Submission to the Equity Omnibus draft working paper

QUEENSLAND TREASURY CORPORATION

3 SEPTEMBER 2021

Queensland Treasury Corporation (QTC) welcomes the opportunity to provide comments on the Australian Energy Regulator's (AER) Equity Omnibus draft working paper. Our main views and conclusions are summarised below.

1 Summary

- QTC supports a diversified approach for estimating the return on equity, with meaningful weight given to historical excess returns, historical real equity returns, and the dividend growth model (DGM). We consider a diversified approach is more likely to produce an unbiased estimate of the return on equity compared to any single approach, especially within the constraints of a legally binding Rate of Return Instrument (RoRI).
- There is strong empirical evidence, supported by sound theoretical explanations, of a negative relationship between the ex-ante market risk premium (MRP) and the risk-free rate over the last 20–25 years. This includes:
  - Empirical estimates of the long-term nominal bond beta (ie, systematic risk) changing from positive to negative, which is consistent with a fall in the risk-free rate, but not a fall in the required return on equity.
  - A change in the correlation between inflation and measures of real economic activity circa 2020, resulting in safe nominal bonds producing strong real returns when the marginal utility of consumption is high. This can explain why nominal bonds changed from being systematically risky to a hedge against equity risk. This hedging property is a factor that reduces the risk-free rate, but not the required return on equity.
  - The time series properties of DGM estimates that show a strong negative relationship between the ex-ante MRP and prevailing risk-free rate over the last 20–25 years. The relationship is present in DGM estimates for Australia and the United States, and is consistent with the change in systematic risk of nominal bonds.
  - Unusually strong demand for safe assets from emerging market central banks, and from 'price insensitive' investors with long-term liabilities that highly value the duration-hedging properties of long-term bonds.
  - The relative stability of return on equity estimates used in independent expert reports, which QTC considers to be informative of how the return on equity is determined in competitive, real-world capital markets.
  - Surveys showing that it is not common practice to add a fixed historical MRP to the prevailing risk-free rate to estimate the return on equity, especially in a low interest rate environment.
- QTC considers this evidence to be sufficient to justify a meaningful departure from the approach in the 2018 RoRI, which assumes no relationship between the ex-ante MRP and the prevailing risk-free rate.
- Departing from the 2018 RoRI is supported by recent advice provided to the AER by Cambridge Economic Policy Associates (CEPA). CEPA advised that:
  - There is 'no good evidence' that the MRP should be assumed to be independent of the risk-free rate.
  - There is 'no conclusive theoretical basis' for an assumption of independence or dependence. This implies that the MRP should not be estimated 'as if' a conclusive theoretical basis exists for either assumption.
  - International regulators do not use MRPs that are 'wholly or even substantially' based on the historical MRP.
  - Since 1993, there has been a 'strong and convincing' negative relationship between the ex-ante MRP and the prevailing risk-free rate. This relationship exists in the estimates for Australia and the United States.
  - The AER should consider a hybrid approach that gives weight to a fixed MRP and a fixed total market return.
- QTC has outlined two preliminary options for how a hybrid approach can be used in the return on equity calculation in the 2022 RoRI. Both options produce implied MRPs that are negatively related to the prevailing risk-free rate, which is consistent with the empirical evidence and theoretical explanations provided in this submission.
- The hybrid approach should be combined with the DGM to estimate the return on equity. QTC considers a diversified approach to be more likely to produce the best possible estimate of the return on equity in an environment of uncertainty, and given the best available information, compared to the approach in the 2018 RoRI.

2 Relationship between the MRP and risk-free rate

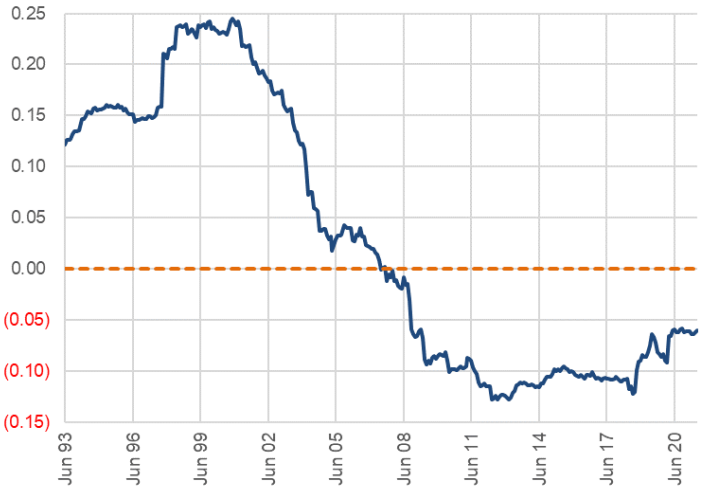
- The AER has asked for views on the relationship between the ex-ante MRP and risk-free rate, specifically:[1]
  - whether any relationship might exist in real or nominal terms
  - the validity, stability, or direction, of any relationship, and
  - the regulatory suitability or practicality of implementing a relationship in the 2022 RoRI.
- Before proceeding, it is important to note that the ex-ante MRP is not a stand-alone parameter that can be estimated independently of the two Capital Asset Pricing Model (CAPM) parameters that define it, being the expected return on the market portfolio (*ERm*) and the risk-free rate. An estimate of *ERm* is required before the MRP can be calculated.
- The AER uses the prevailing 10-year Commonwealth Government Security (CGS) yield as a proxy for the risk-free rate in the CAPM. This means the ex-ante MRP is the outcome from subtracting the prevailing CGS yield from *ERm*. As such, any relationship between the MRP and the prevailing CGS yield is an outcome of the relationship between *ERm* and the prevailing CGS yield.
- Based on the above, assessing the relationship between *ERm* and the prevailing CGS yield requires determining if the factors that affect CGS yields can be expected to affect *ERm* by same amount and in the same direction. More specifically, QTC considers the relevant question to be:

> Have the factors that have contributed to the long-term fall in CGS yields caused the required return on equity (ie, *ERm*) to fall by the same amount?

2.1 The changing systematic risk of nominal bonds

- Figure 1 shows the rolling 10-year empirical beta estimates for 10-year nominal CGS since June 1993 based on monthly returns between June 1983 and June 2021.

FIGURE 1: 10-YEAR CGS BETA ESTIMATE – ROLLING 10-YEAR PERIODS



Source: RBA, S&P. QTC calculations.

- The main observations from Figure 1 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 unstable and displays large '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 expected CGS beta does not have a stable expected value of zero.
- A decrease in the systematic risk of nominal CGS is a factor that has contributed to the fall in CGS yields. However, any reduction in yield that is attributable to the decrease in systematic risk does not, by definition, reduce *ERm*.

[1] AER (2021), *Equity Omnibus draft working paper*, p. 28.

Central bank observations

- The changing systematic risk of nominal bonds was noted in a November 2019 speech by Richard Clarida, Vice Chair of the United States Federal Reserve System:[2]

> *'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).****'*

- The hedging value of nominal bonds is reflected in estimates of the term premium, which is the difference between the nominal bond yield and the expected yield from rolling over a series of short-term discount securities.[3]

> *'The term premium is the additional compensation—relative to investing in and rolling over short-maturity bills—that bondholders require for assuming the risk of holding a long-duration asset with greater exposure to interest rate and inflation volatility. Importantly, according to economic theory the equilibrium term premium can be negative.* ***In this case, which is relevant today in the United States and some other countries, the exposure to interest rate and inflation volatility embedded in a long-maturity bond is more than offset by the potential value of the bond in hedging other risks, such as equity risk.****'*

- Any reduction in yield that is 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 nominal bond yields, but not *ERm*. This leads to a negative relationship between the ex-ante MRP and the prevailing risk-free rate.
- Similar observations were made in a 2021 speech by Brad Jones, Head of Economic Analysis at the Reserve Bank of Australia (RBA):[4]

> *'New banking regulations and central bank asset purchases clearly contributed to the bid for safe assets over this period, but* ***safe asset demand also reflected investor willingness to pay a premium for the insurance-like properties of liquid and highly-rated fixed income securities.****'*
>
> *'Second was* the *perceived* ***recession-hedging properties of sovereign bonds in an environment of low inflation****. This perception became ingrained from the late 1990s onwards as stock and bond returns became negatively correlated, most notably during the equity market crashes of 2000–02 and 2007–08 when US Treasuries fully offset the decline in equities.* ***Assets that payoff in recessions are highly valuable for their consumption smoothing properties, and so can attract demand even at low or negative yields.****'*

- Paying a premium for the 'insurance-like' and 'recession-hedging' properties of nominal bonds reduces the nominal bond yield below the average expected yield from rolling over a series of short-term discount securities. This reduction in yield is *unique* to safe assets with fixed nominal cash flows. By this definition, the reduction in the nominal bond yield cannot also reduce *ERm*.

