRP Discussion Paper the historical average excess return was reported as 6.21%.[6] Its final estimate, which incorporated survey estimates and a forward-looking estimate was 6.26%. At the time of writing, Australian 10-year government bond yields were approximately 3.61%, compared to 3.17% for five-year government bond yields.[7] The implication of the QCA approach is that if we had a 10-year regulatory period the QCA would expect the cost of equity for the average firm to be 9.87% but if we had a five-year regulatory period it would expect the cost of equity for the average firm to be 9.43%.

    If the QCA believes that the average firm would earn its estimated risk premium above the 10-year government bond yield it makes no sense to believe this estimate would change because an administrative decision was made that five-year regulatory periods were to be used. It should necessarily increase the market risk premium estimate by the current difference between 10- and 5-year government bond yields. This does not require an estimate

[3] Hall (2007) reports that over 30 years from 1977 to 2007 the average yields on government bonds with ten, five and two years to maturity were 9.9%, 9.7% and 9.3%, respectively. In its MRP Discussion Paper the QCA reports that, over five and a third years from July 2007 to October 2012, the average yield on ten year bonds was 5.5% compared to 5.2% for five year bonds.

[4] As presented in detail in Section 3 the reason for this is that merely re-setting prices more frequently does not alter the cost of capital investors apply to expected cash flows outside of that regulatory period. It merely alters the expected cash flows.

[5] The QCA places 25% weight on historical average equity returns relative to government bond yields from the Ibbotson data series, a further 25% weight on historical average equity returns adjusted for the QCA estimate of unexpected inflation and 25% weight on survey evidence, upon which it is unclear how much weight respondents placed on historical averages and contemporaneous market conditions in giving their response. Hence, somewhere from 50 – 75% weight is assigned to historical average values.

[6] QCA MRP Discussion Paper, Table 3.1, p. 11.

[7] On 13 March 2013 Bloomberg reported a yield to maturity on 10-year government bonds of 3.58% and a yield to maturity on 5-year government bonds of 3.15%. Assuming semi-annual coupon payments and bonds trading at par, this implies annualized yields of $(1 + 0.0358/2)^2 - 1 = 3.61\%$ and $(1 + 0.0315/2)^2 - 1 = 3.17\%$.

of the long-term average premium relative to five-year government bonds as the QCA claims.[8]

c) **The regulator is estimating a price below that which would prevail in a competitive market.** The basic objective in the regulation of networks is to estimate the price that would prevail in a competitive market. The mechanism by which the regulator attempts this task is to allow the firm, in expectation, to earn a regulated return which allows the firm to recover its cost of capital. This is the principle upon which the Authority relies, that the net present value of expected cash flows should equal zero.

The length of the regulatory period represents a trade-off between administrative burden, regulatory certainty and timeliness of assumptions. It is entirely independent of the price which would prevail in a competitive market. But by linking the term to maturity of the risk-free rate estimate to the regulatory term, the regulator is, in essence, achieving a different objective. The regulator is now in the position of determining what is the "correct" price according to a criteria other than the price which it believes will prevail in a competitive market.

In a competitive market it is reasonable to think that the owner of a network would finance its operations using long-term debt and that cost of this long-term debt would be reflected in competitive market prices. Yet in setting a 5-year term to maturity the regulator has, in effect, determined that a 5-year debt maturity is appropriate and provides the lower return associated with this shorter term to maturity.

The use of longer term debt to estimate the risk free rate does not violate the NPV neutral principle

9. Contrary to the QCA's statements, term matching is not required for an NPV neutral position and the use of longer term debt to estimate the risk free rate does not violate the NPV neutral position.

10. The debate on this issue is encapsulated in three papers published in the *Accounting Research Journal* in 2007. Lally (2007a) presents the argument that the term to maturity used to estimate the cost of debt must match the regulatory period. Hall (2007) contends that this conclusion only holds under one particular set of assumptions regarding future interest rates, that forward rates are an unbiased expectation of future spot rates. Further, as this assumption is inconsistent with the empirical evidence there is no need whatsoever to align the two periods. Lally (2007b) rebuts this contention, arguing that his paper required no assumption whatsoever about future interest rates.

11. The argument of Lally (2007a, 2007b) is that regulation over five years effectively immunises investors against interest rate fluctuations outside of this five-year period. We do not know what those future rates might be, but at the time of the regulatory reset there will be a new set of cash flows which reflect these interest rates, such that the value at the end of five years is effectively guaranteed.

12. This argument basically considers an investment in a regulated entity to be equivalent to a five-year corporate bond, in which the par value is repaid at the end of the fifth year, unless there is a default. But this does not characterise the risk that investors in the regulated entity are exposed to. At the time of their investment they will form expectations for cash flows over the entire asset life and discount

[8] The QCA states that, "from a practical perspective, there is a need to compromise and use the longest available data series, which means using a 10-year average of the market risk premium." This can still be used to form the QCA's view as to the expected return for the average firm in the equity market.

those cash flows at discount rates which reflect the risk of those cash flows. This is the argument made by Hall (2007).

13. Those discount rates are set by the market today. Just because the regulator changes the technique for estimating a series of cash flows does not change those discount rates. So if the regulator announced today that it will use lower interest rates to set the regulated rate of return, and there is no change in the discount rates set by the market, the value of the asset will fall. The only way the asset value can remain unchanged is if the fall in the regulated return is offset by a corresponding fall in the discount rate.

14. The argument of Lally (2007a, 2007b) is that this matching of regulated return and discount rates does occur, because whatever the interest rates are at the end of five years these will be the discount rates set by the market. The problem is that the value of the asset today will be determined by the market's expectations for future interest rates (which determine the expected cash flows) and the term structure of interest rates today (which determine how those cash flows are discounted). The term matching principle holds only under the assumption that the term structure of interest rates today provides a set of unbiased expectations for future interest rates. Empirical evidence shows that this assumption does not hold.[9]

15. The key point is that the QCA position is that the term of the regulatory period can be set to eliminate investors' exposure to interest rate movements outside of the regulatory period. Given an upward-sloping yield curve it could reduce the cost of capital and prices without any impact on firm value. We question this ability, and suggest that if this were true, regulators would have incorporated such considerations earlier. Surely the benefits would be substantial enough to devote a great study to the risks and benefits of this change. The QCA acknowledges that there are re-financing risks associated with the use of five year debt rather than ten year debt, so provides an allowance for debt raising costs.[10] However, this is well short of the analysis we would expect to see if, in reality, there was the chance to reduce the cost of capital even further, by shortening the length of the regulatory period and estimating the cost of debt with reference to bonds of the same maturity.

16. The answer to this question is that we can't arbitrarily reduce risk by changing the length of the regulatory period.

[9] Fama (1976), Lally (2007b).

[10] For example, see the discussion on pages 11 – 12 of the QCA draft decision on QR Network's Draft access Undertaking, December 2009.

2. Implications of the current QCA approach

Overview

17. The QCA has determined that the term to maturity of government bonds used to estimate the risk free rate needs to match the term of the regulatory period in order for the net present value of expected cash flows to equal zero. In the QCA case that term is five years. For ease of exposition we refer to this as "term matching."

18. The QCA has reached this conclusion on the basis of advice received over an extended period of time, which essentially uses the same technical argument presented in the published paper by Lally (2007a). What is not acknowledged in the Risk-free Rate Discussion Paper is that there are a series of three articles in the same journal which debate this issue (Lally, 2007a; Hall, 2007; and Lally, 2007b) in which there is disagreement about whether term matching is required to satisfy this principle.

19. The QCA also states that the rates on government debt vary with the term to maturity of the debt instrument, or in other words the term structure is not flat,[11] and presents data over a five-year period to show an average difference of 0.27% in yields on 10- and 5-year government debt.[12]

20. The technical advice is that regulation effectively immunises the business against interest rate changes outside of the regulatory period. At the end of five years, it is argued that regulated prices are reset, based upon interest rates prevailing at that time, so investors are only exposed to risks over the five-year regulatory period.

21. This advice is not correct. It is not the case that in order to satisfy the NPV = 0 principle that the term of the risk-free rate needs to match the term of the regulatory period. The QCA discussion paper presents the net present value statement as truth, and discusses consequences associated with the violation of this principle. This discussion is unnecessary because it is not the case that term matching is necessary to satisfy the NPV = 0 principle.

22. This is a technical debate relating to valuation, which we discuss in detail in Section 3. But before proceeding to the technical issues, it is worth noting the implications of adopting one conclusion versus another. These should be considered in conjunction with the technical debate, not as an aside to the technical debate. These implications are as follows:

    a) The first implication is that prices could be lowered without any cost to the firm, simply by shortening the length of the regulatory period. If the term matching approach were valid, why have regulators not taken this principle further and chosen to reset prices at even greater frequency than five years, based upon even shorter terms to maturity?[13] The benefits of an additional 0.1 – 0.3% reduction in the cost of capital would be substantial, yet there is not even a debate on this issue. Why? The answer is that a debate over whether to refer to five or ten year debt yields is convenient because one of these terms matches the regulatory period and the other term is the longest dated government bond yields reported on a daily basis. But

[11] QCA Risk-free Rate Discussion Paper, p. 4
[12] QCA Risk-free Rate Discussion Paper, Table 4.1, p.13
[13] There is a difference between more frequent updating of the cost of capital estimate with reference to debt with a long term to maturity, and more frequent updating matching the term to the length of the regulatory period. In some instances the regulator may update its cost of capital estimates more frequently than every five years, for example on an annual basis, but they do not use the one-year risk free rate in this update.

the reason this debate has not progressed further is that regulators have no well-defined rationale to determine the regulatory period which would provide the lowest cost of capital.

b) The second implication is that the estimate of the market risk premium must necessarily be changed. Prior to the QCA deciding to adopt term matching its view was that the average firm in the market would be expected to generate equity returns equal to the 10-year bond rate plus 6%. Subsequent to adopting term matching the QCA believes the equity market is expected to earn a return equal to the 5-year bond rate plus 6%. Why has the expected return on the average stock changed? The answer is it has not, so the market risk premium estimate should reflect the difference between 10- and 5-year bond yields at the time of the determination.

c) The third implication is that the QCA is setting prices below those which would prevail in a competitive market. Suppose that the competitive market outcome is that infrastructure assets are financed over a long period, and the cost of long-dated debt is reflected in competitive market prices. The QCA approach, on average, lowers prices below the competitive market outcome. The QCA contends that these lower prices reflect the lower risk to the firm associated with re-setting prices every five years rather than ten years.

