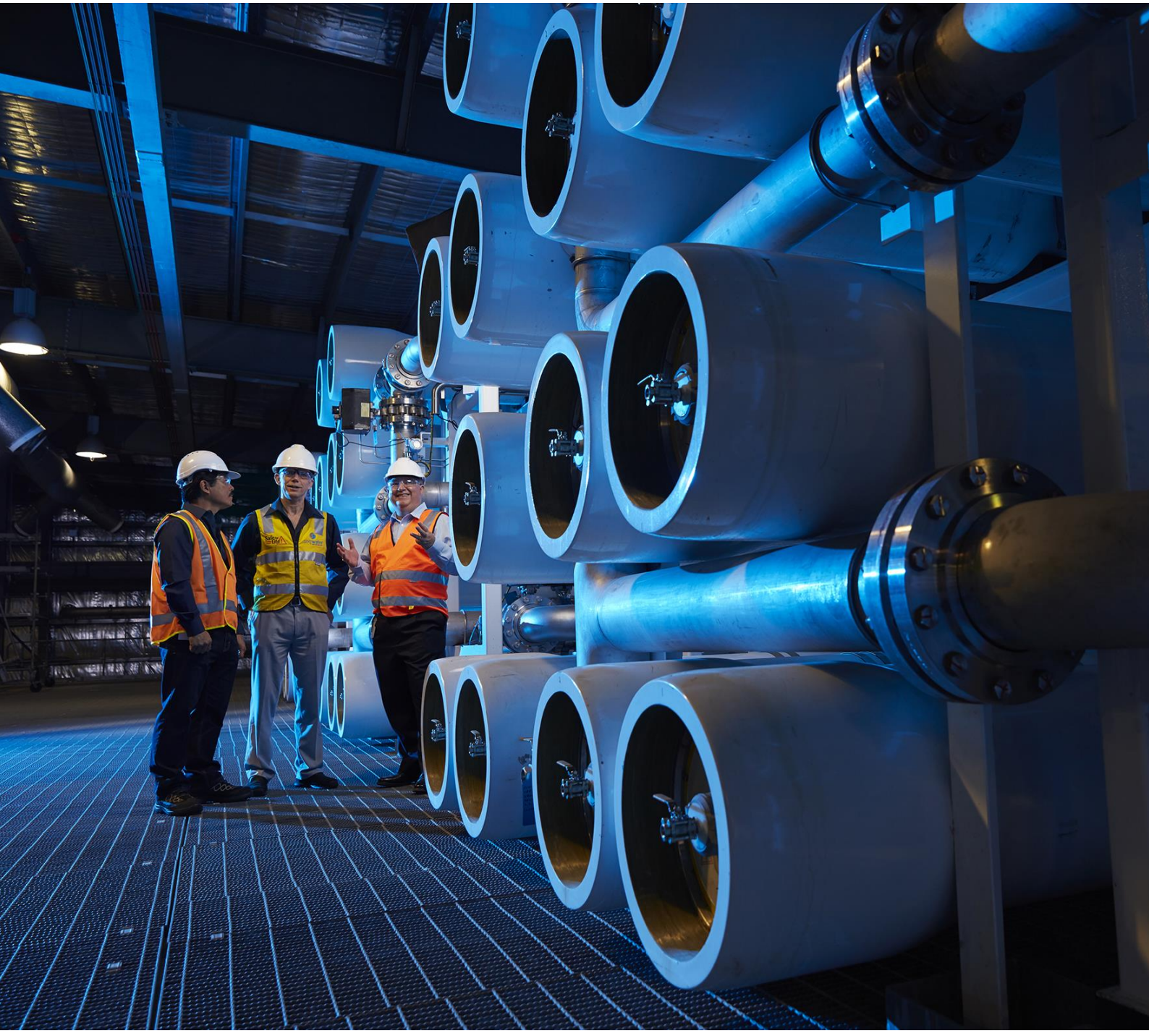
QCA Rate of Return Review 2021
Seqwater response to Request for Comments



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1 Executive summary

1.1 Background

On 2 November 2020, the QCA published a consultation paper that commenced its 2021 Rate of Return Review.[1] The consultation paper seeks views from stakeholders on a range of matters, including the QCA's approach to determining:

- The benchmark level of gearing;
- The return on debt allowance and, in particular, ways in which to implement a trailing average approach;
- The return on equity allowance, including the methodologies used to estimate beta, the market risk premium (MRP) and the risk-free rate; and
- An allowance for gamma.

Seqwater commends the QCA for taking the initiative to conduct this review in pursuit of these aims. Seqwater considers that the provision of an appropriate WACC allowance is essential to promoting the long term interest of consumers.

The WACC allowance sends important investment signals. If the WACC allowance is set below the efficient return required by investors, regulated businesses will be unable to attract the capital they require to make prudent and efficient investments that promote the long term interests of consumers. Conversely, setting the WACC allowance too high could encourage inefficient over-investment, and would result in consumers paying too much for the efficient cost of regulated services. Hence, the WACC methodology adopted by the QCA plays a vital role in promoting the long term interests of consumers.

Furthermore, the allowed return on capital, which depends on the WACC allowance, is the most significant component of Seqwater's regulated revenues. Hence, the way in which the WACC allowance is determined has a direct bearing on Seqwater's financial viability.

For these reasons, Seqwater considers that it is appropriate for the QCA to review its WACC methodology from time to time, to ensure that it remains fit-for-purpose, and that the QCA's initiation of this review demonstrates the QCA's commitment to good regulatory practice.

1.2 Summary of Seqwater's views

1.2.1 The QCA should adopt some key principles upfront to guide its selection of its rate of return methodologies

Seqwater agrees with the view the QCA has expressed in past decisions that the rate of return framework should enable a service provider an adequate opportunity to recover its efficient costs incurred in providing the regulated service to a certain quality and/or standard. This is essential in order to achieve the objective of Part 5 of the QCA Act—namely, to promote the economically efficient operation of, use of and investment in, regulated assets.

Seqwater considers that the QCA should settle on some key principles that would guide the development of a rate of return framework that would achieve the Part 5 objective. As section 2 of this submission explains, Seqwater proposes that the following six principles should be adopted by the QCA:

[1] https://www.qca.org.au/wp-content/uploads/2020/11/rate-of-return-review-request-for-comments-paper-november-2020.pdf

- **Reliance on sound methods and robust analysis.** The WACC methodology should provide for the rate of return needed for regulated businesses to attract and retain capital. This means that the methodologies used should have strong theoretical foundations and all parameter estimates be based on the best available evidence.
- **Transparency and replicability.** The WACC methodology should be transparent in explaining how parameter estimates have been determined and enable stakeholders to reasonably estimate the allowed rate of return that will be expected to apply to regulated businesses in the QCA's determinations.
- **Stability over time.** The WACC methodology needs to be relatively stable over time to give stakeholders certainty. The methodology should only be updated where there is sufficient evidence that the change would increase the accuracy of the rate of return estimate.
- **Consistency with best regulatory practice.** In determining the WACC, the QCA should consider approaches used by other Australian regulators.
- **Internal consistency.** The methodologies adopted by the QCA should ensure internal consistency between estimates of different WACC parameters.
- **Proportionate treatment of evidence.** Evidence considered by the QCA when selecting a methodology or methodologies should be weighed in a proportionate manner.

1.2.2 A number of aspects of the QCA's existing rate of return framework are working well and should be retained

Section 3 of this submission explains that a number of a number of elements of the QCA's existing approach that are working well and therefore should be maintained. These include the QCA's:

- Use of the Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM) to set the return on equity allowance;
- Use of a 10-year term to set the risk-free rate allowance; and
- General adoption of a benchmark gearing estimate of 60%.

1.2.3 One aspect of the QCA's existing framework should be reviewed as a matter of priority

Section 4 of this this submission identifies one aspect of the QCA's methodology that, in Seqwater's view, should be reviewed as a matter of priority: The lack of consistency between the between the risk-free rate and market risk premium (MRP) estimates used by the QCA which, in the current low-interest rate environment, is resulting in economically unsound estimates of the required return on equity.

The QCA's approach of pairing an estimate of the prevailing risk-free rate with an essentially fixed estimate of the MRP (that fails to reflect prevailing market conditions) is used by other regulators such as the AER. That approach has recently been shown to produce extreme and unreasonably low return on equity allowances that have resulted in benchmark regulated businesses posting negative profits. Such outcomes are incompatible with a regulatory framework that seeks to promote prudent and efficient investment, and point to a clear deficiency in the current methodology. These outcomes can be avoided by pairing together consistent estimates of the risk-free rate and the MRP. IPART has demonstrated that it is possible to develop a workable WACC methodology that achieves consistency between WACC parameters.

1.2.4 Other matters on which the QCA has sought views

Methodology for estimating beta

Section 5.1 of this submission provides Seqwater's views on several methodological issues relevant to the estimation of beta. Briefly, Seqwater proposes the following:

- The QCA should use the broadest possible sample of firms of comparable risk to the regulated business.
- The industry in which the firm operates should be the primary consideration for identifying the comparability of firms.
- The QCA should not seek to select comparators based on the factors identified in the consultation paper. The empirical relevance of the factors identified by the QCA is speculative, and it is challenging to consistently select a sample of comparators that is sufficiently large to provide reliable beta estimates based on the factors identified by the QCA.
- The QCA should exclude illiquid/thinly-traded stocks from its comparator sample.
- The QCA should estimate betas using a horizon of at least 10 years to reduce the risk of beta estimates being driven by random statistical variation, and to improve the statistical precision of estimates.
- The QCA should use weekly returns data to estimate betas.
- If the QCA uses weekly (or monthly) returns data, beta estimates should be derived using all possible reference days, and then averaged, to minimise reference day risk.
- The QCA should use de-levering and re-levering formulae that omit the corporate tax term (e.g., the Brealey-Myers formulae), to ensure that the beta estimation process is consistent with finance theory.
- The measure of gearing for the comparators used by the QCA to estimate beta should be calculated by using a market value of equity and book value of debt measured at the same point in time.
- The gearing of each comparator firm should be determined by computing the average gearing over the entire estimation horizon, rather than at a snapshot point in time (e.g., at the end of the estimation horizon).
- The SL-CAPM to under-estimate the required return on capital of low-beta stocks means that estimates of the required return on equity derived empirically by implementing the SL-CAPM should be viewed by the QCA as more likely to under-estimate the true required return on equity than unbiased estimates or over-estimates.
- The SL-CAPM has a tendency to under-estimate the required return on capital of low-beta stocks. This means that estimates of the required return on equity derived empirically by implementing the SL-CAPM should be viewed by the QCA as more likely to under-estimate the true required return on equity than unbiased estimates or over-estimates. The QCA should have regard to this ‘low-beta bias’ problem by exercising caution when determining the beta allowance.

Methodology for estimating the MRP

Section 5.2 of this submission presents Seqwater’s views on the approach that the QCA should adopt when estimating the MRP. Seqwater submits that:

- The QCA should use the Ibbotson, Wright and Cornell Dividend Growth Model (DGM) methods to estimate the MRP. The Siegel and survey methods should be given no consideration by the QCA.
- The overall estimate of the required return on equity can be estimated reliably only if the risk-free rate and MRP parameters in the SL-CAPM are estimated in an internally-consistent way. An internally-consistent estimation approach would require that:
    - The Ibbotson and Wright estimates (which reflect long-run, average market conditions) be paired consistently with an estimate of the risk-free rate that also reflects average financial market conditions, such as a long-term historical average. This approach would produce an *internally-consistent backward-looking estimate* of the required return on equity.
    - The DGM estimates (which reflect prevailing market conditions) be paired consistently with contemporaneous risk-free rate that also reflects the prevailing financial market conditions. This

approach would produce an *internally-consistent forward-looking estimate* of the required return on equity.

- The final allowed return on equity could be computed by applying 25% weight to each of the Ibbotson and Wright estimates and 50% weight to the DGM estimate. However, as noted above, each of these three MRP estimates should be paired with a consistent estimate of the risk-free rate.
- When deriving its Cornell DGM estimates of the MRP, the QCA currently makes some inappropriate and non-standard assumptions, which are not applied by any other regulator in Australia, and which render the resulting DGM estimates unreliable. The key problem with the QCA's current implementation of the Cornell DGM is the assumption that the 10-year government bond yield will increase to 5.8% over the next 10 years. Seqwater considers that the QCA should no longer make such an assumption (and the associated adjustments) when implementing the Cornell DGM.
- The QCA should continue to rely only on arithmetic averaging when computing Ibbotson (and Wright) estimates of the MRP. Geometric averaging should not be employed by the QCA for the purposes of determining an MRP allowance using historical returns.

Methodology for estimating gamma

Section 5.3 sets out Seqwater's views on the appropriate methodology for estimating gamma. Seqwater submits that:

- The QCA should define clearly whether the benchmark efficient entity is a large multinational. If that is not the case, then the QCA should estimate the distribution rate by giving consideration to the proportion of credits distributed by unlisted firms in Australia.
- Given the role played by gamma within the QCA's regulatory framework, gamma should be interpreted as the economic value that investors place on imputation tax credits. As such, theta should be estimated using techniques that are designed to estimate the market value of credits (e.g., dividend drop-off analysis).

Methodology for estimating setting the return on debt allowance

Section 5.4 of this submission presents Seqwater's views on the appropriate approach for setting the return on debt allowance. At the present time, the QCA does not set Seqwater's return on debt allowance. Rather, the Ministerial Referral Notices direct the QCA to use an estimate of the cost of debt provided by the Queensland Treasury Corporation. Seqwater does not seek any change to this arrangement.

Responses to the QCA's consultation questions

Section 6 presents Seqwater's responses to each of the questions posed in the consultation paper.

2 Principles for guiding the selection of WACC methodologies

2.1 An appropriate rate of return allowance is essential to promoting efficient investment and use of regulated assets

The roles and responsibilities of the QCA are prescribed in the QCA Act (the Act). Part 5 of the Act is relevant to the making of access determinations by the QCA, and Part 5A relates to the pricing of water. The objective of Part 5 (section 69E) of the Act 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.*

The QCA explained in its 2014 cost of capital market parameters final decision that this objective is:[2]

> *…consistent with the idea that revenues should be sufficient to finance the efficient, total costs of the firm.*

In that same decision, the QCA explained that:[3]

> *The cost of capital framework should enable a service provider an adequate opportunity to recover its efficient costs incurred in providing the regulated service to a certain quality and/or standard. At the same time, it should protect customers from excessive prices.*

The rate of return allowance plays an important role in achieving the objective of Part 5 of the Act. The weighted average cost of capital (WACC) represents the minimum rate of return that investors require in order to commit capital to a firm rather than invest elsewhere. That is, it is the lowest return that investors in the firm would require in order to provide compensation for the risks they bear and to cover the opportunity cost of their funds.

