2022 Rate of Return Instrument

11 MARCH 2022 – RATE OF RETURN INFORMATION PAPER AND FINAL WORKING PAPERS

Queensland Treasury Corporation (QTC) welcomes the opportunity to provide comments on the Australian Energy Regulator's (AER) *Rate of return Information Paper* and final working papers.

The current round of consultation is the last opportunity for stakeholders to provide input before the AER makes the draft 2022 Rate of Return Instrument (RoRI). At this stage of the review process, QTC's primary concern is that the Wright approach has not been properly considered. The *Equity Omnibus final paper* has not assessed the Wright approach based on its original purpose, which is to make a direct unconditional estimate of a key Capital Asset Pricing Model parameter – the expected market return. Rather, an indirect assessment has been made, which has created an unintended bias against the Wright approach.

Giving zero weight to a valid estimation approach is a very strong position, especially when the approach is used by other regulators and has been supported by several advisors to the AER. In QTC's view, the AER's preliminary decision to give zero weight to the Wright approach should be reconsidered before the draft 2022 RoRI is made.

Summary

A diversified approach is required to estimate the allowed return on equity

- The 2022 RoRI must include an approach for producing the best estimate of the allowed return on equity across a wide range of market conditions that cannot be known when the final RoRI is made. In our view, the 2022 RoRI should use a diversified approach that gives meaningful weight to the following approaches:
  - historical excess returns (ie, the HER approach)
  - historical real equity returns (ie, the Wright approach), and
  - the calibrated Dividend Growth Model (DGM) proposed by Energy Networks Australia (ENA).
- A wide range of market conditions will be experienced during the term of the 2022 RoRI, and these may have a material impact on the prevailing cost of equity. However, no adjustments can be made to the outcomes from the allowed return on equity approach in the 2022 RoRI.
- Given this binding constraint, a diversified approach is the best and most fit-for-purpose way for the AER to estimate an allowed return on equity that best reflects prevailing market conditions when a final determination is being made, recognising that there is no scope to exercise discretion as market conditions change.

The AER has not properly considered the Wright approach

- The AER has relied on advice from Partington & Satchell, who suggest that the Wright approach would have produced substantially negative market risk premiums (MRP) when nominal bond yields were of the order of 15 per cent. QTC responded to this advice in an October 2020 submission to the AER. We demonstrated that for a plausible estimate of expected inflation at the time, the implied MRP would have been positive.
  - The AER has neither acknowledged nor responded to the points made in our submission. The *Equity Omnibus final paper* restates the advice from Partington & Satchell as though it was uncontested.
- The AER has not sought to determine if the empirical basis for the Wright approach (ie, the 'remarkable degree of stability' in real stock returns in the United States over more than two centuries) applies in Australia. Had it done so, it would have found that the real return on equity in Australia is also stable. This means the historical real return on equity is a statistically valid unconditional estimate of the expected real market return. In QTC's view, this finding supports giving meaningful weight to the Wright approach in the 2022 RoRI.

- The AER's assessment of the Wright approach has been wrapped up in a broader consideration of the relationship between the risk-free rate and MRP. As such, the AER has not assessed the Wright approach based on its original purpose, which is to make an unconditional estimate of the expected real market return.
- The secondary outcome under the Wright approach is a perfect negative relationship between the risk-free rate and the implied MRP. The AER has used the secondary outcome to make an indirect assessment of the Wright approach by asking if there is a theoretical basis for a negative relationship between the risk-free rate and MRP. Having satisfied itself that no 'widely accepted theoretical basis' or 'conclusive theoretical underpinning' for a negative relationship exists, the AER has concluded that zero weight should be given to the Wright approach.
- If the AER believes the Wright approach should be assessed based on the secondary outcome, it follows that the same standard must apply to the secondary outcome from the HER approach, which is a perfect positive relationship between the expected market return and the risk-free rate.
  - No evidence has been provided in the *Equity Omnibus final paper* to show that a 'widely accepted theoretical basis' or 'conclusive theoretical underpinning' exists for a perfect positive relationship. Therefore, the same theory-based threshold that led the AER to give zero weight to the Wright approach would, if consistently applied, also give zero weight to the HER approach.
  - Similarly, the HER approach would be assessed as not being fit-for-purpose because the relationship between the expected market return and risk-free rate is likely to be time-varying, may change signs overtime (from positive to negative or negative to positive), and cannot be reliably quantified.
- An unintended bias against the Wright approach has been created due to the way the AER has applied its assessment criteria. Therefore, the preliminary decision to give zero weight to the Wright approach should be reconsidered before the AER makes the draft 2022 RoRI. QTC recommends the AER:
  - provide an assessment of the theoretical basis for the Wright approach in Wright, Mason & Miles (2003), and a comparable assessment of the theoretical basis for the HER approach
  - confirm if the 'key evidential basis' for the Wright approach (ie, stability of the real return on equity) applies based on Australian real equity returns, and
  - make a side-by-side assessment of the Wright and HER approaches based on their original purposes, not the implied secondary outcomes, and include these assessments in the draft 2022 RoRI.

Relationship between the risk-free rate, expected market return and market risk premium

- In QTC's view, the AER has placed too much weight on theory when assessing the relationship between the risk-free rate and MRP. This has led to an unrealistic standard for acceptance being applied to evidence from real-world practices that are relevant to the relationship:

> *After reviewing stakeholder submissions, we found no conclusive theoretical underpinning for a negative relationship.*

- The plain English meaning of the expression 'conclusive' means to put an end to 'any doubt, question or uncertainty'. This is an unrealistic standard that is of no value in assessing the relationship between the risk-free rate and MRP. It has also been introduced at a late stage in the review process, and without prior consultation.
- The AER has also used theory to assess evidence from the practices of real-world investors. However, the investor perspective is informative because it reflects a broad range of factors and considerations that extend *beyond* theory. Making the perceived value of the investor perspective contingent on a theoretical requirement defeats the purpose of considering the investor perspective in the first place.
- QTC considers independent expert reports to be useful in assessing the relationships between the risk-free rate, expected market return and MRP. The *Equity Omnibus final paper* cites advice from CEPA, who concluded that independent experts commonly used an MRP of 6.0 per cent, with no adjustment for the falling risk-free rate.
- QTC addressed CEPA's conclusion in our submission to the *Equity Omnibus draft paper*. We found that expert reports reviewed by CEPA showed that:
  - If a 6.0 per cent MRP was used, it was common practice for an uplift to be applied to the risk-free rate.
  - If the prevailing risk-free rate was used, it was typically added to an MRP that was higher than the historical average excess return of 6.0 per cent.
  - We found the same results in a larger sample of expert reports that were made between 2013 and 2021.
  - The AER has neither acknowledged nor responded to the points made in our submission. No assessment of our critique of CEPA's conclusion has been made, and there has been no response to the corroborating evidence

from a larger sample of expert reports. The *Equity Omnibus final paper* restates the CEPA's conclusion as though it was uncontested.

- Although we believe the AER has been provided with sufficient evidence to conclude that a less-than-perfect positive relationship exists between the expected market return and risk-free rate, we have provided additional evidence in Section 3.2.2 to add further support to this conclusion.
- Three options for using empirical evidence to determine the weights to apply to the Wright and HER approaches have also been provided. The options, which are not based on outputs from the DGM, suggest weights of 40–50 per cent for the Wright approach and 50–60 weight for the HER approach.

Term of the allowed return on equity

- The AER has considered the question of the term of the allowed return on equity in multiple reviews dating back to 2009. On each occasion, the AER correctly concluded that a 10-year term should be used rather than a term that matches the length of the regulatory period. Two arguments have been presented in favour of term-matching, which in our view do not provide any reason for the AER to depart from a 10-year term.
- The first argument is that valuing regulated equity is different from valuing un-regulated equity, because a regulator is not concerned about cashflows beyond the end of the regulatory period. Un-regulated equity is typically valued based on perpetual cashflows, so a longer-term risk-free rate is appropriate. However:
  - Under the CAPM, a firm's risk characteristics are captured by the equity beta. Therefore, any difference between the cost of equity for a regulated and un-regulated firm should be fully attributable to the difference between their equity betas. As such, we agree with the AER's conclusion in the 2018 RoRI that:

    > *Setting a rate of return using a 10 year term will provide for allowed returns on an investment in a regulated business that are comparable with the investor valuations of other stocks within the market with a similar degree of systematic risk.*

  - The two recent expert reports for businesses that are regulated by the AER provide evidence that regulated businesses are not valued on a different basis. Both reports use a 10-year risk-free rate to estimate the cost of equity despite the businesses being subject to 5-yearly resets of the allowed return on equity.
- The second argument is that regulated equity can be thought of as a very long-term floating rate bond with a coupon that is reset at the start of each 5-year regulatory period. As a consequence, it is argued that regulated equity should be valued 'as if' it is a 5-year bond, which requires the use of a 5-year risk-free rate.
  - As shown in Section 4, a long-term Commonwealth Government Security (CGS) with a coupon that is reset every 5 years to equal the 5-year CGS yield would likely be priced at a significant margin above the 5-year CGS yield on each reset date. Excluding the margin from the return on equity allowance will produce an NPV<0 outcome.

Weighted trailing average cost of debt approach

- If the AER decides to adopt a weighted trailing average for the cost of debt, the weights should be based on the percentage change in the post-tax revenue model (PTRM) debt balance. The spreadsheet model that forms part of this submission shows how a PTRM-weighted trailing average can be calculated.

1 A diversified approach is required to estimate the allowed return on equity

1.1 Responding to the constraints under a binding RoRI

- The 2022 RoRI must include an approach for producing the best estimate of the allowed return on equity across a wide range of market conditions that cannot be known when the final RoRI is made. This is especially challenging under regulatory settings where the approach must be applied without discretion. There is no scope to review the outcomes even if a review is justified based on prevailing conditions when a final determination is being made.
- For example, the fixed MRP approach in the 2018 RoRI produced an unrealistically low estimate of the allowed return on equity in March 2020, when the effects of Covid–19 first started to impact global equity markets. However, the AER was legally prevented adjusting the estimate. This is important because the AER was making its final determinations for the Queensland and South Australian electricity distributions businesses around this time.
  - A return on equity approach that gives weight to estimation approaches that do not assume a fixed MRP would have produced a more realistic estimate that reflected the heightened level of investor risk aversion at that time.
- In QTC's view, the 2022 RoRI should include a diversified return on equity approach that gives meaningful weight to:
  - historical excess returns (ie, the HER approach)
  - historical real equity returns (ie, the Wright approach), and
  - the calibrated Dividend Growth Model (DGM) proposed by Energy Networks Australia (ENA).
- Each approach will produce a better estimate of the allowed return on equity in different market conditions compared to the other approaches. However, it is unrealistic to expect a single approach to produce the best estimate across all possible market conditions that may occur during the term of the 2022 RoRI. This is why a diversified approach should be used – each approach is good, but not perfect.
- A wide range of market conditions will be experienced during the term of the 2022 RoRI, and these will include market shocks, such as those experienced in March 2020, and other unanticipated events that may have a material impact on the prevailing cost of equity. However, no adjustment can be made to the outcome from the allowed return on equity approach regardless of whether an adjustment is justified based on prevailing market conditions.
- Given this binding constraint, a diversified approach is the best and most fit-for-purpose way for the AER to estimate an allowed return on equity that best reflects prevailing market conditions when a final determination is being made, recognising that there is no scope to exercise discretion as market conditions change.

1.2 Options considered in the Information Paper

- Given the AER's preliminary decision to give zero weight to the Wright approach, QTC does not consider the three preliminary options in the *Rate of Return Information Paper* to be sufficiently diversified to be capable of producing the best estimate of the allowed return on equity.
- The AER uses estimates from three data providers to estimate the 10-year BBB+ debt yield. This is because no single data provider can be expected to produce the best estimate consistently over time, or across a wide range of market conditions. The different yield curve-fitting methods have strengths and weaknesses, so taking a simple average is a pragmatic way of reducing estimation error and avoiding over-reliance on any single data provider. The same principle should apply to the allowed return on equity.
- Estimating the allowed return on equity is far more difficult than estimating the 10-year BBB+ yield. As such, the AER should make full use of the available estimation approaches (ie, the HER, Wright and DMG approaches), and not limit itself to one or two approaches.
- In our view, the option that should be reconsidered by the AER before making the draft 2022 RoRI is a weighted average of the HER, Wright and calibrated DGM approaches[1]. A weighted average approach is consistent with the recommendation to the AER by Dr. Martin Lally at the Concurrent Evidence Session on the MRP[2]:

[1] QTC (December 2017), *Rate of Return Guideline Review Issues Paper*, Table 1 on p. 4.

[2] AER Concurrent Evidence Session 3 – Market Risk Premium, proofed transcript, p. 65–66.

