Queensland Competition Authority

Final report

Rate of return review

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EXECUTIVE SUMMARY

We have reviewed our approach to determining reasonable rates of return for entities that are subject to the various regulatory regimes provided for in the *Queensland Competition Authority Act 1997* (QCA Act). We consider this review will promote confidence in our methods and provide stakeholders with transparency over our cost of capital approach. The findings of the review could also guide future regulatory submissions.

This report sets out our findings and methods to determine rates of return.

Our approach for this review has been to consider our recently applied methods as a starting point and to review them in light of underlying economic principles and regulatory best practice. While some of our current methods remain largely unchanged, we are introducing several changes:

- *Our approach to assessing the rate of return*—our overall assessment approach to estimating rates of return includes a streamlined process we may use in the event that a regulated entity proposes a rate of return we consider is reasonable. If we consider a regulated entity's submitted WACC value is not reasonable, we will determine a rate of return by first estimating a bottom-up value and then assessing its reasonableness by applying a top-down approach (Chapter 3).
- *The trailing average cost of debt*—we consider a benchmark trailing average debt management strategy should be used to determine regulated entities' cost of debt allowance. We will apply the characteristics of a benchmark trailing average approach that we have determined are appropriate (for example, a 10-year simple trailing average) (Chapter 5).
- The market risk premium—we will adopt the Ibbotson (historical) method to estimate the market risk premium (Chapter 6), supplemented by our consideration of a range of current market information to assess whether the overall return on equity requires an adjustment to reflect prevailing market conditions at the time of a decision (Chapter 3).

The estimates of individual parameters identified in this report should be regarded as indicative and may change over time as financial market conditions change, or if there are relevant developments that warrant further consideration. This review process was not intended to prescribe a binding methodology for rate of return assessments, but rather to provide our latest consideration of these matters to guide stakeholders. Our intention is that in future regulatory reviews that require an assessment of rates of return, all stakeholders will be given an opportunity to make submissions, which we will consider on their merits.

Our methods and indicative values (Table 1) represent our final findings.

We note that most of our methods and values are largely in step with those of Australian regulators. We compare our approaches to those of other regulators throughout this report.

Table 1 Final positions on the rate of return

Parameter/approach	*Final positions*
Form of WACC	Nominal, post-tax WACC (Officer WACC3) (see Chapter 2).
WACC assessment approach	Determine whether the overall WACC value proposed by a regulated entity is reasonable—by considering our statutory obligations, including public consultation; assessing commercial and regulatory risk, considering factors such as the estimation methods and values applied for each parameter, and the WACC values of other regulated entities (sections 3.2 and 3.3). If the proposed value is considered reasonable, it will likely be approved. If the proposed WACC value is not considered reasonable, determine a reasonable WACC value—by estimating a bottom-up value and applying a top-down assessment to confirm whether the bottom-up value constitutes a reasonable WACC value (applying judgement in the circumstances), including whether the overall WACC value requires an adjustment to reflect prevailing market conditions at the time of a decision (section 3.4).
Gearing	Consider the previous regulatory gearing as a starting point, and only depart from this benchmark if there is sufficient evidence of change—considering factors such as regulatory precedent, the entity's risk and analysis of comparators (Chapter 4).
Cost of debt approach	Use a benchmark trailing average debt management strategy (Chapter 5).
Trailing average characteristics	Apply an unweighted (simple) 10-year trailing average to the entire cost of debt, with annual and equal debt tranche refinancing (section 5.6).
Trailing average implementation	In accordance with a forward-looking regulatory approach, transition arrangements are not required to implement the benchmark trailing average debt management strategy, except for exceptional circumstances (section 5.6.6).
Cost of debt credit rating	Consider the entity's financial risk and business risk, regulatory precedent and comparator analysis (section 5.5.2).
Cost of debt data source	Use data from the Reserve Bank of Australia with a 10-year term to maturity (section 5.5.3).
Debt-raising costs	Apply an allowance of 10 basis points for the transaction costs associated with raising debt for the trailing average approach (section 5.7).
Cost of equity approach	Use the Sharpe-Lintner Capital Asset Pricing Model (Chapter 6).
Risk-free rate	Use 10-year Australian Government bond yields, averaged over a period of 20 to 60 business days close to the commencement of each regulatory period, with the length and timing of the period nominated by the regulated entity in advance (section 6.6).
Beta	Assess the risk of the regulated entity using first principles, to determine relevant comparator industries. Assess potential comparator firms against inclusion criteria and liquidity filters. Calculate equity beta values using 10-year weekly returns data and de-lever to asset betas using the Brealey-Myers levering formula with a debt beta of 0.12. Re-lever the asset beta using regulatory benchmark values to obtain a value for the equity beta (section 6.5).
Market risk premium	Adopt the Ibbotson (historical) method to estimate the market risk premium (section 6.4).
Gamma	Apply a value of 0.484, which is the product of a value of 0.88 for the distribution rate based on the average distribution rate of relevant top 50 companies on the ASX by market capitalisation, and a utilisation rate of 0.55 based on the equity ownership of Australian listed companies. Periodically update this on the basis of current statistical evidence (Chapter 7).

1 INTRODUCTION

1.1 About the rate of return

The rate of return is the return expected by investors to compensate them for investing in a firm. Therefore, in relatively efficient markets, it is the cost to the firm of obtaining debt and equity funding from investors. The form of rate of return we generally apply is the weighted average cost of capital (WACC), which we explain in Chapter 2.

In a regulatory context, the rate of return is used for various purposes, such as to determine the return on capital component of allowable revenue for a regulated firm, which it recovers from its customers through charges for the provision of goods and services. In more light-handed regulatory frameworks, it is used by regulators and policy makers to determine if firms may be earning excess returns. We may apply the rate of return for regulated entities in various assessments, such as:

- investigations into pricing practices relating to certain monopoly business activities
- price monitoring investigations
- assessments of draft access undertakings and draft amending access undertakings
- determinations of access disputes or other pricing determinations.

These assessments can occur at regular intervals or in response to certain events, such as at the request of a Minister or at the request of access providers, access seekers or access holders.

In determining rates of return for these assessments, we are required to have regard to a number of statutory factors (discussed in section 1.4.1).

1.2 Purpose of this review

We wanted to set out how we are going to arrive at reasonable rate of return values for the entities that are subject to the regulatory regimes we administer under the *Queensland Competition Authority Act 1997* (QCA Act). Determining a rate of return is an important aspect of economic regulation. This is because it is a key determinant of the return on capital, which typically accounts for a large proportion of regulated entities' allowable revenues and therefore strongly influences the prices paid by their customers.[1]

An inappropriate approach to determining the rate of return can have detrimental impacts:

- If the rate of return is too low, it could have a 'chilling' effect on investment, leading to inadequate capacity and/or service quality and potentially reducing revenues to the point where the financial sustainability of a regulated entity is endangered.
- If the rate of return is too high, leading to inefficiently higher prices, then users might use too little of the good or service, resulting in allocative inefficiency. Moreover, a regulated entity could be encouraged to overinvest, leading to inefficient capital allocation in the economy and higher prices, which could potentially reduce consumer welfare, discourage investment in dependent markets, or create incentives for inefficient bypass.

[1] The return on capital is the product of the rate of return and the regulatory asset base (RAB).

Therefore, it is important that we have confidence in our approach to estimating the rate of return. In undertaking this review, we followed a public process during which we invited and considered stakeholder input.

The review provided transparency over what we consider to be a reasonable approach to determining the rate of return, which may help regulated entities and their customers to prepare regulatory submissions in the future.

We note that determining reasonable rates of return involves the exercise of judgement, given the uncertainty inherent in estimating rates of return. There is no single 'correct' approach; therefore, determining a reasonable rate of return involves considering the strengths and weaknesses of a variety of approaches.

1.3 Scope

We have considered our existing WACC methodologies as a starting point and focused on changes that reflect regulatory best practice and underlying economic principles.

1.4 Guidance for decision-making

1.4.1 Factors relevant to rate of return

In determining rates of return for entities that are subject to our regulatory regime, we are required to consider various factors in the QCA Act. We set out some examples below.

Under part 5 of the QCA Act, when making an access determination, and in order to approve a draft access undertaking for a regulated entity, we must have regard to the factors in ss. 120(1) and 138(2) of the QCA Act respectively, including:

- the object of part 5 of the QCA Act as set out in s. 69E, namely to promote the economically efficient operation, use of and investment in, significant infrastructure by which services are provided, with the effect of promoting effective competition in upstream and downstream markets (ss. 120(1)(a) and 138(2)(a))
- the legitimate business interests of the owner or operator of the service (s. 138(2)(b)) and the access provider (s. 120(1)(b))
- the legitimate business interests of persons who have, or may acquire, rights to use the service (s. 120(1)(c))
- the pricing principles mentioned in s. 168A, including that the price for access to a service should generate expected revenue for the service that is at least enough to meet the efficient costs of providing access to the service and include a return on investment commensurate with the regulatory and commercial risks involved (s. 168A(a), referenced in ss. 120(1)(l) and 138(2)(g))[2].

Under part 3 of the QCA Act, when conducting investigations about pricing practices or price monitoring investigations for monopoly business activities, we must have regard to the matters set out in s. 26(1), including:

- the appropriate rate of return on assets (s. 26(1)(e))

[2] It should be noted that, in approving a draft access undertaking or resolving an access dispute, it is not necessary for us, in any particular case, to specify a specific return or a numerical framework for determining returns. For example, see QCA, *DBCT 2019 Draft Access Undertaking*, final decision, March 2021, pp. 107–109.

- the need for efficient resource allocation (s. 26(1)(a))
- the protection of consumers from abuses of monopoly power (s. 26(1)(c))
- social welfare and equity considerations (s. 26(1)(i))
- the need for pricing practices not to discourage socially desirable investment (s. 26(1)(j)).

When determining rates of return, we also consider matters set out in any relevant direction notice from the responsible Minister.[3]

1.4.2 Other guiding principles

Sunwater and Seqwater suggested we adopt principles for determining the rate of return methodology, and Seqwater suggested specific principles.[4] While we have not explicitly used a set of principles to guide our decision-making in this review, we consider there is merit in the principles suggested by Seqwater and in relevant comments from other stakeholders. We have considered these principles broadly throughout the review, to help us achieve our aim of obtaining reasonable WACC values:

- We have relied on a wide range of available, relevant evidence and undertaken detailed analysis to determine methods and values we consider are robust. For instance, we have reviewed academic papers, empirical evidence and other regulatory decisions, among other sources.
- Where feasible and reasonable, we have favoured approaches that are simple (to enhance understandability) and pragmatic (for ease of implementation and, in some cases, to align with how businesses operate in the real world).[5]
- The trailing average meets another desirable goal—that is, regulatory certainty, which can provide investors with confidence to invest in long-lived assets.[6] We consider that regulatory certainty does not necessarily mean that WACC methods and parameters will not change in the future, but that processes are well understood and robust, being based on sound regulatory principles.
- We have included appendices with calculations for some parameters, so that our methods are transparent and can be replicated by stakeholders.
- We have aimed to promote consistency between parameter methods/values, given the interrelationships between some parameters.
- We have reviewed the methods of other Australian regulators to ensure our methods are consistent with regulatory best practice.[7]

[3] For example, in our investigation of pricing practices for Seqwater's bulk water supply for 2018–21, we were required to consider the use of Seqwater's cost of debt as estimated by the Queensland Treasury Corporation for the cost of debt component of the WACC (QCA, *Seqwater bulk water price review 2018–21*, final report, March 2018, p. 91).

[4] See Sunwater, sub. 6, p. 1; Seqwater, sub. 7, pp. 3–4, 7–9.

[5] This was supported by Unitywater (sub. 1, p. 2).

[6] Stakeholders that supported reduced volatility in the WACC include ARTC (sub. 14, pp. 3–5), Unitywater (sub. 1, p. 1), Logan City Council (sub. 2, p. 1) and the DBCT User Group (sub. 8, p. 3).

[7] For example, Logan City Council and ARTC supported this (see Logan, sub. 2, p. 1; ARTC, sub. 14, pp. 2–5).

1.5 Structure of the report

Our report is set out as follows:

- Introduction and context, including the rate of return benchmark (Chapters 1 and 2)
- WACC assessment approach, including the top-down approach (Chapter 3)
- Individual WACC components:
  - gearing (Chapter 4)
  - cost of debt (Chapter 5)
  - cost of equity (Chapter 6)
  - gamma (Chapter 7)
- Appendices containing calculations and other information.

1.6 WACC at a glance

Figure 1 provides an overview of the weighted average cost of capital. It also indicates the section in the report where each parameter is discussed.

Figure 1 WACC overview

Risk and the rate of return (s. 3.2): The rate of return compensates the firm for the risks it bears that have not otherwise been fully allocated or mitigated through other regulatory arrangements.

WACC (Ch 2)

The weighted average cost of capital (WACC) is a measure of the expected return that investors require for investing in an asset. In order to attract funds, a firm must offer a return comparable to what investors would expect to earn by investing in another asset with the same risk. It is a weighted average of returns required by two providers of funds for investment, equity holders and debt holders. We use the Officer WACC3 model and estimate the WACC for a benchmark firm, rather than use a firm's actual costs.

=

Cost of equity (Ch 6)
× (1- Gearing)

Select approach (e.g. CAPM) and estimate parameters

+

Cost of debt (Ch 5)
× Gearing

Select benchmark debt management strategy (e.g. trailing average) and estimate parameters

=

Risk-free rate (Ch 6) – rate of return on an investment with zero default risk.

Decision points –

- Proxy for the risk-free asset (e.g. Commonwealth government bonds)
- Term to maturity
- Averaging period length and timing (rates are averaged over a period to reduce the impact of temporary shocks).

+

Market risk premium (Ch 6) – expected return on the market portfolio held by investors above the risk-free rate.

Decision points –

- Which information to use, including types of current market information and estimation methods (e.g. historical and/or forward-looking methods).
- Determine value for the market risk premium, if using multiple sources of information.

×

Equity beta (Ch 6) – measure of a firm's systematic risk (incl. the effect of financial risk), relative to the risk of the market. The equity beta is calculated by re-levering the selected asset beta using a levering formula.

Select levering formula (e.g. Brealey-Myers), inputs include:

Gamma (Ch 7) – value attributed to imputation tax credits; the product of a distribution rate and utilisation rate.

Decision point – decide on methods and data to calculate these rates.

Asset beta (Ch 6) – measure of the risk of a business with no gearing relative to the risk of the market.

Decision points –

- Determine underlying risk of the firm (first principles analysis)
- Select comparator industries (industries facing similar risk)
- Estimate asset betas of comparator firms by de-levering their estimated equity betas derived from returns data
- Determine an appropriate asset beta for the firm having regard to asset betas of the comparator firms.

Debt beta (Ch 6) – measure of the systematic risk associated with a firm's debt.

Decision point – determine a value for the debt beta.

Raw cost of debt (Ch 5) – cost that a regulated firm will face from borrowing via bank debt or corporate bond issuance.

Decision points –

- Source of benchmark debt data (e.g. third-party providers incl. RBA, Bloomberg, Thomson Reuters)
- Credit rating of firm (i.e. measure of the ability of a firm to repay its debt). Firms with lower credit ratings (i.e. riskier businesses) will face higher debt funding costs. Determined based on various information, including an assessment of the risks facing the business, financeability tests and the credit rating of firms with similar risk profiles.
- Term to maturity of debt
- Averaging period length and timing.

+

Debt-raising costs (Ch 5) – transaction costs that are associated with raising debt.

Decision point – determine an allowance for debt-raising costs.

Gearing (Ch 4) – proportion of debt that makes up the total funding for a firm (where total funding is the sum of debt and equity).

Decision points – determine an appropriate benchmark gearing for a firm by having regard to factors such as regulatory precedent, the risk of the firm and the gearing of comparator firms with similar risk profiles.

Note –

- Debt can be acquired more cheaply than equity to a point, as increasing the level of debt will expose the business to greater financial risk, which in turn increases the equity beta of a firm.
- Gearing is related to the credit rating of a firm (higher gearing can lead to a lower credit rating).

1.7 Stakeholder submissions on overarching rate of return matters

Stakeholder engagement is a key part of our review. We received submissions from stakeholders on a wide range of matters in response to our request for comments paper and draft report. We have considered all submissions received.[8] Most submissions related to specific aspects of our rate of return methodology, and we have considered these submissions in relevant sections throughout this report. However, some submissions related to the overall rate of return, its relevance in specific regulatory processes, and other matters relating to the review process. These matters include consideration of evidence and stakeholders' ability to engage with this and related processes. We consider these broader matters in the remainder of this chapter.

1.7.1 Zero rate of return

Some stakeholders said there should be a zero rate of return for government-owned entities:

- The Pioneer Valley Water Co-operative said government-owned entities should provide a service on a non-profitmaking basis and should not be a 'cash cow' for the government.[9]
- Eton Irrigation said that water and electricity should be provided at cost (or subsidised) as a service to the community that underpins economic activity and jobs in the region—and therefore Sunwater and Ergon should have a zero rate of return.[10]
- The Queensland Farmers' Federation said the government-owned monopoly suppliers should have a cost of capital set using actual costs rather than excessive inflated returns.[11]

The Queensland Farmers' Federation also submitted that financial sustainability for both customers and suppliers should be included as a factor in determining rates of return.[12]

Our statutory obligations require us to consider and weigh a number of factors when making a decision or providing advice. These factors vary, depending on the part of the QCA Act that applies.[13] Balancing these factors is an important part of our regulatory task, and that exercise is specific to the set of circumstances before us.

As an economic regulator, when setting prices (or rates of return on the assets used to provide the service), we need to consider, among other factors, the efficient use of resources and investment over time. These considerations are informed by an assessment of what would occur in an effectively competitive market.[14]

The rate of return compensates investors for the time value of money and risk that they face in providing the assets that deliver the services that are subject to the regulatory regime. If we set a rate of return that is too low (relative to an effectively competitive benchmark), then prices will

[8] QCA, *Rate of return review*, request for comments, November 2020.
[9] Pioneer Valley Water Co-operative Limited, sub. 4, p. 1.
[10] Eton Irrigation, sub. 11, p. 2.
[11] It said the rural water delivery business should be set at 'lower bound prices'. That is, prices should not include a rate of return; and electricity network companies that have federally mandated revenue caps should be assessed as to being either entirely 'risk free business' or should be provided with only a very marginal risk rate—as these businesses operate in an extremely 'low risk' environment (Queensland Farmers' Federation, sub. 15, pp. 2–3).
[12] Queensland Farmers' Federation, sub. 23, p. 2.
[13] For example, in conducting an investigation about monopoly business activities, we are required to have regard to the protection of consumers from the abuses of monopoly power and the need for pricing practices not to discourage socially desirable investment—see section 1.4.1, which lists these factors as well as other factors that are relevant to the rate of return.
[14] See QCA Act, ss. 26, 69E, 168A and *Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017]* FCAFC 79, 494–495.

be too low, causing excess consumption. As a result, such an approach will potentially result in an inefficient amount of the good or service. Moreover, a rate of return that is too low will also lead to investment that is too low (relative to an effectively competitive benchmark), as the firm will not have an incentive to invest at the efficient level. This outcome will therefore compromise dynamic efficiency.

The rate of return depends on the riskiness of the business activity, not on whether the business is owned privately or by the government—ownership does not matter. In this context, setting a rate of return that is too low would not be consistent with the principle of competitive neutrality. This principle requires that a public sector business, or agency, not have a competitive advantage (or disadvantage) over the private sector solely due to its government ownership.15 In Queensland, the competitive neutrality principle is applied to all government-owned corporations, government agencies and local governments carrying out significant business activities.

Finally, we note that it is the Queensland Government's prerogative to implement policy as it relates generally to the Queensland economy. This includes whether or not certain services to a community should be subsidised.

1.7.2 Matters relating to the review process

Ability to engage

The Queensland Farmers' Federation said it does not have internal expertise or the resources to retain external expertise, to meaningfully engage in the technical discussion about setting the rate of return. Moreover, it said the process significantly favours the regulated organisations and companies that have a very strong vested interest to invest in the resources to provide detailed submissions to us, engage at a highly technical level and, most importantly, provide a perspective that is very hard for customer organisations to challenge. The Queensland Farmers' Federation also said that no matter how hard we try to be balanced, there is a significant power imbalance in the favour of the regulated entities.[16]

While there may be instances where there exist differences in the ability of parties to engage with technical material, we seek to ensure transparency by engaging in broad and published consultation with stakeholders, which includes publication of our evidence, sources and our reasons. As an independent economic regulator, our role is to provide advice and make decisions based on the evidence available to us. With this independence comes accountability for making decisions that are both reasoned well and explained well.

Relevantly, we are not limited to considering only the material stakeholders provided to us for this review—submissions are one source of information that we must consider along with other information that we carefully review. We have reviewed a wide range of evidence as well as other regulatory decisions to reach views on rate of return matters.[17] In various reviews we undertake,

[15] For example, in the absence of competitive neutrality, a government-owned business could achieve a competitive advantage over a private sector firm via its access to the state of Queensland's debt funding, which is less expensive than that of a private firm, due to the state's high (AA) credit rating. The principle of competitive neutrality requires that all government-owned corporations or significant business activities pay a fee to neutralise any cost of funds advantage by way of government ownership, where the fee is based on the entity's stand-alone credit rating vis-a-vis its actual cost of funds (Queensland Government, *Competitive Neutrality and Queensland Government Business Activities,* policy statement: National Competition Policy implementation in Queensland, July 1996, pp. 11–24).

[16] The Queensland Farmers' Federation, sub. 15, pp. 2–3.

[17] In section 1.4.2, we list consideration of a wide range of evidence as a guiding principle for this review.

we are required to consider multiple factors, and these typically include having regard to consumers—for example, we must have regard to the protection of consumers from abuses of monopoly power, in conducting an investigation about monopoly business activities.[18]

Consideration of evidence

Aurizon Network said the rate of return review process will be improved by ensuring a wider consideration of evidence and materials than that submitted by stakeholders. It recommended undertaking a wider-ranging review of other rate of return input methodologies, including comparable reviews by other regulators. It said that we have historically utilised a narrow field of experts in respect of estimating reasonable rates of return and that there is an inherent risk that the regulator becomes captured by the views and opinions of the consultant. It recommended that we seek to diversify the advice we receive from expert advisors.[19]

As discussed above, we have considered a wide range of evidence for this review in addition to submissions that stakeholders provided. We reviewed other regulatory decisions as one source of evidence to inform our positions. We endeavoured to carefully consider all information provided—including advice from expert consultants—to inform our views, rather than accept advice as is.

1.7.3 Negotiated outcomes

The rate of return arises in different contexts in the QCA Act. Under part 5, access seekers have the statutory right to negotiate access to declared services with recourse to binding arbitration in the event of parties being unable to reach a negotiated agreement. Part 5 also provides for access undertakings to set out, amongst other things, a structured negotiation process. In other areas, such as in part 3, division 3 of the QCA Act, we are required to have regard to the rate of return on assets as part of an investigation. Stakeholders provided some comments on these matters.

Commercial negotiations

Several stakeholders said there are benefits to the regulated entity and its customers reaching agreement on the rate of return through commercial negotiations, relative to the regulator setting the rate of return.

The Australian Rail Track Corporation (ARTC) said that where users are able to negotiate with infrastructure owners, such outcomes will tend to be most efficient, as it allows users to manage their supply chain risks and costs most effectively.[20] ARTC also said that negotiated outcomes could provide less volatile WACC outcomes than otherwise regulated outcomes:

> ARTC believes a negotiation-based methodology is independent of financial market conditions and therefore produces a less volatile outcome that benefits the entire industry chain.[21]

Aurizon Network said that negotiated settlements are a preferred outcome to regulatory terms (in certain circumstances). It said the ability and incentives to achieve a negotiated settlement are influenced by the expected rate of return that might be obtained under the alternative regulatory terms and conditions. It cited the finding from the Hunter Valley Coal Network negotiated settlement that customers are often willing to pay a little more than the regulator

[18] QCA Act, s. 26(1)(c).
[19] Aurizon Network, sub. 5, pp. 2, 6–7.
[20] ARTC, sub. 14, p. 5.
[21] ARTC, sub. 14, pp. 4–5.

deems appropriate, in order to secure a service that is better tailored to their needs than the regulator would otherwise specify.[22]

We consider that there are benefits to negotiated outcomes, and where such outcomes are legally permitted and do not create anti-competitive effects, they should not be interfered with.[23] Moreover, if a regulated entity and its customers support a proposed rate of return, the parties have made their own assessment of the benefits and costs of the agreement underpinning it, including the commercial and regulatory risks. As such, the agreed position represents an alignment of the parties' interests. Customers would not be incentivised to support provisions that increase their own costs without receiving corresponding benefits.

In the event that an access provider and its customers can reach agreement on the rate of return, or some other commercial agreement that makes no mention of a rate of return, such a negotiated outcome would likely have a significant influence on our regulatory assessment (if relevant), subject to our other statutory obligations.[24],[25] An example of a commercial settlement we approved is the Aurizon Network revised UT5 draft amending access undertaking (DAAU), approved in December 2019. We approved the proposed rate of return provisions set out in the revised UT5 DAAU, noting that:

> a diverse and overwhelming number of coal producers have supported the package of proposed amendments and by doing so have made their own assessment of the commercial and regulatory risks that will affect Aurizon Network under the proposed UT5 DAAU arrangements as well as the benefits and costs that these provisions are expected to provide.

Given the consensus position of the parties with respect to various components of the WACC, we considered that it was not necessary to investigate those matters.[26]

The Dalrymple Bay Coal Terminal (DBCT) User Group commented on the application of the rate of return in a negotiate-arbitrate model. It said that in negotiate-arbitrate models, predictability of QCA arbitration outcomes is critical to enhancing the prospects of incentivising negotiated outcomes. The DBCT User Group said that given the need for predictability, a bottom-up estimate of WACC should be strongly influential in QCA arbitrations that occur under this form of regulation.

In the context of approving a WACC, or a process for determining a WACC at a point in time, as part of an access undertaking process, we would have regard to the factors affecting approval (s. 138(2)), including the pricing principles (s. 168A). In making an access determination in an arbitration, we would consider and weigh the relevant factors. In the specific context of the Dalrymple Bay Coal Terminal, we refer the parties to our guidelines for the arbitration of disputes.[27]

The DBCT User Group also said that s. 120(1)(c) of the QCA Act expressly requires consideration of the interests of all access holders and access seekers—not just those which are party to the immediate arbitration—and it said this strongly suggests that the QCA intends to consider consistency and certainty of approach across users.[28] As discussed above, we would apply the

[22] Aurizon Network, sub. 5, pp. 2–4.
[23] For example, a service provider and a customer could reach a bilateral agreement that adversely impacts prospective (efficient) entrants.
[24] There may be other factors we must also consider, such as the interest of future users and the public interest.
[25] For example, this situation would apply to an access undertaking approval process.
[26] QCA, *Aurizon Network's 2019 draft amending access undertaking*, decision, November 2019, p. 17.
See also QCA, *Aurizon Network's Revised UT5 draft amending access undertaking*, decision, December 2019.
[27] QCA, *Arbitration of disputes in relation to the DBCT service*, guideline, March 2021.
[28] DBCT User Group, sub. 8, pp. 16, 27–28.

criteria that are relevant to the particular process (for example, approving an access undertaking or resolving a dispute).

Other regulatory processes

Commercial negotiations may not be particularly relevant within all regulatory frameworks—for example, in investigations where we provide advice rather than set prices, including advice constrained by a set of referral terms. Commercial agreements might also not be particularly relevant in circumstances where individual customers do not directly negotiate with a regulated entity (for example, household electricity customers).[29]

While negotiation is not relevant to every regulatory setting, we encourage all regulated entities to actively engage with their customers in all aspects of their regulatory framework, including the rate of return. There is benefit in understanding customers' needs and preferences and working collaboratively to benefit all parties.

1.7.4 Actual rate of return versus target rate of return regulation

Canegrowers submitted that in order to set the rate of return, we should investigate the actual rates of return of the businesses subject to our regulatory regime. Canegrowers argued that instances where regulated businesses have been able to consistently achieve actual returns that were greater than NPV=0 would be an indicator that the business was abusing its market power. Canegrowers noted differences between how we and the AER apply building blocks modelling, with the AER having regard to actual costs incurred by regulated entities when setting future cost allowances.30

Canegrowers proposed that we:

- apply the cyclical model of economic regulation31 to all aspects of the rate of return calculation by collecting and reporting on actual rates of return achieved by regulated entities during each regulatory price control period to inform forthcoming regulatory pricing decisions.
- delay the present review until we have collected and analysed the actual rate of return achieved by the monopolies we regulate.32

The role in setting the rate of return is to compensate investors in the regulated entity for the risks that they face. The way in which this is done is by benchmarking the regulated entity against other businesses with similar risks to determine a reasonable rate of return. The potential for a regulated entity to achieve an actual return that is higher or lower than the rate of return we set will be dependent on the entity being able to outperform or underperform relative to the cost benchmarks that are assigned. However, we do not think that historical performance is directly relevant in setting the benchmark rate of return for firms subject to our regulatory regime.

In any case, there are a variety of reasons that actual returns may depart from those that are deemed reasonable on an ex ante basis. These include, for example, temporary revenue over-

[29] We acknowledge that there may be circumstances where negotiated outcomes could be taken into consideration when we undertake an investigation about pricing practices, as identified by Sunwater (sub. 19, p. 1).
[30] Canegrowers, sub. 17, pp. 11–13.
[31] The cyclical model of economic regulation that Canegrowers raises is one where actual cost outcomes are used to inform future cost forecasts.
[32] Canegrowers, sub. 17, p. 2.

collection, the regulated firm electing to depart from the benchmark financing arrangements to take on greater risk, and efficiency gains due to productivity improvements.

2 RATE OF RETURN BENCHMARK—THE WACC

In Australian regulatory practice, the most common benchmark for determining the rate of return on investment is the weighted average cost of capital (WACC). The WACC is the weighted average of a firm's expected costs of equity and debt.

2.1 Benchmark approach

A standard rationale for applying economic regulation to firms with natural monopoly characteristics and significant market power is that their profit-maximising behaviour can lead them to deliver suboptimal economic outcomes; that is, to produce less of a good or service (resulting in higher prices), such that output is too low from society's perspective (allocative inefficiency). In addition, these firms might not have appropriate incentives to reduce production and operating costs to efficient levels, due to the absence of competitors.[33]

Regulation can help improve performance and incentivise more efficient outcomes. One approach involves the way in which regulators set allowed costs, including the cost of capital, for regulated entities. If the regulator sets these costs using relevant, efficient benchmarks, rather than by using an entity's actual costs, regulation can provide such incentives.

When the regulator bases a regulated entity's allowable revenue on the costs of an efficient benchmark firm, the regulated entity's actual costs could differ from the benchmark—depending on how efficiently it operates and finances its business. As a result, this approach can drive efficient outcomes by creating an incentive for a regulated entity to outperform the benchmark, as it will retain any additional income. Accordingly, this approach helps protect customers from a regulated entity making inefficient operating or financing decisions. It also supports the principle of competitive neutrality.[34]

A benchmark is typically based on 'comparator' firms that have a similar risk profile. We consider that potentially relevant comparator firms would have similar underlying risk characteristics.

2.2 Form of WACC

Consistent with other Australian regulators, we use a nominal, post-tax WACC, specifically Officer's 'WACC3' definition. A 'post-tax' framework refers to the rate of return after company tax (but before taxes owed by shareholders or other ultimate beneficiaries).[35] A nominal, rather than real, approach is simpler and more transparent, as most costs, taxes, depreciation and interest are expressed in nominal terms. For Officer's WACC3, we estimate the tax paid by a firm (company tax) and the value of imputation credits (gamma) within the allowable regulatory cash flows as separate items (rather than within the WACC itself). The Officer WACC3 is calculated as:

[33] Leibenstein conjectured a positive relationship between external pressures on a firm and the effort of its employees. In particular, Leibenstein hypothesised a significant social cost of market power, because a firm's costs would rise as its employees perceived that effort maximisation is not necessary. (See H Leibenstein, 'Allocative efficiency vs. x-efficiency,' *The American Economic Review*, vol. 56, no. 3, 1966, pp. 392–415.)

[34] That is, a government-owned entity should not have a competitive advantage or disadvantage over a private firm solely due to its government ownership.

[35] In other words, it does not include compensation for the cost of corporate income tax. Instead, the overall building block revenue allowance includes a separate tax allowance building block.

$$WACC3 = \frac{E}{V} \times r_e + \frac{D}{V} \times r_d$$

where:

r_e = nominal post (company) tax rate of return on equity

r_d = nominal pre-tax rate of return on debt[36]

E = value of equity

D = value of debt

V = value of the firm (equity + debt).

[36] The rate of return on debt is characterised as 'pre-tax', as the cash flow being discounted is the cash flow to lenders before (company) tax (i.e. the cash flow is the interest payments made by the company to lenders).

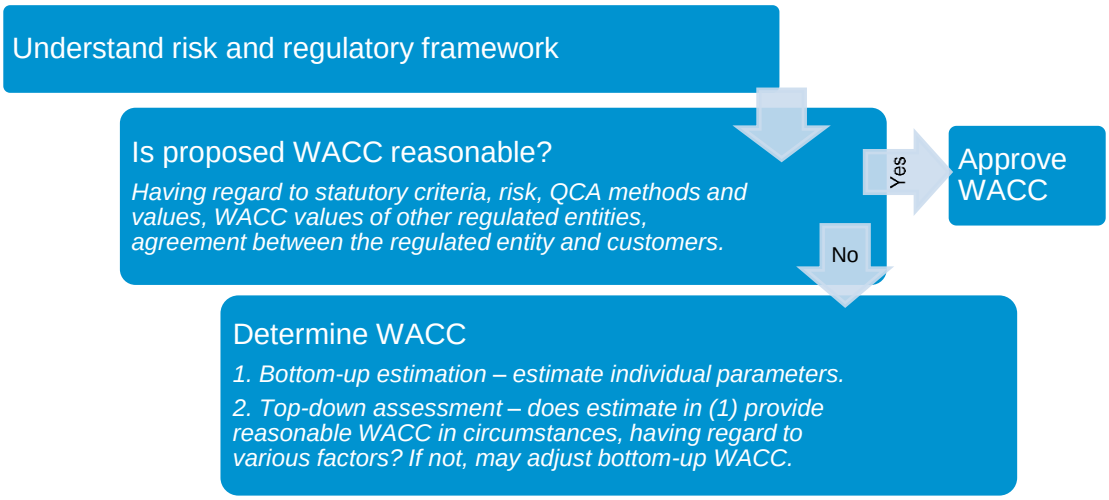
3 WACC ASSESSMENT APPROACH

In this chapter, we outline our approach to assessing WACC proposals we receive from regulated entities as part of the relevant regulatory process.