Prices could be lowered without any cost to the firm, simply by shortening the length of the regulatory period

23. On average we observe an upward-sloping yield curve, so the typical case is a yield on 5-year debt which is less than the yield on 10-year debt. This is consistent with the yields over the last five years presented by the QCA which show an average difference of 0.27% between the yields on 10- and 5-year debt.[14] According to the QCA's rationale, we could adopt a 10-year regulatory period and have relatively high prices or a 5-year period and adopt relatively low prices. In both cases the firm would earn a return equal to its cost of funds so is unaffected. If this is true, then why not switch to a three-year period, or a one-year period, for setting the regulated rate of return? Compared to the potential economic benefits – lower prices at no loss of value – the administrative costs of estimating the regulated return would be small. But no-one is proposing that the regulated return be reset every year with reference to debt with one year maturity.

24. There is a plausible reason why the Authority has not advocated for an even shorter term reset period, aside from administrative cost. A shorter period exposes the firm to more hedging costs and/or refinancing risk. In order to offset its interest costs with the debt component of the regulated return, the firm typically participates in the bond and swaps markets in order to incur effective interest costs which approximate the debt component of the benchmark return. This increases hedging costs and exposes the firm to risk because the swaps market does not necessarily trade enough volume in a short space of time to achieve an effective hedge. An alternative is to refinance the debt portfolio at each reset period, but this approach typically exposes the firm to more risk of a mis-match between interest expense and debt allowance because of illiquidity in the bond market.

25. So, a shorter regulatory period has not been promoted as a means to lower prices without an economic loss, perhaps because of refinancing risk. But if refinancing risk is such a concern, why not reduce this even further and advocate for a ten-year regulatory period?

[14] QCA Risk-free Rate Discussion Paper, Table 4.1, p. 13

26. The answer is that we cannot have lower prices and no loss of value to the firm, merely by assuming a lower term to maturity for the risk free rate. Firm value is not independent of interest rates outside of the regulatory period. At the time of the regulatory reset, the market will value the firm as a function of two inputs – its expected cash flows for all periods and its expectations for all future discount rates. Both sets of expectation are formed at the time of the determination. The expected future discount rates are entirely independent of the regulator's determination as to what is incorporated in the expected cash flows. On the other hand, the expected cash flows are a direct function of the regulator's decision.

The estimate of the market risk premium must necessarily be changed

27. In all its determinations the QCA has adopted an estimate of the market risk premium of 6.00%, which is the most common assumption in regulatory determinations. It is also an assumption which exhibits very little variation across those determinations, despite material fluctuations in the assumed debt risk premium.

28. The reason for the stability of the market risk premium estimate is that, in comparison to the debt risk premium, it is more challenging to observe with precision. So the regulator places a large amount of weight in decision-making on the historical equity market returns relative to government bond yields and a low amount of weight on contemporaneous indicators of the premium. In the QCA's case this weight is between 50% and 75% depending upon whether survey estimates of the market risk premium are considered to be estimates of the contemporaneous risk premium or estimates of the long-term average.[15]

29. According to the QCA estimates the historical average return on equities relative to 10-year government bonds is 6.21%. The QCA also reports an estimate of 4.32%, which removes the effect of what it considers to be an unexpected component of inflation. This means that if the QCA had no information about risk premiums in current market conditions and no survey evidence it would assign a market risk premium of 5.27% as it places equal weight on each of these two assumptions.[16] We ignore the issue of rounding to the nearest per cent for the moment.

30. At the time the discussion paper was written the QCA considered a contemporaneous estimate of the market risk premium to be 8.70% and the estimate from survey evidence to be 5.80%. Taking account of each of these estimates with equal weight the average market risk premium estimate is 6.26%, which the QCA rounds to 6.00%.

31. There is no question that the QCA has made these estimates of the market risk premium with respect to the yield on 10-year government bonds. There is also no question that the market risk premium is an estimate of the return expected to be earned on the broader market, which is the same as the return expected to be earned on an investment with average systematic risk. Yet the QCA considers it to be inappropriate to make any adjustment to the market risk premium to account for the use of a five-year

[15] In survey responses it is difficult to determine whether the respondent is stating the cost of equity capital which is present in the market at that time (that is, which sets the present value of expected cash flows equal to the market price) or whether the respondent is stating the cost of capital he or she would use to arrive at a fair value. That fair value estimate may well be based upon a long-term average return. It is also not clear whether the respondent is considering a market risk premium for illustrative purposes or for investment purposes. For example, a professor might use a long-term average market risk premium estimate in class today which does not necessarily reflect today's market conditions, but an investor might use a different estimate today. For more discussion on this issue see SFG Consulting, 2013, *Response to the QCA Discussion Paper on risk-free rate and market risk premium.*

[16] QCA Risk-free Rate Discussion Paper, p. 10.

term to maturity for debt, and as such, is seemingly at a cross purposes. In other words, the QCA makes estimates of the MRP with reference to yields on ten year debt, yet considers it inappropriate to account for the use of five year term to maturity in setting the regulated rate of return.

32. At the time of writing the yield on 10-year government bonds was approximately 3.61%, compared to 3.17% for five-year government bonds. The implication of the QCA approach is that if we had a ten-year regulatory period it would expect the cost of equity for the average firm to be 9.87% (that is, a risk free rate of 3.61% plus a market risk premium of 6.26%). But if we had a five-year regulatory period it would expect the cost of equity for the average firm to be 9.43% (that is, a risk free rate of 3.17% plus a market risk premium of 6.26%).

33. If the QCA believes that the average firm would earn its estimated risk premium above the ten-year government bond yield it makes no sense to believe this estimate would change because an administrative decision was made that five-year regulatory periods were to be used. It should necessarily increase the market risk premium estimate by the current difference between ten- and five-year government bond yields.

34. This does not require an estimate of the long-term average premium relative to five-year government bonds as the QCA claims. The QCA states that the use of a long-term average estimate made with respect *to* ten-year yields allows it to use the longest period of available data so is a reasonable compromise.[17] The issue is not about measuring the risk premium with respect to a different risk free rate. It is simply about reaching a decision as to the expected return on an investment with average systematic risk, and then subtracting the QCA's estimate of the risk-free rate.

35. The QCA's reluctance to use a market risk premium relative to five-year bond yields is associated with its view on statistical imprecision, the basis for which it rounds its market risk premium estimate to the nearest percent. The QCA contends that the imprecision in the market risk premium estimate is large, relative to the difference between five- and ten-year bond yields. The leads to its view that, if it cannot be established with statistical reliability that the market risk premium estimate should be 6.26% instead of 6.00% then it should maintain the 6.00% assumption.

36. This is a misapplication of the notion of statistical estimation error. Suppose that the two bond yields are observed with precision, but the market risk premium is estimated with error. In that case, the error associated with the cost of equity capital is exactly the same as the error associated with the market risk premium. In statistical terms, assuming a ten-year term to maturity, the mean estimate for the cost of equity capital is 9.87% and it has a standard error of x%. We don't know with certainty the value for x% but we will see that it does not matter. For the purposes of the exercise, let us assume it is 0.50% so one standard error either side of the mean provides a range of 9.37% to 10.37%.

37. Then, the QCA changes its assumption for the risk-free rate but holds constant its expectation for the market risk premium. Under a five-year term to maturity, the authority changes its conclusion to a mean estimate of 9.43%. But the standard error has not changed from 0.50%. So the range of one standard error either side of the mean is 8.93% to 9.93%.

38. In essence, the QCA's view is that the two means are not statistically different from each other so it should remain with its default estimate of a 6.00% market risk premium. But the Authority has actually changed its best estimate of the cost of equity capital. It previously believed that its best estimate of the cost of equity in the broader market was 9.87%. Now it believes that its best estimate of the cost

[17] QCA Risk-free Rate Discussion Paper, p. 6.

of equity in the broader market is 9.43%. And this occurs simply because current practice is to adopt a regulatory period of five-years instead of ten-years.

39. The QCA also makes reference to commentary from Lally (2004) that increasing the market risk premium by the difference between the five- and ten-year bond yields implicitly assumes that the term structure for equity is flat. It does not invoke this assumption and in any event is irrelevant to the discussion and a distraction from the issue. The issue is that the QCA forms a view as to the expected return that the average stock will earn over the next five years. It is not possible that this expectation will depend upon the term of the regulatory period.[18]

The regulator is setting a price below that which would prevail in a competitive market

40. The basic objective in the regulation of networks is to estimate the price which would prevail in a competitive market. The mechanism by which the regulator attempts this task is to allow the firm, in expectations, to earn a regulated return which allows the firm to recover its cost of capital. This is the principle upon which the Authority relies, that the net present value of expected cash flows should equal zero.

41. The length of the regulatory period represents a trade-off between administrative burden, regulatory certainty and timeliness of assumptions. If the regulatory period is very long, there is low administrative burden, high regulatory certainty but a high risk that the assumptions which underpin the determination are no longer appropriate by the end of the period. If the regulatory period is very short, assumptions are timely but there is an increased administrative cost and reduced business confidence about revenues outside of the regulatory period.

42. The selection of the regulatory period is entirely independent of the price which would prevail in a competitive market. But by linking the term to maturity of the risk-free rate estimate to the regulatory term, the regulator is, in essence, achieving a different objective. The regulator is now in the position of determining what is the "correct" price according to a criteria other than the price which it believes will prevail in a competitive market.

43. To some extent, the nature of regulation will impact upon the firm's behaviour. The firm will operate in a manner which maximises value for shareholders, conditional upon the regulatory framework in which it operates. But the concept involved here is different to other relationships between regulation and firm behaviour.

44. In a competitive market it is reasonable to think that the owner of a network asset would finance its operations using long-term debt, given its tangible assets and relatively stable operational cash flows. It is for these very reasons that the regulator assumes the firm can finance its operations with 60% debt. Thus, in the absence of regulation, the firm would incur debt costs associated with ten-year maturity debt rather than five-year maturity debt.

