Queensland Competition Authority 2021 rate of return review

REQUEST FOR INFORMATION – JANUARY 2021

QUEENSLAND TREASURY CORPORATION

Summary

Cost of debt

- QTC supports a 10-year trailing average to determine the allowed cost of debt. The trailing average should replicate the cost produced by a benchmark portfolio of ten nominal fixed-rate loans with annual maturities from 1–10 years.
- When the regulated asset base (RAB) is increasing a weighted trailing average will produce a better cost of debt estimate than a simple trailing average. However, the difference between the cost of debt estimates 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.
- Annually updating the trailing average is appropriate as it minimises the difference between the efficiently incurred cost of debt for the benchmark firm and the cost of debt allowance.
- Different transitions may be appropriate for different businesses. For example, 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.
- If the QCA continues to target a real cost of debt the revenue deductions for inflation on the debt-funded portion of the RAB should equal the amount of inflation that is expected to be added to the debt-funded portion of the RAB during the regulatory period. This requires an estimate of expected inflation for the term of the regulatory period rather than the 10-year term currently used by the QCA.

Return on equity

- QTC supports giving fixed weights to multiple approaches for estimating the expected return on the market portfolio (ER_m), which is a key input in the Capital Asset Pricing Model (CAPM).
- A reasonable estimate of ER_m can be made using the Ibbotson, Wright and dividend discount model (DDM) approaches. No weight should be given to the Siegel approach or survey-based estimates, although some surveys and the practices of valuation professionals can be useful in determining the relationship between ER_m and the prevailing 10-year Commonwealth Government Security (CGS) yield.
- QTC considers a reasonable set of weights to be: Ibbotson (25 per cent), Wright (25 per cent) and DDM (50 per cent). Giving more total weight to approaches that produce relatively stable estimates of ER_m (ie, Wright and DDM) is consistent with the observation that the hurdle/discount rates used by investors and valuation professionals have not fallen to the same extent as the 10-year CGS yield.
- The implied market risk premium (MRP) from the QCA's DDM in Queensland Rail's 2020 draft access undertaking is 4.7 per cent. In our view, this is unrealistically low as there is no reason to believe investors currently require an MRP that is significantly lower than the long-term historical MRP of 6.0–6.5 per cent.
- The low implied MRP may be due to the QCA's assumption of a term structure for ER_m beyond year 10. QTC does not agree that equity has a term structure in the same way that fixed-rate debt does. Furthermore, the term structure assumption is based on the belief that the 10-year nominal CGS yield is strongly mean reverting, however the results from a simple mean reversion test do not support this belief. Finally, imposing a term structure is not generally accepted practice when implementing the DDM.
- In our view, the QCA's DDM estimates should be consistent with the estimates made by other regulators such as the Independent Pricing and Regulatory Tribunal (IPART) and the Australian Energy Regulator (AER). As such, QTC's support for the DDM is conditional on appropriate changes being made to the QCA's DDM approach as part of the 2021 rate of return review.

1 Cost of debt

- QTC supports a 10-year trailing average of the total benchmark debt yield to determine the nominal cost of debt allowance. A trailing average approach:
  - can be approximated in practice with a prudent and efficient debt management strategy
  - provides correct compensation for refinancing risk by using a 10-year debt term and assuming that 10 per cent of the debt balance is refinanced each year, and
  - is consistent with the debt management strategies used by non-regulated businesses that operate in capital intensive industries and maintain relatively high gearing.
- In contrast, the on-the-day cost of debt approach:
  - implies the use of a debt management strategy that cannot be implemented in practice by a stand-alone firm
  - is inconsistent with sound financial risk management principles and observed debt issuance practices of regulated and unregulated firms, especially regarding the staggering of debt maturity dates
  - incorrectly assumes that refinancing risk can be managed if an on-the-day 10-year debt risk premium (DRP) is allowed, when what is actually required is compensation for maintaining a debt portfolio with annual maturities from 1–10 years, and
  - creates the potential for large mismatches between the annual cost of debt allowance and the annual cost of debt incurred by an efficiently financed firm, which are windfall gains/losses for consumers.
- Most Australian regulators have moved away from the on-the-day approach and adopted a trailing average approach. As noted by the Independent Competition and Regulatory Commission (ICRC)[1]:

> *'During the 2018 water price investigation, the Commission determined the cost of debt using a trailing average approach. This approach was consistent with contemporary regulatory practice and represented a shift away from the previous 'on-the-day' approach, which was no longer used on its own by other Australian regulators.'*

1.1 Efficient debt costs

- The regulated cost of debt allowance can be viewed as the cost outcome from maintaining a benchmark debt management strategy. As explained by the QCA:[2]

> *'Before estimating a regulatory cost of debt allowance, it is first necessary to choose a benchmark debt management strategy as the basis for this estimation process.'*

- An *efficient* debt management strategy results in a firm's equity providers being exposed to an acceptable level of interest rate risk and refinancing risk considering the firm's size, asset life, capital structure and revenue characteristics. This applies to all levered firms regardless of whether they are subject to economic regulation. The cost produced by an efficient debt management strategy can be viewed as an efficient cost of debt.
- A benchmark debt management strategy will only approximate how debt is managed in practice. In our view, the main features that should be reflected in a regulated cost of debt approach are as follows:
  - Maintaining a flat debt maturity profile with annual maturities from 1–10 years. This requires refinancing 10 per cent of the total debt balance each year. QTC considers this to be an acceptable level of refinancing risk for a benchmark firm with relatively high gearing.
  - Refinancing maturing debt with 10-year nominal fixed-rate debt. This will produce a relatively stable total cost of debt that is not sensitive to short-term volatility in the prevailing benchmark debt yield.
  - Making annual updates to minimise the difference between the cost of debt allowance and the efficiently incurred cost of debt for the benchmark firm.

[1] ICRC, September 2020, *Issues Paper – Review of Methodologies for the Weighted Average Cost of Capital*, p. 23.

[2] QCA, November 2020, *Request for comments – Rate of return review*, p. 8.

2 Response to specific questions

2.1 Cost of debt

Question 2

Should the trailing average be applied to the entire benchmark cost of debt, or only to the debt risk premium?