If the rate of return allowance is set above this minimum required return, then investors would be compensated more than they need in order to commit funds, and consumers would pay more than the efficient level for the regulated services delivered by the firm. However, if the rate of return allowance is set below this minimum required return, then the return provided by the regulatory framework would be inadequate to compensate investors for the opportunity costs and risks they face. Under these circumstances, it would not be economically rational for investors to commit capital to the firm. This, in turn, would undermine the business's ability to make the prudent and efficient investments that are necessary to deliver the regulated services. Inefficient underinvestment in regulated services would not promote the long term interests of consumers.

Seqwater considers that the rate of return allowance should be set in line with the efficient cost of capital to send appropriate signals for efficient investment in, and use of, regulated assets—and that levels of investment or usage that are either too low or too high would not promote the long term interests of consumers. This point was recognised recently by the Independent Competition and Regulatory Commission (ICRC) when it noted that:[4]

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[2] QCA, Cost of capital: market parameters, Final decision, August 2014, p. 7.
[3] QCA, Cost of capital: market parameters, Final decision, August 2014, p. 4.
[4] ICRC, Review of methodologies for the weighted average cost of capital, Issues paper, September 2020, p. 3.

If the Commission were to set the rate of return too low, Icon Water may not be able to attract sufficient funds to invest in maintaining, upgrading, renewing and replacing water and sewerage assets. If the rate of return were to be set too high, there would be a risk of encouraging too much investment in the business, and consumers would pay higher than necessary water bills. Neither of these outcomes are in the long-term interests of customers.

Seqwater considers that it is essential that the regulatory framework provide an appropriate rate of return (i.e., one that is sufficient to cover the WACC of an efficient and prudent firm) in order to promote efficient investment in, and use of, regulated assets.

2.2 Principles that should guide the QCA's choice of rate of return methodologies

Seqwater proposes that the QCA should adopt some key principles to guide its selection of its rate of return methodologies. Seqwater proposes the following principles, a number of which are based on principles proposed recently by the ICRC:[5]

Reliance on sound methods and robust analysis. The WACC methodology should provide for the rate of return needed for regulated businesses to attract and retain capital. This means that the methodologies used should have strong theoretical foundations and all parameter estimates be based on the best available evidence.

The methodologies used should produce an estimate of the required rate of return that reflects *prevailing market conditions in each regulatory period*, not average market conditions over the long-run.

Furthermore, the return on capital allowance should be set in line with the best estimate of the required return on capital in *every regulatory period*. The allowed return on capital should not be set such that it under-recovers the efficient return on capital in some regulatory periods and over-recovers the efficient return in other periods, in the expectation that the required return on capital will be recovered on average, over the long-run.

Transparency and replicability. The WACC methodology should be transparent in explaining how parameter estimates have been determined and enable stakeholders to reasonably estimate the allowed rate of return that will be expected to apply to regulated businesses in the QCA's determinations.

Seqwater considers that the QCA's process for selecting an estimate for each WACC parameter should be explained in sufficient detail that an informed stakeholder should be able to independently replicate the QCA's estimate.

The QCA should avoid exercising judgment in a way that reduces the transparency and replicability of its methodologies.

The QCA should explain transparently the weight it has attached to different pieces of evidence (and the reason for those weights) when determining WACC parameter estimates, such that informed stakeholders are able to replicate the QCA's estimates.

Stability over time. The WACC methodology needs to be relatively stable over time to give stakeholders certainty. The methodology should only be updated where there is sufficient evidence that the change would increase the accuracy of the rate of return estimate.

However, Seqwater considers that the QCA should be willing to change its methodology if presented with compelling evidence that its existing approach is producing unreliable estimates of the required rate of return (i.e., estimates that do not align with the return required by investors in the prevailing market conditions).

[5] ICRC, Review of methodologies for the weighted average cost of capital, Issues paper, September 2020, section 1.4.

Consistency with best regulatory practice. In determining the WACC, the QCA should consider approaches used by other Australian regulators.

However, the QCA should not follow an approach simply because it is used by the majority of regulators. The QCA should adopt an approach used by other regulators if there are convincing reasons why that approach produces reliable estimates of the required rate of return. More weight should be placed on the approaches of other regulators that exhibit the QCA's assessment criteria. That is, the QCA should consider the economic merits of the approaches used by other regulators, and not rely simply on an approach because it is used widely by other regulators. *The QCA should give primacy to "best" regulatory practice rather than "popular" regulatory practice*. This would be consistent with the principle above: the reliance on sound methods and robust analysis.

Internal consistency. The methodologies adopted by the QCA should ensure internal consistency between estimates of different WACC parameters. There are a number of inter-relationships between various WACC parameters (e.g., equity beta and gearing, risk-free rate and market risk premium). Therefore, the QCA should not seek to estimate each WACC parameter in isolation. Rather, the QCA's estimation process should recognise the interlinkages between parameters such that the overall allowed rate of return is determined in an internally-consistent way.

Proportionate treatment of evidence. Evidence considered by the QCA when selecting a methodology or methodologies should be weighed in a proportionate manner. For example, it would be disproportionate to reject a principle, concept or methodology that has been established (e.g., in the academic literature, through commercial financial practice, or by regulators) over many decades by citing a small number of studies that seem to contradict that well-established principle, concept or methodology. The QCA should select its WACC methodologies by considering any particular piece of (supporting or contradicting) evidence in the proper context of all the available evidence.

In summary, Seqwater proposes that the QCA adopt upfront a set of clear criteria to guide its selection of rate of return methodologies. The criteria that Seqwater proposes are the following:

- Reliance on sound methods and robust analysis;
- Transparency and replicability;
- Stability over time;
- Consistency with best regulatory practice;
- Internal consistency; and
- Proportionate treatment of evidence.

3 Aspects of the QCA's methodology that are working well

As explained in this section, Seqwater considers that a number of aspects of the QCA's existing rate of return methodology are working well and should be maintained.

3.1 Use of the Sharpe-Lintner Capital Asset Pricing Model to set the return on equity allowance

The QCA currently uses the SL-CAPM to set the return on equity allowance. This model is used universally by regulators in Australia. Seqwater supports the continued use of the SL-CAPM by the QCA.

There are a number of shortcomings with the SL-CAPM, including a well-documented tendency for it to under-estimate the return on equity required by investors in firms with a beta lower than 1. This issue is discussed further in section 5.1.8. Notwithstanding this well-known weakness of the SL-CAPM, Seqwater considers that the QCA should use the SL-CAPM for the purposes of determining the return on equity allowance. However, as explained in section 5.1.8, the QCA should regard estimates of the required return on equity derived empirically using the SL-CAPM as likely to be under-estimates of the true required return on equity, and set the return on equity allowance accordingly.

3.2 Use of a 10-year term for the risk-free rate

In past decisions, the QCA has typically used a term-to-maturity for the risk-free rate equal to the length of the regulatory period. For instance, in its 2018 decision for Seqwater, the QCA estimated a three-year risk-free rate to match Seqwater's three-year regulatory period.

However, in its 2019 UT5 final decision in relation to Aurizon Network's draft access undertaking, the QCA adopted a 10-year term-to-maturity for the risk-free rate.[6] The QCA reaffirmed the use of a 10-year term-to-maturity for the risk-free rate in its 2020 final decision for Queensland Rail.[7]

Seqwater supports the QCA's recent use of a 10-year term-to-maturity for the risk-free rate on the grounds that the term of the bond should be a proxy for the life of the regulated asset, and that a longer-term bond may also better reflect the expectations of investors—given the long-term nature of infrastructure asset investment.

3.3 General use of a benchmark gearing estimate of 60%

The consultation paper notes that in recent reviews, the QCA has selected the gearing level for a regulated firm based on the firm's risk profile, the gearing level of comparator firms and regulatory precedent.[8]

The QCA has generally used a benchmark gearing estimate of 60%. As Table 1 shows, this is consistent with nearly all the gearing decisions adopted recently bey regulators of water utilities in Australia.

One exception in the Table below is the QCA's decision to adopt a benchmark gearing assumption of 50% for the Gladstone Area Water Board (GAWB). In its June 2020 decision, the QCA determined that it would be appropriate to adopt a lower benchmark gearing for GAWB than the benchmark gearing adopted by other regulators—or indeed the QCA itself when regulating other water businesses—because GAWB has particular

[6] QCA, Aurizon Network's 2017 draft access undertaking, Final decision, December 2018, p. 78.
[7] QCA, Queensland Rail 2020 draft access undertaking, Final decision, February 2020, p. 42.
[8] Consultation paper, p. 7.

characteristics that meant it is likely to face more risk (and, therefore, lower debt capacity) than other regulated water businesses. For instance, the QCA explained that:[9]

> *[The QCA's benchmark gearing assumption for GAWB of 50 per cent] is below the 60 per cent gearing level set by regulators for most other water utilities in Australia. We consider this relativity remains appropriate at this time. GAWB may be less able than typical water utilities to support debt, due primarily to its dependence on a relatively small number of large industrial customers. This risk characteristic differs from typical water utilities that tend to have larger customer bases comprising small residential customers.*

As these considerations do not apply in Seqwater's case, the QCA's regulatory precedent in relation to GAWB would is of little relevance to the QCA's deliberations on an appropriate benchmark gearing assumption to adopt when setting Seqwater's allowed rate of return.

Table 1 Recent regulatory gearing decisions

Regulator	Regulated business	Year	Gearing decision
ESCOSA	SA Water	2016	60%
ESC	Various (PREMO)	2016	60%
ERA	Water Corporation, Aqwest and Busselton Water	2017	55%
IPART	Various	2018	60%
OTTER	TasWater	2018	60%
ICRC	Icon Water	2018	60%
QCA	Seqwater	2018	60%
QCA	Gladstone Area Water Board	2020	50%
QCA	Seqwater, Sunwater (irrigation)	2020	60%
ESCOSA	SA Water	2020	60%

Source: Various regulatory decisions.

Seqwater supports the QCA's application of a benchmark gearing of 60% in Seqwater's case.

[9] QCA, Gladstone Area Water Board price monitoring 2020–25 Part A: Overview, Final report, May 2020, p. 92.

4 Lack of consistency between the risk-free rate and the MRP

This section identifies an aspect of the QCA's existing rate of return approach that Seqwater considers should be addressed as the highest priority during the rate of return review: the lack of consistency between the risk-free rate and MRP allowances determined by the QCA.

4.1 The nature of the problem

The QCA uses the Capital Asset Pricing Model (CAPM) to estimate the required return on equity:

$$E[r_e] = r_f + \beta_e\big(E[r_m] - r_f\big).$$

When implementing the CAPM, the QCA's approach has been to:

- Use a prevailing estimate of the risk-free rate – being the prevailing yield on government bonds; and
- Use an effectively constant estimate of the market risk premium, $\big(E[r_m] - r_f\big)$.

Under this approach, the risk-free rate is assumed to move one-for-one with changes in government bond yields. However, the MRP estimate remains essentially time-invariant. This means that, under the QCA's current approach, the required return on equity essentially moves in lock-step with changes in government bond yields.

An outcome whereby estimates of the required return on equity move one-for-one with changes in government bond yields is inconsistent with the observed evidence from financial markets.

For example, the Governor of the Reserve Bank has recently observed that required returns have remained stable even as government bond yields have fallen to historical lows:[10]

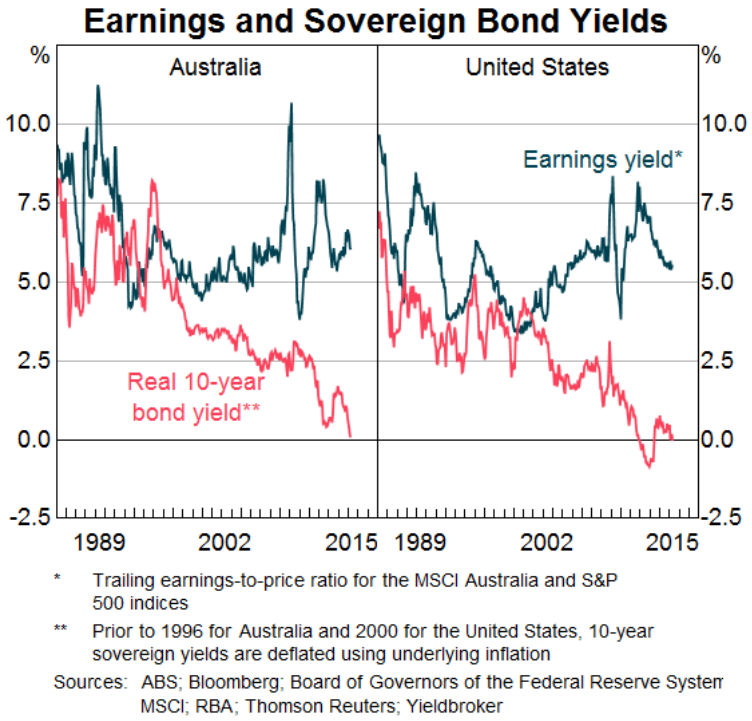
> *In this context, it is worth noting that despite the marked decline in global interest rates (and some decline in the cost of equity), average hurdle rates of return for new investments in many countries have not changed much...It seems that there is a global norm for hurdle rates somewhere around the 13 to 14 per cent mark and it is hard to shift this norm, even at record low interest rates.*
>
> *There are a couple of possible explanations for this.*
>
> *The first is that the reduction in the cost of borrowing has been offset by a rise in the required risk premium due to the uncertainties that I spoke about. If this were so, the hurdle rate would be unchanged, with lower interest rates just compensating for the riskier environment.*
>
> *The second possibility is that some firms have been slow to adjust to the new reality of low interest rates. We hear reports that a hurdle rate of return of 13 to 14 per cent has been hardwired into the corporate culture in some companies. Changing this hard-wiring is difficult and time consuming. However, from our liaison with Australian companies, we do know that some companies have lowered their hurdle rates and this is opening up new opportunities for them. It would be good to hear more such reports.*
>
> *My view is that there is an element of truth to both explanations: risk premiums have gone up and, in some cases, hurdle rates of return are too sticky.*

[10] Lowe, P., October 2019, "Some echoes of Melville," Sir Leslie Melville Lecture, Canberra, pp. 11-12.

The stability in required returns has been observed for some time now. In 2015 the former Governor of the Reserve Bank of Australia, observed that the equity risk premium appeared to have risen to offset the falls in government bond yields such that the overall required return on equity had remained stable:[11]

> *…post-crisis, the earnings yield on listed companies seems to have remained where it has historically been for a long time, even as the return on safe assets has collapsed to be close to zero (Graph 2).*[12] ***This seems to imply that the equity risk premium observed ex post has risen even as the risk-free rate has fallen and by about an offsetting amount.***

Figure 1 Earnings and sovereign bond yields (Graph 2)



Source: Reserve Bank of Australia.