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

[3] Clarida (2019), p. 2.

[4] RBA (June 2021), *Uncertainty and Risk Aversion – Before and After the Pandemic*, p. 5–6.

2.2 Explanations for the change in systematic risk

- This section summarises three academic papers that provide sound empirical and theoretical reasons for why the systematic risk of nominal bonds changed from positive to negative circa 2000. The common theme is that a change in the correlation between inflation and measures of real economic activity has changed the *timing* of when nominal bonds are expected to deliver strong real returns relative to equities.
- A fourth paper links these reasons to the success of monetary policy in reducing inflation, inflation volatility, and in anchoring inflation expectations at historically low levels.

Campbell, Pflueger and Viceira (2019)

- CPV (2019) identify a change in the sign of the correlation between inflation and the output gap as reason for why the systematic risk of nominal bonds changed from positive to negative in early 2001:[5]

> *'We estimate that the correlation between inflation and the output gap switched from negative to positive in 2001.* ***Higher inflation lowers real bond returns and higher output raises stock returns, explaining why the bond-stock return correlation changed from positive to negative.****'*
>
> *'The model explains the qualitative change in Treasury risks with the correlation between inflation and the output gap, which was negative in the first period and positive in the second. This sign switch in correlation, which also occurs in the correlation of five-year average inflation with the lagged output gap and the correlation of the five-year average nominal Federal Funds rate with the lagged output gap, drives our result.*
>
> ***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.****'*

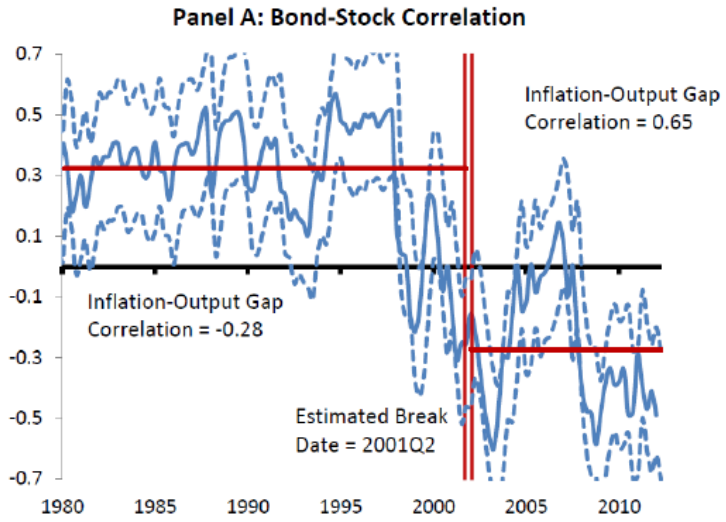
- The last sentence in the quote above could have been equivalently and more intuitively written as:

> *'If this correlation is positive, as in the second period, nominal long-term bond prices* ~~*decline*~~ ***rise*** *in periods of* ~~*low*~~ ***high*** *marginal utility,* ***so bonds are hedging assets.****'*

- Figure 2 shows that prior to 2001, the correlation between inflation and the output gap was -0.28. This means inflation was counter-cyclical (ie, low inflation coinciding with positive economic states and vice-versa). Post-2001 the correlation has been significantly positive at +0.65. This means inflation has become pro-cyclical (ie, low inflation coinciding with negative economic states and vice-versa).

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

FIGURE 2: ROLLING STOCK-BOND AND INFLATION-OUTPUT GAP CORRELATIONS



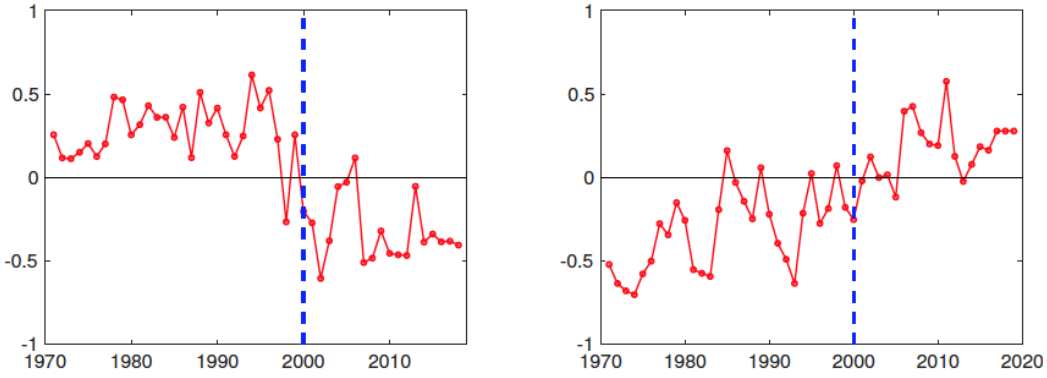
Source: CPV (2019)

- The implications of the change in correlation between inflation and the output gap are as follows:
  - 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, 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, high marginal utility of consumption), so bonds had negative systematic risk and were a hedge against equity risk (ie, negative beta).
- A decrease in the systematic risk of 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 of nominal bonds cannot also reduce *ERm*.

Li, Zha, Zhang and Zhou (2020)

- LZZZ (2020) identify a similar change in the correlation between inflation and real consumption growth as a reason for why the systematic risk of nominal bonds changed from positive to negative circa 2000 (Figure 3)[6].

FIGURE 3: STOCK-BOND AND CONSUMPTION-INFLATION CORRELATIONS



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

- The implications of the change in correlation between inflation and consumption are the same as those based on the output gap:

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

- When the correlation was negative pre-2000, nominal bonds delivered poor real returns when consumption was low (ie, high inflation, poor equity performance, high marginal utility of consumption), so bonds had positive systematic risk (ie, positive beta).
- When the correlation was positive post-2000, nominal bonds delivered strong real returns when consumption was low (ie, low inflation, poor equity performance, high marginal utility of consumption), so bonds had negative systematic risk and were a hedge against equity risk (ie, negative beta).

- A decrease in the systematic risk of 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 of nominal bonds cannot also reduce *ERm*.

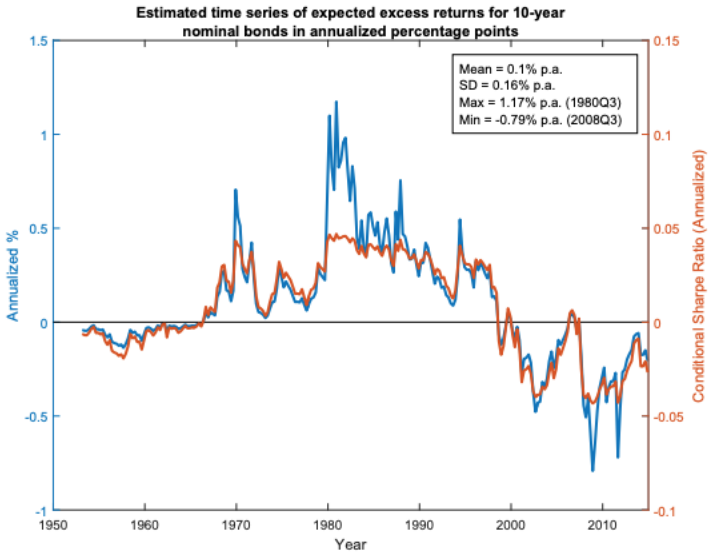
Campbell, Sunderam and Viceira (2016)

- CSV (2016) identify a change in the sign of the correlation between inflation and real economic activity as reason for why the systematic risk of nominal bonds changed from positive to negative in circa 2000:[7]

> *'Our model shows that the risk premia of nominal Treasury bonds should have changed over the decades because of changes in the covariance between inflation and the real economy.* ***The model predicts positive nominal bond risk premia in the early 1980s, when bonds covaried positively with stocks, and negative risk premia in the 2000s and particularly during the downturn of 2007–09, when bonds hedged equity risk'****.*

- The authors produce model-based estimates of the term premium that makes up part of the 10-year nominal bond yield (Figure 4). The nominal term premium equals the difference between the 10-year yield and the expected return from rolling over a series of 3-month discount securities over a 10-year period. The nominal term premium can be expressed as a real term premium plus an inflation risk premium, so it represents compensation for the interest rate and inflation risks associated with owning a 10-year nominal fixed-rate bond.

FIGURE 4: TERM PREMIUM ESTIMATES



Source: CSV (2016).