- The trailing average should replicate the cost produced by a portfolio of ten nominal fixed-rate loans with annual maturities from 1–10 years. As such, the trailing average should apply to the entire benchmark debt yield. This is consistent with the approach adopted by the AER in December 2013.
- Only applying a trailing average to the DRP is consistent with a 'hybrid' approach, which assumes the benchmark firm maintains a portfolio of ten floating-rate loans with annual maturities from 1–10 years. An interest rate swap is used to lock in a single base rate on the loans for the term of the regulatory period. This strategy was used by some firms under the on-the-day approach.
- In its draft and final rule determinations the Australian Energy Markets Commission (AEMC) reached an important conclusion on how the regulated cost of debt should be determined:[3]

> *'… the long-term interests of consumers would be best served by ensuring that the methodology used to estimate the return on debt reflects, to the extent possible, **the efficient financing and risk management practices that might be expected in the absence of regulation.**'*

- The AEMC's conclusion was consistent with the advice provided to it by SFG Consulting:[4]

> *'Yet there seems no reason why the term of the regulatory period, which represents a trade-of between administrative efficiency and timeliness of reviews, would bear any relationship to the prices which would prevail in a competitive market.'*

- The base interest rate hedging strategy under the on-the-day approach is a response to regulation. There is no reason to believe that a comparable unregulated firm operating in a competitive market would fully reset the base interest rate on its entire debt portfolio once every five years, or any other frequency. As explained by Lally:[5]

> *'For example, if the regulatory regime is the present one and the regulatory cycle is five years, regulated firms could be expected to convert the risk free rate component of their cost of debt into five year debt and the evidence presented indicates that they do this… This tells us nothing about how they would behave if they were not regulated.'*

- Using interest rate swaps to achieve a shorter-term average base rate may be appropriate if an unregulated firm's revenues are highly cyclical or correlated with changes in short-term interest rates. This will reduce earnings volatility by achieving consistency between revenues and debt servicing costs. Firms with relatively low gearing may choose a shorter-term base rate if the impact of interest rate changes on earnings is sufficiently small.
- When determining a cost of debt approach in a regulatory context the relevant comparators are firms that:
  - provide an essential service
  - operate long-lived assets in capital intensive industries, and
  - maintain gearing levels that are significantly higher than the average gearing for listed firms.
- The income elasticity of demand for an essential service is likely to be very low. As a consequence, the revenues of a comparable unregulated firm will be relatively stable and not sensitive to the economic cycle or changes in interest

[3] AEMC, November 2012, *Final Rule Determination, Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services*, p. 73.

[4] SFG Consulting, February 2012, *Preliminary analysis of rule change proposals*, para. 180.

[5] M. Lally, March 2014, *The trailing average cost of debt*, p. 44.

rates. From risk management perspective it is appropriate for this type of firm to adopt a debt management strategy that produces a relatively stable total cost of debt.

- Based on the above, QTC considers an efficient debt strategy for a comparable unregulated firm is to maintain a portfolio of *fixed-rate* debt with annual maturities out to at least 10 years. This will reduce earnings volatility as no more than 10 per cent of the total debt is repriced each year at the prevailing debt yield.
- In our view, the trailing average approach should not retain any features of the on-the-day approach that are unique to regulation, such as using interest rate swaps to lock in a fixed base rate for the term of the regulatory period. As such, the trailing average should apply to the total benchmark debt yield.

Question 3

What should be the term of the trailing average cost of debt, and how frequently should each debt tranche be refinanced?

- The trailing average should replicate the cost produced by a portfolio of ten nominal fixed-rate loans with annual maturities from 1–10 years. As such, the correct benchmark debt term is 10 years, which means 10 per cent of the total debt balance is refinanced each year.
- There are several options for performing the annual refinancing. For example, 2.5 per cent of the debt balance could be refinanced during 20-day windows on a quarterly basis. Alternatively, 10 per cent of the debt balance could be refinanced during a 20–40-day window each year.

Question 4

Should each debt tranche in the trailing average cost of debt be given equal weighting, or should some alternative weighting scheme (such as weighting by capital expenditure) be implemented?

- When the RAB is increasing a weighted trailing average will produce a better cost of debt estimate than a simple trailing average.
- QTC has previously outlined a simple approach for calculating a weighted trailing average[6]. The approach assumes each increase in the benchmark debt balance is equally funded across the 10 fixed-rate loans in the portfolio at the prevailing benchmark debt yield. For example, if the starting debt balance is $100, each loan is assumed to provide $10 of funding. If the benchmark debt balance increases by $20, each loan is assumed to provide an additional $2 of funding at the prevailing debt yield. The 'post-borrowing' yield (PBY) that applies to each loan is calculated as follows:
  - $PBY_t = (\$10 \times PBY_{t-1} + \$2 \times \text{Prevailing Yield}_t) \div \$12$
- This is equivalent to giving a $2÷$12 weight to the prevailing yield and a $10÷$12 weight to last year's PBY for each loan in the portfolio. The weighted trailing average cost of debt equals the simple average of the ten PBYs.
- 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.

Question 5

Should the price changes for a trailing average cost of debt be passed through each year, or at the end of each regulatory period?

- A proper application of the trailing average approach requires the cost of debt allowance to be updated annually:[7]

[6] QTC, April 2014, *Trailing average cost of debt Issues Paper*, Appendix B, p. 20–21.

[7] M. Lally, March 2014, *The trailing average cost of debt*, p. 31.

'… the use of a trailing average regime is premised on the need to better match the allowed cost to that actually incurred. Since the cost actually incurred better corresponds to the trailing average with annual updating, this suggests that annual updating should be used if a trailing average regime is adopted.'

- In a previous submission we performed a simulation analysis to quantify the mismatch between the cost of debt produced by a portfolio of ten fixed-rate loans with annual maturities from 1–10 years and a trailing average that is not updated annually[8]. The analysis showed the potential for material over- or under-compensation across multiple consecutive 5-year regulatory periods. These mismatches, which are windfall gains/losses for consumers, can be avoided by annually updating the trailing average cost of debt.
- An alternative approach of calculating a true-up at the end of each regulatory period should not be used:
  - If the true-up is reflected in the revenues for the next regulatory period this could result in a large step-change relative to the outcomes under an annually updated trailing average.
  - Capitalising the true-up in the RAB is inconsistent with reducing the mismatch between efficiently incurred debt costs and the regulated cost of debt allowance. Interest payments are contractual and any mismatches relative to the cost of debt allowance must be funded as they occur. Gradually recovering the cumulative mismatch over the life of the assets is not consistent with the contractual nature of debt servicing costs.
- In QTC's view, the best outcome for consumers and regulated businesses is for the trailing average cost of debt to be updated annually. This is consistent with the approach adopted by the AER in December 2013.

Question 6

Should there be a transition period to a trailing average cost of debt, or should the trailing average be implemented immediately? If there is a transition, what should it look like—for example, how long should the transition be?

- Different transitions may be appropriate for different businesses. For example, 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.

AER transition

- The AER transition applies to the total benchmark debt yield.
  - At the start of the transition the ten yields in the trailing average each equal the prevailing 10-year benchmark debt yield.
  - In each subsequent year one of the original yields drops out and is replaced with the prevailing 10-year benchmark debt yield.
  - After ten years the trailing average cost of debt will equal the average 10-year benchmark debt yield over the previous ten years.

Hybrid transition

- The hybrid transition applies to the base interest rate and pairs this with a 10-year trailing average of the 10-year swap risk premium (SRP)[9].
  - At the start of the transition the ten yields in the trailing average equal the prevailing 1–10 year swap rates plus the corresponding historical 10-year SRPs over the last ten years.
  - In each subsequent year one of the original yields drops out and is replaced with the prevailing 10-year benchmark debt yield.
  - After ten years the trailing average cost of debt will equal the average 10-year benchmark debt yield over the previous ten years.