45. Instead, the regulator determines that a five-year debt maturity is appropriate and provides the lower allowance associated with this shorter term to maturity. All else being equal, the regulator allows for lower prices than would prevail in a competitive market. The regulator believes this is the fair return for risk, because the underlying rationale is that the regulated return is the cost of capital. So the regulator has determined that the five-year regulatory period has lowered the firm's risk and consequently allows for lower prices than would otherwise prevail.

[18] QCA Risk-free Rate Discussion Paper, p. 6 and Appendix A, p. 20.

46. The consequence of this is that the regulator has determined that allowing a lower return/lower risk price (compared to the competitive market price) has more economic benefits than allowing for the price which would prevail in a competitive market. Yet there has been no analysis of the potential consequences of this choice. Furthermore, if it was optimal to reduce the cost of funds and therefore reduce the regulated price below the competitive market price, why would this principle not be taken further? According to the Authority's rationale, the administrative choice of a five-year regulatory term implies lower risk to the firm than a ten-year regulatory term, because this choice flows through to an average lower cost of funds. Why not implement a series of administrative choices which also reduce the cost of funds and therefore result in even lower prices?

47. The answer is that the regulatory framework is designed with the objective of replicating competitive market outcomes, and in particular the price which would prevail in that competitive market. Regulation itself changes the interaction between the firm and the market – it increases some risks and decreases others – but the intention is that the average impact on price is neutral. In adopting the shorter term to maturity in the risk-free rate assumption, the price impact is not neutral. If the Authority believes that the normal borrowing arrangement for the firm would be the issuance of long-dated debt, then adopting a short-term risk-free rate assumption necessarily implies a price below that which would prevail in a competitive market.

3. Valuation issues

Overview

48. The debate on this issue is encapsulated in three papers published in the *Accounting Research Journal* in 2007. Lally (2007a) presents the argument that the term to maturity used to estimate the cost of debt must match the regulatory period. Hall (2007) contends that this conclusion only holds under one particular set of assumptions regarding future interest rates, that forward rates are an unbiased expectation of future spot rates. Further, as this assumption is inconsistent with the empirical evidence there is no need whatsoever to align the two periods. Lally (2007b) rebuts this contention, arguing that his paper required no assumption whatsoever about future interest rates.[19]

49. This section is devoted to the technical aspects of this debate, specifically about whether the term to maturity of the risk free rate needs to match the regulatory period in order for the present value of expected cash flows to equal the asset base. We do not believe there needs to be any relationship between these two terms in order for this NPV neutral position to hold.

50. The argument of Lally (2007a, 2007b) is that regulation over five years effectively immunises investors against interest rate fluctuations outside of this five-year period. We do not know what those future rates might be, but at the time of the regulatory reset there will be a new set of cash flows which reflect these interest rates, such that the value at the end of five years is effectively guaranteed.

51. This argument basically considers an investment in a regulated entity to be equivalent to a five-year corporate bond, in which the par value is repaid at the end of the fifth year, unless there is a default. But this does not characterise the risk that investors in the regulated entity are exposed to. At the time of their investment they will form expectations for cash flows over the entire asset life and discount those cash flows at discount rates which reflect the risk of those cash flows.

52. Those discount rates are set by the market today. Just because the regulator changes the technique for estimating a series of cash flows does not change those discount rates. So if the regulator announced today that it will use lower interest rates to set the regulated rate of return, and there is no change in the discount rates set by the market, the value of the asset will fall. The only way the asset value can remain unchanged is if the fall in the regulated return is offset by a corresponding fall in the discount rate.

53. The argument of Lally (2007a, 2007b) is that this matching of regulated return and discount rates does occur, because whatever the interest rates are at the end of five years these will be the discount rates set by the market. The problem is that the value of the asset today will be determined by the market's expectations for future interest rates (which determine the expected cash flows) and the term structure of interest rates today (which determine how those cash flows are discounted). The term matching principle holds only under the assumption that the term structure of interest rates today provides a set of unbiased expectations for future interest rates. Empirical evidence shows that this assumption does not hold.

54. To simplify the analysis, both Lally (2007a and 2007b) and Hall (2007) consider the case where the asset life is two years and the regulatory period is one year. So there are two regulatory periods in the life of the asset. The two questions are:

[19] The QCA also cites Schmalensee (1989) in support of the more general principle that the regulated price should cover the firm's efficient costs, including the cost of capital. But this does not necessarily imply term matching.

a) Is there a restrictive assumption which underpins the term matching principle?

b) What is the regulated return which satisfies the present value principle which does not rely upon a restrictive assumption?

55. We address these questions below but reiterate that the issue is not simply about the technical debate. In the prior discussion we presented three implications of accepting the term matching argument – that we could lower prices and risk further by even shorter regulatory periods, that the market risk premium must rise and the regulated price being below the competitive market price. But these are not implications to be considered as a trade-off to violating the NPV neutral principle. It is still the case that the present value of expected cash flows will equal the asset base if the regulated rate of return is set with reference to the term to maturity which would actually be used in an unregulated firm. In short, using yields on ten-year bonds does not violate the NPV neutral principle.

General case

56. Consider the case where an investment of C dollars is funded by L proportion of debt and $(1 - L)$ proportion of equity. So, we want to know whether the present value of expected cash flows to equity holders equals the initial equity investment of $(1 - L) \times C$.

57. The expected cash flow to equity holders in year one is the sum of four components. The symbols used below correspond to those used in Lally (2007) apart from the symbol for the regulated return, which we express as ret_1 and ret_2 for the regulated return adopted for year one and two, respectively. Once we set up the framework we will adopt specific assumptions for the way the regulated return is set. The cost of debt and equity capital are the same in this analysis. The expected cash flow to equity holders in year one (F_1) is:

a) The return of capital – the asset base (C) multiplied by the depreciation rate (k); plus

b) The return on capital – the asset base (C) multiplied by the regulated return (ret_1); less

c) The repayment of debt – the leverage ratio (L) multiplied by the asset base (C) multiplied by the depreciation rate (k); less

d) The interest expense on debt – the leverage ratio (L) multiplied by the asset base (C) multiplied by the interest rate on debt (which is the same as the regulated return because in this analysis the cost of debt and equity capital are the same) (ret_1).

58. Expressed as an equation we have:

$$F_1 = Return\ of\ capital + Return\ on\ capital - Repayment\ of\ debt - Interest\ expense$$
$$= Ck + Cret_1 - LCk - LCret_1$$

59. The appropriate discount rate to apply to this expected cash flow is the one-year interest rate prevailing at time 0 (R_{01}). So the present value of the first year expected cash flow is:

$$PV(F_1) = \frac{Ck + Cret_1 - LCk - LCret_1}{1 + R_{01}}$$
$$= \frac{Ck(1 - L) + Cret_1(1 - L)}{1 + R_{01}}$$

$$= \frac{C(1-L)(k+ret_1)}{1+R_{01}}$$

60. Now consider the second year expected cash flow. This comprises the same four components, but with a lower investment base. The four components are:

    a) The return of capital – the asset base [$C \times (1-k)$]; plus

    b) The return on capital – the asset base [$C \times (1-k)$] multiplied by the regulated return in year two (ret_2); less

    c) The repayment of debt – the leverage ratio (L) multiplied by the asset base [$C \times (1-k)$]; less

    d) The interest expense on debt – the leverage ratio (L) multiplied by the asset base [$C \times (1-k)$] multiplied by the regulated return (ret_2).

$$\begin{aligned} F_2 = Return\ of\ capital + Return\ on\ capital - Repayment\ of\ debt - Interest\ expense \\ = C(1-k) + C(1-k)ret_2 - LC(1-k) - LC(1-k)ret_2 \\ = C(1-k)(1+ret_2 - L - Lret_2) \\ = C(1-k)[(1-L) + ret_2(1-L)] \\ = C(1-k)(1-L)(1+ret_2) \end{aligned}$$

61. As with the expected cash flow in the first year, we need to discount this expected cash flow to time zero. The discount factor in the denominator accounts for the year one year discount rate (R_{01}) and the expected one-year discount rate in year two (R_{12}). This means that the present value of year two expected cash flows is as follows:

$$PV(F_2) = \frac{C(1-k)(1-L)(1+ret_2)}{(1+R_{01})(1+R_{12})}$$

62. So if we sum the two present value computations we have the following equation:

$$PV(F_1) + PV(F_2) = \frac{C(1-L)(k+ret_1)}{1+R_{01}} + \frac{C(1-k)(1-L)(1+ret_2)}{(1+R_{01})(1+R_{12})}$$

63. So the issue becomes, is there a technique for specifying the regulated rates of return (that is, ret_1 and ret_2) which sets the right-hand side of the equation equal to the equity investment of $C(1-L)$?

Term matching

64. One approach would be to set the regulated return with reference to the yield on one-year debt. This is the proposal of Lally (2007a, 2007b). For the first year, this is observable. The yield is R_{01}, so we would set ret_1 equal to R_{01}. The issue is what happens in the second year. The argument of Lally is that, if term matching is adopted, it does not matter what happens to interest rates between now and the end of the first regulatory period. Any movement in the regulated return (ret_2) will be matched by movement in the second year discount rate (R_{12}). If the discount rate in the second year and the regulated return in the second year are aligned at R_{12} then we have the following present value equation:

$$
\begin{aligned}
PV(F_1) + PV(F_2) &= \frac{C(1-L)(k+R_{01})}{1+R_{01}} + \frac{C(1-k)(1-L)(1+R_{12})}{(1+R_{01})(1+R_{12})} \\
&= \frac{C(1-L)(k+R_{01})}{1+R_{01}} + \frac{C(1-k)(1-L)\cancel{(1+R_{12})}}{(1+R_{01})\cancel{(1+R_{12})}} \\
&= \frac{C(1-L)(k+R_{01}+1-k)}{1+R_{01}} \\
&= \frac{C(1-L)(1+R_{01})}{1+R_{01}} \\
&= C(1-L)
\end{aligned}
$$

65. As highlighted in the equation, the present value of expected cash flows is equal to the initial investment because the two expressions $(1 + R_{12})$ are off-setting. But it is at this point where the divergence of opinion arises. We have a different view to Lally (2007a, 20007b) as to what R_{12} represents. The views can be summarised as follows.

    a) Lally contends that, at the end of year one, we observe the year two interest rate and this is both the discount rate to apply to year two and the regulated return. So the interest rates will always be equivalent. Hence, setting the term to maturity equal to the regulatory period ensures the present value equation is satisfied.

    b) We disagree. Both the regulated return in year two (ret_2) and the discount rate for the second year (R_{12}) have an expected value today. If the regulator adopts a different technique for estimating the return in year two, this does not affect the market's expectation today for the discount rate in year two. This means that the present value equation above only holds under one specific assumption – that the *expectation* for the regulated return equals the *expectation* for the one-year rate in one year's time.

