Submission to the QCA 2021 rate of return review draft report

24 AUGUST 2021

Queensland Treasury Corporation (QTC) welcomes the opportunity to provide comments on the Queensland Competition Authority's (QCA) 2021 rate of return review draft report.

QTC agrees with the preliminary positions regarding the QCA's new approach for estimating the cost of debt. QTC agrees with some positions regarding the approach for estimating the return on equity. However, there are some positions that we believe require reconsideration by the QCA, in particular:

- Giving 100 per cent weight to the Ibbotson method, which assumes an unbiased estimate of the expected return on the market portfolio (*ERm*) can be made by adding a fixed historical market risk premium (MRP) to the prevailing 10-year Commonwealth Government Security (CGS) yield, and
- giving zero weight to *ERm* estimates from the Wright method and the dividend growth model (DGM).

QTC is aware of the implementation issues with the DGM. However, the use of the DGM by other regulators suggests the issues can be reasonably dealt with. However, if the QCA maintains its position to give zero weight to point estimates from the DGM, QTC submits that consideration should at least be given to the time series properties of the DGM estimates, which show that *ERm* has not fallen point-for-point with the prevailing 10-year CGS yield. This relationship exists over the last 20 years based on data from Australia and the United States.

The cost of equity estimates used in independent expert reports and some surveys also indicate than *ERm* has not fallen point-for-point with the prevailing 10-year CGS yield. A simple way to reflect this relationship in the return on equity is by using a weighted average of the Wright and Ibbotson methods to estimate *ERm*. QTC considers giving equal weight to both methods to be a reasonable approach.

1 The cost of debt

- QTC agrees with the proposed approach in the draft report for calculating the cost of debt[1]:

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

- QTC also agrees that:
  - no transition is a reasonable default position, although this should be considered on a case-by-case basis depending on how a business may have managed its debt under the previous on-the-day approach
  - the monthly corporate debt yields produced by the Reserve Bank of Australia (RBA) should be used to determine the 10-year benchmark corporate debt yield
  - linear extrapolation of the RBA's yield estimates for the 7- and 10-year effective tenors should be used to determine the estimate for an exact 10-year tenor
  - a simple trailing average is a reasonable approach if new capital expenditures are relatively small compared to the existing regulated asset base, and
  - annual updates will accurately reflect the efficiently incurred cost of debt under the trailing average approach, although a business should have the option to apply other approaches on a net present value neutral basis.

[1] QCA (June 2021), *Draft report – Rate of return review*, p. 37

- The QCA's proposed approach will result in the cost of debt reflecting the efficiently incurred cost of debt for a benchmark efficient entity. This will greatly reduce the mismatches that naturally occur under the on-the-day approach, which are effectively wealth transfers between consumers and regulated businesses.
- Finally, we agree with the QCA's reasoning for why a 'hybrid' trailing average should not be used[2]:

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

2 The return on equity

- QTC agrees with some of the proposals for estimating the return on equity. Specifically, we agree that:
  - the capital asset pricing model (CAPM) is a suitable model
  - historical equity returns from 1958 onwards should be used
  - arithmetic averages should be used with no weight given to geometric averages
  - no explicit weight should be given to the Siegel MRP or surveys, however we still consider that independent expert reports and some surveys can be useful in determining the relationship between *ERm* and the CGS yield.
- There are some preliminary proposals that QTC does not agree with, and we believe these should be reconsidered before a final decision is made. In particular:
  - There is no theoretical, statistical or empirical evidence to support giving 100 per cent weight to a method that produces *ERm* estimates that move point-for-point with the prevailing 10-year CGS yield.
  - The Wright method is a statistically and theoretically valid way of making a direct estimate of *ERm*, which is a key input into the CAPM. QTC does not agree with the conclusions based on the QCA's analysis of historical returns in Australia, which have been used to justify reducing the weight given to the Wright method to zero.
  - More clarity is required on the proposed qualitative role for the DGM and how it may provide directional guidance to the QCA's overall assessment of the return on equity.
  - The QCA has not fully engaged with all of the material in QTC's previous submission regarding real-world valuation practices and their relevance to the relationship between *ERm* and the prevailing CGS yield. This material supports our view that *ERm* has been far more stable than the prevailing CGS yield. This relationship should be reflected in the QCA's approach for estimating the return on equity.

2.1 Market risk premium

- There are only three inputs into the CAPM:
  - the expected return on a zero-beta asset (ie, the risk-free rate)
  - the expected return on the market portfolio (*ERm*), and
  - the equity beta.
- The MRP is not a stand-alone parameter that can be estimated independently of the two CAPM parameters that define it, being *ERm* and the risk-free rate. As such, the MRP is not an input into the CAPM.
- The QCA uses the prevailing 10-year CGS yield as a proxy for the risk-free rate. As a consequence, the ex-ante MRP is the *outcome* from subtracting the prevailing CGS yield from *ERm*. This clearly requires *ERm* to be estimated first. Similarly, any relationship between the ex-ante MRP and the prevailing CGS yield is an *outcome* of the relationship between *ERm* and the prevailing CGS yield.
- In our view, there are significant problems with using a fixed MRP that has been estimated independently of the prevailing CGS yield, which is the preliminary approach in the draft report. This assumes that the factors affecting CGS yields also affect *ERm* in the same direction and by exactly the same amount. As we show in this submission, there is sufficient empirical and theoretical evidence to show that this assumption is not correct. Rather, the fall in

[2] QCA Draft report, p. 36.

The hybrid trailing average assumes the benchmark firm maintains a portfolio of floating rate loans with annual maturities from 1–10 years, and enters into an interest rate swap just prior to the start of each regulatory period to lock in a fixed base interest rate on each floating rate loan. The use of interest rate swaps in this way is the 'artefact of the regulatory process' referred to by the QCA.

CGS yields over the last 20 years has not been matched by a point-for-point fall in *ERm*. The outcome is a negative relationship between the ex-ante MRP and the prevailing CGS yield.

2.1.1 The role of historical data

- QTC supports using historical data to estimate the return on equity. However, this should include giving material weight to direct estimates of *ERm* based on historical real equity returns.
- This differs from the preliminary approach in the draft report where 100 per cent weight is given to an indirect estimate of *ERm* that equals the historical MRP plus the prevailing CGS yield.
- In our view, all estimation methods have strengths and weaknesses, so it is difficult to justify giving 100 per cent weight to any method. Furthermore, we consider some estimation methods to be complementary, which supports using a weighted average of the estimates from those methods.

2.2 The Wright method

- The Wright method is a statistically and theoretically valid way of using historical data to make a direct estimate of *ERm*. In our view, the draft report does not provide convincing reasons for reducing the weight given to the Wright method to zero.
- The Wright method uses the long-term average real return on equity as an unconditional estimate of the expected real return on equity. As explained by Wright and Smithers (2013)[3]:

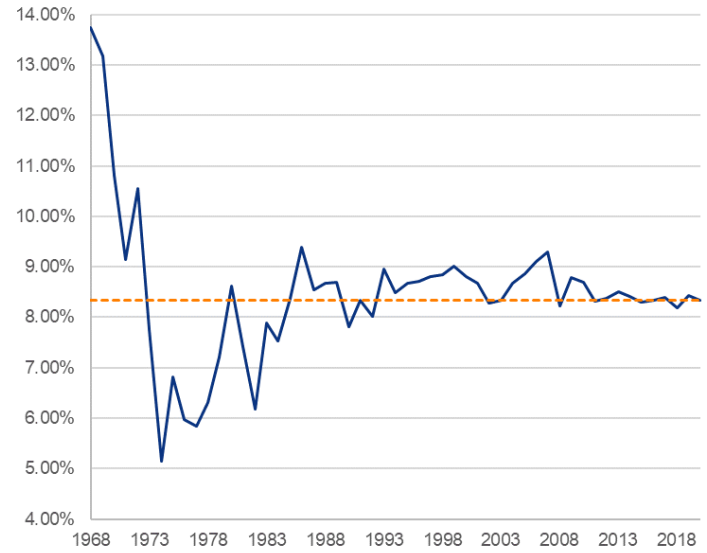
> *'A minimal requirement for assuming some magnitude is constant in expectation is that it should historically have been stable, ex post.'*

- The minimal requirement is for the underlying data to have a stable average value. 'Stability' does not require the data to have a low absolute or relative standard deviation.
- In this context, stability can be determined by annually re-calculating the cumulative average real return on equity using an expanding estimation window that incorporates an additional return each year:
  - If the returns have a stable average, the cumulative average will converge on the sample average and remain close to that value as additional returns are added to the estimation window. In addition, shorter-term rolling averages of the returns will tend to oscillate around the sample average.
  - If the returns do not have a stable average the cumulative average will tend to 'wander' as more returns are added without ever settling at any particular value[4].
- Figure 1 shows the cumulative average based on annual real equity returns in Australia between 1958 and 2020. The cumulative average converges on the sample mean of 8.3 per cent by the mid-2000s and has subsequently remained relatively close to that value.