[8] QTC, April 2014, *Trailing average cost of debt Issues Paper*, Appendix A, p. 13–19.

[9] The SRP equals the 10-year benchmark debt yield minus the 10-year swap rate. The hybrid transition can also be implemented using 1–10 year CGS yields and the historical DRPs.

- The hybrid transition assumes that under the on-the-day approach the benchmark firm maintained a portfolio of ten floating-rate loans with annual maturities from 1–10 years, and used an interest rate swap to lock in a single fixed base rate for the term of the regulatory period.
- To replicate the transition to a trailing average of the total 10-year benchmark debt yield the benchmark firm would undertake the following transactions:
  - When the previous interest rate swap matures at the end of the regulatory period, the benchmark firm enters into ten pay fixed interest rate swaps with annual maturities from 1–10 years.
  - In each subsequent year the maturing floating-rate loan is refinanced with a 10-year *fixed-rate* loan. The maturing interest rate swap is not replaced.
  - After ten years the average portfolio cost will equal the average 10-year benchmark debt yield over the previous ten years (ie, a 10-year trailing average of the total benchmark debt yield).
- In our view, both transition approaches, and the immediate adoption of the trailing average (ie, no transition), have merit and should be considered further in the 2021 rate of return review.

Historical data to implement a transition

- Table 1 shows the historical Reserve Bank of Australia (RBA) BBB corporate yield, SRP and DRP estimates. The estimates have been extrapolated to a 10-year tenor using the slope of the BBB DRP curve. These data can be used to determine the ten initial yields in the trailing average for different transition start dates.
- If no transition is applied, the ten observations in the trailing average will equal the historical 10-year benchmark debt yields between 2011–2020.

TABLE 1: HISTORICAL BBB ESTIMATES - CALENDAR YEAR AVERAGES

Calendar year	10-yr BBB yield (%)	10-yr BBB SRP (%)	10-yr BBB DRP (%)
2011	8.0	2.5	3.1
2012	7.1	3.0	3.7
2013	7.1	2.8	3.3
2014	6.0	2.0	2.4
2015	5.0	2.0	2.4
2016	4.8	2.3	2.5
2017	4.5	1.6	1.8
2018	4.6	1.7	2.0
2019	3.7	2.0	2.3
2020	3.1	2.2	2.2

Source: RBA, QTC calculations.

Question 7

Should a regulated entity commit to a trailing average approach for a minimum length of time (for example, 10 years)?

- Adopting the trailing average approach should be considered a permanent change. This will not prevent the QCA from performing future reviews of the cost of debt approach, however there should be an expectation that the trailing average approach will apply indefinitely.

Question 9

Should we continue to use data from third-party providers to calculate the cost of debt? If so, which third parties? What approach should be used to derive the cost of debt estimate (i.e. average of multiple third-party sources)?

- The trailing average approach results in 10 per cent of the allowed cost of debt being updated each year based on the prevailing benchmark debt yield. As such, estimation errors are unlikely to have a material impact on the allowed cost of debt in any given year. If the errors are unbiased they should average out to zero over time.
- QTC considers giving equal weight to the corporate yield estimates from the RBA and Bloomberg to be reasonable. Incorporating estimates from other data providers could be considered, however any extra benefit is likely to be small under the 10-year trailing average approach.
- If the QCA prefers to use publicly available data, 100 per cent weight can be given to the RBA estimates. Bloomberg can be used if the RBA temporarily or permanently stops producing corporate yield estimates.

Question 11

For the trailing average cost of debt calculation:

- What is an appropriate length averaging period?

- When should the averaging period be? Should the averaging period occur at the same time each year?

- The length and timing of the averaging period has been addressed in our response to Question 3.
- There should be no requirement for the annual averaging periods to occur at the same time in each regulatory year.

2.2 Return on equity

Question 22

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

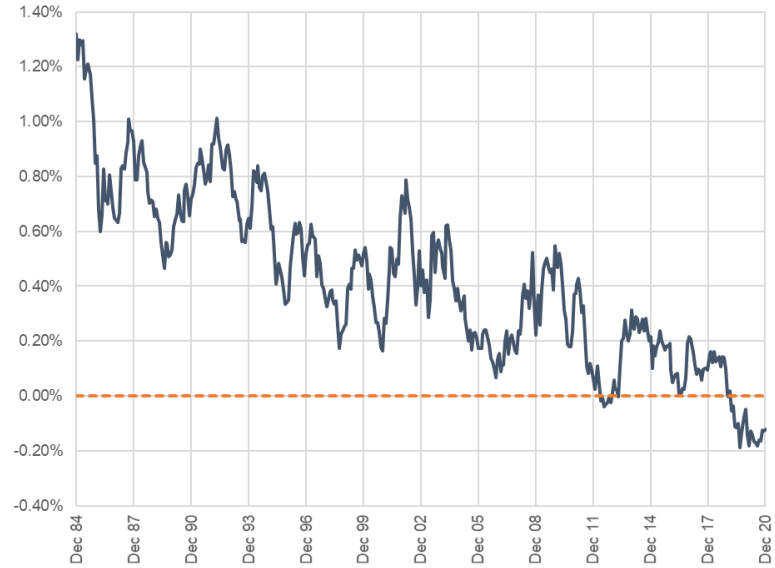
- QTC supports using the Ibbotson, Wright and DDM approaches to estimate ER_m), which is a key input in the CAPM.
- No weight should be given to the Siegel approach or survey-based estimates, although some surveys and the practices of valuation professionals can be useful in determining the relationship between ER_m and the prevailing 10-year CGS yield.
- As explained in Section 2.2.6 QTC submits that equal weight be given to historical and forward-looking approaches.

2.2.1 Ibbotson approach

- The Ibbotson approach adds the long-term average excess equity return to the prevailing 10-year CGS yield to estimate ER_m. The average excess return is often referred to as the historical market risk premium (MRP). QTC considers that some weight should be given to the Ibbotson approach as it is likely that investors will have regard to past excess returns when forming expectations about required excess returns.
- A key weakness of the Ibbotson approach is that it fails to capture the changes in investor risk aversion that directly affect the required rates of return on risky and risk-free assets. For example:
  - Increasing investor risk aversion during the global financial crisis (GFC) led to a flight-to-quality from risky assets such as equities to safe assets such as nominal CGS. These supply/demand dynamics caused in a significant increase in required risk premiums and a significant decrease in the prevailing 10-year CGS yield.
  - As a consequence, ER_m during the GFC did not fall point-for-point with the 10-year CGS yield, as implied by the Ibbotson approach. Given the severity of the crisis it is likely the required MRP increased by more than the fall in the 10-year CGS yield, resulting in the ER_m increasing from its pre-GFC levels.
  - Similar outcomes occurred during the sovereign debt crisis in 2011–2012 and when COVID-19 started impacting the financial markets in early 2020.