66. In the words used in Hall (2007) we state that, under term matching, the present value equation is satisfied only if the expectation for the next one-year rate is equal to the one-year forward rate for one-year borrowing. If, instead, the market believed that one-year interest rates were going to be the same as today's one-year rate (that is, if $ret_2 = R_{01}$) then the present value equation would be as follows:

$$
\begin{aligned}
PV(F_1) + PV(F_2) &= \frac{C(1-L)(k+R_{01})}{1+R_{01}} + \frac{C(1-k)(1-L)(1+R_{01})}{(1+R_{01})(1+R_{12})} \\
&= \frac{C(1-L)(k+R_{01})}{1+R_{01}} + \frac{C(1-k)(1-L)\cancel{(1+R_{01})}}{\cancel{(1+R_{01})}(1+R_{12})} \\
&= C(1-L)\left(\frac{k+R_{01}}{1+R_{01}} + \frac{1-k}{1+R_{12}}\right) \\
&= C(1-L)\left[\frac{k+R_{01}+kR_{12}+R_{01}R_{12}+1-k+R_{01}-kR_{01}}{(1+R_{01})(1+R_{12})}\right] \\
&= C(1-L)\left[\frac{1+2R_{01}+kR_{12}+R_{01}R_{12}-kR_{01}}{(1+R_{01})(1+R_{12})}\right] \\
&= C(1-L)\left[\frac{(1+R_{01})(1+R_{12})+(R_{01}-R_{12})(1-k)}{(1+R_{01})(1+R_{12})}\right] \\
&= C(1-L)\left[1+\frac{(R_{01}-R_{12})(1-k)}{(1+R_{01})(1+R_{12})}\right]
\end{aligned}
$$

67. The implications are that, if we assume that the yield curve next year is that same as this year's yield curve (so that $ret_2 = R_{01}$) then:

    a) If the year two discount rate is higher than this year's interest rate ($R_{12} > R_{01}$) then the expression in the square brackets is less than one and the present value of expected cash flows will be less than the equity investment. This will happen if the yield curve is upward-sloping which, on average, is true.

    b) If the year two discount rate is equal to this year's interest rate ($R_{12} = R_{01}$) then the expression in the square brackets is equal to one and the present value of expected cash flows is equal to the equity investment.

    c) If the year two discount rate is lower than this year's interest rate ($R_{12} < R_{01}$) then the expression in square brackets is greater than one and the present value of expected cash flows will be greater than the equity investment.

68. In sum, the term matching principle does not guarantee that the present value of expected cash flows to equity holders equals the equity investment. This holds only under the following assumption – that the expected interest rate in the next regulatory period is the same as the discount rate applied to that interest rate. Alternatively, if the current interest rate is the expected rate next period, then an upward-sloping yield curve will result in a loss of equity value and a downward-sloping yield curve will result in a gain.

What is the correct regulated return?

69. The previous sub-section demonstrates that term matching only provides the correct regulated return if the market's expectation for the next one-year rate is equal to the current discount rate appropriate for year two. If the market expected next year's one-year rate to be the same as this year's rate, the present value equation no longer holds. This prompts the question as to what is the appropriate regulated return?

70. To answer this question, we rearrange the general equation to solve for the regulated return in period 1 (ret_1). We have:

$$C(1-L) = \frac{C(1-L)(k+ret_1)}{1+R_{01}} + \frac{C(1-k)(1-L)(1+ret_2)}{(1+R_{01})(1+R_{12})}$$

$$1 = \frac{k+ret_1}{1+R_{01}} + \frac{(1-k)(1+ret_2)}{(1+R_{01})(1+R_{12})}$$

$$1+R_{01} = k+ret_1 + \frac{(1-k)(1+ret_2)}{(1+R_{12})}$$

$$ret_1 = 1+R_{01}-k-(1-k)\frac{(1+ret_2)}{(1+R_{12})}$$

$$ret_1 = R_{01} + (1-k)\left(1-\frac{1+ret_2}{1+R_{12}}\right)$$

71. Recall that this is a general equation. It simply expresses the regulated return in the first year as a function of the current one-year rate (R_{01}), the year two discount rate (R_{12}), the depreciation rate (k), and the expected regulated return in year two (ret_2). If the year two discount rate is the same as the expected regulated return in year two, then the regulated return in year one collapses to the one-year rate. However, if the market expects the return in the second year to be equal to the current one-year rate – so the yield curve does not change – then the regulated return which solves the present value equation is as follows:

$$\begin{aligned} ret_1 &= R_{01} + (1-k)\left(1 - \frac{1+ret_2}{1+R_{12}}\right) \\ &= R_{01} + (1-k)\left(1 - \frac{1+R_{01}}{1+R_{12}}\right) \end{aligned}$$

Numerical example

72. In this numerical example, the yield to maturity on one-year debt is 5% (R_{01} = 0.05), and the yield to maturity on two-year debt is 6% (R_{02} = 0.06). This means that the discount rate applying to the second year is 7.01%, computed as $(1 + R_{02})^2 \div (1 + R_{01}) - 1 = (1.06)^2 \div 1.05 - 1 = 1.1236 \div 1.0500 - 1 = 0.0701$. The investment base is \$1.00, leverage is 60% and the depreciation rate is 50%. Applied to the general equation, the present value of expected cash flows is:

$$\begin{aligned} PV(F_1) + PV(F_2) &= \frac{C(1-L)(k+ret_1)}{1+R_{01}} + \frac{C(1-k)(1-L)(1+ret_2)}{(1+R_{01})(1+R_{12})} \\ &= \frac{1.00(1-0.60)(0.50+ret_1)}{1.0500} \\ &\quad + \frac{1.00(1-0.50)(1-0.60)(1+ret_2)}{1.0500 \times 1.0701} \\ &= \frac{0.40(0.50+ret_1)}{1.0500} + \frac{0.20(1+ret_2)}{1.1236} \end{aligned}$$

73. The key point is that the discount factors in the denominators of the above equations are present at the time of the determination. The expectations for cash flows in years one and two could be altered by changing the regulatory process. But this would not change the discount factors. This contrasts with the view of Lally (2007a, 2007b) who contends that, under term matching, the second period discount rate is aligned with the second period regulated return. We disagree. Under term matching, the expectation for the regulated return in the second period is the market's view as to what the one-year rate will be in a year's time. This is not necessarily the same as the discount rate the market would apply today to that rate.

74. To quantify the impact on equity value, suppose that we applied term matching and assumed that the market's expectation for next period's regulated return was the same as the year two discount rate (so the market believes the yield curve represents an unbiased expectation of the next short-term rate). In this case the present value of the expected cash flows to equity holders is \$0.40 as shown below:

$$\begin{aligned} PV(F_1) + PV(F_2) &= \frac{0.40(0.50+ret_1)}{1.0500} + \frac{0.20(1+ret_2)}{1.1236} \\ &= \frac{0.40(0.50+0.05)}{1.0500} + \frac{0.20(1.0701)}{1.1236} \\ &= 0.2095 + 0.1905 \end{aligned}$$

$$= 0.4000$$

75. However, equity holders under-recover if the market actually expects the yield curve next year to be the same as the current yield curve. If the market expects next year's one-year rate to still be 5%, equity value falls by 1%.

$$\begin{aligned} PV(F_1) + PV(F_2) &= \frac{0.40(0.50 + ret_1)}{1.0500} + \frac{0.20(1 + ret_2)}{1.1236} \\ &= \frac{0.40(0.50 + 0.05)}{1.0500} + \frac{0.20(1.05)}{1.1236} \\ &= 0.2095 + 0.1869 \\ &= 0.3964 \end{aligned}$$

76. Alternatively, suppose that the regulated return was set according to the equation presented in the previous sub-section. In this instance, given the assumption that the yield curve does not change, we have:

$$\begin{aligned} ret_1 &= R_{01} + (1 - k)\left(1 - \frac{1 + ret_2}{1 + R_{12}}\right) \\ &= R_{01} + (1 - k)\left(1 - \frac{1 + R_{01}}{1 + R_{12}}\right) \\ &= 0.05 + (1 - 0.50)\left(1 - \frac{1.0500}{1.0701}\right) \\ &= 0.05 + 0.50 \times 0.0188 \\ &= 0.05 + 0.0094 \\ &= 5.94\% \end{aligned}$$

77. If this regulated return were incorporated into the present value equation in year 1, and if the expected return in year two is 5% (because the yield curve does not change) then the present value of expected cash flow is:

$$\begin{aligned} PV(F_1) + PV(F_2) &= \frac{0.40(0.50 + ret_1)}{1.0500} + \frac{0.20(1 + ret_2)}{1.1236} \\ &= \frac{0.40(0.50 + 0.0594)}{1.0500} + \frac{0.20(1.0500)}{1.1236} \\ &= 0.2131 + 0.1869 \\ &= 0.4000 \end{aligned}$$

Conclusion

78. The key point is that term matching only sets the present value of expected cash flows equal to the investment base *if* the expected regulated return in the next period is equal to the discount rate for that period which the market observes today. The general equation we present does not rely upon this restrictive assumption. We can solve for the correct regulated return in the first period as a function of expected future interest rates.

79. According to the term matching approach, if there is an upward-sloping yield curve and if this upward-slope is expected to continue, equity holders will not recover their investment in the present

value of expected cash flows. In contrast, if the regulated return is set according to all future interest expectations, the present value equation will be satisfied.