> *"What's the best method?", we don't have to pick one. If we were picking one, we'd have to face this awful conundrum. I would say to you,* ***"All methods are imperfect. So choose a set of methods that you think are, for all their imperfections, worth putting weight on, and then equally weight those methods." And the set of methods that I would recommend is not only historical averaging and the dividend growth model, but this Wright estimator****. And I would also strongly urge the AER to look at the results from foreign markets.*
>
> *Now, I should add that it's very fortunate that in that Dimson, Marsh and Staunton data Australia comes out at about in the middle. So whether you put some weight on the foreign data or not doesn't make much difference.*

- A weighted average approach was also supported in the same Concurrent Evidence Session by Dr. Toby Brown[3]:

> *We've heard that various people have said that we should "give weight to", and I think that's right.* ***I think there should be an explicit commitment to a non-zero weight****. There's some kind of bringing together of the results of different models, and that involves not putting a zero weight on any of them. I'm not sure that it's sensible to pre-commit to exactly equal weighting on everything that you're going to look at,* ***but none of the models should have a zero weight****.*

- The advice from Dr. Lally and Dr. Brown supports our contention that the AER should:
  - reconsider its preliminary decision to give zero weight to the Wright approach, and
  - adopt a diversified approach that gives meaningful weight to the HER, Wright and calibrated DGM approaches.

2 The AER has not properly considered the Wright approach

2.1 Reliance on advice from Partington & Satchell

- In their June 2020 report to the AER, Partington & Satchell advised that[4]:

> *… when Australian government bond rates were of the order of 15%, using the Wright approach would have resulted in a substantial negative estimate of the market risk premium. In the most elementary models of investor behaviour, negative risk premiums are not possible for risk averse investors.*

- Although no estimates of the implied MRP were provided, the advice appears to have been accepted by stakeholders who believe no weight should be given to the Wright approach. The above quote appears in a submission from the Consumer Reference Group (CRG), and the AER has referred to the advice in four working papers including the *Equity Omnibus final paper*[5].
- At a minimum, the level of expected inflation that would have produced a zero implied MRP should have been reported, along with reasons why expected inflation at the time was significantly lower than this level. Without this information, it is not clear how the conclusion of a substantially negative implied MRP was reached[6].
- QTC addressed this issue in an October 2020 submission to the AER. We showed that the average real return on equity up to and including 1981 (when the nominal bond yield peaked at 15 per cent) was about 7.5 per cent. If 10-year expected inflation was above 7.0 per cent, the MRP under the Wright approach would have been positive[7].

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[3] AER Concurrent Evidence Session 3 – Market Risk Premium, proofed transcript, p. 78–79.

[4] Partington and Satchell (June 2020), *Report to the AER: Alternative Asset Pricing Models*, p. 23.

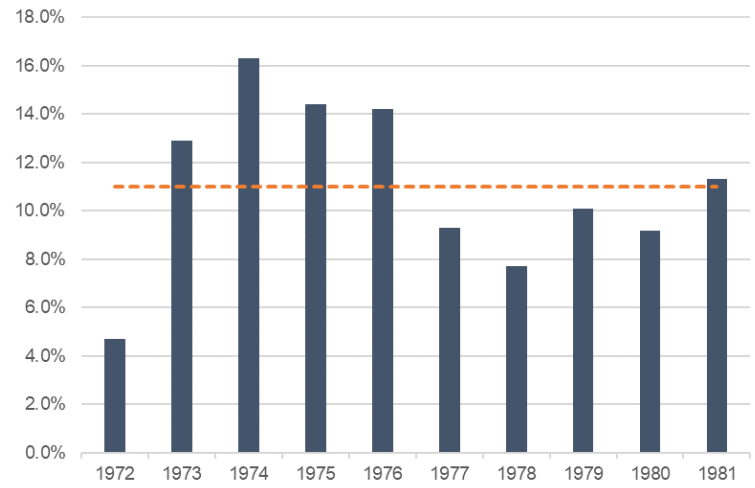
[5] CRG (September 2021), *CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers – Volume 1: Technical*, p. 82.

[6] The implied MRP equals (1+historical average real return on equity) x (1+expected inflation) -1 - nominal bond yield.

[7] QTC (October 2020), *Pathway to the 2022 Rate of Return Instrument*, p. 3–4.

- Actual inflation in the 10 years up to and including 1981 was persistently high and averaged *11.0 per cent per annum* (Figure 1). It is reasonable to assume that persistently high inflation would have significantly influenced inflation expectations in 1981. Therefore, we concluded it is plausible that 10-year expected inflation was higher than 7.0 per cent, which would have produced a positive implied MRP under the Wright approach.

FIGURE 1: ACTUAL ANNUAL INFLATION



Source: Brailsford, Handley & Maheswaran (2012).

2.1.1 No acknowledgement of QTC's views by the AER

- The AER has neither acknowledged nor responded to the above analysis from QTC's submission. The *CAPM and alternative return on equity models final paper* restates the original advice from Partington & Satchell as though it was uncontested, as do the *Equity Omnibus draft and final papers*. This suggests the AER has accepted the advice, and that it has influenced the AER's preliminary decision to give zero weight to the Wright approach.
- In QTC's view, the AER should reconsider the advice from Partington & Satchell before making the draft 2022 RoRI. To assist, we have considered a longer period where inflation and nominal bond yields were relatively high[8]. The choice of period has been informed by previous advice to the AER from Partington & McKenzie[9]:

> *Prior to this period [1970s] bond yields were typically in the range 3% to 6%, but then jumped and for a substantial period were typically between 10% and 15%. The explanation for this jump was a sustained period of inflation, starting in the 1970s, when inflation rates above 10% were not unusual. The prevailing view was that high inflation would be around for a long time and it was not until the 1990's that inflation was ultimately tamed.*

- The results are shown in Table 1. During this period average inflation was 9.7 per cent and the average nominal bond yield was 12.0 per cent. Trailing 10-year inflation confirms the persistently high actual inflation during this period, which is likely to have strongly influenced inflation expectations at the time.

[8] The historical average real return on equity has been calculated using expanding averaging periods with three different start dates (1883, 1937 and 1958). The estimates in Table 1 are a weighted average of the three historical averages in the relevant year, with weights based on the number of observations in each averaging period. This approach produces a slightly different estimate in 1981 (7.3 per cent) compared to the estimate in our October 2020 submission (7.5 per cent).

[9] Partington & McKenzie (February 2013), *Review of the AER's overall approach to the risk-free rate and market risk premium*, p. 8.

TABLE 1: EXPANDED ANALYSIS OF THE WRIGHT-IMPLIED MRP

Year	Nominal bond yield (%)	Historical average real equity return (%)	Expected inflation for implied MRP = 0 (%)	Trailing 10-year inflation (% pa)
1975	10.0	7.1	**2.7**	7.2
1976	10.4	6.8	**3.4**	8.3
1977	9.5	6.7	**2.6**	8.9
1978	8.8	6.9	**1.8**	9.5
1979	10.1	7.2	**2.7**	10.2
1980	12.6	7.8	**4.4**	10.6
1981	15.0	7.3	**7.2**	11.0
1982	14.0	6.8	**6.8**	11.6
1983	13.5	7.5	**5.5**	11.2
1984	13.4	7.4	**5.6**	9.8
1985	14.9	7.8	**6.6**	9.2

Source: Brailsford, Handley & Maheswaran (2012), RBA. QTC calculations.

- The levels of expected inflation that would have produced zero implied MRPs under the Wright approach are shown in column 4. Expected inflation higher than these levels would have produced positive implied MRPs.
- The expected inflation levels are not particularly high, especially considering that 10-year trailing inflation was consistently above 7.0 per cent per annum, and Partington and McKenzie's observation that the prevailing view was that 'high inflation would be around for a long time'. As such, it is plausible that expected inflation was higher than these levels. This would have produced positive implied MRPs under the Wright approach.
- From 1986, the implied MRP can be directly determined by deducting the inflation-linked bond yield from the historical real return on equity (Table 2). Inflation-linked bond yields are biased upwards by an illiquidity premium, so the estimates in Table 2 should be viewed as lower bounds for the implied MRPs under the Wright approach.

TABLE 2: IMPLIED WRIGHT MRP USING INFLATION-LINKED BOND YIELDS

Year	Nominal bond yield (%)	Inflation-linked bond yield (%)	Historical average real equity return (%)	Lower bound for the Wright implied MRP (%)
1986	13.4	5.8	8.3	**2.5**
1987	12.9	5.1	7.9	**2.8**
1988	13.0	4.3	7.9	**3.6**
1989	12.9	4.8	8.0	**3.2**
1990	12.1	5.5	7.5	**2.0**
1991	9.4	5.5	7.9	**2.4**

Source: Brailsford, Handley & Maheswaran (2012), RBA. QTC calculations.

- Even when calculated using upwardly-biased inflation-linked bond yields, the lower bound MRPs under the Wright approach were positive in each year between 1986 and 1991, and have been steadily increasing ever since.
- The additional analysis supports our original conclusion that even when nominal risk-free rates were of the order of 15 per cent, it is likely that the implied MRPs under the Wright approach would have been positive. Regardless, even if there was some doubt about the sign of the implied MRPs during a period of double-digit nominal bond yields and inflation, this is unlikely to be relevant in the period for which the 2022 RoRI will operate.
- QTC submits that the additional analysis should be considered by the AER before making the draft 2022 RoRI.

2.2 AER commitment to consider the rationale for Wright approach

- In the *Rate of return and cashflows in a low interest rate environment draft paper*, the AER made a commitment to consider the rationale for the use of the Wright approach by regulators in the United Kingdom[10]. The commitment was repeated in the *Equity Omnibus draft paper*:

> *As part of our work on this topic we will consider the approach of the United Kingdom regulators and the rationale for their findings. This will include considering:*
>
> - *The initial 2003 work of Smithers and Company that proposed that the real market cost of capital should be assumed constant on the basis of UK data from long-term historic averages of realised stock returns.*
> - *The 2013 and 2018 consulting work that concluded that the approach of assuming the total market return is relatively constant that had been adopted by the UK regulators remained appropriate.*
> - *The decisions of Ofgem and other regulators where they determined to apply a constant total market return approach.*
> - *Whether we consider any relationship found in the United Kingdom is likely to apply in Australia and could be determined with sufficient validity and stability to warrant Australian regulatory use.*

- The AER's undertaking to perform this analysis was also noted by the CRG, along with an expectation that further analysis of the Wright approach would be provided in the *Equity Omnibus final paper*[11]:

> *The Equity omnibus paper did not provide substantially further insight into the AER's consideration of these matters. The CRG looks forward to reviewing this further analysis from the AER.*

- In QTC's view, the AER has not fulfilled this commitment. For example, the reports referred to by the AER are:
  - Wright, Mason & Miles (2003), *A study into certain aspects of the cost of capital for regulated utilities in the U.K.*
  - Wright & Smithers (2013), *The Cost of Equity Capital for Regulated Companies: A review for Ofgem.*
  - Wright et al (2018), *Estimating the cost of capital for implementation of price controls by UK Regulators – An update on Mason, Miles and Wright (2003)*.
- The first and second reports are not cited in the *Equity Omnibus final paper*. While the third report is cited once, the reference is to the DGM rather than the Wright approach. As such, it is not clear what consideration has been given to these reports by the AER in forming its preliminary position on the Wright approach.
- More importantly, the AER has not sought to determine if the empirical basis for the Wright approach (ie, the 'remarkable degree of stability' in real stock returns in the United States over more than two centuries) applies in Australia. Had it done so, it would have found that the real return on equity in Australia is also stable.
- Without properly considering the theoretical and empirical basis for the Wright approach, QTC considers it to be unreasonable for the AER to propose giving zero weight to the Wright approach in the 2022 RoRI.

2.2.1 The theoretical basis for the Wright approach

- The theoretical basis for the Wright approach is explained in Wright, Mason & Miles (WMM 2003) and CEPA's report to the AER on the relationship between the risk-free rate and MRP[12]. The main points are as follows:
  - WMM express the CAPM as follows:

$$E(R_i) = (1 - \beta_i)R_f + \beta_i(E(R_m))$$

[10] AER (May 2021), *Rate of return and cashflows in a low interest rate environment – Draft working paper*, p. 29.

[11] CRG (September 2021), *CRG Response to the AER's July 2021 Draft Working Papers: The Overall Rate of Return, Debt Omnibus and Equity Omnibus Papers – Volume 1: Technical*, p. 83.

[12] CEPA (June 2021), *Relationship between RFR and MRP*, p. 27–31.

- This expression shows that the expected market return has the greatest impact on the expected return on equity when the beta is greater than 0.5. It also shows that the MRP is not a stand-alone input into the CAPM.
- The standard CAPM is silent on how the three parameters should be estimated. To address this issue, WMM turn to the Consumption CAPM (CCAPM) for guidance.
- In the CCAPM, assets with payoffs that are positively correlated with consumption (and therefore negatively correlated with the marginal utility of consumption) require a positive risk premium because high (low) payoffs tend to occur when the marginal utility of consumption is low (high).
- The main conclusions from WMM (2003) are as follows:
  - The model explains why equities offer higher expected returns than a risk-free asset. However, it requires an unrealistically high level of risk aversion to explain the size of the historical difference between equity and risk-free returns.
  - The model cannot explain the size of the difference because it fails to explain the low absolute returns on risk-free assets. In contrast, it is not particularly hard to derive estimates of the expected return on equity that are consistent with theory[13].
  - There is no obvious conflict between observed average stock returns and the predictions of theory[14].
- The final point above provides the motivation for WMM to consider whether the historical average real return on equity should be used to make an unconditional estimate of the expected real return on equity.