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

[4] An example of a data series that does not have a stable average is one that has a consistent trend up or down. In the case of an upwards trend, the expanding window average will not converge on the sample average and remain close to that level as new data is added. Another example is a data series that displays multiple long-term trends (up and down). A good example is the CGS yield (see Section 2.2.1).

FIGURE 1: CUMULATIVE HISTORICAL AVERAGE - REAL RETURN ON EQUITY



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

- The stable average indicates that the Wright method is a statistically valid way of using historical data to make a direct estimate of *ERm*.
- In addition to being statistically valid, the Wright method is consistent with theory based on the consumption CAPM. In this model, 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 the high (low) payoffs tend to occur when the marginal utility of consumption is low (high).
- The model explains why equities offer higher returns than risk-free assets. However, it requires an unrealistically high level of risk aversion to explain the *size* of the historical difference between equity and risk-free returns:[5]

> *'While the standard theory applied by Mehra and Prescott has major problems explaining the relative historic returns on equities vs safe investments, this is largely because it fails to explain the low absolute returns on safe assets. In contrast, it is not particularly hard to derive estimates of the expected stock return itself that are consistent with the theory.'*
>
> *'… there is no obvious conflict between observed mean stock returns and the predictions of theory.'*

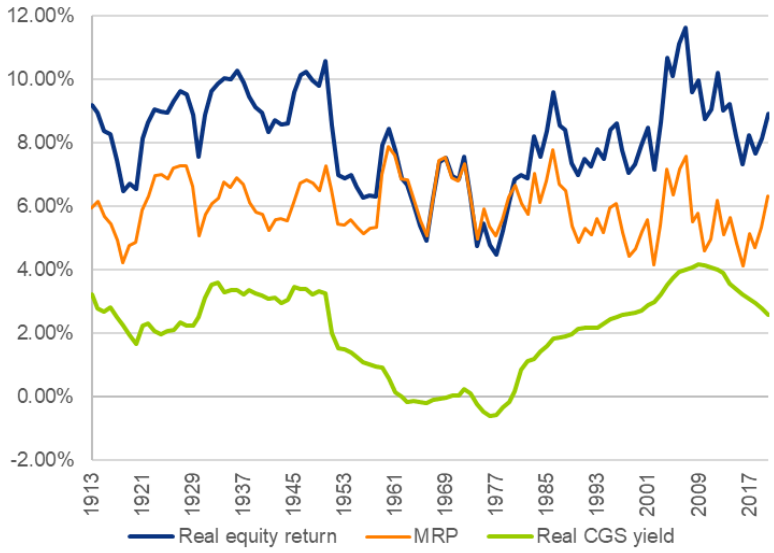
- Based on these considerations, it is QTC's view that the Wright method is a statistically *and* theoretically valid way of using historical data to make a direct estimate of *ERm*, which means it should be given explicit and meaningful weight in the QCA's return on equity approach.

2.2.1 Analysis based on Australian data

- The draft report includes a modified version of Wright's original analysis based on the more common approach of using CGS yields rather than returns to estimate the MRP (Figure 2). The draft report also shows the rolling 30-year averages for the QCA's estimate of a 'real' CGS yield, which appears to equal the nominal CGS yield deflated by annual realised inflation.

[5] S. Wright, R. Mason and D. Miles (2003), *A Study Into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, p. 17 and p. 33.

FIGURE 2: ROLLING 30-YEAR AVERAGES (MRP BASED ON PROXY FOR REAL CGS YIELDS)



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

- Figure 2 shows that the real return on equity and MRP both have stable averages as the rolling 30-year averages tend to oscillate around the sample averages of 8.3 per cent and 6.1 per cent respectively[6]. In contrast, the 'real' CGS yield is highly unstable, and this has important implications for the conclusions reached in the draft report regarding the exclusive use of the Ibbotson method.
- The standard deviation of the real return on equity and MRP are 1.5 per cent and 0.9 per cent respectively between 1883 and 2020, and 1.2 per cent and 0.9 per cent between 1958 and 2020. The QCA concludes[7]:

> *'… as our own empirical evidence finds that historically the MRP is likely to more stable than the return on equity, we consider that the Ibbotson method is therefore more likely to provide us with a better estimate of the premium that investors require on average for investing in the market.'*

- This conclusion forms part of the QCA's reasoning for giving 100 per cent weight to the Ibbotson method and for not using the Wright method in any direct manner. In our view, this is not a reasonable conclusion:
  - Even if standard deviation is the sole or primary selection criterion, the correct approach would be to reflect the relative standard deviations in the weights given to the Wright and Ibbotson methods. For example, weights based on the inverse of the individual standard deviations will be lower for the method with the relatively higher standard deviation and vice-versa. Based on standard deviations of 1.2 per cent and 0.9 per cent between 1958 and 2020, the weights that would apply to the Wright and Ibbotson methods are 43 per cent and 57 per cent respectively[8].
  - More importantly, 'stability' in the context of using historical data to make an unconditional estimate of an expected value requires the data to have a stable sample average. It does not require the data to have a low absolute or relative standard deviation.
  - The historical return on equity has a stable average (Figures 1 and 2), so it is a statistically valid way of using historical data to make a direct estimate of *ERm*.
  - The historical MRP also has a stable average (Figure 2). However, the historical MRP is added to the prevailing CGS yield to estimate *ERm* under the Ibbotson method. As a consequence, the Ibbotson *ERm* will only be consistent with the historical data (ie, have a stable average) if the CGS yield is stable[9]:

[6] These estimates reflect no adjustment for imputation credits (ie, theta = zero).

[7] QCA Draft report, p. 51.

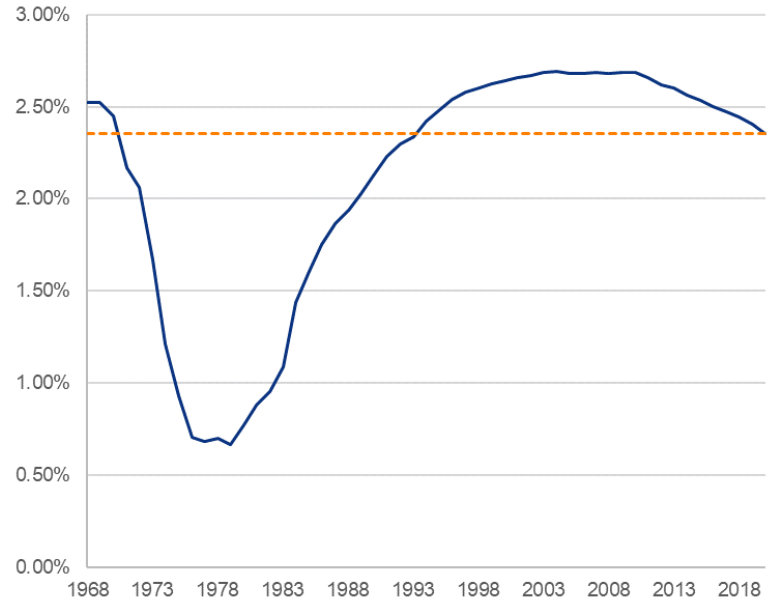
[8] (1/1.2)/(1/1.2 + 1/0.9) = 0.43

[9] A. Gregory (2012), *The AER Approach to Establishing the Cost of Equity – Analysis of the Method Used to Establish the Risk Free Rate and the Market Risk Premium*, p. 4–5.