80. Furthermore, if the regulator had to choose between setting the regulated return at the five-year bond yield or the ten-year bond yield (rather than determine the return with reference to all rates) the estimation error will be considerably lower if the regulator refers to the ten-year bond yield. In general, the life of the regulated asset will be considerably longer than ten years. In theory, the correct regulated return will be a function of interest rates over the entire life of the asset. So if we could observe yields at maturities longer than ten years, and even if these yields did not rise above the ten-year yields, the weighted average yields over the entire asset life will be considerably closer to the ten-year bond yield than the five-year bond yield.

4. Conclusions

81. The QCA considers that the term to maturity used to estimate bond yields for setting the regulated return must equal the regulatory period. The basis for this conclusion is that it is only under this assumption that the present value of expected cash flows matches the asset base. This is not correct. The present value relationship is still satisfied without this requirement. Furthermore, when the yield curve is upward-sloping this will result in the present value of expected cash flows falling below the investment base.

82. Implicit in the advice to the QCA is an assumption that the discount rate series we observe today is a reliable indicator of future regulated returns. This is not necessarily true. If the current yield curve is an unbiased estimate of future yields, and if there is an upward-sloping yield curve, then the firm will continue to receive regulated returns below the cost of capital.

83. Furthermore, under the QCA's approach, there are three implications which necessarily follow and which suggest there is some underlying assumption which does not make sense. We have identified that underlying assumption and illustrated the technique which allows the regulator to determine the appropriate regulated return under any specified set of expectations for interest rate movements. This technique can be expanded to any number of periods, with the result being a rate much closer to the ten-year bond yield than the five-year bond yield.

84. The three implications of term matching are:

    a) Given an upward-sloping yield curve, regulated prices could be immediately lowered without any value loss to the firm, simply by reducing the length of the regulatory period. According to the arguments for this approach, the firm is not exposed to the risk of interest rate fluctuations subsequent to this period because these are entirely offset by changes to the discount rate. If this is true, why not eliminate the risk altogether by having the shortest regulatory period possible?

       A counter-argument to this implication is that the risk and price reduction benefits of even shorter regulatory periods would be offset by increased refinancing risk. But there has been no analysis to suggest that five-year regulatory periods represent a better outcome than one, two, three or four years according to this rationale. The reason this has not been analysed is because, in reality, we cannot arbitrarily reduce the risk of the firm simply by shortening the regulatory period. Given an upward-sloping yield curve there will simply be lower regulated returns under term matching and a reduction in equity value.

    b) The estimate of the market risk premium must necessarily be changed. The cost of equity capital for the average firm is not contingent upon the administrative choice of the regulatory period or the decision of the regulator to align the term to maturity of the debt estimate with that period. If the risk-free rate input is lowered, unless the regulator has in fact altered the view as to the required return to equity holders in the Australian market, the market risk premium estimate must rise.

       Discussion about statistical imprecision in the measurement of five versus ten-year risk premiums, or about whether the term structure for equity returns is flat are not relevant. In reaching a decision on the regulated rate of return, the QCA incorporates an assumption about expected equity market returns. Its expectation for returns in the equity market can't

be different depending upon whether an administrative choice is made to reset prices for a regulated entity every three, five, ten years or any other time.

c) The regulator would no longer estimate the price which would prevail in a competitive market. As a general principal, the regulator is attempting to estimate the price which would prevail in a competitive market. We see no reason why this competitive market outcome would be related to the administrative choice as to the regulatory period. Clearly, the regulatory framework interacts with firm risks and firm behaviour. We cannot ignore this interaction. However, there does not seem to be a sensible reason to set low prices in jurisdictions with short regulatory periods and high prices in jurisdictions with long regulatory periods, when in both cases the ultimate objective is to estimate a competitive market price.

85. In short, the present value relationship is not breached when the regulator refers to ten-year bond yields and none of the implications mentioned above are triggered.

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Options for Estimating a Weighted Average Cost of Capital for Water Utilities: A Preliminary Discussion Paper*

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Prepared for Unitywater
March 2013

* This paper is incomplete however it has been provided in its current form at the request of Unity Water.

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Executive Summary

The Concern Being Addressed

1. The return on capital[1] is the most significant component of the building block approach to setting maximum revenue (and prices) for water and sewerage pricing. It is calculated as the opening Regulatory Asset Base ["RAB"] x Weighted Average Cost of Capital ["WACC"].
2. Under current regulatory practice in Australia, changes in the risk free rate and the risk premium on debt tend to flow directly through to changes in the WACC set at the commencement of each regulatory period. By contrast regulatory practice is to maintain the risk premium on equity at the long term average thereby leading to an inconsistency in the timing of measurement of the inputs. Recent increased volatility in the risk free rate (and other inputs) can therefore translate to large changes in the maximum revenue requirement and prices for water (and other utility services).
3. Unitywater is concerned that the potential volatility in prices arising from this price setting process is inconsistent with the relative stability that would be expected to accompany the use of very long lived assets financed by long term capital.
4. There is a window of opportunity to reconsider the regulatory pricing process for the water industry in Queensland. Unitywater (and the industry more broadly) is seeking input on possible options and associated strengths and weaknesses that might reduce the volatility in prices, while providing investors with a satisfactory return, that can arise from the current regulatory process. The input is part of the Queensland Competition Authority's ["QCA's"] process to develop a permanent price monitoring framework to apply to the South East Queensland water distributor-retailers from 1 July 2015.
5. This preliminary paper is incomplete but identifies a number of options (not discussed in full at this time) that may meet the dual objective. In addition, we understand that the content of this paper in its' current form is also relevant to the QCA's current WACC Methodology Review. In particular, the paper contains some initial analysis of market data which may provide background for consideration of alternative ways to estimate the market risk premium for regulatory purposes.

[1] To be distinguished from the return **of** capital – which is essentially the depreciation charge for the RAB.

Framework and Setting

6. In this section, we briefly outline some economic and management principles that guide our analysis.

7. Water and sewerage assets are very long lived assets (expected life is greater than 50 years). As commercial businesses attempting to attract funding for initial and ongoing investment in such assets, these utilities have to consider whether the investment can earn at least the opportunity cost of investing in other assets of comparable risk and duration.

8. A general risk mitigation principle when funding the acquisition of assets is to match the duration of funding (both debt and equity) to the duration of the asset. Not doing so exposes the business to:

    a. ***roll over risk***, the risk of not being able to raise the capital at all. Relatively recent examples of the adverse consequences of exposure to this risk are Centro Properties and Babcock and Brown. Neither could raise debt at the time of roll-over with extremely adverse consequences for shareholders;

    b. ***transaction costs*** associated with raising capital each time a roll-over occurs, and

    c. ***interest rate changes*** that can cause profitability to be different from what was expected at the time the assets were purchased and therefore exposes the business to the probability of an interest cost increase which increases default risk and associated costs.

9. In practice, most businesses with very long lived assets are exposed to these risks because debt funds are not available for the life of the assets. This leads to implementation of a variety of risk minimisation practices such as spreading the maturity of debt over time so that not all is 'renewed' at one point in time and hedging interest rate exposure.

10. The lack of an active market for very long maturing debt also creates challenges in easily assessing the opportunity cost for long life assets. As a default, common practice in Australia is to use the yield on ten year maturing Commonwealth Government Securities as a proxy for the risk free rate and for estimating debt and equity risk premia. This is likely to underestimate the interest cost of debt when assets have lives longer than ten years.

11. Water and Sewerage assets (as for most Utility businesses) are subject to regulatory pricing as a result of concerns about monopoly pricing. Typically the regulatory regime in South East Queensland is attempting to establish oversight that:

    - Imitates the outcome of a competitive market;
    - provides incentive for efficiency in capital and operating expenditure; and

- reflects the prevailing economic conditions at the time of each pricing reset.

12. An often cited guideline when setting regulated prices is to enable the regulated business to earn a return consistent with the opportunity cost of capital of a *benchmark efficient business* (it can potentially earn more if it can operate more efficiently than the benchmark).

13. Its application is typically using the building block approach which assesses a maximum revenue from adding together;

    a. A return on capital (the opportunity cost of capital applied to a regulatory asset base[2]);

    b. A return of capital typically depreciation;

    c. Taxes payable; and

    d. 'Efficient' operating and maintenance costs.

14. Typically, the opportunity cost of capital is estimated as a '*plain vanilla'* weighted average cost of capital with:

    a. The opportunity cost of debt estimated as the risk free rate on ten year maturing debt plus a risk premium for debt rated in the BBB range for infrastructure assets where the levels of debt are high at around 60%;

    b. The opportunity cost of equity estimated using the Capital Asset Pricing Model ["CAPM"]; and

    c. The gearing weights as 60% debt.

15. The regulatory process, as a general rule, breaks pricing decisions into five year intervals. This means that each five year price path can move up or down relative to the prior path when each regulatory decision is implemented. As is noted below, a change in the WACC used to calculate the return on capital from (say 10%) to (say 7%) will lead to a substantive change in the required revenue for Unitywater. The interval selection of five years can lead to implementation challenges when all inputs to WACC, for example, do not reflect current economic conditions – which is one issue underlying behind the motivation for this discussion paper. As noted, the market risk premium ["MRP"] in particular is the stand out input that does not reflect current economic conditions and this can facilitate the large movements in required revenue.

[2] We are accepting the RAB as a given in this paper but what is an 'optimal' structure to the assets of regulated infrastructure is becoming a significant issue for regulators.

Options For Minimising Price Changes

16. The primary focus of this discussion paper is on the WACC component of the return on capital component of the building block approach to regulatory price setting.

17. Options for dealing with the current inconsistency in the timing of estimating the inputs to the WACC are identified in this section of the paper with a preliminary (and cursory at this time) discussion of strengths and weaknesses of each. An estimate of the WACC under each option and the resulting price path derived from the current RAB and capital expenditure profile has not yet been estimated.

18. The options considered to date are:

    Work within the current regulatory regime but use a consistent approach to estimating the timing of the inputs to the WACC. In turn, consistency can be achieved by:

    i. Using spot rates for all inputs;

    ii. Using average rates for all inputs..