- The estimated term premium was large and positive between 1970 and the late 1990s, which was likely due to a large positive inflation risk premium to compensate for the high level of inflation volatility during this period. Since the late 1990s the term premium has mostly been negative, especially during the global financial crisis in 2008.
- A negative term premium is similar to an insurance premium that reduces the yields on bonds with fixed nominal cash flows. By definition, this premium (ie, yield discount) does not reduce *ERm* because it is a premium paid to hedge equity risk. As such, it is a factor that has contributed to a fall in the risk-free rate, but not a fall in *ERm*.

[7] J. Campbell, A. Sunderam and L. Viceira (2016), *Inflation bets or deflation hedges? The changing risks of nominal bonds*, p. 1.

- CSV (2016) conclude that:[8]

> *'… the behavior of inflation plays an important role in driving the changing stock-bond covariance.'*

- The 'behaviour of inflation' relates to its changing correlation with economic fundamentals such as real economic activity, the output gap and real consumption growth. This change has caused a reduction in the systematic risk of nominal bonds because low inflation, which increases the real return on nominal bonds, now tends to occur during negative economic states where equities perform poorly, and the marginal utility of consumption is high. This hedging property is a factor that has contributed to a fall in the risk-free rate, but not *ERm*.
- In our view, these three papers present sound empirical evidence and theoretical reasons for why the relationship between the ex-ante MRP and the prevailing risk-free rate has been negative over the last 20 years.

Clarida (2019)

- In the same speech referred to in Section 2.1, Clarida cites CPV (2019) and provides an explanation for why the correlation between inflation and the output gap changed from negative to positive circa 2001:[9]

> *'… 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.****'*

- The change in correlation between inflation and the output gap from negative to positive means that inflation has changed from being counter-cyclical to pro-cyclical, which has in turn led to a reduction in the systematic risk of nominal bonds:[10]

> *'When inflation is countercyclical, investors require a premium to hold nominal assets. This premium is then embedded in nominal interest rates. If inflation becomes less countercyclical, or even procyclical, this premium is reduced or can even become negative, reducing the level of long-term interest rates, which might in turn affect the economy.'*

Summary

- There are sound empirical and theoretical reasons for why the systematic risk of nominal bonds changed from positive to negative cira 2000. The outcome from the change is a negative relationship between the ex-ante MRP and the prevailing risk-free rate.
- In our view, these findings support a departure from the 2018 RoRI approach of giving 100 per cent weight to an estimation approach that assumes no relationship exists between the ex-ante MRP and the prevailing risk-free rate.

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[8] CSV (2016), p. 40.

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

[10] F. Gourio and P. Ngo (January 2020), *Risk Premia at the ZLB: A Macroeconomic Interpretation*, p. 2.

2.3 Relationships based on ex-ante MRP estimates

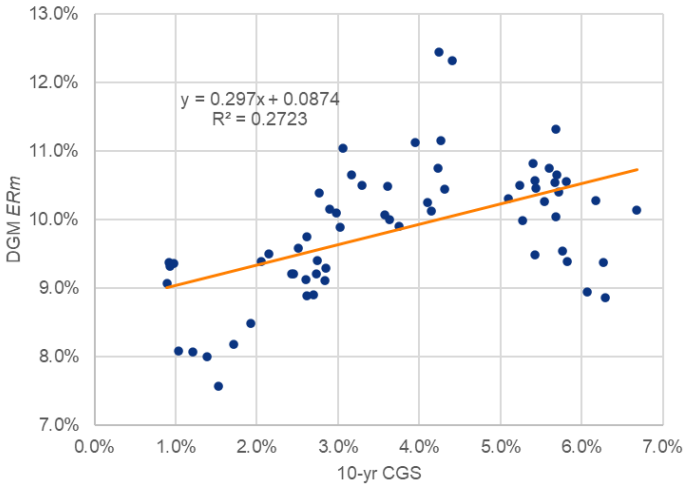
- The conclusions in the papers considered in Section 2.2 are based on realised returns, which are a noisy proxy for expected returns. The Equity Omnibus paper notes that what is ultimately of interest is whether any relationships exist in ex-ante estimates of *ERm* and the MRP:[11]

> *'We also note that, for the purposes of regulatory use, the relationship that we are most interested in would have to exist between the parameters in an ex-ante sense. That is, we set an ex-ante return on equity and therefore, the ex-ante risk free rate would need to have a robust, transparent and evidence based relationship to the ex-ante market risk premium for it to be implemented.'*

2.3.1 QTC's DGM estimates

- The dividend growth model (DGM) is a theoretically sound way of using market prices and forecast dividends to make ex-ante estimates of *ERm* and the MRP. The DGM does not assume or impose any relationship between *ERm* and the prevailing risk-free rate, so it is a useful way of determining if the relationships identified in Section 2.2 based on realised returns are also present in estimates of expected returns.
- The time series properties of the DGM estimates can be used to measure the strength of the relationship between the ex-ante estimates and the risk-free rate, and to determine if the relationship has changed over time.
- Figure 5 shows the relationship between quarterly estimates of *ERm* from QTC's application of the DGM and the prevailing 10-year CGS yield between September 2005 and June 2021. The slope of the linear trend is +0.3, which is significantly less than the slope of +1.0 assumed by the approach in the 2018 RoRI. This indicates that *ERm* has been relatively stable and has fallen by less than the prevailing CGS yield.

FIGURE 5: RELATIONSHIP BETWEEN DGM *ERM* AND PREVAILING CGS YIELD (2005–2021)

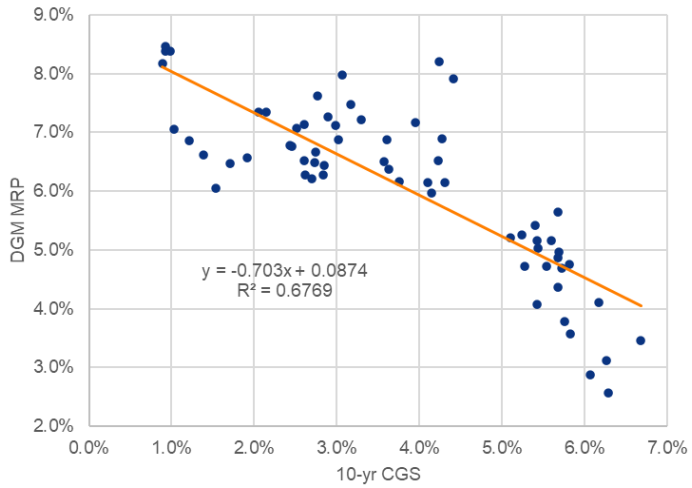


Source: Bloomberg, Yieldbroker. QTC calculations.

- Figure 6 shows the relationship between the ex-ante MRP and the prevailing 10-year CGS yield. There is a strong negative relationship with a linear slope of -0.7, which is significantly less than the slope of 0.0 assumed by the approach in the 2018 RoRI. The negative relationship is a consequence of the DGM estimates of *ERm* being more stable than the prevailing CGS yield.

[11] Equity Omnibus paper, p. 35.

FIGURE 6: RELATIONSHIP BETWEEN DGM MRP AND PREVAILING CGS YIELD (2005–2021)



Source: Bloomberg, Yieldbroker. QTC calculations.

2.3.2 CEPA's DGM and earnings yield model estimates

- In a report prepared for the AER, Cambridge Economic Policy Associates (CEPA) used the DGM and earnings yield models to estimate the ex-ante MRP. The focus of CEPA's analysis is on the time series properties of the estimates:[12]

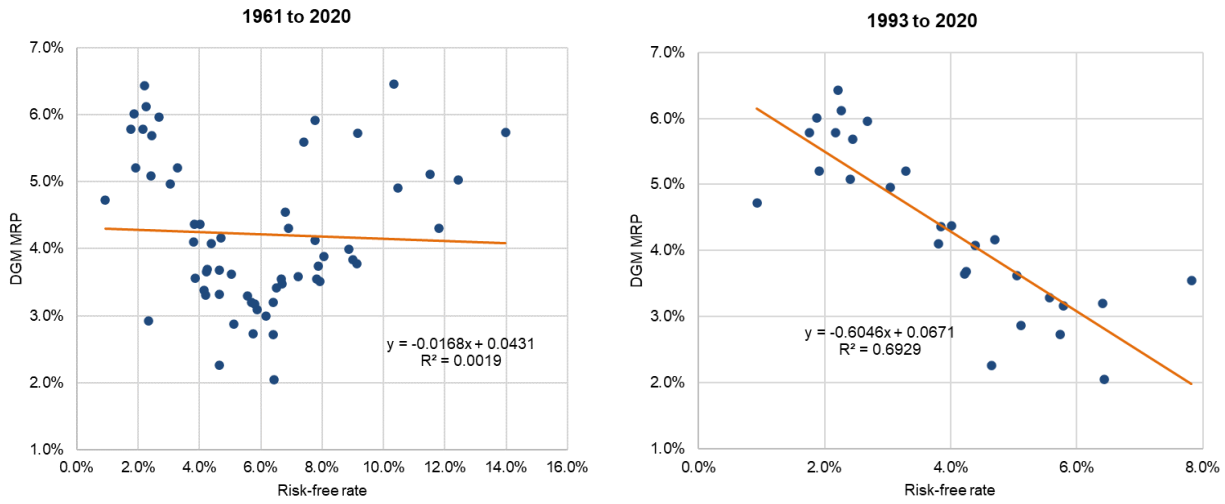
> *'We do not consider that the cost of equity estimates that we have constructed would provide reliable estimates suitable for use in a determination.* ***However, we consider them suitable for the task of this paper, which is to assess whether there is a relationship between the MRP and the RfR****. While absolute levels of these MRP estimates may not be reliable, we consider that the changes in estimates over time are indicative of the changes in the cost of equity.'*