'Clearly, if long run historical returns are the best guide to expected returns, RM [ERm] expectations could, in principle, be estimated by adding some historical estimate of the MRP to the estimate of RF, ***but only if the risk-free rate is stable over time****, implying that the [ex-ante] market risk premium is also stable.'*

– The QCA's proxy for the 'real' CGS yield is clearly unstable because the rolling 30-year averages do not oscillate around any particular value and display large swings up and down over time (Figure 2). This is confirmed in Figure 3, which shows a cumulative average that has not settled at any particular value.

FIGURE 3: CUMULATIVE HISTORICAL AVERAGE - REAL CGS YIELD PROXY



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

- In QTC's view, instability in the indirect Ibbotson estimate of *ERm*, which is inconsistent with the stability of historical return on equity, indicates that the ex-ante MRP is unlikely to be stable[10]. This is a sufficient reason for not giving a 100 per cent weight to the Ibbotson method when estimating the return on equity..

2.2.2 Relationship between the risk-free rate and MRP

- The draft report states that[11]:

'… we consider that a lack of empirical evidence supporting a strong negative relationship between the risk-free rate and the MRP for Australia makes it difficult for us to justify using the Wright method in any direct manner.'

- Setting aside the fact that the above criticism could also be applied to the Ibbotson method, Sections 2.3 and 2.4 present domestic and international evidence which shows that *ERm* has fallen, but not by the same amount as the risk-free rate. The outcome is a negative relationship between the ex-ante MRP and the prevailing risk-free rate. Although the relationship is not as strong as the relationship implied by the Wright method, this does not mean the Wright method should not be used 'in any direct manner'. Rather, the less than perfect negative relationship supports giving weight to the Wright and Ibbotson methods.

It is important to note that the 'market risk premium' referred to at the end of this quote is the difference between the direct estimate of *ERm* using historical data and the prevailing risk-free rate.

[10] As we show in Section 2.3.3, the instability in the CGS yield can be partially explained by the instability in the systematic risk of nominal CGS. By definition, the systematic risk of other assets does not affect *ERm*, however the Ibbotson approach allows the systematic risk of nominal CGS to be fully reflected in the estimate of *ERm*. In contrast, the Wright and DGM estimates are not affected by the prevailing CGS yield, and we consider this to be a sound reason for giving explicit weight to these methods.

[11] QCA Draft report, p. 51.

- The material in Sections 2.3 and 2.4 is consistent with recent advice provided by Cambridge Economic Policy Associates (CEPA) to the AER on the relationship between the MRP and CGS yields[12]:

> *'Our assessment is that* ***(i) there is acceptance that MRP is not stable and (ii) it is possible that there is an inverse relationship between the forward looking MRP and the RfR, and (iii) there is no good evidence that the MRP should be assumed to be independent of the RfR, the current implicit assumption of the AER's [Ibbotson] approach, and (iv) there is no conclusive theoretical basis for an assumption of independence or dependence****. In judging evidence on MRP using historic data, the AER can choose whether to use:*
>
> *• An assumption that the MRP is fixed (current [Ibbotson] approach)*
>
> *• An assumption that the TRMR is stable ("Wright approach")*
>
> *• An approach that has regard to both measures.* ***This could be for example a weighted average of the two measures, that assumes that the MRP is related to the RfR, but the relationship is not one to one.***
>
> *Our review of international regulators demonstrates that regulatory processes can accommodate any of these approaches. The data to implement these for Australia is available.*
>
> *The evidence indicates that the second two alternatives cannot be ruled out, and may provide a better estimate of the forward looking MRP consistent with the AER's duty.'*

- Of particular note is CEPA's assessment that 'no good evidence' exists to support the assumption that the MRP is independent of the prevailing CGS yield, which is what the Ibbotson method assumes. Furthermore, the lack of a 'conclusive theoretical basis' for an assumption of independence or dependence suggests that 100 per cent should not be given to the Wright or Ibbotson methods.
- In our view, if the QCA decides to only use historical data to estimate the return on equity, a weighted average of the Wright and Ibbotson methods should be used, consistent with the third approach outlined by CEPA.

2.3 Dividend growth model

- Despite previously giving weight to point estimates from the DGM, the draft report proposes reducing the weight to zero, although the estimates may play a qualitative role in the QCA's overall assessment of the return on equity[13]:

> *'We do consider that estimates from the dividend growth model remain relevant. However, given the limitations of the model, we propose to use its estimate to provide directional guidance when considering the overall cost of equity.'*
>
> *'Due to the sensitivity of the dividend growth model to modelling specifications and assumptions, we do not consider that MRP estimates generated from such a model will be robust. Consequently, we do not propose to use dividend growth models to directly estimate the MRP as part of future reviews. However, we consider that there may be a qualitative role for dividend growth models in assessing a forward-looking cost of equity.'*

- The draft report does not explain how the 'directional guidance' from the DGM would be provided in practice. It may be that the QCA plans to estimate the implied MRP from the DGM at the time of a determination, but it is not clear how that estimate would be used. For example:
  - An adjustment to the return on equity could be made if the implied MRP from the DGM is significantly different from the historical MRP.
  - The QCA has previously cited volatility in the implied MRPs as a perceived weakness of the DGM, so presumably the QCA would give little weight to any implied MRPs that are significantly different from the historical MRP.
  - As such, it is unclear how the DGM estimates could possibly have any impact on the return on equity given the QCA's concerns about the volatility of the implied MRPs.

[12] CEPA (June 2021), *Relationship between RFR and MRP – Report for the Australian Energy Regulator*, p. 6–7.

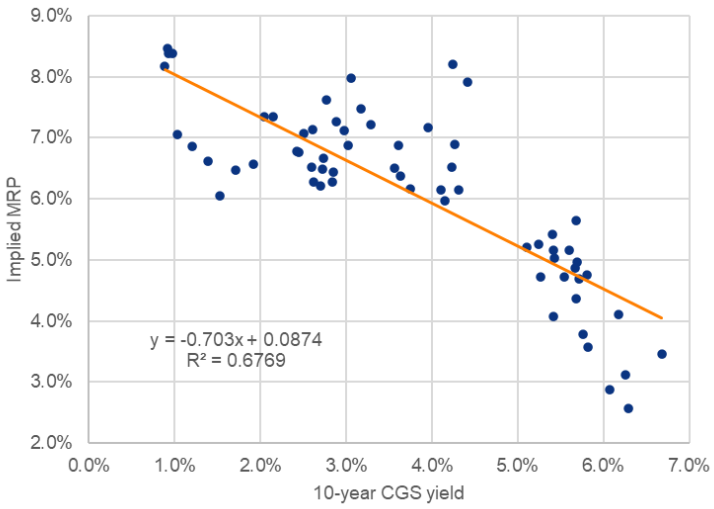
[13] QCA Draft report, p. 48 and p. 55.

- Although QTC does not consider the implementation issues to be significant enough to justify giving zero weight to the point estimates from the DGM, at a minimum the time series properties of the DGM estimates can provide useful information on the relationship between the *ERm* and the prevailing CGS yield. If the QCA has a preference to only use historical data, the time series properties should play a role in determining the weights given to the Wright and Ibbotson methods.
- As shown in the following sections, the time series properties of the DGM estimates based on data from Australia and the United States both indicate that *ERm* has fallen by less than the risk-free rate over the last 20 years.

2.3.1 QTC's DGM estimates

- Figure 4 shows the relationship between the quarterly implied MRP from QTC's application of the DGM and the prevailing 10-year CGS yield between September 2005 and June 2021. There is a strong negative relationship with a linear slope estimate of -0.70. This means that a 1.0 per cent decrease in the prevailing CGS yield has led to a 0.7 per cent increase in the implied MRP[14]. This is the outcome from the DGM estimates of *ERm* being more stable than the prevailing 10-year CGS yield.