Work within Current Regulatory Framework but Deal with Flaws

19. The recent impact of the GFC and aftermath on capital markets has brought into focus a deficiency in the way the weighted average cost of capital ["WACC"], has been generally estimated when there are 'unusual" circumstances exhibiting high (or low) risk. The WACC for decision making and regulatory purposes is an opportunity cost which should reflect the market's forecast of economic conditions that are expected to prevail over the decision horizon. In well attended capital markets the spot rate on long dated financial instruments should reflect the opportunity cost for long-lived assets like those in the water industry.

20. A model is required to estimate the cost of equity because a spot rate is not observable as it is for debt. The most widely used model is the Capital Asset Pricing Model ["CAPM"].

21. The CAPM equation is:

$$E(k_e) = r_f + [E(k_m) - r_f]\,\beta_e \qquad (1)$$

Where $E(k_e)$ is the expected return on asset e or cost of equity if the asset is equity

r_f is the nominal risk free rate of return

$E(k_m)$ is the expected return on the market portfolio

$[E(k_m) - r_f]$ is often called the expected market risk premium ["MRP"] being the amount by which investors will be rewarded for bearing the risk of the market portfolio which has a beta of 1

β_e is the equity beta or risk of asset e relative to the risk of the market.

22. A mix of average and spot rates has been generally used as inputs to the CAPM equation to estimate the cost of equity whereas a spot rate is used for the cost of debt for input to the WACC calculation. This is because a spot rate for the long run expected return on the market or the market risk premium is not readily observable. Consequently the cost of equity is usually estimated with a spot risk free rate but an average equity risk premium, in turn estimated as an average market risk premium (usually over a very long horizon) and an average beta (usually estimated over a much shorter time horizon). For explanatory purposes, the average market risk premium can be viewed as if it is an average market return less an average risk free rate (although this is not the way it is calculated). An outcome of the usual process is that the risk free rate to which an equity risk premium is added is a spot rate and it will differ from that implicit in the market risk premium where averages are used. Strictly speaking these two risk free rates should be the same and be spot rates just as the expected return on the market should be a spot rate.

23. Recent increased risk in capital markets is naturally accompanied by an increase in the risk premium in required rates of return. This will be reflected in the cost of debt component of the WACC estimate but not in the equity component when long term averages are used. A consequence will be the narrowing of the margin between the cost of debt and equity[3] and in the case of a recent QCA draft determination for SEQ Water the incongruent outcome of a cost of debt higher than the cost of equity. The outcome is an underestimation of the WACC under current high risk conditions (the converse also holds).

24. Two further matters may have exacerbated the challenge in estimating a current WACC.: One is that the thinness of the Australian corporate debt market (in both size and number of trades) means a paucity of data for estimating a debt risk premium ["DRP"], particularly for 10 year bonds, and a need to use a form of modelling for this purpose – always second best to using actual market data. The other is changes in liquidity and in the demand for long dated Commonwealth Government Securities ["CGS"] causing some concern that the risk free rate is lower than it would be otherwise. A concern is that current risk free rates are generally low around the world relative to pre GFC levels. If price determination hearings occur when rates are 'low' which subsequently rise over the regulatory price review period then, given inflexibility in output prices, regulated businesses are concerned investors will not be able to earn the prevailing required rate of return for long term investments or assets. Of course the converse will also hold whereby regulatory authorities will be concerned that investors are overcompensated if

[3] The absurdity of this outcome is clearly demonstrated by the increase in debt spreads with increases in risk during the GFC. The same transmission could be expected to increase the spread between debt and equity.

the WACC is set for a period that is less than the 'life' of the investment and the risk free rate falls.

25. Possible solutions to the challenge of mixing spot and average rates is to estimate either a spot expected market return and deduct the current risk free rate to obtain an estimate of the expected market risk premium or to estimate an expected market risk premium directly. Another is to adjust the long run average MRP for changes in the risk free rate relative to the average. Yet another is to use averages for all variables. We consider these options in more detail.

Use of the dividend discount model to estimate a spot expected return on the market and deduct the spot risk free rate

26. The dividend growth model attributed to Gordon and Shapiro has been widely used in regulatory determination in the USA to estimate the cost of equity instead of the CAPM so there is regulatory precedent for its use.

27. The simplest form of the growth model describes a share price p_0 as the present value of the next expected dividend (d_1) that is expected to grow at a perpetual rate g[4]. The discount rate is the cost of equity (k_e) for the underlying company or asset. The relationship is:

$$p_0 = \frac{d_1}{ke - g}$$

28. The cost of equity implicit in an observed share price, given estimates of k_e and g can be 'backed out" of the model. By re-arrangement:

$$k_e = {}^{d_1}/_{p_0} + g$$

29. Thus the cost of equity can be viewed as the next *expected dividend yield* plus the *expected perpetual growth rate* in dividends. The model can be used at the individual share level which in turn can be summed (weighted) to a market view or used at a market level per se.

30. More expansive forms can be used where a forecast series of dividend yields are substituted for a single estimate with the growth rate reflecting growth after the forecast period of individual dividends.

31. The model is forward looking and so can provide valuable information on discount rates incorporating changes in views of cash flows and the cash flow profile.

[4] The g or growth in a perpetuity model must be equal to the retained earnings times the cost of equity capital to be logically correct, any other number cannot occur in perpetuity.

32. CEG, Capital Research and SCG for example, have advocated use of the model in the Australian regulatory environment. They use analyst's consensus forecasts to obtain an "informed' view of the dividend yield(s). Bloomberg also estimate a MRP for a number of countries by using share price data and analysts' consensus forecasts of earnings / dividends.

33. Estimates as at December 2011 provide a forward MRP above the more traditionally used 6%. Clearly this captures a spot rate for the expected return on the market and the MRP to match the spot rate traditionally used in the CAPM and thereby overcoming the timing inconsistency referred to earlier.

Table 1: Use of Dividend Growth Model to estimate MRP

Who	Div Yield*	Growth	Implied E(km)	Rf	MRP
NERA	6.03	5.65	11.68	3.99	7.7
CEG	5.68	6.60	12.28	3.77	8.5
Capital Research	6.29	7.00	13.29	3.73	9.6
Bloomberg					10.5

Primary source: Capital Research, "Forward Estimate of the Market Risk Premium: Update", March 2012; A Report Prepared for distribution businesses: APA Group, Envestra, Multinet Gas and SP AusNet, March 2012. Also see: NERA Economic Consulting, "Prevailing conditions and the Market Risk Premium, a report for APA Group, Envestra, Multinet and SP AusNet, 28th March 2012. CEG "Internal consistency of risk-free rate and MRP in the CAPM", a report for Envestra, SP AusNet, Multinet and APA Group, March 2012.

34. A particular challenge with use of the various forms of the model is their sensitivity to assumptions about the cash flow profile and therefore the dividend yield derived from analysts' forecasts. Often the forecasts are for 2 or 5 years into the future so the cash flows beyond that period are approximated by a growth rate. Because of the sensitivity to the expected market return to this variable, the growth rate is variable is usually criticised by those wishing to discredit the approach or derive a different estimate of an equity risk premium or MRP.

Strengths

- Explicitly provides a forward view of the market return therefore of the MRP;
- Will change to reflect economic circumstances prevailing at the time of the estimate;
- Uses market analysts consensus forecasts of future cash flows and therefore can be viewed as independent of a regulator, the regulated companies and their advisors;
- Its use has regulatory precedent in the USA and has been used as input to regulatory hearings in Australia by advisors to both the regulators and the regulated.

Challenges

- The outcome is very sensitive to the assumption(s) about g thus providing a challenge in obtaining agreement between parties;
- Consensus forecasts are not always up to date or timely;
- At this time insufficient evidence has been collated (or is available) to establish whether its use in the current regulatory reset process will lead to more stable prices. Some evidence in this regard is provided in a later section.

Use of implied volatility from option on the stock market and a constant MRP per unit risk

35. Another method of obtaining an estimate of the spot MRP is to derive it from information about the amount of risk apparent in the stock market. This can be obtained by 'backing out implied volatility' of an option pricing model applied to the prices of options on the stock market index.

36. We have recommended (and used) this approach however we propose it only as a means of amending the MRP under unusual economic circumstances such as the GFC and its aftermath.

37. The method has its genesis in the CAPM which describes the risk premium on equity as beta times the MRP. The MRP, in turn, can be shown to be a function of the risk or variance of the market and the market price of risk. Merton[5] for example, describes the MRP (at a point of time) in terms of:

$$MRP = \alpha - r_f = Y_1\sigma^2$$

where α is the expected market return

r_f is the risk free rate

Y_1 reflects a representative investor's relative risk aversion (or the reciprocal of the weighted sum of the reciprocal of each investor's relative risk aversion and the weights are related to the distribution of wealth among investors)

σ^2 is a current view of the variance of the market return.

38. Here the MRP is expressed as amount of risk times the 'price of risk' or a 'reward to risk ratio' as Merton calls it.

[5] R Merton, "Estimating the Expected Return on the Market: an Exploratory Investigation", Journal of Financial Economics, 8, 1980 p 323-361

39. We assume Y_1 is a constant and equal to the average historical MRP divided by the average historical standard deviation of the market (□).

40. The link to total market risk can also be seen by direct reference to the CAPM for the market as a whole:

$$E(k_m) = r_f + [E(k_m) - r_f] \beta_m$$

$$\text{Since } \beta_m = \text{cov}(k_m, k_m) / \sigma_m^2$$

$$= \sigma_m^2 / \sigma_m^2 = \sigma_m / \sigma_m \text{ then}$$

$$E(k_m) = r_f + [E(k_m) - r_f) \sigma_m / \sigma_m$$

$$= r_f + [E(MRP)/ \sigma_m] \sigma_m'$$

41. As noted, we have applied this relationship by assuming the reward to risk ratio [E(MRP) / σ_m) is constant derived from historical averages and used a forward view of σ_m available from the implied volatility of options on a stock market index.[6]

42. The forward estimate of market risk is assessed from the implied volatility of traded options written on the ASX 200 Index. We apply a constant MRP per unit of risk to the current estimate of market risk to derive a one year view of the MRP. It is a one year view because the option contract has a one year maturity. The one year estimate is transitioned to the long run average MRP over a typical 5 year regulatory period.