- The Ibbotson approach is also affected by the inflation risk premium (IRP) that makes up part of the 10-year nominal CGS yield. The IRP compensates owners of assets with fixed nominal cash flows for systematic inflation risk. The sign of the IRP depends on the relationship between inflation and real economic activity[10]:
  - A positive IRP exists when increasing inflation coincides with falling real economic activity. The IRP is positive because the real return on assets with fixed nominal cash flows decreases during unfavourable economic states (ie, when equities are performing poorly).
  - A negative IRP exists when falling inflation coincides with falling real economic activity. Investors are willing to accept a lower yield because the real return on assets with fixed nominal cash flows increases during unfavourable economic states (ie, the nominal asset acts as a hedge against poor equity returns).
- There are no publicly available long-term estimates of the Australian IRP, however Kim et al (2019) produce model-based estimates using US Treasury bond yields from 1984–2020 (Figure 1)[11]. Although the estimates are based on US data, the same broad trends are likely to be similar for the Australian IRP.

FIGURE 1: 10-YEAR INFLATION RISK PREMIUM ESTIMATES (US DATA)



Source: Kim et at, 2019.

- The historical MRP reflects a deduction for the positive average IRP in the historical 10-year nominal CGS yield. The net impact of the IRP on ER_m under the Ibbotson approach equals the IRP in the prevailing 10-year nominal CGS yield minus the historical IRP. Due to the steady decline in the IRP in Figure 1 the prevailing IRP will be lower than the cumulative historical average IRP at a given point in time. As a consequence, the net IRP will be negative, which results in the Ibbotson approach under-estimating ER_m[12].
- QTC submits that further consideration be given to the impact of the net IRP on the allowed return on equity under the Ibbotson approach in the 2021 rate of return review.

2.2.2 Siegel approach

- The Siegel approach adjusts the Ibbotson MRP based on the premise that, historically, high unexpected inflation between 1940–1990 artificially reduced the real return on nominal CGS but not the real return on equity, thereby creating an upward bias in the Ibbotson MRP[13].
- The adjustment adds the historical nominal CGS yield (deflated by average realised inflation) to the Ibbotson MRP and deducts what is believed to be an improved estimate of the historical real CGS yield.

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[10] The IRP compensates for *systematic* inflation risk, so the 10-year nominal CGS yield is a biased proxy for the expected return on a zero-beta asset in the CAPM.

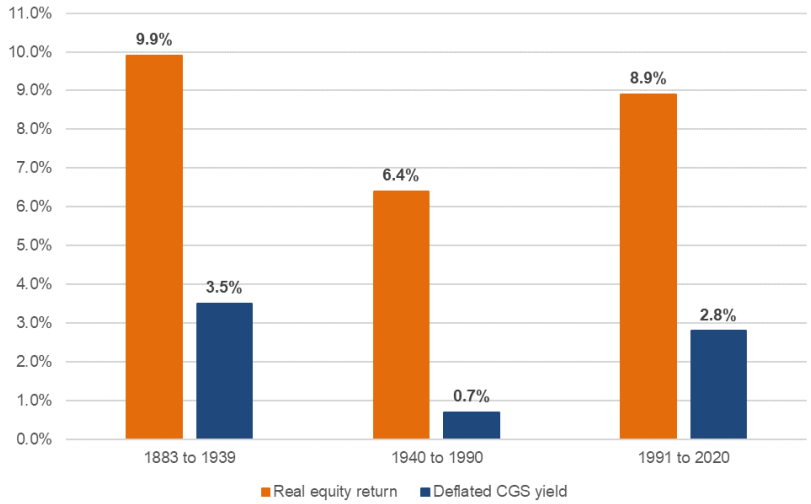
[11] Kim, Walsh & Wei, May 2019, *Tips from TIPS: Update and Discussions*, FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

[12] If the IRP was stationary (ie, displaying no time trend), the net IRP mismatch should average out to zero over time. However, due to the steady decline in the IRP the deduction for the historical average IRP at a given point in time will typically be larger than the prevailing IRP in the prevailing 10-year nominal CGS yield.

[13] QCA, August 2014, *Final decision – Cost of capital: market parameters* , p. 16 and p. 59.

- Australia's inflation experience can be divided into the following major sub-periods, with 1940–1990 being characterised as the sub-period with high unexpected inflation[14]:
  - 1883–1939 (0.9 per cent)
  - 1940–1990 (6.4 per cent)
  - 1991–2020 (2.3 per cent)
- The historical real return on equity and deflated CGS yield are shown in Figure 2. The average deflated CGS yield is materially lower between 1940–1990. However, contrary to the premise of the Siegel approach, the real return on equity is also materially lower between 1940–1990.

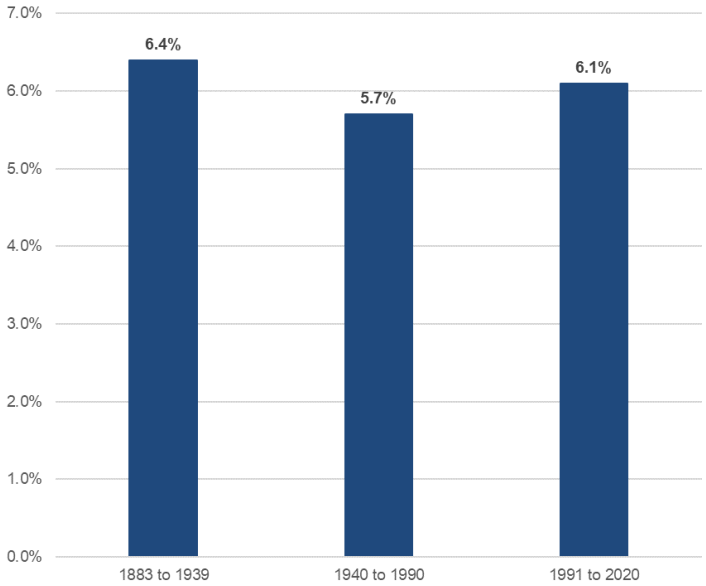
FIGURE 2: AVERAGE RETURNS AND YIELDS BY SUB-PERIOD



Source: Brailsford, Handley and Maheswaran (2008), QTC calculations. Estimates do not include an adjustment for imputation credits.

- The net effect of actual inflation on the real return on equity and deflated CGS yield is an average MRP that is relatively low between 1940–1990 (Figure 3). This is difficult to reconcile with the conclusion based on Siegel's analysis that high unexpected inflation caused the historical MRP between 1940–1990 to be biased upwards.

FIGURE 3: AVERAGE MRP BY SUB-PERIOD



Source: Brailsford, Handley and Maheswaran (2008), QTC calculations. Estimates do not include an adjustment for imputation credits.

[14] QCA, August 2014, *Final decision – Cost of capital: market parameters* , p. 61.