- CEPA's main observations are as follows:[13]
  - since 1936, there is a weak negative relationship between the ex-ante MRP and the prevailing CGS yield
  - in the more recent sub-period since 1993, there has been a 'strong and convincing' negative relationship between the ex-ante MRP and the prevailing CGS yield, and
  - the relationships based on Australian data are consistent with the estimates produced by Damodaran using data from the United States.
- The Damodaran estimates referred to by CEPA have been produced annually between 1961 and 2020. Figure 7 shows the relationship between the ex-ante MRP and the risk-free rate since 1961 and the more recent sub-period starting in 1993.

[12] CEPA (June 2021), *Relationship between RFR and MRP*, p. 6.

[13] CEPA (June 2021), p. 6.

FIGURE 7: SUB-PERIOD ANALYSIS OF IMPLIED MRP VS PREVAILING RISK-FREE RATE (1993 BREAK POINT)



Source: Damodaran (2021)

- A change in the relationship is clearly evident in Figure 7. Although Damodaran does not explain the change, in commenting on the regression outcomes for the full 1961–2020 period (left side graph in Figure 7) he noted:[14]

> *'In earlier versions of the paper, this regression has yielded a mildly positive relationship between the implied ERP and the T.Bond rate, but the combination of low rates and high equity risk premiums since 2008 seems to have eliminated even that mild connection between the two,* ***a result consistent with the regime change recorded by Campbell, Pflueger and Viceira****, referenced in the earlier section.'*

- The regime change identified by Campbell, Pfleuger and Viceira is the change in the correlation between inflation and the output gap as explained in Section 2.2.
- Similarly, CEPA does not explain the change, although it does point to a change in monetary policy and the impact on inflation and inflation expectations as a possible explanation:[15]

> *'Why should the relationship between expected returns and bond yields change in the early 1990s? We consider that there was a major change in central bank approaches to inflation at that time. In the US, the tight monetary regime under Fed chair Volcker had lowered inflation and inflation expectations. From 1989 onwards, central banks, starting with New Zealand, began explicitly targeting inflation through monetary policy. We consider that this had a material effect on investor expectations and the way that both short and long rates were set in the relevant developed economies.* ***It is plausible therefore that a substantial structural change in MRP and its relationship to other economic variables would have occurred at around that time. Nonetheless, we accept that we have not yet identified a strong theoretical reason for why the direction of the relationship changed in the way it did.****'*

- The papers considered in Section 2.2 provide sound empirical evidence and theoretical reasons, based on the changing behaviour of inflation, for why the relationship between the ex-ante MRP and prevailing risk-free rate became strongly negative in the latter part of the sample period:
  - A change in the correlation between inflation and the output gap/real consumption growth from negative to positive means that post-2000, lower than-expected-inflation tends to occur during negative economic states where the marginal utility of consumption is high, and equities perform poorly.

[14] Damodaran (2021), p. 13. Although CPV (2019) detect a structural break in early 2001, the relationship between the DGM MRP and the risk-free rate is still strongly negative using Damodaran's estimates between 2001 and 2020.

[15] CEPA (June 2021), p. 6.

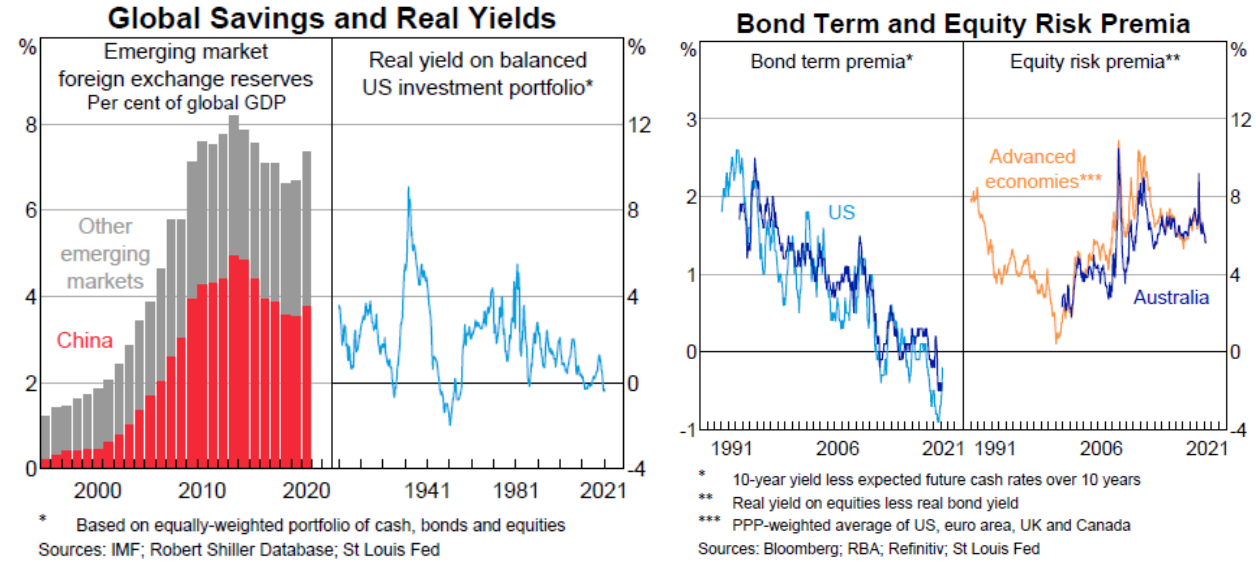
- As a consequence, nominal bonds have behaved as a hedge against equity risk because they deliver strong real returns when actual inflation is lower than expected. This is consistent with the empirical estimates of the nominal bond beta changing from positive to negative in Australia and the United States.
- The improved hedging properties of nominal bonds is a factor that has contributed to a fall in nominal bond yields, but not *ERm*. This is consistent with the DGM estimates of *ERm* having not fallen by as much as the prevailing risk-free rate, in Australia and the United States, which results in a negative relationship between the ex-ante MRP and the prevailing risk-free rate.
- As explained by Clarida (2019), the success of monetary policy in reducing inflation and anchoring expected inflation at relatively low levels was a likely contributor to the changing behaviour of inflation circa 2000.

- QTC considers the changing behaviour of inflation to be a plausible explanation for the 'substantial structural change in the MRP and its relationship to other economic variables' referred to by CEPA.
- The negative relationship between the ex-ante MRP from the DGM and the risk-free rate indicates that the factors that have contributed to falling CGS yields have not caused *ERm* to fall by the same amount. The negative relationship is consistent with the reduction in the systematic risk of nominal bonds based on realised returns in Section 2.1.
- In QTC's view, this confirming evidence strengthens the case for making a material departure from the 2018 RoRI, which gives 100 per cent weight to an estimation approach that assumes no relationship exists between the ex-ante MRP and the prevailing CGS yield.

2.3.3 Complementary demand-based explanations

- Other factors are likely to have contributed to the changing relationships observed in the DGM estimates of the ex-ante MRP. For example, CEPA refers to a 2016 paper by Kevin Daly that suggests the relative stability of the required return on equity post-2000 is consistent with the shift in global wealth to risk-averse investors such as central banks in emerging markets, especially China[16].
- The same shift in wealth was noted in a 2021 speech by the RBA (left side graph in Figure 8). The RBA concluded that the shift has led to 'unusually strong demand for safe assets' relative to risky assets such as equities'[17]. This is a plausible demand-based explanation for some of the divergence between the required return on equity and a falling risk-free rate post-2000 (right side graph in Figure 8).

FIGURE 8



Source: RBA (June 2021).

[16] K. Daly (2016), *A Secular Increase in the Equity Risk Premium*.

[17] RBA (June 2021), *Uncertainty and Risk Aversion – Before and After the Pandemic*, Graph 3 on p. 6.