43. Our most recent application of the approach (based on 20 day average implied volatility to 16 August 2012) provides a one year forward view of 9.1% which, when transitioned to the long run MRP of 7% over 5 years generated an MRP of 8.4% p.a. The 8.4% is a geometric average of the decline from 9.1% to 7% over five years. This is a conservative view of the profile given that the one year forward rates in the BBB debt risk premium for seven years do not show any evidence of a decline.

44. While the approach can be criticised for lack of precision, this form of criticism can be levelled at much of the process of estimating the WACC. In our view the approach provides a MRP that is more reflective of current circumstances than the historical average that does not reflect current economic circumstances. It is also better aligned with the DRP than the historical average thereby capturing a similar view across the capital market.

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[66]Lettau M & S Ludvigson, "Measuring and Modeling Variation in the Risk- Return Trade-off", Handbook of Financial Econometrics, Vol 1, 2010, Ch 5 note that the empirical evidence on whether the reward for risk is constant is mixed and inconclusive. Given that we are seeking a practical method of adjusting for an unusual risk environment we are of the view that our approach is reasonable and not contradicted by the evidence. We also note that Wang, "Is Australia Risk Averse? Some Evidence from the All Ordinaries Index Market", Working Paper (ssrn.com/abstract= 1104883) finds a positive risk return trade-off and that Australian stock market investors are risk averse.

45. Figure 1 shows an application of this approach to historical data. The figure contrasts the cost of equity so estimated with the cost of equity estimated using the constant 6% MRP. Both estimates use a beta of 0.8 and the prevailing real risk free rate. Figure 2 shows the resultant WACC for the two approaches using 60% gearing and a common cost of debt.

Figure 1: Estimates of the Real Cost of Equity using a constant 6% MRP Vs a Variable MRP

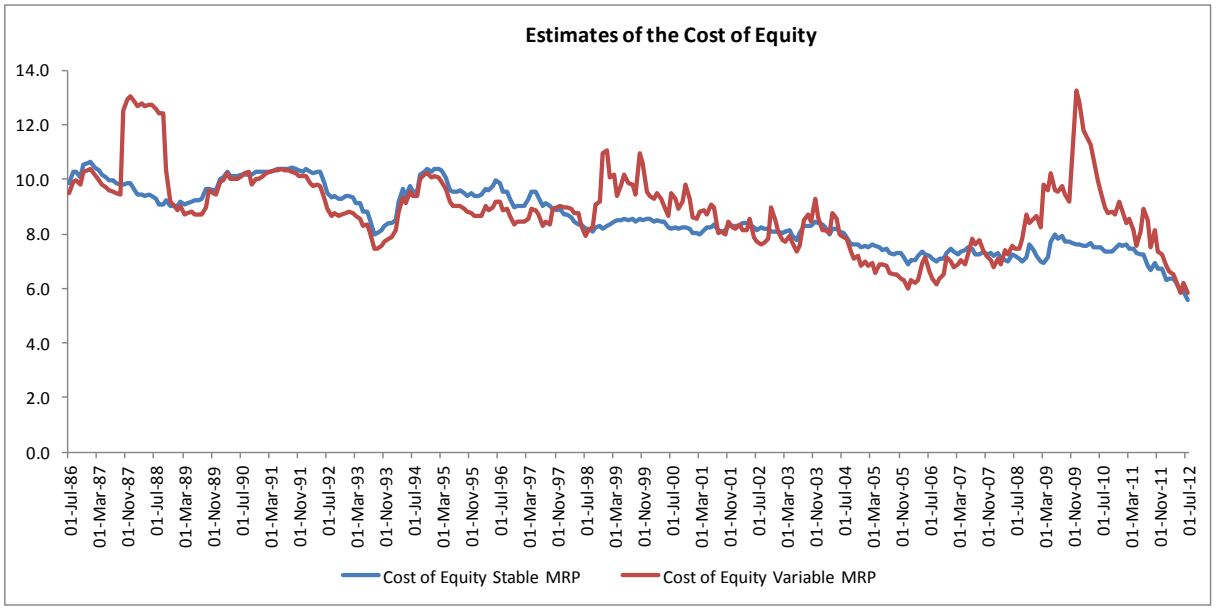
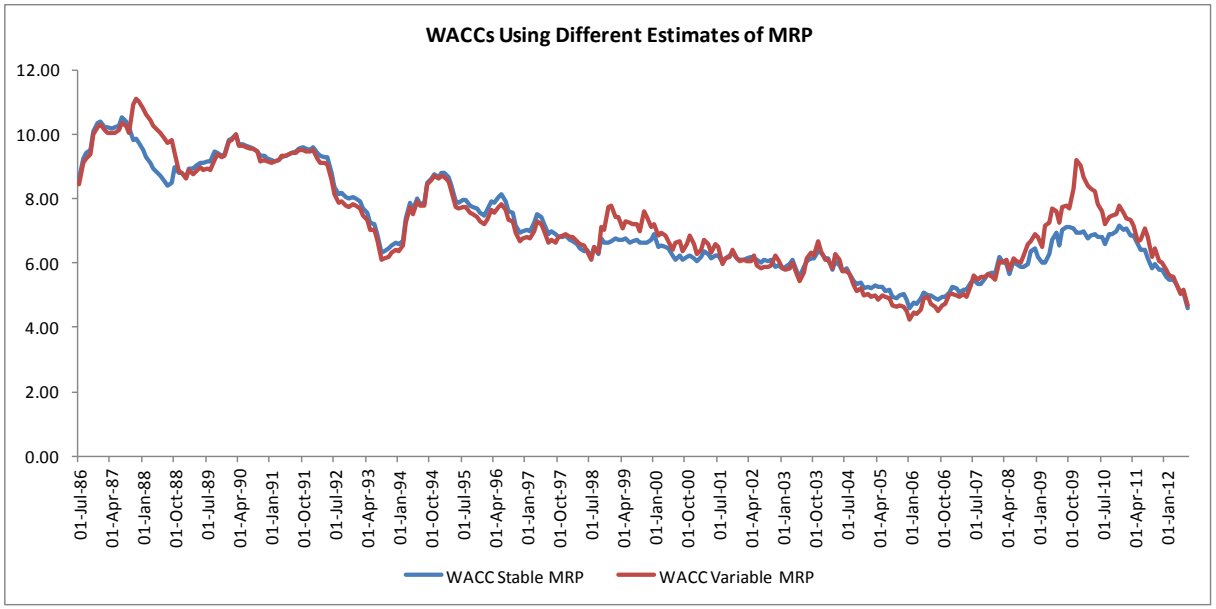


Figure 2: Estimates of Real WACC using a constant 6% MRP Vs a Variable MRP



46. The two estimates (of both cost of equity and WACC) track each other generally however they depart in times of relatively unusual risk behaviour. The cost of equity derived from a variable MRP is higher than that derived from a constant 6% MRP in times of higher than

average risk and lower in times of below average risk. This outcome is consistent with finance theory and what might be expected pragmatically. It also confirms a view presented earlier that departure from use of a constant MRP is warranted when economic circumstances are 'unusual'.

47. Key points about the time series estimates for cost of equity above include (yet to be expanded):

    - The yield on indexed CGS was used as the real risk free rate - the first date this was published by the RBA was in July 1986 and this defines the start of the time series
    - An MRP of 6% was used as the constant MRP (real) for the 'stable MRP' estimates
    - A one year forward view of risk from traded options is available from September 2004 however a 3 month view is available from July 1997. We have used the latter to provide the longest time series. Prior to 1997 we used an estimate based on prior market historical volatility. The two track closely over the period for which we have when have common data
    - A beta of 0.8 was used to estimate the cost of equity.

48. Key points about the time series estimates for WACC include (yet to be expanded)

    - The cost of debt is meant to reflect that for a BBB rated corporate entity
    - The public corporate debt market in Australia is small and illiquid and yield data is hard to find prior to July 1998. We have used Bloomberg data (7 year maturities to give the longest time series) where available and filled in with some Spectrum data post July 1998. The data pre-1998 was estimated using a regression model relating the DRP on corporate bonds to the DRP on NSW Treasuries (both relative to 10 year CGS yields). The pre 1998 data is therefore a not market data but it affects both methods of estimating the WACC equally.

Strengths

- Explicitly provides a forward view of the MRP;
- Will change to reflect economic circumstances prevailing at the time of the estimate;
- Uses a forward view of risk albeit a one year view;
- Appears to provide a cost of equity that better reflects risk levels prevalent at each point in time.

Challenges

- The application of the construct is relatively new and will require 'greater scrutiny' to be acceptable to both regulated and regulators;
- Currently the most reliable estimate of a forward view of risk is a one year view. Consequently assumptions are necessary to convert this to a view that is expected to prevail over the regulatory period. These are open to criticism and disagreement.
- There has been some criticism of the data but this has not been not quantified[7]

Adjust the long run average MRP for changes in the risk free rate

49. It has been argued that there is negative correlation between the expected market return and the risk free rate. One such argument has been described as a 'flight to quality'. That is, in times of high risk, investors move to low risk securities (e.g. CGS) increasing the price (lowering the yield) thereby inducing negative correlation. This is also consistent with investors becoming more risk averse and demanding a higher premium for investing in risky assets. To the extent that higher risk is associated with lower expected GDP growth, it is feasible that the risk free rate falls while the required market return rises or doesn't fall as much as the risk free rate.

50. While such argument can be mounted, the challenge for formally modelling the impact is to capture the dynamic relationship between the expected return on the market and the risk free rate. This is not feasible within the construct of the single period CAPM. The CAPM is a one period model and does provide guidance on changes of the variables over time - it cannot guide how the expected return on the market or the risk free rate change over time nor how these inputs may or may not be correlated. It would be necessary to seek guidance from a multi-period CAPM model to provide guidance about any relationship.

51. One tempting solution is to assume a constant expected return on the market e.g. the average historical actual return and adjust this by the prevailing risk free rate to obtain the expected MRP. While this provides a more stable estimate of the cost of equity over time than the use of a constant MRP it is challenging to support it from a theoretical perspective using the single period CAPM. For this reason we do not pursue this option further.