- Figures 2 and 3 suggest that the factors that caused high unexpected inflation between 1940–1990 had a material negative impact on the deflated CGS yield *and* the real return on equity. As such, even if adjustments to the historical data are warranted, it does not follow that the adjustments should be limited to the historical CGS yield. This is consistent with the conclusion from Lally and Marsden regarding the Siegel approach:[15]

> *'If one were to adopt these lower Siegel type estimates of the market risk premium, the implications for the cost of capital and capital budgeting would be significant. However, as pointed out by Dimson et al (2002),* ***past equity returns may also have been higher if the economic and other factors that gave rise to very low real bond returns had not arisen****. Thus Siegel's (1992) arguments must be treated with some caution.'*

- Table 2 shows the average real return on equity and deflated CGS yield between 1883–2020 and the two sub-periods that were not affected by high unexpected inflation. The Siegel approach assumes the average deflated CGS yield in the periods that were not affected by high unexpected inflation (3.3 per cent) should be deducted from the average real return on equity between 1883–2020 period (8.4 per cent). This results in a Seigel-adjusted MRP of 5.1 per cent, which is 1.0 per cent lower than the Ibbotson MRP of 6.1 per cent.
- If the suggestion above by Dimson (2002) is plausible, it could be argued that 9.5 per cent is a better estimate of the real return on equity that is not affected by the 'factors that gave rise to' high unexpected inflation between 1940–1990. As shown in Table 2 this produces an adjusted MRP that is similar to the Ibbotson MRP.

TABLE 2: AVERAGE RETURNS AND YIELDS BY SUB-PERIOD

Sub-period	Real equity return (%)	Deflated CGS yield (%)	MRP (%)
1883–2020	8.4	2.3	**6.1**
1883–1939 & 1991–2020	9.5	3.3	**6.2**
Difference	(1.1)	(1.0)	**(0.1)**

Source: Brailsford, Handley and Maheswaran (2008), QTC calculations. Estimates do not include an adjustment for imputation credits.

- Based on these considerations, QTC submits that no weight should be given to the Siegel approach.

2.2.3 Wright approach

- The Wright approach uses the historical real return on equity and current expected inflation to estimate ER_m. This produces a relatively stable nominal ER_m and an implied MRP that moves in the opposite direction to changes in the prevailing 10-year nominal CGS yield.
- The outcomes under the Wright and Ibbotson approaches are very different with the latter producing estimates of ER_m that change point-for-point with changes in the prevailing 10-year CGS yield.
- The Wright approach has been described as a Siegel variant because it is an alternative way of addressing the perceived problems created by high unexpected inflation between 1940–1990. As demonstrated in Section 2.2.2 it is not clear that a problem exists, at least based on Australian data. Regardless, the Wright approach is a valid way of using historical data to make a more direct estimate of ER_m, and QTC submits that it should be given at least as much weight as the Ibbotson approach:[16]

> *'… the second version [Wright] has merit independent of any historical inflation shock because it assumes that the expected real market return is stable over time and this may be a better assumption than that underlying the historical averaging of excess returns.'*

[15] Lally and Marsden, 2002, *Historical market risk premiums in New Zealand: 1931–2000*, p. 18.

[16] M. Lally, September 2019, *Estimation of the TAMRP*, p. 15.

- Unlike the Ibbotson approach, the Wright estimate of ER_m is not affected by the historical or prevailing IRP.

2.2.4 Dividend discount model

- Conceptually, the implied return on equity from the DDM is the most appropriate estimate of the forward-looking ER_m as it equates the present value of forecast dividends with the current value of the equity market.
- Implementing the DDM requires assumptions about the long-term dividend growth rate and how long it takes to transition from short-term to long-term growth. As such, it may be appropriate to consider multiple DDM specifications and use the average result as the input in the overall ER_m calculation.
- A key strength of the DDM is that the time-series properties of the implied MRP estimates are economically sensible and seem to capture changes in investor risk aversion over time (Figure 4):
  - The implied MRP was relatively low between 2006–2007. Realised real equity returns during and just prior to this period were significantly higher than the long-term average, and the average 10-year CGS yield was approximately 6.0 per cent. It is reasonable to expect that investors were requiring a relatively low MRP during this period to provide equity capital, and this is reflected in the DDM estimates.
  - The sharp increase in investor risk aversion during the GFC (2008–2009) and the European sovereign debt crisis (2011–2012) is reflected in the relatively high implied MRP estimates during these flight-to-quality periods.
  - The implied MRP increased by about 2.0 percentage points in between February and March 2020. This coincided with a 21 per cent fall in the Australian stock market, reflecting a sharp increase in investor risk aversion due to the initial impact of COVID-19 on the financial markets.

FIGURE 4: IMPLIED MRP FROM THE DDM

Source: QTC calculations. Utilisation rate of 0.55. Expected inflation reduced from 2.5 per cent to 2.0 per cent in December 2017

- The implied MRP from the QCA's DDM in Queensland Rail's 2020 draft access undertaking is 4.7 per cent[17]. In our view, this is unrealistically low as there is no reason to believe investors currently require an MRP that is significantly lower than the historical MRP of 6.0–6.5 per cent. As shown in Appendix A it is more likely that investors require an above-average MRP when the 10-year CGS yield is significantly below its long-term average.
- The low implied MRP may be due to the QCA's assumption of a term structure for ER_m beyond year 10[18]. QTC does not agree that equity has a term structure in the same way that fixed-rate debt does. Furthermore, the term structure assumption is based on the belief that the 10-year nominal CGS yield is strongly mean reverting, however the results from a simple mean reversion test do not support this belief [19]. Finally, imposing a term structure is not generally accepted practice when implementing the DDM.

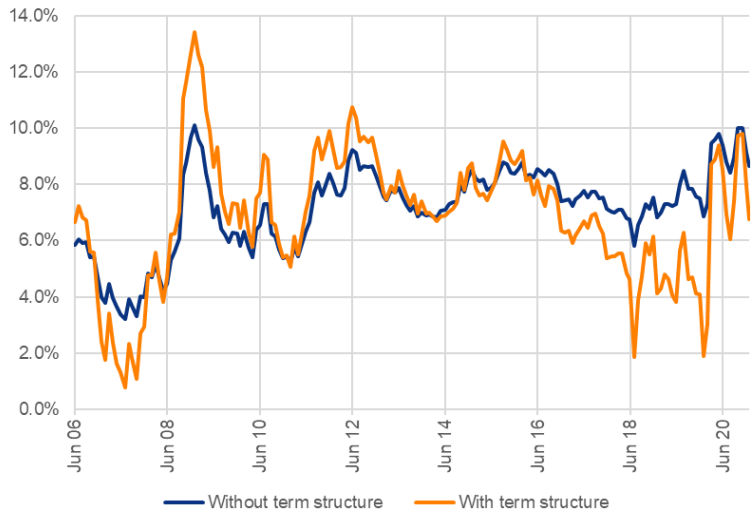
[17] QCA, February 2020, *Queensland Rail 2020 draft access undertaking*, p. 48.