3.1 Key points

- In determining rates of return that apply to regulated entities, our key regulatory task is to consider whether the overall rate of return is reasonable.
- We have developed a WACC assessment approach to determine whether a proposed WACC is reasonable, in the context of the risks the firm faces within its regulatory framework and the market within which it operates (Figure 2).
- If we consider a WACC value is reasonable, having regard to public consultation, various statutory criteria and other considerations, we are likely to approve it.
- If we do not consider the WACC value is reasonable, we will determine a WACC value. We will undertake a bottom-up estimation and assess the result in a top-down exercise.

Figure 2 WACC assessment approach



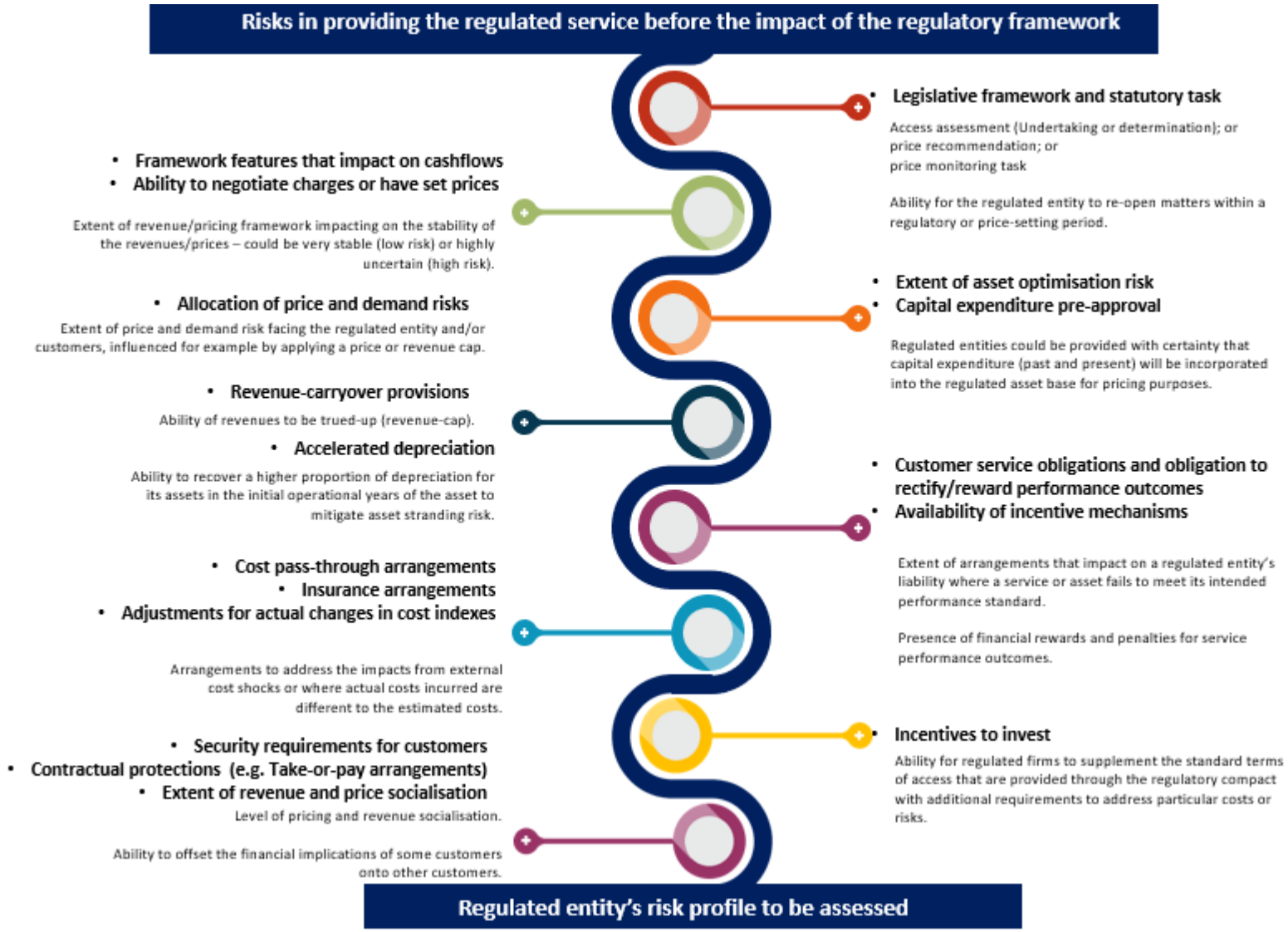
- We identified the following matters for consideration:
  - understanding risk and the regulatory framework: the context for assessing WACC values (section 3.2)
  - assessing whether the proposed WACC value is reasonable (section 3.3)
  - determining an appropriate WACC value where a regulated entity does not propose a reasonable WACC value (section 3.4)
  - undertaking a normalisation exercise to compare the regulated entity's proposed WACC value or QCA-determined WACC value to those of other regulated entities (section 3.5).
- We have adopted principles to guide the normalisation exercise, relevant data sources and example calculations in Appendix A: Normalising regulatory WACC values.

3.2 The role of risk and the regulatory framework when assessing the rate of return

The rate of return compensates the investor for the time value of money and risk that they face in providing the assets that deliver the services that are subject to the regulatory regime. A regulated entity will inevitably be exposed to various risks when providing services. Determining whether a regulated entity's proposed rate of return is reasonable, first requires us to consider the overarching commercial and regulatory risks the entity faces, including specific market characteristics. This requires an assessment of the way in which risks are addressed, if at all, within the overall regulatory framework. This framework can have an impact on the risk profile of an entity—as regulatory arrangements can mitigate, allocate and/or otherwise compensate for risks.

Figure 3 highlights how various features of a regulatory framework can impact a regulated entity's risk profile. For example, use of a revenue cap with a true-up mechanism means that the entity is likely to receive a stable cash flow stream, insulating it from demand and revenue risk.

Figure 3 Features of regulatory framework and impact on regulated entity's risk profile



At the same time, a regulated entity should not be compensated to the extent risk is mitigated or can be efficiently allocated to another party (such as by insurance). Moreover, a regulated entity should not be compensated for risk stemming from factors within the control of management, such as its own inefficiency or negligence.

By assessing rates of return within the context of a broad understanding of the types of risks a firm faces and how these risks are being addressed by the regulatory framework or other means, we aim to determine reasonable rates of return that are not too high (leading to prices that are inefficiently high) or too low (leading to insufficient incentives to promote efficient investment).

Sunwater submitted that we had identified the legislative framework and statutory task as a feature of the regulatory framework that could impact a regulated entity's risk profile, but we had not indicated how we will take this risk into account or how we will distinguish between the risks faced by regulated entities subject to different regimes.[37]

The intention of investigating the regulatory framework of the firm is to determine the residual risks that a firm should be efficiently exposed to after considering the various aspects of the regulatory framework. If different regulatory frameworks contribute to varying levels of residual risk, then this risk is something that we would consider when setting the rate of return and may feed directly into the determination of parameters such as beta, gearing and credit rating.

3.3 Assessing reasonableness of regulated entity's proposed WACC

Our view is that once a regulated entity proposes a WACC value, we will undertake analysis to determine whether the overall proposed WACC is reasonable, noting that this task will require the exercise of judgement. Information that we may consider (although we are neither bound, nor limited, by this list) includes:

- methodologies and/or values we consider are appropriate—such as those from this WACC review. We may consider regulatory certainty, for instance where the proposed values are consistent with previous regulatory decisions and there are no substantive reasons to change (for example, a previous beta value)
- the risks the firm faces within its regulatory framework
- the WACC values of other Australian regulated entities with similar risk profiles. We will normalise these WACC values so that they can be compared at the same point in time (see section 3.5). The WACC values of other Australian regulated entities may provide a guide as to whether the proposed WACC is reasonable, although in comparing values it is important to consider the firm-specific factors that cause differences in the firms' risk profiles as well as other mechanisms in the regulatory framework. These factors may explain why some values are higher or lower.

The DBCT User Group had concerns with the way in which we might assess reasonableness within a negotiate-arbitrate framework and asked us to clearly define a narrow set of circumstances in which we would accept a WACC proposal without conducting a bottom-up estimate.[38]

If we consider the proposed WACC value is reasonable, we are likely to accept it. If we do not consider it is reasonable, we will determine a WACC value that we consider is reasonable, using available evidence and information.

[37] Sunwater, sub. 19, pp. 1–2.
[38] DBCT User Group, sub. 24, pp. 1–2.

For example, suppose a WACC proposal from a regulated entity applies the relevant methods and values set out by us (such as our method for estimating the risk-free rate and adopting our value of gamma) and it also applies the same values for the firm-specific parameters as in previous reviews (such as the same credit rating and gearing). To the extent that there have been no material changes in the overall risk profile and regulatory framework, it may be reasonable to approve such a proposal.

3.4 Determining reasonable rates of return

In the case that we consider a WACC value proposed by a regulated entity is not reasonable, we will determine a reasonable WACC value for that entity. We will do this in two steps: a bottom-up WACC estimation exercise, and a top-down assessment to determine if the bottom-up WACC value provides an overall rate of return that is appropriate in the circumstances.

3.4.1 Bottom-up WACC estimation

We will estimate WACC values by calculating individual parameters. Our intention is that in future regulatory reviews that require an assessment of rates of return, all stakeholders will be given an opportunity to make submissions, and we will consider these on their merits.

While this review is not binding, it does provide our latest consideration of these matters after considering a wide range of empirical evidence, academic papers and market data and consulting with stakeholders on our approaches.

3.4.2 Top-down assessment of reasonableness

We want to determine rates of return that are reasonable overall. Therefore, we want to assess whether the value estimated in the bottom-up exercise provides an overall WACC value that is reasonable. We would apply judgement in the context of the assessment as to whether the estimated WACC value is commensurate with the risks the firm faces, and therefore whether it provides the firm with an appropriate level of compensation. In doing so, we note the risks of not providing sufficient incentives to promote efficient investment or in setting prices that are inefficiently high.

We do not intend to automatically adjust our bottom-up value in each review. Rather, we would consider adjusting it if there were circumstances that deem this necessary for providing an overall reasonable WACC value. In this way, the top-down approach allows us to exercise our judgement to determine an overall rate of return for a regulated entity that we consider is reasonable.

One example of where we may adjust our bottom-up WACC value is if we are concerned that there are specific market conditions that might cause our bottom-up estimate of the cost of equity to be inappropriate. For instance, our bottom-up estimate may not fully account for circumstances where there is heightened investor risk aversion and/or market volatility or abnormal interest rates. To identify instances where there are market circumstances that require us to adjust our bottom-up WACC estimate, we may consider such factors as the Australian S&P 200 Volatility Index (VIX), the current level of the risk-free rate relative to historical risk-free rates, and the output of our dividend growth model (see section 6.4).

We may also consider the WACC values of other regulated entities with similar risk as an indicator of the reasonableness of our WACC value (we would do that by undertaking the normalisation exercise set out in section 3.5).

Other reasons that may cause us to adjust our bottom-up WACC value include identification of risks that are not captured in the WACC estimation framework, which may be appropriate to be

compensated through the overall rate of return. These include, for instance, risks associated with environmental, social and corporate governance (ESG) considerations.[39]

Houston Kemp Economists raised (in a report commissioned by Dalrymple Bay Infrastructure) the following points in relation to incorporating ESG considerations:

> This fundamental reshaping of investment decisions by reference to considerations that sit outside long-accepted, financial drivers of risk and returns cannot readily be incorporated into conventional frameworks for the estimation of the rate of return.
>
> For instance, the availability and cost of debt capital for two businesses with an identical credit rating and very similar financial characteristics can be markedly different if one is perceived to score more poorly against ESG criteria. Similarly, perceptions as to ESG considerations can lead to significant differences between the availability and cost of capital for businesses that face the same level of systematic risk.
>
> In our opinion, it is therefore not sufficient to account for the effects of ESG considerations on the cost of capital through adjustments to conventional measures of financial risk, such as a firm's credit rating or equity beta.[40]

Aurizon Network argued that future QCA determinations will need to consider a broader range of impacts associated with ESG. Aurizon Network said that it welcomed the QCA's recognition of potential ESG impacts on rates of return for ESG-exposed sectors.[41]

Aurizon Network added that credit ratings may not be a reliable basis for determining the cost of debt for firms in ESG-exposed sectors, if there are additional risk premiums being included in financing costs. That is, the cash flows and liquidity may support a particular credit rating, but the firm may not be able to obtain finance at the benchmark cost for that rating. Aurizon Network said firms in ESG-exposed sectors are also likely to face higher debt raising costs.[42]

We accept that ESG matters are an emerging concern that we may need to consider in future determinations of the rate of return.

If we consider that any top-down adjustment (up or down) is required, we will provide our reasoning for this adjustment. The adjustment will be made to the overall WACC, rather than to individual WACC parameters. The size of the adjustment would depend on the reason for the adjustment.

Submissions about the top-down approach

We received many comments from stakeholders on our top-down approach to the rate of return.

A key theme was that the adjustments to the bottom-up WACC values in some previous decisions were not predictable, transparent or well-explained. Stakeholders were also uncertain about when we would make an adjustment to the bottom-up WACC value and by how much.[43] Seqwater said we should avoid exercising judgement in a way that reduces the transparency and replicability of the methodologies.[44] The QRC generally opposed 'top down' adjustments to the

[39] The integration of ESG considerations in investment decision-making is growing, as ESG-related risks are becoming more relevant for those industries impacted by climate change policy.
[40] DBI, sub. 25, p. 10.
[41] Aurizon Network, sub. 5, p. 6.
[42] Aurizon Network, sub. 5, p. 18.
[43] See for instance, DBI, sub. 3, pp. 9–15; Unitywater, sub. 1, p. 2; DBCT User Group, sub. 8, pp. 9–15.
[44] Seqwater, sub. 7, p. 8.

rate of return—and added that, where this does occur, a detailed explanation of exceptional circumstances is needed.[45]

Some stakeholders commented on the direction and magnitude of any adjustment. Comments included that the size of any adjustment may be arbitrary[46]; a framework should be in place to estimate the magnitude of an adjustment[47]; the exercise of regulatory discretion should be skewed toward commercial reasonableness rather than false precision[48]; and (in contrast) it is critical to not set a rate of return of return with an upward bias[49].

Other stakeholders recognised the difficulty in setting a rate of return and supported using discretion where necessary to account for risks or considerations that fell outside of the CAPM or were unaccounted for in our bottom-up estimation of WACC parameters.[50]

We consider the top-down approach set out in this report may help to address stakeholders' concerns about any uncertainty regarding our previously applied top-down approach, as it provides greater clarity over how we determine reasonable WACC values. As noted above, we would not automatically apply a top-down adjustment in all reviews. Rather, having the top-down approach allows us to exercise our judgement in circumstances where we consider the bottom-up WACC value may not provide a reasonable overall rate of return for an entity. In circumstances where we apply a discretionary adjustment, we would provide our reasoning for the adjustment and for its size. If owners or operators of declared services require greater certainty, they may apply for a binding ruling under part 5 of the QCA Act.[51]

We are not providing worked examples of how we will apply adjustments to our bottom-up assessment of a WACC decision. An assessment of whether our bottom-up number is appropriate will involve many considerations that are specific to the circumstances facing the regulated entity, as well as the market conditions that are present at the time of the decision.

ARTC said that we should focus on the total return as the relevant outcome, rather than debating the appropriate methodology for every parameter in the calculation.[52] We also consider that it is the total return that is important, and this is the intended purpose of our top-down approach.

Unitywater said risk adjustments should be made to cash flows rather than to the rate of return, as cash flow adjustments are transparent in their application and can be logically tied to identified risks.[53] We consider that it may be preferable to make adjustments to cash flows, where this is a reasonable approach in the circumstances. For example, in some circumstances it may be reasonable to accelerate depreciation rather than apply a premium on the rate of return for asset stranding in order to mitigate this risk.

3.5 Normalising WACC values of other regulated entities

In assessing whether a proposed WACC value, or our estimated WACC value, is reasonable, we may seek to compare the relevant WACC value to the WACC values of other Australian regulated

[45] QRC, sub. 20, p. 2.
[46] DBCT User Group, sub. 8, p. 5; QRC, sub. 20, p. 2.
[47] DBI, sub. 3, p. 15.
[48] Aurizon Network, sub. 5, p. 5.
[49] DBCT User Group, sub. 8, p. 27.
[50] Aurizon Network, sub. 21, pp. 3–7; DBI, sub. 25, pp. 10–11.
[51] QCA Act, s. 150D.
[52] ARTC, sub. 14, p. 4.
[53] Unitywater, sub. 1, p. 2.

entities that have similar risk profiles. This comparison could help inform our assessment of the reasonableness of the WACC value.

To compare the WACC values on a like-for-like basis, we 'normalise' the other regulators' WACC values so that they can be compared at the same point in time. This normalisation exercise involves calculating the time-varying parameters with reference to the same point in time (for example, the commencement of the regulatory period in the assessment). More detail on our approach to normalisation is provided in Appendix A: Normalising regulatory WACC values.

We note that the normalisation exercise will serve as a guide only—the results should be interpreted with caution. The exercise requires assumptions in order to replicate other regulators' methodologies, and full information is not available in some regulatory decisions.[54] In addition, the WACC values should not be interpreted as standalone comparison measures; rather, they should be considered in the context of a firm's overall risk, which is influenced by its specific regulatory framework.

[54] For instance, the averaging periods that the AER uses to calculate the cost of debt for entities it regulates is confidentially determined.

4 METHODOLOGY TO ESTIMATE GEARING

The capital structure of a firm refers to the relative proportions of debt and equity that together finance the firm's activities.[55] *Gearing refers to the proportion of debt comprising the total value of the firm's assets (that is, debt and equity).*

4.1 Key points

- A firm's decision about gearing is influenced by the after-tax costs of various funding sources (typically debt and equity of different forms) and by the preparedness of funding providers to provide funding, depending on the financing and operating risks of the firm. A firm also considers the impact of gearing on its financial flexibility.[56] Gearing will vary across industries, depending on the volatility of the industry's cash flows. In general, industries with more stable cash flows can sustain a higher proportion of debt.
- Our views on matters related to gearing are:
  - Gearing for a regulated entity is likely to be relatively stable over time—regulated entities tend to have stable cash flows, because of factors such as features of the regulatory framework (for example, revenue caps) and low demand elasticity[57] for the essential services provided by some firms. However, the efficient level of gearing targeted by a firm may change over time (for example, if there are material changes to the tax regime or the firm embarks on a substantial capital expansion).
  - When we assess gearing for a regulated entity, we consider what the gearing might look like for an efficient benchmark entity, rather than adopt the regulated entity's actual gearing. An efficient benchmark provides the firm with an incentive to make efficient financing decisions and protects consumers/users from imprudent decisions.
  - We will use the current regulatory gearing as a starting point. If there is persuasive evidence that the current benchmark no longer represents efficient gearing, we will determine a new benchmark, having regard to factors such as Australian regulatory precedent, the firm's current risk profile and the gearing of comparator firms. Other Australian regulators consider similar factors in determining regulatory gearing and have generally set regulatory gearing in the range of 50 to 60 per cent.
- Key matters we identified during our review are:
  - assessing regulatory gearing for a firm (section 4.2)
  - comparator matters, including selection and measurement (section 4.4)

[55] A firm's capital funds a range of business activities, including operations, maintenance and capacity expansion, as well as working capital.

[56] Other factors that might also influence the choice of debt level include asymmetric information and agency costs. For example, the firm's choice of capital structure can be used to convey managers' private information about the firm's expected returns and investment opportunities to investors (see SA Ross, 'The determination of financial structure: the incentive signalling approach', *Bell Journal of Economics*, vol. 8, no. 1, 1977, pp. 23–40). Also, capital structure can be used as a mechanism to address agency problems, such as resolving conflicts between equity holders and debt holders (see M Jensen and W Meckling, 'Theory of the firm: managerial behavior, agency costs, and capital structure', *Journal of Financial Economics* vol. 3, no. 4, 1976, pp. 305–360).

[57] In other words, the quantity of the services demanded is not highly sensitive to the price.

- regulatory precedent (section 4.3)
- linkages with other aspects of the regulatory framework (section 4.6).

4.2 Assessing regulatory gearing

We consider that the benchmark gearing for a regulated entity should remain reasonably stable over time. In general, regulated entities have established and stable risk profiles that do not vary significantly over time; therefore, they can sustain similar proportions of debt over time, all else equal.

The entities subject to our regulatory regime tend to have several characteristics that give rise to relatively steady and predictable cash flows. For example, many of them have features in their regulatory and/or contractual frameworks that reduce risk (for example, cost pass-through arrangements, revenue caps, take-or-pay contracts). Also, many of them have demand for the service that tends to be correlated with incremental population growth, which tends to be relatively stable over time. These factors, in conjunction with large stable asset bases, provide a basis for long-term, stable financing.

Our view is that the regulator should carefully consider the benchmark gearing for a regulated entity, and once that value has been established, only change it if there is persuasive evidence to do so. An advantage of maintaining a relatively stable regulatory gearing is that it provides regulatory certainty, which can promote ongoing investment in the regulated firm and provision of the relevant services. We note that other regulators have generally maintained the same or similar gearing over time for the entities they regulate.

It is also possible that the efficient benchmark gearing for a firm may change over time—for example, if there are material changes to the tax regime, or significant variations in the firm's capital expenditure program. Before changing the benchmark gearing, the implications of a change for investors and customers, as well as the financial sustainability of the firm, should be tested.

In summary, we will base our approach to assessing regulatory gearing on the premise that gearing should generally be relatively stable over time. We will determine regulatory gearing for a firm as follows:

- Use the current regulatory benchmark gearing as the starting point.
- Assess whether this value continues to represent an efficient gearing for the firm, by considering factors such as:
  - the regulatory gearing decisions for relevant Australian regulated entities
  - material changes in the risk profile of the regulated firm
  - the gearing of relevant comparator firms that have a similar risk profile.

To change the regulatory gearing, we would require persuasive evidence that the current gearing no longer represents an efficient benchmark. Any change to regulatory gearing would be based on the factors above and would be carefully considered.

4.3 Comparator matters

In reviewing whether the current regulatory gearing of an entity remains appropriate, another consideration is the gearing of listed firms that have comparable risk to the regulated firm (see discussion below). In seeking comparators, we require listed firms, as the current market value

of their equity can be estimated when their stock is listed on an exchange and shows sufficient liquidity. If we consider the gearing of comparator firms, we will firstly select relevant comparators and then measure their gearing.

4.3.1 Selecting relevant comparators

To select relevant comparators for gearing, we will assess the risk of the regulated entity and find comparator firms with similar risk, having regard to factors that impact the variability and cyclicality of their cash flows. The industry of the regulated firm provides a natural starting point for sourcing potential comparators, as firms within the same industry will typically share some similar features (for example, cost structures) that impact cash flow variability and therefore, the ability to take on debt. However, the industry (and form of regulation) are not necessarily determinative, as other features, such as contracts and customer base, are also important to consider.

Our risk analysis for gearing to date has differed from our assessment of risk for beta. When estimating beta, we have necessarily focused on systematic or non-diversifiable risk, whereas for gearing we have considered total risk, of which systematic risk is one component.[58] Other factors can affect the total volatility of returns, such as geographic diversification and weather vulnerability, without necessarily affecting beta.

Stakeholders had varying views about whether to use the same comparators for both beta and gearing. The DBCT User Group and Urban Utilities considered beta comparators would generally be appropriate for gearing comparators[59], while the Gladstone Area Water Board (GAWB) said the comparators for gearing and beta do not need to be the same.[60] While we consider that comparators we use to estimate beta provide an appropriate starting point for considering comparators for gearing, we are not limited to considering only those comparators. We may seek other comparators for gearing, as the risks that underlie the estimation of beta and gearing can differ.

Another matter to consider when selecting comparators is the relevance of the gearing of international firms. Seqwater considered the gearing of international firms may have limited relevance to the gearing of Australian water companies. It said the QCA should therefore not rely on gearing of comparators but rather rely on precedent for gearing.[61] We consider that there may be country-specific factors that may limit the relevance of international firms' gearing (such as differences in tax regimes).

The gearing of comparators is only one factor we may consider in assessing gearing for regulated entities—we may consider other factors, such as regulatory precedent. We may also consider the gearing of listed Australian infrastructure firms, for example, if our analysis indicates that they share broadly similar risks as the regulated entity we are assessing.

[58] Firms are affected by both firm-specific and market-wide risks. When firms carry both types, only the firm-specific risks will be diversified away when many shares are combined in a portfolio. As shares are added to the portfolio, total volatility will decline until only the systematic, or undiversifiable, risk remains. Systematic risk is the basis of compensation under the Capital Asset Pricing Model (see Chapter 6).

[59] DBCT User Group, sub. 8, p. 21; Urban Utilities, sub. 10, p. 3.

[60] GAWB gave an example where it considered comparators could be drawn from various industries for beta, but comparators should be drawn from the same industry for gearing (GAWB, sub. 7, p. 2).

[61] Seqwater, sub. 7, p. 40.

4.3.2 Measuring gearing of comparators

After selecting relevant comparators, the next step is to measure their gearing. Gearing is calculated as a firm's debt divided by the sum of its debt and equity. Several issues arise in the context of measuring gearing.

Market vs book values

For the selected comparators (that is, the benchmark firms), we require values of their debt and equity in order to estimate their gearing. Such values can be book values (values from a firm's financial statements) or market values (market prices of traded debt and equity securities).

To the extent relevant, we use market data to estimate other WACC parameters, in particular our equity beta estimates (see section 6.5). Consistent with this view, we also consider that market values are relevant for estimating gearing. However, while the current market value of a (listed) firm's equity can be estimated from a listed stock of sufficient liquidity, the market value of debt may be more problematic to estimate. Debt instruments, for example, bonds that pay fixed coupons, might not trade often. Further, bank debt does not trade at all, and it is a significant source of debt for Australian infrastructure firms.[62] Accordingly, common regulatory and business practice in Australia is to use the book value of debt as a proxy for its market value.[63]

We will therefore use the market value of equity and the book value of debt (as a proxy for the market value of debt) when estimating the gearing of comparators. We note that both the AER and ERA adopt a similar approach.[64]

Term of measurement

In calculating the gearing of a comparator firm, it is common regulatory practice to calculate the firm's gearing over a long term, such as 5 to 10 years, by taking an average over that period.[65] Such an approach is consistent with our view that the benchmark gearing for a regulated infrastructure firm should remain reasonably stable over time. Calculating benchmark gearing over a longer term also smooths the effects of any short-term factors affecting gearing, such as a change in the market capitalisation of a company due to significant movements in the share price or a major capital expansion or acquisition.

In general, we consider it is desirable to use more data in order to generate a more reliable estimate, so long as the data remains sufficiently relevant (as older data is less current and relevant than more recent data). We consider averaging gearing estimates over a 10-year period strikes a balance between these trade-offs, and therefore we will use a 10-year term for estimating benchmark gearing. We note a 10-year term is consistent with the term for estimating the equity beta (section 6.5).

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[62] For example, see PwC, *Energy Networks Association: Benchmark term of debt assumption*, 2013, Appendix A.

[63] Financial practice has shown this approach to provide a close approximation as long as there has not been a sudden change in interest rates (see RJ Sweeney, AD Warga and D Winters, 'The market value of debt, market versus book value of debt, and returns to assets', *Financial Management*, vol. 26, no. 1, 1997, pp.1–26).

[64] The AER places primary weight on gearing estimates from market values (using the book value of debt as a proxy for market value of debt), and the ERA uses the book value of net debt for calculating gearing (AER, *Rate of return guidelines*, explanatory statement, draft, July 2018, p. 167; ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and the Pilbara Railways*, final determination, August 2019, p. 16).

[65] The AER considers both 5- and 10-year periods, and ERA considers a 10-year period (AER, *Rate of return guidelines*, explanatory statement, draft, July 2018, pp. 168–69; ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and the Pilbara Railways*, final determination, August 2019, p. 15).

4.4 Regulatory precedent

In assessing whether the current regulatory gearing remains appropriate, we may consider the gearing approaches and values applied by other Australian regulators. We consider our approach to assessing regulatory gearing is supported by other Australian regulatory gearing outcomes—other regulators have generally maintained the same or similar gearing over time for the entities they regulate (Table 2).

Table 2 Regulatory benchmark gearing over time

Regulator	*Industry*	*Gearing in the 2000s (%)*	*Gearing from a recent decision (%)*
AER	Electricity	60	60
ACCC	Rail	60	50
ERA	Electricity	60	55
ERA	Rail	30	20
ESC	Water	60	60
ICRC	Water	60	60
IPART	Water	60	60

Sources: AER, Electricity transmission and distribution network service providers—Review of the weighted average cost of capital (WACC) parameters, final decision, May 2009, p. 48; AER, Rate of return instrument—explanatory statement, December 2018, p. 67; ACCC, Australian Rail Track Corporation's 2018 Interstate Access Undertaking, draft decision, December 2018, p. 143; ERA, The Pilbara Infrastructure (TPI): Final Determination on the 2009 Weighted Average Cost of Capital for TPI's Railway Network, June 2009, p. 25; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, Appendix 5: Return on Regulated Capital Base, September 2018, p. 91; ERA, 2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and the Pilbara Railways, final determination, August 2019, p. 19; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019, p. 29; ESCOSA, SA Water Regulatory Determination 2020, final determination: statement of reasons, June 2020, p. 209; ICRC, Regulated water and sewerage services prices 2018–23, final report, May 2018, p. 87; IPART, Review of prices for Water NSW Greater Sydney from 1 July 2020, final report, June 2020, p. 169; The Allen Consulting Group, Queensland Below Rail Network—Cost of capital update, final report, prepared for the QCA, June 2009, p. 14; ACCC, Australian Rail Track Corporation Access Undertaking, decision, May 2002, p. 159.

Other Australian regulators also generally consider similar factors in determining regulatory gearing benchmarks. For example, in recent decisions, the ACCC and ESCOSA stated they consider their past practice for the regulated entity; ESCOSA, IPART, the ACCC and the ICRC have considered other regulatory decisions; the AER, ERA and IPART have looked at the gearing of comparator firms; and the ERA and the AER stated they consider the risk of the firm.[66]

4.5 Stakeholder submissions

Stakeholders were broadly supportive of our proposed approach to assessing gearing.[67] Seqwater said the QCA's assessment of benchmark gearing should be informed by a number of

[66] AER, *Rate of return instrument—explanatory statement*, December 2018, p. 64; ACCC, *Australian Rail Track Corporation's 2018 Interstate Access Undertaking*, draft decision, December 2018, pp. 143–44; ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and the Pilbara Railways*, final determination, August 2019, p. 19; ESCOSA, *SA Water Regulatory Determination 2020*, final determination: statement of reasons, June 2020, p. 215; ICRC, *Regulated water and sewerage services prices 2018–23*, final report, May 2018, p. 115; IPART, *Review of our WACC method*, final report, February 2018, p. 73.

[67] GAWB, sub. 22, p. 15; Seqwater, sub. 27, p. 2.

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. The Central Highlands Regional Council said relevant comparators should include/be limited to equivalent government-owned corporations.

Redland City Council considered the Australian Accounting Standards Board's AASB 16 standard may be relevant to assessing gearing.

> AASB16 Leases impact (increasing EBITDA, but reducing pre-tax profit, and an increase in Debt to Equity ratio and a reduction in interest cover ratio) will need to be considered.[68]

Adopting the AASB 16 standard means that in general, leases that were previously classified as expenses are now brought onto the (accounting) balance sheet of a firm, with the effect of increasing the value of the firm and potentially impacting a firm's gearing ratio.

We typically set gearing for a regulated firm based on an efficient benchmark firm, rather than based on a firm's actual gearing.[69] However, such matters may be relevant, and we will consider information put forward by a regulated firm in a future review relating to such effects of accounting standards.

4.6 Linkages with other aspects of the regulatory framework/rate of return

The regulatory gearing benchmark is linked to the rate of return through the following avenues:

- *Weighting of WACC components*—gearing is the weight that is assigned to the rate of return on debt in the WACC equation (with the remaining weight assigned to the rate of return on equity).
- *Equity beta*—gearing is positively correlated with the equity beta. As gearing increases, the equity beta increases, because debt funding increases risk to equity holders (as equity holders are paid after debt holders in the event of bankruptcy).
- *Credit rating*—gearing is related to credit rating, in that a firm that is more highly geared may have a lower credit rating due to the risks that arise from sustaining more debt.
- *Taxation*—gearing affects interest expenses, which are deductible for tax purposes. A higher regulatory gearing equates to a higher interest deduction (tax shield), and a lower tax allowance in the regulatory building blocks model, all else equal.

[68] Redland City Council, sub. 12, p. 3.
[69] Therefore, if relevant, we may consider any changes in accounting standards when selecting an appropriate set of comparators.

5 METHODOLOGY FOR ESTIMATING THE COST OF DEBT

The cost of debt is the cost to a firm of servicing and raising debt from a range of lenders. It is a fundamental component of the WACC, as debt financing is a significant cost to capital-intensive firms with long-lived assets such as regulated infrastructure entities.

5.1 Key points

- Determining the 'benchmark' cost of debt requires relevant data and an appropriate methodology. We have reconsidered our methodology for estimating the cost of debt in light of regulatory best practice and other developments.
- On matters related to the cost of debt, we will:
  - set the cost of debt allowance for a regulated entity by referencing a benchmark efficient firm as opposed to the actual costs of the regulated entity (section 5.3)
  - apply a trailing average as the benchmark debt management strategy (section 5.4)
  - base the data source for the cost of debt on 10-year corporate bond yields reported by the RBA, but consider the credit rating benchmark for entities on a case-by-case basis at the time of their next review (section 5.5)
  - use an unweighted (simple) 10-year trailing average[70], applied to the entire cost of debt, with annual debt tranche refinancing (section 5.6)
  - not require transition arrangements to implement the benchmark trailing average debt management strategy, in accordance with a forward-looking regulatory approach, except in exceptional circumstances (section 5.6.6)
  - apply debt-raising costs of 10 basis points per annum for the trailing average approach (section 5.7).

5.2 Steps in estimating the cost of debt

Before estimating a regulatory cost of debt allowance, it is necessary to choose a benchmark debt management strategy as the basis for this estimation process (section 5.4). In Australia, regulators typically apply either an on-the-day or a trailing average debt management strategy for this purpose, with the latter now widely applied.

The on-the-day approach assumes that the benchmark firm refinances its entire debt portfolio (closely) before the start of a regulatory period. A trailing average approach assumes that a firm refinances a portion of its debt (a debt tranche) at staggered intervals (typically yearly), rather than refinancing all of its debt at the same time and (closely) preceding the start of a regulatory period.