- In the May 2019 Statement on Monetary Policy the RBA also identified 'price-insensitive buyers' as another source of increased demand for long-term government bonds relative to risky equities:[18]

> *'In addition, there has been ongoing demand for long-term government bonds from other price-insensitive buyers, such as insurers and defined benefit pension funds,* ***despite very low or negative interest rates****. These firms often have significant long-term liabilities with maturities that are longer than those of many financial assets. The resulting maturity gap means that the decline in bond yields increases the present value of these firms' liabilities by more than the present value of their assets****. As a result, these firms have an incentive (and are often required by regulation) to purchase additional long-term assets to hedge interest rate risk. Finally, financial institutions have also increased their holdings of such assets, partly to meet requirements under stricter liquidity regulations in the wake of the financial crisis.****'*

- Similar to the increased demand from risk-averse investors such as emerging market central banks, ongoing demand for long-term government bonds from price insensitive investors has likely contributed to a widening of the margin between the prevailing CGS yield and the required return on equity (ie, the ex-ante MRP). This is another factor that is likely to have contributed to a reduction in CGS yields, but not a reduction in *ERm*.

2.3.4 Summary

- In our view, there are sound reasons for why the relationship between the ex-ante MRP and the prevailing CGS yield has been negative over the last 20–25 years. As such, the 2022 RoRI should not give 100 per cent weight to an approach that assumes no relationship exists. This is consistent with the conclusions and recommendations in CEPA's report:[19]
  - There is 'no good evidence' that the MRP should be assumed to be independent of the risk-free rate, which is the current assumption in the 2018 RoRI.
  - There is 'no conclusive theoretical basis' for an assumption of independence or dependence. This implies that the MRP should not be estimated 'as if' a conclusive theoretical basis exists for either assumption.
  - International regulators do not use MRPs that are 'wholly or even substantially' based on the historical MRP.
  - Since 1993, there has been a 'strong and convincing' negative relationship between the ex-ante MRP and the prevailing risk-free rate. This relationship exists in the estimates for Australia and the United States.
  - The AER should consider a hybrid approach that gives weight to a fixed MRP and a fixed total market return.
- QTC considers a hybrid approach to be the best way of using historical data in the return on equity calculation. However, we also consider that the best estimate of the return on equity is more likely to be made if meaningful weight is also given to the DGM.
- Section 2.4 shows that the estimates from a simple hybrid approach are a good proxy for the return on equity estimates used in independent expert reports. This is important because the return on equity approach in the 2022 RoRI must be capable of making the best possible estimate of the return on equity required by real-world investors operating in competitive, real-world capital markets.

2.4 Independent expert reports

- QTC considers independent expert reports (IER) to be a valuable source of information on how *ERm* is estimated in practice, because actual market transactions often occur based on the recommendations and valuations in the IERs. Furthermore, IERs are not anonymous, so reputational risks provide a strong incentive to make valuations using a realistic estimate of the market cost of capital. This makes IERs far more credible than anonymous surveys.
- IERs usually include an explanation of how the return on equity has been estimated and what adjustments have been made to ensure it reflects prevailing market conditions. For example, it has been common practice for independent experts to apply an uplift to the risk-free rate to partially offset the impact of falling CGS yields on the return on equity. These adjustments are relevant to the relationship between *ERm* and the prevailing CGS yield.
- The time series properties of the return on equity estimates can also provide insights into the relationship between the return on equity and the prevailing CGS yield over time, and as a consequence, the relationship between the ex-ante MRP and the prevailing CGS yield.

[18] RBA (May 2019), *Statement on Monetary Policy*, Box B on p. 30.

[19] CEPA (2021), p. 5, 38 and 44.

2.4.1 CEPA's findings

- CEPA reviewed 23 IERs that were prepared between 2013 and 2021, and concluded:[20]

> *'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.'*

- QTC does not agree with this conclusion. Of the 23 IERs reviewed by CEPA, only 5 used a 6.0 per cent MRP and the prevailing CGS yield. The other IERs used a higher MRP or applied an uplift to the prevailing CGS yield. For example:
  - Most IERs prepared by BDO used a 7.0 per cent mid-point for the MRP.
  - The most recent IER by Deloitte in 2021 used an 8.3 per cent MRP.
  - All IERs 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 IER 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 IER for UGL Limited as an IER that used a 6 per cent MRP and the prevailing risk-free rate[21]. This is incorrect. 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:[22]

> *'In Grant Samuel's opinion,* ***these calculations are likely to understate the true cost of capital for UGL****.*
>
> *Some academic/valuation practitioners consider it to be inappropriate to add a "normal" market risk premium (e.g. 6%) to a temporarily depressed bond yield and argue that a "normalised" risk free rate should be used. This practice has become increasingly common among broker analysts. On this basis, an increase in the risk free rate to, say, 4% (still relatively low by historical standards) would increase the calculated WACC range to 10.5–11.8%.*

  - 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.
- In our view, a closer examination of the IERs reviewed by CEPA shows 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 long-term average MRP of 6.0 per cent.
- Neither approach supports giving 100 per cent weight to the approach in the 2018 RoRI of adding a fixed historical MRP to the prevailing CGS yield.

2.4.2 Review of independent expert reports by Synergies Economic Consulting

- CEPA notes that its review was not based on a comprehensive sample of IERs between 2013 and 2021. However, a more comprehensive review of the total market return (TMR) used in IERs between 2013 and 2020 has been performed by Synergies Economic Consulting[23].
- As shown in Figure 9, the TMR has been more stable than the prevailing 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 (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).

---

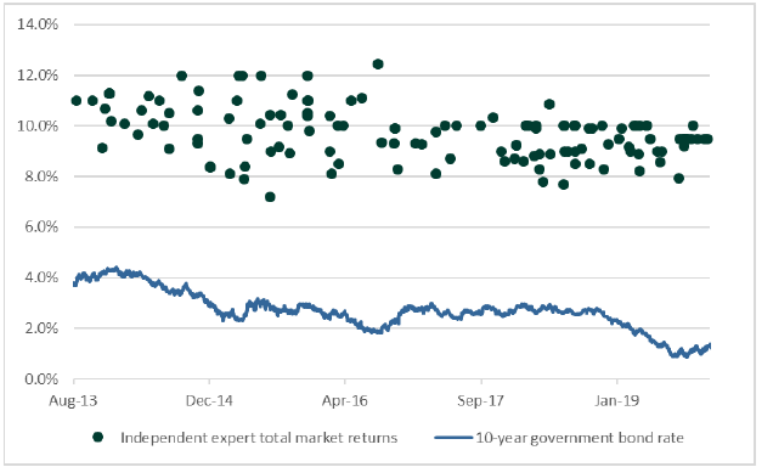
[20] CEPA (2021), p. 18.

[21] CEPA (2021), p. 55.

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

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

FIGURE 9: 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 (2020). Figure 9 on p. 115.

- The average TMR and 10-year CGS yield between 2013 and 2020 are 9.7 per cent and 2.6 per cent respectively, which means the independent experts were using (on average):[24]
  - 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).
- Neither approach supports giving 100 per cent weight to the approach in the 2018 RoRI of adding a fixed historical MRP to the prevailing CGS yield.

Comparison with a simple hybrid approach

- Figure 10 shows the estimates of *ERm* based on a simple hybrid approach that gives equal weight to the MRPs based on historical excess returns and the historical real return on equity (converted to nominal terms using expected inflation)[25]. The estimates are broadly similar to the TMR estimates in Figure 9, with the hybrid estimate falling from 10.5 per cent in August 2013 to 8.8 per cent in 2020.

FIGURE 10: *ERM* FROM AN EQUALLY-WEIGHTED HYBRID APPROACH

Source: Bloomberg, Yieldbroker. QTC calculations.

[24] Synergies (May 2020), p. 114.

[25] An expanding window starting in 1958 has been used to calculate the historical average excess return and real return on equity. As such, there is some change in the estimates as new data becomes available. Furthermore, changes in expected inflation also cause the nominal value of the historical real return on equity to change. As a consequence, neither parameter has a fixed value between 2005–2020.