[18] QCA, August 2014, *Final decision – Cost of capital: market parameters* , p. 71.

[19] The slope coefficient from a regression of annual changes in the 10-year risk-free rate on the 1-year lagged 10-year risk-free rate is not statistically less than zero between 1883–2020 and 1958–2020.

- Figure 5 shows the implied MRP estimates with and without a term structure for ER_m beyond year 10. The estimates are significantly more volatile when a term structure is assumed, and some estimates between 2018–2020 are implausibly low at approximately 2.0 per cent.

FIGURE 5: IMPACT OF TERM STRUCTURE ASSUMPTION ON IMPLIED DDM MRP



Source: QTC calculations. Utilisation rate of 0.55. Expected inflation reduced from 2.5 per cent to 2.0 per cent in December 2017.

- In our view, the QCA's DDM estimates should be consistent with the estimates made by other regulators such as IPART and the AER (adjusted for differences in the assumed utilisation rate):
  - IPART's latest biannual update of its cost of capital parameters as at 31 July 2020 shows an implied MRP range of 8.4–8.8 per cent based on three different versions of the DDM[20].
  - The AER published an annual update of its DDM MRP estimates in December 2020[21]. The low and baseline estimates from a 3-stage DDM are shown in Table 3. The estimates have been increasing over the last three years with a current range of 7.6–9.8 per cent:

TABLE 3: AER IMPLIED DDM MRP ESTIMATES

Scenario	2018 (%)	2019 (%)	2020 (%)
Low	5.96	6.42	**7.64**
Baseline	7.23	8.34	**9.82**

Source: AER

- QTC's support for the DDM is conditional on appropriate changes being made to the QCA's DDM approach as part of the 2021 rate of return review.

2.2.5 Surveys

- QTC submits that no quantitative weight should be given to surveys, although some surveys and the practices of valuation professionals can be useful in determining the relationship between ER_m and the prevailing 10-year CGS yield. This can be used to inform the weights given to the Ibbotson, Wright and DDM approaches.
- A key problem with using surveys in a regulatory context is treating the MRP and the risk-free rate as independent parameters. Even if a survey shows an average MRP that is in line with the historical MRP, it does not follow that the survey respondents use this estimate and the *prevailing* 10-year CGS yield to populate the CAPM.
- As shown in Appendix A, there is evidence that the ER_m used by real-world investors and valuation professionals has been relatively stable since 2013 despite a significant fall in the 10-year nominal CGS yield. This observation is not consistent with adding the historical MRP to the prevailing 10-year CGS yield. Rather, it implies a negative

[20] IPART, August 2020, *WACC Biannual Update*, p. 4. Estimates are based on an assumed theta of 0.35.

[21] AER, December 2020, *Rate of return Annual Update*, p. 15. Estimates are based on an assumed theta of 0.65.

relationship between the forward-looking MRP and the prevailing 10-year CGS yield, which is consistent with the outcomes under the Wright and DDM approaches.

2.2.6 Choice of weights

- The QCA's current weights and QTC's proposed weights are shown in Table 4:[22]

TABLE 4: CURRENT AND PROPOSED WEIGHTS

Estimation approach	QCA current weights (%)	QTC proposed weights (%)
Ibbotson	**25**	**25**
Wright	**15**	**25**
Dividend discount model	**25**	**50**
Siegel	15	0
Surveys	20	0

- QTC supports a weighted average approach to estimate ER_m, however we submit that weight should only be given to the Ibbotson, Wright and DDM approaches. The estimate should be rounded to two decimal places to preserve the time-series properties of the allowed return on equity and the implied MRP.
- The Ibbotson and Wright approaches use historical data, however the time-series properties of the ER_m estimates are very different:
  - Under the Ibbotson approach ER_m moves point-for-point with changes in the 10-year CGS yield.
  - Under the Wright approach ER_m is stable and not affected by changes in the 10-year CGS yield.
  - The best estimate of ER_m is likely to be between these two extremes, so in the absence of any other considerations it is appropriate to give equal weight to both approaches.
- The DDM is a forward-looking approach that does not overlap with Ibbotson or Wright approaches. As such, the DDM is likely to provide useful incremental information, which justifies a meaningful weight in the overall ER_m calculation. As shown in Figure 4 the time-series properties of the implied MRP estimates are economically sensible and seem to accurately capture changes in the level of investor risk aversion over time.
- QTC considers a reasonable set of weights to be: Ibbotson (25 per cent), Wright (25 per cent) and DDM (50 per cent). Our proposed weights give:
  - the same total weight to historical (ie, Ibbotson and Wright) and forward-looking (ie, DDM) approaches, and
  - more total weight to approaches that produce relatively stable estimates of ER_m (ie, Wright and DDM), which is consistent with the observation that hurdle/discount rates used by investors and valuation professionals have not fallen to the same extent as the 10-year CGS yield (see Appendix A).
- As explained in Section 2.2.4 QTC considers the QCA's recent DDM estimates to be unrealistically low. If a reasonable set of DDM parameters cannot be determined in the 2021 rate of return review a simple average of the Ibbotson and Wright estimates of ER_m should be used. This will produce ER_m estimates that move in the same general direction as the prevailing 10-year CGS yield, but the size of the movements will be smaller. This is consistent with ER_m being more stable than the prevailing 10-year CGS yield.

Question 23

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

- QTC submits that a weighted average of the Ibbotson, Wright and DDM approaches should be used to estimate the ER_m that is used as an input in the CAPM. A reasonable set of weights is outlined in Section 2.2.6.
- The estimate should be rounded to two decimal places to preserve the time-series properties of the allowed return on equity and the implied MRP.

[22] QCA, February 2020, *Queensland Rail 2020 draft access undertaking*, p. 46.

Question 25

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

- 100 per cent weight should be given to the single longest period that reflects the most reliable data (ie, 1958–present) when estimating the historical MRP and real return on equity.

Question 26

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

- If ER_m is estimated using the weights proposed in Section 2.2.6 a 20–60 day averaging period for the risk-free rate is considered to be reasonable.