Some recent research undertaken by the RBA confirms that the hurdle rates used by Australian firms to make investment decisions are changed very infrequently and are typically well above prevailing estimates of the cost of capital (where those estimates are based on the approach of adding a constant risk premium to the prevailing government bond yield). That is, the expected rate of return that Australian firms require in order to commit capital to investment opportunities appears to remain relatively stable, even in the face of short-term changes in interest rates. The RBA's research observes that:[13]

> *…in many instances it appears that firms are using hurdle rates that have not changed in a long time, set at a time when nominal long-term interest rates were far higher than they are today. Whether explicit or not, such behaviour is consistent with a reduced appetite for risk or the possibility that risks have increased.*

[11] Glenn Stevens, Speech to the Australian American Association, New York, 21 April 2015. Emphasis added.
[12] Graph 2 in the quote above is reproduced as Figure 1.
[13] Lane, K., Roswell, T., Firms' investment decisions and interest rates, RBA Bulletin, June 2015, p. 4.

In summary, a number of market participants have concluded that, since the GFC, the market risk premium has increased to offset at least some of the decline in government bond yields and that this has resulted in a cost of equity that is relatively more stable over time.

While there is no reason to think that the required return on equity remains perfectly fixed over time, there is even less reason to think that the cost of capital moves in perfect lock-step up and down with changes in the government bond yield. In order for the overall required return on equity to remain relatively stable as the risk-free rate varies, it must be the case that risk premiums move in the opposite direction to (at least partially) offset any changes in the risk-free rate.

Seqwater submits that the QCA's current approach of estimating the required return on equity by adding an effectively fixed premium to the prevailing government bond yield is inconsistent with the observed evidence from financial markets and should be examined as part of the QCA's WACC review.

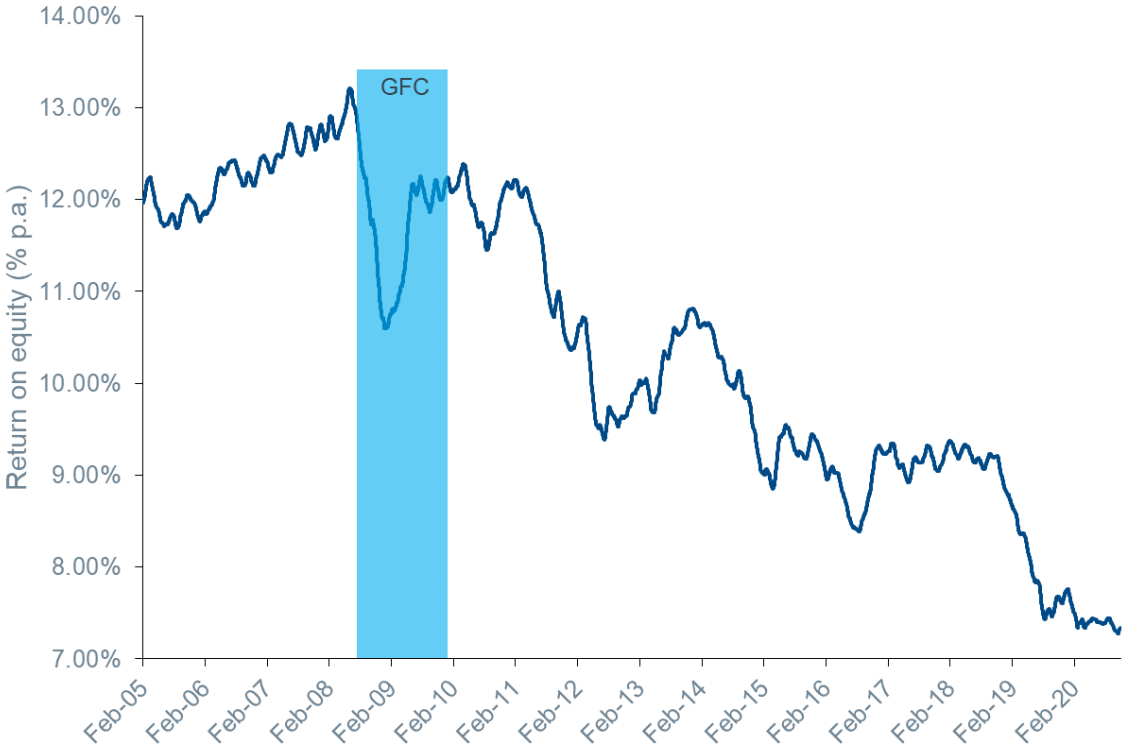
4.2 The consequences of the QCA's current approach

Figure 2 below shows that the approach of adding a fixed MRP to the prevailing government bond yield produces economically implausible outcomes in many real-world scenarios. For example, the QCA's current approach implies that the return that investors require on equity capital would:

- *Fall* during financial crises (such as during the GFC) and economic downturns, as government bond yields typically decline (sometimes very materially) during such times.[14] This is implausible because the price of equity capital should increase, not fall, as equity investors face more market risk in such circumstances; and
- *Rise* during economic booms (such as the decade or so immediately before the GFC), as government bond yields typically increase during periods of economic expansion.

[14] Government bond yields often decline during financial crises and economic downturns due to a flight-to-safety, whereby investors substitute low-risk assets (e.g., highly-rated government bonds) for risky assets (e.g., stocks), and because of monetary policy interventions by central banks that drive down the supply of government debt and push down interest rates.

Figure 2 Return on market equity estimates implied by the QCA's current methodology



Source: RBA data, QCA determinations. Figures are QCA estimates of the required return for an asset with an equity beta of 1.

The approach of adding an effectively fixed MRP to the prevailing government bond yield is similar to the approach currently adopted by the AER. That approach has been shown recently to produce extreme and unreasonably low return on equity allowances. Specifically, at present, the AER's methodology of pairing a prevailing risk-free rate with a fixed MRP is producing:

- The lowest allowed nominal return on equity ever set by the AER;
- The lowest allowed real return on equity ever set by the AER;
- Lower nominal and real return on equity allowances than any other regulator overseas considered in a recent study prepared by the Brattle Group for the AER;[15]
- Allowed returns that have, for the first time ever, resulted in the networks regulated by the AER posting negative profit after tax (NPAT), which is clearly unsustainable;[16] and
- Allowed returns that are insufficient to support credit rating metrics that are commensurate with investment grade debt.[17]

All of these outcomes suggest that the approach that is currently used by the AER, which is relevantly similar to the QCA's current approach, is likely to place regulated businesses in circumstances that are financially unsustainable.

[15] Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, June 2020.
[16] ENA, *A hybrid approach that has regard to market data: Response to AER review of regulatory treatment of inflation*, 29 July 2020, Section 2.
[17] Specifically, the AER's current allowances produce FFO/Debt ratios that are consistent with BB-rated debt, at best.

Seqwater submits that the QCA's WACC review should carefully consider whether its current approach produces:

- Estimates of the required return on equity that are economically plausible over a range of financial market conditions; and
- An allowed return on equity that places regulated firms in a financially sustainable position in the long run.

4.3 A more robust methodology requires internally consistent parameter estimates

A key reason for the alarming outcomes identified above is the approach of pairing together inconsistent estimates of the risk-free rate and the MRP. Seqwater submits that, a sound and robust method for estimating the required return on equity is to pair estimates of the risk-free rate and the MRP that have been estimated consistently. For instance:

- If a prevailing (forward-looking) estimate of the risk-free rate is used (per the QCA's existing approach), it should be combined with a prevailing (forward-looking) estimate of the MRP; and
- If an estimate of the MRP that reflects average market conditions is used (per the long-run historical average MRP determined by the QCA), it should be combined with a risk-free rate that also reflects average market conditions (i.e., a long-run historical average of government bond yields).

IPART is an exemplar amongst regulators in this regard. IPART uses a method whereby it derives a:

- 'Long-term' estimate of the required return on equity by combining a risk-free rate estimated using a 10-year historical averaging period with a fixed estimate of the MRP (intended to reflect a long-run average of historical excess returns on the Australian stock market) of 6.0%; and
- 'Current' estimate of the required return on equity by combining a risk-free rate estimated using a 40-day averaging period with an entirely forward-looking MRP estimate that changes as market conditions (e.g., stock prices, dividend and earnings forecasts, interest rates) change.

IPART then gives equal weight to its long-term and current estimates of the required return on equity to determine its overall return on equity allowance.

In 2012, when IPART was developing this methodology, it noted that:[18]

> *In relatively stable market conditions, there may be a little difference between long-term historic and current market implied estimates of the expected MRP. Since the GFC, market conditions have become significantly more volatile. Estimates of the market implied expected MRP are currently above the historic long-term average of 6%.*
>
> *The application of the CAPM using a stable historic MRP (of 6%) and a prevailing market rate for the risk free rate means that the cost of equity will move in synchronicity with the risk free rate for a given level of equity beta. If the risk free rate fluctuates significantly so will the cost of equity.*
>
> *In late 2008/early 2009, and then again from late 2011, the risk free rate fell to a 50-year low. The overall effect is that the regulatory cost of equity has fallen and may underestimate the cost of equity for regulated businesses when the risk free rate is low. Conversely, it may overestimate the cost of equity when the risk free rate is high.*

[18] IPART, Review of method for determining the WACC: Dealing with uncertainty and changing market conditions, December 2012 (IPART discussion paper), p. 55.

IPART went on to explain that:[19]

> *…estimated risk premiums are not stable through time. Risk premiums tend to move in the opposite direction to the riskfree rate. As investors may respond to recent losses on riskier assets by shifting to safer assets, prices of those assets are likely to fall, increasing the expected rate of return for a given flow of future dividends. In periods of high risk aversion there is a flight from risky assets to safe assets (such as the risk free rate). This tends to push up the price of safe assets, thereby pushing down their yields. Thus, in these circumstances, a falling risk free rate tends to be associated with rising equity risk premiums (and vice versa).*
>
> *To the extent there is a negative relationship between the risk free rate and the risk premiums on listed equities, the required return of the equity market (being the sum of risk free rate and the market risk premium) is relatively more stable than its individual components.*

In its 2018 WACC methodology decision, IPART reaffirmed its approach of pairing consistent estimates of the risk-free rate and the MRP:[20]

> *We consider it would be invalid to combine a current risk-free rate with a historic MRP, because the fresult of that calculation would not represent the state of the equity market at any point of time. By combining a current estimate of the risk-free rate with a current MRP estimate, we can approximate the current market price of equity. Likewise, by combining a historic estimate of the risk-free rate with a historic MRP estimate, we can approximate the historic average market price of equity. Either of these benchmarks would be a valid point of reference. When we combine the risk-free rates and MRP estimates in this time-consistent way, the current cost of equity is closer to the historic average cost of equity than either of them is to the time-inconsistent sum.*

Recently, IPART made a submission to ESCOSA's review of SA Water's regulated prices for the 2020-24 regulatory period explaining why the approach followed by ESCOSA (which is very similar to that used by the QCA) is likely to produce unreasonably low return on equity allowances in the current market conditions. IPART submitted that:[21]

> *ESCOSA, along with the AER and most other Australian regulators calculate the return on equity using equation (1).*
>
> $$Re = (short\ term)Rf + \beta * (long\ term)MRP \quad (1)$$
>
> *As spot risk free rates are very low right now and the long-term MRP is lower than the current MRP, this procedure gives a low estimate of the cost of equity.*
>
> *In contrast, we calculate the return on equity using equations (2) – (4).*
>
> $$(short\ term)Re = (short\ term)Rf + \beta * (short\ term)MRP \quad (2)$$
>
> $$(long\ term)Re = (long\ term)Rf + \beta * (long\ term)MRP \quad (3)$$
>
> $$Re = \frac{\left((short\ term)Re + (long\ term)Re\right)}{2} \quad (4)$$

[19] IPART discussion paper, pp. 57-58.
[20] IPART 2018 WACC methodology, pp. 51-52.
[21] IPART, Submission on Draft Report, SA Water Regulatory Determination 2020, 3 April 2020, pp. 2-3.

> *In our view, despite the fact that it is widely used, the approach taken in equation (1) will generate biased estimates of the market cost of equity because it combines incompatible short term and long term market observations. As you note in your statement of reasons (p 156) Frontier Economics recommended that, because there is an inverse relationship between the MRP and risk-free rate, it is important to adopt an approach to estimating the required return on equity that pairs the risk-free rate consistently with the MRP. We agree with Frontier on this point.*
>
> *Our approach avoids that problem. Both short-term and long-term cost of equity estimates employ matched MRP and risk-free rate observations. It is highly significant that our current and long-term cost of equity estimates are quite similar to each other. Both of these numbers are higher than ESCOSA's equity return. We use the midpoint of the two in our WACC calculation. We consider that our procedure generates values that correspond to equity prices a firm could obtain in real markets, either one for short-term (liquid) equity or one for long-term (patient) equity. We say these are real markets because the empirical basis of the current MRP estimates is the observation of daily share price movements on the ASX. The return on equity is calculated and then the MRP is deduced from that.*

IPART explains in the submission quoted above why it is imperative to combine consistent risk-free rate and MRP to avoid economically non-sensical return on equity estimates.

For the avoidance of doubt, Seqwater does not submit that the QCA should replicate IPART's methodology. Rather, Seqwater's position is that the QCA should adopt an approach that pairs internally-consistent estimates of the risk-free rate and the MRP. IPART is raised in this submission simply as an example of a regulator that has (a) understood and articulated clearly the economic rationale for this approach, and (b) developed a workable method for doing so.

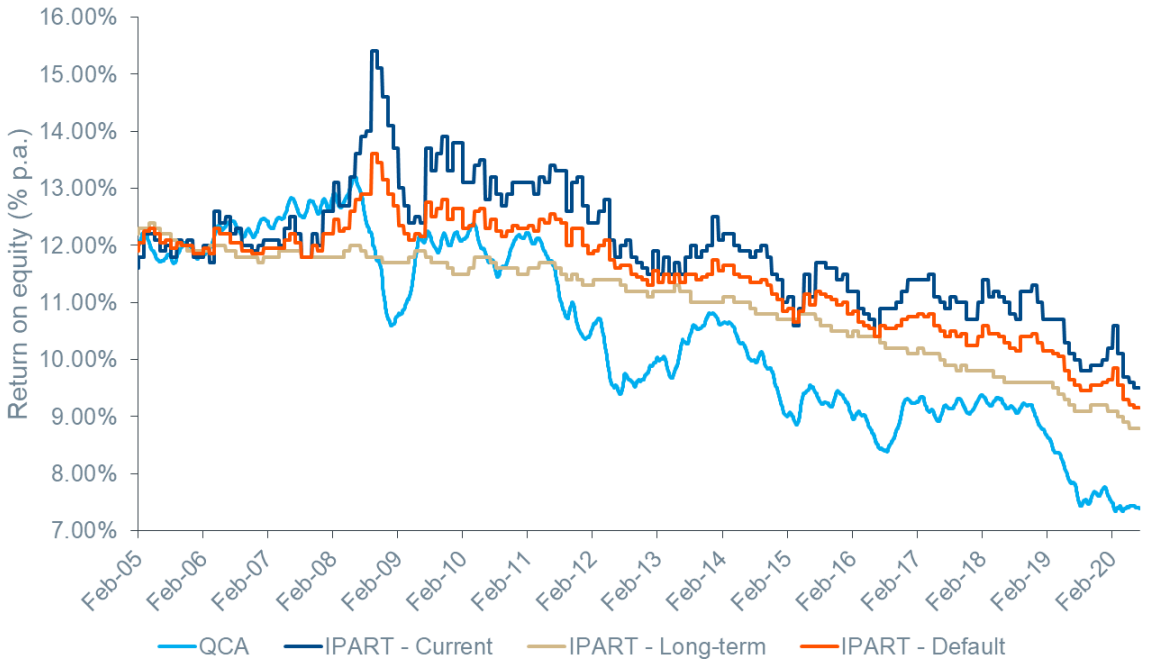
4.4 A comparison of outcomes under the IPART and QCA approaches

A key advantage of the IPART approach of pairing together consistent estimates of the risk-free rate and the MRP is that it tends to produce estimates of the required return on equity that are more stable over time. That is, the IPART approach satisfies the 'stability over time' assessment criterion proposed by the QCA. This can be seen in Figure 3, which plots the return on equity estimates produced when IPART's method and the QCA's method are applied to market data from January 2005 onwards.