- In QTC's view, the above points demonstrate that the Wright approach has a sound theoretical basis. We are not aware of a comparable theoretical basis for the HER approach.

2.2.2 The empirical basis for the Wright approach

- The Wright approach uses the long-term historical average real return on equity to estimate the expected real return on equity. The 'key evidential basis' for doing this is the stability of the historical real return on equity. As explained in Wright & Smithers (2013)[15]:

> *A minimal requirement for assuming some magnitude is constant in expectation is that it should historically have been stable, ex post. A glance at Figure 1.1 demonstrates very clearly, on the basis of US data, that real stock returns have shown a remarkable degree of stability over more than two centuries.*

- In this context, 'stability' does not mean the underlying data are not volatile. Stability means that variations in the sample average tend to become smaller as the sample size increases. This indicates that the sample average is converging towards the unobservable population average as more data becomes available.
- In addition, shorter-term rolling averages will tend to oscillate around the sample average rather than displaying large, sustained swings away from the sample average.
- Figure 1.1 referred to in Wright & Smithers (2013) has been reproduced in Figure 2. It shows that the rolling 30-year average real return on equity based on United States data oscillates in a relatively tight range around an average value of about 7.0 per cent. This behaviour is consistent with the underlying real returns being stable.
- In contrast, the historical real returns on nominal bonds and cash are not stable as the rolling 30-year averages do not oscillate around any particular value. Rather, the rolling averages display large, sustained swings away from the sample averages as new data becomes available.

[13] Wright, Mason & Miles (2003), *A study into certain aspects of the cost of capital for regulated utilities in the U.K*, p. 17.

[14] Wright, Mason & Miles (2003), *A study into certain aspects of the cost of capital for regulated utilities in the U.K*, p. 33.

[15] Wright & Smithers (2013), *The Cost of Equity Capital for Regulated Companies: A Review for Ofgem*, p. 14.

FIGURE 2: WRIGHT AND SMITHERS (2013) – FIGURE 1.1

- The stability of the historical real return on equity means the historical average is a statistically valid unconditional estimate of the expected real return on equity[16]. This is the empirical basis for the Wright approach.
- Wright et al (2018) conclude[17]:

> *Thus, 15 or so years on from the original [2003] MMW report, we do not see any obvious evidence in the history of returns themselves to cast doubt on the* ***key evidential basis*** *for the treatment of the EMR:* ***that long-run stock returns are stable in real terms****.*

2.2.3 What did Wright et al recommend to the United Kingdom regulators?

- Wright et al have advised regulators in the United Kingdom to assume the expected real return on equity is stable, and to give 100 per cent weight to the historical average to make an unconditional estimate of the expected real return on equity.
- Given the constraints under a binding RoRI that must be applied without discretion, QTC does not consider that 100 per cent weight should be given to any estimation approach. In our view, the questions that need to be reconsidered by the AER are:
  - Does the Wright approach produce a statistically valid unconditional estimate of the expected real return on equity?
  - If it does, what weight should be given to the Wright approach compared to other estimation approaches?
- By definition, giving 100 per cent weight to an unconditional estimate ignores all other information. In our view, there is other information which indicates that the expected market return has fallen, but not point-for-point with the risk-free rate. This evidence is largely based on the practices of investors and valuation experts who face strong financial and reputational incentives to make good estimates of the cost of capital.
- As such, QTC considers there is a strong argument for giving some weight to the Wright approach in the 2022 RoRI.

2.2.4 Misconceptions about the Wright approach

- The Wright approach is often described as an approach that *assumes* a perfectly negative relationship between the risk-free rate and MRP. However, the primary assumption under the Wright approach relates to the expected market return, not the implied MRP[18]:

---

[16] The historical average is an unconditional estimate because only depends on historical real equity returns. Conditional estimates can be made by considering other factors such interest rates, the slope of the yield curve, dividend yields, debt premiums and the output gap.

[17] Wright et al (2018), *Estimating the cost of capital for implementation of price controls by UK Regulators – An update on Mason, Miles and Wright (2003)*, p. 38.

[18] AER (2018), *Rate of Return Instrument – Draft Explanatory Statement*, p. 234. AER (December 2021), *Overall rate of return, equity and debt omnibus – Final working paper*, p. 63.

The Wright Approach relies heavily on the assumption of a perfect, or at least near perfect, negative relationship between the risk free rate and the MRP. That is, for every basis point the risk free rate decreases the MRP increases the same amount, or vice versa, in order to keep the return on equity constant.

The Wright approach is also known as the total market return approach. It assumes there is a perfect negative relationship between the MRP and risk-free [sic].

- The Wright approach uses the historical average real return on equity as an unconditional estimate of the expected real market return. The primary assumption is that no relationship exists between the expected market return and risk-free rate. The negative relationship between the implied MRP and risk-free rate is a secondary outcome.
- The HER approach uses the historical average excess return as an unconditional estimate of the expected MRP. The primary assumption is that no relationship exists between the expected MRP and the risk-free rate. The secondary outcome is a perfect positive relationship between the implied expected return on equity and the risk-free rate.
- If the AER believes the Wright approach should be assessed based on the secondary outcome, it follows that the HER approach must be assessed in the same way. For example, the above descriptions of the Wright approach can be re-worded to describe in comparable terms the secondary outcome under the HER approach:

The Historical Excess Returns Approach ***relies heavily on the assumption of a perfect, or at least near perfect, positive relationship between the risk free rate and the expected market return****. That is, for every basis point the risk free rate decreases the expected market return decreases the same amount, or vice versa,* ***in order to keep the market risk premium constant.***

The Ibbotson approach is also known as the historical excess return approach. ***It assumes there is a perfect positive relationship between the expected market return and risk-free rate.***

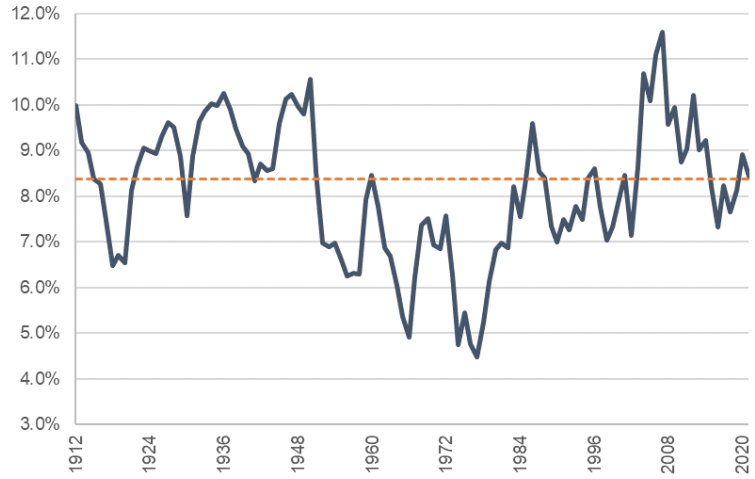
- Any assessment criteria that are applied to the secondary outcome under the Wright approach must also be applied to the secondary outcome under the HER approach. This issue is considered in more detail in Appendix A.

2.2.5 Is the real return on equity in Australia stable?

- Any reasonable assessment of the Wright approach in an Australian context should start with a replication of the analysis in Figure 2 using Australian data, which we have done in Figure 3. The rolling 30-year average displays similar behaviour to the rolling average based on United States data, oscillating around the sample average of 8.4 per cent[19]. This is consistent with the real return on equity in Australia being stable.

[19] No adjustments have been made to the historical returns for the assumed value of imputation credits.

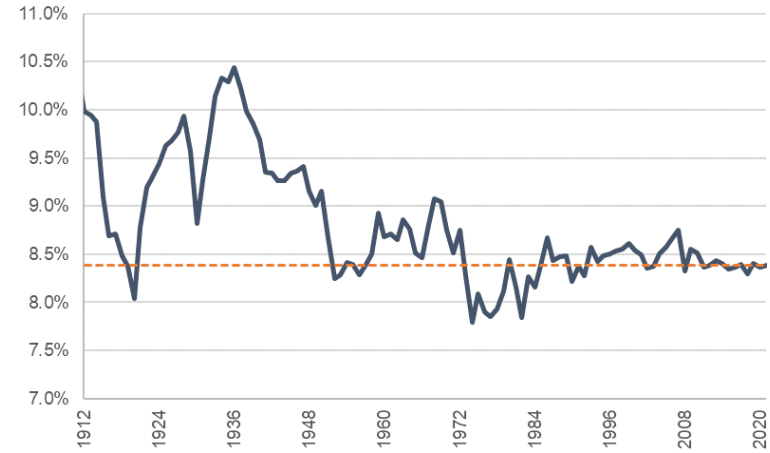
FIGURE 3: AUSTRALIAN HISTORICAL REAL RETURN ON EQUITY – ROLLING 30-YEAR AVERAGES



Source: Brailsford, Handley and Maheswaran (2012), RBA, S&P. QTC calculations.

- The stability of the real return on equity can also be shown by calculating the historical average using a fixed start date and an expanding averaging period. If the real returns are stable, variations in the historical average should become smaller as the length of the averaging period increases[20].
- Figure 4 shows the expanding historical average real equity returns between 1883 and 2021 (139 annual observations). The full sample average is 8.4 per cent, and the expanding average starts to settle around this value well before the end of the sample period. This is consistent with the real return on equity in Australia being stable.

FIGURE 4: EXPANDING AVERAGE REAL RETURN ON EQUITY – AUSTRALIAN DATA



Source: Brailsford, Handley and Maheswaran (2012), RBA, S&P. QTC calculations.

- Table 3 shows that annual variations in the sample average are becoming smaller as the sample size increases.

TABLE 3: VARIATION IN THE EXPANDING SAMPLE AVERAGE

Period	Range (%)	Standard deviation of annual changes (%)
Last 50 years	7.8–8.8	0.20
Last 25 years	8.3–8.8	0.12
Last 10 years	8.3–8.4	0.06

Source: Brailsford, Handley & Maheswaran (2012), RBA, S&P. QTC calculations.

[20] The most recent value of the expanding average will always be exactly equal to the sample average regardless of whether the underlying returns are stable. However, what is of interest is *when* the expanding average starts to settle at values close to the full sample average. In general, the earlier this occurs the more stable the underlying data.

- A statistical test for stability (ie, stationarity) can be performed using the Augmented Dickey-Fuller test. The test statistic based on annual real returns between 1883 and 2021 is -12.5. This is significantly lower than the 1 per cent critical value of -3.5, which provides further support for the real return on equity in Australia being stable.
- In the Concurrent Evidence Session on the MRP, Dr. Glenn Boyle provided the following comments on unconditional estimates of the MRP[21]:

> *… is the long run estimate of historical excess returns the best estimate of the MRP? Well, which MRP? If it's the unconditional MRP then if the excess returns distribution is stationary and ergodic, which can be tested, then the law of large numbers basically tells us that the sample average over a long time series converges to the unconditional mean, in this case the unconditional risk premium.*
>
> *So there's not an assumption here about the future looking like the past, it's simply do the underlying excess return distributions, do they have the right statistical properties? If they do, then it follows that the best estimate you can get of the unconditional premium is the historical average.*

- In our view, Dr. Boyle's comments also apply to the underlying distribution of real equity returns. As we have shown, the distribution has the 'right statistical properties', so the best estimate of the unconditional expected real return on equity is the historical average real return on equity. This means a direct estimate can be made of a key CAPM parameter, rather than using other data and assumptions to 'build up' an estimate.
- The results in this section are consistent with the findings in Wright, Mason & Miles (2003), Wright & Smithers (2013) and Wright et al (2018) based on United States data. This means the historical average real return on equity is a statistically valid unconditional estimate of the expected real return on equity. In our view, this is sufficient to give meaningful weight to the Wright approach in the 2022 RoRI.

2.2.6 What assessment has been made in the Equity Omnibus final paper?

- The AER has not sought to determine if the historical real return on equity in Australia is stable, which is the key evidential basis for the Wright approach. No assessment has been made of the theoretical basis for the Wright approach set out in Wright, Mason and Miles (2003) and CEPA (2021).
- Instead, the Wright approach has been wrapped up in a broader consideration of the relationship between the risk-free rate and MRP. As such, the AER has not assessed the Wright approach based on its original purpose, which is to make an unconditional estimate of the expected real market return.
- The secondary outcome under the Wright approach is a perfect negative relationship between the risk-free rate and the implied MRP. The AER has used the secondary outcome to make an *indirect* assessment of the Wright approach by asking if there is a theoretical basis for a negative relationship between the risk-free rate and MRP.
- After reviewing stakeholder submissions, the AER found no 'widely accepted theoretical basis' or 'conclusive theoretical underpinning' for a negative relationship[22]. By implication, the AER has formed a preliminary view that zero weight should be given to the Wright approach. This means that of the estimation approaches based on historical data, the AER is proposing to continue giving 100 per cent weight to the HER approach in the 2022 RoRI.

[21] AER Concurrent Evidence Session 3 – Market Risk Premium, proofed transcript, p. 68–69.

[22] *Equity Omnibus final paper*, p. 60 and 61.