3 Other issues

3.1 Expected inflation and the allowed cost of debt

- The cost of debt allowance in the building block model is converted from a nominal cost to a real cost by making revenue deductions for expected inflation on the debt-funded portion of the RAB. The building block model assumes the benchmark firm borrows an amount equal to the annual indexation of the debt-funded portion of the RAB based on actual inflation during the regulatory period.
- The above process is equivalent to targeting a real cost of debt. The 'delivered' nominal cost of debt equals the real cost of debt plus actual inflation. The real cost of debt allowance plus the proceeds from the new borrowings is the total cash available to service the benchmark firm's debt for the term of the regulatory period.
- Borrowing against the indexation makes it clear that the efficiently incurred cost of debt is a nominal cost, which means the benchmark firm issues nominal debt rather than inflation-linked debt. As such, the regulatory objective should be to deliver a nominal cost of debt (ie, real cost of debt plus actual inflation) that is sufficient to service the efficiently incurred nominal cost of debt for the benchmark firm.
- If the QCA continues to target a real cost of debt, the revenue deductions for inflation on the debt-funded portion of the RAB should equal the amount of inflation that is expected to be added to the debt-funded portion of the RAB during the regulatory period. It follows that the term of the expected inflation estimate should equal the term of the regulatory period, which is typically 5 years. If the estimate is unbiased the expected nominal cost of debt allowance will equal the efficiently incurred cost of debt for the benchmark firm over the term of the regulatory period[23].
- Estimating expected inflation for the term of the regulatory period is consistent with the new approach adopted by the AER in December 2020[24].
- Because the term structure of expected inflation is usually upward sloping, the QCA's current use of 10-year expected inflation will cause the expected nominal cost of debt allowance to be lower than the benchmark firm's nominal cost of debt. This is inconsistent with the fundamental regulatory principle of providing a regulated firm with the opportunity to recover at least its efficient costs.
- An alternative approach is to deliver a nominal cost of debt allowance by using the same estimate of expected inflation to make revenue deductions on the debt-funded portion of the RAB and to index the debt-funded portion of the RAB during the regulatory period. This results in the amount of inflation deducted from the revenues matching the amount of inflation that is subsequently added to the debt-funded portion of the RAB. This approach removes the impact of actual inflation on the delivered nominal cost of debt, which is appropriate because the cost of servicing nominal debt is not affected by actual inflation.

[23] Even if the estimate is unbiased, actual inflation will not equal expected inflation in all regulatory periods. This will result in mismatches between the delivered nominal cost of debt allowance and the nominal cost of debt for the benchmark firm.

[24] AER, December 2020, *Final position – Regulatory treatment of inflation*, p. 6. The AER's new approach uses a 5-year estimate of expected inflation to make revenue deductions on the entire RAB.

Appendix A: The market cost of equity

A.1: Background

- An important regulatory objective is to make the best estimate of the return on equity that is required by real-world investors operating in real-world financial markets. As such, it is important to consider how investors and valuation professionals determine required rates of return and discount rates in practice. This requires considering:
  - the absolute value of ER_m at a given point in time, and
  - the time-series properties of ER_m relative to the time-series properties of the prevailing 10-year CGS yield.

A.2: Observations from the RBA

- In October 2019 RBA Governor Philip Lowe gave a speech at the Australian National University where he provided some observations on why the hurdle rates required by investors have not fallen to the same extent as the risk-free interest rate. The key observations from the speech are captured in the following quote:[25]

> *'… it is worth noting that despite the* ***marked decline in global interest rates (and some decline in the cost of equity)****, average hurdle rates of return for new investments in many countries have not changed much. It seems that there is a global norm for hurdle rates somewhere around the 13 to 14 per cent mark and it is hard to shift this norm, even at record low interest rates.*
>
> *There are a couple of possible explanations for this.*
>
> *The first is that the reduction in the cost of borrowing has been offset by a rise in the required risk premium due to the uncertainties that I spoke about. If this were so, the hurdle rate would be unchanged, with* ***lower interest rates just compensating for the riskier environment****. The second possibility is that some firms have been slow to adjust to the new reality of low interest rates…*
>
> *My view is that there is an element of truth to both explanations:* ***risk premiums have gone up and, in some cases, hurdle rates of return are too sticky.****'*

- The Australian Financial Review (AFR) reported on the speech in December 2019. To explore the Governor's observations further the AFR contacted several CEOs of Australian companies and asked the following question:[26]

> *'Have you already lowered your hurdle rates for investment projects in response to lower interest rates? If not, would you be willing to?'*

- Some responses from the CEOs are provided below:

> *'We haven't lowered our hurdle rates at this time.* ***Although interest rates are an input to our cost of capital, equity risk premiums have, in our view, gone up, balancing out any benefits from low interest rates.****' (Tabcorp)*
>
> *'Over time we have reduced our hurdle rates based on the theoretical cost of raising debt,* ***but hurdle rates have not come down as much as some may think, because risk has increased.****' (EnergyAustralia)*

[25] RBA, 29 October 2019, *Some echoes of Melville*, p. 11–12.

[26] Australian Financial Review, 11 December 2019, *CEOs on how to get business investing.*

*'Given the current environment, **it's difficult to predict at this stage whether we would lower our hurdle rates for investment projects in response to lower rates**. This is a unique economic situation for Australia - we have never seen rates this low before - but if rates keep falling - then we would have to reassess.' (Adelaide Bank)*

'We revised our pre-tax normalised return on equity target to the RBA cash rate plus 14 per cent, removing the variable impact of interest rates. This enables us to target a strong return for investors through the cycle'. (Challenger)

'While we haven't yet changed our hurdle rates, it is certainly something we are thinking about.' (Woolworths)

*'We have agreed with our board to **moderately reduce hurdle rates** to prudently reflect the **dual impact of lower interest rates and higher macro-economic risks'**. (Stockland)*

- The CEO responses are consistent with the RBA Governor's observation that required rates of return have not fallen point-for-point, or at all in some cases, with a falling 10-year CGS yield. This can be interpreted as investors acting 'as if' they are giving material weight to a relatively stable ER_m when determining required rates of return. This implies a negative relationship between the forward-looking MRP and the prevailing 10-year CGS yield, which is more consistent with ER_m estimates from the Wright and DDM approaches rather than the Ibbotson approach.
- Stable hurdle rates are not a recent observation. In 2015 RBA Governor Glenn Stevens noted the following:[27]

'But another feature that catches one's eye is that, post-crisis, the earnings yield on listed companies seems to have remained where it has historically been for a long time, even as the return on safe assets has collapsed to be close to zero... This seems to imply that the equity risk premium observed ex post has risen even as the risk-free rate has fallen and by about an offsetting amount. Perhaps this is partly explained by more sense of risk attached to future earnings, and/or a lower expected growth rate of future earnings.

*Or it might be explained simply by stickiness in the sorts of 'hurdle rates' that decision makers expect investments to clear. I cannot speak about US corporates, but this would seem to be consistent with the observation that we tend to hear from Australian liaison contacts that the **hurdle rates of return that boards of directors apply to investment propositions have not shifted, despite the exceptionally low returns available on low-risk assets**.*

*The possibility that, de facto, **the risk premium being required by those who make decisions about real capital investment has risen by the same amount that the riskless rates affected by central banks have fallen may help to explain why we observe a pick-up in financial risk-taking, but considerably less effect, so far, on 'real economy' risk-taking.**'*

- QTC considers the observations from the RBA Governors, and the CEO responses, to be relevant to the QCA's approach for estimating the allowed return on equity. In particular, the implied negative relationship between the forward-looking MRP and the prevailing 10-year CGS yield should be considered when determining the weights that apply to the different ER_m estimation approaches.