Strengths

- Recognises that MRP is not constant over time;
- Provides a more stable WACC than use of a stable MRP (at say 6%);

[7]Hall, Martin. Response to 'adjusting the market risk premium to reflect the global financial crisis' [online]. JASSA, no.4, 2011: 11-14

- Certainly deals with the concern about the risk free rate being low currently by providing a higher MRP and therefore higher cost of equity than under the traditional approach;
- Relatively straight forward.

Challenges

- Not consistent with the single period CAPM which does not define a time path for $E(r_m)$ and R_f nor any relationship between them;
- Assumes a constant $E(r_m)$ - which is unlikely;
- Relies on negative correlation between $E(r_m)$ and R_f to provide a more stable MRP / cost of equity and this, in turn, requires empirical support at least and an understanding of the circumstances that cause the negative correlation.

Use averages for all inputs rather than spot rates

52. One method of 'smoothing' prices is to establish the revenue requirement using a WACC that reflects the averages of the inputs. Effectively this is built on a view that over the long term the "unders' and 'overs' of the actual WACC versus the average cancel each other out. The approach has an implicit assumption that the distribution of each input that generated the averages is stable over time.

53. A particular challenge is estimating the average. Using an assumption that the past is a guide to the future enables averages to be estimated from past data. However a challenge lies in defining the time period to calculate the average.

54. By way of example, we have advocated the use of the longest period available to estimate the historical average MRP. This is for a number of reasons including:

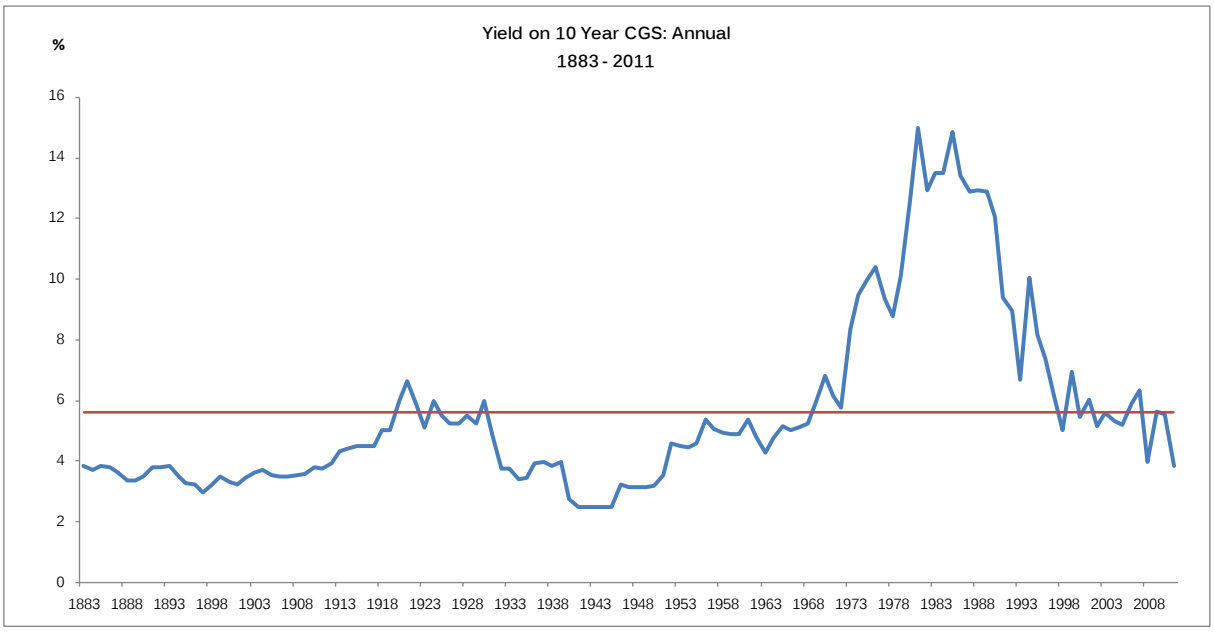
    a. The historical observations are highly volatile thereby requiring a large number to obtain confidence in the mean (minimise the standard error of the estimate)

    b. Unusual events, like the GFC, will have a big influence on the average if a short period is used. As a result the event will be over-represented relative to the likelihood of its reoccurrence and provide a biased average.

55. A similar challenge lies with estimating an average risk free rate. Figure 3 shows the 10 year risk free rate[8], captured annually, from 1883 to 2012. It should be apparent that the average will vary depending on the period chosen - for example, an average that commences with the high rates in the 1980s will be higher than one that commences with circa 2000.

[8] Mostly 10 year - see Officer, R. R., 'Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective', in Ray Ball, Philip Brown, Frank J. Finn and R. R. Officer(eds.), *Share Markets and Portfolio Theory: Readings and Australian Evidence*, University of Queensland Press, 1989r

Figure3: Historical Risk Free Rate: Yield on (mostly) 10year Commonwealth Government Securities



56. Table 2 captures statistics for the risk free rate calculated over different periods.

Table 2: Statistical characterisation of 10 Tear CGS over various time periods

Source	RBA	RBA	RBA	Officer
	Daily	Monthly	Monthly	Annual
	3 Jan 1995 to 31 October 2012	July 1969 to October 2012	January 1980 to October 2012	1883 to 2011
Average	5.91	8.68	8.81	5.61
Std Dev	1.29	3.29	3.65	2.94
Coeff of Variation	0.22	0.38	0.41	0.52
Maximum	10.56	16.50	16.50	15.00
Minimum	2.70	2.89	2.89	2.50
3rd Quartile	6.21	11.51	12.89	6.00
2nd Quartile	5.68	8.18	7.43	4.88
First Quartile	5.32	5.80	5.60	3.64
No. Obs.	4504	520	394	129

57. While the longer period is generally preferred, data for a long period is not available for all inputs and it is desirable to have data for all inputs for a common time period. As noted already, the public corporate debt market in Australia is small, illiquid and has a short history. Consequently it is challenging to know whether the average debt risk premium calculated from available data is representative of what may happen in the future.

58. Our estimates of the average inputs and the consequent WACC have been calculated using real rather than nominal data for the period July 1986 to July 2012 and the WACC is summarised in Table 3. The period is restricted largely due to data availability. We have used real data then converted it to nominal with a current view of inflation (2.5% as a starting point). The real plain vanilla WACC calculated using the average inputs was 6.7% which translates to a nominal WACC of 10%.

Table 3: WACC Using Averages for all inputs (Monthly Data Jan 1981 to July 2012)

Input	Average	Median
Rf (Real Terms)	3.8	3.6
MRP (Stable)	6.0	6.0
DRP (bp)	244	204
Gearing	0.6	0.6
Beta Equity	0.8	0.8
Plain Vanilla WACC (Real)	7.1	6.7
Assumed Inflation (placemarker)	2.5%	2.5%
Plain Vanilla WACC (Nominal)	10%	9%

59. In contrast Table 4 captures the average of the WACC calculated on a monthly basis using the same data as that used to capture the averages of the inputs in Table 3. The columns containing the words "Using Variable MRP" captures the estimates using a forward view of the MRP derived from an estimate of market volatility as discussed in a prior section.

60. The outcomes are similar.

Table 4: Average WACC (Monthly Data Jan 1981 to July 2012)

	Real WACC		Nominal WACC	
	Using 6% MRP	Using Variable MRP	Using 6% MRP	Using Variable MRP
High	10.5	11.1	13.3%	13.9%
3rd Quartile	8.4	8.6	11.1%	11.3%
Median	6.7	7.0	9.4%	9.7%
1st Quartile	6.1	6.1		8.8%
Low	4.6	4.2	7.2%	6.8%
Simple Average	7.1	7.3	9.8%	10.0%

Relationship between the expected market return and the risk free rate

61. There is evidence and opinion that there is an inverse relationship between the risk free rate and the MRP to use in the CAPM to estimate the cost of equity. Evidence exists in the UK and USA as well as in the Australian Market.

62. A finding by Smithers & Co[9] (in a submission to the cost of capital for a regulated Airport) was that the sum of the risk free rate and the equity risk premium is more stable than the individual components. Smithers and Co conclude:

"There is considerably more uncertainty about the true historic[al] equity premium and (hence the risk-free rate) than there is about the true cost of equity capital. From the perspective of the regulators, however, this ranking of uncertainty is fortunate, since the latter is far more important, for firms with risk characteristics not too far from those of the average firm. For this reason we regard the standard approach to building up the cost of equity, from estimates of the safe rate and the equity premium, as problematic. We would recommend, instead, that estimates should be derived from estimates of the aggregate equity return (the cost of equity for the average firm), and the safe rate."

"Given our preferred strategy of fixing on an estimate of the equity return, any higher (or lower) desired figure for the safe rate would be precisely offset by a lower (or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected." P 49

63. This view is shared by Aswath Damodaran[10] as examining US data. As he states:

"If you define the expected return from stocks as the sum of the risk free rate and the equity risk premium, the last decade has seen changes in that composition. Note that while the overall expected return on stocks (backed out from level of the S&P 500 index and expected cash flows from stocks) has been in a fairly tight range (8%-9%), the proportions coming from the risk free rate and equity risk premium have changed."

64. CEG[11] provide similar evidence that there is a negative relationship between the MRP and the risk free rate in Australia.

65. CEG also provides evidence that the risk premium derived from yields on various financial instruments has risen when the level of the risk free rate has generally fallen. By inference it is reasonable to expect the same relationship with (unobservable) equity yields.

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[9] Wright, Stephen, Mason, Robert, and Miles, David (2003) "A study into certain aspects of the cost of capital for regulated utilities in the UK" London, Smithers & Co Ltd

[10] Aswath Damodaran, "Musings on Markets", September 2011. Also "Equity Risk Premiums (ERP): Determinants, Estimation and Implications – A post Crisis Update", October 2009

[11] CEG, "Internal consistency of risk free rate and MRP in the CAPM", Prepared for Envestra, SP AusNet, Multinet and APA, March 2010

"The evidence from all these sources points at trends towards higher risk premiums at times of lower CGS yields, such as those experienced in early 2009 and the current time." P 10

66. The challenge for the regulatory process is to understand the circumstances that lead to the use of a 'fixed' MRP being inappropriate and giving rise to an under or over estimate of the return required on capital.