FIGURE 4: DGM IMPLIED MRP VS PREVAILING CGS YIELD (2005–2021)

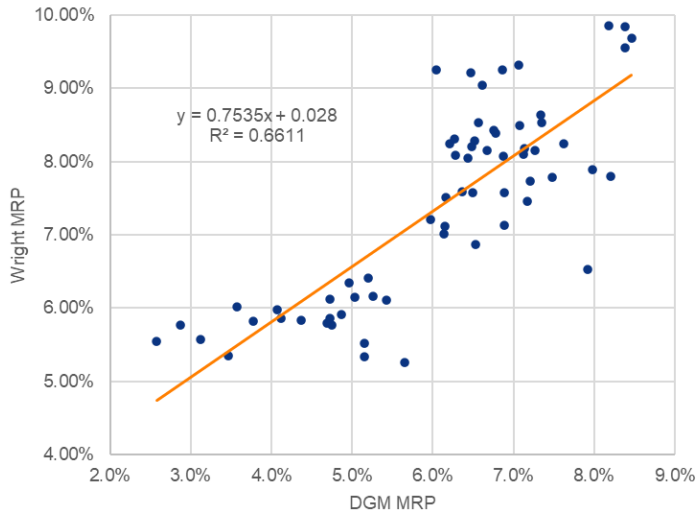


Source: Bloomberg, RBA. QTC calculations. Quarterly estimates.

- Despite being based on completely different data, there is a strong positive relationship between the implied MRPs from the DGM and Wright methods, as shown in Figure 5. This indicates that the investor expectations implicit in the current value of the equity market have been formed with some regard to the historical return on equity.

[14] The Wright method implies a slope estimate of -1.0, whereas the Ibbotson method implies a slope estimate of zero. Therefore, the DGM estimates are closer to the relationship implied by the Wright method.

FIGURE 5: IMPLIED MRP FROM THE DGM AND WRIGHT METHOD (2005–2021)



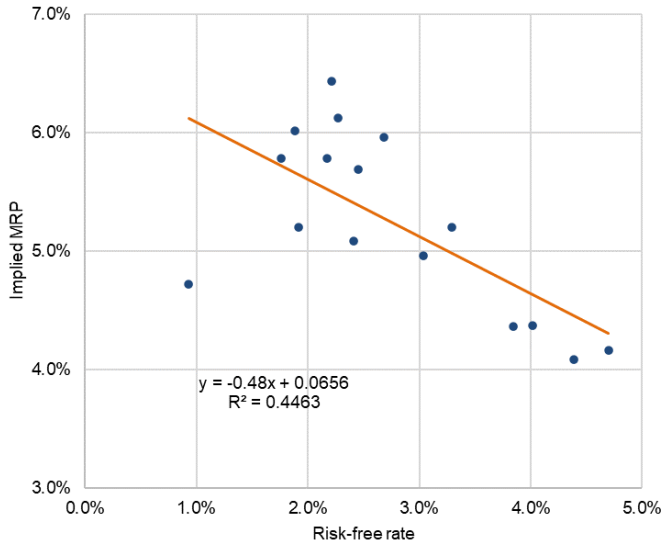
Source: Bloomberg, RBA. QTC calculations. Quarterly estimates.

- QTC considers the time series properties of the DGM estimates based on Australian data to be supportive of a less than perfect negative relationship between the ex-ante MRP and the prevailing CGS yield. This relationship can be reflected in the QCA's return on equity approach by using a weighted average of the Wright and Ibbotson methods.

2.3.2 Damodaran's DGM estimates for the United States

- Damodaran has produced annual DGM estimates between 1961 and 2020 for the United States[15]. Figure 6 shows the relationship between the implied MRP and the prevailing risk-free rate between 2005 and 2020 to align with the sample period for QTC's estimates.

FIGURE 6: DGM IMPLIED MRP VS PREVAILING RISK-FREE RATE (2005–2020)

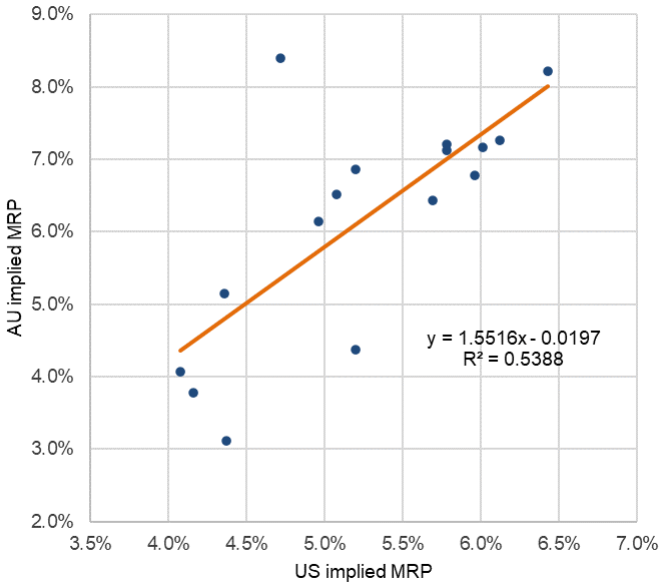


Source: Damodaran (2021). Annual year-end estimates.

- The negative relationship between implied MRP and risk-free is consistent with QTC's estimates, although the strength of the relationship is stronger in the Australian data. There is also a strong positive relationship between the year-end Damodaran and QTC implied MRP estimates (Figure 7):

[15] A. Damodaran (March 2021), *Equity Risk Premiums (ERP): Determinants, Estimation, and Implications – The 2021 Edition Updated: March 23, 2021*.

FIGURE 7: AUSTRALIAN AND US IMPLIED MRPS (2005–2020)



Source: Damodaran (2021), QTC.

- Consistent with the Australian data, the time series properties of the DGM estimates based on United States data show a strong negative relationship between the implied MRP and the prevailing risk-free rate.
- It is also worth noting Damodaran's views on why the historical MRP *should not* be used to estimate the ex-ante MRP[16]:

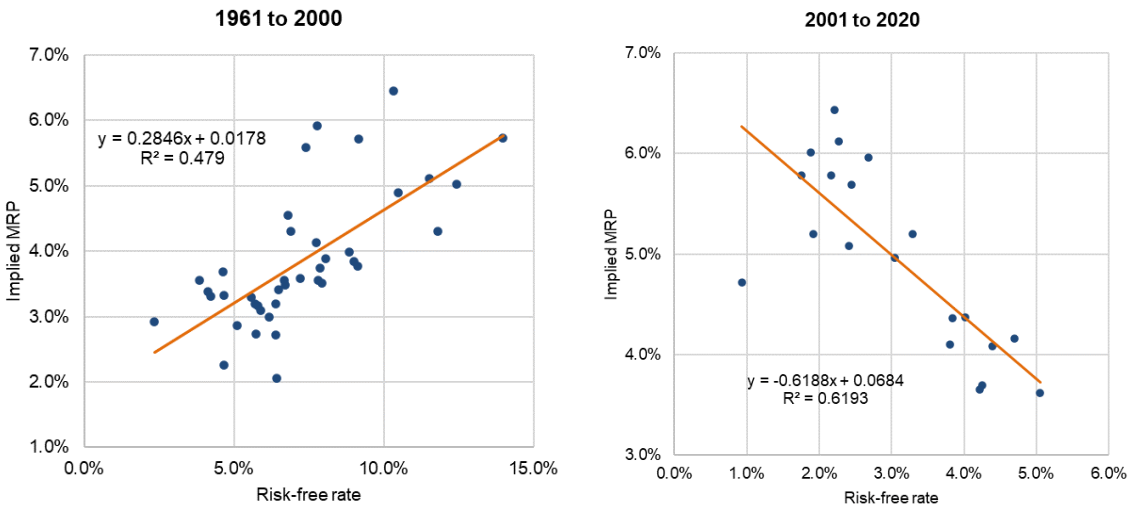
> *'If we extend our analysis to make forecasts of the actual return premium earned by stocks over bonds for the next five or ten years, the current implied premium [DGM] remains the best predictor, though the earnings yield does well for ten-year returns.* ***Historical risk premiums perform even worse as forecasts of actual risk premiums over the next 5 or 10 years; in fact, they operate as good contra indicators, with a high historical risk premium forecasting lowered actual returns in the future.*** *If predictive power were the only test, historical premiums clearly fail the test.'*
>
> ***'Historical risk premiums are very poor predictors of both short-term movements in implied premiums or long-term returns on stocks.'***

2.3.3 Changing relationship over time

- Damodaran's estimates also show a change in the relationship between the implied MRP and the prevailing risk-free rate circa 2001 (Figure 8):

[16] Damodaran (2021), p. 128–129.