The Figure below shows that, while the estimates produced by IPART's methodology have declined over time (because government bond yields have declined), they have not fallen as quickly or as materially as the estimates produced by the QCA's approach. Hence, while the IPART methodology is currently producing return on equity allowances that are significantly lower than they were in 2018, the estimates produced by IPART's methodology have been less volatile over time than the estimates produced by the QCA's approach. For instance, the standard deviation of IPART's default return on equity estimate over the period February 2005 to July 2020 (presented in the Figure above) is 0.95%. By contrast, the standard deviation of the return on equity estimates derived using the QCA's method over the same period is 1.58%.

Moreover, the estimates produced by IPART's method move in an economically plausible fashion (e.g., increasing during periods of financial crisis, such as during the GFC and Covid-19 crisis), whereas the QCA's estimates evolve in a counterintuitive way (e.g., by falling during crises).

Figure 3 Return on equity estimates produced by IPART's and the QCA's methods



Source: RBA data, IPART data, Seqwater calculations. Notes: For simplicity, the calculations in this Figure assume a beta of 1. The estimates presented in this Figure are not intended to represent the return on equity that was actually allowed by IPART and the QCA in past decisions. Rather, the Figure simply presents the estimates that obtain when IPART's and the QCA's methodologies are applied to market data.

Seqwater submits that the QCA's WACC review should carefully consider the implications of its current approach to setting the allowed return on equity, including the financeability concerns that are arising in other jurisdictions that have adopted similar approaches.

5 Specific issues on which the QCA has sought comment

5.1 Approach to estimating beta

There are several different methodological choices to be made when estimating beta—a number of which the QCA has sought stakeholders' views on. The following section sets out Seqwater's the key methodological issues that the QCA should have regard to when developing its beta estimation approach. This section also discusses how the QCA should interpret its empirical estimates of beta when determining a regulatory allowance for beta.

5.1.1 Choice of comparators

A common approach adopted by regulators in Australian when estimating a benchmark beta allowance for a regulated business is to consider the empirical estimates of beta derived for a sample of listed comparator firms. Ideally, the comparator firms used in such a process should have a similar exposure to systematic risk as the firm that is the subject of regulation.

The consultation paper identifies several factors that could be relevant to assessing the level of systematic risk that a regulated firm is exposed to—market power, nature of the customer base, regulation, contracting arrangements, elasticity of demand for the product/service, growth options and operating leverage. The consultation paper seeks views on whether the factors identified by the QCA appropriate for assessing the level of risk that a firm is exposed to, and whether some factors should be considered more important than others (Question 17).

Seqwater makes two observations in this regard:

- An important (and overarching) factor that the QCA has not identified in the consultation paper is the industry in which the firm operates. In the past, the QCA has relied on firms in unrelated industries to estimate the betas of the firms it regulates. For example, when determining the beta for regulated water companies, the QCA has considered the betas of energy networks as well as water businesses on the grounds that both types of businesses are perceived to have similar risks. When regulating rail networks, the QCA has in the past disregarded listed rail companies, but used water and energy networks as the relevant comparators. In Seqwater's view, the QCA should first start with a sample of listed firms in the relevant industry. Then, the sample could be broadened out to consider firms in unrelated industries if the primary sample from the relevant industry is considered too small or otherwise inadequate to obtain statistically-robust or reliable estimates.
- It is very difficult to find comparators that are 'close' in terms of all of the seven factors identified by the QCA. Furthermore, it is very difficult to select comparators systematically and consistently on the basis of the factors proposed by the QCA. For instance, even amongst regulated utilities, the form of regulation applied to different businesses can vary significantly—ranging from simple information disclosure regimes (which are very light-handed), to regulation that indexes prices according to estimated efficiency factors, through to high-powered incentive-based systems of regulation. If the QCA decides to select comparators based on whether they are regulated or not, then the QCA would also need to assess the relevance of the different forms of regulation to identify those firms that are subject to the most similar forms of regulation. However, that would likely become an unwieldy and ultimately fraught task for the purposes of selecting relevant comparators. On such strict criteria, the QCA may be left with a comparator sample that is too small to provide reliable estimates of beta

Seqwater considers that there is a trade-off between sample size (the larger the sample of comparators, the more statistically-precise the beta estimates will be) and comparability. Generally, the larger the sample, the greater the statistical precision of estimates. However, if the size of a comparator sample is expanded beyond a certain point, the comparability of the firms within the sample may diminish. This, in turn may reduce the reliability of the resulting beta estimate, notwithstanding the improvement in precision from a purely statistical

point of view. Conversely, if the sample size is narrowed to permit only the most comparable firms, then the resulting sample is likely to be very small and come at the cost of greater statistical imprecision and variability in estimates over time due simply to randomness.

Hence, when deciding on the appropriate size of the sample, the QCA should strike a balance between achieving an acceptable level of statistical precision and comparability in the sample and explain how those two considerations have been weighed up.

Seqwater also proposes that the QCA exclude from its comparator sample any companies identified as illiquid or thinly-traded stocks. This is because the insensitivity of the share price of thinly-traded stocks tends to result in distorted (downwardly-biased) beta estimates. Seqwater notes that IPART uses the broadest possible sample of comparator firms, excluding comparators that are identified as illiquid stocks. IPART uses the Amihud measure (i.e., the daily ratio of absolute stock return to its dollar volume, averaged over a relevant time period) to identify illiquid stocks.[22] Seqwater supports such an approach.

In summary, Seqwater considers that, when selecting comparators for the purposes of beta estimation:

- The QCA should use the broadest possible sample of firms of comparable risk to the regulated business;
- The QCA should not seek to select comparators based on the factors identified in the consultation paper. The empirical relevance of the factors identified by the QCA is speculative, and it is challenging to consistently select a sample of comparators that is sufficiently large to provide reliable beta estimates based on the factors identified by the QCA;
- The QCA should not seek to select comparators based on the factors identified in the consultation paper. The empirical relevance of the factors identified by the QCA is speculative, and it challenging to consistently select a sample of comparators that is sufficiently large to provide reliable beta estimates; and
- The QCA should exclude illiquid/thinly-traded stocks from its comparator sample.

5.1.2 Choice of estimation horizon

The consultation paper seeks views on the time horizon that should be used to estimate beta (e.g., two years, five years, 10 years (Question 14).

The QCA recognises that over the short term, some of the variation in beta estimates may be attributable to statistical noise, rather than to changes in the systematic risk profile of the firms in the industry samples. However the QCA also notes that Ofwat considered that there were strong reasons to favour the use of betas estimated using the most recent two-year window (on the grounds that a relatively short estimation period provides the best forward-looking estimates of beta).

Whilst the QCA is correct that Ofwat favoured the use of short (i.e., two-year) estimation horizons for beta, that decision has subsequently been questioned in an appeal decision by the UK Competition and Markets Authority (CMA). The CMA's provisional findings on appeals sought by four water businesses in England and Wales on Ofwat's PR19 decisions noted that:[23]

> *…as raised by the water companies, we acknowledge the potential presence of 'noise' in short term estimates, and therefore consider that this estimation method should be used along with longer periods and frequencies to provide the most robust data from which to estimate equity betas.*

[22] IPART, Review of our WACC method, Final report, February 2018, section 5.8.1.
[23] CMA, Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Provisional findings, 29 September 2020, para. 9.262.

The CMA went on to conclude that it was appropriate to consider estimates derived using a range of horizons (i.e., two years, five years and 10 years), rather than rely exclusively on a very short (i.e., two-year horizon) as Ofwat had done.[24]

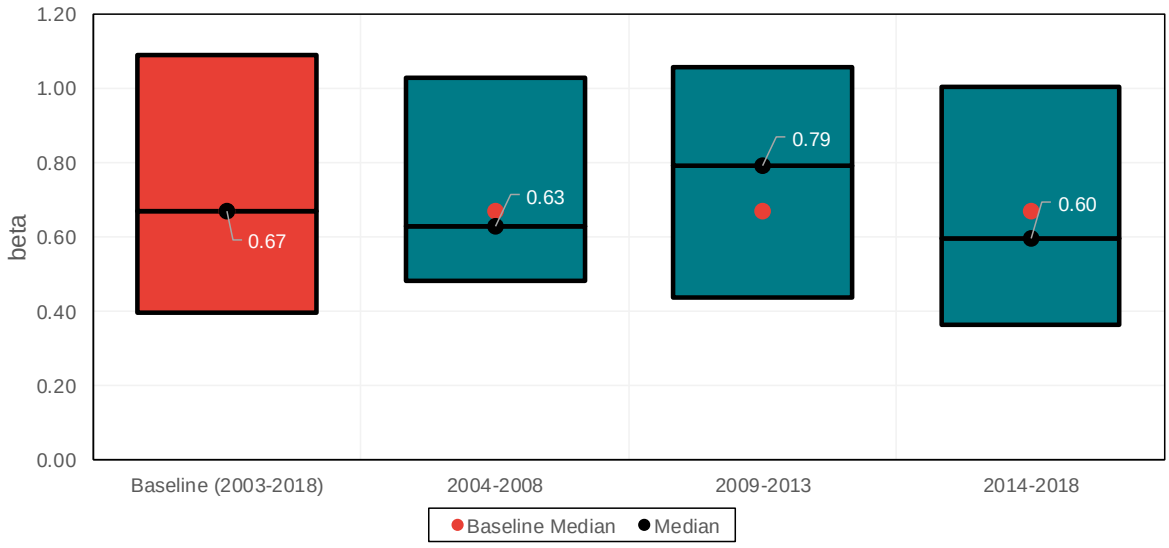
In Seqwater's view, the QCA should use the longest possible period of historical returns to estimate beta. Two years is too short a period to use as it would lead to estimates that are:

- statistically imprecise (due to small sample size); and
- highly variable over time—due to random statistical variation rather than true changes in systematic risk.

The firms that the QCA regulates are typically stable businesses that are involved in a narrow scope of activities, and which typically provide essential services. It is very unlikely that the true systematic risk of such businesses will vary materially over short periods of time. However, betas that are estimated over short periods (such as two years, or even five years)—even for infrastructure and essential services firms—tend to be highly variable over time. Such variation over is more likely to be due to statistical noise rather than genuine changes in systematic risk. The use of long estimation horizons will tend to produce more stable betas that less prone to random variation.

This can be seen from empirical analysis presented in a recent report by Frontier Economics, which is reproduced below in Figure 4.

Figure 4 Impact of shortening the estimation period on beta estimates



Source: Frontier Economics, Review of IPART's proposed beta estimation approach, July 2019, pp. 16-17.

Frontier Economics demonstrated the degree of variability in beta estimates as the estimation period applied to 35 water comparator firms considered by IPART was shortened. The first (red) bar presents the estimation outcome using the a 16-year period. The remaining bars present the estimation outcomes for three non-overlapping five-year periods, which mimic what might occur if IPART were to re-estimate beta at each price review using just five years of historical data. Each bar represents a beta estimate range reflecting the 25th to 75th percentile of estimates, and the median estimate across the sample, for each scenario, is identified.[25]

[24] CMA provisional findings, para. 9.267.
[25] Note that our baseline median estimate of 0.67 differs somewhat from the estimate of 0.741 presented in Figure 3 of the factsheet. This could be due to aspects of IPART's estimation approach that we were unable to replicate. However, the difference between our baseline estimate and the estimate presented in the factsheet is

The Figure shows that the median beta estimate could be as low as 0.60 and as high as 0.79, depending on which five-year period is used in the estimation. It is noteworthy that the median estimates for each of the shorter windows are materially different from the median estimate that relates to the whole period (0.67) — notwithstanding that each of the shorter windows overlaps materially with the full period. That is, each of the shorter windows covers roughly 1/3rd of the full period. Despite this, the estimates derived using the shorter windows are volatile and materially different from the estimate derived using the full 16-year period.

Seqwater considers that the QCA should estimate betas using a horizon of at least 10 years to reduce the risk of beta estimates being driven by random statistical variation, and to improve the statistical precision of estimates.

5.1.3 Choice of returns interval

The QCA seeks views on the returns interval (e.g., daily, weekly, monthly) that should be used to estimate beta (Question 15). The choice of returns interval involves a trade-off between the number of observations permitted within a fixed sample period (which affects the statistical precision of estimates) and the scope for other statistical problems to arise.