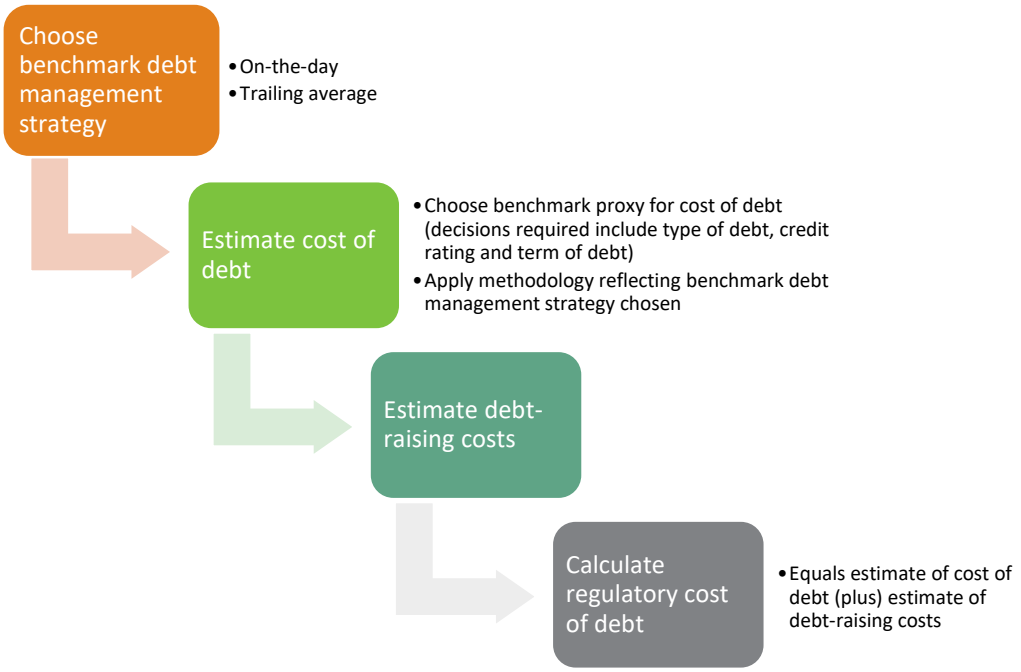
Once a benchmark debt management strategy has been chosen, the cost of debt (and hence a cost of debt allowance) can be estimated. The estimation process requires data and methodology decisions. The cost of debt data source reflects the characteristics of the benchmark firm's debt.

[70] An 'unweighted (simple)' trailing average places equal weight on each year's observation; therefore, a 10-year trailing average implies an annual weight of 10%. In contrast, 'weighted' means unequal annual weights—for example, weightings based on forecast, or historical, annual capital expenditure.

This involves making decisions in relation to the type of debt, credit rating and term of debt (section 5.5). The methodology that is applied should best reflect the benchmark debt management strategy chosen (sections 5.5 and 5.6).

A final step is to provide an allowance for the transaction costs associated with raising debt, as part of the cost of debt[71] (section 5.7).

Figure 3 Estimating the regulatory cost of debt allowance



5.3 Benchmarking

Our view is that the cost of debt for a regulated entity should be set by referencing the debt management strategy of a benchmark efficient firm, as opposed to the actual strategy adopted by the regulated entity in question.

In practice, regulated entities implement debt management strategies suitable to their individual needs. Potential decisions include whether to:

- issue short-term debt (for example, 1-year maturity), long-term debt (for example, 10-year maturity), or a range of debt maturities, as a method of managing capital expenditure, refinancing and interest rate risk
- borrow in domestic or offshore bank or capital markets
- issue fixed-rate or floating-rate debt
- use swap contracts or some other derivative to manage interest rate risk in the context of the regulatory framework
- issue debt denominated in Australian dollars or foreign currencies, or a mixture of the two
- access project financing or leasing arrangements

[71] An allowance for debt-raising costs could instead be included as a cash-flow component of operating costs.

- consider the extent to which the financing of the regulated business may impact on the financing of any unregulated activities of the firm.

Given we are trying to establish the WACC of a firm operating in an effectively competitive market, our view is that the cost of debt for a regulated entity should be set by referencing a debt management strategy of a benchmark efficient firm as opposed to seeking to define the debt management strategy for a specific regulated entity.

5.4 Debt management strategies

Our view is that the benchmark debt management strategy used to determine a regulated entity's cost of debt should reflect a trailing average approach.

Historically, the QCA has solely relied on the on-the-day approach to estimate an appropriate cost of debt. This involved setting the regulatory cost of debt over a relatively short period preceding (but close to) the start of a regulatory period.[72] This cost of debt is then 'locked in' for the term of the regulatory period. The rationale for this approach is that the cost of debt at the beginning of a regulatory period should reflect prevailing market conditions, providing an efficient signal for new investment.[73] An on-the-day approach to estimating the cost of debt has previously been used by regulators in Australia.

However, it may be efficient for capital-intensive infrastructure firms to stagger their debt financing to avoid needing to refinance their entire debt portfolio over a relatively short window of time to manage refinancing risk.[74] This has in part led many Australian regulators over the last decade to move to estimating the cost of debt using a form of trailing average debt management strategy.[75] For example, the AER, ESC, ESCOSA and ICRC all have recently used a trailing average cost of debt approach (see Appendix B).

Unity Water, Sunwater, Queensland Treasury Corporation (QTC), Urban Utilities, Redland City Council and the Queensland Resources Council (QRC) all supported estimating the cost of debt using a trailing average approach.[76] They argued that relative to an on-the-day approach, the trailing average approach:

- better reflects how capital-intensive firms with high gearing refinance their debt in practice and as such is more representative of an efficient benchmark
- reduces the mismatch between the regulatory cost of debt and the actual cost of debt incurred by a firm

[72] In practice, regulators average the cost of debt over a number of days as close as practically possible to the commencement of a regulatory period. This short multi-day averaging period helps to mitigate the effect of single-day aberrations in rates, while determining a cost of debt that is relatively 'current', and therefore consistent with the on-the-day approach.

[73] This is only the case at the beginning of the regulatory period, as there may be deviation from the 'locked-in' rate over the course of the regulatory period (although a firm could, in principle, hedge such potential deviations by using forward contracts).

[74] Refinancing risk is the risk that when a firm seeks to refinance its existing debt portfolio, it is unable to do so efficiently. This may be because it will incur a significant premium to refinance the debt (e.g. if there is a large quantity being refinanced) or because the bond market is either closed or thinly traded at the time.

[75] The trailing average debt management strategy estimates the regulatory cost of debt as an average of the total cost of debt over an historical period, with regular updates of that average.

[76] Unitywater, sub. 1, p. 1; Sunwater, sub. 6, p. 1; QTC, sub. 9, p. 2; Urban Utilities, sub. 10, p. 1; Redland City Council, sub. 12, p. 1; QRC, sub. 20, p. 2.

- reduces refinancing risk through the natural hedge offered by staggering debt maturities[77]
- reduces price volatility for customers, as temporary jumps in prevailing debt costs are averaged out; therefore, large changes take time to be reflected in allowable revenues.[78]

The trailing average approach has additional benefits in that it:

- reduces the consequences of capturing anomalous cost of debt data, as only a relatively small debt tranche (for example, 10%) is re-estimated each year[79]
- can be implemented by large infrastructure firms in practice—an on-the-day debt management strategy cannot be fully implemented by these firms, as there is no liquid market for credit default swap contracts to hedge against an on-the-day debt risk premium (DRP) rate.[80]

In contrast, the DBCT User Group indicated it does not support the trailing average approach. Aurizon Network said that further analysis should consider the implications both of applying an unweighted trailing average (given the possibility of large and non-uniform capital expenditure) and of the proposed transitional arrangements.[81]

Given these concerns, Aurizon Network submitted there may be alternative and simplified approaches to implementing a trailing average debt risk premium model. Specifically, Aurizon Network indicated that a 10-year historical average debt risk premium plus a prevailing risk-free rate may be more acceptable to Aurizon Network and its customers. Aurizon Network stated its customers may even prefer to retain the on-the-day approach to ensure revenues and prices better reflect current economic conditions at the time of the reset.[82]

The DBCT User Group raised the concern that there was no clear justification for moving away from the QCA's well established and understood on-the-day approach. The DBCT User Group noted the QCA's April 2015 final decision on the trailing average cost of debt where the QCA determined that there was no compelling case for changing the existing on-the-day methodology for estimating the cost of debt to the trailing average approach.[83]

For regulatory purposes, our preference is to identify a benchmark debt management strategy. We observe that capital-intensive infrastructure firms may not be able to substantially hedge their debt rates against an on-the-day rate, due to a lack of depth in relevant interest swap

[77] For example, a firm may issue 10 per cent of its debt requirements each year in the form of 10-year debt. In this case, only 10 per cent of the debt would mature in each year. Thus, even if there is a problem with refinancing, it would pertain only to a small proportion of the debt. That is, each year only 10 per cent of the debt would be exposed to the risk that debt markets were effectively closed or that interest rates were much higher than expected.

[78] The on-the-day debt management strategy can lead to large swings in revenue allowances (and therefore prices), as the cost of debt is set for the term of the regulatory period (e.g. five years). Therefore, if rates prevailing at the time of a reset reflect unusual market conditions, such as during the global financial crisis, these rates are 'locked in' for determining the regulatory cost of debt for the term of the regulatory period (and not reset for five years).

[79] The impact of an on-the-day cost of debt rate capturing anomalous market activity is more significant under the on-the-day approach, because the estimates are made over short averaging periods and are 'locked in' for the term of the regulatory period.

[80] A credit default swap contract (also called a CDS agreement) is a bilateral, financial agreement in which one party is the protection buyer ('risk shedder') and the other party is the protection seller ('risk taker'). The protection is against an unforeseen credit event that might preclude the reference entity from paying its loan/bonds (default).

[81] Aurizon Network, sub. 21, pp. 14–15.

[82] Aurizon Network, sub. 21, p. 13.

[83] DBCT User Group, sub. 24, pp. 2–3.

derivative markets, and they may also prefer to adopt a staggered debt portfolio to minimise refinancing risk.

Relevantly, in regulatory settings that do not involve a regular price reset (for example, monitoring), it is self-evident that adopting an on-the-day strategy is not appropriate for the regulated firm (at a minimum, from a risk management perspective). In regulatory settings with price resets, we observe that the firm's hedging of debt rates against a regulatory on-the-day rate is an artificial strategy that the firm adopts in response to regulators determining the cost of debt using an on-the-day approach. We consider regulation should establish benchmarks that reflect observable, efficient behaviour of relevant businesses, rather than benchmarks that are based solely on the regulatory term.

Therefore, when reviewing the relevant debt management strategy, we need to consider the likely debt management behaviour of an unregulated 'efficient' firm operating in a competitive market for similar services. We consider it appropriate to use this reference point, as the debt management strategy benchmark we are developing is to serve as a proxy for this hypothetical unregulated competitor—and such a competitor would have no reason to utilise an on-the-day strategy.[84] Rather, we consider that the trailing average approach is representative of the debt management strategy adopted by a benchmark efficient firm operating in a competitive market.

QTC supported our preference to adopt a benchmark trailing average debt management strategy:

> The QCA's proposed approach will result in the cost of debt reflecting the efficiently incurred cost of debt for a benchmark efficient entity. This will greatly reduce the mismatches that naturally occur under the on-the-day approach, which are effectively wealth transfers between consumers and regulated businesses.[85]

5.4.1 Single benchmark debt management strategy

Our approach is to use a single definition of a benchmark efficient firm for the purpose of estimating the regulatory cost of debt.

GAWB stated that given the wide range of businesses regulated by the QCA, it is imperative that the rate of return methodology reflects the different benchmark debt management strategies best suited to each type of business's operational and financing circumstances. GAWB considered that both the trailing average and on-the-day approaches should be available as options for regulated entities, having regard to customer preferences.[86]

We consider that offering firms a choice between debt management strategies would not encourage efficient debt financing. Offering a choice would provide entities with an incentive to propose the option that maximises their allowed cost of debt. For instance, the prevailing cost of debt at the start of a regulatory period may be high, relative to its historical average. If so, an entity might prefer the on-the-day approach to a trailing average approach. If the prevailing cost of debt subsequently fell below the trailing average by the beginning of the next regulatory period, its preferences may change in favour of a trailing average approach.

In addition, we consider that factors such as different sizes or ownership structures of entities do not justify the adoption of different benchmark definitions. As stated, firms construct different debt portfolios based on a number of factors. There is no 'one-size-fits-all' strategy, and tailoring debt management strategies to particular firm types is potentially not consistent with the

[84] We note that this position is also consistent with the position of the Australian Competition Tribunal in *Applications by Public Interest Advocacy Centre Ltd and Ausgrid [2016]* ACompT1, 913–915.
[85] QTC, sub. 18, p. 2.
[86] GAWB, sub. 22, p. 5.

benchmarking task. Therefore, we intend to specify the trailing average as the single debt management strategy for the purpose of determining cost of debt.

5.5 Cost of debt data source

We consider that the cost of debt data source should reflect 10-year corporate bond yields reported by the RBA, while the credit rating benchmark for entities should be considered on a case-by-case basis at the time of their next review.

In general, we do not consider it appropriate to use proprietary data sources or in-house models, in the interests of relying on data sources that are publicly available, robust, transparent and replicable. This represents a change from our current approach but is consistent with the practice of several other Australian regulators (Table 3).

Table 3 Cost of debt data source used for regulatory purposes

Regulator	*Cost of debt data source*
AER	Average of Bloomberg, RBA, and Thomson Reuters 10-year rated corporate bond yields. The AER estimates a BBB+ rated corporate bond yield by calculating a weighted average of the broad BBB and broad A rated debt yields from each provider.
ESC	RBA 10-year BBB rated corporate bond yield
IPART	RBA 10-year BBB rated corporate bond yield
ESCOSA	RBA 10-year BBB rated corporate bond yield
ERA (electricity)	ERA estimates its own bond rates using an in-house methodology (post-2015)
OTTER	RBA 10-year BBB rated corporate bond yield
ICRC	Average of Bloomberg and RBA 10-year BBB corporate bond yields

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

We consider the cost of debt data source should reflect the characteristics of the benchmark firm's debt. This involves making decisions in relation to the type of debt, credit rating and term of debt.

5.5.1 Type of debt

We consider it appropriate to reference fixed-rate corporate bond yields—using a non-proprietary third-party data source—to estimate the cost of debt.

Firms are typically able to access various types of debt financing—for example, bonds, bank debt and project finance. However, when deriving cost of debt data, regulators commonly reference fixed-rate bonds, because this practice:

- avoids the need to decide how the benchmark efficient firm selects between the different types of debt
- provides a simple, relatively accurate and unbiased approximation of the cost of debt used by a benchmark firm

- enables the use of data sources that are publicly available, robust, transparent and replicable
- is consistent with established commercial and regulatory practice.

Fixed-rate bond yields can be estimated in-house or sourced from a third party. We consider it appropriate to source fixed-rate bond yields from third-party providers. We consider in-house estimates of bond yields tend to be difficult to replicate and do not provide any substantive improvements in accuracy, relative to those developed by third-party providers. Using a third-party provider has the advantages that data sources:

- are provided for use by market practitioners and developed independently from the regulatory process
- are constructed by finance experts who have access to a comprehensive financial database
- can be readily implemented in the context of automatically updating the cost of debt.

Current third-party providers of corporate bond yields in Australia include the RBA, Bloomberg, Thomson Reuters and Standard & Poor's. The only readily available public data source is that prepared by the RBA, while the others are proprietary.

The use of third-party corporate bond yields for estimating cost of debt is common across the Australian regulatory landscape (Table 4).[87] However, since 2015, the Economic Regulation Authority (ERA) has determined its cost of debt by estimating its own bond yields using an in-house methodology.

Table 4 Third-party corporate bond yields used for regulatory purposes

Regulator	*Third-party provider(s) used for corporate bond yields*	*Comment*
AER	Gives equal weight to the RBA, Bloomberg, and Thomson Reuters	The AER stated this approach gives equal weight to the strengths and weaknesses of the three curves and mitigates against price shocks if any one curve temporarily or permanently ceases to be published.[88]
ESC	RBA	It has been the ESC's long-standing practice to use RBA data.
IPART	RBA	IPART considers sourcing RBA data is appropriate, as it is publicly available through the RBA's website, meaning IPART's cost of debt calculations can be replicated by stakeholders at no cost.[89]
ESCOSA	RBA	It has been ESCOSA's long-standing practice to use RBA data.
OTTER	RBA	It has been OTTER's long-standing practice to use RBA data.
ICRC	Gives equal weight to the RBA and Bloomberg	ICRC considers using the RBA and Bloomberg data series gives equal weight to the strengths and weaknesses of each series and mitigates the risk that any one series temporarily or permanently ceases to be published. The ICRC also considers that the RBA and Bloomberg data sources are accurate.[90]

[87] No regulator in Australia references cost of debt data that Standard & Poor's develops.
[88] AER, *Rate of Return Instrument*, explanatory statement, December 2018, p. 278.
[89] IPART, *Review of our WACC method*, final report, February 2018, p. 46.
[90] ICRC, *Review of Methodologies for the Weighted Average Cost of Capital*, draft report, February 2021, p. 32.

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

Urban Utilities, Redland City Council and QRC recommended that an open source of data be used to allow for transparency; therefore, they suggested that the RBA data should be used as the preferred source. Redland City Council highlighted that RBA estimates are unbiased, transparent, publicly available and appropriate for the purposes of calculating a benchmark cost of debt. Urban Utilities and Redland City Council said if the RBA data is unavailable, a backup data source should be nominated—Urban Utilities recommended Bloomberg.[91]

QTC originally considered that a reasonable approach is to give equal weight to the corporate yield estimates from the RBA and Bloomberg.[92] It subsequently considered that the monthly corporate debt yields produced by the RBA should be used to determine the 10-year benchmark corporate debt yield.[93]

In contrast, GAWB and Aurizon Network submitted that a reasonable approach is to give equal weight to the corporate yield estimates from the RBA and Bloomberg. GAWB stated using multiple data sources helps to achieve an unbiased estimate and increases the integrity of the estimate by reducing its mean square error.[94] Aurizon Network noted that it is good regulatory practice to consider information from multiple data sources. Aurizon Network also noted that RBA data has limitations due to being estimated monthly and giving more weight to bonds closest to the target tenor.[95]

Central Highlands Regional Council suggested that the government cost of borrowing should be applied to government entities.[96] We consider that proposal is not consistent with the principle of competitive neutrality, which seeks to ensure that government businesses do not receive competitive advantages over their private sector competitors by virtue of their government ownership. An important way such an advantage is neutralised is by the government-owned business paying a cost of debt that is commensurate with the cost of debt for a private sector firm with the same credit rating.[97]

More generally, we consider the cost of capital for an efficient firm depends on the riskiness of its business activity, not on whether it is owned privately or by the government. Regulated entities should be compensated for the risk they bear in providing the service. As such, we set the rate of return based on an efficient benchmark firm rather than on actual costs, to incentivise efficient decision-making.

In recent reviews, we calculated the DRP for the regulated entity by taking an average premia derived from RBA and Bloomberg corporate bond yield data. We note that at present both the RBA and Bloomberg rely on the same primary data source—Bloomberg Valuation Service (BVAL) bond pricing data produced by Bloomberg. However, they apply different criteria for including or excluding a particular bond from their indices and apply different methods to combine individual

[91] Urban Utilities, sub. 10, p. 4; Redland City Council, sub. 12, p. 4; QRC, sub. 20, p. 2.
[92] QTC, sub. 9, p. 7.
[93] QTC, sub. 18, p. 1.
[94] GAWB, sub. 22, p. 19.
[95] Aurizon Network, sub. 21, pp. 17–18.
[96] Central Highlands Regional Council, sub. 16, p. 16.
[97] Specifically, these government-owned businesses pay a debt guarantee fee that is based on their standalone credit rating vis-à-vis their actual cost of funds.

bonds to produce their indices (particularly bond weightings). There is no evidence to suggest that one approach will add value or yield a more accurate estimate, relative to the other.

Our preference is to solely reference RBA data series for estimating the cost of debt in the future. The RBA is an independent and reputable provider of data series and uses transparent and robust methodologies to develop its data series. Further, the RBA's data series are readily available, unlike those prepared by the other third parties, which are currently available only with a paid subscription to these services. Adopting these sources would make it more expensive for stakeholders to replicate our method.

5.5.2 Credit rating

We consider the applicable credit rating benchmark for each entity that is subject to our regulatory regime should be determined on a case-by-case basis at each specific price review.

A credit rating is an assessment of the creditworthiness of a borrower. It reflects the relative risk involved in lending to the rated firm, the firm's ability to repay the debt and an implicit forecast of default risk. Credit ratings commonly take the form of a letter rating (AAA, A, BBB, etc.). A higher credit rating (for example, AAA) indicates a borrower is less likely to default (that is, not be able to repay the amount borrowed), and it generally corresponds to a lower DRP. A lower credit rating (for example, C) indicates a borrower is more likely to default, and it generally corresponds to a higher DRP.

The benchmark credit rating is an input into deriving the cost of debt benchmark. As with all other WACC parameters, the credit rating of a benchmark efficient firm is not directly observable and must be estimated. Once the credit rating is chosen, the cost of debt can then be calculated using debt yield data available from third-party data providers for the benchmark credit rating.

Most Australian regulators assume a credit rating of either BBB or BBB+ for the entities they regulate (Table 5).

Table 5 Benchmark credit ratings used by regulators

Regulator	*Credit rating*
AER	BBB+
ESC	BBB
IPART	BBB
ESCOSA	BBB
ERA (electricity)	BBB
OTTER	BBB
ICRC	BBB

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

Urban Utilities said that most regulated entities are rated in the BBB credit rating band, and as such, the assumed credit rating for WACC purposes should remain in the BBB credit rating band. Urban Utilities also suggested that data for the BBB credit rating band is more balanced when compared to the A rating band, which is heavily weighted to the A– end. Therefore, using the A

rating band may distort the DRP applied to A rated entities (that is, a higher DRP could be applied).[98]

Central Highlands Regional Council suggested a high credit rating would be expected for government-owned entities.[99]

Dalrymple Bay Infrastructure (DBI) commented on the need to investigate ESG[100] considerations when determining the cost of capital for a benchmark efficient firm—including for its credit rating and cost of debt.[101] Aurizon Network also supported the need to consider ESG-related impacts in the future:

> [F]uture determinations or reviews of businesses regulated by the QCA under Part 5 will need to consider a broader range of impacts associated with Environmental, Social and Corporate Governance implications for financial markets. These potential impacts are highly uncertain and may not be foreseeable now but could impact on the cost and availability of finance and increase the transaction costs of obtaining that finance in the future.[102]

We consider the potential impact of ESG-related considerations on the rate of return are typically best accounted for within our proposed WACC assessment approach, namely in the top-down assessment of the overall WACC (see section 3.4.2). At this time, we do not propose to adjust the benchmark credit rating for a regulated entity to address ESG-related risks.

We considered whether to adopt a single benchmark credit rating for all regulated entities, or a different rating for each entity. To adopt a single benchmark credit rating, we would need to be fully confident that the entities subject to our regulatory regime share a similar degree of overall risk. However, we consider that the relevant risks that ports, rail and water service providers face under the Queensland regime may not be sufficiently similar for this purpose. For example, some industries operate in more stable markets than others, and therefore the risks of investing in those industries could be lower both for debt and equity investors. As such, using a single benchmark credit rating could be problematic. We therefore consider it appropriate to assess the applicable credit rating benchmark for each entity on a case-by-case basis.

Selecting a credit rating for a regulated entity can involve assessing several factors. Previously, we have assessed factors such as business risk and financial risk[103], the regulatory gearing, regulatory precedent and the credit rating of comparator firms. We have also considered credit metrics to test whether the entity is likely to remain financeable over the regulatory period, given the credit rating and the forecast regulatory cash flows.

We consider that the gearing for a regulated infrastructure firm should be fairly stable over time (Chapter 4). Regulated entities with established risk profiles that do not change much over time are also likely to be able to sustain a similar proportion of debt over time. Once established, the credit rating and gearing should only be adjusted after thorough testing of the implications for investors, customers and the financial sustainability of the firm. We propose to assess the credit rating and gearing benchmarks for each entity on a case-by-case basis at the time of their reviews. For future reviews, we consider the current regulatory credit rating provides an appropriate

[98] Urban Utilities, sub. 10, p. 3.
[99] Central Highlands Regional Council, sub. 16, p. 14.
[100] ESG stands for environmental, social and corporate governance.
[101] DBI, sub. 3, p. 19.
[102] Aurizon Network, sub. 21, p. 3.
[103] Business risk relates to an entity's earnings volatility and its ability to generate sufficient revenue to cover its operational expenses. Such risk can be assessed by examining several factors. Financial risk relates to an entity's ability to manage its gearing and debt-related obligations, such as interest payments, and it can be assessed by testing credit metrics.

starting point. We would require persuasive evidence to justify moving away from this benchmark.

GAWB supported the QCA determining the applicable credit rating benchmark on a case-by-case basis at each price review and strongly agreed that the credit rating and gearing should only be adjusted after thorough testing of the implications for investors, customers and the financial sustainability of the regulated entity.[104]

We note that a BBB credit rating is a well-established benchmark for Australian regulated water entities (Table 6). We also have accepted the use of a BBB benchmark credit rating in recent investigations into GAWB and rural irrigation prices.[105]

Table 6 Regulated water entities—credit ratings used for regulatory purposes

Regulator	*Credit rating*
ICRC	BBB
IPART	BBB
ESC	BBB
ESCOSA	BBB

Sources: ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018; IPART, Review of our WACC method, final report, February 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; ESCOSA, SA Water Regulatory Determination, final determination, June 2020.

5.5.3 Term of debt

We consider that the term of debt should be 10 years, which is in step with the views adopted by other Australian regulators (Table 7).

Table 7 Cost of debt term used by other regulators

Regulator	*Cost of debt term*
AER	10 years
ESC	10 years
IPART	10 years
ESCOSA	10 years
ERA (electricity)	5 years (risk-free rate), 10 years (DRP)
OTTER	10 years
ICRC	10 years

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

[104] GAWB, sub. 22, p. 19.

[105] QCA, *Gladstone Area Water Board price monitoring 2020–25 Part A: Overview*, final report, May 2020, p. 93; QCA, *Rural irrigation price review 2020–24 Part A: Overview*, final report, January 2020, p. 94.

The DBCT User Group said the term of debt should match the regulatory period. It considered this approach would:

> preserve the QCA's NPV = 0 principle and minimise the likelihood of overestimating the cost of debt from a higher term to maturity[106]

Counter to this, DBI and Urban Utilities stated the trailing average cost of debt should be estimated by reference to yields on 10-year debt, as providers of infrastructure services using long-lived assets typically issue long-term debt.[107]

We do not consider that the NPV=0 principle is determinative of allowable revenues. If it is relevant at all, its only utility is to determine whether revenues recover efficient costs. In relation to access matters under part 5 of the QCA Act, we are required by s. 168A(a) of the QCA Act to ensure expected revenues are at least enough to meet efficient costs but also to have regard to a range of other factors (for example, those set out in s. 120), the proper consideration of which may, in any particular case, lead to a situation of NPV>0.

We consider calculating a 10-year cost of debt is consistent with the efficient debt financing practices of regulated infrastructure entities with long-lived assets. Issuing debt for longer terms, such as 10 years, can help manage refinancing risk. Calculating a 10-year cost of debt is also widely accepted and applied by Australian regulators, except for ERA in its energy decisions.

5.5.4 Bond yield extrapolation

The RBA determines its 10-year bond yields by aggregating relevant bonds with a residual maturity close to the target 10-year tenor, but the aggregated tenor of its 10-year bonds has tended to be marginally less than 10 years.[108] Therefore, if we use the RBA's raw data series without adjustment, we would likely underestimate the benchmark debt yield for 10 years. For this reason, we are maintaining our approach of linearly extrapolating RBA 10-year bond yields to 10 years.

QTC supported our approach of linearly extrapolating RBA 10-year bond yields:

> [L]inear extrapolation of the RBA's yield estimates for the 7- and 10-year effective tenors should be used to determine the estimate for an exact 10-year tenor.[109]

5.6 Trailing average debt management strategy

We consider it appropriate to apply the following benchmark trailing average approach to determine regulatory cost of debt:

- The trailing average should be applied to the entire cost of debt (section 5.6.1).
- The term of the trailing average should be 10 years, with annual debt tranche refinancing (section 5.6.2).
- Entities should have flexibility to nominate an averaging period of a preferred length and timing. In the event an entity does not nominate an averaging period, we would apply a default averaging period (section 5.6.3).

[106] DBCT User Group, sub. 8, p. 18.
[107] DBI, sub. 3, p. 16; Urban Utilities, sub. 10, p. 3.
[108] For further information about how bonds are chosen as part of the RBA's estimates, see I Arsov et al., 'New Measures of Australian Corporate Credit Spreads', *RBA Bulletin*, December quarter, 2013.
[109] QTC, sub. 18, p. 1.

- The trailing average must be unweighted (simple) (section 5.6.4).
- The timing of price adjustments to reflect annual updates to the cost of debt should be determined on a case-by-case basis (section 5.6.5).
- In accordance with a forward-looking regulatory approach, transition arrangements are not required to implement the benchmark trailing average debt management strategy, except in exceptional circumstances (section 5.6.6).

The exact mathematical formula of the trailing average approach depends on the assumptions made regarding several parameters, including:

- the trailing average term (for example, 10 years)
- the frequency of debt tranche refinancing within the trailing average (for example, yearly)
- proportions attributed to debt tranche refinancing within the trailing average (that is, unweighted (simple) average or weighted average).

For instance, if the benchmark efficient firm issues 10-year fixed-rate corporate bonds in parcels of equal size uniformly once a year, the resulting cost of debt estimate is a simple average of the cost of debt over the 10-year period immediately before the start of the next regulatory year.

We have considered the various parameters pertaining to the trailing average approach. In reaching our views on these parameters, we have considered the views of stakeholders and where possible sought to adopt an overall approach that is simple and transparent and reflects regulatory best practice.

5.6.1 Scope of the trailing average

We consider the trailing average approach should be applied to the entire cost of debt.

This view is largely in step with the views of other Australian regulators (Table 8).

Table 8 Other regulators' application of the trailing average approach

Regulator	*Application of the trailing average approach*
AER	Entire cost of debt
ESC	Entire cost of debt
IPART	Entire cost of debt
ESCOSA	Entire cost of debt
ERA (electricity)	DRP only
OTTER	Entire cost of debt
ICRC	Entire cost of debt

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

The cost of debt consists of two components—a base risk-free rate and a DRP. We investigated whether to apply the trailing average approach to the entire cost of debt or to the DRP only (that is, a hybrid approach).

QTC, DBI, Urban Utilities, Redland City Council and Central Highlands Regional Council supported applying the trailing average approach to the entire cost of debt.[110] They argued that a trailing average approach applied to the entire cost of debt is more reflective of the actual debt management approaches of firms operating in a competitive market and, therefore, more likely to represent efficient financing practices.

In contrast, the DBCT User Group supported a hybrid approach. Under a hybrid debt management approach, the regulated firm uses interest rate swaps at the beginning of each regulatory period to manage interest rate risk (that is, the risk-free rate reflects an on-the-day rate), whilst the DRP reflects a debt portfolio with staggered maturities (that is, the DRP reflects a trailing average).[111]

The DBCT User Group considered the hybrid approach provides an appropriate balance between conceptual purity, regulatory stability and internal consistency with the cost of equity, because:

- it provides a cost of debt that more closely aligns with benchmark debt management practices
- the commercial impact is only restricted to a change in the way the DRP is estimated
- the risk-free rate would be internally consistent with the cost of equity.[112]

We consider that the hybrid strategy it is an artefact of the regulatory process—in particular, it is a product of a regulatory reset in combination with an on-the-day cost of debt. Under these conditions, some firms implement the hybrid strategy in response to the periodic resetting of rates. As such, it is not a strategy adopted by unregulated firms in competitive markets, as these markets have no regulatory resets.

Alternatively, we consider that a trailing average applied to the entire cost of debt:

- minimises distortions associated with mismatches between the regulatory cost of debt allowance and the actual debt servicing costs of firms, as firms procure total debt, not components of it
- minimises refinancing transaction costs due to the natural hedge provided by staggered debt issuances
- avoids interest swap costs to realign the risk-free rate with the term of the regulatory period
- requires the estimation of fewer variables, as it can be estimated on a top-down basis—rather than as the sum of individually calculated risk-free rate and DRP components
- uses readily available datasets and avoids the need to estimate the interest swap rate (for the risk-free rate), for which data is less widely available than the bond data that are used when applying the trailing average approach to the entire cost of debt
- is consistent with regulatory practice in Australia.

We consider that the trailing average approach should be applied to the entire cost of debt. We consider this is more reflective of the actual debt management approaches of firms operating in a competitive market and is therefore more likely to represent efficient financing practices.

[110] QTC, sub. 9, p. 3; DBI, sub. 3, p. 16; Urban Utilities, sub. 10, p. 3; Redland City Council, sub. 12, p. 3; Central Highlands Regional Council, sub. 16, p. 12.
[111] The interest rate swap contracts convert the base rate of the 10-year cost of debt such that that the term matches the term of the regulatory period (e.g. five years).
[112] DBCT User Group, sub. 8, p. 18.

5.6.2 Trailing average term and frequency of debt tranche refinancing

We consider that the term of the trailing average should be 10 years and debt tranche refinancing should be annually.

This view is largely in step with the views adopted by other Australian regulators (Table 9).

Table 9 Trailing average term and frequency of debt tranche refinancing used by other regulators

Regulator	*Trailing average term*	*Debt tranche refinancing frequency*
AER	10 years	Annual
ESC	10 years	Annual
IPART	4 years (current cost of debt) and 10 years (historical cost of debt)	Annual
ESCOSA	10 years	Annual
ERA (elect)	10 years (DRP)	Annual
OTTER	Calculates an average of the last nine, eight, seven, six, five, four, three, two, one year/s.	Regulatory period
ICRC	10 years	Annual

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

QTC, DBI, Urban Utilities and Redland City Council all supported a trailing average with a 10-year term. QTC supported annual refinancing. Urban Utilities suggested the frequency of the refinancing could be annually at a minimum, with the option of more frequent refinancing (maximum quarterly) to assist in reducing repricing and refinancing risk.[113]

While quarterly updates could be an option, we consider that annual updates strike a better balance between maintaining a current cost of debt and reducing administrative complexity. Most regulators also prefer annual updates.

We consider that the term of the trailing average should match the term of our chosen cost of debt data source—that is, 10 years—and the frequency of debt tranche refinancing should be yearly.

5.6.3 Averaging period for determining debt tranche rates

We consider it appropriate to allow entities flexibility to nominate an averaging period of a chosen length and timing. If no nomination is made, a default averaging period would apply.

An averaging period is required to estimate the cost of debt rate for each tranche within the trailing average. We consider it appropriate to implement a 10-year trailing average with annual refinancing.

Regulatory precedent is varied in relation to the length of the averaging period applied. For instance, the AER allows each regulated entity to nominate in advance its own averaging period

[113] QTC, sub. 9, p. 4; DBI, sub. 3, p. 16; Urban Utilities, sub. 10, p. 3; Redland City Council, sub. 12, p. 3.

to determine the cost of debt. The AER stated this approach allows flexibility in terms of recognising different entities may tap into bond markets at different times during the year. However, the ESC, IPART, ESCOSA and ERA stipulate the averaging periods to be adopted (see Appendix B). This approach prevents similar entities having different cost of debt results for regulatory purposes.