- Table 4 shows the AER's assessment of the negative relationship using some of its other criteria:

TABLE 4: AER ASSESSMENT OF A NEGATIVE RELATIONSHIP BETWEEN THE RISK-FREE RATE AND MRP

Criterion	Description	AER assessment
1. Reflective of economic and financial principles and market information	***Estimation methods*** and financial models are consistent with well-accepted economic and finance principles, and informed by sound empirical analysis and robust data.	*'There is no widely accepted theoretical basis for a negative relationship between the MRP and risk-free rate.'* *'After reviewing stakeholder submissions, we found no conclusive theoretical underpinning for a negative relationship.'*
2. Fit for purpose	The use of ***estimation methods***, financial models, market data and other evidence *should be* ***consistent with the original purpose for which it was compiled*** and have regard to the limitations of that purpose.	*'It is not fit for purpose because the relationship between the MRP and risk-free rate is likely to be time-varying, may change signs overtime (from positive to negative or negative to positive), and cannot be reliably quantified.'*
3. Implemented in accordance with good practice	Supported by robust, transparent and replicable analysis that is derived from available credible datasets.	*'It is not supported by robust, transparent, and replicable analysis that is derived from available credible datasets. The relationship from empirical studies depends on the sample period, and assumptions used.'*
4. Where models of the return on equity and debt are used they are based on:	(a) quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation, and. (b) quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	*'The empirical evidence for a negative relationship typically relies on the DGM results. The DGM is not based on quantitative modelling that is sufficiently robust. It is unduly sensitive to errors in inputs estimation, especially the growth rate. Also, it is subjected to arbitrary filtering or adjustment of data, which does not have a sound rationale.'*

Source: Equity Omnibus final paper, p. 59.

- Our comments on the AER's assessment in Table 4 are as follows:
  - The first criterion relates to estimation methods, not relationships between parameters. The theoretical and empirical basis for the Wright approach is set out in the reports by Wright et al. Had the AER made its assessment of the Wright approach by determining if the real return on equity in Australia is stable, it would have concluded that the Wright approach is:
    - consistent with well-accepted finance principles, and
    - informed by sound empirical analysis and robust data (ie, the same data that are used to calculate the historical excess returns).
  - We also note that it is not clear why the AER's assessment under the first criterion is entirely based on theory when the description is broader and also considers empirical analysis.
  - The second criterion also relates to estimation methods, not relationships between parameters. The original purpose of the Wright approach is to use historical data to make an unconditional estimate of the expected real market return. The stability of the real return on equity in Australia means the Wright approach is fit-for-purpose when making a direct estimate of a key CAPM parameter.
  - The Wright approach satisfies the third criterion as it is based on the same historical equity returns that are used to calculate the historical excess returns.

– Regarding the fourth criterion, although the results from a standard application of the DGM support a negative relationship, there is other non-DGM evidence that also supports a negative relationship (see Section 3).

2.2.7 What assessment should have been made in the Equity Omnibus final paper?

- If the AER believes the Wright approach should be assessed based on the secondary outcome, it follows that the same standard must also apply to the secondary outcome under the HER approach. The assessment approach in the *Equity Omnibus final paper* has created an unintended bias against the Wright approach.
- The AER's assessment is based on having not found a widely accepted theoretical basis or conclusive theoretical underpinning for a negative relationship between the risk-free rate and MRP. That is, the AER has used a high theory-based threshold to dismiss the Wright approach based on its implied secondary outcome.
- The secondary outcome under the HER approach is a perfect positive relationship between the implied expected market return and the risk-free rate. No evidence has been provided in the Equity Omnibus final paper to show that a 'widely accepted theoretical basis' or 'conclusive theoretical underpinning' exists for a perfect positive relationship. Therefore, the same theory-based threshold that led the AER to give zero weight to the Wright approach would, if consistently applied, also give zero weight to the HER approach.
- Similarly, a consistent application of the AER's other assessment criteria to the secondary outcome under the HER approach would have led the following conclusions:
  - it is not fit-for-purpose because the relationship between the expected market return and risk-free rate is likely to be time-varying, may change signs overtime (from positive to negative or negative to positive), and cannot be reliably quantified (fit for purpose), and
  - it is not supported by robust, transparent, and replicable analysis that is derived from available credible datasets. The relationship from empirical studies depends on the sample period, and assumptions used (implemented in accordance with good practice).
- Based on the above, QTC considers that:
  - Theory provides little assistance in determining the weights that should be given to the Wright and HER approaches, and it certainly cannot be used to support giving zero weight to the Wright approach.
  - Any assessment criteria should either be applied consistently to both approaches or not at all.
  - A better approach is to use the criteria to a make a side-by-side assessment of both approaches based on their original purpose, which is making an unconditional estimate of the expected market return (Wright) and the MRP (HER). If the AER had made its assessment on this basis, both approaches would have been identified as providing useful information when estimating the allowed return on equity under the 2022 RoRI.

Advice from CEPA on the Wright approach

- CEPA (2021) found that no conclusive theoretical basis exists for the Wright *or* HER approaches[23].

> *There also appears to be as strong a theoretical basis for the argument that the RfR and the MRP are perfectively negatively correlated (the "Wright" approach) as there is for the argument that the RfR and total equity market returns are perfectly positively correlated (the fixed MRP approach).*
>
> *… there is no conclusive theoretical basis for an assumption of independence or dependence.*

- A similar view was expressed by Dr. Jonathan Mirrlees–Black at the Concurrent Evidence Session on the MRP[24]:

> *Finance theory provides no conclusive evidence on whether MRP or equity returns are stable. We must therefore rely on the empirical evidence.*

[23] CEPA (June 2021), p. 14 and 44.

[24] J. Mirrlees-Black (CEPA), *AER – Expert evidence sessions – 17 February 2022*, slide 5.

- CEPA recommended the AER consider giving weight to both approaches (ie, a hybrid approach), as this may provide a better estimate of the forward looking MRP consistent with the AER's duty[25]. This is a logical conclusion when a theory-based threshold for acceptance is consistently applied to both approaches.
- QTC agrees that a hybrid approach should be used for the estimation approaches based on historical data. The outcome from the hybrid approach should be combined with an estimate of the expected market return from the ENA's calibrated DGM when estimating the allowed return on equity.
- We also agree that the limited guidance from theory means that reliance must be placed on empirical evidence. In our view, the AER has been provided with evidence, and some supporting theoretical explanations, which shows that a less-than-perfect positive relationship exists between the expected market return and risk-free rate. However, we have provided additional evidence to support this conclusion in Section 3, along with some options for using the evidence to determine a reasonable set of weights for to the Wright and HER approaches.

2.2.8 Next steps

- In QTC's view, the *Equity Omnibus final paper* has not made a proper assessment of the Wright approach. Therefore, the preliminary decision to give zero weight to the Wright approach should be reconsidered before the AER makes the draft 2022 RoRI. QTC recommends the AER:
  - provide an assessment of the theoretical basis for the Wright approach in Wright, Mason & Miles (2003), and a comparable assessment of the theoretical basis for the HER approach
  - confirm if the 'key evidential basis' for the Wright approach (ie, stability of the real return on equity) applies based on Australian real equity returns, and
  - make a side-by-side assessment of the Wright and HER approaches based on their original purposes, not the implied secondary outcomes, and include these assessments in the draft 2022 RoRI.
- QTC's assessment of the Wright approach based on its original purpose is provided in Appendix A.

3 Relationship between the risk-free rate, expected market return and MRP

- In our October 2020 submission to the *CAPM and alternative return on equity models draft paper*, we stated[26]:

> *… the overarching objective of the RoRI review is to determine an approach for producing the best estimate of the return on equity required by real-world investors operating in real-world financial markets. As such, primacy should be given to how real-world investors actually determine required rates of return. Finance theory and academic research may be useful, but it should always remain on tap, not on top.*

- In QTC's view, the AER has placed too much weight on theory when assessing the relationship between the risk-free rate and MRP. This has led to an unrealistically high standard for acceptance being applied to evidence from real-world practices that are relevant to the relationship. As explained in Section 2, the same standard has been used to justify a preliminary decision to give zero weight to the Wright approach. For example[27]:

> *After reviewing stakeholder submissions, we found* **no conclusive theoretical underpinning** *for a negative relationship.*
>
> *ENA submitted that the Wright approach should receive at least as much weight as the fixed MRP. However, they did not provide a theoretical underpinning to support giving the Wright approach at least as much weight as the fixed MRP. Similarly, the QTC and the NSG proposed approaches to implement a negative relationship without providing any theoretical underpinning to support their approaches.*

[25] CEPA (June 2021), p. 44.

[26] QTC (October 2020), *Pathway to the 2022 Rate of Return Instrument*, p. 1.

[27] *Equity Omnibus final paper*, p. 61 and 64.

Given the lack of theoretical basis, and issues with quantifying the relationship, our preferred position is not to recognise and implement a negative relationship between the MRP and risk-free rate in making the rate of return Instrument.

- QTC does not consider this to be a reasonable or useful assessment approach:
  - The plain English meaning of the expression 'conclusive' means to put an end to 'any doubt, question or uncertainty'. This is an unrealistic standard, especially when the topic of enquiry relates to asset pricing.
  - This standard has not been discussed in the working papers published prior to the *Equity Omnibus final paper*. It has been introduced at a late stage of the 2022 RoRI review process, and without prior consultation. Of more importance, the standard has not been consistently applied to the Wright and HER approaches.
  - Determining an appropriate set of weights for the Wright and HER approaches is an empirical task. As shown in Section 3.2.3, a range of empirical weighting options suggest that about 60 per cent weight should be given to the HER approach. This is close to our preliminary proposal to give equal weight to both approaches[28].
  - In the 2018 RoRI, the AER chose to recognise and implement a perfect positive relationship between the expected market return and the risk-free rate. However, the AER did not demonstrate that a 'conclusive theoretical underpinning' or 'theoretical basis' existed to support a perfect positive relationship. Similarly, the *Equity Omnibus final paper* provides no conclusive evidence to support a perfect positive relationship between the expected market return and the risk-free rate.
- The remainder of this section is structured as follows:
  - Section 3.1 explains the limits of theory in assessing the practices of real-world investors.
  - Section 3.2 points out the material from QTC's submission to the *Equity Omnibus draft paper* that has not been acknowledged or responded to. This section provides additional evidence from an expanded sample of expert reports, and from the Concurrent Evidence Session on the MRP. Some options for how this evidence can be used to determine the weights to apply to the Wright and HER approaches are also provided.
  - Section 3.3 considers the AER's response to the academic papers cited in our submission.

3.1 Real-world investor expectations

- QTC considers that the expectations and practices of real-world investors provide valuable information when considering the relationship between the expected market return and the risk-free rate. In our October 2020 submission, we referred to a speech by RBA Governor Phillip Lowe where he offered some observations on why the hurdle rates used by domestic and offshore investors have not fallen in line with interest rates. He concluded[29]:

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.

- We provided comments from some of the investors referred to by the RBA Governor, who explained that rising risk premiums were the reason why their return expectations have not fallen by the same amount as the risk-free rate[30]:

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.

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.

[28] As explained in Appendix A, there are other factors that suggest that more weight should be given to the Wright approach. When these are considered along with the empirical estimates, it is reasonable to give equal weight to the Wright and HER approaches.

[29] QTC (October 2020), *Pathway to the 2022 Rate of Return Instrument*, p. 8.

[30] QTC (October 2020), *Pathway to the 2022 Rate of Return Instrument*, p. 8.

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.

- On a stand-alone basis, these observations support a negative relationship between the MRP and the risk-free rate. However, the *Equity Omnibus final paper* seems to consider the observations to be relevant to the extent that they do or do not provide 'theoretical underpinnings' to support a negative relationship:[31]

We also note NSPs, and investors made a number of observations in their submissions to support a negative relationship between the MRP and risk-free rate. For example, it was brought to our attention that investors' return expectations may not have fallen with the risk-free rate. ***However, these observations do not necessarily provide theoretical underpinnings to support a negative relationship****.*

- There is no further consideration of the observations in the *Equity Omnibus final paper*. This suggests the practices and expectations of real-world investors are not important to the AER on a stand-alone basis.
- It may be that the observations do not provide a theoretical underpinning to support a negative relationship. However, that is not the point of considering real-world practices or seeking feedback from investors. In this regard, we note the final terms of reference for the AER's Investor Reference Group (IRG), which state that[32]:

The purpose of the IRG is to allow the AER to obtain direct and ongoing feedback from an investor perspective, in order to inform the AER's decisions on rate of return and inflation and ultimately the 2022 Instrument.

- The investor perspective is informative because it reflects a broad range of factors and considerations that extend *beyond* theory. Making the perceived value of the investor perspective contingent on a theoretical requirement defeats the purpose of considering the investor perspective in the first place.
- Furthermore, the real-world return expectations of investors often reflect heuristics and rules of thumb that have been developed based on years of experience and observation, and some of these may be inconsistent with theory. For example, Grant Samuel's independent expert report for AusNet Services notes that[33]:

Valuation is an estimate of what real world buyers and sellers of assets would pay and must therefore reflect parameters that will be applied in practice even if they are not theoretically correct.