FIGURE 8: SUB-PERIOD ANALYSIS OF IMPLIED MRP VS PREVAILING RISK-FREE RATE



Source: Damodaran (2021)

- A possible explanation for the change is the relationship between inflation and the output gap[17]:

> *'Since the 2008 crisis, with its aftermath of low government bond rates and a simmering economic crisis, equity risk premiums in the United States have behaved differently than they have historically. Connolly and Dubofsky (2015) find that equity risk premiums have increased (decreased) as US treasury bond rates decrease (increase) and have moved inversely with inflation (with higher inflation leading to lower equity risk premiums), both behaviors at odds with the relationship in the pre-2008 period, suggesting a structural break in 2008.*
>
> *Campbell, Pfueger [sic] and Viceira (2019) also confirm a shift in the relationship between stocks and bonds, but trace the change back earlier to 2001 and link it to the change in the link between inflation and real output from negative in the pre-2001 time period to positive, post 2001.'*

Changing systematic risk of nominal bonds

- The reason for the shift in the relationship between equity and bond returns identified by Campbell, Pflueger and Viceira is explained as follows[18]:

> *'We detect a break in 2001Q2, with a negative inflation-output gap correlation before and a positive correlation after.* ***Because nominal bond returns are inversely related to inflation and stock returns are positively related to the output gap, one might expect that the comovement between bonds and stocks should change in the opposite direction around this break date****.'*
>
> *'If the correlation between inflation and the output gap is negative, as it was during our first period, this means that nominal long-term bond prices decline in periods of high marginal utility and bonds are risky. If this correlation is positive, as in the second period, nominal long-term bond prices decline in periods of low marginal utility,* ***so bonds are hedging assets.****'*

- The main conclusion is that the systematic risk of nominal bonds changed from positive to negative in early 2001 due to a change in the correlation between inflation and the output gap:

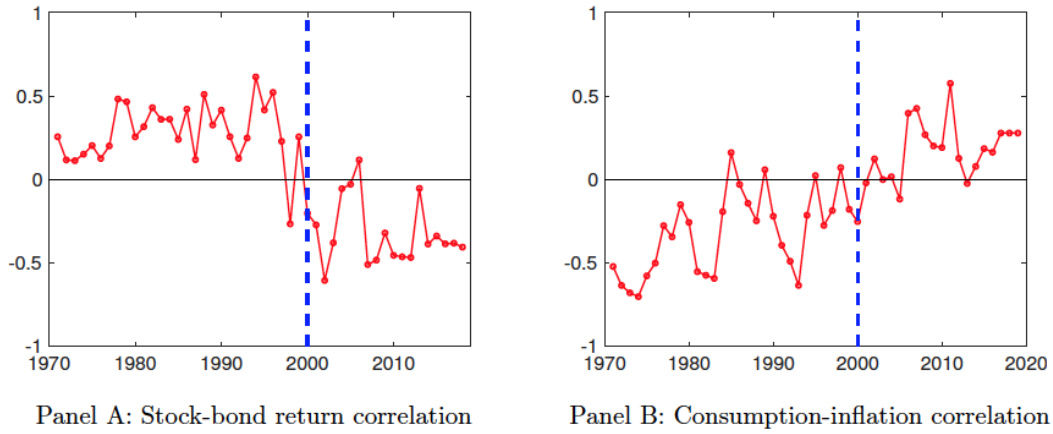
[17] Damodaran (2021), p. 13–14.

[18] J. Campbell, C. Pflueger and L. Viceira (May 2019), *Macroeconomic Drivers of Bond and Equity Risks*, p. 3 and p. 2.

- When the correlation was negative pre-2001, nominal bonds delivered poor real returns when the output gap was low (ie, high inflation, poor equity performance and high marginal utility of consumption), so bonds had positive systematic risk (ie, positive beta).
- When the correlation was positive post-2001, nominal bonds delivered strong real returns when the output gap was low (ie, low inflation, poor equity performance and high marginal utility of consumption), so bonds had negative systematic risk (ie, negative beta).

- The same shift in the relationship between equity and bond returns also aligns with a change in the correlation between inflation and consumption from negative to positive in 2000 (Figure 9)[19]. The implications for the systematic risk of nominal bonds are the same as those based on the change in correlation between inflation and the output gap.

FIGURE 9: STOCK-BOND AND CONSUMPTION-INFLATION CORRELATIONS



Source: Li, Zha, Zhang and Zhou (October 2020)

- The reduction in the systematic risk of nominal bonds is a factor that can partially explain the fall in bond yields post-2000. However, *ERm* is not affected by the changing systematic risks of other assets. Therefore, it is likely that:
  - *ERm* has been more stable than the falling risk-free rate since 2000, which results in
  - a negative relationship between the ex-ante MRP and the prevailing risk-free rate.
- The changing systematic risk of nominal bonds was also mentioned in a November 2019 speech by Richard Clarida, Vice Chair of the US Federal Reserve System[20]:

> *'In the 1970s and 1980s, the sign of the correlation was positive, which implies that bond and stock returns tended to rise and fall together. In this period, bonds provided a diversification benefit when added to an equity portfolio (the bond return beta to stocks averaged 0.2) but not a hedge against equity risk. Since the late 1990s, the empirical correlation between bond and stock returns has typically been negative (the bond return beta to stocks has averaged negative 0.2).*
>
> *This means that since the late 1990s, bond returns tend to be high and positive when stock returns are low and negative so that nominal bonds have been a valuable outright hedge against equity risk.* ***As such, we would expect the equilibrium yield on bonds to be lower than otherwise, as investors should bid up their price to reflect their value as a hedge against equity risk (relative to their value when the bond beta to stocks was positive).****'*

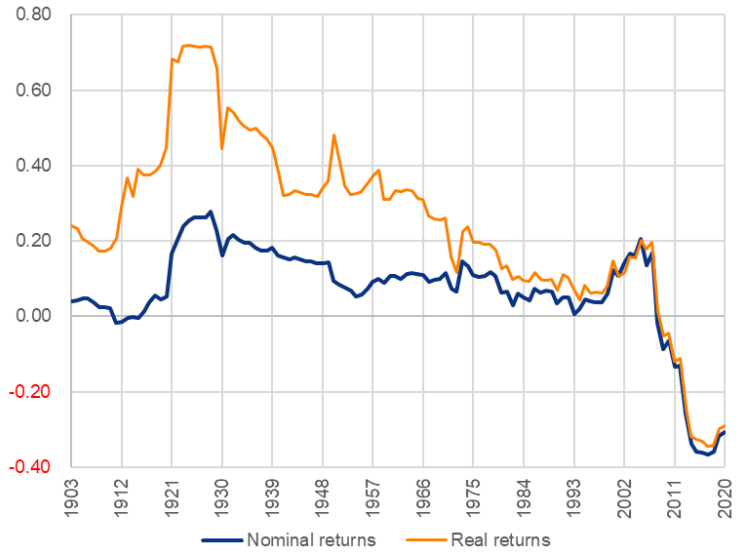
- By definition, any increase in price (ie, reduction in yield) due to the ability of nominal bonds to hedge equity risk does not reduce *ERm*. Expressed differently, the hedging properties of nominal bonds is a factor that reduces the yield on nominal bonds but not *ERm*. This can explain the negative relationship between the MRP from the DGM and the prevailing risk-free rate over the last 20 years.

[19] Li, Zha, Zhang and Zhou (October 2020), *Stock-bond Return Correlation, Bond Risk Premium Fundamentals, and Fiscal-Monetary Policy Regime*, p. 1.

[20] R. Clarida (November 2019), *Monetary Policy, Price Stability, and Equilibrium Bond Yields: Success and Consequences*, p. 8.

- Figure 10 shows the rolling 20-year beta of 10-year nominal CGS beta based on realised nominal and real returns. The reduction in systematic risk is broadly consistent with the patterns observed by Clarida in the United States data.