QTC indicated that there are several options for performing annual refinancing. They include refinancing 2.5 per cent of the debt balance during 20-day windows on a quarterly basis. Alternatively, 10 per cent of the debt balance could be refinanced during a 20- to 40-day window annually.[114] QTC suggested that there should be no requirement for the annual averaging periods to occur at the same time in each regulatory year.[115]

Urban Utilities recommended that the averaging period should be the whole year and conclude before the start of the relevant price setting year and remain consistent for as long as the trailing average method is utilised. Urban Utilities also suggested the averaging period should conclude within six months of the regulatory period to ensure a connection between the observations and pricing is maintained.[116] Redland City Council also preferred an averaging period over a whole year as close as reasonably practical to the beginning of the next pricing setting period. It stated this approach reduces interest rate risk arising from a shorter period and smooths out possible anomalies.[117]

Our preference is to give entities flexibility to nominate an averaging period of a chosen length and timing, which allows them to finance their debt according to their business requirements at any stage throughout the year (that is, 12 months) and keeps refinancing risk to a minimum. However, we consider the averaging period nominated by the entity should be 'locked in' for each year within the trailing average at the start of a regulatory period. We also consider the nomination period should be restricted to between 1 April and 31 March in advance of the next regulatory year. This would allow entities a minimum of three months to annually update their cost of debt, and hence prices, before the applicable regulatory year.

In the event an entity does not nominate an averaging period, we consider a default averaging period, namely the average of 12-monthly observations from April to March in advance of the next regulatory year, is appropriate. This approach removes the administrative complexity of nominating averaging periods and is simple to implement.

5.6.4 Debt tranche weightings

We consider it appropriate to adopt an unweighted (simple) trailing average to determine the benchmark cost of debt.

This view is in step with the approach adopted by other Australian regulators (Table 10).

[114] QTC, sub. 9, p. 4.
[115] QTC, sub. 9, p. 7.
[116] Urban Utilities, sub. 10, p. 4.
[117] Redland City Council, sub. 12, p. 4.

Table 10 Debt tranche weightings used by other regulators

Regulator	*Debt tranche weighting*
AER	Unweighted (simple)
ESC	Unweighted (simple)
IPART	Unweighted (simple)
ESCOSA	Unweighted (simple)
ERA (electricity)	Unweighted (simple)
OTTER	Unweighted (simple)
ICRC	Unweighted (simple)

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

Either an unweighted (simple) or a weighted trailing average can be adopted. An unweighted (simple) trailing average approach determines the benchmark cost of debt by simply averaging the historical tranche rates within the trailing average. A weighted trailing average approach determines the benchmark cost of debt by applying weights to historical tranche rates within the trailing average. For example, the weights could be based on actual debt issuance data. So, greater weights would be applied to years when more debt is issued.

An advantage of the unweighted (simple) trailing average approach is its simplicity. Its main drawback arises when the proportion of debt portfolio refinanced each year materially varies over time. Not applying weights in these instances leads to a mismatch between the regulatory cost of debt allowance and the cost of debt incurred, which potentially could lead to investment distortions.

Advantages of the weighted trailing average approach are that it minimises the potential mismatch between the regulatory cost of debt allowance and incurred debt costs; therefore, it provides efficient investment signals, as borrowings for new capital expenditure are compensated at the prevailing rate.

Several stakeholders supported an unweighted (simple) trailing average approach, due to the complexity involved in implementing a weighted approach.

> A weighted trailing average involves additional calculations compared to a simple trailing average. Furthermore, the difference between the cost of debt allowances should be small if the RAB increases are relatively small. Although a weighted trailing average is technically more correct, QTC considers a simple trailing average to be far superior to the current on-the-day approach.[118]
>
> [I]n our opinion the QCA should adopt an equal-weighted trailing average unless there is compelling evidence that a weighting mechanism can be designed to elicit an incremental improvement in efficiency, without introducing disproportionate complexity to the cost of debt calculation.[119]

[118] QTC, sub. 9, p. 4.
[119] DBI, sub. 3, p. 19.

> We believe that a simple 'hybrid' trailing average, where equal weights are applied to each debt tranche is better because it is administratively simpler and less costly, without too much of a departure from conceptual purity.[120]
>
> Each year should be given equal weight to allow for a smoothed outcome to WACC changes which would translate to smooth pricing changes (if required). Additionally, this would remove complexity of applying the trailing average.[121]
>
> Each year should be given equal weight to allow for a smoothed outcome to WACC changes which would translate to smooth pricing changes (if required).[122]

Central Highlands Regional Council suggested the weighting approach that provides the greater stability and certainty in water pricing may be the most appropriate.[123]

In contrast, Aurizon Network submitted that an unweighted (simple) trailing average approach is unlikely to be suitable for regulated businesses with large non-uniform capital expenditure programs.[124]

While a weighted trailing average is designed to account for businesses raising debt in a non-uniform manner, we find it unlikely that firms will raise debt in a manner that closely matches their capital expenditure program. The fixed costs associated with the issuance of significant debt tranches means that it is not viable for firms to issue a new tranche of debt to match the annual capital expenditure for a particular year.

Furthermore, we consider that relative to an unweighted (simple) trailing average approach, a weighted trailing average approach:

- is substantially more complex to implement and may lack transparency
- is sensitive to errors in estimating actual debt proportions
- represents a departure from the benchmarking approach, as the weights used in a trailing average would be different for each individual regulated entity
- would likely need to be implemented via a retrospective (NPV-neutral) true-up, since weights can only be computed after the parameters they are based on have been observed
- is not consistent with regulatory practice in Australia.

Based on the reasons outlined above, our preference is to adopt an unweighted (simple) trailing average to determine the benchmark cost of debt.

5.6.5 Timing of updates to allowable revenue

We consider it appropriate to update the regulatory cost of debt annually and decide the timing of the subsequent price adjustments on a case-by-case basis.

A function of a trailing average debt management strategy is that it regularly updates—the oldest tranche of debt will mature and be replaced by a new tranche of debt. Therefore, the cost of debt will update in accordance with debt tranche refinancing (that is, annually) by an amount equal to the difference between the interest rate of the old and the new tranche of debt, divided by the total number of tranches within the trailing average portfolio (that is, 10). Therefore, when implementing the trailing average approach, a consequential consideration is whether to pass

[120] DBCT User Group, sub. 8, p. 19.
[121] Urban Utilities, sub. 10, p. 3.
[122] Redland City Council, sub. 12, p. 3.
[123] Central Highlands Regional Council, sub. 16, p. 12.
[124] Aurizon Network, sub. 21, pp. 14–15.

through the impact of the updated cost of debt via annual price updates or via a true-up at the beginning of the next regulatory period.

Regulatory precedent is mixed in relation to the timing of updates to allowable revenue. A variety of approaches are adopted, including annual updates, end-of-period true-ups, and no updates (see Appendix B).

A key rationale for updating revenues annually is to provide consistency with an efficient debt management strategy for a benchmark firm. For example, if the efficient debt management strategy reflects a portfolio of debt with staggered maturity dates out to 10 years with annual refinancing at the prevailing 10-year debt yield, then to reflect this, the regulated cost of debt allowance (and hence revenue) should also change each year. Annual updates would minimise mismatches between the regulatory cost of debt allowance captured in allowable revenues and the actual cost of debt from a benchmark efficient firm during the regulatory period. This would reduce sustained periods of potential over- or under-compensation and potential investment distortions. QTC analysis found that when true-ups are not performed annually, there was potential for material over- or under-compensation across consecutive five-year regulatory periods and subsequently large step changes in revenues relative to annual updates of the trailing average.[125]

QTC, Unitywater, Sunwater and Urban Utilities supported updating allowable revenue annually when using a trailing average approach. QTC stated annual updates will accurately reflect the efficiently incurred cost of debt under the trailing average approach, although it also submitted that a business should have the option to apply other approaches on a net present value neutral basis. Unitywater said annual updates would minimise the difference between the efficiently incurred cost of debt for a benchmark firm and the cost of debt allowance. Sunwater said annual updates would contribute to reducing regulated entities' exposure to interest rates. Urban Utilities suggested annual updates would smooth any potential price shocks, relative to updating allowable revenue at the beginning of each regulatory period.[126]

Central Highlands Regional Council suggested revenue updates across a regulatory period are more likely to avoid abrupt changes in water pricing.[127]

DBCT User Group supported a trailing average cost of debt approach that is 'trued up' at the end of regulatory periods. The DBCT User Group suggested a 'true-up' at the end of regulatory periods means there is less WACC and price volatility during regulatory periods, which in turn reduces regulatory risk.[128]

GAWB said that annual updates to its prices present a challenge within its current regulatory framework and would create some price uncertainty for its customers. GAWB highlighted that its prices are set at the start of each regulatory period and can contractually only be increased by the consumer price index (CPI) within the period. GAWB said that if prices are to be adjusted beyond these CPI changes during the regulatory period, it will add an additional layer of uncertainty for customers, as a revenue 'true-up' would need to occur at the start of each regulatory period. GAWB stated the approach the QCA adopts must provide regulated entities with the ability to implement alternative arrangements, provided they appropriately balance the entities' commercial obligations and the resultant pricing impacts for customers.[129] GAWB stated

[125] QTC, sub. 9, p. 5.
[126] QTC, sub. 18, p. 1; Unitywater, sub. 1, p. 1; Sunwater, sub. 6, p. 1; Urban Utilities, sub. 10, p. 3.
[127] Central Highlands Regional Council, sub. 16, p. 13.
[128] DBCT User Group, sub. 8, p. 19.
[129] GAWB, sub. 13, p. 2.

that its support for the trailing average is contingent on regulated businesses retaining the flexibility to manage the associated revenue true-up process as they see fit.[130]

We consider the preferred timing of revenue updates may be different for each firm, depending on its individual circumstances. For this reason, our view is not to prescribe a uniform rule on all regulated entities at this time. Instead, we prefer to assess whether to apply annual price adjustments, an end of period true-up or any other arrangements on a case-by-case basis, as part of each individual review process. The assessment would consider the submissions from the regulated entity, its customers and other relevant stakeholders. This approach could be particularly useful in circumstances where light-handed price monitoring suggests a less prescriptive and more flexible approach.

If allowed revenue for regulated entities is updated via an end-of-period true-up at the next regulatory reset, we would ensure that it is equivalent in present value terms to an outcome from annual updating. We propose to apply the regulatory WACC as the discount rate for present value calculations, as it reflects the opportunity cost to the benchmark firm of either receiving funds or paying funds from the 'true-up'.

5.6.6 Transition arrangements

We consider that transition arrangements are not required to implement a benchmark trailing average debt management strategy except in exceptional circumstances. In particular, in relation to price monitoring and review activities, we consider that the nature of the task does not justify the additional costs to ourselves and the regulated entity associated with undertaking the relevant transitional calculations.

Transition arrangements in this context refer to implementing measures to transition a regulated entity from a benchmark on-the-day approach to a benchmark trailing average approach when determining regulatory cost of debt allowances.[131] An important consideration for implementing a trailing average cost of debt is whether there should be a transition over time to the trailing average approach, or whether there should be an immediate implementation.

In its 2013 rate of return guideline, the AER decided that there should be a transition to a trailing average, whereas other regulators such as ESCOSA and ESC have implemented a trailing average cost of debt immediately.[132] Transition arrangements have been a significant issue for Australian regulators in their respective assessments to implement a trailing average approach.

DBI suggested transition arrangements are not required, as going forward, each of the methodologies contemplated by the QCA will be equivalent in present value terms over an extended horizon. DBI also stated that the majority of regulatory authorities in Australasia adopted a trailing average without any form of transition.[133]

Sunwater submitted that the QCA's proposal to move to a 10-year trailing average, without any transition, will improve the disparity between its actual cost of debt and the allowable cost of debt reflecting a benchmark efficient entity.[134]

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[130] GAWB, sub. 22, p. 5.

[131] Firms implement debt management strategies suitable to their individual needs (real world). In a regulatory context, estimating the cost of debt is based on the debt policy of a benchmark efficient firm.

[132] See AER, *Rate of Return Guideline*, explanatory statement, December 2013, p. 98; ESCOSA, *SA Water Regulatory Determination*, final determination, June 2020, p. 24; ESC, *Melbourne Water Price Review 2016*, final decision, June 2016, p. 50.

[133] DBI, sub. 3, p. 16.

[134] Sunwater, sub. 19, p. 2.

Unitywater, QTC and Urban Utilities stated that when determining cost of debt allowances, the regulator should account for those entities that have adopted a trailing average debt management strategy in recent years.

> Unitywater supports allowance to be made to reflect debt management strategies adopted by entities to align with a trailing average approach as supported several years ago. As such, the correct starting value of the benchmark debt yields in the trailing average calculation should be consistent with the timing of these decisions. It is not appropriate to use the prevailing benchmark debt yield as the starting value of the trailing average cost of debt for these businesses.[135]

> QTC is aware that some businesses adopted debt management strategies aligned with the trailing average approach several years ago. The starting value of the benchmark debt yields in the trailing average should be consistent with the timing of these decisions.[136]

> An entity that currently manages refinancing and pricing risks through annual refinancing of a portion of its debt should be able to replicate its debt management strategy into the WACC calculation.[137]

Urban Utilities and GAWB suggested that where entities have adopted a debt management strategy that reflects elements of the on-the-day approach in practice, transition arrangements may be required:

> [A]n entity that has managed refinancing in-line with regulatory price setting should be able to transition into the trailing average.[138]

> The need for a transitional period should be assessed by the QCA on a case-by-case basis in consultation with the regulated business. As additional time may be required to allow the regulated business to adjust its current financing arrangements.[139]

Aurizon Network stated it does not support the introduction of a trailing average cost of debt approach without transition for businesses regulated under part 5 that have applied a prevailing on-the-day cost of debt management strategy. Aurizon Network stated the QCA has not provided evidence which demonstrates how a firm would transition from a prevailing on-the-day approach to a trailing average approach without transition, and not be exposed to the prospect of a material windfall gain or loss.[140]

We have not provided analysis of the potential impact associated with implementing a trailing average cost of debt without transition arrangements. Whilst it is possible to determine the impact now (given today's debt rates), it is not possible to meaningfully determine any potential impact in the future. Any type of impact analysis is dependent on the path of future interest rates, which is highly uncertain over a long period.

Having identified the trailing average approach as our preferred forward-looking benchmark debt management strategy, we do not consider transition arrangements are required under normal circumstances. We do not support implementing transition measures to address historical impacts under the on-the-day approach in previous years. We consider the regulatory approach should be forward-looking, with the allowed rate of return being commensurate with the efficient financing costs of a benchmark efficient firm that implemented a trailing average approach.

[135] Unitywater, sub. 1, p. 2.
[136] QTC, sub. 9, p. 5.
[137] Urban Utilities, sub. 10, p. 3.
[138] Urban Utilities, sub. 10, p. 3.
[139] GAWB, sub. 13, p. 2.
[140] Aurizon Network, sub. 21, pp. 16–17.

However, we consider the adoption of transition arrangements may be considered on a case-by-case basis in limited circumstances, for example where applying a trailing average debt management strategy without such arrangements creates material and adverse impacts on a firm that are not related to its own inefficiency. QTC broadly supported this view:

> [N]o transition is a reasonable default position, although this should be considered on a case-by-case basis depending on how a business may have managed its debt under the previous on-the-day approach.[141]

Aurizon Network submitted that access providers and their customers should not be precluded or prevented from agreeing to methodologies or inputs which depart from the findings and guidance provided by the QCA.[142] We acknowledge that under certain circumstances there are benefits to negotiated outcomes. We consider that when negotiated outcomes are legally permitted and do not create anti-competitive effects, they should not be interfered with.

CEG raised the following points in relation to the QCA adopting a benchmark trailing average debt management strategy without transition arrangements:

- The optimal regulatory strategy in response to a benchmark on-the-day debt management strategy is to adopt a hybrid debt management approach.
- If the QCA adopts a benchmark trailing average debt management strategy, without transition, Aurizon Network will be exposed to risks (associated with regulatory mismatch[143]) at its next regulatory reset (2028) given it currently adopts a hybrid debt management approach.
- The financial risk faced by Aurizon Network is heightened relative to the other businesses regulated by the QCA because its next regulatory reset is so distant from now.
- The QCA could materially reduce the risk (and associated costs) faced by Aurizon Network by:
  - simply adopting the hybrid debt management strategy as the benchmark used to set compensation for the cost of debt; or
  - putting in place a replicable transition from the current efficient debt management strategy (the hybrid) to the trailing average.[144]

We acknowledge the uncertainty faced by Aurizon Network in relation to our adopted benchmark trailing average debt management strategy. Given Aurizon Network's next access arrangement review is so distant from now (2028), it is hard to gauge the potential impacts associated with transitioning from a benchmark on-the-day debt management strategy to a benchmark trailing average debt management strategy.

As such, we reaffirm our position of considering flexible arrangements in limited circumstances where applying a trailing average debt management strategy without such arrangements creates material and adverse impacts on a firm that are not related to its own inefficiency. For example, at its next regulatory review, Aurizon Network could negotiate with its customers on suitable transition arrangements to unwind elements of its hybrid debt management strategy to match

[141] QTC, sub. 18, p. 1.
[142] Aurizon Network, sub. 21, p. 3.
[143] Regulatory mismatch risk is the potential for a mismatch between the regulated firm's actual debt costs and the compensation for debt costs given by the regulator.
[144] CEG, sub. 21, pp. 1–2.

the benchmark trailing average debt management strategy. We would consider the adoption of such arrangements on a case-by-case basis.

5.7 Debt-raising costs

We consider it appropriate to allow debt raising costs of 10 basis points within the cost of debt for the trailing average approach. We also will consider proposals by individual businesses on a case-by-case basis, should they be able to demonstrate that they face efficient debt-raising costs that are higher than this amount.

This figure is on the low side relative to those estimates adopted by other Australian regulators (Table 11).

Table 11 Debt-raising costs used for regulatory purposes

Regulator	*Debt-raising costs*
AER	Allowance included in operating costs—based on efficient debt-raising costs for benchmark firm
ESC	15 basis points added to cost of debt
IPART	12.5 basis points added to cost of debt
ESCOSA	12.5 basis points added to cost of debt
ERA (electricity)	10 basis points added to cost of debt
OTTER	10 basis points added to cost of debt
ICRC	12.5 basis points added to cost of debt

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

Debt-raising costs encompass the administrative costs associated with raising debt. Previously, we have provided entities with an allowance for the transaction costs associated with raising debt, as part of the cost of debt in the WACC. Our benchmark assumption has been that the regulated entity is fully debt-financed by corporate bonds with a term of 10 years. This assumption greatly simplifies the analysis of the cost of debt, and of debt-raising transaction costs. In recent decisions, we have provided an allowance of 10.8 basis points per annum in the cost of debt for regulated entities. This allowance comprised estimates of arrangement costs and other debt-raising costs.[145]

We consider it is reasonable that debt issuance costs could vary between different efficient debt management strategies, because different debt management strategies involve different types of debt and frequency of refinancing and, therefore, are likely to incur different levels of transaction costs. As such, there may be different, albeit efficient, debt-raising costs, depending on the approach taken (that is, on-the-day compared to trailing average). This view is supported by analysis undertaken by PwC (2013), which estimated direct transaction costs of 10.8 basis

[145] Arrangement fees are earned by investment banks to compensate for their management of the capital raising process. Other debt-raising cost categories include legal fees, credit rating fees, registry costs, agent's out-of-pocket expenses, and cross-currency hedging (PwC, *A cost of debt estimation methodology for businesses regulated by the Queensland Competition Authority*, June 2013, pp. 73–86).

points per annum based on one notional debt issue of $2,500 million, and 9.9 basis points per annum based on 10 notional debt issues of $250 million.[146],[147] Our preliminary view was to add debt-raising costs of 9.9 basis points per annum to the benchmark trailing average cost of debt.

Sunwater stated that QTC currently charges it an administration rate of 14.0 basis points per annum, which is added to the interest charge on the cost of debt. Sunwater therefore recommended that we revisit our preliminary view to allow debt-raising costs of 9.9 basis points.[148]

We do not consider that QTC's administration rate reflects an appropriate benchmark for estimating debt-raising costs for regulatory purposes. This is because the administration rate might include charges for services for which the benchmark efficient firm might not have to pay.

Aurizon Network stated that firms in ESG-exposed sectors are likely to be subject to greater transaction costs associated with raising debt than considered or allowed for in prior research.[149] We consider the impact of ESG considerations on the rate of return are best accounted for within our proposed WACC assessment approach, in particular the top-down assessment of an overall WACC (see section 3.4.2) as opposed to adjusting benchmark debt-raising costs for a regulated entity.

GAWB recommended that the QCA update the estimate of debt-raising costs based on a new survey.[150] We note that the PwC 2013 estimate of debt-raising costs is relatively contemporary, compared to the ACCC 2002 estimate adopted by other Australian regulators. We are also reluctant to engage a consultant to update the estimate of the debt-raising cost allowance as the resulting impact is likely to be insignificant, given the small size of the allowance.

Given the information in the public domain we consider it reasonable to round our estimate of debt raising costs to 10 basis points. We also will consider proposals by individual businesses on a case-by-case basis, should they be able to demonstrate that they face efficient debt-raising costs that are higher than this amount.

5.8 Linkages with other aspects of the regulatory framework

The regulatory cost of debt is linked to the regulatory framework through the following avenues:

- Gearing—the benchmark cost of debt is informed by a benchmark credit rating, which is subsequently related to gearing. A firm with a high credit rating (for example AAA) is likely to have lower gearing relative to a firm with a low credit rating (for example C), all else being equal.
- Taxation—the cost of debt affects interest expenses, which is subsequently an input into the calculation of regulated entities' benchmark tax allowance. Interest expenses are calculated by multiplying the debt portion of a firm's asset base by the cost of debt rate. Interest expenses serve as a deduction within the tax allowance calculation; therefore, a higher cost of debt equates to a higher interest expense deduction, and a lower tax allowance, all else being equal.

[146] PwC, *Energy Networks Association: Debt financing costs*, June 2013, p. 19.
[147] The most material direct transaction cost was the arrangement fee, estimated at 8.5 basis points for each option (that is, arrangement fees increased approximately directly in proportion to term of issuance; therefore, it is the same in basis point terms irrespective of size of issuance).
[148] Sunwater, sub. 19, p. 2.
[149] Aurizon Network, sub. 21, p. 18.
[150] GAWB, sub. 22, p. 19.

- Return on assets—the cost of debt affects the overall WACC, which is in turn an input into the calculation of regulated entities' return on capital building block component. The return on capital is calculated by multiplying a firm's total asset base by the WACC. Therefore, a higher cost of debt equates to a higher WACC and higher return on capital, all else being equal.

6 METHODOLOGY TO ESTIMATE THE COST OF EQUITY

The cost of equity is the rate of return required by shareholders for investing in a firm. The return to shareholders is a cost to the firm. We will estimate the cost of equity using the Sharpe-Lintner Capital Asset Pricing Model *which requires estimation methodologies for the market risk premium, beta and the risk-free rate.*

6.1 Key points

- Determining a cost of equity requires that we determine parameter estimates for the CAPM. In this rate of return review, we outline our methodology to estimate each of these parameters in the future.
- On matters related to the cost of equity, we will:
  - continue the use of the Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM) as our foundation model (section 6.2), noting that estimating a reasonable cost of equity does not require that each parameter is estimated using data from consistent time periods (section 6.3)
  - use the Ibbotson method to estimate the market risk premium (MRP). It will give a reasonable estimate in most market conditions (section 6.4)
  - estimate beta having regard to the relative risk of domestic and international firms operating in a variety of relevant industries; previous regulatory decisions; and the regulatory decisions of other potentially relevant entities. In estimating the beta for firms in a variety of industries, we will use weekly data over a 10-year estimation window (section 6.5)
  - calculate the risk-free rate using the yields on Australian Government nominal bonds of a 10-year maturity and use an averaging period of 20 to 60 days (section 6.6).
- There may be market conditions that result in our bottom-up estimate of the overall cost of equity being unreasonable. In such circumstances, we would consider making an adjustment to the overall cost of equity, rather than to individual parameters (section 3.4).

6.2 Foundation model—Sharpe-Lintner Capital Asset Pricing Model

To estimate the cost of equity, we have historically used the SL-CAPM as our foundation model. This model states that the expected rate of return on equity for an asset is determined by the way that the asset's returns vary relative to the returns of the market portfolio of risky assets (through the parameter, beta). The expected rate of return on equity is defined as the sum of the rate of return on a risk-free asset and the premium investors require to accept the risks associated with the asset's returns. It is expressed as follows:

$$r_e = r_f + \beta_e \times MRP$$

where:

r_e= (expected) rate of return on equity

r_f = risk-free rate

β_e = equity beta

MRP = market risk premium

Canegrowers submitted that the SL-CAPM model was flawed and inappropriate to use in setting the rate of return. Canegrowers said versions of the CAPM have two well-known limitations:

- model error—the model is a simplified representation of reality with limited explanatory power due to missing explanatory variables
- parameter estimation error—the model requires estimation of parameters for which there is either no data or limited data, requiring use of proxy parameters.[151]

While the SL-CAPM is not without limitations (for instance, it has limited empirical performance when predicting actual stock returns[152]), it is widely used by regulators and market practitioners, due to the way it conceptualises risk and translates it into an expected rate of return on equity. In addition, it is relatively straightforward to implement, as the required number of inputs are relatively small and amenable to estimation. We consider that the SL-CAPM is preferable to other available models at this time, and we will continue to use the SL-CAPM to determine the cost of equity in future reviews.

6.3 Consistency of cost of equity parameters

Seqwater and ARTC submitted that our approach to estimating the cost of equity involves the pairing of internally inconsistent parameters.[153] Specifically, they considered that the use of a current risk-free rate should be paired with a current estimate of the MRP and that a historical risk-free rate should be used with an historical MRP estimate. Furthermore, they argued that our use of internally inconsistent parameters leads to return on equity estimates that are too low in the current financial environment.

We consider the relevant cost of equity when determining the WACC is the expected return on equity that investors require for investing in a regulated entity on a forward-looking basis. To estimate this return on equity we employ the SL-CAPM, which requires us to estimate values for beta, the risk-free rate, and an MRP.

As the risk-free rate is observable, our best estimate for the forthcoming regulatory period has involved using current Australian Government bond yields. In contrast, as the MRP for the coming regulatory period is unobservable, our best estimate may have regard to both historical and forward-looking information. Historical information may be relevant to determining a forward-looking MRP if investors use historical returns data to shape their expectations of future returns. Consequently, we do not consider that using historical information to inform forward-looking estimates for some cost of equity parameters but not others results in an approach that uses internally inconsistent parameters. Rather, it is simply the consequence of some parameters being best estimated with current data, while others may be best estimated using historical data.

Within the CAPM framework, the MRP is the parameter that addresses any relationship between the risk-free rate and the return on equity. This matter has been considered in detail (amongst others) within the market risk premium section of the report (section 6.4).

[151] Canegrowers, sub. 17, pp. 10–11.
[152] For instance, Fama, EF and French, KR, 'The Capital Asset Pricing Model: Theory and Evidence', *Journal of Political Economy*, vol. 18, no. 3, 2004, pp. 25–46.
[153] Seqwater, sub. 7, p. 43; ARTC, sub. 14, pp. 3–4.

6.4 Market risk premium

6.4.1 Overview

The MRP is the additional return that an equity investor requires, to be compensated for the risk of investing in a fully diversified portfolio of risky assets, relative to purchasing a risk-free asset. As the MRP is not directly observable, it needs to be estimated, and there are different methods that can be used. Typically, these methods can be grouped into two broad categories—historical and forward-looking.

In recent reviews, we have estimated the MRP by using a three-step process. The first step produced estimates of the MRP from a variety of MRP estimation approaches. These estimation approaches included a mix of forward-looking approaches (Cornell dividend growth model and surveys) and those that use historical data (Ibbotson, Seigel, and Wright methods).[154] The second step calculated summary statistics (mean, median and weighted mean), based on applying weights to the estimates from the methods. The third step then applied judgement, using the summary statistics as a guide, to determine a final estimate.

We acknowledge that it might not have been entirely clear to stakeholders how we chose the weighting scheme and how we applied judgement when considering the summary statistics. Accordingly, we have reviewed not only our estimation methods, but also our general approach to estimating the MRP. In reconsidering our approach, we have emphasised providing a simpler and more transparent approach, noting that a more complex approach (for example, with multiple methods and weights) does not necessarily yield a more accurate estimate, relative to a simpler approach.[155] We are therefore moving away from a mechanical, complex weighting scheme of various methods and instead opting for a simpler estimation approach.

Having reviewed each of the MRP estimation methods from our previous approach, we consider that particular aspects of the Siegel, Wright and survey methods make these methods unsuitable for our purposes at present. Accordingly, we no longer will use them to estimate the MRP. We do consider that estimates from the dividend growth model remain relevant. However, given the limitations of these methods, we will use their estimates to provide directional guidance when considering the overall cost of equity (see below). We will not use the dividend growth model estimate or the Wright method for directly determining the MRP.

The Ibbotson method—which assumes that investors use historical excess returns data to inform their expectations of achievable future returns—provides a plausible indication of the risk premium an investor requires on average for investing in the market. Relative to the other methods that we have assessed, we prefer the Ibbotson method for determining a value for the MRP. As such, we will use the Ibbotson method as the basis for setting the MRP as part of our future reviews.

However, in some economic conditions—such as when there is heightened investor risk aversion, market volatility or abnormal interest rates—we recognise that our approach may not result in a reasonable estimate of the cost of equity parameters. In these instances, rather than adjusting individual parameters, we will instead adjust our overall cost of equity estimate as part of our top-down analysis (see section 3.4.2).

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[154] One could argue that both the surveys and the Wright method are hybrid approaches, as they contain elements that are both historical and forward-looking. We use the current classification for presentation purposes only.

[155] This is particularly relevant for the MRP given the dispersion of estimates produced by different estimation methodologies.

Key issues we identified during our review are:

- how we will incorporate historical data to determine an MRP value (section 6.4.2)
- alternative MRP estimation approaches (section 6.4.3)
- how we will arrive at a final value for the MRP (section 6.4.4).

6.4.2 The role of historical data in determining an MRP

In recent reviews, we attributed weight to the Ibbotson, Siegel and Wright methods (among others) to determine an MRP. Each of these methods calculates a value by having regard to some form of historical returns data. QTC, the DBCT User Group, Seqwater and Unitywater all agreed that methods using historical data should be given weight in determining an MRP; however, they had differing views on the weight that should be ascribed to each of these individual methods and the way the methods should be employed.[156]

Ibbotson and Wright methods and the implied relationship between the risk-free rate and MRP

Central to both the Ibbotson and the Wright methods is an implied relationship between the risk-free rate and the MRP (with a consequential effect on the total return on equity in each case). The Ibbotson method assumes that the average historical excess return over an appropriate historical period is a relevant estimate of the forward-looking MRP. For a long time series of historical returns, the resulting average will only change slowly over time. Accordingly, using this method to estimate the MRP generally results in the CAPM-based cost of equity varying one for one with movements in the risk-free rate.

Conversely, the Wright method assumes that the real return on equity required by investors does not change over time. Accordingly, when the risk-free rate decreases (increases), the MRP increases (decreases) by the same amount to maintain a stable real cost of equity over time. The implication of the Wright method is that there is an assumed perfectly negative correlation between the risk-free rate and the MRP.

The DBCT User Group supported using the Ibbotson method to determine the MRP, while QTC and Seqwater considered that both the Ibbotson and Wright methods should be used to determine the MRP.[157] Redland City Council and Urban Utilities considered that the MRP should increase when the risk-free rate falls. Similarly, Unitywater submitted that the cost of equity should be somewhat agnostic to the risk-free rate.[158]

QTC and GAWB did not support our proposed approach in the draft report to determine the MRP by exclusively giving weight to the Ibbotson method and no weight to the Wright method.[159]

QTC considered that the Wright method was a statistically and theoretically valid way of using historical data to make a direct estimate of the expected return on equity and as such should be given explicit and meaningful weight in our approach to estimating the return on equity.[160]

QTC considered that Australian data suggesting that the MRP has been more stable over time compared to the real return on equity was not a reasonable basis to place sole reliance on the Ibbotson method. QTC submitted that instability in the real Commonwealth Government Security

[156] QTC, sub. 9, p. 7; DBCT User Group, sub. 8, p. 24; Seqwater, sub. 7, p. 31.
[157] QTC, sub. 9, p. 7; DBCT User Group, sub. 8, p. 24; Seqwater, sub. 7, pp. 31–32.
[158] Redland City Council, sub. 12, p. 4; Urban Utilities, sub. 10, p. 5; Unitywater, sub. 1, p. 2.
[159] QTC, sub. 18, p. 2; GAWB, sub. 22, pp. 6–7.
[160] QTC, sub. 18, p. 3.

(CGS) yield results in unstable estimates of the return on equity when estimated with the Ibbotson method, which is inconsistent with stable observed historical return on equity data.[161]

Aurizon Network, GAWB and QTC all highlighted a recent report by Cambridge Economic Policy Associates (CEPA) commissioned by the AER that identified a negative relationship between the risk-free rate and the implied MRP using dividend growth models (DGM)[162] and earnings yield models.[163,164] QTC supplemented this analysis by regressing its own DGM estimates against the prevailing 10-year CGS yield at the time and similarly found a negative relationship using data from 2005 onwards.[165]

QTC also presented results from Damodaran's DGM estimates, which show that for the subperiod from 1961 to 2000 there was a positive relationship between the implied MRP derived from DGM and the risk-free rate. However, this relationship reversed and was negative from 2001 onwards. QTC submitted that a possible explanation for this change is the relationship between inflation and the output gap. QTC referred to a 2019 paper by Campbell, Pflueger and Viceira that identifies a structural break in 2001, whereby a negative inflation-output gap correlation was observed beforehand, and positive correlation after. Campbell, Pflueger and Viceira argue that because nominal bond returns are inversely related to inflation, bonds were risky assets prior to 2001 and were hedging assets afterwards.[166] To support this point, QTC provided analysis which shows that rolling 20-year CGS beta estimates were positive up until the early 2000s before turning negative.[167]

QTC considered that it was likely for the now negative correlation between the implied MRP and the risk-free rate to continue due to the continued likelihood of pro-cyclical inflation and anchoring of inflation expectations.

QTC presented a series of survey and independent expert reports that demonstrate the estimated return on equity over the last few years has not fallen one-for-one with changes in the risk-free rate. QTC also considered that the long-term decline in the inflation risk premium observed in nominal CGS yields is likely to lead to an understated estimate of the return on equity when using the Ibbotson method, and this bias should be considered when applying weights to MRP estimation methods.