- The observation from Grant Samuel supports QTC's position that primacy should be given to how real-world investors determine required rates of return. The decisions made by investors are ultimately judged by the market in the form of profits/losses or the creation/destruction of shareholder value. The significance of these incentives and consequences mean that any observed practices should be assumed to be based on sound reasons. The fact that these reasons may not be obviously supported by, or grounded in, theory is not relevant.
- In our view, the real-world investor expectations should be reassessed by the AER on a stand-alone basis, and not through a theoretical lens, before making the draft 2022 RoRI.

[31] *Equity Omnibus final paper*, pp. 59–60.

[32] AER (September 2020), *Investor Reference Group final terms of reference*, p. 2.

[33] *Grant Samuel (December 2021), AusNet Services – FINANCIAL SERVICES GUIDE AND INDEPENDENT EXPERT'S REPORT IN RELATION TO THE PROPOSAL BY AUSTRALIAN ENERGY HOLDINGS NO 4 PTY LTD,* Appendix 3, p. 1.

3.2 Independent expert reports

- In its June 2021 report for the AER, CEPA reviewed 23 independent expert reports (IER) that were prepared between 2013 and 2021, and reached the following conclusion:

> *We also observed that over the entire period (2013 to 2021) the MRP applied was commonly 6% with no adjustment for the falling RfR over this period.*

- This conclusion is not correct. In our submission to the *Equity Omnibus draft paper* we noted that of the 23 expert reports reviewed by CEPA, only 5 used a 6.0 per cent MRP and the prevailing CGS yield. The other reports used a higher MRP or applied an uplift to the prevailing CGS yield[34]:
  - Most reports prepared by BDO used a 7.0 per cent mid-point for the MRP.
  - The most recent report by Deloitte in 2021 used an 8.3 per cent MRP.
  - All reports prepared by Lonergan Edwards used a 6.0 per cent MRP and a 4.0 per cent risk-free rate.
  - Grant Thornton used a 6.0 per cent MRP and a 5-year average of the 10-year CGS yield in the 2013 IER for Blackwood, and a 10-year average of the 10-year CGS yield in the 2018 expert report for AWE Limited.
  - KPMG used a 6.0 per cent MRP and a risk-free rate based on a blend of spot, forecast and historical averages (with the historical averages being materially higher than the spot risk-free rate).
  - CEPA identified Grant Samuel's 2016 expert report for UGL Limited as an IER that used a 6 per cent MRP and the prevailing risk-free rate. This is not correct[35]. Grant Samuel used a 6.0 per cent MRP and the prevailing CGS yield (2.3 per cent at the time) to arrive at an initial WACC range of 8.9–10.1 per cent with a mid-point of 9.5 per cent. However, Grant Samuel immediately went on to state that:[36]

> *In Grant Samuel's opinion, these calculations are likely to understate the true cost of capital for UGL.*

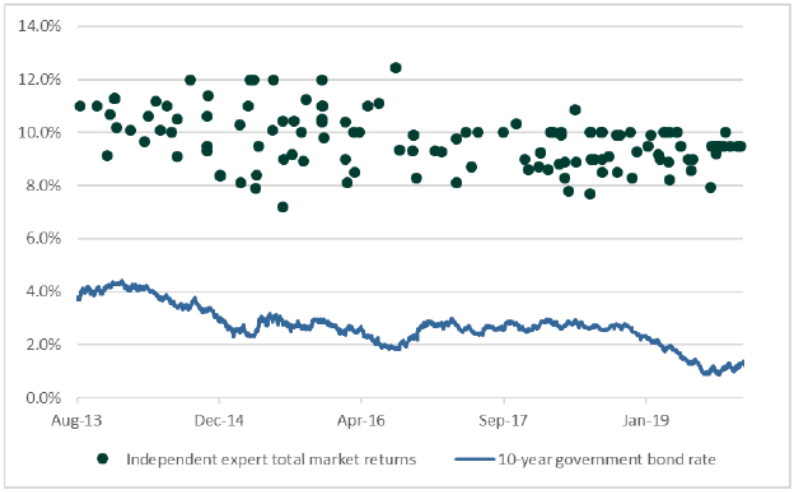
- The final WACC used by Grant Samuel was 11.0 per cent, which is materially higher than the initial 9.5 per cent mid-point. The final WACC is consistent with a 6.0 per cent MRP and a 4.0 per cent risk-free (ie, 1.7 per cent higher than the prevailing CGS yield) in the return on equity. No adjustment was made to the cost of debt.
- QTC concluded that the expert reports reviewed by CEPA showed that:
  - If a 6.0 per cent MRP was used, it was common practice for an uplift to be applied to the risk-free rate to reduce the impact of falling CGS yields.
  - If the prevailing CGS yield was used, it was typically added to an MRP that was higher than the historical average excess return of 6.0 per cent.
- To corroborate this conclusion, we provided additional evidence from a much larger sample of expert reports made between 2013 and 2020 that was compiled by Synergies Economic Consulting (Synergies). Figure 5 shows the total market returns (TMR) from the sample, and the prevailing 10-year CGS yield.

[34] QTC (September 2021), *Submission to the Equity Omnibus draft working paper*, p. 13–14.

[35] CEPA (June 2021), p. 55.

[36] Grant Samuel (2016), *Independent Expert's Report in relation to the takeover offer by CIMIC Group Limited* , p. 54.

FIGURE 5: TOTAL MARKET RETURNS USED IN INDEPENDENT EXPERT REPORTS



Note: The TMRs in this chart are presented on a post-tax basis and do not include any ad hoc risk premia, which would further increase the post-tax return on equity for a firm with an equity beta of 1.
Data source: Connect 4, Synergies calculations

Source: Synergies Economic Consulting (2020). Figure 9 on p. 115.

- The average TMR and 10-year CGS yield are 9.7 per cent and 2.6 per cent respectively, which means the experts were using (on average):[37]
  - a 7.1 per cent implied MRP and a 2.6 per cent CGS yield, or
  - a 6.0 per cent MRP and a 3.7 per cent CGS yield (ie, a 1.1 per cent uplift to the prevailing CGS yield).
- The results from the larger sample of expert reports did not support CEPA's conclusion that the MRP applied was commonly 6 per cent with no adjustment for the falling risk-free rate.

3.2.1 No acknowledgement of QTC's views by the AER

- The AER has neither acknowledged nor responded to the above analysis from QTC's submission. No assessment of our critique of CEPA's conclusion has been made, and there has been no response to the corroborating evidence from a larger sample of expert reports compiled by Synergies. The *Equity Omnibus final paper* restates CEPA's conclusion as though it was uncontested[38]:

> *CEPA stated that independent experts tended to rely on a mixture of historical data, academic literature, and regulatory precedent when setting the MRP. They also observed that over the entire period (2013 to 2021), the MRP applied was commonly 6.0 per cent, with no adjustment for the falling risk-free rate over this period.*

- In QTC's view, the AER should reconsider the above conclusion from CEPA based on the assessment made in QTC's submission the Equity Omnibus draft paper before making the draft 2022 RoRI.

3.2.2 Additional information

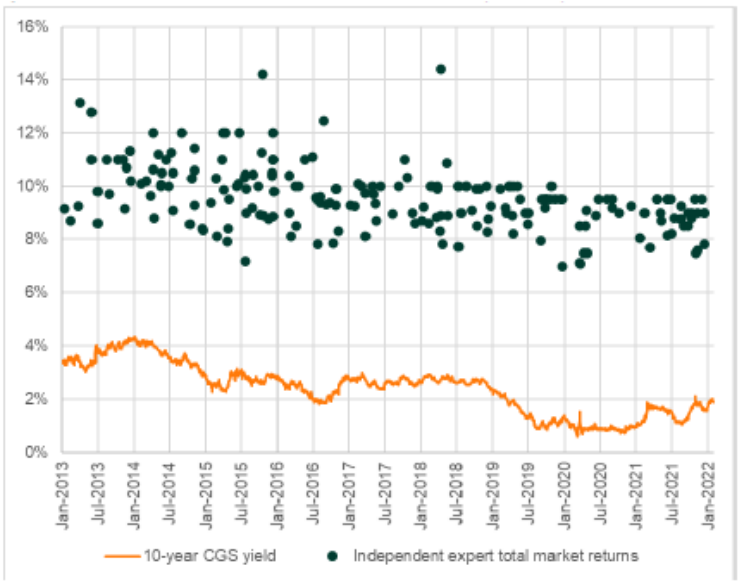
- QTC considers independent expert reports to be a valuable source of information on how the cost of capital is estimated in practice, because market transactions often occur based on the valuations. Reputational risk provides a strong incentive to make valuations using realistic estimates of the real-world cost of capital.
- In our view, sufficient evidence has already been provided to the AER to demonstrate that valuation experts do not estimate the TMR by adding a fixed historical MRP to the prevailing CGS yield. Rather, there is a less-than-perfect positive relationship between the TMR and the prevailing CGS yield.

[37] Synergies Economic Consulting (May 2020), *Determining a WACC estimate for Port of Melbourne*, p. 114.

[38] *Equity Omnibus final paper*, p. 41.

- To strengthen this conclusion QTC has engaged Synergies to[39]:
  - update the TMR estimates in Figure 5, and
  - run a simple linear regression of the TMR on the prevailing 10-year CGS yield.
- The sample period now extends from January 2013 to January 2022, and includes 210 TMR observations (Figure 6).

FIGURE 6: TMR USED IN INDEPENDENT EXPERT REPORTS – UPDATED

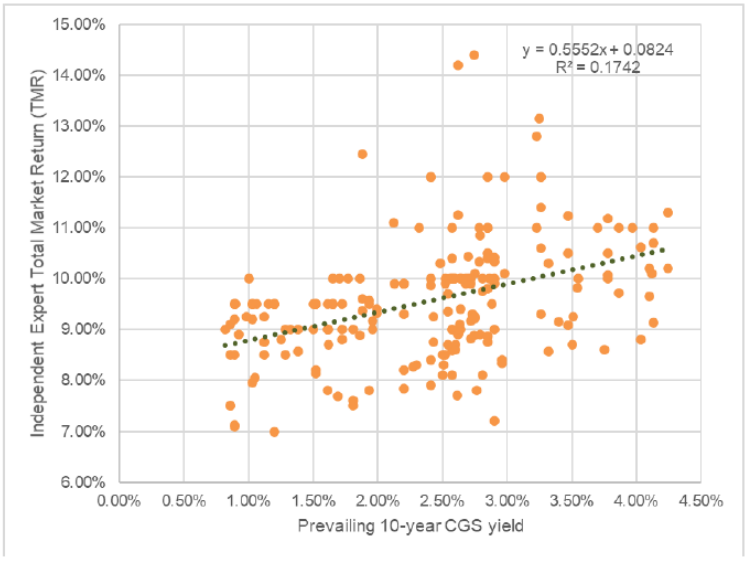


Data source: Synergies analysis using RBA data and Connect 4 database

Source: Synergies (2022)

- Figure 7 plots each TMR estimate against the prevailing 10-year CGS yield at the time the estimate was made[40]. The regression outputs are summarised in Table 5.

FIGURE 7: TMR VS PREVAILING 10-YEAR CGS YIELD



Data source: Synergies analysis using RBA data and Connect 4 database

[39] Synergies (February 2022), *Summary of independent expert report analysis*.

[40] An alternative approach would be to use each TMR/CGS yield pair to calculate the average TMR and CGS yield for each month in the sample period, and then run the regression based on the monthly averages. This would improve the overall fit of the regression, but is unlikely to materially affect the intercept and slope estimates.

TABLE 5: REGRESSION OF TMR ON PREVAILING 10-YEAR CGS YIELD

Source	Period	Intercept (%)	Slope	95% confidence interval for the slope estimate
Synergies	Jan 13–Jan 22	8.2	0.56	0.39–0.72

- The slope estimate of 0.56 indicates that a 100 basis point increase (decrease) in the 10-year CGS yield is associated with a 56 basis point increase (decrease) in the expected TMR. Therefore:
  - there is a less-than-perfect positive relationship between the expected TMR and the 10-year CGS yield, and
  - there is a less-than-perfect negative relationship between the implied MRP and the 10-year CGS yield.
- A similar regression exercise using the TMR from independent expert reports was performed by HoustonKemp in 2016 (Table 6)[41]. The sample period is January 2008–November 2015, so there is very little overlap with the Synergies sample period. On a combined basis, the sample periods include the 2008–2009 global financial crisis, the 2011–2012 sovereign debt crisis and the initial impact of Covid–19 in March 2020.

TABLE 6: REGRESSION OF TMR ON PREVAILING 10-YEAR CGS YIELD

Source	Period	Intercept (%)	Slope	95% confidence interval for the slope estimate
HoustonKemp	Jan 08–Nov 15	7.6	0.76	0.69–0.83

- The slope estimate of 0.76 indicates that a 100 basis point increase (decrease) in the 10-year CGS yield is associated with a 76 basis point increase (decrease) in the expected TMR.

Time-varying MRP estimates from Leadenhall

- QTC has collected additional MRP estimates from Leadenhall, an Australian corporate advisory firm. It is important to note that Leadenhall does not adjust the risk-free rate when estimating the TMR. Leadenhall uses the prevailing 10-year CGS yield and a time-varying MRP that is not adjusted for imputation credits.
- Table 7 shows the estimates that QTC has been able to source from various documents on the Leadenhall website.