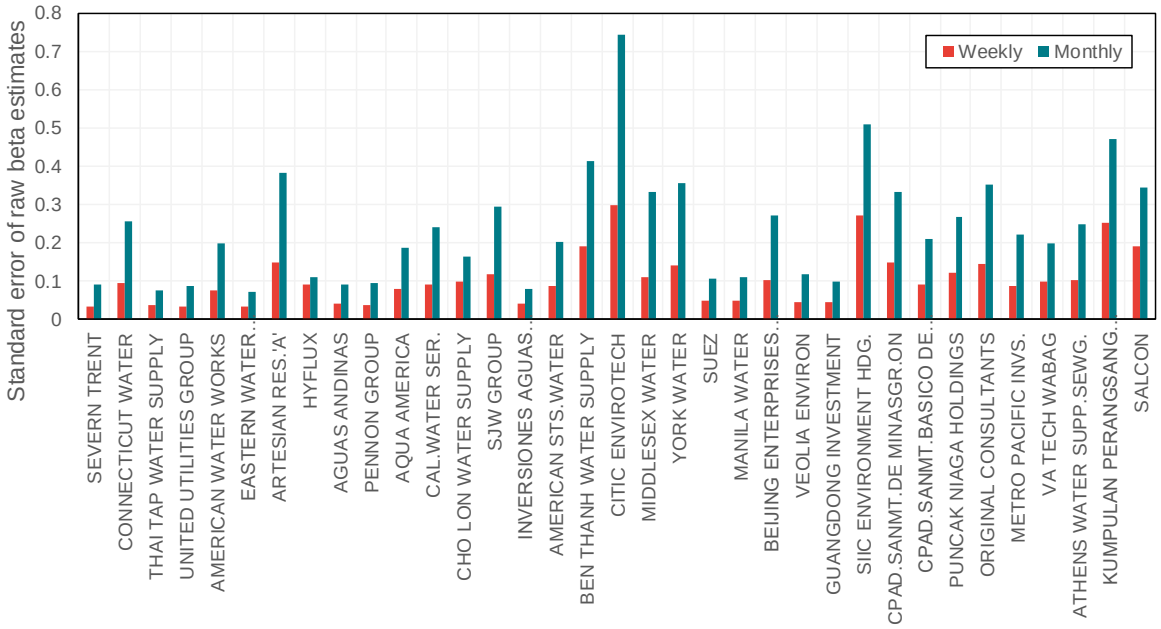
For instance, use of daily returns would provide a large number of observations over a given sample period (compared to weekly and monthly returns). Hence, the use of high frequency data tends to improve the statistical precision of beta estimates. This point was also demonstrated by Frontier Economics in a recent report. Frontier Economics noted that, using a 16-year estimation period:

- Monthly returns data would permit the use of up to 192 observations for each comparator;
- Weekly returns data would permit the use of up to 832 observations for each comparator; and
- Daily returns data would permit the use of up to 3,520 observations for each comparator (assuming 220 trading days per year).

Typically, the statistical precision of estimates will improve as the number of observations within an estimation period increases. The statistical precision of a beta estimate may be measured by the standard error of the estimate. The lower the standard error, the greater the statistical precision of the estimate (all else remaining equal). Figure 5 below (reproduced from Frontier Economics' report) compares the standard errors of the beta estimates for 35 water company comparators considered by IPART, estimated using weekly and monthly returns data. On average (across the sample), the standard errors of estimates derived using monthly returns are 2.3 times larger than the standard errors derived using weekly returns. That is, according to the results in the Figure below, using weekly returns rather than monthly returns on average more than doubles the statistical precision of the beta estimates.

also at least partly explained by the fact that Thomson Reuters appears to have updated some of the information on some of the comparators since IPART accessed those data. The relatively minor differences between our baseline estimate and IPART's does not change the overall conclusions we draw in this report.

Figure 5 Standard errors of beta estimates derived using weekly and monthly returns



Source: Frontier Economics, Review of IPART's proposed beta estimation approach, July 2019, p. 18.

Frontier Economics went on to explain that while use of daily returns data would improve the statistical precision of estimates still further (by increasing the number of observations used in the estimation), a well-recognised problem with daily returns data is that the observed returns can be correlated over time due to 'non-trading':[26]

> *Consider, for example, the case where a particular stock does not trade after say 2:00 pm on a certain day. In that case, the return on that day will be computed up to the 2:00 pm trade, which will be recorded as the closing price for the day. The measured return for the following day will be recorded from 2:00 pm the previous day through to the last trade on that day. The net effect is that two hours of return (from 2:00 pm to 4:00 pm) is shifted from one day to the next. This creates negative serial correlation in the measured returns. It is well recognised in the finance literature that this has the effect of creating a bias in beta estimates. The impact of this bias is more material for daily returns than it is for weekly returns as the amount of return that is 'shifted' from one period to the next is proportionately larger when daily returns are used. Our preliminary analysis of the comparators in IPART's sample detected evidence of serial correlation in daily stock returns over the 16-year estimation period.*

Hence, there is a trade-off involved in the choice of returns frequency. Increasing the frequency of data used improves the statistical precision of estimates, but also increases the risk of other statistical problems that might distort the estimates. The use of weekly returns offers a balance between these alternative considerations. Most regulators in Australia use weekly returns for this reason.[27]

Seqwater supports the use of weekly returns for the purposes of estimating betas.

[26] Frontier Economics, Review of IPART's proposed beta estimation approach, July 2019, p. 18.
[27] See, for example, IPART, Estimating Equity Beta for the Weighted Average Cost of Capital, Final report, August 2020, p. 1.

5.1.4 The QCA's process for estimating betas should address reference day risk

If weekly and monthly returns are used, then the QCA should derive estimates using every possible reference day, so as to avoid the introduction of a sampling error problem known as 'reference day risk.'

When estimating betas using returns data of lower-than-daily frequency (e.g., weekly or monthly returns data), it is necessary to choose the reference day used to calculate returns (e.g., in the case of weekly data, Monday-to-Monday, Tuesday-to-Tuesday, etc.).

The resulting beta estimates can be highly sensitive to the reference days selected. The risk of estimation error due to the choice of reference day is known in the empirical finance literature as *reference day risk.* Acker and Duck (2007), who investigated the extent of reference day risk associated with five-year monthly betas for S&P500 companies using Datastream data, show that the effect of reference day risk can be very severe.[28] For example, they found that:

- the estimated beta of one stock was +2 using one reference day and -2 using another;
- between two consecutive five-year periods, the estimated beta of one stock fell by 0.93 using one reference day and rose by 3.5 using another; and
- the average difference in the beta estimate (arising from a change in the reference day used to measure returns), across all stocks in the sample, ranged between 0.70 and 0.92, depending on the five-year estimation window considered.

Dimitrov and Govindaraj (2007) confirm the findings of Acker and Duck using a different dataset (i.e., CRSP).[29] They found, for instance, that one stock in the sample had a monthly beta estimate of 0.38 using one reference day and 2.45 using another (a difference of +2.08), over the same estimation period. In that study, the mean difference in estimated betas (across all stocks), arising from a change in the reference day used to measure monthly returns, was +0.68, which Dimitrov and Govindaraj note is similar to the mean range found by Acker and Duck (i.e., 0.70 to 0.92).

Frontier Economics explains in a recent report that:[30]

> *A standard way to mitigate this sampling error problem is to estimate each comparator's beta as the mean of estimates derived using all possible reference days. For instance, if using weekly returns, then the estimation process for a given comparator would involve:*
>
> - *deriving an estimate of beta five different reference days (Monday, Tuesday, …, Friday); and*
> - *averaging over all five estimates to obtain a mean estimate for that comparator.*
>
> *This exercise would then be repeated for each comparator.*
>
> *Such a process would utilise all the information contained in the returns data for each comparator and minimise sampling error that would introduce spurious variability in estimates over time.*

This recommendation was accepted by IPART when developing its current beta estimation methodology.[31]

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[28] Acker, D., and N. W. Duck, 2007. "Reference-day risk and the use of monthly returns data," *Journal of Accounting, Auditing and Finance*, 22, 527–557.
[29] Dimitrov, V., and S. Govindaraj, 2007. "Reference-day risk: Observations and extensions," *Journal of Accounting, Auditing and Finance*, 22, 559–572.
[30] Frontier Economics, Review of IPART's proposed beta estimation approach, July 2019, p. 20.
[31] IPART, Estimating Equity Beta for the Weighted Average Cost of Capital, Final report, August 2020, p. 1.

Seqwater proposes that, if the QCA uses weekly or monthly returns data, beta estimates should be derived using all possible reference days, and then averaged, to minimise reference day risk.

5.1.5 Choice of de-levering and re-levering formulae

The QCA typically uses the Conine leverage formula to de-lever and re-lever beta estimates.[32] The Conine leverage formula is the following:

$$\beta_e = \beta_a + (\beta_a - \beta_d)(1-t)\frac{D}{E}$$

where β_e is the (re-levered) equity beta, β_a is the estimated asset beta, β_d is the estimated debt beta, t is the corporate tax rate, D is the relevant measure of debt, and E is the relevant measure of equity.

As the formula above shows, the re-levered equity beta and the de-levered asset beta depend on the corporate tax rate. However, as explained in a recent report by Frontier Economics, the inclusion of a tax term in the de-levering and re-levering formulae is appropriate only if one assumes that the firm in question maintains a constant dollar amount of debt. This is not the assumption that the QCA makes. Rather, the QCA assumes that the benchmark entity maintains a constant gearing ratio (that is, debt as a proportion of total capital).

Frontier Economics presents a mathematical proof that demonstrates that under such an assumption, the appropriate de-levering and re-levering formulas omit the tax term.[33] These tend to be referred to by regulators in Australia as the Brealey-Myers formulae.

When IPART recently redeveloped its beta estimation methodology, IPART agreed with Frontier Economics' analysis and decided to use the Brealey-Myers formulae to de-lever and re-lever estimated betas—rather than leverage formulae that incorporate a tax term.

Seqwater considers that the QCA should use de-levering and re-levering formulae that omit the corporate tax term (e.g., the Brealey-Myers formulae), to ensure that the beta estimation process is consistent with finance theory.

5.1.6 Market vs. book value of equity

The QCA's approach to date has been to use the market value of equity (rather than the book value of equity), when computing the gearing of comparators used to de-lever the comparators' equity betas. Seqwater considers that this approach is correct and should continue to be followed by the QCA.

The measure of debt used in the QCA's calculations is the book value of debt, because the market value of debt is typically unavailable. The book value of debt is obtained from statutory accounts, and is therefore only available at infrequent intervals (e.g., quarterly, half-yearly or annually). However, the market value of equity can be measured more frequently (i.e., daily in the case of stocks that trade each day).

Seqwater considers that gearing for the comparators used by the QCA to estimate beta should be calculated by using a market value of equity and book value of debt measured at the same point in time. Pairing together an up-to-date measure of the market value of equity with a stale measure of the book value of debt would result in inaccurate estimates of gearing for the comparators that would distort beta estimates.

[32] QCA, SEQ Retail Water Long-Term Regulatory Framework - weighted average cost of capital (WACC), Final report, Appendix B, September 2014.
[33] Frontier Economics, Review of IPART's proposed beta estimation approach, July 2019, Appendix B.

5.1.7 Measurement of gearing

The consultation paper does not explain how the QCA proposes to determine the gearing of the comparators used to estimate the betas of a regulated business. However, in past decisions, the QCA's advisers on beta, Incenta, has used gearing measured at a snapshot point in time at the end of the estimation horizon.

Seqwater submits that the measure of gearing that is used to de-lever the estimated equity betas of the comparators in the QCA's sample should be computed using the *average* gearing over the estimation period, rather than a snapshot of gearing at a particular point in time (e.g., the start or end of the estimation period). This is because the estimated betas represent a measure of the *average* relationship between stock returns and market returns over the estimation period, rather than the relationship between stock returns and market returns at a specific point in time.

The appropriate measure of gearing to use when de-levering betas is the average gearing of the comparator over the estimation period. The gearing of a stock at the end of the estimation period is unlikely to be consistent with the average gearing over that period, if gearing has changed over time.

This approach was recently adopted by IPART when it redeveloped its beta estimation methodology.[34]

Seqwater proposes that the gearing of each comparator firm should be determined by computing the average gearing over the entire estimation horizon, rather than at a snapshot point in time (e.g., at the end of the estimation horizon).

5.1.8 Low-beta bias

Since the 1960s, when the SL-CAPM was first developed, overwhelming empirical evidence has emerged over several decades and in many countries that the SL-CAPM underestimates the required return on equity for stocks with a beta less than 1 (i.e., low-beta stocks). This has become known the 'low-beta bias' problem.

As noted earlier in this submission, the QCA currently uses the SL-CAPM to estimate the required return on equity. The SL-CAPM may be written mathematically as follows:[35]

$$r_e = r_f + \beta \times (r_m - r_f)$$

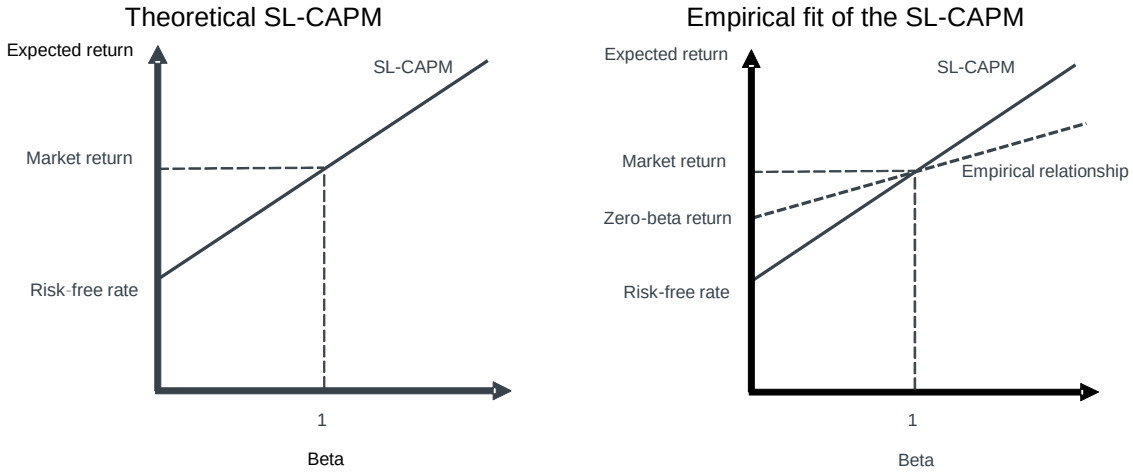
where:

- r_e is the required return on equity;
- r_f is the risk-free rate;
- β is the equity beta;
- r_m is the expected return on the market; and
- $r_m - r_f$ is the MRP.

The theoretical version of the SL-CAPM may be presented graphically as in the left-hand panel of Figure 6 below. The Figure shows that according to this theoretical model, the expected return on an investment increases as the non-diversifiable risk (i.e., beta) associated with the investment increases. When the non-diversifiable risk of the investment is zero, then the expected return on the investment is simply the risk-free rate. When the non-diversifiable risk of the investment is 1 (i.e., the investment's returns are perfectly correlated with the returns of the market as a whole), then the expected return on the investment is equivalent to the expected return on the market.

[34] IPART, Estimating Equity Beta for the Weighted Average Cost of Capital, Final report, August 2020, p. 2.
[35] Issues paper, Box 3.1, p. 12.

Figure 6 Graphical representation of the theoretical and empirical SL-CAPM



Source: Seqwater.

The SL-CAPM was derived as a purely theoretical model using a set of theoretical assumptions and mathematical proofs. The developers of the SL-CAPM did not have any regard to market data when developing the model.

However, soon after the theoretical SL-CAPM had been published, researchers began to test empirically how well it explained real-world data. Over nearly 50 years, the empirical evidence—which is remarkably consistent over time and across different markets—suggests that the SL-CAPM fits actual returns data poorly. Specifically, the evidence indicates that the relationship between returns and risk is systematically flatter than predicted by the theoretical SL-CAPM, as shown in the right-hand panel of Figure 6.