QTC submitted that if we were to continue to rely on only historical data when determining the cost of equity, then we should use either an approach that:

- gives equal weight to the MRP estimates produced by the Ibbotson and Wright methods, paired with the prevailing 10-year CGS yield
- estimates the MRP with the Ibbotson method, paired with a risk-free rate that equals a weighted average of the prevailing 10-year CGS yield and the difference between the

[161] QTC, sub. 18, pp. 4–6.
[162] We consider DGM in more detail in section 6.4.3.
[163] QTC, sub. 18, pp. 4–6; Aurizon Network, sub. 21, pp.11–12; GAWB, sub. 22, pp. 8–9.
[164] While CEPA found a weak negative relationship using data from 1917 onwards, it found a stronger relationship when focusing on data after 1993.
[165] QTC, sub. 18, pp. 8–9.
[166] This is because the structural break in the inflation-output gap correlation means that prior to 2001 nominal bond returns were positively correlated with output and after 2001 nominal bond returns were negatively correlated with output.
[167] QTC, sub. 18, pp. 10–13.

estimate of the market return from the Wright method and the MRP estimate with the Ibbotson method.[168]

GAWB considered that sole reliance on the Ibbotson method to determine the MRP would lead to more volatile estimates of return on equity over time. GAWB submitted that the implicit assumption of a one-for one relationship between the return on equity and the risk-free rate as implied by the Ibbotson approach is simply not consistent with Australian market evidence. GAWB highlighted commentary from financial practitioners that supported an inverse relationship between the risk-free rate and the MRP.[169]

GAWB said that the existence of a perfect negative correlation between the MRP and the risk-free rate should not be a prerequisite for placing some reliance on the Wright approach in estimating the cost of equity. It noted that if similar logic were applied to the Ibbotson approach, the fact that the MRP may indeed sometimes move in response to the risk-free rate would invalidate its use for setting the MRP. Given that the Ibbotson and Wright approaches represent two theoretical extremes, GAWB proposed we should give weight to both methods.

Seqwater submitted that the AER has commissioned a number of consultant reports as part of its 2022 Rate of Return Instrument and that these reports had relevance to our task in estimating the MRP.[170] In relation to these reports Seqwater noted that:

- CEPA has advised the AER that there 'is not good evidence' to support the Ibbotson approach and recommended that the Wright or a hybrid approach should be considered
- Brattle has advised the AER that its approach of relying on the Ibbotson method to estimate the MRP is 'not as effective as the approaches of other regulators'.

Seqwater submitted that we should consider in detail the expert reports and the detailed Energy Networks Association submission that have been submitted to the AER in relation to the task of estimating the MRP and our proposal to exclusively use the Ibbotson method.

In terms of any possible co-movement that can occur between the risk-free rate and the market risk premium, we consider there are three possible outcomes that can occur when the risk-free rate changes. For a given increase in the risk-free rate, the market risk premium could either decrease, remain the same, or it could increase. And so, while the Ibbotson and Wright methods are often seen as the two extremes describing the implied movements of the risk-free rate and the market risk premium, they do not account for situations where both the risk-free rate and the MRP move in the same direction.

As part of this review, we have considered the reports identified by stakeholders. In relation to the CEPA report[171] and other analysis that involves regressing the output of DGM models against the risk-free rate, it is not surprising that negative correlations between the MRP and the risk-free rate are observed. Due to the common approach of specifying a single cost of equity in the structure of the DGM, any decrease in the risk-free rate will cause an offsetting increase in the model's cost of equity estimate, holding all else constant. As such, we do not find these regressions compelling, as the negative correlation observed may simply be a by-product of the specification of the DGM rather than a result of any true relationship.

[168] QTC, sub. 18, p. 14.
[169] GAWB, sub. 22, p. 9.
[170] Seqwater, sub. 27, pp. 2–3.
[171] CEPA, *Relationship between RFR and MRP*, report for the Australian Energy Regulator (AER), June 2021.

We are of the view that if there has been a historically positive but declining inflation risk premium in Australian Commonwealth government bonds, then this may contribute to a downward bias to the estimate of the MRP from the Ibbotson method. However, survivorship bias induces an upward bias in historical returns data that will play a mitigating role in any downward bias due to any inflation risk premium. In so far as there is no downward bias caused by an inflation risk premium as part of the Wright method, this may result in the Wright method being overall upwardly biased due to the presence of survivorship bias.[172]

While valuation experts and survey results seem to suggest that survey participants consider that there has been a negative relationship between the risk-free rate and the MRP since 2013, this does not by itself indicate that they give weight to the Wright method. In fact, we consider there to be limited support and use for the Wright method by textbooks, academics and practitioners.

We acknowledge that QTC and GAWB have made a number of valid points. For instance, we consider that the MRP is likely to vary over time. Our draft report also noted evidence of a likely positive correlation between the risk-free rate and the MRP throughout most of the 20th century before this correlation became negative in the late 1990s and 2000s. While QTC has presented arguments for why this negative correlation may be expected to continue in the future, there is still a relatively small number of yearly observations showing this relationship (approximately 20).

At this stage we will continue to use the Ibbotson method and will place no weight on the Wright method. We consider that the Ibbotson method is likely to provide a plausible indication of the average market risk premium investors can expect to receive in normal conditions. Although we are not placing any weight on the Wright method, we plan to monitor the future movement of the risk-free rate and the MRP.

Siegel method

The Siegel method is a variant of the Ibbotson methodology, based on the premise that historically, unexpected inflation has reduced the observed, real return on bonds but not the real return on equities. Siegel demonstrates that, over the period from 1926 to 1990, the Ibbotson estimate of the market risk premium is atypically high, due to the unusually low real returns on bonds during that period, which Siegel attributes to unexpected inflation. As only expected inflation (as opposed to unexpected inflation) is relevant for forming an estimate of expected real returns, Siegel argues that the Ibbotson estimate is biased upwards when it is estimated using data from this period.

QTC submitted that during 1940–1990, high inflation had an impact on not only the real return on bonds but also the real return on equity, resulting in an MRP that is relatively low during this period. QTC considered that it is therefore difficult to reconcile this result with the conclusion of Siegel's analysis that high unexpected inflation caused the historical MRP between 1940–1990 to be biased upwards.[173]

Further, Seqwater submitted that there are a number of problems with the Siegel approach that make it unfit for purpose. Seqwater considered that it was unorthodox to revise 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

[172] A common component of the Ibbotson and Wright data is the underlying real return.
[173] QTC, sub. 9, pp. 8–10.

- making an adjustment to convert the data into what one considers it would have looked like if the unexpected events had not occurred.

Seqwater further noted that there is no evidence of the Siegel approach being used by any other regulator in Australia—or indeed by Siegel himself.[174] GAWB considered that the continued inclusion of the Siegel MRP was unlikely to enhance the robustness of our overall MRP estimate.

We consider there is merit in leaving the historical data unadjusted, noting that we do not make any adjustments for other phenomena such as survivorship bias or the inflation risk premium. Therefore, we consider that using the Siegel method is not necessary, as the adjustment for unexpected inflation is the only point of distinction between it and the Ibbotson method. As such, we will discontinue using the Siegel method as part of future reviews. We note this change simplifies our approach to determining the MRP.

Sampling periods and arithmetic and geometric returns

When using historical data, an important consideration is the sampling period that these returns are taken from. Generally, there are five key sampling periods that have been used within Australia when calculating historical returns. The start of each sampling period corresponds to either a shift in the quality of data available or to an important structural event.

The sampling periods are:

- 1883 to present: the longest time series of Australian stock data available
- 1937 to present: includes data from the financial sector
- 1958 to present: includes data after the removal of equity price controls[175]
- 1984 to present: includes data after the floating of the Australian dollar
- 1988 to present: includes data after the start of dividend imputation.

Each of these series has strengths and weaknesses. Datasets associated with the two oldest series consist of a large number of observations, and as a result are likely to produce estimates with lower standard errors. However, there are legitimate concerns with the quality of subsets of the data. For example, only 12 equities are included in the data as of 1905 and 47 equities as of 1935. Furthermore, it could be argued that today's market is very different from the market of 80 to 100 years ago, with results from these series not reflecting the MRP that is relevant to a current investor.

On the other end of the spectrum, data from the two most recent series are likely to produce estimates that contain highly relevant information using higher quality data. However, as this data is recent, there are fewer observations and consequently, the results themselves will be more susceptible to market cyclicality and major economic events.

QTC, Seqwater and Urban Utilities submitted that primary weight should be given to the 1958 series when estimating the MRP using historical returns.[176] QTC considered that this period was the longest period of high-quality data.

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[174] Seqwater, sub. 7, pp. 31–32.

[175] 1958 is the first year for which the Sydney All Ordinary Shares price index was calculated on a daily, rather than a retrospective basis, and 1958 is also (approximately) the first year for which marketable short-term government securities (e.g. Treasury notes) were issued. See T Brailsford, J Handley and K Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting* & *Finance*, vol. 48, 2008, pp. 85–86.

[176] QTC, sub. 9, p. 14; Seqwater, sub. 7, p. 43; Urban Utilities, sub. 10, p. 5.

Consistent with recent decisions, we will rely exclusively on the results of the 1958 series, as it contains both a relatively large number of observations and consists of high-quality data.

Geometric and arithmetic returns

In the context of the averaging of excess returns in historical time series, a relevant issue is the use of the arithmetic, or geometric, average of returns. There are mixed views as to the appropriate averaging approach. Blume considered that compounding the arithmetic average of one-year returns over multiple periods would result in an upward biased estimate, while doing the same with a geometric average would lead to a downward biased estimate.[177] Meanwhile, Lally considered that using arithmetic averages would ensure that the expectation of the regulated asset's value equals the current regulatory book value.[178] In recent reviews, we have used the arithmetic average.

Urban Utilities submitted that geometric averaging should be considered, as it takes into account the compounding between periods, and investors tend to utilise geometric averages rather arithmetic averages.[179] Seqwater did not support the use of geometric averages as part of historical methods. It considered that, while geometric averages might be relevant for determining the returns that investors have actually realised over a period of time, when assessing what returns investors can expect to receive over some future period, the only appropriate approach to use is an arithmetic average. It then provided a numerical example that shows that, in the presence of uncertainty, the expected value of the investment will always be consistent with the arithmetic mean.[180] Both GAWB and QTC also supported that we use arithmetic returns, rather than geometric returns.

In recent decisions, both the AER and ERA have used information provided from both arithmetic and geometric averages when determining an appropriate value for the MRP.[181] Meanwhile Ofwat, the United Kingdom economic regulator of water services, uses the Jacquier, Kane and Marcus efficient estimator, which prescribes weight to both the arithmetic and geometric average to calculate historical returns.[182]

We consider that the reasonableness of using arithmetic and geometric averages is dependent on how investors use historical information to develop their projections of future expected returns. If investors treat each historical yearly return as an equally likely outcome in the future, and treat each of these observations independently, repeating this process for their investment window, then the arithmetic mean is the appropriate choice. However, if investors use historical returns generated over a period of time, where those returns are compounded, then some consideration should be given to using estimates based on the geometric mean.

While there is regulatory precedent for using a weighted average of both geometric and arithmetic means, such an approach would require us to determine an appropriate set of weights to apply to the arithmetic and geometric means, and it is not clear what these weights should be.

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[177] ME Blume, 'Unbiased estimators of long-run expected rates of return', *Journal of the American Statistical Association*, vol. 69, no, 347, 1974, pp. 634–638.

[178] M Lally, *The cost of equity and the market risk premium*, Victoria University of Wellington, July 2012, pp. 31–32.

[179] Urban Utilities, sub. 10, p. 5.

[180] Seqwater, sub. 7, pp. 34–36.

[181] AER, *Rate of return instrument: Explanatory Statement*, December 2018, p. 90; ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and The Pilbara Railways,* final determination, August 2019, pp. 42–43.

[182] Ofwat, *PR19 final determinations: Allowed return on capital technical appendix*, December 2019, p. 44.

Given these considerations, we will maintain our approach of using arithmetic averages to estimate historical returns, noting that this may produce a conservative estimate of historical excess returns.

6.4.3 The use of other methods

In previous reviews, we have also considered both hybrid and forward-looking methods.

Dividend growth models

In past reviews, we have given weight to dividend growth models when determining a value for the MRP. The dividend growth model is a forward-looking method that, rather than using historical data, relies on current information and forecasts. In general, dividend growth model estimates are obtained by finding a value of the expected return on the market portfolio that reconciles the current value of the market portfolio with the present value of the expected stream of future dividends flowing from it.

The use of dividend growth models received mixed responses from stakeholders. The DBCT User Group submitted that, while dividend growth models have a good theoretical basis, applying them requires assumptions on future dividend yield and growth, making the approach highly subjective and prone to estimation error.[183]

Seqwater and QTC supported the use of dividend growth models to determine a value for the MRP.[184] Seqwater noted that both CEPA and the Brattle Group had recommended the AER should have regard to forward-looking DGM evidence as part of its 2022 Rate of Return Instrument.[185] QTC's support for our use of the dividend growth model was contingent on us making adjustments to certain assumptions. QTC considered that the dividend growth model that we applied in previous decisions produced unrealistic outputs; QTC pointed to our estimate of 4.7 per cent in January 2019 as an example. GAWB also considered our Cornell DGM estimates were not delivering estimates that were consistent with market dynamics or other indicative regulatory estimates and considered that we should revise our growth assumptions underpinning the model.[186]

QTC and Seqwater had concerns that our dividend growth model used a long-term cost of equity, which assumes a long-term risk-free rate of more than 5 per cent.[187],[188] QTC said that this assumption was predicated on the belief that the 10-year nominal CGS yield is strongly mean-reverting; however, it indicated that results from a simple mean reversion test do not support this belief. Seqwater noted that it was not aware of any user of dividend growth models that assumed a mean-reverting long-run risk-free rate, while QTC suggested that results from our dividend growth model should be consistent with the results from IPART and the AER.

QTC included commentary from Damodaran (2020) on the predictive power of different MRP methods over five and 10 years. Damodaran found that the Ibbotson method had the lowest predictive power, while the DGM had the greatest predictive power. Both QTC and GAWB asked

[183] DBCT User Group, sub. 8, p. 24.
[184] QTC, sub. 9, p. 7; Seqwater, sub. 7, p. 32.
[185] Seqwater, sub. 27, pp. 2–3.
[186] GAWB, sub. 13, p. 3.
[187] QTC, sub. 9, pp. 11–12; Seqwater, sub. 7, p. 32.
[188] Dividend growth models can be set up assuming that there is one single cost of equity that applies in perpetuity. Alternatively, a term structure can be assumed, where there is a short-term cost of equity that applies initially and for transition years, while a long-term cost of equity applies to discount the terminal value.

us to provide clarity on our proposal to assign a qualitative role to the DGM in assessing a forward-looking cost of equity.[189]

One of the advantages of using dividend growth models is that they use current market data and forecasts to estimate a forward-looking MRP. However, we also consider that there are issues with using dividend growth models. Notably, the outputs of these models are highly sensitive to parameter inputs, such as dividend growth rates, as well as to changes in the underlying modelling specification. The implication is that the model can produce estimates that are unduly volatile.[190]

In this context, we note that relaxing our assumption of a mean-reverting risk-free rate will reduce the volatility in the estimates—and there may be a case for relaxing this assumption.[191] However, this change also further highlights the sensitivity of the results to model specification. Furthermore, making this change does not eliminate all potential for unduly volatile estimates to arise from the dividend growth model.

Given these considerations, we have reservations about applying any type of mechanical weight to a dividend growth model estimate when determining a value for the MRP. To do so would create the risk that our final MRP estimates may also be subject to unwarranted volatility.

In reaching this view, we note that the volatility of results from dividend growth models was among key concerns identified by the AER and ERA[192]. Informed by the advice of Partington and Satchell,[193] these regulators both decided to have diminished regard for dividend growth model estimates when determining a value for the MRP. Also, we are not convinced that relying on multiple dividend growth models will improve our estimate. To the extent that we think that a particular model with certain assumptions is most appropriate, the result produced from that model is most relevant.

It is not surprising that the DGM may produce estimates that have higher correlations with actual short-term future returns data than the Ibbotson method. Because the Ibbotson estimate of the MRP changes slowly over time, we would expect it to produce estimates with limited correlation with actual short-term future returns. The fact that Damodaran finds a negative correlation between the Ibbotson MRP and actual market returns[194] may be explained by the presence of negative serial correlation in returns data over intervals of five years.[195]

To the degree that the DGM can successfully provide some indication of future market returns by capturing current market conditions, this would contribute to a positive correlation between forecast returns using the DGM and actual market returns. A positive correlation implies that the

[189] QTC, sub. 18, pp. 7–10; GAWB, sub. 22, p. 10.

[190] Volatility is a natural feature of the economy. Accordingly, we want the model to capture market volatility in estimating the market risk premium. However, to the extent possible, we also want to ensure that the modelling specification does not attribute unwarranted volatility to the estimated market risk premium.

[191] There is mixed empirical evidence on whether risk-free rates are mean-reverting over time. After analysing risk-free rate data in an Australian context, we were unable to rule out the possibility that the risk-free rate is not mean-reverting.

[192] AER, *Rate of return instrument: Explanatory Statement*, December 2018, p. 257; ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and The Pilbrara Railways*, final determination, August 2019, p. 49.

[193] G Partington and S Satchell, *Allowed rate of return 2018 guideline review*, report to the AER, May 2018.

[194] Damodaran, A, *Equity Risk Premiums (ERP): Determinants, Estimation, and Implications—The 2021 Edition*, March 2021, pp. 127–128.

[195] For instance, See EF Farma and KR French, 'Permanent and temporary components of stock prices', *Journal of Political Economy*, vol. 96, no. 2, 1988, pp. 246–273; JM Poterba and LH Summers, 'Mean reversion in stock returns: evidence and implications', *Journal of Financial Economics*, vol. 22, no. 1, 1988, pp. 27–59..

DGM is likely to be a good directional predictor of future returns data. However, being a good directional predictor does not necessarily help us use the DGM as a direct method, as it has a large estimation variance.

In addition, while historical data may indicate a positive correlation between DGM and actual returns data, it does not provide us with solutions to the problems identified above, including the sensitivity of the DGM to modelling specifications and assumptions. Consequently, we will not use dividend growth models to directly estimate the MRP as part of future reviews. However, we consider that there is justification for using the output of DGMs for directional guidance when considering the overall cost of equity as part of our top-down assessment. In this regard we will use our DGM model[196] to produce an estimate of the MRP that we will consider alongside other information when determining if our bottom-up return on equity estimate requires an adjustment.

Survey methods

In past reviews, we have given weight to survey methods when determining a value for the MRP. These surveys attempt to estimate a future value for the MRP based on the survey responses from independent valuation experts, institutional investors, financial analysts, company managers and academics. Typically, when considering survey methods, we have used survey studies published annually by Pablo Fernandez and KPMG. We have also previously considered reports by independent analysts.

Stakeholders raised a number of concerns with the use of survey methods to determine an MRP. The DBCT User Group submitted that MRP estimates from surveys are subjective, because they depend on the participants who respond, and they may give information that is strategically the most beneficial to them.[197] QTC submitted that a key problem with using surveys in a regulatory context is that surveys treat the MRP and the risk-free rate as independent parameters.[198] Seqwater also raised concerns, including that:

- surveys tend to have few respondents
- the surveys quickly become dated and irrelevant
- there is no information about the qualifications of respondents
- surveys do not indicate what the respondents are using the MRP for.[199]

We are of the view that these are legitimate criticisms of survey methods. Furthermore, we note that, if we were to use other methods to determine the MRP, and these are also commonly used by market practitioners in informing their views of an MRP, survey methods may not be providing any new or additional information. It is also not clear whether survey estimates of the MRP include an adjustment for imputation credits. Accounting for this possibility complicates the analysis of surveys.

As surveys are only published once a year, the potential for these results to reflect out-of-date information is high if respondents use dividend discount models (or other forward-looking methods) to estimate the MRP. Outputs of dividend growth models are sensitive to changes in

[196] For clarity, we intend to use a DGM based on a single cost of equity.
[197] DBCT User Group, sub. 8, p. 24.
[198] QTC, sub. 9, pp. 12–13.
[199] Seqwater, sub. 7, pp. 32–33.

input values (which can move significantly over a span of months), meaning these survey results might reflect more of a historical view rather than the present view of the respondent.

We therefore consider that including survey methods may not contribute meaningful or additional information that allows us to improve our determination of the MRP, and we will therefore not use them as part of future reviews.

6.4.4 Determining a point estimate

After assessing each of the methods we have used in previous reviews, we have fundamental concerns with some aspects of these methods in the context of estimating an MRP. Specifically:

- We consider that as there is merit in leaving historical data unadjusted—and the only differentiating factor between the Siegel method and the Ibbotson method is an adjustment for unexpected inflation—the Siegel method is redundant.
- Significant issues with survey design, responses, and timeliness greatly limit the usefulness and relevance of survey methods.
- We have concern with theoretical basis of the Wright method and the lack of data showing a consistent negative relationship between the risk-free rate and the market risk premium.

While we recognise that no estimation methodology is perfect, our issues with these methods have reduced our confidence in using them. We are also of the view that any weighting of estimates produced by different methods is arbitrary. As such, we will not retain the Siegel, Survey and Wright methods to estimate the MRP.

In relation to dividend growth models, we consider that that their sensitivity to different assumptions and inputs makes them unsuitable to be directly used to estimate the MRP. However, we consider that the DGM may have a qualitative role in informing a forward-looking cost of equity (see section 3.4.2).

Finally, we consider that the Ibbotson method is likely to provide a plausible indication of the risk premium an investor requires on average for investing in the market. Relative to the other methods that we have assessed, we consider that the Ibbotson method is preferable to use in determining a value of the MRP. We will estimate the MRP using the Ibbotson method, employing the 1958 sampling period and arithmetic averages.

While we will determine the MRP using the Ibbotson method, this does not mean that the return on equity for each of our WACC decisions will move in lockstep with the risk-free rate. As part of each WACC decision, we will perform a top-down assessment of the overall WACC, including forming a view on an appropriate return on equity. In reviewing what is an appropriate return on equity, we will have regard to factors such as market-specific conditions, including, for example, the level of the risk-free rate, market volatility, our DGM model estimate and the market return on equity required by investors.

In undertaking this exercise, we note that it is possible that an overall cost of equity (deemed reasonable) is not dissimilar to a cost of equity determined using an MRP based on both the Wright and Ibbotson methods, depending on the prevailing market circumstances. While we recognise that such an approach introduces a degree of discretion, we consider that this is necessary, given that an entirely fixed or formulaic approach to determining a reasonable cost of equity is unlikely to be robust across the entire spectrum of possible market conditions.

6.5 Beta

6.5.1 Overview

The asset beta (or unlevered equity beta) of an entity is a measure of the volatility of returns from a firm's assets relative to the volatility of returns to the market as a whole—often referred to as systematic (or non-diversifiable) risk. The equity beta (or levered asset beta) reflects not only this risk, but also the financial risk borne by equity holders from the use of debt as part of the funding for the business.

To determine beta for a regulated entity, it is common regulatory practice to consider the observed beta values of a benchmark set of firms on the basis that these betas reflect the systematic risk of the regulated entity. Ideally, in the Australian context, this set would comprise firms that are listed on the Australian Stock Exchange (ASX), with similar operational characteristics and facing similar risks as the regulated entity. This is commonly cross-checked against similar analysis undertaken by other regulators in relation to similar firms.

There are few domestically listed firms that are comparable to the entities subject to our regulatory regime—infrastructure service providers with market power. In the absence of any ideal comparator firms, we need to generate a sample, or samples, of sufficiently comparable listed firms that will allow us to produce the best estimate of beta, such that it reasonably compensates the regulated entity for the systematic risk that it faces.

Our view is that using samples of firms from domestic and international stock exchanges will allow us to compare the relative risk of the regulated entity in question with that of the firms that make up these samples. We will calculate the betas for these firms by using 10-year weekly data. The betas from these industry samples will serve as reference points that, while not determinative, will help guide our decision on an appropriate beta for the regulated entity under review. Other information we may consider when assessing an appropriate beta could include our past regulatory decisions and relevant decisions made by other regulators.

At this time, we have not specified a reasonable beta for the firms subject to our regulatory regime. Also, we have not sought to undertake a comparison of the relative risk features against listed comparator firms. These tasks will be undertaken in the regulatory decision specific to each regulated entity. Rather, our aim in this review is to set out key aspects of a methodology that we will apply in future reviews, including: our considerations when evaluating systematic risk; estimation methods and design issues; and the types of data.

Our estimates for asset betas for firms in a variety of industries, using the approach set out in this chapter, are provided at Appendix D. These estimates illustrate our approach to developing reference points for future beta decisions.

Key issues that we identified during our review include:

- our analysis of key features that contribute to the systematic risk of a firm (section 6.5.2)
- reviewing the industries and comparator firms used to establish beta reference points (section 6.5.3)
- the way we will estimate beta for the sample firms within an industry (section 6.5.4), including the frequency of returns and time horizon data, leveraging formulas and, where necessary, data adjustments.

6.5.2 Identifying determinants of systematic risk

In order to assess the relative systematic risk of the businesses subject to our regulatory regime against the firms in our comparator set, we need to first identify the determinants of systematic risk, as they relate to a regulated entity.

Therefore, the first step is to undertake an assessment of the regulated entity in the context of the regulatory framework in order to understand the business and operating environment that affects the covariance[200] of the regulated firm's returns with the market (discussed in section 3.2).

We then need to consider the features that reduce or increase the firm's exposure to systematic risk in order to estimate a beta from a sample, or samples, of comparable firms.

Systematic risk features

The table below describes a number of general factors that can influence a (regulated or unregulated) firm's systematic risk profile. There can be interrelationships between these factors. Finally, an assessment with respect to these factors is necessarily a qualitative exercise, and as such, it serves only as a guide for identifying and considering beta comparators.

Table 12 Factors that influence systematic risk

Factors	*Description*
Customer characteristics	A customer base with relatively inelastic demand for a product or service will be likely to contribute to lower systematic risk, all else constant, as the demand profile for the good or service will be less responsive to economic shocks relative to the market as a whole. If the service or product is exported, then this will generally limit the level of systematic risk exposure, as beta is measured against domestic market returns rather than global returns.[201]
Revenue protection mechanisms	Contracting arrangements allow a firm to maintain a stable revenue profile, even in the midst of a sustained economic shock. Contracts of shorter duration are unlikely to be as effective at mitigating systematic risk for the regulated entity as it is more likely that a such a contract will expire during a period of economic downturn, potentially leading to a loss in revenue (if the customer decreases its demand for the product or service). Some regulatory mechanisms may also stabilise revenue in instances where actual demand deviates from forecast demand and so will limit the systematic risk exposure that a firm faces.
Growth options	Growth options relate to a firm's ability to expand its service territory or product range. Growth options can have an impact on the systematic risk of a business, particularly when the growth option has a different risk profile to the firm's regulated activities.
Operating leverage and pricing structure	Operating leverage measures the proportion of operating costs that are fixed in nature. Firms that have a high level of operating leverage will find it difficult to cut costs in the event of an economic downturn, in response to a potential reduction in demand from customers. While operating leverage relates to the nature of costs, the pricing structure and the way the business recovers revenue are also relevant. If prices for a given good or service allow for the recovery of revenue largely through a fixed pricing

[200] Covariance is a statistical measure that captures the extent to which two variables move together.
[201] The extent to which systematic risk will be limited depends on the sensitivity of the domestic market returns to international macroeconomic events.

Factors	Description
	component, then this structure is likely to lead to lower risk for the business, all else equal, than if revenue is largely dependent on a variable pricing component.

Other considerations

Industry and physical operations of the regulated entity

A number of stakeholders submitted that the most important determinant of a firm's systematic risk is the industry that the business resides in. Specifically, Seqwater submitted that the industry that the firm belongs in should be used as the primary basis for selecting comparators.[202] Aurizon Network considered that there is likely to be large statistical imprecision in estimating the beta for firms with similar characteristics and within the same industry. Therefore, Aurizon Network considered it reasonable to conclude that comparisons of unlisted firms with out-of-industry comparators would be statistically unreliable.[203] Aurizon Network applied a bootstrapping approach with replacement[204] to show the high intra-industry variability generated when looking at the North American pipeline sample used in the Aurizon Network UT5 decision. Aurizon Network also submitted that if beta estimates from cross-industry comparators are to be used then they should be supported by some empirical evidence of businesses with comparable business risks across different industry sectors having comparable betas.

Aurizon Network requested that we investigate:

- empirical support that validates the statistical reliability of out-of-industry comparators
- explicit examples where regulators employ out-of-industry comparators
- empirical evidence that supports the reliance on first principles as a reliable basis for the selection of out-of-industry comparators.
- Aurizon Network also highlighted an excerpt from the AER's recently released omnibus papers on the rate of return that discusses the potential bias that can be introduced by including firms that do not share a similar level of risk as the benchmark firm. As an example, the AER notes that the addition of toll firms and telecommunications businesses would not be consistent with the 'pure play' benchmark that it has defined for energy network businesses.[205]

Sunwater and GAWB submitted that due consideration should be given to the physical characteristics of the firm, while GAWB also submitted that the operational characteristics of the regulated entity are relevant.[206] ARTC considered that in the case of coal assets, the use of comparators from outside the coal industry would lead to the regulated business being undercompensated, as the comparators being chosen would not reflect the increasing risks that coal assets face.[207]

We do not consider that using a within-industry comparator will always yield a better estimate of beta for a particular entity. Ultimately, it is the covariance of the firm's returns with the market's returns that determine the beta of that firm. There are a variety of factors (see Table 12) that are

[202] Seqwater, sub. 7, p. 41.
[203] Aurizon Network, sub. 5, pp. 7–8.
[204] Bootstrapping involves resampling the dataset many times to generate summary statistics that are intended to be representative of the population.
[205] Aurizon Network, sub. 21, pp. 8–9.
[206] Sunwater, sub. 6, p. 1; GAWB, sub. 13, p. 3.
[207] ARTC, sub. 14, p. 4.

not dependent on the physical characteristics of the firm but could nevertheless have an impact on a firm's returns relative to the market. Within a particular industry, two firms with similar physical operations may have vastly different contracting profiles or customer base characteristics, which may cause the two firms to face significantly different systematic risk profiles.

It is also possible for two firms, in different industries, to have similar returns profiles and thus face similar systematic risk—despite differences in operating and physical characteristics. As such, depending on the risk profile of the business, it is possible that out-of-industry comparators may provide more relevant information than within industry comparators that are subject to different risks.

The point of using a pure-play method[208] is to establish comparators with a similar level of systematic risk in order to determine the cost of capital to the firm. Ideally these firms would be identical to the benchmark firm for which we are trying to determine the cost of capital. Unfortunately, due to the unique nature of the firms that are subject to our regulatory regime, there are very few, if any, listed firms that fulfill this condition. As a result, we must look to identify other firms that share similar risk characteristics as the benchmark firm. These comparators will not be alike in some ways, and any analysis should take such differences into account when assessing risk.

These issues will not be as relevant for regulators setting the cost of capital where listed pure play comparators do exist. Presumably, in the case of the AER, if it considers that it already has a sample of firms that meets its 'pure play' definition, then we would share the view that populating that sample with firms with a different level of risk would introduce bias into the sample.

We consider it is relatively easy to find examples that demonstrate why it is important to consider more than just the industry or the physical characteristics of the firm when selecting comparators. We have provided some data-based examples in Appendix D that highlight the importance of undertaking a first principles analysis of the underlying risk characteristics of the firm.

In response to ARTC's comments about the societal risks related to coal assets, we consider that ESG-related[209] risks are potentially relevant risks that should be considered. However, some of these risks are not easy to incorporate, or are difficult to capture within the CAPM framework, particularly when it is unclear whether some risks are systematic or not. Rather than try and specifically adjust for these risks within our bottom-up estimate, our view is that it is reasonable to consider these risks as part of our top-down approach to WACC (see section 3.4.2)

Are some features more important than others?

DBI submitted that we have given too much consideration to the importance of regulation when selecting comparators.[210] DBI considered that the factors that determine systematic risk are strongly interrelated and that identifying comparable businesses requires applying a broad perspective to those factors rather than to any one particular characteristic. Furthermore, DBI said that estimating the equity beta should be guided by a forward-looking assessment of the factors that are most pertinent to the long-term systematic risk of a business, as investors evaluate risk over the life of the investment.

[208] A pure-play method seeks to identify comparable (in terms of similar risk) firms by finding firms in the same industry, who have operations in a single line of business.
[209] ESG stands for environmental, social and corporate governance.
[210] DBI, sub. 3, pp. 20–22.

The DBCT User Group said that market power, ability to exercise that power, volume risk and capital intensity should be the main factors to consider in choosing comparator firms.[211] Of these characteristics, the DBCT User Group considered that market power is the most important. Seqwater submitted that our previously used business characteristics could all impact the systematic risk that a business faces; however, it is impossible to determine how much each of these factors contributes to the overall systematic risk of the business.[212] It said it would be equally impossible to select comparators that match the regulated business closely in terms of all of these factors.

GAWB submitted that the activities undertaken by a regulated business's customers can impact risk exposure. Therefore, customers' risk profiles should be considered when forming an initial sample of relevant firms.[213]

While regulation can be an important determinant of systematic risk, we consider that merely the presence of regulation may not have a determinative impact on systematic risk. Regulation is only one factor we will consider when determining the systematic risk of the entities subject to our regulatory regimes. Relevantly, we previously expressed the view that Queensland Rail's West Moreton track will face greater systematic risk than Aurizon Network's Central Queensland Coal Network, despite both being subject to regulation.[214]

We take the view that market power is not necessarily the most important factor when determining systematic risk. Firms in a competitive operating environment will face a greater level of total risk compared to a monopolist, as there is always the possibility that the firm may lose customer share to a competitor. However, it is not clear how this risk is systematic in nature. Assuming that firms are rational profit maximisers, there is no reason the risk of a customer shifting to a competitor would be expected to be higher during a period of market downturn.[215] So, while a high degree of market power is likely to be correlated with inelastic demand for the service and with regulation, there may not be a direct, causal link between market power, in and of itself, and systematic risk.

Ultimately, it is important to assess the relevant characteristics collectively rather than individually when assessing systematic risk. It is possible for firms to have different firm-specific characteristics but similar levels of systematic risk. For some businesses, particular characteristics will be more important than others in affecting the systematic risk that they face.

We take the view that the nature of the customer base is important in assessing the systematic risk of a business. However, the fact that a customer may face certain risks need not require that these risks are reflected in the sample used to generate the beta of the firm, as the firm and the customer may face a different set of risks. This is particularly the case where a firm has features such as contracting arrangements or a regulatory regime that cause it to have a stream of revenue that is more stable than its customers' revenue.

[211] DBCT User Group, sub. 8, pp. 21–22.
[212] Seqwater, sub. 7, p. 41.
[213] GAWB, sub. 13, p. 3.
[214] QCA, *Queensland Rail 2020 draft access undertaking*, February 2020, p. 38.
[215] This is because the customer will already be with the firm that can provide it with the good or service at the lowest price, assuming there is no difference in quality or service standard.