[41] HoustonKemp (January 2016), *The Cost of Equity: Response to the AER's Draft Decisions for the Victorian Electricity Distributors, ActewAGL Distribution and Australian Gas Networks*, p. 48.

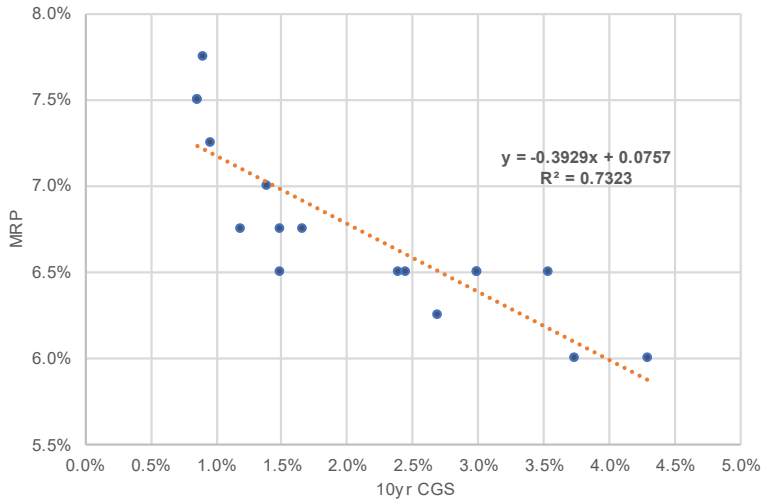
TABLE 7: TIME-VARYING MRP ESTIMATES FROM LEADENHALL

Date	Prevailing 10-year CGS yield (%)	Time-varying MRP (%)	AER MRP (%)	MRP difference (Leadenhall – AER %)	Leadenhall implied TMR (%)
Jun 2013	3.55	6.50	6.00	0.50	10.05
Dec 2013	4.30	6.00	6.00	0.00	10.30
Jun 2014	3.75	6.00	6.00	0.00	9.75
Dec 2014	3.00	6.50	6.00	0.50	9.50
Jun 2015	3.00	6.50	6.00	0.50	9.50
Jun 2017	2.40	6.50	6.00	0.50	8.90
Jun 2018	2.70	6.25	6.00	0.25	8.95
Dec 2018	2.45	6.50	6.10	0.40	8.95
Jun 2019	1.40	7.00	6.10	0.90	8.40
Dec 2019	1.20	6.75	6.10	0.65	7.95
Mar 2020	**0.90**	**7.75**	**6.10**	**1.65**	**8.65**
Jun 2020	**0.87**	**7.50**	**6.10**	**1.40**	**8.37**
Sep 2020	**0.86**	**7.50**	**6.10**	**1.40**	**8.36**
Dec 2020	**0.97**	**7.25**	**6.10**	**1.15**	**8.22**
Jun 2021	1.49	6.50	6.10	0.40	7.99
Sep 2021	1.49	6.75	6.10	0.65	8.24
Dec 2021	1.67	6.75	6.10	0.65	8.42
Average	**2.10**	**6.75**	**6.05**	**0.70**	**8.85**

Source: Leadenhall, AER, QTC calculations.

- The main observations from Table 7 are as follows:
  - Leadenhall's MRP estimates have never been lower than the AER's MRP estimates.
  - The average Leadenhall MRP is 70 basis points higher than the average AER MRP. This excludes any upward adjustment to the Leadenhall estimates for the AER's assumed value of imputation credits.
  - The average difference is significantly higher in 2020 (140 basis points) due to the initial impact of Covid–19. This is consistent with the time-varying MRP being countercyclical and relatively high during periods of heightened investor risk aversion.
- Figure 8 shows a strong negative relationship between the time-varying MRP and the prevailing CGS yield. The results from a simple linear regression of the implied TMR on the prevailing CGS yield are summarised in Table 8.

FIGURE 8: LEADENHALL MRP VS PREVAILING 10-YEAR CGS YIELD



Source: Leadenhall, QTC calculations.

TABLE 8: REGRESSION OF THE IMPLIED TMR ON THE PREVAILING 10-YEAR CGS YIELD

Source	Period	Intercept (%)	Slope	95% confidence interval for the slope estimate
Leadenhall	Jun 13–Dec 21	7.6	0.61	0.48–0.74

- The slope estimate of 0.61 indicates that a 100 basis point increase (decrease) in the 10-year CGS yield is associated with a 61 basis point increase (decrease) in the expected TMR. Therefore:
  - there is a less-than-perfect positive relationship between the implied TMR and the 10-year CGS yield, and
  - there is a less-than-perfect negative relationship between the time-varying MRP and the 10-year CGS yield.

Fernandez survey data

- We have run the same regression using the Fernandez surveys that asked the respondents for estimates of the risk-free rate and MRP (Table 9). Given the small sample size, we do not place much weight on the results. We also consider surveys to be far less reliable than independent expert reports. However, the slope estimate is consistent with a less-than-perfect positive relationship between the expected TMR and prevailing CGS yield (Table 10).
- QTC notes that the Fernandez survey responses are usually made around March each year. The initial effects of Covid–19 on the global equity markets occurred in March 2020. The 8.60 per cent TMR from the 2020 Fernandez survey is very close to the 8.65 implied TMR used by Leadenhall in March 2020. In contrast, the approach in the 2018 RoRI would have produced a TMR of just 7.00 per cent.
- This is important because the AER was making its final determinations for the Queensland and South Australian electricity distribution businesses around this time. In our view, this highlights the danger of placing too much reliance on a single estimation approach in a RoRI that must be applied without discretion, and why a diversified approach should be used that makes use of all valid estimation approaches.

TABLE 9: FERNANDEZ SURVEYS - MEDIAN RESPONSES FOR AUSTRALIA

Year	Survey MRP (%)	Survey CGS (%)	Prevailing CGS (%)	Implied survey TMR (%)	Implied MRP based on the prevailing CGS (%)
2013	5.8	3.3	3.5	9.1	5.6
2015	5.1	3.0	2.4	8.1	5.7
2017	7.6	3.1	2.7	10.7	8.0
2018	7.1	3.0	2.7	10.1	7.4
2019	6.1	2.8	2.0	8.9	6.9
2020	**6.2**	**2.4**	**0.9**	**8.6**	**7.7**
2021	6.3	2.5	1.7	8.8	7.1

Source: Annual Fernandez surveys, RBA. QTC calculations.

TABLE 10: REGRESSION - FERNANDEZ SURVEY DATA

Source	Period	Intercept (%)	Slope	95% confidence interval for the slope estimate
Fernandez surveys	2013–2021	8.2	0.45	n/a

- QTC considers that the additional information provides further support for a less-than-perfect positive relationship between the risk-free rate and the expected market return, which implies a less-than-perfect negative relationship between the risk-free rate and MRP.
- The additional information also demonstrates that the negative relationship is not a product of the DGM results, which should address the following concern in the *Equity Omnibus final paper*[42]:

> *The empirical evidence for a negative relationship typically relies on the DGM results.*

- QTC submits that the additional information should be considered by the AER before making the draft 2022 RoRI.

3.2.3 Empirical-based weights for the Wright and HER approaches

- This section outlines three options for determining weights for the Wright and HER approaches based on:
  - the slope estimates from regressions of the TMR on prevailing 10-year CGS yield
  - the slope estimates from regressions of the rolling 10-year nominal/real return on equity on the lagged 10-year nominal/real CGS yield at the start of each 10-year period, and
  - the standard deviations of the 30-year rolling averages of the real return on equity and historical excess return.
- The weighting options do not rely on outputs or results from the DGM.

[42] *Equity Omnibus final paper*, p. 57.

Weights based on regressions of the TMR on the 10-year CGS yield

- The results from the regressions of the TMR on the prevailing 10-year CGS yield are summarised in Table 11.

TABLE: 11 SUMMARY OF REGRESSION RESULTS

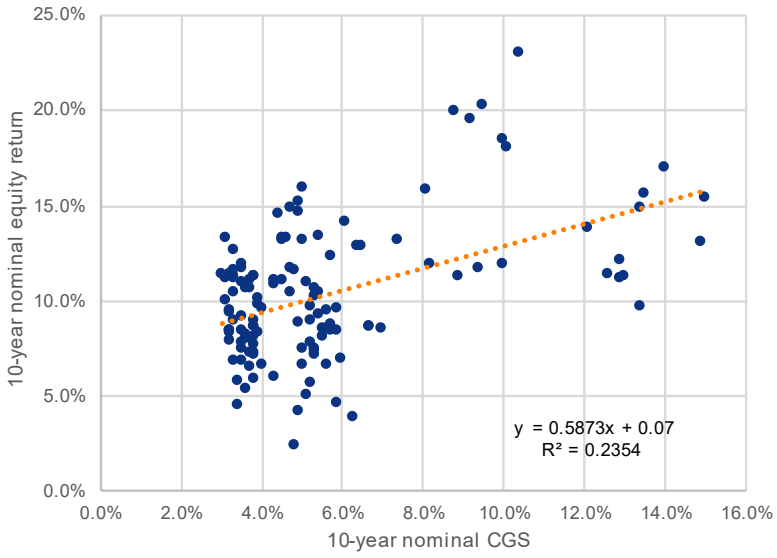
Source	Period	Intercept (%)	Slope	95% confidence interval for the slope estimates
Synergies	Jan 13–Jan 22	8.2	0.56	0.39–0.72
Leadenhall	Jun 13–Dec 21	7.6	0.61	0.48–0.74
HoustonKemp	Jan 08–Nov 15	7.6	0.76	0.69–0.83
Simple average		**7.8**	**0.64**	**0.52–0.76**

- If the experts were giving 100 per cent weight to the Wright (HER) approach, the slope estimates would be 0.0 (1.0). However, these slope estimates are well outside the 95 per cent confidence intervals for each regression. This indicates that the experts estimate the TMR 'as if' material weight is given to the Wright and HER approaches.
- The average slope estimate is 0.64, which suggests weights of 64 per cent for the HER approach and 36 per cent for the Wright approach.

Weights based on regressions of the 10-year equity return on the lagged 10-year CGS yield

- Figure 9 shows the relationship between the rolling 10-year nominal return on equity and the prevailing 10-year CGS yield at the start of each 10-year investment period. This allows the equity and CGS returns to be calculated over a common investment period that matches the term of the CGS. This is way of using historical data to estimate the relationship between the return on equity and risk-free rate.

FIGURE 9: ROLLING 10-YEAR EQUITY RETURNS VS START-OF-PERIOD 10-YEAR CGS YIELD (NOMINAL DATA)

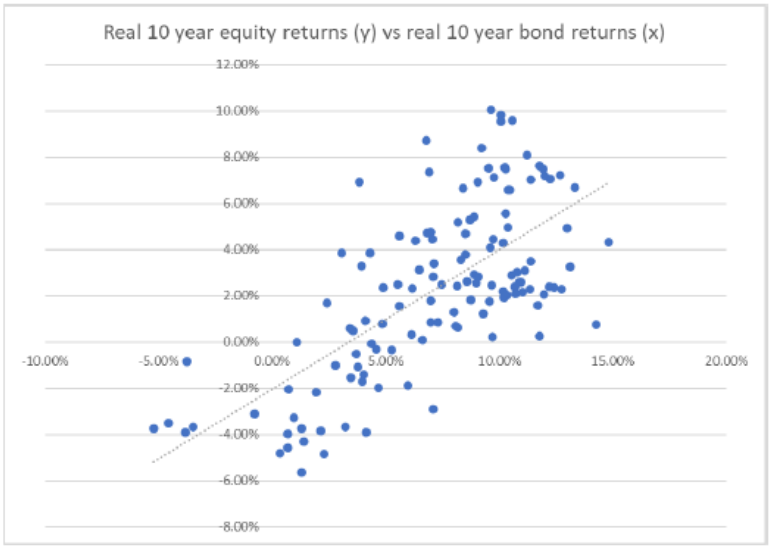


Source: Brailsford, Handley and Maheswaran (2012). QTC calculations.

- The slope estimate is 0.59, which suggests weights of 59 per cent for the HER approach and 41 per cent for the Wright approach.
- In the Concurrent Evidence Session on the MRP, Dr. Jonathan Mirrlees–Black presented the results from a similar analysis using 10-year real equity returns and 10-year nominal CGS yields that are adjusted for realised inflation over each 10-year investment period (Figure 10)[43]. The slope estimate is 0.60, which is very close to slope estimate of 0.59 based on nominal equity returns and CGS yields.

[43] J. Mirrlees-Black (CEPA), *AER – Expert evidence sessions – 17 February 2022*, slide 8. QTC understands the adjustment for inflation is to determine the real return from buying a 10-year nominal CGS and holding it to maturity.

FIGURE 10: ROLLING 10-YEAR EQUITY RETURNS VS START-OF-PERIOD 10-YEAR CGS YIELD (REAL DATA)



Source: J. Mirrlees-Black (2022).