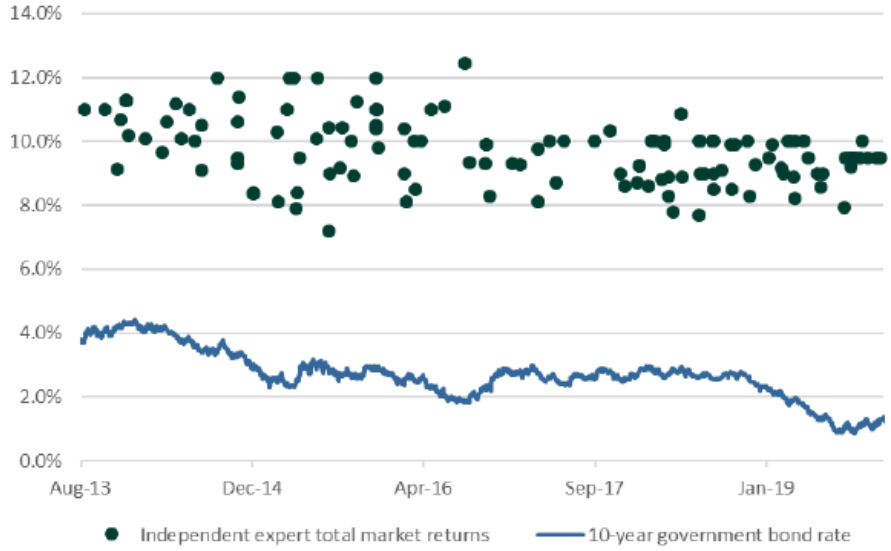
A.3: Valuation professionals

- In a report prepared for Port of Melbourne, Synergies Economic Consulting compiled a time-series of the market cost of equity used in independent valuation expert reports between 2013–2019 (Figure 6)[28]:

[27] RBA, April 2015, *Address to The American Australian Association Luncheon.*

[28] Synergies Economic Consulting, May 2020, *Determining a WACC estimate for Port of Melbourne*, p. 115.

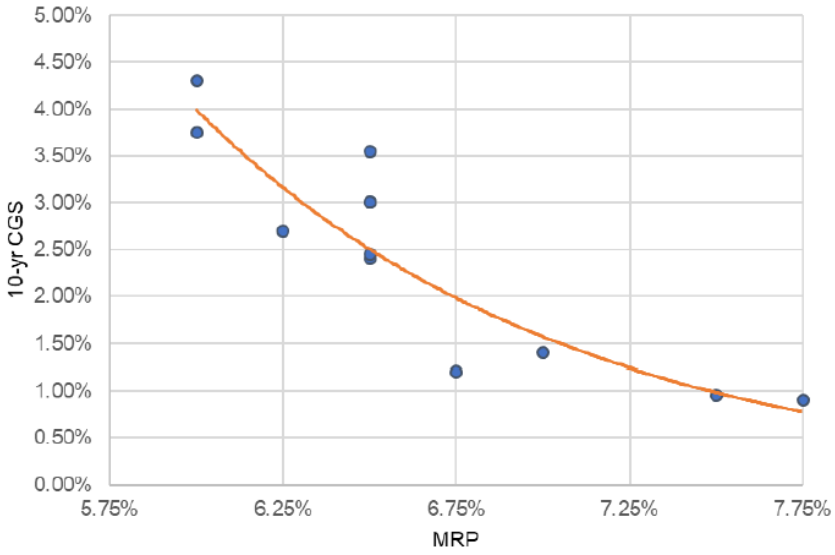
FIGURE 6: MARKET COST OF EQUITY USED BY INDEPENDENT VALUATION EXPERTS



Source: Synergies Economic Consulting, Connect 4 database

- Despite a significant fall in the 10-year CGS yield from 4.0 per cent to 1.0 per cent the market cost of equity only shows a slight downward trend. A relatively stable market cost of equity implies a negative relationship between the forward-looking MRP and the prevailing 10-year CGS yield.
- The MRP/CGS yield pairings used by Leadenhall (an Australian corporate advisory firm) provide further support for a negative relationship between the forward-looking MRP and prevailing 10-year CGS yield (Figure 7):

FIGURE 7: MRP AND 10-YEAR CGS YIELD PAIRINGS (JUNE 2013–JUNE 2020)



Source: https://www.leadenhall.com.au/

- The KPMG 2019 Valuation Practices survey also reports a relatively stable ER_m despite a material fall in the prevailing 10-year CGS yield:[29]

> *'Australia has the highest market cost of equity of the selected developed economies at 8.8%, with the US and Europe the lowest at 6.5%.'*

[29] KPMG, 2020, *Valuation Practices Survey 2019: What's it worth? Determining value in the continuing low interest rate environment*, p. 5.

- The 10-year CGS yield was 1.4 per cent on 30 June 2019, which implies an MRP of 7.4 per cent. As the historical MRP is 6.0–6.5 per cent, the KPMG survey is also consistent with a negative relationship between the forward-looking MRP and the prevailing 10-year CGS yield.

A.4: Relevance to the allowed return on equity

- The QCA has previously expressed doubts about the relevance of valuation practices in a regulatory context:[30]

> *'… valuation has no necessary implications for price regulation, under which regulators reset prices every regulatory period (e.g. five years) and accordingly, they revise the rate at regular intervals. In other words, observing that valuation experts apply a 10-year rate (or higher) in discounting cash flows has no implications for the correct rate to be applied in the cost of capital in determining regulated revenues.'*

- More recently the QCA has moved away from this position and concluded that a 'term matching' approach for determining the term of the risk-free rate is not appropriate:[31]

> *'We do not bind ourselves to previous market parameter decisions where we consider past decisions are no longer providing appropriate regulatory outcomes … we are no longer convinced that term-matching provides for an overall return on investment that is commensurate with the commercial and regulatory risks involved for regulated entities. As such, we have decided to adopt a 10-year bond term to estimate the risk-free rate, as part of our bottom-up WACC assessment.'*

- QTC agrees with the QCA's decision to adopt a 10-year risk-free rate as it brings the allowed return on equity closer to the discount rates used in practice. In our view, the 2021 rate of return review is an opportunity to further improve the QCA's approach by incorporating other aspects of valuation practice, such as a relatively stable ER_m, into the allowed return on equity calculation.

A.5: Conclusion

- The material presented in Appendix A indicates that real-world hurdle and discount rates are far more stable than the prevailing 10-year CGS yield. In QTC's view, it is important for the QCA's return on equity approach to produce estimates that share this important real-world property. This can be achieved by using the weighted average approach for estimating ER_m in Section 2.2.6 of this submission.

[30] QCA, August 2014, *Final decision – Cost of capital: market parameters* , p. 50.

[31] QCA, February 2020, *Queensland Rail 2020 draft access undertaking*, p. 42.