FIGURE 10: 20-YEAR ROLLING CGS BETA ESTIMATES (ANNUAL DATA)



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

- Clarida provides a plausible explanation for why the correlation between inflation and the output gap changed from negative to positive[21]:

> *'… the change in the U.S. monetary policy regime that began in 1979 under Paul Volcker and that was extended by Alan Greenspan in the 1990s very likely contributed to the change in the sign of the correlation between inflation and the output gap as well as the change in sign of the correlation between the federal funds rate and the output gap that we observe in the data. These are the sorts of patterns that a simple model of optimal monetary policy would produce when starting from an initial condition in which inflation is well above the (implicit) target, as was the case in 1979:*
>
> *High initial inflation triggers a policy response for the central bank to push up the real policy rate well above inflation in order to push output below potential, which, via the Phillips curve, will, over time, lower inflation toward the target. If this policy succeeds ex post, inflation expectations become anchored at the new lower level of inflation, and policy can, then, respond to demand shocks by adjusting real rates pro-cyclically, the opposite of what is required when initial inflation is too high and inflation expectations are not anchored.*
>
> ***Inflation will also be pro-cyclical with well-anchored inflation expectations if demand shocks dominate and inflation expectations remain anchored.'***

- Pro-cyclical inflation means that low inflation (which increases the real return produced by nominal bonds) will tend to occur during unfavourable economic states when the marginal utility of consumption is high. As such, nominal bonds are more likely to be a hedge for equity risk rather than just a diversifier of equity risk in an environment where inflation is pro-cyclical and inflation expectations remain anchored.
- Although Clarida's explanation is based on inflation and monetary policy in the United States, the long-term inflation trends and outcomes have been very similar in Australia. Furthermore, the Reserve Bank of Australia's (RBA) adoption of inflation targeting in the early 1990s has been successful in significantly reducing inflation and anchoring inflation expectations at levels materially lower than what was experienced in the 1970s and 1980s, which is similar to the outcomes in the United States referred to by Clarida.

[21] Clarida (2019), p. 10.

2.3.4 Summary

- The time series properties of DGM estimates in Australia and the United States both show a strong negative relationship between the implied MRP and the prevailing risk-free rate since circa 2000. There are sound theoretical reasons for why the negative relationship exists, and for why it should continue to exist (eg, pro-cyclical inflation and the anchoring of expected inflation).
- Even if the QCA decides to give no weight to point estimates of *ERm* from the DGM, the negative relationship between the implied MRP and the prevailing 10-year CGS yield is a valid reason for using a weighted average of the Wright and Ibbotson methods to estimate the return on equity.

2.4 Real-world valuation practices and surveys

- In our submission to the QCA's request for information paper, we stated that[22]:

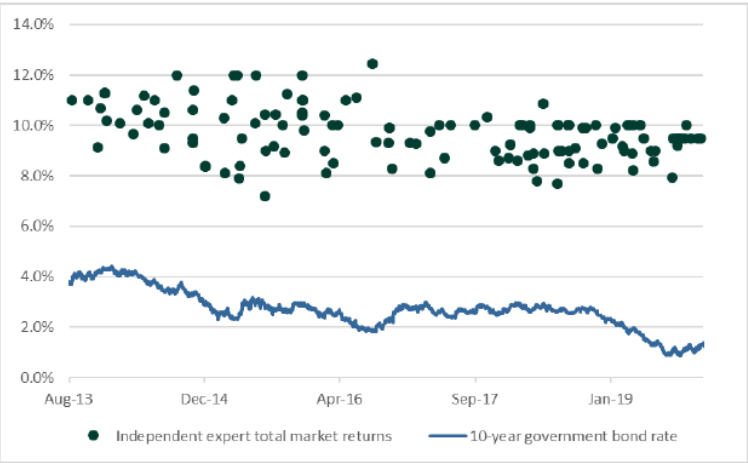
> *'… no quantitative weight should be given to surveys, although some surveys and the practices of valuation professionals can be useful in determining the relationship between ERm and the prevailing 10-year CGS yield. This can be used to inform the weights given to the Ibbotson, Wright and DDM approaches.'*

- The QCA has not fully engaged with the material we provided. Apart from a brief reference to commentary from the RBA on relatively stable hurdle rates, no consideration was given to the other material that supports our view that:
  - it is not common practice for valuation experts to estimate *ERm* by adding a fixed historical MRP to the prevailing CGS yield, and
  - *ERm* has been far more stable than the prevailing CGS yield, with the outcome being a negative relationship between the ex-ante MRP and the prevailing CGS yield.

2.4.1 Real-world valuation practices

- QTC cited a report by Synergies Economic Consulting that showed a time series of the total market return (TMR, which is the same as *ERm*) used in independent expert reports (IER) between 2013 and 2020[23]. QTC considers IERs to be a valuable source of information on the market cost of equity because actual market transactions often occur based on the recommendations and valuations made by the independent experts.
- As shown in Figure 11, the TMR has been much more stable than the 10-year CGS yield. A visual inspection suggests that the average TMR was about 10.0 per cent at the start of the sample and about 9.0 per cent at the end of the sample period (ie, a 1.0 per cent fall). In contrast, the 10-year CGS was 4.0 per cent at the start of the sample and about 1.5 per cent at the end of the sample (ie, a 2.5 per cent fall).

FIGURE 11: 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

[22] QTC (January 2021), *Queensland Competition Authority 2021 rate of return review – Request for information*, p. 12.

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

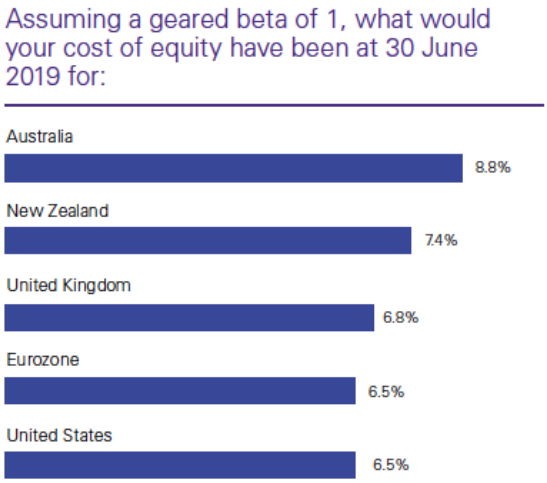
Source: Synergies (May 2020).

- The average TMR and 10-year CGS yield between 2013 and 2020 were 9.7 per cent and 2.6 per cent respectively, which means the independent experts were using (on average):
  - 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, 1.1 per cent higher than the average prevailing CGS yield).
- Both approaches are consistent with a negative relationship between the MRP and the *prevailing* CGS yield. Neither approach supports adding a fixed historical MRP to the prevailing CGS yield.

2.4.2 Surveys

- We considered the 2019 KPMG valuation practices survey to be informative because the respondents were asked to make a direct estimate of *ERm* as at a specific date (30 June 2019)[24]. The responses are shown in Figure 12:

FIGURE 12: MARKET COST OF EQUITY ESTIMATES



Source: KPMG 2019 Valuation Practices survey.

- The prevailing 10-year CGS yield on 30 June 2019 was 1.4 per cent, which means that to arrive at an *ERm* of 8.8 per cent for Australia, the survey respondents must have used:
  - a 7.4 per cent implied MRP and a 1.4 per cent CGS yield, or
  - a 6.0 per cent MRP and a 2.8 per cent CGS yield (ie, 1.4 per cent higher than the prevailing CGS yield).
- Both approaches are consistent with a negative relationship between the MRP and the *prevailing* CGS yield. Neither approach supports adding a fixed historical MRP to the prevailing CGS yield.

2.4.3 Additional material on surveys

KPMG 2017 valuation practices survey

- The 2017 KPMG[25] survey is a good example of why the MRP should not be viewed as a stand-alone parameter that is independent of the risk-free rate. Figure 13 shows the distribution of survey responses for the most recently used MRP. KPMG does not explain when 'most recent' was, however the report does state that the responses were received in late 2016[26].