Weights based on the standard deviation of rolling 30-year averages

- The final option uses the standard deviations of the rolling 30-year averages of the historical excess returns (calculated using the nominal return on equity and nominal CGS yields) and the real return on equity. The weights are based on the inverse of the standard deviations, which results in more weight being given the approach with the lower standard deviation[44].
- Based on data from 1912–2021, the standard deviations of the excess returns and real return on equity are 0.92 per cent and 1.48 per cent respectively. This suggests weights of 62 per cent for the HER approach and 38 per cent for the Wright approach[45]. The weights based on each option are summarised in Table 12:

TABLE 12: SUMMARY OF WEIGHTING OPTIONS

Option	HER (%)	Wright (%)
Regressions based on TMRs from IERs	64	36
Regression based on historical nominal 10-year equity returns and lagged nominal 10-year CGS yields	59	41
Regression based on historical real 10-year equity and CGS returns	60	40
Standard deviation of rolling 30-year averages	62	38
Simple average	**61**	**39**

- Despite being based on different methods and data, each option produces similar weights. In our view, a simple average is a pragmatic way of using empirical evidence to determine weights for the Wright and HER approaches.
- The estimates in Table 12 suggest giving 60 per cent weight to the HER approach and 40 per cent to the Wright approach. However, as discussed in Appendix A, there are other factors that are relevant when determining an appropriate set of weights. In general, these factors relate to the prevailing CGS yield being an imperfect proxy for the expected return on a zero-beta asset. When these factors are taken into account, QTC considers that equal weights should apply to the Wright and HER approaches.

[44] Ideally, this analysis would be performed using 10-year real equity returns and 10-year inflation-linked CGS yields, however inflation-linked yields are not available prior to 1986.

[45] (1/0.92)/(1/0.92 + 1/1.48) = 62 per cent.

- It could be argued that the weighting options do not have a theoretical underpinning. However, theory provides little assistance in determining the weights, so it is necessary to rely on empirical approaches.
- QTC submits that the weighting options should be considered by the AER before making the draft 2022 RoRI.

3.3 Academic research

- Although QTC considers real-world practices to be of primary importance, we acknowledge that academic research can be useful when determining an approach for estimating the allowed return on equity.
- In our submission to the *Equity Omnibus draft paper*, we cited three papers that provided a sound theoretical explanation for a negative relationship between the risk-free rate and MRP. These papers documented a change in the systematic risk of nominal bonds from positive to negative due to a change in the relationship between inflation and economic fundamentals such as the output gap, real consumption and real economic activity. We also referred to a speech from the Vice Chair of the United States Federal Reserve System, which provided a plausible monetary policy-based explanation for the changing behaviour of inflation.
- Our objective was not to demonstrate that a conclusive theoretical underpinning for a negative relationship exists. Rather, our objective was to show that there are plausible theoretical reasons for why the fall in risk-free rates since circa 2000 has not been matched by a point-for-point reduction the expected market return[46].
- In response, the AER cited a single academic paper that offered a different view on the relevance of economic fundamentals such as the output gap, and concluded[47]:

> *Therefore, we consider there is no widely accepted theoretical basis to support a negative relationship between the MRP and risk-free rate.*

- The paper cited by the AER provides an alternative explanation for a negative relationship between the risk-free rate and MRP based on flight-to-quality events. These are the type of events that the AER's preferred HER approach is not capable of capturing. However, they are likely to be captured if meaningful weight is given to the Wright and the calibrated DGM approaches in the 2022 RoRI.

3.4 Concluding comments

- The *Equity Omnibus final paper* includes the following comment on empirical estimations and theory[48]:

> *We consider that an empirical estimation should be underpinned by a good theoretical basis.*

- Requiring a good theoretical basis for the empirical results from academic research is sensible because it prevents findings being published that may be the result of data-mining. In our view, the papers cited in our submission to the *Equity Omnibus draft paper* include empirical results that are underpinned by a good theoretical basis.
- The same considerations do not necessarily apply outside academic research. For example, there may not be a good theoretical basis for the observation that real-world investors have not lowered their hurdle rates point-for-point with a falling risk-free rate. Similarly, there may not be a good theoretical basis for the observation that since 2008, the TMRs used by valuation experts have been more stable than the risk-free rate.
- However, given the strong financial and reputational incentives faced by investors and valuation experts, it is reasonable to assume their cost of capital estimates are based on sound reasons. Poor decision-making does not survive very long when it is subject to market forces and competition.
- When assessing real-world empirical evidence, having 'skin in the game' is a far more important assessment criterion than meeting a theory-based threshold for acceptance. This is why QTC remains of the view that:

> *… primacy should be given to how real-world investors actually determine required rates of return. Finance theory and academic research may be useful, but it should always remain on tap, not on top.*

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[46] A decrease in the systematic risk of safe nominal bonds is a factor that has contributed to the fall in nominal bond yields. However, any reduction in yield that is attributable to the decrease in systematic risk does not, by definition, reduce the expected market return.

[47] *Equity Omnibus final paper*, p. 60.

[48] *Equity Omnibus final paper*, p. 63.

4 Term of the return on equity

- The AER has considered the question of the term of the allowed return on equity in multiple reviews dating back to 2009. On each occasion, the AER concluded that a 10-year term should be used rather than matching the term to the length of the regulatory period (ie, 5 years).
- No new arguments or evidence have been presented to support any change to this long-standing position. The current 10-year term should be retained in the 2022 RoRI.

4.1 Observations based on real-world practice

- In the *2018 RoRI explanatory statement*, the AER provided a clear explanation for why a 10-year risk-free rate should be used in the allowed return on equity[49]:

> *We consider a 10 year term is consistent with the theory of the Sharpe-Lintner CAPM which is a single period equilibrium model, estimating the returns an investor requires over a long-term investment horizon.* ***The 10-year term also reflects the actual investor valuation practices*** *and academic works.*

- For the reasons set out in Section 3, QTC agrees the allowed return on equity approach should reflect actual investor valuation practices.

4.2 Is valuing regulated equity different to valuing un-regulated equity?

- One argument for term-matching is that valuing regulated equity is different from valuing un-regulated equity, because a regulator is not concerned about cashflows beyond the end of the regulatory period. Un-regulated equity is typically valued based on perpetual cashflows, so a longer-term risk-free rate is appropriate.
- The AER's task is to replicate the outcomes that would likely prevail in a competitive market. As explained by Wright, Mason and Miles (2003)[50]:

> *Thus, the limited nature of competition in product markets is not a relevant issue in assessing the cost of capital. In capital markets, the firm can be treated as a "price-taker" rather than a "price-maker". All that matters is the market cost of capital adjusted for the firm's risk characteristics, irrespective of whether it is a monopoly.*

- Under the CAPM, a firm's risk characteristics are captured by the equity beta. As the market cost of capital is a market-wide parameter, any difference between the cost of equity for a regulated and un-regulated firm should be fully attributable to the difference between their equity betas. There is nothing special about regulated equity that warrants a different approach, which is consistent with the AER's conclusion in the 2018 RoRI that[51]:

> *Setting a rate of return using a 10 year term will provide for allowed returns on an investment in a regulated business that are* ***comparable with the investor valuations of other stocks within the market with a similar degree of systematic risk****.*

- Two recent expert reports for businesses that are regulated by the AER provide evidence that regulated businesses are not valued on a different basis compared to un-regulated businesses. Both reports have used a 10-year risk-free rate to estimate the cost of equity despite the businesses being subject to 5-yearly resets of the allowed return on equity. Furthermore, both cost of equity estimates are materially higher than the estimates based on the approach in the 2018 RoRI, which also uses a 10-year risk-free rate[52].

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[49] AER (December 2018), *Rate of Return Instrument – Final explanatory statement*, p. 126.

[50] Wright, Mason & Miles (2003), *A study into certain aspects of the cost of capital for regulated utilities in the U.K*, p. 1.

[51] AER (December 2018), *Rate of Return Instrument – Final explanatory statement*, p. 127.

[52] Grant Samuel (December 2021), *AusNet Services – FINANCIAL SERVICES GUIDE AND INDEPENDENT EXPERT'S REPORT IN RELATION TO THE PROPOSAL BY AUSTRALIAN ENERGY HOLDINGS NO 4 PTY LTD.* KPMG (October 2021), *Independent Expert Report for Spark Infrastructure RE Limited.*

4.3 Is regulated equity the same as a long-term rate-resetting bond?

- Another argument for term-matching is that regulated equity is the same as a long-term floating rate bond with a coupon that is reset at the start of each 5-year regulatory period. This argument attempts to avoid the problem of the regulated asset base (RAB) not being return in cash at the end of each 5-year regulatory period.
- In our submission to the *Term of the rate of return draft working paper*, we noted[53]:

> *The AER is effectively viewing regulated equity as a long-term floating rate Commonwealth Government Security (CGS) with a coupon that is reset every 5 years to equal the prevailing 5-year CGS yield plus an equity risk premium.*

- In response, the AER stated[54]:

> *Firstly, while we used Dr Lally's analogy of a sequence of regulatory allowance being like a floating rate bond, we did not contemplate it being a long-term floating rate CGS. Rather, just like floating rate bonds in Australia use 180 day Bank Bill Swap Rate (BBSW) as a benchmark, we contemplated a long-term floating rate bond that used a five-year CGS yield as a benchmark for the risk free rate in the CAPM with the CAPM equity risk premium added to the benchmark.*

- The AER uses the yield on a 10-year bond issued by the Commonwealth Government as a proxy for the risk-free rate in the CAPM. As such, it is clear that the AER was contemplating a long-term floating CGS with a coupon that is reset every 5 years to equal the prevailing 5-year CGS yield (ie, a very long-term rate resetting CGS).
- Therefore, what is of interest is the discount rate that would apply to a long-term rate-resetting CGS. We provided a high level consideration of this issue in our earlier submission. A more detailed consideration is provided below.

4.3.1 How would the market price a long-term rate-resetting CGS?

- In the Concurrent Evidence Session on the MRP, Dr. Lally described the 5-year CGS yield as the yield that applies to a CGS that *matures* in 5-years' time. This does not describe the cashflow profile of a long-term rate-resetting CGS, so it does not follow that the correct discount rate is the prevailing 5-year CGS yield on each reset date.
- There are no long-term rate-resetting CGS on issue, so the discount rate cannot be observed. However, a natural benchmark is a CGS asset swap package, structured as follows:
  - buying a long-term fixed rate CGS
  - entering into a pay fixed/receive floating interest rate swap with the same term as the CGS, and
  - entering into consecutive 5-year receive fixed/pay floating swaps during the term of the CGS.
- The longest fixed-rate CGS has a remaining term to maturity of about 30 years. This issue can currently be swapped to produce a floating rate coupon equal to the bank bill swap reference rate (BBSW) plus 36 basis points per annum. When combined with six consecutive 5-year receive fixed swaps, the realised return on the asset swap package over the 30-year term will equal the average fixed rate on the 5-year swaps plus 36 basis points per annum.
- Figure 11 shows the historical 5-year CGS/swap spread between 1992 and 2022.

[53] QTC (July 2021), *Term of the Rate of Return – Submission to the draft working paper*, p. 3.

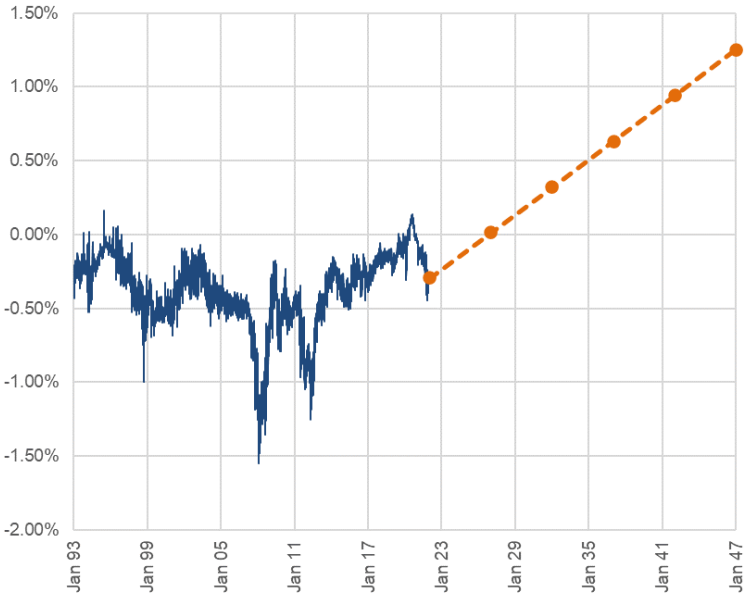
[54] AER (September 2021), *Term of the rate of return & Rate of return and cashflows in a low interest rate environment Final working paper*, p. 54–55.

FIGURE 11: 5-YEAR CGS YIELD MINUS 5-YEAR SWAP RATE

Source: Bloomberg.

- With a few brief exceptions, the spread has been consistently negative with an average value of -38 basis points. The spread is strongly mean-reverting and negatively skewed. The current spread is -30 basis points.
- The orange dashed line in Figure 12 shows the path the 5-year CGS/swap spread would need to take for a 30-year rate-resetting CGS with a coupon equal to the 5-year CGS yield on each reset date to match the total return from a 30-year CGS asset swap package with 5-yearly rate resets.