2.5 Surveys

- The AER's preliminary position is to continue giving weight to surveys to inform the MRP estimate:[26]

> *'Our preliminary position is to continue to place the same weighting on survey evidence as we did in the 2018 rate of return review. We disagree with ENA and APGA's view that no weight be given to survey evidence.*
>
> ***We note survey evidence comes from market practitioners who are asked what they expect the MRP to be in the Australian market**. When considering survey results we do not give weight to any single survey over others as surveys take on different forms and can vary in different ways, including the questions asked, type of participants and number of participants.*
>
> *Furthermore, while surveys have limitations and are not at a level of reliability to be used in the direct estimation of the MRP, it can be used to inform us of investor expectations. This view is supported by CEPA, and Partington and Satchell in their recent expert advice to us.'*

- QTC agrees that surveys should not be used in the direct estimation of the MRP. However, we consider the AER's proposed use of surveys may lead to incorrect conclusions regarding *ERm*:
  - Focussing on the MRP as a stand-alone parameter assumes there is no relationship between the ex-ante MRP and the prevailing CGS yield. CEPA has advised the AER that there is 'no good evidence' for this assumption.
  - The required input into the CAPM is *ERm*, not a component of *ERm*. If a survey directly or indirectly asks for an estimate of *ERm*, these are the estimates that should be considered by the AER.
  - In isolation, the median or average MRP from a survey does not allow valid conclusions to be reached on how the respondents would or did estimate *ERm*.
- After reviewing a selection of surveys, CEPA concluded:[27]

> *'Although there are limitations to survey data. [sic] The Fernandez, KPMG, and Institute of Actuaries surveys suggest that the MRP reported by academics and practitioners stays relativity constant at least over the time period examined. This suggests the assumed relationship is that total market return would decreases [sic] as risk-free rates decrease.'*

- A closer analysis shows that *ERm* has been relatively stable, with the consequence being a negative relationship between the ex-ante MRP and the prevailing CGS yield. A negative relationship is consistent with CEPA's conclusions based on the empirical analysis of ex-ante MRP estimates from the DGM in Section 2.3.

2.5.1 KPMG Valuation Practices Survey

- CEPA conclude that a 6.0 per cent MRP was most commonly reported in the KPMG Valuation Practices Survey:[28]

> *'The KPMG Valuation Practices Survey is a short survey of current market assumptions and key valuation assumptions used by valuation practitioners, fund managers, investment bankers, and other financial practitioners in Australia. Again, there are limitations to the conclusions that can be drawn from the surveys as there is no consistency reported in the mix of respondents. In each year (the survey has been conducted since 2013) the most commonly reported MRP in use was 6%.'*

KPMG 2017 survey

- The 2017 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[29]. Figure 11 shows the distribution of survey responses for the 'most recently' used

[26] Equity Omnibus paper, p. 26.

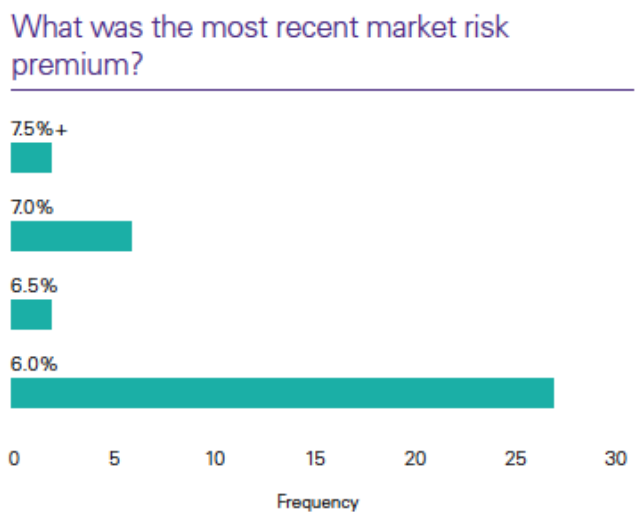
[27] CEPA (2021), p. 17.

[28] CEPA (2021), p. 17.

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

MRP. Although KPMG does not explain when most recent was, the report states that the survey responses were received in late 2016[30].

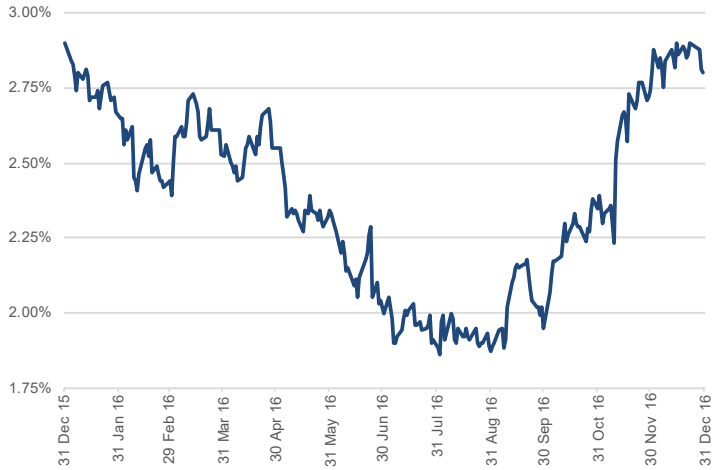
FIGURE 11: MRP ESTIMATES FROM THE 2017 KPMG SURVEY



Source: KPMG 2017 Valuation Practices survey.

- Figure 12 shows the daily 10-year CGS yield between December 2015 and December 2016.

FIGURE 12: DAILY 10-YEAR CGS YIELD

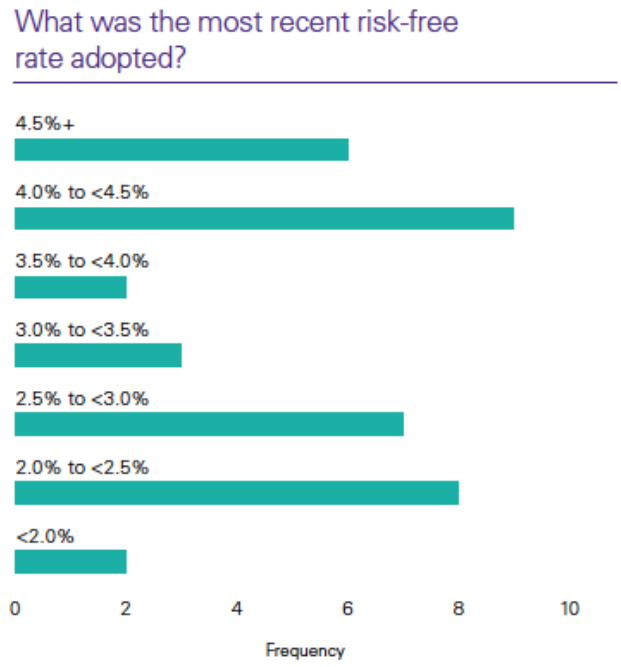


Source: Yieldbroker.

- As the survey responses were received in late 2016, it is reasonable to assume the prevailing CGS yield was between 2.0 and 2.8 per cent when the responses were being made. However, Figure 13 shows the majority of respondents used a risk-free rate materially higher than 3.0 per cent, which is higher than the *maximum* CGS yield at any time between December 2015 and December 2016.

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

FIGURE 13: RISK-FREE RATE ESTIMATES FROM THE 2017 KPMG SURVEY



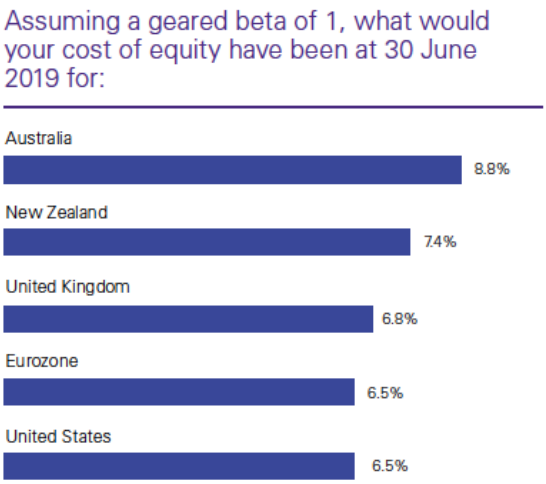
Source: KPMG 2017 Valuation Practices survey.

- In our 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 return on equity.
  - Some of the respondents that used a risk-free rate of circa 2.5 per cent were the same respondents that used a 6.5 per cent or higher MRP.
- Neither approach supports giving 100 per cent weight to the approach in the 2018 RoRI of adding a fixed historical MRP to the prevailing CGS yield.

KPMG 2019 survey

- The 2019 survey is informative because the respondents were asked to make a direct estimate of *ERm* on 30 June 2019[31]. The responses are summarised in Figure 14:

FIGURE 14: *ERM* ESTIMATES



Source: KPMG 2019 Valuation Practices survey.

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

- The most commonly used MRP was 6.0 per cent and the average MRP was 5.9 per cent. However, the prevailing 10-year CGS yield on 30 June 2019 was 1.4 per cent, which means to arrive at an *ERm* of 8.8 per cent for Australia, the survey respondents used (on average):
  - a 7.4 per cent implied MRP and the prevailing 1.4 per cent CGS yield, or
  - a 5.9 per cent MRP and a 2.9 per cent CGS yield (ie, a 1.5 per cent uplift to the prevailing CGS yield).
- Neither approach supports giving 100 per cent weight to the approach in the 2018 RoRI of adding a fixed historical MRP to the prevailing CGS yield.