[24] KPMG (2020), *What's it worth? Determining value in the continuing low interest rate environment.*

[25] KPMG (July 2017), *For all it's worth – KPMG Valuation Practices Survey 2017.*

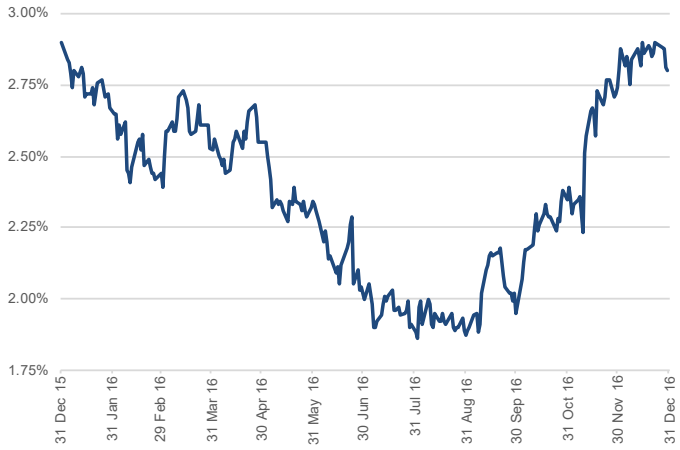
[26] KPMG (July 2017), p. 5.

FIGURE 13: MRP ESTIMATES FROM THE 2017 KPMG SURVEY

Source: KPMG 2017 Valuation Practices survey.

- Figure 14 shows the daily 10-year CGS yield in between December 2015 and December 2016.

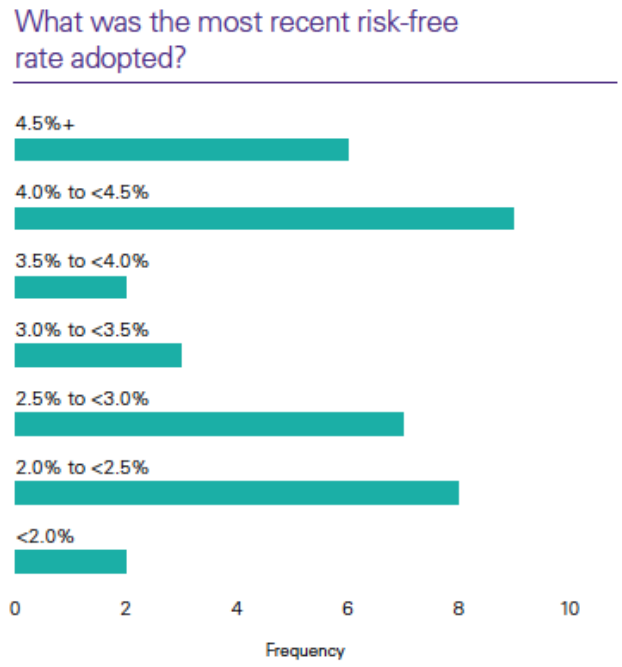
FIGURE 14: DAILY 10-YEAR CGS YIELD



Source: Yieldbroker.

- As the survey responses were received in late 2016, it is reasonable to assume that the prevailing CGS yield was in the range of 2.2–2.8 per cent when the responses were being made. However, Figure 15 shows that the majority of respondents used a risk-free rate than was materially higher than 3.0 per cent, which is higher than the *maximum* CGS yield at any time between December 2015 and December 2016.

FIGURE 15: RISK-FREE RATE ESTIMATES FROM THE 2017 KPMG SURVEY



Source: KPMG 2017 Valuation Practices survey.

- In QTC's view, it is highly likely that most of the respondents that used a 6.0 per cent MRP were the same respondents that used a risk-free rate materially higher than the prevailing CGS yield. This is consistent with an uplift being applied to partially offset the impact of falling CGS yields on the cost of equity.
- It is also likely that some of the respondents that used a risk-free rate of about 2.5 per cent were the same respondents that used an MRP of 6.5 per cent or higher.
- Both approaches are consistent with a negative relationship between the MRP and the prevailing CGS yield. Neither approach supports adding a fixed historical MRP to the prevailing CGS yield.

Fernandez surveys

- The QCA has previously considered the annual Fernandez surveys to inform its MRP estimate. Although QTC does not support explicitly using these surveys to estimate the return on equity, they can provide useful information on the relationship between the MRP and CGS yields.
- The surveys in 2013, 2015 and between 2017–2021 are informative because they contain responses for the MRP *and* the risk-free rate. The median responses for Australia are summarised in Table 1, along with an estimate of the prevailing 10-year CGS yield around the time when the surveys were being completed:[27]

[27] The prevailing risk-free rates are based on the 20-day average of the 10-year CGS yield up to and including the date when Fernandez compiled the responses in each year. Most averaging periods occurred between March and June.

TABLE 1: FERNANDEZ SURVEYS - MEDIAN RESPONSES FOR AUSTRALIA

Year	Survey MRP (%)	Survey CGS (%)	Prevailing CGS (%)	CGS difference (%)	Implied survey *ERm* (%)	MRP + prevailing CGS (%)
2013	5.8	3.3	3.5	(0.2)	**9.1**	**9.3**
2015	5.1	3.0	2.4	0.6	**8.1**	**7.5**
2017	7.6	3.1	2.7	0.4	**10.7**	**10.3**
2018	7.1	3.0	2.7	0.3	**10.1**	**9.8**
2019	6.1	2.8	2.0	0.8	**8.9**	**8.1**
2020	6.2	2.4	0.9	1.5	**8.6**	**7.1**
2021	6.3	2.5	1.7	0.8	**8.8**	**8.0**
Change from 2013 to 2021	0.5	(0.8)	(1.8)	n/a	**(0.3)**	**(1.3)**

- Consistent with the independent experts reports and KPMG surveys, the Fernandez surveys indicate that *ERm* has not fallen point-for-point with the prevailing CGS yield. Between 2013 and 2021, *ERm* fell by just 0.3 per cent. If the median MRPs were added to the prevailing 10-year CGS yield, *ERm* would have fallen by 1.3 per cent.
- Finally, the responses in 2020 are interesting because they were made around the time of the initial impact of COVID-19 on the global equity markets. This was clearly a period of heightened risk-aversion, and although the median MRP of 6.2 per cent was in line with the historical average MRP, a material uplift of 1.5 per cent was made to the prevailing CGS yield, which was only 0.9 per cent at the time.
  - This outcome could have been approximated in a regulatory context by using a weighted average of the Wright and Ibbotson methods.

2.4.4 Summary

- The surveys considered above are consistent with the time series properties of the DGM estimates which indicate that *ERm* has not fallen by as much as the prevailing CGS yield.
- In our view, this provides additional support for using a weighted average of the Wright and Ibbotson methods to estimate the return on equity.

2.5 Inflation risk premium

- The draft report states that[28]:

> *'… QTC considered that we should adjust our estimate from the Ibbotson method to account for the inflation risk premium.'*

- QTC did not propose an explicit adjustment for the inflation risk premium (IRP). We provided evidence that, due to a long-term decline in the IRP, the Ibbotson method is likely to under-estimate *ERm*. We considered this to be a relevant factor when determining the weights that apply to different estimation methods, but we did not propose any adjustments to the historical MRP. Further detail on this point is provided in Appendix A.
- The QCA also expressed concerns about using data from the United States data to reach conclusions on the Australian IRP. As explained in Appendix A, there are sound reasons for why the same trends are likely to be common to both estimates, so the conclusions are likely to apply to Australia.
- QTC maintains that the long-term decline in the IRP has (and will continue to) produce a downwards bias in the estimate of *ERm* under the Ibbotson method. In contrast, estimates of *ERm* from the Wright and DGM methods are not affected by the IRP. We submit that this issue be reconsidered by the QCA before a final decision is made.

[28] QCA Draft report, p. 49.