FIGURE 12: BREAK-EVEN PATH FOR THE 5-YEAR SWAP/CGS SPREAD



Source: Bloomberg. QTC calculations

- The break-even path for the 5-year CGS/swap spread is implausible, especially given the strongly mean-reverting nature of the spread and its negative skew. The spread would need to suddenly turn positive and reach levels that are several multiples above the maximum spread that has been observed since 1992.
- Figure 12 demonstrates that if the Commonwealth Government sought to issue a 30-year bond with a coupon that is reset every 5-years to equal the 5-year CGS yield, the discount rate would have to be significantly higher than the prevailing 5-year CGS yield on each reset date. This is intuitive because a 30-year bond has a significantly lower level of refinancing risk compared to a 5-year bond, and this reduction in risk should come at a cost to the borrower.

- It is not possible to determine the exact size of the margin, but there can be no doubt that it would be positive. The 30-year CGS asset swap package is the natural market-based benchmark for pricing, so investors would assess the likely future path of the 5-year CGS/swap spread to determine the discount rate. For example:
  - If investors view the long-term average as the best estimate of the expected spread on each future reset date, the discount rate would be **73 basis points** above the prevailing 5-year CGS yield on each reset date.
  - Even under an extreme scenario where the expected spread on each future reset date equals the maximum historical spread of +17 basis points, the discount rate would still be **29 basis points** above the prevailing 5-year CGS yield on each reset date.
- As the correct discount rate is higher than the 5-year CGS yield, the market value of the rate-resetting CGS will be lower than its face value. In a revenue building block model, the CGS face value has the same meaning as the book value of the equity-funded portion of the RAB.
- It follows that in order for the book and market value to be equal at the start of each 5-year regulatory period, the margin must be reflected in the return on equity allowance. Excluding the margin from the allowed revenues will produce an NVP<0 outcome.

Summary

- The AER's long-term floating rate bond analogy does not support matching the term of the risk-free rate in the CAPM with the length of the regulatory period. Instead, it shows that the allowed return on equity needs to be based on a risk-free rate that is higher than the prevailing 5-year CGS yield in order to achieve NPV=0.
- QTC does not consider the long-term rate-resetting bond analogy to be a suitable or practical way to determine the term of risk-free rate. There is too much uncertainty regarding the likely size of the margin that would need to apply to attract investor interest relative to the CGS asset swap package. However, there can be no doubt that the margin would be positive. Furthermore, the relevant time horizon for network assets is significantly longer than 30 years, so there is insufficient CGS and swap data to estimate the margin at these longer horizons.
- In our view, the allowed return on equity should be consistent with how regulated and un-regulated infrastructure assets are valued in competitive markets. Consistent with AER's conclusion in the 2018 RoRI, this requires a term of 10-years for the risk-free rate in the allowed return on equity.

5 Weighted trailing average cost of debt

- If the AER decides to adopt a weighted trailing average, QTC considers the weights should be based on the percentage change in the post-tax revenue model (PTRM) debt balance.
- The spreadsheet model that forms part of this submission shows how a PTRM-weighted trailing average can be calculated. The approach is identical to applying an on-the-day transition to the annual increases in the PTRM debt balance, and combining the corresponding benchmark debt yields on new debt with benchmark debt yields that apply to the existing PTRM debt balance.

Appendix A: Assessing the Wright and HER approaches

A.1: Primary unconditional versus secondary conditional estimates

A.1.1: The Wright approach

- The primary estimate under the Wright approach is the expected real return on equity, which equals the historical average real return on equity. By definition, the estimate is unconditional because it is not affected by any other factors, variables or information. The theoretical and empirical basis for doing this is explained in Section 2:

$$E(Rm) = Historical\ Rm$$

- The secondary estimate under the Wright approach is an implied MRP. The estimate is conditional because it depends on the difference between the historical average and prevailing CGS yield:

$$Implied\ E(MRP) = Historical\ Rm - Prevailing\ CGS\ yield$$
$$Implied\ E(MRP) = (Historical\ MRP + Historical\ CGS\ yield) - Prevailing\ CGS\ yield$$
$$\boldsymbol{Implied\ E(MRP) = Historical\ MRP + (Historical\ CGS\ yield - Prevailing\ CGS\ yield)}$$

- Under the Wright approach, any difference between the implied MRP and the historical average MRP is fully attributable to the difference between the historical average and prevailing CGS yield.

A.1.2: The HER approach

- The primary estimate under the HER approach is the expected MRP, which equals the historical average excess return. The AER defines the excess return in a given year as the difference between the annual return on equity and the 10-year CGS *yield*. This is different from the estimates produced by Wright et al, which use annual equity and bond returns. The bond returns reflect changes in the market value due to annual changes in market yields.
- By definition, the estimate is unconditional because it is not affected by any other factors, variables or information. The empirical basis for doing this is the stability of the historical difference between the annual return on equity and the prevailing 10-year CGS yield. QTC is not aware of a theoretical basis for this approach:

$$E(MRP) = Historical\ Rm - Historical\ CGS\ yield$$

- The secondary estimate under the HER approach is an implied expected market return. The estimate is conditional because it depends on the difference between the prevailing and historical average CGS yield:

$$Implied\ E(Rm) = Historical\ MRP + Prevailing\ CGS\ yield$$
$$Implied\ E(Rm) = (Historical\ Rm - Historical\ CGS\ yield) + Prevailing\ CGS\ yield$$
$$\boldsymbol{Implied\ E(Rm) = Historical\ Rm + (Prevailing\ CGS\ yield - Historical\ CGS\ yield)}$$

- Under the HER approach, any difference between the implied expected market return and the historical average market return is fully attributable to the difference between prevailing and historical average CGS yield.

A.1.3: Both approaches must be assessed on a consistent basis

- It is straightforward to criticise both approaches based on the secondary conditional estimates because:
  - On a stand-alone basis they are extreme and unrealistic.
  - It is not clear why departures from the historical return on equity and historical MRP should be *fully explained* by the difference between the prevailing and historical CGS yield.
- In contrast, the primary unconditional estimates are more reasonable because they are based on historical distributions that have 'the right statistical properties', such as stable long-term average values.

- As such, it is not appropriate to assess one approach based on its primary unconditional estimate and the other approach based on its implied secondary outcome. That is what has been done in the *Equity Omnibus final paper*.
- The AER has assessed the Wright approach on the basis of the secondary conditional estimate (ie, the implied MRP) and its relationship with the prevailing risk-free rate. However, the AER has taken a different approach when assessing the HER approach by only considering the primary unconditional estimate of the MRP. For example, the *Equity Omnibus final paper* states that[55]:

> *In 2018, we stated that MRP is not stationary and is likely to vary under different economic conditions. However, there was no theoretical basis for determining how the MRP might vary with the risk-free rate (RFR). In addition, we did not consider we had a sufficiently robust method to estimate genuine variations in the MRP through time. We therefore considered the best regulatory approach was to fix the MRP and have the return on equity vary with the risk-free rate.*

- Fixing the MRP means the AER made its decision based on the primary unconditional estimate (ie, the historical average excess return). No comparable assessment was made of the secondary conditional estimate, which implies a perfect positive relationship between the expected market return and the risk-free rate.
- As shown in Section 2, historical real return on equity in Australia is a statistically valid unconditional estimate of the expected market return. As such, the following conclusion would have been reached if an assessment was made of the primary unconditional outcome under the Wright approach :

> *The* ***expected market return*** *is likely to vary under different economic conditions. However, there is no theoretical basis for determining how the* ***expected market return*** *might vary with the risk-free rate (RFR). In addition, we do not have a sufficiently robust method to estimate genuine variations in the* ***expected market return*** *through time. We therefore consider the best regulatory approach is to* ***fix the expected market return and have the MRP vary with the risk-free rate.***

- When a consistent assessment is made, there is no justification for giving zero weight to the Wright approach.

A.2: Additional factors that are relevant to the choice of weights

- Section A.1 demonstrates that when the Wright and HER approaches are assessed on a consistent basis, it is not possible to determine which approach is best, or the weights that should be given to each approach. Both approaches make statistically valid unconditional estimates of the expected market return and MRP.
- In QTC's view, empirical evidence provides the most guidance on the weights that should be given to each approach, and we have provided some options for how this can be done in Section 4. However, there are other factors that should be considered when determining weights.

A.2.1: The CGS yield is an imperfect proxy for the expected return on a zero-beta asset

- Figure 13 shows the rolling 10-year empirical beta for 10-year nominal CGS since June 1993 based on monthly data between June 1983 and February 2022:

[55] *Equity Omnibus final paper*, p. 31. We assume that the AER is not referring to 'stationarity' in a statistical sense, as this would mean the historical average excess return is not a statistically valid unconditional estimate of the MRP.

FIGURE 13: 10-YEAR CGS EMPIRICAL BETA – ROLLING 10-YEAR PERIODS

Source: RBA, S&P. QTC calculations.

- The main observations from Figure 13 are as follows:
  - The rolling beta was positive in the early part of the sample period, started to fall sharply around 2000, and has been negative since 2008.
  - The rolling beta is highly unstable and displays large, sustained 'swings' away from zero. This indicates that the prevailing CGS yield is not a good proxy for the expected return on a zero-beta asset, either at specific points in time or an average over time. It also suggests the CGS beta does not have a stable expected value of zero.
- In its July 2021 submission, ENA argued that the nominal CGS yield may include a 'convenience yield', which reflects the positive value of special safety and liquidity features that are unique to CGS. ENA argued that the convenience yield results in CGS yield under-estimating the expected return on a zero-beta asset[56].
- In response, the AER provided some evidence of an 'inconvenience yield', which has the opposite interpretation as a convenience yield[57]. As such, ENA and the AER have both demonstrated that nominal CGS yields may contain a time-varying risk premium that should not be reflected in the expected return on a zero-beta asset.

A.2.2: Implications for the choice of weights

- If 100 per cent weight is given to the HER approach, the impact of any bias in the prevailing CGS yield (ie, difference relative to the true expected return on a zero-beta asset) will be fully reflected in the allowed return on equity.
- If 100 per cent weight is given to the Wright approach, the impact of any bias will be reduced because there is an offsetting effect between the prevailing CGS yield and the implied MRP. For example, if the prevailing CGS yield is biased upwards by 30 basis points, the same bias will be reflected (in the opposite direction) in the implied MRP. The impact of the offset on the allowed return on equity is less-than-perfect when the equity beta is less than 1.0, but the net bias is still lower compared to the HER approach.
- QTC does not support giving 100 per cent weight to any single estimation approach. The empirical options for determining the weights suggest that about 60 per cent weight should be given to the HER approach. Taking into account the other benefits of the Wright approach outlined above, QTC considers it reasonable to give equal weight to the Wright and HER approaches.

[56] ENA (July 2021), *Rate of return and cashflows in a low interest rate environment – Response to the draft AER working paper*.

[57] AER (September 2021), *Term of the rate of return & Rate of return and cashflows in a low interest rate environment – Final working paper*.

A.3: QTC's assessment of the Wright approach using the AER's criteria

- Table 12 sets out QTC's assessment of the Wright approach based on its original purpose. The last two criteria have been applied to QTC's proposal for a diversified approach for determining the allowed return on equity.

TABLE 12: QTC ASSESSMENT OF THE WRIGHT APPROACH USING AER CRITERIA

Criterion	Description	QTC assessment
1. Reflective of economic and financial principles and market information	Estimation methods and financial models are consistent with well-accepted economic and finance principles, and informed by sound empirical analysis and robust data.	*The theoretical basis for the Wright approach is set out in Wright, Mason & Miles (2003). The empirical basis is the stability of the historical real return on equity (refer Section 2.2.5).* *Stability is a requirement for assuming that the real market return is constant in expectation.*
2. Fit for purpose	The use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose.	*The original purpose of the Wright approach is to estimate the expected real market return.* *The stability of the historical real return on equity means the Wright approach is a fit-for-purpose approach for making an unconditional estimate of the expected real market return under the 2022 RoRI.*
3. Implemented in accordance with good practice	Supported by robust, transparent and replicable analysis that is derived from available credible datasets.	*Most of the data comes from Brailsford, Handley and Maheswaran (2012). These are the same data that are used to calculate the historical average excess return. Post-2012 data are available on the AER's website.* *This allows any estimates under the Wright approach to be verified and replicated.*
4. Where models of the return on equity and debt are used they are based on:	(a) quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation, and. (b) quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	*The Wright approach is not a financial model. It is a method for estimating the expected real market return, which is an input into the CAPM.* *Any errors in the historical data will also be reflected in the historical excess returns.*
5. Where market data and other information is used, this information is:	(a) credible and verifiable (b) comparable and timely, and (c) clearly sourced.	*Most of the data comes from Brailsford, Handley and Maheswaran (2012). These are the same data that are used to calculate the historical average excess return. The post-2012 data are available on the AER's website.*
6. Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.		*QTC's proposal is for the allowed return on equity under the 2022 RoRI to be determined using a diversified approach that gives weight to the HER, Wright and calibrated DGM estimates.* *This is likely to capture changing market conditions more effectively than any single estimation approach.*
7. In assessing possible changes for the 2022 review, we will also have regard to:	(a) the materiality of any proposed change, and (b) the longevity or sustainability of new arrangements.	*A diversified approach will produce a more stable estimate that is not overly exposed to errors in any one approach. This is a material improvement on the preliminary options in the Information Paper.*