There have been a number of empirical studies that have found evidence of a low-beta bias using Australian data and the same techniques used by academic studies to uncover the low-beta bias in other markets. For instance:

- NERA (2013) demonstrates using Australian data between 1974 and 2012 that no statistical relationship could be identified between stock returns and beta estimates.[36] The NERA result suggests that, contrary to the SL-CAPM's upward-sloping relationship between expected returns and beta, the empirical relationship between stock returns and beta estimates is not significantly different from a horizonal line. In other words, NERA's findings would suggest that the required return for any Australian stock (including those with no exposure to systematic risk) would be set equal to the required return on the Australian stock market (i.e., the sum of the risk-free rate and the MRP). This finding is consistent with a finding of low-beta bias in the Australian data.
- Using Australian stock returns data between 1994 and 2014, SFG (2014) found evidence of a positive zero-beta premium (i.e., 3.34%).[37] This result is consistent with a flatter relationship between stock returns and beta than predicted by the SL-CAPM for the Australian market, and therefore implies the existence of a low-beta bias in Australia.

[36] NERA, Estimates of the zero-beta premium, June 2013.
[37] SFG Consulting, Cost of equity in the Black Capital Asset Pricing Model, May 2014.

- Again, using Australian data (between 2002 and 2017), Frontier Economics (2018) find statistical evidence that the relationship between the expected return on equity and beta estimates is flatter than is suggested by the SL-CAPM.[38] This is consistent with a finding of low-beta bias in the Australian data.

This flatter relationship indicated by the empirical evidence suggests that the expected return for an investment with zero systematic risk would be higher than the risk-free rate.[39] The difference between this higher required return and the risk-free rate is referred to in the literature as the *zero-beta premium*. The existence of a positive zero-beta premium is plausible, and also supported by finance theory. A key assumption underpinning the SL-CAPM is that investors can borrow and lend as much as they like at the risk-free rate. This is not true in the real world. It has been shown mathematically that once this unrealistic SL-CAPM assumption is relaxed, the expected return from making an investment with zero systematic risk is higher than the risk-free rate.[40] This outcome is consistent with the empirical evidence.

This empirical evidence has two profound implications:

- The SL-CAPM tends to *under-estimate* the required return of stocks with a beta *less* than 1. This has become known the *low-beta bias problem*; and
- The SL-CAPM tends to *over-estimate* the required return of stocks with a beta *greater* than 1. This may be regarded as the *high-beta bias problem*.

The first of these two implications is relevant to the QCA, since the QCA uses the SL-CAPM to estimate Seqwater's required return on equity, and because the QCA's determination is that Seqwater's beta is less than 1. This means that the estimated return on equity derived by the QCA using the SL-CAPM is more likely to be an under-estimate than an over-estimate. The high-beta bias problem is not relevant to the QCA, since no party proposes that Seqwater's beta is greater than 1.

Seqwater submits that:

- The tendency for the SL-CAPM to under-estimate the required return on capital of low-beta stocks means that estimates of the required return on equity derived empirically by implementing the SL-CAPM should be viewed by the QCA as more likely to under-estimate the true required return on equity than unbiased estimates or over-estimates.
- The QCA should have regard to the low-beta bias problem by exercising caution when determining the beta allowance.

For the avoidance of doubt, Seqwater does not propose that the QCA should seek to quantify the size of the low-beta bias and incorporate that as an uplift to Seqwater's allowed return on equity. Rather, Seqwater submits that the QCA should have regard to the well-established fact that the SL-CAPM tends to underestimate the required return on equity of low-beta stocks when determining Seqwater's beta allowance.

5.1.9 Process for selecting a final estimate

The consultation paper notes that:[41]

> *Typically, we update our beta estimates for the relevant industry reference points as part of each review. Over the short term, some of the variation in these estimates may be attributable to statistical noise, rather than to changes in the systematic risk profile of the firms in the industry samples.*

[38] Frontier Economics, *Low-beta bias and the Black CAPM*, September 2018. This study drew on the methodology used in the following seminal study: Brav, A., R. Lehavy, and R. Michaely, 2005. "Using expectations to test asset pricing models," *Financial Management*, Autumn, 31–64.
[39] That is, the intercept of the empirically-estimated relationship is higher than the risk-free rate.
[40] Black, F., 1972, "Capital market equilibrium with restricted borrowing," *Journal of Business*, 45, 3, 444-455.
[41] Consultation paper, p. 13.

> *Therefore, there may be merit in maintaining the beta values of our reference points (unless there is compelling evidence for a change), which could help promote regulatory certainty. We note that IPART has taken a similar position in its recently published draft report on estimating equity beta.*

Seqwater agrees with the QCA that beta estimates can be highly variable over time, and that this variation can be attributable to "statistical noise" rather than genuine changes in systematic risk.

This point was recognised by IPART in a recent decision on its methodology for beta estimation:[42]

> *Noting that beta estimates are imprecise and volatile, and that small changes in beta can lead to large changes in prices, we are aware of the possibility that new analysis could result in departures from the status quo beta that are driven by noisy data rather than genuine market trends.*

In view of this consideration, IPART has (as noted in the consultation paper) adopted a rule that it would depart from the prevailing beta allowance only if there were persistent empirical evidence over a long timeframe that beta had changed materially. Specifically, IPART has decided that it would adopt the following approach:[43]

- Changing an established equity beta would only be contemplated if the established value was more than one standard deviation from the new mean estimate.
- Stakeholder submissions and preference for stability would be taken into account.
- Departure from the status quo would only be contemplated if the evidence supporting a different value was persistent over a long timeframe (i.e., a regulatory period or longer).

That is, IPART now considers that the beta allowance provided to regulated businesses should remain fixed unless there is compelling and sustained evidence to the contrary. In view of the significant uncertainties involved with the task of beta estimation, this is a sound approach in Seqwater's view.

Seqwater proposes that the QCA adopt a similar approach to that adopted by IPART—namely, to depart from the status quo beta allowance only if there is sustained evidence (i.e., over a number of regulatory periods) that beta has increased or decreased.

5.2 Approach to estimating the market risk premium (MRP)

5.2.1 Methods the QCA should rely on to estimate the MRP

The QCA's current approach is to have regard to five approaches when estimating the MRP: Ibbotson, Siegel, Wright, Cornell and surveys. The QCA considers estimates from these approaches and exercises its judgment in selecting a point estimate. The exercise of that judgment is generally unexplained, although in some cases the QCA has provided relative weightings that "would be consistent" with the final point estimate that it has adopted. Although the estimates from the various approaches vary over time, the point estimate adopted by the QCA appears to be effectively fixed at 6.5%.[44] That is, as the individual estimates vary, so too do the weights applied to each estimate (or the way the QCA otherwise exercises its discretion) such that the outcome remains essentially fixed.

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[42] IPART, Estimating equity beta for the Weighted Average Cost of Capital, Final Report, August 2020, p. 6.
[43] IPART, Estimating equity beta for the Weighted Average Cost of Capital, Final Report, August 2020, p. 6.
[44] In the QCA's 2018 final decision on Seqwater's bulk water prices, the QCA adopted an MRP estimate of 7.0%. However, that MRP estimate was paired with an estimate of the risk-free rate that was set by matching the term-to-maturity of three years (i.e., the length of the regulatory period). Were the risk-free rate expressed with a term-to-maturity of 10 years, as was adopted by the QCA in subsequent decisions for Aurizon Networks and Queensland Rail, the associated MRP estimate used by the QCA would have been 6.5%.

The consultation paper seeks views on whether the QCA should continue to rely on the five approaches identified above, and whether relatively more weight should be given to historical or forward-looking methods (Question 22). Seqwater's views about each of the approaches the QCA adopts are summarised in the remainder of this section.

Ibbotson

Seqwater agrees that the Ibbotson approach provides useful information about the long-run average MRP. Since it is computed using data over a long historical period beginning in 1958, it reflects (by construction) the MRP that pertains to the average market conditions over that historical period.

Seqwater submits that the Ibbotson approach should be estimated and used in a manner that is consistent with it providing an estimate of the MRP that pertains to average financial market conditions.

Siegel

The Siegel approach begins with the Ibbotson estimate and then makes an adjustment by:

- Adding the average real risk-free rate over the relevant historical period, computed by reducing the nominal risk-free rate for observed inflation each year; and
- Subtracting an estimate of the real risk-free rate that investors would have been expecting, computed as the average real risk-free rate from inflation-indexed government bonds over the longest period for which that data is available.[45]

Seqwater considers that there are a number of problems with the Siegel approach that make it unfit for purpose. Those problems include:

- Making "adjustments" to the historical data is an unorthodox approach. Specifically, it is unorthodox to revise the historical data by:
  - Identifying which historical events would have been expected by investors at the time, and which would have been unexpected by investors at the time; and
  - Making an adjustment to convert the data into what one considers it would have looked like if the unexpected events had not occurred.
- The proposed basis for the Siegel approach is not borne out in the data. Specifically, the low real rates in the 1970s look no more unusual than the high real rates of the 1980s and 1999s.
- The required data is not available to properly implement the Siegel approach. Real government bond yields are not available for the 1958 to 1987 period.
- There is no evidence of the Siegel approach being used by any other regulator in Australia—or indeed by Siegel himself.[46]

More detail on these issues is set out in a 2017 Frontier Economics report to the QCA.[47]

Seqwater submits that a key part of any WACC review should be a re-examination of the appropriateness of the Siegel approach to estimating the MRP. In particular, the WACC review should carefully consider any aspects

[45] QCA, 2014, Market Parameters Decision, p. 59.
[46] The Siegel approach is used by the New Zealand Commerce Commission. However, the reason for that is because the New Zealand Commerce Commission has historically been advised by the QCA's adviser on the same issue. The point is that both the QCA and the New Zealand Commerce Commission are unusual in their use of the Siegel approach.
[47] https://www.qca.org.au/wp-content/uploads/2019/05/32243_Aurizon-Network-Frontier-Economics-An-updated-estimate-of-the-market-risk-premium-1.pdf.

of the QCA's current approach that are not used in practice and which are unique to the QCA. In Seqwater's view, the Siegel approach should not be used by the QCA.

Wright

Seqwater agrees that the Wright approach provides useful information about the long-run average real return on the market. Since it is computed using data over a long historical period beginning in 1958, it reflects (by construction) the overall required real return on the market that pertains to the average market conditions over that historical period. The historical average real return can be converted into a nominal return by grossing up for current expected inflation using the standard Fisher relationship. The result is a required nominal return that would deliver a real return that is consistent with the long-run historical average.

Seqwater submits that the Wright approach should be estimated and used in a manner that is consistent with it providing an estimate of the required real return that pertains to average financial market conditions.

Cornell

The QCA's Cornell method is a forward-looking 'dividend growth model' (DGM) estimate of the market risk premium. In general, forward-looking DGM estimates have the benefit of reflecting the prevailing conditions in equity markets as they are based on current prices and dividend forecasts rather than historical data.

Seqwater strongly supports the use of a standard and appropriate DGM approach to estimating the forward-looking MRP.

However, over time the QCA has modified the way it implements the Cornell approach such that the current implementation is non-standard (indeed it is unique to the QCA) and unfit for purpose. The key problem with the QCA's current implementation is the assumption that the 10-year government bond yield will increase to 5.8% over the next 10 years. The key problems with that assumption are that:

- There is no basis for such an assumption;
- It results in the return on equity becoming an assumption rather than an estimate; and
- No other user of DGMs (including other regulators in Australia) that Seqwater is aware of embeds such an assumption when implementing DGMs.

More detail on these issues is set out in a 2017 Frontier Economics report to the QCA[48] and in Section 5.2.3 below.

Seqwater submits that a key part of any WACC review should be a re-examination of the appropriateness of the Cornell approach to estimating the MRP. In particular, the WACC review should carefully consider any aspects of the QCA's current approach that are not used in practice and which are unique to the QCA.

Surveys

Seqwater notes that a number of deficiencies have been identified in relation to the survey evidence that is currently considered by the QCA, including:

- The surveys tend to have few respondents;
- The surveys quickly become dated and irrelevant;
- There is no information about the qualifications of respondents;
- There is no information about the non-response rate;

[48] https://www.qca.org.au/wp-content/uploads/2019/05/32243_Aurizon-Network-Frontier-Economics-An-updated-estimate-of-the-market-risk-premium-1.pdf.

- The surveys do not ask respondents what they are using the MRP for. It seems unlikely that any of the respondents would be using the MRP to make real-world investment decisions; and
- There is no information about the values that participants use for other WACC parameters (for example, whether they are using higher values of the risk-free rate in lieu of a higher value for the MRP).

Seqwater submits that MRP survey responses do not contribute any valuable information and should be afforded no weight. We disagree with the QCA's views that surveys are "timely, clear and properly reflective of the views of the market." Consequently, Seqwater submits that a key part of any WACC review should be a re-examination of the appropriateness of the survey approach to estimating the MRP.

5.2.2 Combining inputs into the CAPM

Section 4 above identifies the problems that arise when CAPM parameters are estimated in an inconsistent manner. The source of those problems is the pairing of a contemporaneous risk-free rate (which reflects prevailing market conditions) with an effectively constant MRP (which reflects long-run average market conditions).

Internal consistency requires either that:

- All CAPM parameters reflect the prevailing market conditions; or
- All CAPM parameters reflect the long-run average market conditions.

The remainder of this section explains how the CAPM can be implemented in an internally consistent manner using the Ibbotson, Wright and DGM approaches. We do not examine the Siegel or survey approaches as we consider that those approaches provide no useful information and should therefore be disregarded by the QCA.

Internally consistent implementation of the Ibbotson approach

The Ibbotson approach produces an estimate of the MRP that pertains to the average financial market conditions over the relevant long-run historical period. Consequently, an internally consistent Ibbotson implementation of the CAPM would require a pairing of:

- The Ibbotson estimate of the MRP, $\left(E[r_m] - r_f\right)$, which reflects average financial market conditions; with
- An estimate of the risk-free rate that also reflects average financial market conditions, such as a long-term historical average.

The resulting output from the CAPM would be an estimate of the return on equity that is required in average market conditions.

Internally consistent implementation of the Wright approach

The Wright approach produces an estimate of the required return on the market portfolio that pertains to the average financial market conditions over the relevant long-run historical period. Consequently, an internally consistent Wright implementation of the CAPM would require a pairing of:

- The Wright estimate of the required return on the market, $E[r_m]$, which reflects average financial market conditions; with
- An estimate of the risk-free rate that also reflects average financial market conditions, such as a long-term historical average.

The resulting output from the CAPM would be an estimate of the return on equity that is required in average market conditions.

Internally consistent implementation of the DGM approach

The DGM approach produces an estimate of the required return on the market portfolio that pertains to the prevailing financial market conditions. Consequently, an internally consistent DGM implementation of the CAPM would require a pairing of:

- The DGM estimate of the required return on the market, $E[r_m]$, which reflects the prevailing financial market conditions; with
- An estimate of the contemporaneous risk-free rate that also reflects the prevailing financial market conditions.