6.5.3 Reviewing the industries and comparator firms used to establish beta reference points

As the betas for the entities subject to our regulatory regime are not generally observable, we require the use of betas from listed firms to inform the selection of a reasonable beta estimate. While this exercise will typically involve analysing the betas for firms we consider broadly comparable in risk with the regulated entity in question, there may be instances where we also analyse betas for firms that may be considered to have greater or less systematic risk than the regulated firm, in order to establish bounds for our decision. We will use these beta estimates as reference points to help guide our decision of an appropriate beta for the regulated entity under review.

International or domestic comparators

Our task when determining a set of comparator firms is to identify a set of firms that will best enable us to choose a beta estimate that reasonably reflects the systematic risk of the regulated entity. Consistent with the domestic-style CAPM that we employ, the starting place for an appropriate set of comparators is domestically listed businesses. However, our approach in recent reviews has been to expand our consideration of comparators to include relevant international businesses. This approach has allowed us to increase the sample size of comparator firms available to us, while also allowing us to use comparators from industries that are not publicly listed in Australia, such as regulated water firms.

The DBCT User Group submitted that international markets have different governance structures, institutional frameworks and market characteristics than Australia. It considered that differences in market and regulatory structure could lead to beta estimates from Australian firms being different from international firms.[216] Sunwater recognised the ongoing challenge within the SL CAPM in identifying comparator firms, particularly with the small number of domestically listed firms available for use. However, Sunwater cautioned placing too much reliance on internationally listed firms to address this limitation, as these firms are subject to different regulatory arrangements and have different risk profiles. Sunwater submitted there needs to be a reasonable degree of similarity between the businesses being considered.[217]

Since beta is a measure of the covariance of the asset's return against the broader market's return, the composition of this market is important. If the make-up of two markets is dissimilar, then the betas for two otherwise identical firms operating in different countries could be different. Differences in market composition may also cause the betas for two otherwise similar firms operating in different countries to move in varying directions. Because of this, a certain level of caution needs to be exercised when assessing betas from internationally listed firms.

However, we consider that continuing to use an international sample of firms (alongside domestic firms) is preferable, as relying purely on Australian firms to form comparator sets for the entities subject to our regulatory regime is problematic. We are not confident that there are a sufficient number of listed Australian firms for us to draw upon in order to determine reasonable betas. In particular, any industry sample would comprise a very small number of firms, which could result in beta estimates fluctuating by large margins from review to review. This does not provide regulatory predictability.

An advantage of using a larger sample of firms is that the impact of any one seemingly anomalous beta estimate is not significant when taking an average or median beta from all the firms in the

[216] DBCT User Group, sub. 8, p. 22.
[217] Sunwater, sub. 19, pp. 2–3.

sample. This would not be the case when relying on a very small sample of firms. The potential loss of comparator firms from delisting as a result of mergers and acquisitions would only exacerbate the above issues.

Alongside the statistical advantages that using an international sample offers, it also allows greater flexibility when choosing comparators—due to the availability of firms listed in other industries that are not listed on the ASX—that may better match the level of systematic risk facing the regulated entity. To the extent that there may be country-specific effects on beta estimates, we consider that these can be limited by using a sample of relevant firms from a cross-section of countries where possible. Using a longer time horizon to estimate beta will also limit the impact that a particular country-specific event will have on the beta calculation.

The selection of comparator firms within industries

When selecting a sample of comparator firms, it is highly desirable for the firms to share similar risk characteristics. A sample of firms with similar risk characteristics will generally lead to beta estimates that are less dispersed for that sample. Having a sample with similar risk characteristics also allows for a more relevant comparison between a regulated entity and a sample of firms when performing relative risk assessments.[218]

As we will use international (alongside domestic) firms to generate industry samples, extra care needs to be taken. Firms within the same industry, operating in other countries, may face a different set of risk characteristics, due to factors such as materially different industry structures, regulatory settings and political environments.

On this point, the DBCT User Group said that differences in the regulatory environment, extent of market power and lines of business could result in vastly different risk profiles. As an example, the DBCT User Group noted that Edison International—a major United States electricity utility that is vertically integrated with 20 per cent of its revenue derived from electricity generation—is likely to face a different risk profile than an Australian electricity distribution utility, such as Jemena or Ausgrid.[219]

Regarding the DBCT User Group's comments, we note that international energy businesses such as Edison International differ quite significantly from Australian regulated energy businesses in that they are structured as vertically integrated firms with operations within the distribution, transmission, generation and retail areas. However, despite these differences, we would expect many of the international energy firms to have broadly similar operational risks as a regulated energy business operating in Australia, such as Jemena or Ausgrid. Although standalone operations in the generation and retail spaces are generally considered to be riskier than those in transmission and distribution, many international regulated energy businesses are vertically integrated, operating as monopolists within a specified service territory.

This arrangement is not dissimilar to regulated energy businesses in Australia that operate transmission and distribution infrastructure within specified areas as monopolists. Additionally, while there may be differences in regulatory frameworks across countries, we generally find that most international regulated energy businesses are regulated in such a manner that allows them to recover their efficient costs, including a return on capital commensurate with the risks they

[218] When performing a relative risk assessment, we would compare the risk characteristics of the regulated entity against a typical firm operating in another industry/industries. To the extent that firms within an industry sample face significantly different risks, this undermines the relative risk assessment as the beta generated for that industry sample may reflect a level of systematic risk that is different from the typical firm in that industry sample.

[219] DBCT User Group, sub. 8, p. 22.

face. Many businesses are allowed to recover costs where they depart from forecast levels, and some have 'decoupling' mechanisms that allow the business to recover revenue independent of volume—similar in effect to a revenue cap.

As part of this review, we have closely examined the risk profiles of the firms in industry samples that we have used previously, as well as some of those that have previously been proposed by stakeholders.

Within each of our previous industry samples, there are many firms that share similar risk profiles with other firms in that industry. However, there are also outlier firms within some industry samples that have material operations in activities with differing risk profiles. Where firms were identified as having a materially different risk profile from a typical firm operating in that industry, we removed those firms from the sample.

In an attempt to arrive at a sample of firms that would generally share similar risks to a typical firm operating within a particular industry, we consider that applying the following screening criteria will likely improve our industry samples. It should be noted that by listing the following industries we are not indicating that these industries will necessarily have similar risk levels and be relevant in determining a point estimate for the entities subject to our regulatory regime. Rather, we have selected a variety of industries that are likely to have a wide spectrum of risks from which we can perform relative risk assessments.

Generally, we consider that firms originating from developed countries are preferable to those from developing or emerging economies, as the former are more likely to operate within a more stable political and business environment and are subject to a well-developed system of property rights and legal protections. However, if after reviewing firms operating in developed countries, we are still concerned with the size of our industry sample, we will turn to investigate firms operating in developing countries to potentially generate a larger sample.[220] In investigating firms operating in developing countries, we will have particular regard to country-specific factors that may make inclusion of certain firms unsuitable.

In some past reviews, we have combined regulated energy and water firms into a single sample, while in others we have used a standalone water sample. We consider that such an approach is likely to lead to consistency issues. As we are of the view that these firms are likely to face similar risk profiles, we will use a combined regulated energy and water sample as part of future reviews.

- Regulated energy and water—at least 70 per cent of revenue is derived from transmission, distribution, and retail services for energy businesses and at least 70 per cent of revenue is derived from activities such as storage, distribution and treatment for water businesses. The firm does not face material competition that increases the risk profile of the firm. The firm has mechanisms in place that allow it to pass through costs where they differ from forecast levels.
- Toll roads—70 per cent of revenue is derived from toll activities.
- North American Class 1 railroads—70 per cent of revenue is derived from activities related to Class 1 railroads.[221]

[220] While firms operating in developing countries might face a greater level of sovereign risk, this may not necessarily be reflected in beta estimates of those firms, as the relative systematic risk of firms within the country may be unchanged.

[221] While Class 1 railroads exist outside of North America, differences may arise in the competitive environment and haulage profile of other Class 1 railroads. We note that the North American Class 1 railroads sample has also seen

The above filters require that at least 70 per cent of revenue is derived from the relevant business activity. Ideally, we would require that all revenue is sourced from the business activity we are interested in. However, we consider that such a requirement would be too restrictive, as there would be very few, if any, firms that would fulfill this requirement.[222] At the same time, we consider that setting the requirement to any less than 70 per cent of relevant business activities creates the risk that beta estimates may be substantially impacted by activities that have differing risk levels.

While there is no one 'right' revenue threshold, we consider that 70 per cent strikes a balance between requiring that the predominant source of revenue comes from the activity that we are interested in, while also not requiring a level that is too restrictive such that it is difficult to construct an adequate sample.

Where possible, we will try and include relevant, listed companies from a range of different countries to limit the concentration of firms coming from any one country. However, this approach may not be possible if firms in other countries are less relevant—that is, if they are exposed to substantially different risks—relative to the benchmark we are trying to assess.[223]

Liquidity filters

Alongside the above factors, we will apply further filters to promote confidence in the estimates we derive. If there is not sufficient liquidity, there is a risk that the beta does not accurately capture a stock's true covariance with the market.

GAWB was broadly supportive of us using an explicit market capitalisation threshold as it considered a threshold would help remove firms whose lack of liquidity may impede robust beta estimation.[224] However, Seqwater did not support the exclusion of stocks based on size (for example, using market capitalisation) as a liquidity filter. It considered that small firms can still contribute useful information to the beta estimation task, provided that the stocks are not illiquid stocks due to their size. Instead, Seqwater supported using the Amihud measure—which calculates the ratio of a stock's return on a particular day against its dollar value trading volume on that day—as used by IPART to identify illiquid stocks. It also considered that we should specify a minimum number of trading months before a comparator is included within the sample.[225]

We consider it is appropriate to maintain our use of a market capitalisation filter. Generally, we would expect larger firms to be more liquid than smaller firms. While there may be instances where smaller firms are sufficiently liquid, we consider that these firms would likely serve as poor comparators for any of the industry samples for which we are trying to estimate beta. This is because our industry samples typically comprise firms involved in infrastructure services that necessarily require them to have higher market capitalisations.

We investigated using the Amihud measure and consider it is likely to be able to identify instances of illiquidity. We note that IPART removes any returns observations for an individual comparator

use in other Australian regulatory decisions (for instance, Economic Regulation Authority (ERA), *2018 Weighted Average Cost of Capital at 30 June 2018: For the Freight and Urban Networks, and the Pilbara Railways, draft determination*, May 2019).

[222] Very few firms are 'pure plays', with operations and revenue from one activity. Rather, they undertake several activities, one or more of which might not be related to the activity of interest.

[223] In assessing whether a firm is relevant to include in the sample, we will have regard to the ownership characteristics of the firm. Where the firm has a significant proportion of government ownership, it may not be relevant to include it in an industry sample.

[224] GAWB, sub. 22, p. 13.

[225] Seqwater, sub. 7, p. 42.

that produces an Amihud value of 25 or greater for a given week.[226] After applying a market capitalisation filter of USD$150 million, we did not detect any firms in our industry samples with weekly Amihud values that came close to meeting the threshold value of 25.[227] As such, we do not see a need to calculate the Amihud value for each firm in our industry sample and consider that applying a market capitalisation filter is likely to be sufficient for identifying a liquid sample of firms.

We consider that comparators should have a complete trading history over the chosen observation window. Including comparators that do not have a full set of observations could potentially introduce bias if the covariance of returns with the market changed over the observation window for the majority of firms within the sample.

We will exclude firms that might have problems with liquidity by removing firms with a market capitalisation below 150 million United States dollars.

6.5.4 Estimating beta reference points

To estimate the beta for any given firm, we will regress its returns data against the returns of a proxy for the market portfolio in the home economy, such as the All Ords or ASX200 for Australia and the S&P500 for the United States. Beta estimates are sensitive to the data that is used and the way the regression is carried out. Regulators also have the choice of making adjustments to the results to account for any perceived errors or biases in estimates.

Time horizon of data

To estimate beta, data must be captured over a period of time. In choosing the time horizon of the data that is used, there is an inherit trade-off between capturing a large amount of data to try and limit the standard errors of the estimate, while also capturing information that is relevant to the risk profile of the firm. It is common to estimate beta using five and 10 years of data. Our past practice has typically involved estimating beta using 10 years of data.

Seqwater, Urban Utilities and Central Highlands Regional Council suggested that we should use the longest possible period of historical returns to estimate beta.[228] Seqwater considered that the true systematic risk of the firms subject to our regulatory regime is unlikely to change over short periods of time and, as such, using short time horizons that demonstrate greater variability in beta is likely to reflect statistical noise rather than changes in systematic risk.[229] Aurizon Network said that given the inherent subjectivity of the matter, we should consider both five and 10-year data. Aurizon Network also considered that data of a shorter duration might be particularly relevant for ESG-exposed sectors for which business risks will be changing over time.[230]

We consider that there is greater potential for beta estimates calculated with shorter observation windows to feature statistical noise. However, it is important to note that, while the specific set of risks that a firm faces may not change, the firm may still experience changes in the level of systematic risk and therefore its observed beta. This is because systematic risk is a relative measure, and changes to other industries within an economy may cause the covariance of the company's return with the market's return to change even if nothing specifically has changed with

[226] IPART, *Estimating Equity Beta for the Weighted Average Cost of Capital*, final report, August 2020, p. 5.
[227] Based on past advice from Incenta and CEPA, we have previously filtered out firms with market capitalisations less than US$100 million and US$200 million. We consider that US$150 million represents a reasonable cut-off value.
[228] Seqwater, sub. 7, p. 21; Urban Utilities, sub. 10, p. 4; Central Highlands Regional Council, sub. 16, p. 18.
[229] Seqwater, sub. 7, pp. 21–23.
[230] Aurizon Network, sub. 21, p. 9.

the individual business itself. As such, we consider it reasonable to expect beta estimates for businesses to change over time despite a seemingly unchanged risk profile.

In deciding to use an international sample of firms, we noted that the betas for firms in other countries may not always move in the same way as betas for similar firms in Australia. By using a longer time horizon of data, we consider that the impact of short-term events that might cause betas to move in different directions across countries is likely to be less pronounced.[231] Furthermore, using a longer time horizon is likely to produce more stable results, which will allow for more regulatory certainty for stakeholders. Consequently, we consider that using 10 years of data to estimate beta is appropriate for our task. Using data any older may capture market information that is no longer relevant to estimating a current value for beta.

While we will use 10-year data as our primary means to calculate betas we may use five-year betas as a tool to identify changing risk profiles for businesses in certain sectors.

Frequency of returns data

The frequency of returns data refers to the period of time elapsed before calculating the share price movement of a business relative to the movement in the broader market over the same period of time. Regulators in Australia and around the world generally use daily, weekly or monthly returns periods in their determinations; however, there is no consensus as to which is the best frequency. We have previously estimated beta having regard to both weekly and monthly estimates.

DBI submitted that both monthly and weekly beta estimates should play a role in the estimation of beta but also noted that there was potential for these estimates to be influenced by which reference day was chosen to perform the calculation. For instance, a different beta estimate from weekly returns may be derived if Friday to Friday returns are used in comparison to using Tuesday to Tuesday returns. DBI suggested that when calculating weekly or monthly betas, we should take an average of the betas using different weekly and monthly reference day combinations.[232]

Seqwater considered that the statistical precision of estimates will improve as the number of observations within an estimation period increases. However, it noted that this also increased the risk of other statistical problems, such as non-trading issues associated with daily returns. Seqwater was of the view that using weekly returns offers a balance between these alternative considerations and noted that most Australian regulators use weekly returns for this reason.[233]

GAWB and Aurizon Network did not support an approach of only using weekly returns data.[234] GAWB cited reports from Damodaran, Incenta, and Gregory and Gilbert that all offered a preference for using monthly return data. These reports examined certain type of data frequency effects, including trading day bias and opacity, and concluded that they are likely to be more problematic (that is, lead to (downward) bias in beta estimates) when using weekly returns.[235]

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[231] As there is no prior expectation that betas will move in any particular direction, using a longer time series may net out instances where betas have moved in different directions across countries.

[232] Dalrymple Bay Infrastructure, sub. 3, pp. 25–26.

[233] Seqwater, sub. 7, pp. 23–24.

[234] Aurizon, sub. 9, p. 13; GAWB, sub. 22, p. 11–13.

[235] Trading day biases are caused when a firm does not trade close to the end of the trading day, causing beta calculations to under-represent any correlation between the market and firm in question. Opacity issues are associated with the time that it takes market participants to react to market events and news. If a firm is considered opaque, then there may be a delay between movements in the market and the share price of the firm in question, which will be more significant for narrower trading intervals.

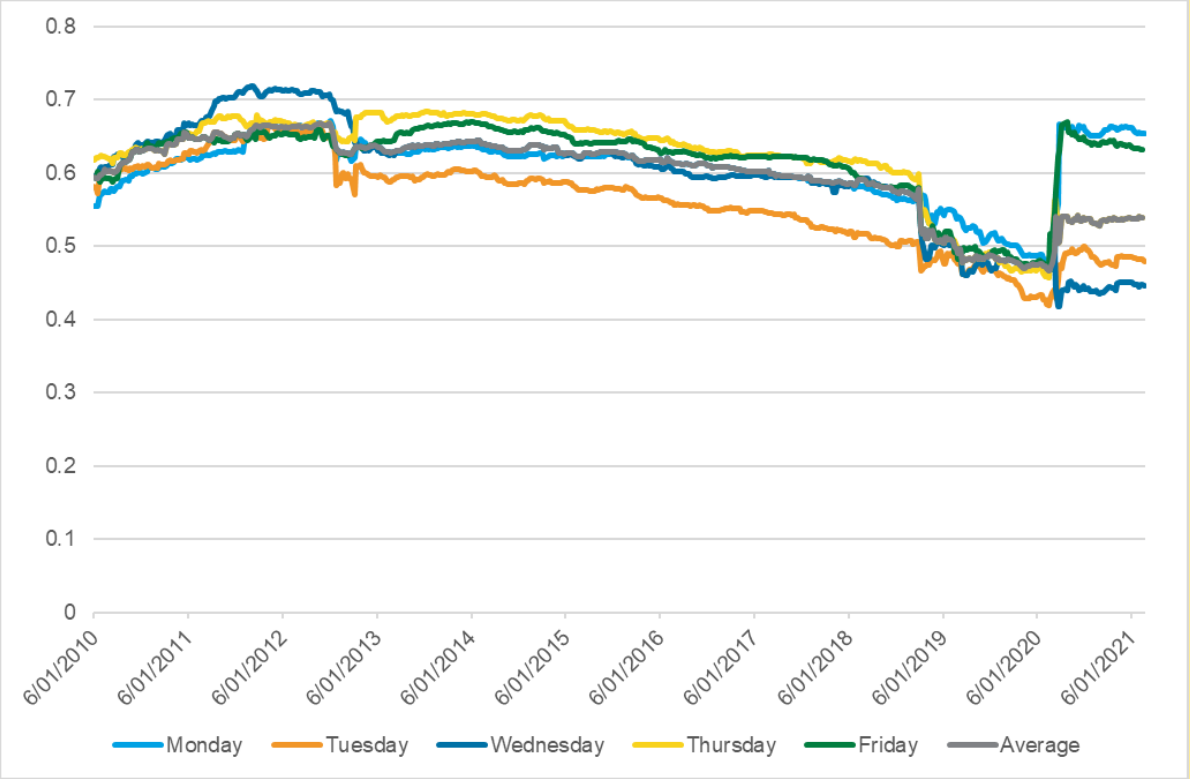
As we are proposing to use a 10-year return window, we are likely to have a sufficient number of observations to use daily, weekly or monthly returns to estimate beta. However, we consider that using weekly data is preferable, as it strikes a balance between having a large number of observations and also being unlikely to capture statistical noise that might possibly be accompanied by higher-frequency (e.g. daily) return intervals. We will not continue estimating betas using monthly returns, as we are of the view that relying on weekly returns is likely to be sufficient and has more attractive statistical qualities—namely, estimates with lower standard errors.

We consider that the presence of trading day biases could lead to understated estimates of betas when using high frequency returns intervals. To test for the presence of potential trading day biases in the firms in our industry sample, we investigated the frequency of trades that occurred in the last one hour of trading across each trading day for two weeks using our regulated energy and water sample. Over this period, we found that across each of the 60 distinct single-minute intervals, on average trades occurred in approximately 52 of the minutes across this sample. As on average there were very few minute intervals where trades did not occur, this suggests that trading day biases are unlikely to be a problem for the firms in our samples.

Similarly, we are not convinced that the time it takes for market participants to react to news about the firm (that is, 'opacity') will lead to a downward bias in the beta estimates of the firms in our sample. The premise of this argument is that it may take investors some time to process news that can influence stock prices, particularly when it is uncertain how this news will impact a particular firm. However, due to the size (market capitalisation) of the firms in our sample and their detailed reporting requirements, we find it unlikely that market participants will be too slow to process market news such that it creates a downward bias on betas. Furthermore, many of the firms in our samples are constituents of the local market indexes that we have used to calculate betas. As such, we consider it doubtful that the firms in our sample would be systematically more opaque than the rest of the firms that are used to define the market.

We note that when using weekly returns, there is the potential for estimates to vary by non-trivial amounts depending on the reference day selected. Figure 4 plots the average rolling equity betas by weekly reference day for a sample of United States regulated energy businesses. It demonstrates the potential differences that may arise. We consider that taking an average of each of these weekly reference day combinations is a reasonable response when dealing with the potential variation that may arise when estimating beta.

Figure 4 Ten-yearly weekly rolling equity betas (median) for United States regulated energy businesses—varied by weekly reference day



Source: QCA analysis.

Levering formula

The equity beta of a firm is affected by its gearing (that is, the proportion of debt in its financial structure). Beta levering formulas are used to adjust betas for gearing and related differences between firms. Such a formula converts ('de-levers') the estimated equity beta values of comparator firms to asset betas to remove the effect of gearing and, depending on the model, other firm- or country-specific effects such as tax.[236] The formula also then converts ('re-levers') the resulting asset beta to estimate an equity beta value for the regulated entity using the benchmark regulatory assumption about the regulated entity's gearing (and in some cases tax environment).

The relationship between the equity beta and gearing requires assumptions in four principal areas, namely whether the firm's:

- sources of finance are ordinary debt and shares, or otherwise[237]
- debt management policy is passive (debt is maintained at a constant level) or active (debt is maintained at a constant proportion of the market value of assets)
- debt provides marginal tax advantages

[236] Relevantly, when de-levering the equity beta values of comparator firms, we use the average gearing of the comparator firm, estimated over the same span of time used to generate an estimate of the equity beta.

[237] 'Straight' debt is an unconditional promise to pay the lender a certain amount by a specified date. It has no special features and cannot be converted into equity of the issuer. A basic example of straight debt is a plain, vanilla bond that obliges the issuer to pay regular, fixed interest and principal repayment upon maturity.

- debt is risky in a systematic sense, such that debt providers share some beta risk.

There are a number of levering formulas set out in finance theory, each of which reflects a specific combination of these assumptions.

In recent reviews, we have used the following levering formula:[238]

$$\beta_E = \beta_A \left(1 + (1 - T_I)\frac{D}{E}\right) - \beta_D (1 - T_I)\frac{D}{E}$$

where TI is the imputation-adjusted tax rate, such that TI = Tc(1–γ), and relevant definitions are:

β_E = equity beta

β_A = asset beta

β_D = debt beta

T_c = statutory corporate tax rate

γ = gamma

D = value of debt

E = value of equity

This formula assumes that a firm operates under a passive debt management strategy (that is, the firm has a constant dollar value of debt), is financed with only straight debt and ordinary shares, and exists in a classical tax world where interest generates a corporate tax deduction (that is, where debt has a tax advantage over equity). It also assumes a positive value for the debt beta, which implies that debt returns incorporate a systematic risk component.

Seqwater submitted that 'the QCA should use de-levering and re-levering formulae that omit the corporate tax term (for example, the Brealey-Myers formulae), to ensure that the beta estimation process is consistent with finance theory'. It cited a Frontier Economics paper that presents a mathematical proof that demonstrates that under the assumption of a constant gearing ratio (rather than a constant dollar value of debt), the Brealey-Myers levering formula is appropriate to use.[239] GAWB also supported the use of the Brealey-Myers formula on the basis that it would reduce the complexity of beta estimation without any loss of robustness.[240]

We have reviewed our use of a passive debt management assumption, as well as the other assumptions. We consider our regulatory gearing assumption of maintaining a constant gearing ratio, rather than constant dollar debt, throughout the regulatory period, is more consistent with an active debt management strategy than a passive strategy. We note that other Australian regulators use formulas that assume an active debt management strategy.[241]

We therefore will use the Brealey-Myers levering formula (with a debt beta) for de-levering and re-levering betas, set out as follows:

$$\beta_E = \beta_A \left(1 + \frac{D}{E}\right) - \beta_D \frac{D}{E}$$

[238] The formula is attributable to Conine. See T Conine, 'Corporate debt and corporate taxes: an extension', *Journal of Finance*, vol. 35, no. 4, 1980, pp. 1033–1036. In applying the Conine formula in Australia, the statutory corporate tax rate is replaced with the imputation-adjusted tax rate.

[239] Seqwater, sub. 7, p. 26.

[240] GAWB, sub. 22, p. 14.

[241] The AER, ERA and IPART use the Brealey-Myers formula, and the ACCC uses the Monkhouse formula.

Empirical evidence supports the view that debt returns contain some element of systematic risk; that is, the debt beta is positive.[242] Some regulators assume a zero debt beta on the basis that, as long as there is consistency in the debt beta value between the de-levering and re-levering processes, the effect on the resulting equity beta will be immaterial.[243] We agree with this conclusion in cases where the benchmark gearing of the regulated firm is not materially different from the gearing of the comparators. However, the average gearing of firms in our industry samples tends to be materially different from the benchmark level of gearing that we assume for many of the firms subject to our regulatory regime.

For these reasons, we will retain a positive value for the debt beta. In recent reviews, we have used a value for the debt beta of 0.12. While Australian regulators tend to assume a debt beta of zero, two United Kingdom regulators, Ofgem and Ofwat, have applied values of 0.075 and 0.12 respectively for the debt beta in recent reviews.[244] We are not aware of any further information that would provide a compelling reason for us to change our estimate of the debt beta. As such, our view is that a debt beta of 0.12 is appropriate.

Form of regression

Traditionally, we have used ordinary least squares (OLS) regressions to estimate a value for beta. The objective of an OLS regression is to minimise the sum of squared errors of the residuals within the set of observations. However, an implication of this method is that outlier observations are given material weight when determining the slope of the regression, which in our case is the estimate of beta.

There are other forms of regression that have other objectives. For instance, least absolute deviations (LAD) aims to minimise the unsquared sum of residuals, rather than the squared sum. As a result, estimates generated using LAD are less sensitive to outliers in the data series. LAD is used by the ERA to estimate betas alongside OLS and other regression techniques.[245]

While we will continue using OLS to estimate beta and recognise that it is the most widely used regression technique, we consider that there may be merit in using LAD as a crosscheck to identify outliers in our returns data. In the event that we are concerned with the presence of outliers in the data for some comparators, we will give weight to beta estimates produced by LAD for those firms.

Low beta bias

Seqwater submitted that since the SL-CAPM was developed, overwhelming empirical evidence has emerged that shows the SL-CAPM underestimates the required return on equity for stocks with a beta of less than 1—otherwise known as 'low beta bias'. Seqwater cited studies conducted

[242] See SM Schaefer and IA Strebulaev, 'Structural models of credit risk are useful: evidence from hedge ratios on corporate bonds', *Journal of Financial Economics*, vol. 90, no. 1, 2008; M Schwert and I Strebulaev, *Capital Structure and Systematic Risk*, Rock Center for Corporate Governance, working paper no. 178, April 2014, doi: 10.2139/ssrn.2421020.

[243] For example, see ACCC, *NSW and ACT Transmission Network Revenue Cap: TransGrid 2004–05 to 2008–09*, final decision, 2005, p. 157.

[244] Ofgem, *RIIO–ED2: Sector Specific Methodology Decision - Finance*, March 2021, p. 44; Ofwat, *PR19 final determinations: Allowed return on capital technical appendix*, December 2019, p. 4.

[245] ERA, *2018 and 2019 Weighted Average Cost of Capital For the Freight and Urban Networks, and the Pilbara Railways,* final determination*,* August 2019, p. 55.

by NERA (2013), SFG (2014) and Frontier (2018) as evidence that low beta bias exists in Australia.[246]

Seqwater considered low-beta bias to be among the most compelling arguments that any stakeholder could submit to a regulatory process. Seqwater said evidence supporting low-beta bias has been documented in the most highly regarded, peer-reviewed journals by leading finance scholars (including Nobel laureates) over several decades in a number of developed markets and that it is so well accepted that it is documented in standard undergraduate finance textbooks.

In relation to lower beta stocks realising higher returns than predicted by the CAPM, Seqwater considered it implausible for investors to be continually surprised by the outcomes of the CAPM over a large span of time. Seqwater submitted that a more realistic scenario is that the CAPM does not perfectly describe stock returns. Furthermore, Seqwater considered it inconsistent to use actual stock price data in forming an estimate of the MRP via the Ibbotson method but not using this same data as evidence of low-beta bias.

Seqwater proposed that, rather than quantify the size of low beta bias and apply it as an uplift, we should consider the tendency for the SL-CAPM to underestimate the required return on equity for low beta stocks when we determine a value for beta.[247]

The issue of low beta bias has featured prominently as part of Australian regulatory decisions for a number of years. Central to the NERA 2013 and SFG 2014 papers claiming that low beta bias exists is the analysis of ex post Australian stock returns. Importantly, however, it is the expected return of investors that is relevant to the CAPM (rather than the realised return). There may be several reasons why realised returns depart from expected returns for significant periods of time. For instance, falling interest rates, the overpricing of high beta stocks, and economic shocks are all reasons that could cause realised returns to exceed returns implied by the CAPM for low beta stocks.

Frontier's 2018 paper uses analyst forecasts as a proxy for expected returns to show that on an ex ante basis, investors require a higher return for low beta stocks than would be implied by the standard CAPM. However, as Partington and Satchell comment in their 2018 paper, there is significant literature to suggest that analyst forecasts are biased upwards and therefore are not a good proxy for expected returns.[248] As such, we do not consider that these papers provide persuasive evidence of low beta bias in Australia.

Furthermore, we do not consider it inconsistent to use actual stock data to estimate the MRP but not use the same data as evidence of low beta bias—the data can be appropriate for one estimation task but inappropriate for a different one. Our view is that the long time-series returns data that is available has favourable properties for estimating the MRP. This view appears to be reflected in the practices of investors and market practitioners who make use of historical returns when estimating the MRP but infrequently make adjustments for low beta bias when estimating rates of return.

We further note that there is no precedent within Australian regulatory decisions to make adjustments for low beta bias. We are not convinced that there is sufficient evidence for us to adjust our estimate of beta for low beta bias.

[246] NERA, *Estimates of the zero-beta premium*, June 2013; SFG Consulting, *Cost of equity in the Black Capital Asset Pricing Model*, May 2014; Frontier Economics, *Low-beta bias and the Black CAPM*, September 2018.
[247] Seqwater, sub. 7, pp. 27–29.
[248] G Partington and S Satchell, *Discussion of submissions on the draft 2018 guideline*, report to the AER, November 2018.

Holding beta estimates constant over time

Seqwater proposed that we depart from the status quo regulatory beta estimate only if there is sustained evidence that beta has increased or decreased.[249]

We note that our estimate of beta, like all aspects of our regulatory decisions, is considered afresh from review to review. While maintaining a given beta value for a specific regulated entity would provide greater stakeholder certainty, we consider that there could be reasons to depart from a beta value used in a previous review. The systematic risk for the regulated entity need not stay static. For instance, if there are proposed changes to the regulatory regime that the firm operates within, or if the profile of the customer base changes significantly from one review to another, then such changes may impact our view of what constitutes a reasonable beta.

Another option is for us to keep our estimates for industry beta reference points fixed (as opposed to our determination of beta for the regulated entity itself), unless we are convinced that there is sufficient reason to change or update them. While the beta estimates for our various industry samples may stay relatively constant over time, particularly as we are estimating these betas using a 10-year window, the systematic risk facing industries may still change. This may cause some industries to become more relevant or less relevant when estimating a reasonable beta for the firms subject to our regulatory regime. We further note that our industry sample estimates are only being used as reference points and are not intended to be determinative.[250] So even if our estimates of these reference points change, we may not necessarily vary our estimate of beta for the regulated entity. Consequently, we will not hold fixed our industry sample beta estimates.

6.5.5 Summary of beta methodology

Our methodology for estimating beta reference points is summarised below. The methodology involves a two-step process—generating industry samples by identifying relevant firms and then estimating the betas for the firms that make up these industry samples.

Step 1. Generate industry samples

- Identify firms that may be relevant as part of industry samples.
- Screen firms, removing firms that do not have comparable risk to a typical firm operating in the industry sample.
- Remove firms with market capitalisation of less than USD$150 million.

Step 2. Estimate industry sample reference point betas

- Form of regression: ordinary least squares with least absolute deviations as a crosscheck.
- Time horizon of data: 10 years.
- Frequency of returns: weekly (an average of estimates generated by all five reference day combinations).
- Further data adjustments: none.
- De-levering formula: Brealey-Myers.

[249] Seqwater, sub. 7, p. 30.
[250] Other information that we will consider when assessing a reasonable beta includes past regulatory decisions and the regulatory decisions for potentially similar firms.

6.6 Risk-free rate

6.6.1 Overview

The risk-free rate is the rate of return an investor would expect to receive on an asset with zero default risk. It compensates an investor for the time value of money.

Estimation of the risk-free rate requires determining an appropriate term to maturity, proxy, data source and estimation method (including an averaging period). We estimate the risk-free rate using current rates as we consider they provide the best estimate of future rates.

We will calculate the risk-free rate by:

- using 10-year Australian Government nominal bond yields
- averaging the yields over a period nominated by the regulated entity that is between 20 and 60 business days in length, ending as close as reasonably possible to the commencement of the regulatory period.

This method is similar to the method applied by other Australian regulators and is very similar to the method we have applied in recent decisions. A difference we are considering is increasing the length of the averaging period—we previously considered 20 days was appropriate but now consider up to 60 days is appropriate.

Key issues that we identified during our review are:

- proxy and term to maturity (sections 6.6.2 and 6.6.3)
- estimation method and data source, including averaging period (section 6.6.4)
- linkages to other aspects of the regulatory framework (section 6.6.5)
- calculation steps and example (Appendix F: Risk-free rate estimation).

We discuss broader considerations for the risk-free rate in the context of the cost of equity (including the relationship with the MRP) at the beginning of this chapter and in section 6.3.

6.6.2 Proxy

We will use Australian Government (nominal) bonds as the proxy asset for the risk-free rate. These bonds have very low default risk and are also highly liquid. Other Australian regulators also accept Australian Government bonds as a proxy for the risk-free asset.