2.5.2 Fernandez surveys

- CEPA's report summarises the median MRP responses for Australia from the annual Fernandez surveys between 2011 and 2020. CEPA's estimates of the risk-free have also been provided, which appear to be the 10-year CGS yields at the end of each calendar year (Table 1):

TABLE 1: FERNANDEZ MEDIAN MRPS AND CEPA RISK-FREE RATES

Year	Median survey MRP (%)	CEPA RfR (%)
2011	5.20	3.70
2012	6.00	3.25
2013	5.80	4.19
2014	6.00	2.79
2015	5.10	2.86
2016	6.00	2.74
2017	7.60	2.64
2018	7.10	2.32
2019	6.10	1.37
2020	6.20	0.97

Source: CEPA (2021) Table 3.1 on p. 15–16.

- The surveys in 2013, 2015 and each year between 2017 and 2020, specifically asked the respondents about the MRP and the risk-free rate. The risk-free rates from those surveys are materially different from CEPA's risk-free rates.
- The median MRP and CGS yields from the relevant surveys for Australia are summarised in Table 2, along with an estimate of the prevailing 10-year CGS yield around the time when the surveys were being completed[32]. The responses to the 2021 survey have also been included:

[32] 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 2: FERNANDEZ SURVEYS - MEDIAN RESPONSES FOR AUSTRALIA

Year	Survey MRP (%)	Survey CGS (%)	Prevailing CGS (%)	CGS difference (%)	Implied survey *ERm* (%)	Survey 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)**

Source: Annual Fernandez surveys, Yieldbroker. QTC calculations.

- The median CGS yields from the surveys are mostly higher than the prevailing CGS yields, especially between 2019 and 2021. Interestingly, the median MRPs in those years are close to the long-term historical average MRP. Treating the MRP as a stand-alone parameter that is independent of the CGS yield would have led to incorrect conclusions on the *ERm* (as per the final two columns in Table 2).
- The 2020 responses are interesting as they were made around the time of the initial impact of COVID-19 on the global equity markets, which is also around the time the AER was making its final determinations for the Queensland and South Australia electricity distribution businesses. This was clearly a period of heightened risk-aversion, with the Australian stock market falling by 36 per cent between 20 February and 23 March[33]. Although the median survey MRP of 6.2 per cent is close to the historical MRP, a material uplift of 1.5 per cent was applied to the prevailing CGS yield, which was only 0.9 per cent at the time[34].
- 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. This implies a negative relationship between the MRP and the prevailing CGS yield, which supports the conclusions from CEPA's empirical analysis of ex-ante MRP estimates from the DGM and earnings yield models in Section 2.3.

2.5.3 Chartered Accountants Australia and New Zealand 2020 survey

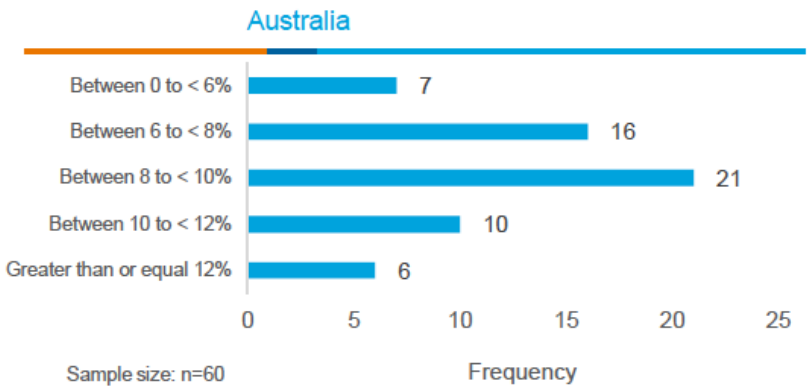
- Although not considered in CEPA's review, the 2020 Chartered Accountants survey is informative because the respondents were asked to provide a direct estimate of *ERm*[35]. The distribution of the estimates as at 30 June 2020 are shown in Figure 15:

[33] Based on the level of implied volatility at the time, the 36 per cent decline was a 10 standard deviation event.

[34] There was a short-term spike in the 10-year CGS yield to 1.6 per cent on 19 March, which was fully reversed over the next few days. Even at this short-term extreme level, the implied CGS uplift would still have been material at 0.8 per cent.

[35] Chartered Accountants Australia & New Zealand (2020), *Business Valuation Practice Survey – Online survey conducted between 30 July – 17 August 2020.*

FIGURE 15: *ERM* ESTIMATES AS AT 30 JUNE 2020



Source: Chartered Accountants – Australia & New Zealand (2020).

- The weighted average *ERm* in Figure 14 is 8.4 per cent based on the mid-point of each band, and the weighted average of the separate MRP responses is 6.3 per cent.
- The 10-year CGS yield on 30 June 2020 was 0.9 percent, which means that the respondents used (on average):
  - a 7.5 per cent implied MRP and the prevailing 0.9 per cent CGS yield, or
  - a 6.3 per cent MRP and a 2.1 per cent CGS yield (ie, a 1.2 per cent uplift to the prevailing CGS yield).
- Neither approach supports giving 100 per cent weight to the approach in the 2018 RoRI of adding a fixed historical MRP to the prevailing CGS yield.

Summary

- The surveys considered in this section do not indicate that *ERm* is estimated by adding a long-term historical average MRP to the prevailing CGS yield, especially in a low interest rate environment. Treating the MRP as a stand-alone parameter will lead to incorrect conclusions on how the survey respondents would or did estimate *ERm*.
- If the AER continues to give weight to surveys, the focus should be on *ERm* responses rather than MRP responses.

3 Implications for the 2022 RoRI

- The AER's guiding principle for the 2022 RoRI is to make the best possible estimate of an unbiased rate of return:[36]

> *'Having consulted with CRG and Energy Networks Australia (ENA) during 2021,* ***we resolved not to make a decision with a conscious bias toward a higher or lower expected rate of return****. Rather, we undertook to aim for the best possible estimate in an environment of uncertainty, given the best available information.*
>
> *To this end, in our position paper "Rate of return and assessing the long-term interests of consumers", we established a guiding principle that we would seek to determine an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services.'*

- QTC agrees that there should be no conscious bias towards a higher or lower rate of return. We also agree with the AER that:[37]

> *'… any approach we adopt must be capable of being implemented in a manner that is sufficiently robust, transparent and evidence based to be suitable for regulatory purposes.'*

[36] AER (July 2021), *Overall rate of return Draft working paper*, p. 23.

[37] Equity Omnibus paper, p. 8–9.

- In our view, the empirical evidence in the submission demonstrates that *ERm* has not fallen point-for-point will the prevailing CGS yield. The outcome is a negative relationship between the ex-ante MRP and the prevailing CGS yield. Importantly, there are sound theoretical explanations for why the relationship has existed over the last 20–25 years.
- A summary of the evidence is provided below. A common theme is that some of the factors that have contributed to fall in the risk-free rate cannot be expected to have reduced *ERm*:
  - Empirical estimates of the long-term nominal bond beta having changed from positive to negative in Australia and the United States (Figure 1).
  - A change in the correlation between inflation and measures of real economic activity circa 2020, resulting in nominal bonds producing strong real returns when the marginal utility of consumption is high. This can explain why nominal bonds changed from being systematically risky to a hedge against equity risk (Figures 2–4).
  - The time series properties of DGM estimates that show a strong negative relationship between the ex-ante MRP and prevailing risk-free rate over the last 20–25 years. The relationship is present in DGM estimates for Australia and the United States, and is consistent with the change in systematic risk of nominal bonds (Figures 5–7).
  - Unusually strong demand for safe assets relative to equities from emerging market central banks, and from 'price insensitive' investors with long-term liabilities that highly value the duration-hedging properties of long-term bonds (Figure 8).
  - The relative stability of return on equity estimates used in independent expert reports, which QTC considers to be informative of how the return on equity is determined in competitive, real-world capital markets (Figure 9).
  - Surveys showing that it is not common practice to add a fixed historical MRP to the prevailing CGS yield to estimate the return on equity, especially in a low interest rate environment (Figures 11–14 and Table 2).
- QTC considers this evidence to be sufficient to justify a meaningful departure from the approach in the 2018 RoRI, which gives 100 per cent weight to an approach that assumes no relationship exists between the ex-ante MRP and the prevailing CGS yield.