The resulting output from the CAPM would be an estimate of the return on equity that is required in the prevailing market conditions.

Combining estimates into a single allowed return on equity

The Ibbotson and Wright approaches are different methods for analysing the long-run historical data. These approaches lie at opposite ends of the same theoretical spectrum. The Ibbotson approach is based on the assumption that the MRP is constant across the whole range of financial market conditions, whereas the Wright approach is based on the assumption that the total required return on the market is constant over all financial market conditions. Seqwater considers that the truth lies somewhere between these two theoretical extremes. Consequently, a natural default would be to apply equal weight to the Ibbotson and Wright approaches.

By contrast, the DGM implementation of the CAPM produces an estimate of the return that is required in the prevailing market conditions.

Seqwater considers that there is some benefit in giving some weight to the estimates of the return that would be required in average market conditions and some weight to the estimate of the return that would be required in the prevailing market conditions. The historical estimates (when properly implemented in an internally-consistent manner) are slow to move and therefore provide a degree of stability in the allowed return on equity (and consequently prices). Applying some weight to the forward-looking estimate ensures that the prevailing market conditions are also reflected in the allowed return on equity and market prices.

By way of example, the final allowed return on equity could be computed by applying 25% weight to each of the Ibbotson and Wright estimates and 50% weight to the DGM estimate.

Seqwater submits that the QCA's rate of return review should carefully consider:

- How to implement CAPM estimates of the required return on equity in an internally consistent manner; and
- How to best distil the various estimates into a single allowed return on equity.

5.2.3 Arithmetic vs. geometric averaging of historical returns

The estimation methods that make use of historical returns involve the averaging either total returns or excess returns over some historical period. The consultation paper notes that in past decisions the QCA has typically applied an arithmetic averaging approach. The consultation paper then recognises that other regulators, such as the AER and ERA, have used both arithmetic and geometric averaging, and seeks views on whether the QCA should similarly adopt the use of geometric averages (Question 24).

The QCA is correct to identify that there are two different methods available for averaging historical excess returns. Each approach is appropriate for different purposes.

When assessing what average returns have *actually* been realised by investors over some historical period, then the appropriate approach to use is geometric averaging. This is because geometric averaging accounts for the compounding of returns over time. The returns that an investor receives over one year can be reinvested to generate returns over the next year, and the next year, and so on. The process of geometric averaging

recognises that returns can be reinvested such that they are compounded over time, and so computes the average rate that delivers the total compounded return over the averaging period.

However, when assessing what return investors can *expect* to receive over some future period, then the only appropriate approach to use is arithmetic averaging. Suppose an investor has 50 years of historical excess returns data, and seeks to estimate the excess return that might be received in the following (i.e., the 51st) year. Then one could interpret the historical data in the following way:

- There is a 1-in-50 chance that the excess return in the 51st year will turn out to be the same as the excess return that was realised in the 1st year;
- There is a 1-in-50 chance that the excess return in the 51st year will turn out to be the same as the excess return that was realised in the 2nd year;
- …and so on.

Given the historical data, the expected excess return in year 51 is the simple arithmetic mean of the excess returns realised in each of the previous 50 years.

This can be seen more clearly with the help of a simple example.[49] Consider an investor who has held an asset for two years and seeks to use that historical data for two purposes:

- To estimate the compound return that has been earned over the historical two-year period; and
- To estimate the expected return over the forthcoming two-year period.

Suppose the observed returns were -2% and 14% in each of the two years, respectively. In this case, the geometric mean is $(0.98 \times 1.14)^{0.5} - 1 = 5.7\%$ and the arithmetic mean is $(-0.02 + 0.14)/2 = 6\%$.

Note that $100 invested at the beginning of the two-year period would have fallen by 2% to $98 at the end of the first year and then risen by 14% to $111.72 at the end of the second year.[50] This is equivalent to an annual compound return of 5.7% $[100(1.057)^2 = 111.72]$. *Thus, the geometric mean is the appropriate calculation for the investor to use to compute the compound return that has been earned over the historical two-year period*.

Now consider the best estimate of the expected return over the forthcoming two-year period. The two-year history suggests that, each year, there is a 50% chance that the return will be -2% and a 50% chance that the return will be 14%. Thus, over the forthcoming two-year period there are four possible outcomes, as summarised in Table 2 below.

Table 2 Illustrative example of arithmetic averaging

Year 1	Year 2	Probability	Value of investment
-2%	-2%	0.25	96.04
-2%	14%	0.25	111.72
14%	-2%	0.25	111.72
14%	14%	0.25	129.96
Expected value			112.36

Source: ENA, AER Review of the Rate of Return Guideline – Response to Draft Guideline, 25 September 2018, pp. 115-116.

[49] This example is reproduced from: ENA, *AER Review of the Rate of Return Guideline – Response to Draft Guideline*, 25 September 2018, pp. 115-116.
[50] ($100*0.98)*1.14 = $111.72.

In this case, the expected value of the investment at the end of the two forthcoming years is $112.36,[51] which equates to the arithmetic mean: $100(1.06)^2 = 112.36$. *Thus, the arithmetic mean is the appropriate calculation when estimating the expected return over a forthcoming period*.

The arithmetic mean treats each historical data point as representing one possible outcome that may occur in each year in the future.

Using the geometric mean to estimate the future expected return implies that the series of historical data will be repeated again in sequence in the future.

The QCA's task is to determine the expected MRP in each year of the next regulatory period. The regulatory process involves no compounding of returns. That is, QCA does not seek to determine regulated revenues that will deliver a particular average compounded return over the regulatory period. In that context, the only appropriate averaging approach that should be used in order to determine the allowed MRP using historical excess returns is the arithmetic averaging approach.

This point was made by the QCA's adviser, Dr Martin Lally, in a report to the AER. Specifically, Dr Lally explained that for the purposes of setting the allowed rate of return, the arithmetic average (not the geometric average) must be used. Dr Lally has also provide a mathematical proof as the basis for that advice. In his 2012 report to the AER, Dr Lally stated that:[52]

> *The AER's belief that geometric averages are useful apparently arises from a belief that there is a compounding effect in their regulatory process (AER, 2012, Appendix A.2.1), and therefore the analysis of Blume (1974) and Jacquier et al (2003) applies. However, I do not think that there is any such compounding effect in regulatory situations and the absence of a compounding effect leads to a preference for the arithmetic mean over the geometric mean.*

Dr Lally then presented a mathematical derivation to demonstrate that the historical arithmetic mean satisfies the NPV=0 criterion and the historical geometric mean does not.[53] Dr Lally set out the NPV=0 test and concludes that:[54]

> *The geometric mean fails this test whilst the arithmetic mean will satisfy it if annual returns are independent and drawn from the same distribution. So, if historical average returns are used, they should be arithmetic rather than geometric.*

Investors may consider geometric means when estimating the compound return that has been earned over some historical period. However, mathematically, the arithmetic mean must be used to estimate the expected return over a forthcoming period – which is what the QCA seeks to determine when setting an *ex ante* rate of return allowance over a regulatory period.

Seqwater submits that, if the QCA chooses to estimate the MRP using historical returns, it should do so only using an arithmetic averaging process—as it has typically done in past decisions. No weight should be given to geometric historical averages of excess returns.

5.3 Approach to estimating gamma

In the Australian regulatory setting, there is broad agreement between all regulators and experts that gamma (γ) should be estimated as the product of two parameters: $\gamma = F \times \theta$. The first parameter (F) is the distribution rate

[51] 112.36 = (0.25 * 96.04) + (0.25*111.72) + (0.25*111.72) + (0.25*129.96).
[52] Lally, 2012, p. 31.
[53] The NPV=0 criterion simply states that the expected present value of allowed revenues should equal the expected present value of the regulated business's efficient costs.
[54] Lally, 2012, p. 32.

– the proportion of created imputation credits that are attached to dividends and distributed to shareholders. The second parameter (θ, or 'theta') is variously defined as "the value of distributed imputation credits" or as "the utilisation rate."

5.3.1 Estimation of the distribution rate

The QCA currently derives its estimate of the distribution rate as the average distribution rate of the 20 largest companies listed on the Australian stock exchange. The QCA seeks views on whether it should broaden its estimation approach to take account of the imputation tax credits distributed by non-listed companies (Question 27).

The QCA estimates gamma (as it does all other rate of return parameters) using a benchmark approach. That is, the QCA estimates gamma from the perspective of a benchmark efficient business, rather than the actual business being regulated.

As such, the key question is whether the proportion of imputation credits generated by the benchmark efficient business that is distributed to investors is best estimated with reference to the 20 largest listed firms, or with reference to other firms? In order to answer this question, the QCA must first define the characteristics of a benchmark efficient business.

It may be appropriate for the QCA to estimate the distribution rate by reference to the average proportion of imputation tax credits distributed by the 20 largest listed firms in Australia if the benchmark efficient entity's distribution of imputation tax credits reflects the way the 20 largest listed firms in Australia distribute credits.

As far as Seqwater is aware, the QCA has not defined (in the same way that other regulators—such as the AER, ERA or IPART) the characteristics of a benchmark efficient business. However, in Seqwater's case, the top 20 largest listed firms in Australia are unlikely to be good proxies for the benchmark efficient business. For instances:

- The 20 largest listed firms in Australia are very large multinationals. For example, BHP has equity that is valued many times larger than the equity in Seqwater's RAB. Even the 20th listed company is several times larger than the service providers that are regulated by the QCA.
- The 20 largest listed firms have a material amount of foreign sourced profits which enable them to distribute a higher proportion of imputation credits. Specifically, multinational firms are able to attach imputation credits to dividends that they distribute out of foreign sourced profits (since any dividend can have credits attached to it). Foreign profits enable any firm to distribute more imputation credits than it would otherwise have been able to. If the QCA considers the benchmark efficient entity to be a domestic firm that does not have access to foreign sourced profits, then exclusive reliance on the 20 largest listed firms in Australia will result in an over-estimate of the distribution rate for the benchmark efficient business.

Seqwater therefore proposes that the QCA should define clearly whether the benchmark efficient entity is a large multinational. If that is not the case, then the QCA should estimate the distribution rate by giving consideration to the proportion of credits distributed by unlisted firms in Australia.

5.3.2 Estimation of theta

Currently, the QCA estimates theta using the so-called 'equity ownership' approach. The QCA describes the equity ownership approach as follows:[55]

[55] QCA, *SEQ Retail Water Long-Term Regulatory Framework - weighted average cost of capital (WACC), Final Report*, September 2014, Appendix B, p. 43.

> *The equity ownership method calculates the shares of domestic and foreign equity ownership for listed firms and assumes utilisation rates for these two classes of investors of one and zero respectively.*
>
> *Based on an estimate of 44% as the foreign ownership share of Australian listed equities, and assuming a utilisation rate of one for domestic resident investors and zero for foreign investors, the weighted average utilisation rate for listed Australian domestic market equities is 0.56 (that is, 44% of zero plus 56% of unity).*

The equity ownership approach estimates theta by considering the proportion of distributed credits that could potentially be redeemed by eligible investors.

The consultation paper seeks views on whether theta should be estimated using alternative approaches such as taxation statistics or market value (dividend drop-off) studies (Question 27)?

In the regulatory context, two alternative interpretations of the meaning of theta have emerged:

- The *market value* interpretation says that theta represents the economic value that investors place on imputation tax credits. That is, how much, in dollar terms, is each imputation credit worth to the investor in question? If the market value interpretation of theta is adopted, then theta should be estimated using techniques that are designed to estimate the market value of credits.
- The *utilisation rate* interpretation says that theta represents the total proportion of all credits created that are (or potentially could be) redeemed by investors. If the utilisation rate interpretation is adopted, then theta should be estimated using an approach that measures the proportion of credits distributed that are (or potentially could be) redeemed—such as the equity ownership approach.

To date, the QCA has adopted the utilisation rate interpretation, rather than the market value interpretation. In Seqwater's view, when determining an appropriate methodology for estimating theta, the QCA should consider the economic role played by gamma within the regulatory framework.

The building block approach used by the QCA to set regulated prices first determines the quantum of dividends and capital gains (i.e., total returns) that are required to be paid to shareholders in the benchmark efficient firm to provide them with a fair return on equity capital. That quantum of dividends and capital gains is then reduced by the assumed value of imputation credits. For shareholders to be made whole, it must be the case that the value (to shareholders) of the deducted dividends and capital gains is equal to the value (to shareholders) of the imputation credits that replace them. That is, what is required (economically) is an estimate of the quantum of dividends and capital gains that shareholders would give up in order to receive a dollar of imputation credits.

Consequently, Seqwater's view is that the proper economic role of gamma in a building block model is as an exchange rate – the quantum of dividends and capital gains that shareholders would give up in order to receive a dollar of imputation credits. This is precisely what the market value approach seeks to measure. That approach measures the average amount by which share prices fall when imputation credits are distributed. The difference between the with-credit and ex-credit share prices indicates the value that investors placed on those credits.

It is important to note that the 'utilisation' approach is not just a different method for estimating the value that shareholders ascribe to imputation credits. Rather, that approach seeks to estimate something entirely different – the proportion of credits created each year that are likely to be redeemed in that year. In our view, that proportion is something quite different from what is required of the gamma parameter in a building block model.

The distinction between the market value and utilisation rate interpretations may be illustrated using an analogy. Suppose a traveller, by means of an airline loyalty program, has accumulated 10,000 frequent flyer points. The fact that the traveller has 10,000 points available to redeem with their airline, on its own, provides no information on the economic value of those points to the traveller, since each point could be worth 1 cent, 2 cents or 5 cents. In order to determine the economic value of those points, one needs to know the amount by which the traveller is able to reduce their next fare if those 10,000 points were to be redeemed. That, in turn, requires an understanding of the exchange rate between one point and one dollar of fare.

The utilisation rate approach would simply count up the number of frequent flyer points available to the traveller. By contrast, the market-based approach would seek to determine the amount by which the traveller may reduce their next fare by redeeming the points accumulated.

Whilst most regulators in Australia have adopted the utilisation rate interpretation of gamma that the QCA has used to date, IPART has taken a different view of gamma. IPART stated the following in its 2018 WACC methodology decision:[56]

> *We agree with Frontier Economics that the value of gamma should be interpreted as the market value of dividends and capital gains that investors would be willing to forgo in exchange for imputation credits. Further, we maintain our view that dividend drop-off studies are currently the best method to estimate the market value of gamma. Its advantage is that it measures the observed value of dividends and imputation credits by examining share price changes on ex-dividend days.*

Seqwater submits that, given the role played by gamma within the QCA's regulatory framework, gamma should be interpreted as the economic value that investors place on imputation tax credits. As such, theta should be estimated using techniques that are designed to estimate the market value of credits (e.g., dividend drop-off analysis).