6.6.3 Term to maturity

We consider it is reasonable to use long-term Australian Government bonds based on a 10-year term to maturity.[251] We consider this approach reflects the requirements of investors and lenders who, in relation to long-lived infrastructure assets, will deploy equity over the entire life of the asset, rather than over any given regulatory period. While we prefer a long-term bond based on the life of the assets, 10 years is the longest-term bond available that is sufficiently liquid.[252]

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[251] In the last decade, we have estimated the risk-free rate using an interpolated term-matched bond term. However, in our most recent reviews, we have reverted to using a 10-year bond term, as we considered that it would better provide for an overall return that was commensurate with the commercial and regulatory risks associated with investment for the life of the asset.

[252] In its simplest form, the SL-CAPM is a one-period model that determines an expected rate of return over a future period that corresponds to investors' common investment horizon. However, the model does not define the term of this horizon. Therefore, common practice is to define the horizon consistent with the problem that is the subject

This approach is widely applied by Australian regulators. Regulators have generally accepted the argument that the term of the bond should be a proxy for the life of the regulated asset. Given the long-term nature of infrastructure asset investment, we consider that a longer-term bond may better reflect the expectations of investors than a shorter-term bond.

Aurizon Network, Seqwater, QTC and GAWB all supported the use of a 10-year Australian Government bond to estimate the risk-free rate.[253] However, GAWB noted that there is a growing market for 30-year bonds in Australia, given the Commonwealth Government has issued its first 30-year bond in October 2016. While acknowledging that the market was not as deep when compared to 10-year bonds, GAWB considered that 30-year rates were a relevant source of information for firms that are investing in very long-life assets.[254]

We note that there is not yet significant depth in Australian government bonds with maturities close to 30 years. As of September 2021, there was only one bond on the market with a maturity close to 30 years. This near 30-year bond has a lower level of turnover than bonds with a 10-year maturity. We have also observed greater bid-ask spreads for longer term Australian government bonds, indicating a lower level of liquidity. At this stage, we will not use the yields of 30-year bonds to estimate a risk-free rate. However, once we are satisfied that bonds with greater maturity are sufficiently liquid, we will consider using them to estimate the risk-free rate.

6.6.4 Estimation method and data source

We will use daily Australian Government bond rates published by the RBA (F16 table) to estimate the risk-free rate. The RBA is a reliable source of information, and its data is publicly available and therefore transparent. The yield for a particular day can be interpolated from two data points either side of that day and then converted into an effective annual rate. The method for this interpolation (set out in Appendix F: Risk-free estimation) is the same method used by other Australian regulators.[255]

While we seek a risk-free rate that is as close as possible to the commencement of the regulatory period, so that it is current, we will average the daily risk-free rate over a short period, to manage the risk of unanticipated volatility from one-off shocks. This averaging approach is consistent with Australian regulatory practice.[256] Therefore, we will estimate the risk-free rate by taking an average of the daily risk-free rate over a short period nominated by the regulated entity.

GAWB submitted that 10-year Australian Government bond yields are likely to be affected by the bond purchasing program conducted by the RBA. GAWB highlighted an RBA paper that estimated that longer-term Australian Government securities have seen their yields reduced by around 30 basis points due to the program.[257]

We consider the relevant risk-free rate for making an investment decision is the current risk-free rate, as it reflects the most relevant and up-to-date information (providing the best estimate of expected, future rates).

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of analysis. Accordingly, if one wants to estimate an expected return on equity for the life of an asset, the term of the risk-free rate would be set to the life of the regulated assets (or to a proxy for the life of the assets).

[253] Aurizon Network, sub. 21, p. 8; Seqwater, sub. 7, p. 4; QTC, sub. 9, p. 18; GAWB, sub. 22, p. 15.

[254] GAWB, sub. 22, p. 16.

[255] For example, the AER applies this approach in its 2018 rate of return instrument (clause 16).

[256] For example, see AER, *Rate of return guidelines*, explanatory statement, December 2018, p. 131; ESCOSA, *SA Water Regulatory Determination 2020*, final determination: statement of reasons, June 2020, p. 218.

[257] GAWB, sub. 22, pp. 16–18.

Regardless of the RBA undertaking its bond-buying program, the yields on 10-year government bonds still provide a proxy for the current risk-free rate for investments in Australia. As such, we will not vary our estimate of the risk-free rate. However, to the degree that the RBA's actions have impacted our estimate of the risk-free rate, this is a factor we could consider when performing our top-down assessment.

Averaging period

Our view is to allow the regulated entity to propose the timing and length of the averaging period, subject to the following conditions:

- Length—the averaging period should be between 20 and 60 business days. This window is short enough to provide a rate that reflects current conditions, but long enough to smooth the effects of temporary data shocks. We note this would represent a departure from our previous application of a 20-day averaging period. We consider allowing a longer averaging period would provide regulated entities with the opportunity to reduce their exposure to short-term volatility in bond yields. A period of 20 to 60 days is consistent with the practice of other Australian regulators, which also use averaging periods of between 20 and 60 days.[258]
- Timing—the averaging period should commence as close as reasonably practical to the start of the regulatory period (ending before commencement of the period), to capture current rates.
- Nomination—the regulated entity must nominate the averaging period in advance of the averaging period commencement date. This is standard practice, to reduce the potential for 'cherry-picking' of a period.

If a final decision is delayed, we do not consider it is necessary for an entity to nominate a revised averaging period. In particular, where the delayed determinations are made as if they were in effect from the original commencement of the regulatory period, the original averaging period would remain appropriate. This approach is consistent with our past practice and regulatory practice in Australia.[259]

QTC supported an averaging period of 20 to 60 days, provided we adopt its proposed weights for the MRP estimation methods.[260] ARTC submitted that our current approach of averaging market-based parameters, such as the risk-free rate over a 20-day period, 'results in the derived WACC adopting market volatility (notwithstanding the assumption that investors take a long-term view on matters such as inflation and risk because they seek stability)'.[261] While we consider it remains appropriate to use a current estimate of the risk-free rate (rather than an estimate based on long-term historical data) (section 6.3), we are open to extending the allowed averaging period to 60 days, which may help reduce the impact of volatility relative to a 20-day averaging period.

[258] For example, in recent decisions, the AER has allowed 20–60-day averaging periods, the ACCC 20 days, ERA, the ICRC and OTTER 40 days and ESCOSA 60 days.
[259] See the AER, *Draft rate of return guidelines*, explanatory statement, July 2018, p. 195.
[260] QTC, sub. 9, p. 14.
[261] ARTC, sub. 15, pp. 3–4.

6.6.5 Linkages with other aspects of regulatory framework

The risk-free rate is used in two places in the CAPM to estimate the cost of equity—it is the first term in the CAPM formula (to which a premium for risk is added) and it is also used to estimate the MRP.

7 METHODOLOGY FOR ESTIMATING GAMMA

The Australian tax system allows companies to provide shareholders with credits (that is, dividend imputation credits) to reflect company taxes paid on profits that are distributed as dividends. Shareholders then use dividend imputation credits to reduce their own tax liabilities. Therefore, imputation credits effectively reduce a company's cost of equity, because they reduce the cost a company incurs in providing its shareholders with the return that they require.

7.1 Key points

- Gamma is the value to investors of distributed dividend imputation credits. The higher (lower) the value of gamma, the greater (lesser) the benefit to investors; accordingly, the lesser (greater) the value of the tax building block in allowable revenue, all else equal. In this review, we outline our proposed approach to estimating gamma.
- Consistent with Australian regulatory practice, we propose to estimate gamma as the product of two components:
  - *distribution rate*—the ratio of distributed imputation credits to company tax paid, and
  - *utilisation rate (theta)*—the rate at which distributed imputation credits are used by investors in the market.
- We will rely on the published annual reports of selected firms (for data on the distribution rate) and Australian Bureau of Statistics (ABS) data (for data on the utilisation rate), rather than Australian Tax Office (ATO) data, for estimation purposes. Given the reservations of the ATO about using its public taxation statistics for detailed time series analysis of the imputation system, we consider that using taxation statistics data is not appropriate at this time.
- We consider that it is appropriate to estimate the distribution and utilisation rates in the following way:
  - Base the distribution rate on the average distribution rate of relevant firms from the 50 largest (by market capitalisation) ASX-listed firms. This sample is a reasonable set of companies given their large proportion of total market capitalisation, and therefore large influence on the distribution rate, and their financial statements provide the best quality data.
  - Base the utilisation rate on the equity ownership of Australian-listed companies, using ABS data.
- In addition to periodically updating our estimates, we will undertake an assessment of alternative estimation techniques of gamma, where necessary, to validate our proposed approach.

Our preliminary view is that a value of 0.484 for gamma is appropriate, based on a distribution rate of 0.88 (average distribution rate of relevant top 50 companies on the ASX by market

capitalisation) and a utilisation rate of 0.55 (equity ownership of Australian listed companies). This value of gamma is similar to values applied by other Australian regulators (see Table 14).[262]

7.2 Imputation credits and the regulatory context

7.2.1 Imputation credits

Dividend imputation prevents the double taxation of company profits in the hands of the beneficial owner. Dividends are paid to equity holders after company tax has been levied—which means that taxation has already occurred at the company level. Dividend imputation treats the corporate taxes associated with dividends paid to shareholders as a pre-payment of shareholders' personal tax on the dividends.[263] The dividend imputation, or 'franking', credits attached to dividends give shareholders a tax credit for the taxes already paid by the company. Specifically, one dollar of distributed imputation credits allows eligible shareholders to reduce their tax liability by one dollar.

Eligible shareholders include Australian resident individuals, complying superannuation funds, certain trustees, complying approved deposit funds, and certain classes of non-resident investors. However, most non-resident investors are ineligible to use these credits to reduce their tax liabilities (for example, foreign investors).

7.2.2 Regulatory context

Consistent with other Australian regulators, we use a nominal, post-tax WACC, specifically Officer's 'WACC3' definition. A 'post-tax' framework refers to the rate of return after company tax (but before personal taxes owed by shareholders or other ultimate beneficiaries). For Officer's WACC3, it is established regulatory practice to estimate the tax paid by a firm (company tax) and the value of imputation credits (gamma) within the allowable regulatory cash flows as separate items.

The higher (lower) the value of gamma, the greater (lesser) the tax benefit to the firm's investors and, accordingly, the lower (higher) the tax component of the firm's allowed revenues.

7.2.3 Form of gamma—market-wide framework

The standard approach in the Australian regulatory context is to estimate gamma as the product of two parameters, a distribution rate and a utilisation rate. Seqwater submitted that there is broad agreement between all regulators and experts that, across Australian regulators, gamma should be estimated as the product of the distribution and utilisation rates.[264]

Consistent with Australian regulatory practice, we will estimate gamma as the product of the:

- *distribution rate*—the ratio of distributed imputation credits to company tax paid, and
- *utilisation rate*—the rate at which distributed imputation credits are used by investors in the market.

[262] For example, recent decisions of the ERA, ACCC and ESCOSA have applied a value for gamma of 0.5. In the AER's recent rate of return guideline, it applied a value of 0.585.
[263] We note that not all shareholders receiving imputation credits pay personal tax.
[264] Seqwater, sub. 7, pp. 36–37.

7.3 Estimation of the distribution rate

Our view is that the data from the top 50 listed firms provide a reliable estimate of the distribution rate for the benchmark firm.[265] The available data and analysis support a current distribution rate of 0.88, based on the average distribution rate of relevant top 50 ASX companies, with the data sourced directly from their financial statements. This estimation approach is consistent with our past practice and other regulators' practices (see Table 14).

We will not use taxation statistics to estimate the distribution rate, given the ATO's stated concerns with using its own data for such a purpose:

> Taxation Statistics cannot be used to estimate the quantum of franking credits created, distributed or received by a company or group over time. This is because it has insufficient information to reliably quantify these amounts.[266]

Seqwater suggested that the assessment of gamma should take account of whether the benchmark efficient entity is a large multinational, (and if not) then estimate the distribution rate by giving consideration to the proportion of credits distributed by unlisted firms in Australia. Seqwater argued that the largest listed firms in Australia are unlikely to be good proxies for the benchmark efficient business—where these firms are multinational firms—as they 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). As such, Seqwater said foreign profits enable any firm to distribute more imputation credits than it would otherwise have been able to.[267]

We have reviewed our approach to estimating the distribution rate, including considering stakeholder comments and current regulatory practice. We recognise that, within the context of the Officer framework, the distribution rate is a firm-specific parameter. However, using a regulated firm's actual distribution rate is not consistent with the general Australian regulatory practice of relying on benchmarks for cost of capital estimation (for example, beta). Addressing this point means we need to consider either some type of industry-wide or market-wide (average) rate.

We consider that related firms, or firms in the same industry, are likely to better match the benchmark efficient entity in the characteristics that are relevant to determining the distribution rate.[268] This suggests that one possibility is to use the set of listed infrastructure firms in Australia that are subject to similar regulatory frameworks (for example, five-yearly resets).[269] On this

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[265] As discussed later in this section, the distribution rate for a firm is calculated as distributed credits divided by tax paid. A market-wide rate then aggregates over the individual firm distribution rates in a sample. As tax paid is highly (positively) correlated with market capitalisation, the largest companies listed on the ASX will be the most influential in determining a market-wide distribution rate. Further, as the sample is expanded to include more firms, the net benefit of adding more firms declines, as they are less influential in impacting the overall rate, and the cost required to assess the financial statements is material. For example, expanding the sample from the top 20 to 50 ASX-listed firms changes the estimate from 0.88 to only 0.89 (before applying any filters).

[266] Australian Tax Office, *Franking account balance—tax of time series data from Taxation Statistics*, ATO note to the AER, 14 September 2018.

[267] Seqwater, sub. 7, pp. 37–39.

[268] The benchmark efficient entity (BEE) is a firm with a similar degree of risk to the regulated firm. This aspect of the definition is consistent with the decision that the Full Federal Court handed down in May 2017—*Australian Energy Regulator v. Australian Competition Tribunal (No. 2) [2017]* FCAFC 79 [537]. Another aspect of the definition is that the benchmark efficient entity is a firm that operates in Australia. The location of a firm determines the conditions under which it operates, including tax regime, industry structure, regulatory regime, and the broader economic and policy environment. These factors all interact to affect the firm's risks in providing the regulated service.

[269] Alternatively, one could use the set of all firms regulated by us. However, and consistent with other jurisdictions, the majority of regulated firms are government-owned corporations (GOCs) that do not issue credits.

basis, the resulting sample would include three listed, network energy businesses regulated by the AER (APA Group (APA), AusNet Services (AST), and Spark Infrastructure (SKI)) and two infrastructure firms regulated by us (Aurizon Holdings Ltd (AZJ) and Dalrymple Bay Infrastructure Ltd (DBI)).[270, 271]

Using the firms' financial statements over a long period (2007–2017), it is possible to calculate distribution rates of 0.84 and 1.0 for APA Group and AusNet Services respectively, and a rate of 0.89 for Aurizon.[272,273] However, it is not possible to determine an estimate for either Spark Infrastructure or DBI.[274] The simple (unweighted) average distribution rate for these three firms is 0.91. As this sample comprises only three firms, the resulting estimate may be unreliable.

An alternative is to include more firms in the sample but at the cost of adding firms that are less similar to the benchmark efficient entity. One such approach relies on the largest ASX-listed firms by market capitalisation. As their market capitalisations are highly (positively) correlated with their tax payments to the ATO, these firms will be the main influencers of the resulting distribution rate.[275] Using the 20 largest firms, their aggregate distribution rate is 0.88 for 2000–2017.[276]

The principal criticism of this approach in recent years has been that the resulting distribution rate does not reflect a rate that is appropriate for the benchmark efficient entity, as the latter differs from firms in the top 20 with respect to factors relevant to determining the distribution rate.[277] The Independent Panel recommended in its review of the AER's draft rate of return guidelines that the AER increase the size of its sample, because the top 20 set of firms contains:

- companies with substantial foreign operations but the definition of the benchmark efficient entity excludes foreign operations
- a concentration of finance companies that carry substantial weight but are unlike the benchmark efficient entity.[278]

[270] Other listed, regulated firms are not listed on the ASX but on a stock exchange in another country. For example, the Mid-West and South-West Gas Distribution Systems (GDS) is a distribution pipeline fully regulated by the ERA. The GDS is owned and operated by ATCO Gas Australia Pty Ltd (ATCO), which is a public company trading on the Toronto Stock Exchange (TSX).

[271] On 23 August 2021, Spark Infrastructure announced that it had entered into a Scheme Implementation Deed, under which Pika Bidco Pty Ltd (Bidco) would acquire Spark Infrastructure.

[272] See M Lally, *Review of the AER's views on gearing and gamma*, report for the Australian Energy Regulator, 2018, pp. 19–20.

[273] The calculation for Aurizon is over the shorter period 2013–2017, as earlier statements do not report a franking account balance.

[274] With respect to Spark Infrastructure, its financial statements from the latter part of the estimation period do not record a franking account balance or the status of dividends (i.e. whether franked or unfranked). DBI has only been listed since December 2020, so there is insufficient data.

[275] The distribution rate for the sample is the sum over all firms of distributed credits divided by the sum over all firms of tax paid.

[276] The first estimate of the distribution rate for the top 20 firms was 0.84 using earlier data from 2000–2014 (see M Lally, *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, report for the Queensland Competition Authority, 2014, p. 40). For the estimate of 0.88 see M Lally, *Estimating the distribution rate for imputation credits*, report for the Australian Energy Regulator, 2018, p. 10.

[277] ENA, submission to the AER, *Draft rate of return guidelines*, 25 September 2018, pp. 146–147.

[278] The financial companies include banks, insurance companies, and diversified financials (see Independent Panel, *Review of the Australian Energy Regulator's rate of return draft guidelines*, September 2018, p. 53.)

In response, the AER subsequently expanded its sample to include the largest 50 ASX-listed companies. The estimate of the distribution rate from this sample increased marginally from 0.88 to 0.89. The AER rounds this figure to 0.9, and the ERA does likewise.[279]

We consider it a reasonable approach to use a larger sample of listed firms—the problem with industry-specific data in this context is that the sample size is too small. Also, we do not consider unlisted companies to be appropriate for such a sample. Regulated firms in our jurisdiction are either privately-owned, listed firms or government-owned corporations (the latter of which we generally benchmark against private sector (listed) firms (for example, beta)). Relevantly, listed firms are, in general, widely held and are likely to have dividend policies that are more similar to those of the benchmark regulated firm.[280]

That said, we do have some reservations about relying on a sample that includes firms with substantial foreign operations and large financials, the latter of which includes banks, diversified financials, and insurance companies. These firms are likely to affect the distribution rate in a way that is not reflective of the benchmark efficient entity. We have examined the distribution rate data for the top 50 companies using the most recent data available (2000–2018) and undertaken some sensitivity analysis (Table 13).

Table 13 Distribution rate estimates (2000–2018)

Sample	*Distribution rate*	*No. of firms*
Top 50 – all firms	0.89	48[a]
Top 50 – less firms with 1) foreign operations > 10%[b]	0.88	20
Top 50 – less firms with 1) foreign operations > 10%; 2) financial services	0.88	18[c]

a The financial statements of Vicinity and GPT do not report franking credit information or a franking account balance respectively, so data from these companies was not usable. Therefore, the number of firms in the 'top 50' actually contributing data is 48. b The best available proxy is proportion of accounting income or alternatively, revenue, arising from foreign operations. c Removing financial firms only removes two additional firms because most are filtered out of the sample when firms with foreign operations (> 10%) are removed.

This analysis indicates that the distribution rate estimate from a group of the top 50 listed companies on the ASX is relatively robust to the removal of firms about which stakeholders have material concerns (that is, financial companies and firms with revenue from material foreign operations). We note that removing both sets of firms from the top 50 leaves a sample of 18 firms with an aggregate distribution rate of 0.88. Our preliminary view is that an estimate of 0.88 is a reasonable proxy for the distribution rate at this time.

In summary, the distribution rate is a firm-specific parameter. However, benchmark and pragmatic considerations support using a larger sample to obtain a better estimate. While some firms in the sample do not necessarily match characteristics of the benchmark efficient entity, it is difficult to construct a sample that does so and is sufficiently large. Data should be drawn from

[279] ERA, *2018 and 2019 weighted average cost of capital for the freight and urban networks, and the Pilbara railways*—final determination, August 2019, pp. 74–75.

[280] Unlisted firms tend to be owned by individuals who have an incentive to reduce dividends to limit the amount of tax paid at higher marginal, personal rates. As a result, the dividend policy, and therefore distribution rate, of these firms would be likely to differ materially from those of the benchmark regulated firm.

listed firms only, as unlisted firms have features that are not generally consistent with the benchmark regulated firm.

7.4 Estimation of the utilisation rate

We consider that the Officer CAPM is consistent with defining the utilisation rate as a (weighted) average of the utilisation rates of individual investors in the market (with the rate equal to one for those investors who can use the credits and zero for those investors who cannot use them).

We consider that the equity ownership approach is the best methodology available to estimate the utilisation rate in this context. The equity ownership approach measures the proportion of Australian equities held by local investors. The method uses data from the ABS, and reliance on this data for this purpose is consistent with regulatory practice. The available data and analysis support a current utilisation rate of 0.55 (section 7.4.2).

In the Australian regulatory context, other approaches have been used to estimate the utilisation rate. The most prominent alternative has been the use of dividend drop-off studies, which seek to measure a 'market' value of the credits.

7.4.1 Dividend drop-off studies

Dividend drop-off studies examine how share prices change on ex-dividend days after the distribution of both cash dividends and attached franking credits. The amount by which the share price changes (on average) is assumed to reflect the value investors place on the cash dividend and imputation credit, as separate from the value of the shares.

Seqwater supported using this methodology. It argued that the assessment of gamma should be interpreted as the economic value that investors place on imputation tax credits. As such, Seqwater said that what is required is an estimate of the market value of the credits—the amount of dividends and capital gains that investors would be prepared to give up to receive a dollar of imputation credits. Accordingly, Seqwater considered that the utilisation rate should be estimated using techniques that are designed to estimate the market value of credits (for example, dividend drop-off analysis).[281]

However, interpreting the utilisation rate as a market value is not consistent with its conceptual meaning in the Officer CAPM framework.[282] The interpretation of the utilisation rate as the proportion of distributed imputation credits used by shareholders as an offset to personal tax rather than as a market value for imputation credits is also consistent with the definition set out by Officer:

> A proportion (γ) of the tax collected from the company will be rebated against personal tax and, therefore, is not really company tax but rather is a collection of personal tax at the company level.[283]

Further, the value of imputation credits is not directly observable in dividend drop-off studies, and any estimate will impound other, unrelated effects, including differential tax rates,

[281] Seqwater, sub. 7, pp. 37–39; Seqwater, sub. 27, p. 3.

[282] Officer (1994) does not provide a formal derivation of his model, but Monkhouse rigorously shows that gamma is the product of a distribution rate and a utilisation rate, where the latter is a weighted average over the rates of individual investors. See P Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting* & *Finance*, vol. 33, no. 2, 1993, pp. 1–18.

[283] RR Officer, 'The cost of capital of a company under an imputation tax system', *Accounting* & *Finance*, vol. 34, no. 1, 1994, pp. 1–17.

transaction costs, the presence of tax arbitrageurs, and risk—allowing for these effects, and separating them from each other, is difficult and complex.

One implication is that multiple interpretations of the value of a distributed credit are possible, depending on the assumptions made about the interaction of the above factors. Such assumptions can also affect the choice of statistical dividend drop-off model for estimation purposes and the treatment of the data.[284]

7.4.2 Equity ownership approach

The equity ownership approach calculates the shares of domestic and foreign Australian equity ownership and assumes utilisation rates for these two classes of investors of one and zero respectively.

We have examined the impact of foreign ownership of listed Australian equity, based on the percentage of foreign ownership and assuming a utilisation rate of one for domestic resident investors (and zero for foreign investors). This analysis indicates an average utilisation rate of 0.55 for listed Australian equities.

We used the ABS national accounts data to estimate the types of equity that are most relevant to the estimation of a market-wide utilisation rate[285], namely the equity held by:

- the classes of domestic investor that are eligible to utilise imputation credits (that is, 'households', 'life insurance corporations', and 'pension funds').
- the classes of investors that are not eligible to use imputation credits (that is, 'the rest of world').

Given that the cost of capital is a forward-looking concept, we consider that an estimate of the expected share of foreign ownership should be based on a period of the most recent five years of available data.[286] In addition, ownership of listed shares is considered to be more relevant than unlisted equity when estimating the utilisation rate to apply to regulated firms in our jurisdiction. As indicated previously, regulated firms are, in general, either privately-owned, listed companies or government-owned corporations (the latter of which we generally benchmark against private sector (listed) benchmarks).

Seqwater noted that some estimates for the components of gamma relate to both listed and unlisted companies.[287] Using both listed and unlisted equity increases the utilisation rate estimate.[288] As indicated above, we consider that it is preferable if gamma is based on estimates for listed companies, as we consider that listed companies are more relevant benchmarks for the regulated firms in our jurisdiction. We consider it likely that there are various impediments to efficient investment by investors in unlisted companies—specifically high transactions costs, lack of relevant information, and limited divisibility and marketability of unlisted assets. In addition, we note that the basis of estimation of other parameters in the CAPM (that is, the market risk premium and beta) also relates to listed companies.

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[284] JC Handley, *Further issues relating to the estimation of gamma*, report for the AER, October 2010; D Cannavan, F Finn and S Gray, 'The value of dividend imputation tax credits in Australia', *Journal of Financial Economics*, vol. 73, no. 1, 2004, pp. 167–197.

[285] ABS, *Australian National Accounts: Finance and Wealth, December 2020*, released 25 March 2021.

[286] This provides 20 observations with which to estimate the utilisation rate (five years of quarterly data).

[287] Seqwater, sub. 7, pp. 36–37.

[288] For example, using listed and unlisted equities the AER generated 0.639 as the most recent point estimate of the utilisation rate—AER, *Rate of return annual update,* December 2020, p. 26.

7.5 Australian regulatory practice

In assessing whether our proposed approach to gamma is appropriate, relevant considerations include the reasons and values that other Australian regulators apply in determining gamma. We consider our approach to assessing gamma is supported by other Australian regulators (Table 14).

Table 14 Australian regulatory approaches to estimating gamma

Regulator	*Distribution rate*	*Utilisation rate*	*Gamma*
AER	0.9 using ASX data	0.65 using equity ownership approach based on the ABS data	0.585
ESC compliance statement	Consideration of Australian regulatory precedent.		0.35−0.5
IPART	0.7 using ATO statistics	0.35 using dividend drop-off of study	0.25
ESCOSA	0.7−1.0 using a range of evidence	0.35−0.81 using a range of evidence	0.5
ERA (electricity)	0.9 using ASX data	0.6 using equity ownership approach using ABS data	0.5
OTTER, ICRC	These regulators adopt the AER's approach to determine gamma.		

Sources: AER, Rate of return instrument, explanatory statement, December 2018, pp. 307–312; ESC, Interim commentary - Port of Melbourne tariff compliance statement 2020–21, December 2020, p. 21; IPART, Review of our WACC method, final report, February 2018, pp. 75–83; IPART, Review of imputation credits (gamma), final decision, March 2012; ESCOSA, Advice on a regulatory rate of return for SA Water, final advice, February 2012; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018, pp. 99–104; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018, p. 154; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018, p. 127.

We will also undertake an assessment of alternative estimation techniques of gamma, where necessary, to validate our proposed approach in future reviews. This includes approaches that other regulators have adopted or that stakeholders have advanced in submissions.

7.6 Linkages with other aspects of the regulatory framework

Gamma is linked to the regulatory framework through the following avenues:

- Market risk premium—gamma is used in the calculation of the Ibbotson estimate and in the dividend growth model.
- Allowable revenues—gamma is used to calculate tax allowances, determined as the estimated cost of corporate tax payable on annual revenue less annual tax expense less the value of imputation credits (gamma).

APPENDIX A: NORMALISING REGULATORY WACC VALUES

This appendix proposes key steps and guiding principles for normalising other regulators' WACC values, as well as an example of a normalisation calculation. The purpose of this exercise is to determine the WACC value that another regulator's WACC methodology would produce at a point in time for a business it regulates, but consistent with our averaging period (that is, we apply the other regulator's WACC methods to estimate a 'normalised WACC' for our averaging period).

Steps for normalising WACC values

We will undertake the following steps for each regulated firm in the comparison sample:

(1) Update the risk-free rate and cost of debt (two time-varying parameters) with reference to the averaging period of the QCA-regulated firm. In doing so, maintain the other regulator's approach to estimating the parameter in question (that is, use the same estimation method, data source, relative timing and averaging period length that the other regulator uses).

(2) Calculate the overall WACC value of the other firm using the updated risk-free rate and cost of debt values, but hold all other parameters (for example, beta, gamma) constant—using values in the relevant, recent regulatory decision.

(3) Compare the firm's normalised WACC value to the WACC value of the relevant QCA-regulated entity on the basis of the overall risk of the firm, which is influenced by its specific regulatory framework.

Step 1 updates the risk-free rate and the cost of debt—two key time-varying parameters. Other parameters can vary over time, such as the MRP (particularly when using a forward-looking model) and beta (particularly when estimated using a shorter period of data), but we do not propose to update these parameters as part of this normalisation exercise. A relevant consideration is that decisions on these parameters tend to involve greater regulatory judgement, and we cannot infer what another regulator would have decided in setting those parameters in our averaging period. For this reason, we consider that the values for these parameters should be drawn from the other regulator's relevant decision.[289]

Guidance for normalising WACC values

We consider that the following points could guide a normalisation calculation:

- *Where information about a method is unclear or missing, or cannot be worked out from the data, apply a best estimate, and state any assumptions applied*. For example, some regulators publish annual cost of debt values but do not publish the timing or length of the averaging period used to calculate those values. In such a situation, it may be possible to deduce the averaging period timing and length from the published values (and these can then be used in the normalisation exercise).
- *Where proprietary data is used, apply judgement as to a work-around*. One option may be to substitute the proprietary data with publicly available data where it is feasible and sensible to do so. Another option may be to adopt the other regulator's averaging period as the comparison averaging period for the normalisation exercise (to apply to all entities) so that the other regulator's value does

[289] There may be a situation where a regulator has published a more recent decision for another entity it regulates (other than the entity being compared). In such a situation, the market-wide parameters (MRP and gamma) from the more recent decision could be used, to provide more up-to-date values for the other regulator's decision-making.

not have to be adjusted. For example, ERA uses bond data from Bloomberg to calculate the debt risk premium for its rail decisions. If we did not have access to this data, we could choose to adopt the averaging period used by the ERA (that is, the period ending 30 June) as the comparison averaging period for the normalisation exercise.

- *Consider other differences in methods and values*. For example, the AER includes an allowance for debt-raising costs in its cash flows, rather than the WACC (like other regulators), so its WACC may require adjustment for this difference. Another possible difference is differing values for gamma, as these can imply different underlying asset beta values, depending on the levering formula a regulator assumes.
- *Interpret the normalised WACC values with caution*. The normalisation exercise may require assumptions in order to replicate other regulators' methodologies, as there is not always full information available for some regulatory decisions. In addition, the WACC values should not be interpreted as standalone comparison measures, as the WACC represents only one component of the suite of regulatory arrangements. Rather, they should be considered in the context of a regulated firm's overall risk, which is influenced by its specific regulatory framework and circumstances.[290]

Example of the normalisation calculation

Suppose we want to normalise the WACC value of fictitious regulated entity X in order to compare it to the WACC value of a QCA-regulated entity, Y. The regulatory period to which the QCA decision relates commences 1 July 2021 (and the regulatory period for the other regulated entity commenced prior to this date). The WACC methodology and values for entity X are provided in Table 15.

Table 15 WACC methods and values of the other regulator—for fictitious regulated entity X

Parameter/approach	*Other regulator's method/value*	*Can value for parameter change?*
Form of WACC	Post-tax, nominal	No
Risk-free rate	Daily RBA data, annualised and averaged over a 40-day period that ends 3 months prior to the start of the regulatory period.	Yes
Equity beta	0.7	No
Market risk premium	6.0%	No
Gamma	0.5	No
Gearing	60%	No
Credit rating	BBB	No
Cost of debt strategy	Simple trailing average over 10 years	No
Cost of debt estimation methodology and data	For each year in the trailing average, use daily annualised Bloomberg data for BBB rated corporate bonds, averaged over a 40-day period finishing 3 months before the start of that year.	Yes
Debt raising costs	11.0 basis points, added to the cost of debt.	No
Overall WACC	N/A	Yes

[290] For example, the normalised WACC of another regulated entity may differ from the WACC of a QCA-regulated entity, due to differences in beta values—that result from different risk profiles owing to different features of the regulatory frameworks.

(4) Update the following time-varying parameters:

   (a) Risk-free rate

(5) Follow the method set out in Appendix F: Risk-free rate estimation, to calculate the risk-free rate using annualised RBA data over the 40-day averaging period ending 31 March 2021.

   (a) Cost of debt

   - *Data*—given that we may not have access to Bloomberg data at the time, instead use publicly available RBA (Table F3) data.
   - *Cost of debt calculation for each year*—calculate the daily yield for BBB rated corporate bonds, following clauses 14 and 16 (for extrapolation and interpolation) in the AER 2018 Rate of Return Instrument, for each business day in the 40-day period ending 31 March of that year. Annualise these yields (in accordance with clause 12 of the AER instrument) and average them, to calculate the cost of debt for the relevant year.
   - *Trailing average*—the cost of debt for a given year is the average of the cost of debt for the 10 previous years and updates each year.

(6) Calculate the WACC value using the updated time-varying parameters (risk-free rate and cost of debt) and holding all other parameters in Table 15 constant (that is, using the other regulator's values as published).

In comparing the normalised WACC value for entity X to QCA-regulated entity Y, consider entity X's overall risk, which is influenced by its specific regulatory framework. Compare the normalised WACC value of entity X to the WACC value of entity Y on this basis.