3 A proposed way forward

- In QTC's view, there is sufficient empirical and theoretical evidence of a negative relationship between the MRP and the prevailing CGS yield. This relationship is the outcome of *ERm* having not fallen by the same amount as the prevailing CGS yield. It is likely that a reduction in the systematic risk of nominal CGS has contributed to this outcome.
- Direct estimates of *ERm* from the Wright method and the DGM are not affected by the systematic risk of nominal CGS, so both estimates of *ERm* should be given material weight in the QCA's final return on equity approach.
- In contrast, the historical MRP has been estimated during a period when the nominal CGS beta was relatively high (Figure 10). Adding this estimate to a prevailing CGS yield that reflects lower (or even negative) systematic risk will introduce a downward bias into the estimate of *ERm*.
- Based on the above, QTC does not consider giving 100 per cent weight to the Ibbotson method to be appropriate or likely to produce an unbiased estimate of *ERm*.
- If the QCA decides to only use historical data to estimate the return on equity, QTC submits that one of the following approaches should be adopted:
  - Under the first approach, the *ERm* that is used as an input into the CAPM is a weighted average of the *ERm* estimates from the Wright and Ibbotson methods. The risk-free rate equals the prevailing 10-year CGS yield.
  - Under the second approach, the historical MRP is used as an input into the CAPM. The risk-free rate equals a weighted average of:
    - the prevailing 10-year CGS yield, and
    - the difference between the estimate of *ERm* from the Wright method and the historical MRP.
- Both approaches are simple and will produce return on equity estimates that do not change point-for-point with the prevailing CGS yield. The second approach reduces the problems created by a lack of stability in the prevailing CGS yield identified in Section 2.2.1 It is also a good proxy for the approach used by independent valuation experts when the historical MRP is used to estimate *ERm*. As such, QTC favours the second approach, although both approaches are a significant improvement on the preliminary approach in the draft report.
- The slope estimates of the relationship between the DGM-implied MRP and the prevailing risk-free rate in Figures 4 and 5 support a 50–70 per cent weight for the Wright method. In our view, a simple and pragmatic approach is to give equal weight to the Wright and Ibbotson methods to estimate the return on equity.

Appendix A: Inflation risk premium analysis

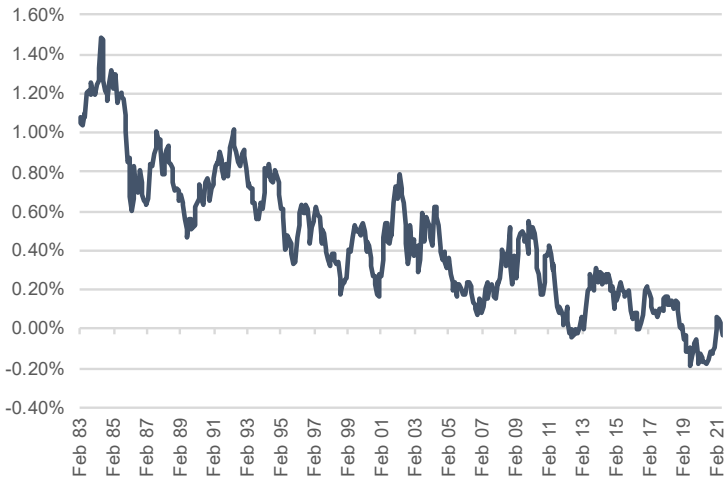
A.1: Background

- The inflation risk premium (IRP) compensates holders of assets with promised fixed nominal cash flows for *systematic* inflation risk. The sign and size of the IRP depends on the covariance between inflation and real economic activity:
  - A positive IRP exists when covariance is negative (ie, high inflation coinciding with low real economic activity and vice-versa). A positive premium is required because the real return on assets with fixed nominal cash flows decreases during unfavourable economic states when the marginal utility of consumption is high.
  - A negative IRP exists when the covariance is positive (ie, low inflation coinciding with low real economic activity and vice-versa). Investors are willing to accept a negative premium because the real return on assets with fixed nominal cash flows increases during unfavourable economic states when the marginal utility of consumption is high (ie, the assets act as a hedge against poor equity returns).
- By definition, the IRP that is reflected in nominal bond yields does not make up part of the real or nominal *ERm*.

A.2: Data

- There are no long-term estimates of the Australian IRP. However, Kim, Walsh and Wei (2021) produce model-based estimates using US Treasury bond yields between 1983 and 2021 (Figure 16)[29]:

FIGURE 16: 10-YEAR INFLATION RISK PREMIUM (US DATA)

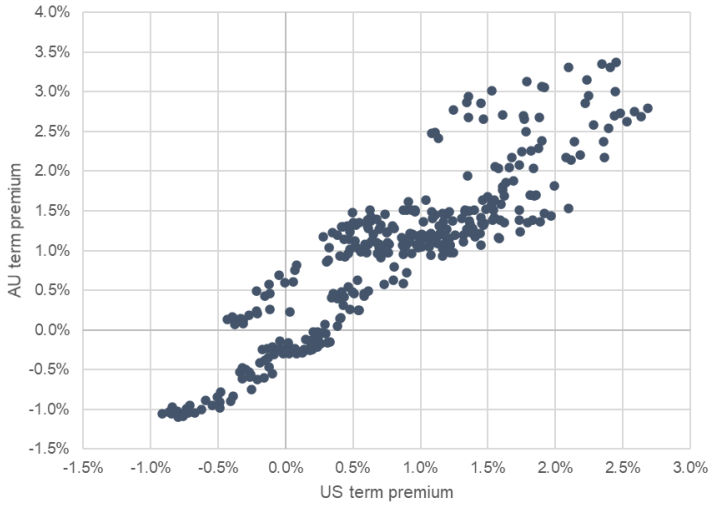


Source: KWW (2021)

- Although the estimates are based on data from the United States, the same broad trends are likely to be similar for the Australian IRP:
  - The inflation experience in Australia and the United States has been very similar. Actual inflation was very high between the late 70s and mid-80s, and the subsequent success of monetary policy in reducing inflation also resulted in a material reduction in realised inflation volatility in both countries (and the respective IRPs).
  - Nominal US Treasury bond and CGS yields/returns are highly correlated, so the components that make up these yields, including the IRP, are also likely to be highly correlated. This is confirmed in Figure 17, which shows a strong positive correlation between the estimated 10-year nominal term premium in Australia and the United States. The nominal term premium equals the real term premium plus the IRP.

[29] Kim, Walsh & Wei (2021), *Tips from TIPS: Update and Discussions*, FEDS Notes. Washington: Board of Governors of the Federal Reserve System.

FIGURE 17: RELATIONSHIP BETWEEN AUSTRALIAN AND US TERM PREMIA



Source: KWW (2021), AOFM.

- Although the size of the IRP may differ between the United States and Australia, the analysis that follows is based on the difference between the prevailing IRP and the historical average IRP over time. Therefore, the absolute values of the IRP estimates are less important than the longer-term trend and volatility of the IRP estimates.

A.3: Analysis

- The QCA's application of the Ibbotson method produces an indirect estimate of *ERm* equal to the prevailing 10-year nominal CGS yield plus a MRP based on a long-term average of annual historical excess returns.
- The IRP is part of the nominal CGS yield, which means that under the Ibbotson method:
  - the prevailing IRP is an *addition* to the return on equity
  - the historical average IRP is a *deduction* from the MRP in the return on equity, and
  - the net IRP in the Ibbotson estimate of *ERm* equals the prevailing IRP in the prevailing nominal CGS yield minus the historical average IRP.
- The IRP is compensation for the systematic inflation risk exposure of assets with fixed nominal cash flows. By this definition, the IRP should not be reflected in any valid estimate of *ERm*. As such, the net IRP that naturally arises under the Ibbotson method is a source of bias in the estimate of *ERm*.
- If the historical IRP has a stable average (ie, exhibits no significant time trends), the net IRP should average out to zero over time. However, there is a clear long-term downtrend in the IRP, which means that as time passes, the prevailing IRP is more likely to be below the historical average IRP than above it (Figure 18). Therefore, the net IRP is more likely to be negative and will not average out to zero over time.

FIGURE 18: PREVAILING AND CUMULATIVE HISTORICAL AVERAGE INFLATION RISK PREMIUM

Source: KWW (2021).

- Figure 19 shows the monthly net IRP between July 2000 and July 2020. The historical average IRP on July 2000 equals the average IRP between February 1983 and July 2000. Thereafter, an expanding window is used to calculate the historical average IRP, so there is no look-ahead bias in the estimates.

FIGURE 19: NET INFLATION RISK PREMIUM DIFFERENCES (US DATA)

Source: KWW (2021).

- A negative net IRP means that a negative inflation risk premium is reflected in the Ibbotson estimates of *ERm*. However, a valid estimate of *ERm* cannot include the IRP because the IRP only applies to the expected return on assets with fixed nominal cash flows. As a consequence, *ERm* under the Ibbotson method is biased downwards. The current bias based on United States data is about -0.5 per cent and for the reasons set out in Section A.1, a similar bias is likely to exist when the Ibbotson method is implemented using Australian data.
- In QTC's view, the IRP bias should be considered by the QCA when determining the weight given to the Ibbotson method compared to alternatives that are not affected by the IRP, such as the Wright method and the DGM.