3.1 Preliminary options for using historical data

- QTC continues to support a diversified approach for estimating the return on equity, with meaningful weight given to historical excess returns, historical real equity returns, and the DGM. We consider a diversified approach is more likely to produce an unbiased estimate of the return on equity compared to any single approach.
- At the AER's online public forum on the Equity Omnibus paper, Energy Networks Australia (ENA) presented some preliminary results from a 'calibrated DGM' that has been developed to address the concerns raised by the AER in 2018 with the implementation of the standard DGM[38].
- QTC expects that further consideration will be given to the calibrated DGM by the AER and stakeholders in the next stage of the return on equity consultation. As such, the following options reflect our preliminary views on how to best use historical estimates of the MRP and real return on equity in the return on equity calculation (ie, the hybrid approach suggested by CEPA).

3.1.1 Preliminary options

- The equity beta, historical MRP, historical real return on equity, and the weights given to the two historical estimates would be fixed in the 2022 RoRI. The only parameters that require updating at the time of a determination are the prevailing CGS yield and expected inflation.

[38] ENA (11 August 2021), *Return on equity – Initial network sector views*, slide 9.

- Hybrid Option 1:
  - The risk-free rate in the CAPM equals the prevailing CGS yield.
  - The *ERm* in the CAPM equals a weighted average of:
    - the prevailing CGS yield plus the historical MRP, and
    - the historical real return on equity, converted to nominal terms using expected inflation.
- Hybrid Option 2:
  - The MRP in the CAPM equals the historical MRP.
  - The risk-free rate in the CAPM equals a weighted average of:
    - the prevailing CGS yield, and
    - an estimate of the historical CGS yield, which equals the historical real return on equity, converted to nominal terms using expected inflation, minus the historical MRP.
  - Giving weight to the historical CGS yield is consistent with the approach used by independent valuation experts when the historical MRP is used to estimate the return on equity in a low interest rate environment. This results in an implicit adjustment (currently an uplift) to the prevailing CGS yield to partially offset the impact of falling CGS yields on the return on equity.
  - The advantage of estimating the historical CGS yield in this way is that no additional data are required compared to Option 1. The historical CGS yield is simply a function of the historical MRP, historical real return on equity, and expected inflation. The implicit adjustment, which can be positive or negative, depends on the difference between the prevailing and historical CGS yields, and the weights given to each estimate.

3.1.2 Examples

- The examples assume the following values are fixed in the 2022 RoRI. These values are hypothetical and have only been chosen to demonstrate the required calculations for each option. The actual values would be determined when the final 2022 RoRI is made:
  - Historical MRP = 6.1 per cent.
  - Historical real return on equity = 8.0 per cent.
  - Equal weight is given to both approaches[39].
  - Equity beta = 0.6
- Tables 3 and 4 show the initial and subsequent estimates of the return on equity under each hybrid option. For illustrative purposes, the prevailing CGS yield starts at 1.2 per cent and increases by 0.5 per cent per annum over the next 4 years. Expected inflation is assumed to be 2.0 per cent.

[39] The slope estimate of -0.7 based on the relationship between the ex-ante MRP and the prevailing CGS yield in Figure 6 suggests that greater weight should be given to the historical real return on equity.

TABLE 3: EXAMPLE - HYBRID OPTION 1

Parameter	Initial	Year 1	Year 2	Year 3	Year 4
CAPM risk-free rate	**1.20**	**1.70**	**2.20**	**2.70**	**3.20**
Expected inflation	2.00	2.00	2.00	2.00	2.00
ERm based on historical MRP	7.30	7.80	8.30	8.80	9.30
ERm based on historical real returns	10.16	10.16	10.16	10.16	10.16
Weighted average CAPM *ERm*	**8.73**	**8.98**	**9.23**	**9.48**	**9.73**
Return on equity	**5.72**	**6.07**	**6.42**	**6.77**	**7.12**
ERm	8.73	8.98	9.23	9.48	9.73
Implied MRP *	7.53	7.28	7.03	6.78	6.53
Δ prevailing risk-free rate		0.50	0.50	0.50	0.50
Δ return on equity		0.35	0.35	0.35	0.35
Δ implied MRP		(0.25)	(0.25)	(0.25)	(0.25)

** ERm minus prevailing risk-free rate.*

TABLE 4: EXAMPLE - HYBRID OPTION 2

Parameter	Initial	Year 1	Year 2	Year 3	Year 4
CAPM MRP	**6.10**	**6.10**	**6.10**	**6.10**	**6.10**
Expected inflation	2.00	2.00	2.00	2.00	2.00
ERm based on historical real returns	10.16	10.16	10.16	10.16	10.16
Historical risk-free rate	4.06	4.06	4.06	4.06	4.06
Prevailing risk-free rate	1.20	1.70	2.20	2.70	3.20
Weighted average CAPM risk-free rate	**2.63**	**2.88**	**3.13**	**3.38**	**3.63**
Return on equity	**6.29**	**6.54**	**6.79**	**7.04**	**7.29**
ERm	8.73	8.98	9.23	9.48	9.73
Implied MRP *	7.53	7.28	7.03	6.78	6.53
Implicit risk-free rate adjustment ^	1.43	1.18	0.93	0.68	0.43
Δ prevailing risk-free rate		0.50	0.50	0.50	0.50
Δ return on equity		0.25	0.25	0.25	0.25
Δ implied MRP		(0.25)	(0.25)	(0.25)	(0.25)

** ERm minus prevailing risk-free rate.*
^ Weighted average risk-free rate minus prevailing risk-free rate.

- The main observations from Tables 3 and 4 are as follows:
  - *ERm* and the implied MRP (ie, *ERm* minus the prevailing risk-free rate) are the same for both options.
  - There is a negative relationship between the prevailing risk-free rate and the implied MRP, which is consistent with the relationship based on ex-ante estimates of the MRP from the DGM (Section 2.3). Given that equal weights are used in these examples, a 1.0 basis point increase (decrease) in the prevailing risk-free rate results in a 0.5 basis point decrease (increase) in the implied MRP.
  - The initial return on equity estimate is lower under Option 1, but it is slightly more sensitive to subsequent changes in the prevailing risk-free rate. This is due to Option 2 giving 50 per cent weight to the historical CGS yield, and the equity beta being less than 1.0.

3.2 Comparisons with the 2018 RoRI approach

- The Equity Omnibus paper states that:[40]

> *'… it is important that submissions that propose a change to our current approach should clearly specify the proposed change and the reasons why it would deliver superior results to our current approach.'*

- QTC considers the hybrid approaches in Section 3.1 are more likely to produce an unbiased estimate of the return on equity compared to the current approach in the 2018 RoRI for the following reasons:
  - Based on current market rates, the initial return on equity estimate will be consistent with the evidence in Section 2 which shows that *ERm* has fallen, but not by as much as the prevailing CGS yield. The current approach in the 2018 RoRI is not consistent with this evidence.
  - Subsequent estimates of the return on equity will have a positive relationship with the prevailing CGS yield, but the relationship will be less than one-for-one. This is consistent with the relationship identified in CEPA's empirical analysis of ex-ante estimates from the DGM and earnings yield models, and the estimates produced by Damodaran. The current approach in the 2018 RoRI, which assumes a one-for-one relationship between changes in the prevailing CGS yield and the return on equity, is not consistent with this evidence.
  - The time series properties of the return on equity estimates are likely to be consistent with the estimates used in independent expert reports, which QTC considers to be reflective of how the return on equity is determined in competitive, real-world capital markets.
  - Any estimation errors in the estimate of expected inflation will have less impact on the real return on equity allowance because the errors will appear (partially, and in opposite directions) in the nominal return on equity and the revenue deductions for inflation on the equity-funded portion of the regulated asset base[41].
  - The impact on the return on equity of any bias in the prevailing CGS yield due to a non-zero CGS beta at the time of a determination will be reduced relative to the approach in the 2018 RoRI.
  - Hybrid Option 2 is a good proxy for the approach used by independent valuation experts when the historical MRP is used to estimate the return on equity in a low interest rate environment (ie, by applying an uplift in the prevailing risk-free rate).
- The hybrid approach should be combined with the DGM to estimate the return on equity. QTC considers a diversified approach to be more likely to produce the best possible estimate of the return on equity in an environment of uncertainty, and given the best available information, compared to the approach in the 2018 RoRI.
- In QTC's view, there is sufficient evidence to justify a meaningful departure from the approach in the 2018 RoRI. The next stage of the return on equity consultation should focus on determining the weights for each estimation approach, and to determine an appropriate form for the hybrid approach.

[40] Equity Omnibus paper, p. 8

[41] Consider a scenario where the estimate of expected inflation contains a bias of +0.5 per cent. A percentage of this bias will be reflected in a higher estimate of *ERm*, which partially offsets the full bias in the revenue deductions on the equity-funded portion of the RAB. In contrast, there is no offset based on the approach in the 2018 RoRI. The full 0.5 per cent bias will be reflected in the revenue deductions.