APPENDIX B: COST OF DEBT APPROACHES IMPLEMENTED BY OTHER REGULATORS

	AER	***ESC***	***IPART***	***ESCOSA***	***ERA (electricity)***	***OTTER***	***ICRC***
Cost of debt estimation approach	Trailing average	Trailing average	Trailing average	Trailing average	On-the-day (risk-free rate) and trailing average (DRP)	Average of on-the-day and historical average weighted towards the present	Trailing average
Application of trailing average	Entire cost of debt	Entire cost of debt	Entire cost of debt	Entire cost of debt	DRP only	Partially applied to entire cost of debt via a historical average weighted towards the present	Entire cost of debt
Cost of debt benchmark	Average of Bloomberg, RBA, and Thomson Reuters 10-year BBB+a rated corporate bond yields	RBA 10-year BBB rated corporate bond yield	10-year AGS bond yield (risk-free rate), spread between RBA 10-year BBB rated corporate bond yield & 10-year AGS bond yield (DRP)	RBA 10-year BBB rated corporate bond yield	5-year bank bill swap rate (risk-free rate), RBA credit spreads for 10-year BBB rated corporate bonds (DRP–pre-2015) and ERA's revised bond yield approach (DRP–post 2015)	10-year AGS bond yield (risk-free rate), RBA credit spreads for 10-year BBB rated corporate bonds (DRP)	Average of Bloomberg and RBA 10-year BBB corporate bond yields
Averaging period for determining debt tranche rates	Nominated by regulated entity; timing between 16 and 4 months in advance of next regulatory year, duration between 10 days and 12 months	Average of 12 monthly observations (i.e. 1 year) between April and March in advance of next regulatory year	Over 40 days as advised by IPART Consistent period applied for each annual tranche of debt for both current and historical estimates	Average of 120 monthly observations (i.e. 10-years), 9-years historical & next regulatory year	Over 20 days as close as is reasonably practical to the beginning of the next regulatory year	Uses both a 40-day averaging period and an average of the last nine, eight, seven, six, five, four, three, two, one year/s	ICRC advises on a confidential basis
Trailing average term	10 years	10 years	Current cost of debt matches regulatory period (i.e. 4 years),	10 years	10 years (DRP)	Nine through to one year/s	10 years

	AER	*ESC*	*IPART*	*ESCOSA*	*ERA (electricity)*	*OTTER*	*ICRC*
			historical cost of debt 10 years				
Debt tranche weightings	Unweighted (simple)	Unweighted (simple)	Unweighted (simple)	Unweighted (simple)	Unweighted (simple)	Weighted average of on-the-day and trailing average rate/s applied	Unweighted (simple)
Debt tranche refinancing frequency	Yearly	Yearly	Yearly	Yearly	Yearly	Regulatory period (i.e. point estimate determined at each regulatory reset)	Yearly
Timing of updates to allowable revenue (annually or retrospective true-up)	Annually	Annually	Either annually or via regulatory period true-up – IPART decides on a case-by-case basis	Cost of debt set for regulatory period by forecasting forward latest available month of data; therefore no updates required	Annually	Prices not updated, as rate of return is fixed for the regulatory period	Annually
Transition arrangements	10-year transition from on-the-day approach to trailing average approach	No transition (i.e. immediate adoption of trailing average approach)	No transition for estimating historical cost of debt. 4-year transition from on-the-day approach to trailing average approach for estimating current cost of debt	No transition (i.e. immediate adoption of trailing average approach)	No transition (i.e. immediate adoption of trailing average approach for DRP)	n/a	10-year transition from on-the-day approach to trailing average approach
Debt-raising costs	Allowance included in operating costs—based on efficient debt-raising costs for a benchmark firm	15 basis points added to cost of debt	12.5 basis points added to cost of debt	12.5 basis points added to cost of debt	10.0 basis points (debt-raising costs) and 11.4 basis points (debt transaction costs for hedging exposure to	10 basis points added to cost of debt	12.5 basis points added to cost of debt

	AER	*ESC*	*IPART*	*ESCOSA*	*ERA (electricity)*	*OTTER*	*ICRC*
					movements in the risk-free rate)		
Commitment to benchmark debt management strategy	Not applicable, as all other Australian regulators prescribe a single benchmark debt management strategy (i.e. there is no option).						

a Note the AER estimates the BBB+ credit rating by calculating a weighted average of the broad-BBB and broad-A rated debt yields from third-party data providers.

Sources: AER, Rate of return instrument, explanatory statement, December 2018; ESC, Melbourne Water's 2021 water price review, guidance paper, November 2019; IPART, Review of our WACC method, final report, February 2018; ESCOSA, SA Water Regulatory Determination, final determination, June 2020; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network—Appendix 5: Return on Regulated Capital Base, final decision, September 2018; OTTER, 2018 Water and Sewerage Price Determination Investigation, final report, May 2018; ICRC, Regulated water and sewerage services prices 2018–23, final report 1, May 2018.

APPENDIX C: COST OF DEBT ESTIMATION

This appendix is intended to guide stakeholders in calculating the cost of debt.

Calculation steps—trailing average approach

We consider it appropriate to apply the following trailing average approach to determine the cost of debt allowance:

- A 10-year trailing average approach is used to determine the entire cost of debt (that is, risk-free rate and DRP).
- The averaging period is the 10 years preceding the year in which the rate applies.
- Each year, the 10-year trailing average cost of debt is updated by rolling forward the data series by one year, such that:[291]
  - the cost of debt for the roll-forward year reflects RBA's non-financial corporate [credit rating[292]] bonds – yield – 10-year target tenor – RBA statistical table F3, linearly extrapolated to 10 years and annualised
  - the annual update will be a simple average of the monthly observations from April to March in the preceding year to which the rate applies[293]
  - the trailing average is a simple average of 10 years of cost of debt.
- Debt-raising costs of 10 basis points added to cost of debt.

$$CoD_t^{nominal} = \left(\sum_{i=t-10}^{t-1} \frac{CoD_i^{nominal}}{10} \right) + debt\ raising\ costs$$

Where:

$CoD_t^{nominal}$

- Is equal to the simple average of the 10 years up to (but not inclusive of) regulatory year '*t*' of *RBA non-financial corporate [credit rating] bonds – yield – 10-year target tenor – RBA statistical table F3*. RBA data linearly extrapolated to 10 years and annualised.
- In the event no averaging period is selected by the entity, each annual rate will be determined by averaging the monthly observations from April to March before the start of regulatory year '*t*'.
- Credit rating for entities is determined on a case-by-case basis at each review.

Debt-raising costs

- Equal to 10 basis points per annum.

[291] That is, each year the calculation drops the oldest observation from the trailing average and adds the current year's observation to it.
[292] Credit rating for regulated entities is to be determined on a case-by-case basis at each review.
[293] This is in the event no averaging period is selected by the regulated entity.

Calculation approach of the trailing average

Suppose we want to calculate the trailing average cost of debt for the 2021–22 regulatory year. The methodology and values are provided in Table 16, assuming the default averaging period is applied.

Table 16 Trailing average approach calculation

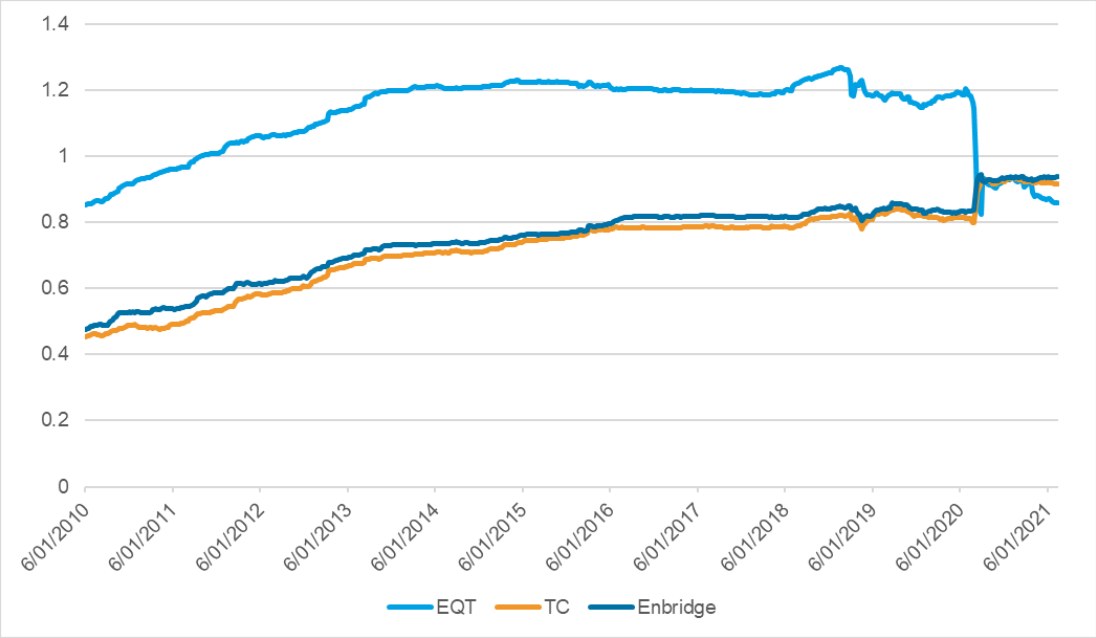
	RBA non-financial corporate [credit rating] bonds – yield – 10-year target tenor – RBA statistical table F3. RBA data linearly extrapolated to 10 years and annualised
Cost of debt regulatory year (t-10) – average of 12 monthly observations of RBA data, April 2011 – March 2012	7.94%
Cost of debt regulatory year (t-9) – average of 12 monthly observations of RBA data, April 2012 – March 2013	6.85%
Cost of debt regulatory year (t-8) – average of 12 monthly observations of RBA data, April 2013 – March 2014	7.18%
Cost of debt regulatory year (t-7) – average of 12 monthly observations of RBA data, April 2014 – March 2015	5.22%
Cost of debt regulatory year (t-6) – average of 12 monthly observations of RBA data, April 2015 – March 2016	5.26%
Cost of debt regulatory year (t-5) – average of 12 monthly observations of RBA data, April 2016 – March 2017	4.72%
Cost of debt regulatory year (t-4) – average of 12 monthly observations of RBA data, April 2017 – March 2018	4.48%
Cost of debt regulatory year (t-3) – average of 12 monthly observations of RBA data, April 2018 – March 2019	4.68%
Cost of debt regulatory year (t-2) – average of 12 monthly observations of RBA data, April 2019 – March 2020	3.36%
Cost of debt regulatory year (t-1) – average of 12 monthly observations of RBA data, April 2020 – March 2021	2.87%
Trailing average cost of debt regulatory year (t,2021–22) – average of cost of debt regulatory year (t-1) to (t-10)	5.26%

APPENDIX D: BETA DATA

In this appendix, we demonstrate why it can be important to look past the physical characteristics or the broader industry that the firm operates in. As an example, we consider three businesses that have been proposed as part of a pipeline sample proposed by Aurizon Network as beta comparators in the past[294]—TC Energy Corporation, Enbridge and EQT Corporation.

TC Energy Corporation and Enbridge operate businesses with significant operations in liquids and natural gas pipelines. These businesses largely operate transportation businesses, with a large proportion of revenue derived from long-term contracts with customers. EQT Corporation is significantly engaged in the production and exploration of natural gas. One would expect that a producer of natural gas would likely face a significantly different and greater risk profile than a business involved in the transportation of gas and liquids under long-term contracts.[295]

Figure 5 10-year weekly rolling equity betas for TC Energy, Enbridge and EQT Corporation



Note: While these charts present equity betas rather than asset betas, we expect that accounting for gearing will not change the relativities of the betas shown here.

Source: QCA analysis.

The pre-covid beta of EQT Corporation was consistently higher than that of TC Energy and Enbridge. Despite the fact that all three firms were included in the same sample and all have operations related to natural gas, we consider that they are exposed to different levels of risk, which is captured in their betas.

As a result, we do not consider that using a within-industry comparator will always yield a better estimate of beta for a particular entity. For instance, within the regulated energy sample that we had historically used, one of the firms, Natural Fuel Gas Company, has business activities that make it unsuitable for continued use within this sample. For the year ending 30 September 2020, approximately 42 per cent of Natural Fuel Gas Company's revenue was derived from its utility segment, while 39 per cent was derived

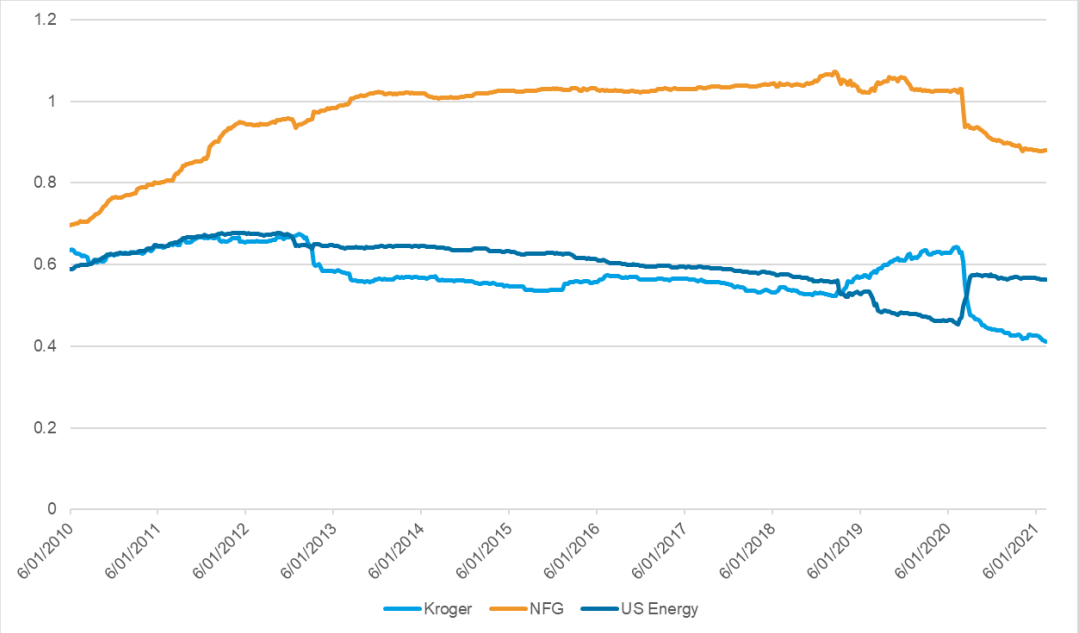
[294] For instance, see Aurizon Network, *2017 Draft Access Undertaking Submission,* November 2016.

[295] A producer of natural gas faces greater revenue uncertainty, as, for instance revenue is tied to the success of drilling operations, which can at times be highly uncertain.

from gas exploration and production. We would expect that the large gas exploration and production segment of this business would cause it to have a greater level of systematic risk than other regulated energy businesses whose revenue is predominantly derived from their utility segment.

We have plotted the beta of National Fuel Gas Company against the median beta of a sample of United States-regulated energy firms and the beta of a large supermarket chain, Kroger Co. (Figure 6).

Figure 6 10-year weekly rolling equity betas for Kroger, National Fuel Gas Company and United States-regulated energy firms (average)



Source: QCA analysis.

The beta for Kroger Co is much closer to the median beta of a sample of United States energy firms, despite Kroger Co operating in a completely different industry to an energy business. This result is perhaps not surprising when comparing the risk characteristics of Kroger Co to a typical regulated energy business. While Kroger Co is not regulated and has no contracting with customers, the demand for its products (groceries) is largely invariant to the broader performance of the market (that is, low income elasticity of demand). As such, we would expect that the revenue for Kroger Co is likely to be stable over time and Kroger Co therefore may face a similar level of systematic risk as a typical regulated energy business, which also has relatively stable revenue.

We do not propose to use listed retail grocery firms as comparators for regulated infrastructure firms. Rather, the two examples above emphasise that while the industry in which the firm operates may be relevant[296], caution should be exercised when selecting firms within an industry to be part of a sample. This is particularly the case when firms operating in the industry have operations across a variety of business segments. As such, depending on the risk profile of the business, it is possible that out-of-industry comparators may provide more relevant information than within-industry comparators that are subject to different risks from the benchmark business.

[296] Indeed, firms operating in the same industry as the benchmark firm form an effective starting point in assembling a comparator set of firms. Where these firms face similar risk features as the benchmark business, they are likely to be among the most relevant comparators to use.

APPENDIX E: BETA REFERENCE POINTS

This appendix sets out the firms that we propose to include to form beta reference points for a select group of industries. We have selected firms to be included in these samples where they meet the filtering requirements set out in section 6.5.3 of this report.

Sunwater submitted that it was concerned that we were pointing towards a fixed selection of energy, water and toll road comparator firms to use as beta reference points. Sunwater preferred a less rigid application, and said that the list should be refined for each regulated entity at the time of review, to ensure the most appropriate comparators are selected.[297]

It should be noted that the following lists of firms are not meant to be definitive, and there may be other firms that are relevant and could be added to these samples, should they be identified. In addition, the list of firms that we use to calculate beta reference points will be reviewed over time to make sure the firms that comprise these lists remain appropriate to use.

The objective of applying the filtering requirements set out in section 6.5.3 of this report is to establish a comparator group of firms that share similar levels of risks. The intent of coming up with beta reference points is to not come up with binding estimates that will be applied mechanically. Rather they will be used as a means for comparing relative risk. If the regulated firm faces a differing risk profile to the firms that comprise a particular industry sample, this is something that we would take into consideration when determining a value for the asset beta.

Table 17 Regulated energy and water industry sample

Company	***Ticker code***
Alliant Energy Corp	LNT US Equity
Ameren Corporation	AEE US Equity
American Electric Power	AEP US Equity
APA Group	APA AU Equity
AusNet Services	AST AU Equity
Avista Corp	AVA US Equity
Black Hills Corp	BKH US Equity
Canadian Utilities Ltd	CU CN Equity
CMS Energy Corp	CMS US Equity
Consolidated Edison Inc	ED US Equity
Dominion Energy Inc	D US Equity
Duke Energy Corp	DUK US Equity
Edison International	EIX US Equity
Emera Inc	EMA CN Equity
Eversource Energy	ES US Equity

[297] Sunwater, sub. 19, pp. 2–3.

Company	***Ticker code***
FirstEnergy Corp	FE US Equity
Fortis Inc	FTS CN Equity
Idacorp Inc	IDA US Equity
MGE Energy Inc	MGEE US Equity
National Grid Plc	NG/ LN Equity
NorthWestern Corp	NWE US Equity
PNM Resources Inc	PNM US Equity
Portland General Electric Co	POR US Equity
PPL Corp	PPL US Equity
Sempra Energy	SRE US Equity
Spark Infrastructure Group	SKI AU Equity
Southern Co/the	SO US Equity
WEC Energy Group Inc	WEC US Equity
Xcel Energy Inc	XEL US Equity
American Water Works Co Inc	AWK US Equity
American States Water Co	AWR US Equity
Artesian Resources Corp	ARTNA US Equity
California Water Service Grp	CWT US Equity
Middlesex Water Co	MSEX US Equity
SJW Group	SJW US Equity
Essential Utilities Inc	WTR US Equity
York Water Co	YORW US Equity
Severn Trent Plc	SVT LN Equity
United Utilities Group Plc	UU LN Equity
Average asset beta: 0.39	
Median asset beta: 0.39	

Table 18 Toll road sample

Company	*Ticker code*
Atlantia Spa	ATL IM Equity
Getlink SE	GET FP Equity
Transurban Group	TCL AU Equity
Atlas Arteria	ALX AU Equity
Average asset beta: 0.57	
Median asset beta: 0.54	

Table 19 North American Class 1 Railroad sample

Company	*Ticker code*
CSX Corp	CSX US Equity
Kansas City Southern	KSU US Equity
Norfolk Southern Corp	NSC US Equity
Union Pacific Corp	UNP US Equity
Canadian National Railway Co	CNR CN Equity
Canadian Pacific Railway Ltd	CP CN Equity
Average asset beta: 0.88	
Median asset beta: 0.92	

APPENDIX F: RISK-FREE ESTIMATION

This appendix is intended to guide stakeholders in calculating the risk-free rate. It includes calculation steps and example calculations.

Calculation steps

The risk-free rate is averaged over a period nominated by the regulated entity, between 20 and 60 business days long and commencing as close as reasonably practical to the start of the regulatory period (ending before the regulatory period starts). The averaging period must be nominated before it occurs. It can be calculated using the following steps:

(1) Add 10 years to each day in the averaging period.

(2) Download the RBA F16 table (Indicative mid rates of selected Australian Government securities). Use the data from the two nominal bond issues whose maturity dates straddle the period established in step 1.[298]

(3) Calculate the yield for each business day in the averaging period, using the following steps: For each business day in the averaging period, locate the corresponding yield for that day from each bond issue. Use the yields from the two bond issues to interpolate the yield for the bond in step 1, consistent with the method in the AER 2018 rate of return instrument (clause 16). For each business day in the averaging period, calculate the yield as:

$$yield_t = yield_A + \frac{yield_B - yield_A}{days\ between\ issue\ of\ A\ and\ B} \times (days\ between\ issue\ of\ A\ and\ day\ t)$$

where:

- $yield_t$ corresponds to the yield we want to calculate (for target date t which is a day in the period given in step 1)
- A corresponds to the bond with maturity date before the period in step 1
- yield_A is the yield for bond A (for target day t)
- B corresponds to the bond with maturity date after the period in step 1
- yield_B is the yield for bond B (for target day t).

Step 3 will be undertaken for each day in the period described in step 1—that is, between 20 and 60 times, depending on the proposed length of the period.

(4) Given the interpolated yields for each day calculated in step 3 are stated as percentages, convert each yield to a decimal number by dividing by 100 (for example, 2.1% is equal to 0.021).

(5) Convert each yield in step 4 to an effective annual rate (EAR):

$$yield^{EAR} = \left(\left(1 + \frac{yield_t}{x}\right)^x - 1\right) \times 100$$

where:

[298] That is, select the nominal bond whose maturity date is closest to, but before, the first date in the period in step 1; and the nominal bond whose maturity date is closest to, but after, the last date in the period in step 1.

- $yield^{EAR}$ is the effective annual rate for each day of the period described in step 1
- $yield_t$ is the calculated yield for each target date t, expressed as a decimal (as per step 4)
- x is the frequency of the compounding interest over the course of a year on $yield_t$ (the frequency of compounding interest on a CGS nominal yield is semi-annual, so x is 2).

(6) Average the yields calculated in step 5 to arrive at an estimate of the risk-free rate.

$$y_{average} = \frac{y_1 + y_2 + \cdots + y_T}{T}$$

where:

- $y_{average}$ is the average of the annualised yields over the period
- y_1 corresponds to the annualised yield of the first day of the averaging period
- y_T corresponds to the annualised yield of the last day of the averaging period
- T is the number of days in the averaging period.

Example calculation

Suppose a regulated entity proposes a 20-business day averaging period commencing 6 July 2020 and ending 31 July 2020, for a regulatory period commencing in August 2020.

(1) The date range for the averaging period 10 years on is 6 July 2030 to 31 July 2030.

(2) From the RBA F16 dataset, the bond issue closest to and before this period is 'Treasury Bond 155 2.50% 21-May-2030' (FCMYMAY30D) and the bond issue closest to and after this period is 'Treasury Bond 160 1.00% 21-Dec-2030' (FCMYDEC30D).

(3) Calculate the yield for the first day in the period (06/07/2020):

$$yield = 0.920 + \frac{0.975 - 0.920}{21.12.2030 - 21.05.2030} \times (06.07.2030 - 21.05.2030)$$

$$yield = 0.920 + \frac{0.055}{214} \times 46$$

$$yield = 0.9318$$

(4) Divide the yield by 100.

$$\frac{0.9318}{100} = 0.009318$$

(5) For the first day in the period, 6 July 2020, the annualised yield will be:

$$y_1^{EAR} = \left(\left(1 + \frac{0.009318}{2}\right)^2 - 1\right) \times 100 = 0.9340\%$$

This should be repeated for the remaining 19 days, as per Table 20.

Table 20 Risk-free rate example calculations

(a) *Date of day in averaging period*	*(b)* *Date 10 years on (as per step 1)*	*(c)* *Date of earlier bond issue A*	*(d)* *Date of later bond issue B*	*(e)* *Yield A*	*(f)* *Yield B*	*(g)* *Yield of day in averaging period*	*(h)* *Annualised yield (%)*
6/07/2020	6/07/2030	21/05/2030	21/12/2030	0.92	0.975	0.9318	0.9340
7/07/2020	7/07/2030	21/05/2030	21/12/2030	0.885	0.935	0.8960	0.8980
8/07/2020	8/07/2030	21/05/2030	21/12/2030	0.87	0.92	0.8812	0.8832
9/07/2020	9/07/2030	21/05/2030	21/12/2030	0.9	0.95	0.9114	0.9135
10/07/2020	10/07/2030	21/05/2030	21/12/2030	0.86	0.91	0.8717	0.8736
13/07/2020	13/07/2030	21/05/2030	21/12/2030	0.9	0.95	0.9124	0.9145
14/07/2020	14/07/2030	21/05/2030	21/12/2030	0.91	0.96	0.9226	0.9247
15/07/2020	15/07/2030	21/05/2030	21/12/2030	0.87	0.92	0.8829	0.8848
16/07/2020	16/07/2030	21/05/2030	21/12/2030	0.88	0.935	0.8944	0.8964
17/07/2020	17/07/2030	21/05/2030	21/12/2030	0.865	0.92	0.8796	0.8816
20/07/2020	20/07/2030	21/05/2030	21/12/2030	0.885	0.94	0.9004	0.9024
21/07/2020	21/07/2030	21/05/2030	21/12/2030	0.865	0.915	0.8793	0.8812
22/07/2020	22/07/2030	21/05/2030	21/12/2030	0.885	0.94	0.9009	0.9030
23/07/2020	23/07/2030	21/05/2030	21/12/2030	0.86	0.91	0.8747	0.8766
24/07/2020	24/07/2030	21/05/2030	21/12/2030	0.865	0.915	0.8800	0.8819
27/07/2020	27/07/2030	21/05/2030	21/12/2030	0.885	0.935	0.9007	0.9027
28/07/2020	28/07/2030	21/05/2030	21/12/2030	0.92	0.97	0.9359	0.9381
29/07/2020	29/07/2030	21/05/2030	21/12/2030	0.875	0.925	0.8911	0.8931
30/07/2020	30/07/2030	21/05/2030	21/12/2030	0.855	0.905	0.8714	0.8733
31/07/2020	31/07/2030	21/05/2030	21/12/2030	0.815	0.86	0.8299	0.8317

(6) Average the annualised yields (in column (h)) to obtain an estimate of the risk-free rate:

$$y_{average} = \frac{0.9340\% + 0.8980\% + \cdots + 0.8317\%}{20} = 0.8944\%$$

Note that the values here are rounded for presentation purposes; however, values should not be rounded in the calculation.

APPENDIX G: GAMMA ESTIMATION

This appendix provides the steps for calculating gamma. Gamma (γ) is calculated as the product of the distribution rate and utilisation rate:

$\gamma = d \, x \, U$

where:

d = distribution rate

U = utilisation rate

Estimation of the inputs for gamma is described below.

Distribution rate

The approach for calculating the distribution rate is based on the financial statements method.[299] The method estimates the distribution rate for the largest firms (by market capitalisation) on the ASX. ERA and the AER also use this approach.

In summary, the distribution rate for each company is calculated using data from each company's financial statements. Distributions are based on the dividend payments, and tax paid is imputed from the distributions and franking account balances over time (see the note below Table 21).[300]

The most recent assessment of the distribution rates of the top 50 firms listed on the ASX involves examining their financial statements over the period 2000 to 2018. The results are in Table 21.

Table 21 Distribution rate—top 50 companies (2000–2018)[301]

Company	*FAB_{2000}*	*FAB_{2018}*	*DIV*	*DIST*	*TAX*	*DIST rate*
CBA	450	1,464	76,399	32,742	33,756	0.97
BHP	24	14,054	81,233	34,814	48,844	0.71
Westpac	–56	1,357	65,581	28,106	29,519	0.95
ANZ	0	97	54,073	23,174	23,271	1.00
NAB	0	844	61,915	26,535	27,379	0.97
Telstra	74	191	63,195	27,084	27,201	1.00
Woolworths	418	2,610	18,616	7,978	10,170	0.78
Wesfarmers	0	978	24,769	10,615	11,593	0.92
CSL	20	0	367	157	137	1.15
Woodside	173	2,301	17,259	7,397	9,525	0.78
Rio Tinto	445	8,068	52,312	22,419	30,043	0.75
Macquarie	133	117	3,631	1,556	1,540	1.01

[299] M Lally, *Estimating gamma*, report for the Queensland Competition Authority, 2013; M Lally, *Estimating the distribution rate for imputation credits for the top 50 ASX companies*, 2019.

[300] The detailed calculations are described in M Lally, *Estimating the distribution rate for imputation credits for the top 50 ASX companies*, 2019.

[301] Not all firms in the sample were listed, or have data available, for the entire period.

Company	*FAB_{2000}*	*FAB_{2018}*	*DIV*	*DIST*	*TAX*	*DIST rate*
Origin Energy	0	116	3,229	1,384	1,500	0.92
Suncorp	70	385	12,358	5,296	5,611	0.94
QBE Ins.	–8	224	4,782	2,050	2,282	0.90
Brambles	188	85	1,553	666	563	1.18
Santos	360	466	4,197	1,799	1,905	0.94
AMP	80	148	7,916	3,393	3,461	0.98
Amcor	0	0	593	254	254	1.00
Transurban	72	139	817	350	417	0.84
Scentre	164	113	428	183	132	1.39
Aristocrat	0	106	891	382	488	0.78
Ins Aus	489	100	9,647	4,134	3,745	1.10
South 32	0	201	870	373	574	0.65
Goodman	43	0	89	38	–5	–7.85
Newcrest	0	12	151	65	77	0.84
Sydney Airport	0	0	0	0	0	---
Cimic	597	44	1,585	679	126	5.38
AGL	0	–94	3,564	1,527	1,433	1.07
Fortescue	0	1,757	3,740	1,603	3,360	0.48
Treasury Wine	0	70	210	90	160	0.56
ASX	6	269	4,358	1,868	2,131	0.88
Cochlear	9	39	1,076	461	491	0.94
Lendlease	968	14	2,497	1,070	116	9.22
APA Group	1	3	161	69	71	0.97
REA	25	344	623	267	586	0.46
Qantas	174	0	4,095	1,755	1,586	1.11
Ramsay	0	573	1,946	834	1,407	0.59
Sonic	5	0	1,721	737	732	1.01
Vicinity	---	---	---	---	---	---
Dexus	17	57	138	59	99	0.60
Stockland	10	14	0	0	4	0.00
Computershare	27	69	711	305	346	0.88
Bluescope	106	0	2,247	963	857	1.12
Tabcorp	–5	74	5,448	2,335	2,414	0.97
Crown Resorts	49	35	2,412	1,034	1,020	1.01

Company	*FAB_{2000}*	*FAB_{2018}*	*DIV*	*DIST*	*TAX*	*DIST rate*
GPT	---	---	---	---	---	---
Aurizon	8	72	1,225	525	589	0.89
Caltex (Ampol)	0	1,007	2,594	1,112	2,119	0.52
Medibank	42	136	931	399	493	0.81
Total				**260,637**	**294,124**	**0.886**

Note: The franking account balances (FAB_{2000}, FAB_{2018}) and fully franked dividends (DIV) are drawn from the firms' financial statements over the period. As DIV is fully franked dividends, the distribution of credits (DIST) is (3/7)DIV. Tax payments to the ATO are the sum of DIST and the increase in the franking account balance. The distribution rate is then DIST/TAX. All dollar figures are in $m.

Source: M Lally, Estimating the distribution rate for imputation credits for the top 50 ASX companies, 2019, pp. 5–6.

Utilisation rate

Calculation steps

The most recent assessment of the utilisation rates of imputation credits involves examining equity ownership over the period 2016 to 2020.

We use the ABS national accounts data[302] to estimate the types of equity that are most relevant to the estimation of a market-wide utilisation rate, namely the equity held by:

- the classes of domestic investors that are eligible to utilise imputation credits (that is, 'households', 'life insurance corporations', and 'pension funds')
- the classes of investors that are not eligible to use imputation credits (that is, 'the rest of world').

We then calculate the share of equity held by domestic investors eligible to use imputation credits as a proportion of the equity held by the eligible and non-eligible investors.

This data is obtained from Table 48, 'The Listed Shares and Other Equity Market', using the 'A*mounts outstanding at end of period*', from the 5232.0 Australian National Accounts: Finance and Wealth.

[302] ABS, *Australian National Accounts: Finance and Wealth*, cat. no. 5232.0, table 48.

APPENDIX H: LIST OF SUBMISSIONS

The submissions we received are listed below. They are numbered for reference purposes only—the numbers are used in the footnotes in the report. The submissions are available on our website.

Table 22 Submissions

Stakeholder	*Sub. no.*	*Submission*	*Date*
Australian Rail Track Corporation	14	Submission on QCA request for comments paper	2 February 2021
Aurizon Network	5	Submission on QCA request for comments paper	29 January 2021
	21	Submission on QCA draft report	24 August 2021
Canegrowers	17	Submission on QCA request for comments paper	29 June 2021
Central Highlands Regional Council	16	Submission on QCA request for comments paper	29 January 2021
Dalrymple Bay Coal Terminal User Group (DBCT User Group)	8	Submission on QCA request for comments paper	29 January 2021
	24	Submission on QCA draft report	13 September 2021
Dalrymple Bay Infrastructure (DBI)	3	Submission on QCA request for comments paper	28 January 2021
	25	Submission on QCA draft report	24 August 2021
Eton Irrigation	11	Submission on QCA request for comments paper	29 January 2021
Gladstone Area Water Board (GAWB)	13	Submission on QCA request for comments paper	29 January 2021
	22	Submission on QCA draft report	24 August 2021
Logan City Council	2	Submission on QCA request for comments paper	28 January 2021
Pioneer Valley Water Co-operative	4	Submission on QCA request for comments paper	28 January 2021
Queensland Farmers' Federation	15	Submission on QCA request for comments paper	5 February 2021
	23	Submission on QCA draft report	3 September 2021
Queensland Resources Council (QRC)	20	Submission on QCA draft report	24 August 2021
Queensland Treasury Corporation (QTC)	9	Submission on QCA request for comments paper	29 January 2021

Stakeholder	*Sub. no.*	*Submission*	*Date*
	18	Submission on QCA draft report	24 August 2021
Redland City Council	12	Submission on QCA request for comments paper	29 January 2021
Seqwater	7	Submission on QCA request for comments paper	29 January 2021
	27	Submission on QCA draft report	5 October 2021
Sunwater	6	Submission on QCA request for comments paper	29 January 2021
	19	Submission on QCA draft report	20 August 2021
Unitywater	1	Submission on QCA request for comments paper	9 December 2020
Urban Utilities	10	Submission on QCA request for comments paper	29 January 2021

ABBREVIATIONS

AASB	Australian Accounting Standards Board
ABS	Australian Bureau of Statistics
ACCC	Australian Consumer and Competition Commission
AER	Australian Energy Regulator
ARTC	Australian Rail Track Corporation
ASX	Australian Stock Exchange
ATO	Australian Tax Office
CAPM	capital asset pricing model
CEPA	Cambridge Economic Policy Associates
CGS	Commonwealth Government securities
DAAU	draft amending access undertaking
DBI	Dalrymple Bay Infrastructure
DCBT	Dalrymple Bay Coal Terminal
DGM	dividend growth model
DRP	debt risk premium
ERA	Economic Regulation Authority, Western Australia
ESC	Essential Services Commission
ESCOSA	Essential Services Commission of South Australia
ESG	environmental, social and corporate governance
GAWB	Gladstone Area Water Board
ICRC	Independent Competition and Regulatory Commission
IPART	Independent Pricing and Regulatory Tribunal of New South Wales
LAD	least absolute deviation
MRP	market risk premium
NPV	net present value
OLS	ordinary least squares
OTTER	Office of the Tasmanian Economic Regulator
QCA	Queensland Competition Authority
QRC	Queensland Resources Council
QTC	Queensland Treasury Corporation
RAB	regulatory asset base
RBA	Reserve Bank of Australia
SL-CAPM	Sharpe-Lintner Capital Asset Pricing Model
WACC	weighted average cost of capital

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