5.4 Approach to setting the return on debt allowance

At the present time, the QCA does not set Seqwater's return on debt allowance. Rather, the Ministerial Referral Notices direct the QCA to use an estimate of the cost of debt provided by the Queensland Treasury Corporation (QTC). Seqwater does not advocate for a change to this arrangement.

Currently, the Ministerial Referral Notices require the QCA to set Seqwater's return on debt allowance using a cost of debt estimate provided by QTC. Seqwater continues to support this approach, and does not advocate the use of a different approach at this time to set Seqwater's return on debt allowance.

[56] IPART, *Review of our WACC method*, Final Report, February 2018, p. 83.

6 Seqwater's responses to questions posed by the QCA

Question 1: Should the relevant comparators for determining the benchmark gearing of a regulated firm be those used in our beta analysis?

The QCA's assessment of benchmark gearing should be informed by a number of considerations, including the empirical evidence on gearing from comparator firms, regulatory precedent and the need for stability in the QCA's rate of return decisions over time. There are no listed water companies in Australia. Therefore, all water sector comparators that might be used by the QCA to assess Seqwater's comparators would be drawn from overseas. The gearing of those firms may have limited relevance to the gearing of Australian water companies. Therefore, the QCA should not rely exclusively on the gearing of comparators used to estimate beta. Rather, the QCA should recognise that it has consistently used a benchmark gearing of 60% for most businesses it regulates. Seqwater supports the maintenance of this benchmark gearing assumption on the grounds of regulatory certainty and predictability.

Question 14: Over what time horizon should we estimate beta (e.g. 2 years, 5 years, 10 years)?

Seqwater proposes that the QCA should estimate betas using a historical time horizon of at least 10 years. A relatively long averaging period would ensure a large number of observations within the estimation period, thereby improving the statistical precision of the estimate. Use of a long estimation period would also improve the stability of estimates. Seqwater considers that a two year estimation period is too short to obtain reliable estimates of beta. Such estimates are likely to be less statistically precise and subject to considerable volatility over time. That volatility is more likely to be a reflection of statistical noise than genuine changes in systematic risk—given that regulated entities are generally stable businesses with stable operations. The true systematic risk of such firms would not be expected to vary materially over time.

Question 15: What return interval(s) should we rely upon when estimating beta (i.e. should our asset betas be estimated using daily, weekly, or monthly return data)?

The choice of returns interval involves a trade-off between the number of observations permitted within a fixed sample period (which affects the statistical precision of estimates) and the scope for other statistical problems to arise. For instance, use of daily returns would provide a large number of observations over a given sample period (compared to weekly and monthly returns) but estimates derived using daily returns can suffer from serial correlation, which can introduce bias into the estimation of beta.

The use of weekly returns offers a balance between these alternative considerations. Most regulators in Australia use weekly returns for this reason—although some also consider estimates derived using monthly returns.

If weekly and monthly returns are used, then the QCA should derive estimates using every possible reference day, so as to avoid the introduction of a sampling error problem known as 'reference day risk.' See section 5.1.3 for further discussion of this issue.

Question 16: Given that some volatility in beta estimates will reflect statistical noise, should we consider maintaining the beta estimates of our industry reference points for set period of time (for example two years) unless there is compelling evidence to change those estimates?

As noted in response to Question 15, the true systematic risk faced by regulated businesses is likely to be fairly stable over time, since such firms are generally stable businesses with operations that do not change materially or quickly over time. Hence, the QCA should err on the side of stability in beta allowances over time—recognising that empirical estimation of betas can be subject to considerable uncertainty and statistical noise.

Seqwater therefore proposes that the QCA adopt the approach recently adopted by IPART, whereby an established beta allowance would varied only if there were persistent empirical evidence over a long timeframe that beta had changed materially.

Question 17: Are the following features appropriate for assessing the level of risk that a firm is exposed to? If so, are they equally important or are some factors more important than others for assessing the risk of a firm?

- Market power
- Nature of the customer base
- Regulation
- Contracting arrangements
- Elasticity of demand for the product/service
- Growth options
- Operating leverage

In principle, all of these factors could affect the systematic risk of a firm. However, it is impossible to say how much of a role each of these factors contribute to the systematic risk of a business. It is equally impossible to select comparators that match the regulated business closely in terms of all of these factors.

Seqwater considers that the QCA should select relevant comparators for beta estimation by first identifying listed Australian firms operating in the same industry as the regulated business. Such businesses are likely to be closely comparable to the regulated business on a number of the criteria outlined above by the QCA. If the resulting sample is inadequate to reliably estimate beta (e.g., if the resulting sample is too small), then the QCA should expand its search for comparators by examining listed firms overseas that operate in the same industry as the regulated firm and/or listed Australian firms that operate in different (but similar) industries. However, the QCA should explain clearly how and why it has selected its comparators.

The QCA should avoid making qualitative adjustments to betas to reflect the factors identified above because it is not possible to reliably estimate the extent to which the factors above contribute to systematic risk, if at all.

Question 18: How important are the physical and operational characteristics of the regulated entity when evaluating the relevance of comparator firms and industries?

As explained in response to Question 17, Seqwater considers that the primary consideration for selection of comparators should be the industry in which the regulated business operates. Other firms operating in the same industry are likely to have similar physical and operational characteristics.

Question 19: In recent reviews we have considered firms operating in regulated energy and water, toll roads, pipelines and Class 1 railroads industries as beta reference points. Are there any other industries that could act as useful reference points to determine beta for the entities that we regulate?

Please see response to Question 17.

Question 20: What characteristics of a firm are likely to make it unrepresentative of a typical firm operating in that industry (e.g. having operations in other industries; having parent ownership; the regulatory framework being too dissimilar; and being in a country outside of Australia or in a less-developed country)?

All of the factors mentioned above could reduce the comparability of firms. However, the key question is the extent to which these factors influence systematic risk. If these factors do not have a significant influence on the systematic risk of the firm, then including in the sample of comparators firms that differ in these respects may have not material effect on the QCA's overall beta estimate. Unfortunately, there is no reliable way to assess whether or to what extent these factors do in fact affect systematic risk. Seqwater considers that the QCA should use the largest and broadest possible sample of firms operating in the same industry as possible when estimating beta. Seeking to exclude firms on the grounds that they may differ in systematic risk (due to the various factors mentioned above) from the benchmark efficient business could result in a comparator sample that is too small to produce statistically-reliable beta estimates.

The benefit of using the largest and broadest possible sample possible is that each comparator in the sample would receive relatively little weight. Hence, even the inadvertent inclusion of firms that in fact are not

comparable to the benchmark efficient business, in terms of exposure to systematic risk, would have little impact on the QCA's overall beta estimate. By contrast, narrowing the sample significantly by seeking out only the most comparable firms would amplify the effect of each individual comparator in the sample on the overall estimate. Since there are no 'perfect' comparators to the firms that the QCA regulates, such an approach may result in a small sample of imperfect comparators, each exerting a significant influence on the overall estimate. An approach that seeks to rely on a small sample of 'highly similar' comparators also runs the risk of becoming untenable over time, if some of the favoured comparators become delisted or are subject to mergers and takeovers. By way of example, when the AER first began estimation of betas for regulated energy networks, it relied on a sample of nine Australian comparators. Today, only three of those original comparators remain listed. A sample of three is too small to obtain reliable beta estimates. Consequently, the AER has continued to rely on information on some firms that have now been delisted for over a decade.

Question 21: What other criteria should we consider when identifying comparator firms in our sample industries (e.g. sufficient trading volume, market capitalisation and standard errors of beta estimates)?

Seqwater considers that the QCA should exclude historical returns for those periods where the relevant comparator stock has been identified as illiquid/thinly-traded. It is well-documented that the use of returns on thinly-traded stocks will tend to bias beta estimates down. In some cases, this approach would result in some historical periods for a given series of stock returns being excluded due to thin-trading. In some cases, the entire stock may be excluded from the comparator sample because it was illiquid over the whole estimation period. Retaining stock returns for those periods where the stock was liquid would be appropriate because doing so would contribute useful information to the estimation process. This approach has recently been adopted by IPART.

The QCA should also consider specifying minimum number of months for which historical data on a potential comparator is available before it is included in the sample. IPART excludes any firms that has fewer than 36 months of trading data.

Seqwater does not support the exclusion of stocks based on size (e.g., market capitalisation) or statistical precision of estimates (e.g., standard errors). Small firms can contribute useful information to the beta estimation task (provided that they are not illiquid stocks due to their size). The statistical precision of estimates can be improved by using a relatively long estimation period and ensuring a sufficiently large number of stock return observations within the estimation period.

Question 22: Should we continue to rely on the results from each of the Ibbotson, Siegel, Wright, Cornell dividend growth model and survey methods? Should we place relatively more weight on historical methods or forward-looking approaches?

As discussed in section 4, Seqwater favours an approach that pairs consistent estimates of the risk-free rate and the MRP. In Seqwater's view, it would be preferable for the QCA to achieve internal consistency of this kind than to continue to estimate the MRP independently of the risk-free rate, and by a combination of different MRP estimation approaches. Achieving internal consistency between the risk-free rate and the MRP is likely to be produce more reliable and economically-meaningful estimates of the required return on equity than the QCA's current approach.

If the QCA wishes to estimate the required return on equity using an estimate of the prevailing risk-free rate then, for internally consistency, it should use an MRP estimate that has been estimated using a DGM approach. However, Seqwater considers that there are significant problems with the way in which the QCA applies the Cornell DGM. In particular, Seqwater considers that the QCA should not apply a downward adjustment to the long-run growth rate, or assume a long-run required return on equity, when implementing the Cornell DGM.

If the QCA wishes to estimate the required return on equity using the Ibbotson approach then, for internally consistency, it should use a risk-free rate that has been estimated using a long historical averaging period.

Seqwater submits that the QCA should not use the Siegel approach. The Siegel approach simply makes a downward adjustment to an Ibbotson estimate of the MRP for unanticipated inflation. Thus, consideration of the

Ibbotson and Siegel estimates together effectively double-weights historical excess returns evidence. No other regulator in Australia relies on the Siegel approach.

Seqwater also submits that the QCA should have no regard to surveys as they provide little or no reliable information on the returns actually required by investors.

Question 23: Should we continue to assess a value for the MRP based on the median, mean and a weighted mean of the estimates produced by each method?

If the QCA wishes to derive its MRP estimate using a combination of historical returns and forward-looking evidence, then the QCA should:

- Estimate the MRP by giving equal 50% weight to an MRP derived using historical returns and 50% to an MRP derived using forward-looking evidence (i.e., DGMs) and 50% weight to the Ibbotson estimate.
- Estimate the risk-free rate by giving equal weight to a prevailing risk-free rate and a risk-free rate derived by averaging government bond yields over a long historical period.

This would be consistent with the approach that is used by IPART.

Question 24: As part of the historical estimation methods, should we continue to compute historical returns using an arithmetic average, or should we also use a geometric average?

Geometric and arithmetic averages are not simply different methods that could appropriately be used for the same purpose. Rather, the two averaging approaches are appropriate for different purposes:

- Geometric averages are appropriate for expressing the average historical excess returns that investors *have actually realised* in the past, because geometric averaging recognises that investors can reinvest returns to generate compounded future returns.
- Arithmetic averages are appropriate when using historical excess returns to estimate the MRP that investors can *expect over some future period*. The arithmetic mean treats each historical data point as representing one possible outcome that may occur in each year in the future.

The QCA's task is to estimate the MRP that equity investors can expect in each year over a future regulatory period. There is no role for the compounding of returns in such an assessment. Therefore, if the QCA seeks to estimate the MRP using historical excess returns, then only the arithmetic averaging approach should be used.

Question 25: As part of our historical methods should we continue to give primary weight to the sampling period from 1958–present, or should we give more weight to a different sampling period/s?

Seqwater considers that it is appropriate for the QCA to continue to give primary weight to the sampling period from 1958 when estimating the MRP using historical returns. MRP estimation approaches based on historical averaging of returns or excess returns require a sufficiently long time series in order to produce statistically-reliable estimates. A time series commencing in 1958 would seem to be acceptably long for this purpose.

Question 26: Should we allow for the risk-free rate to be calculated over a longer averaging period than 20 days?

As explained in section 4, and in response to Question 22, the QCA should seek to estimate the required return on equity by pairing together consistent estimates of the risk-free rate and the MRP. If the QCA seeks to estimate the MRP using an approach that uses a very long history of historical excess returns (e.g., the Ibbotson approach), then the QCA should (for consistency) estimate the risk-free rate by averaging historical government bond yields over as long a historical period as possible using reliable data.

Question 27: Should we broaden our estimate of the distribution rate to give weight to rates based on unlisted equity? Should we estimate the utilisation rate using alternative approaches such as taxation statistics or market value studies (i.e. dividend drop-off)?

The QCA currently estimates the distribution rate using information on the average proportion of imputation tax credits distributed by the 20 largest listed firms in Australia. All of these firms are large multinational firms that

have significant sources of foreign sourced profits, which enable them to distribute a higher proportion of imputation credits. The QCA should define clearly whether the benchmark efficient business for which it is setting allowances. If the benchmark efficient entity is not a large multinational firm that has significant sources of foreign sourced profits, then the QCA should broaden its estimate of the distribution rate to consider the proportion of credits distributed by unlisted firms in Australia.

The QCA's current approach is to estimate the utilisation rate (also referred to as 'theta') by calculating the proportion of all credits that have been distributed in Australia, which could potentially be redeemed by eligible equity investors. An alternative interpretation of theta is the economic value that equity holders actually place on imputation tax credits. This is the market value (rather utilisation rate) interpretation of the meaning of theta.

In Seqwater's view, when determining an appropriate methodology for estimating theta, the QCA should consider the economic role played by gamma within the regulatory framework. The building block approach used by the QCA to set regulated prices first determines the amount of dividends and capital gains (i.e., total returns) that are required to be paid to shareholders in the benchmark efficient firm to provide them with a fair return on equity capital. That quantum of dividends and capital gains is then reduced by the assumed value of imputation credits. For shareholders to be made whole, it must be the case that the value (to shareholders) of the deducted dividends and capital gains is equal to the value (to shareholders) of the imputation credits that replace them. That is, what is required (economically) is an estimate of the quantum of dividends and capital gains that shareholders would give up in order to receive a dollar of imputation credits.

Consequently, Seqwater's view is that the proper economic role of gamma in a building block model is as an exchange rate – the quantum of dividends and capital gains that shareholders would give up in order to receive a dollar of imputation credits. This is precisely what the market value approach seeks to measure. Hence, the proper interpretation of the meaning of theta within the QCA's regulatory framework is the market value interpretation. As such, the QCA should rely only on approaches that estimate the market value of imputation tax credits—such as dividend drop-off analysis—when estimating theta. This is the approach followed by IPART.