frontier economics

The market risk premium

Report prepared for Seqwater | 17 June 2021

Disclaimer

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1 Executive Summary

1.1 Author of report

1. This report has been authored by Professor Stephen Gray, Professor of Finance at the UQ Business School, University of Queensland and Director of Frontier Economics, a specialist economics and corporate finance consultancy. I have Honours degrees in Commerce and Law from the University of Queensland and a PhD in Financial Economics from Stanford University. I teach a range of courses in finance, corporate valuation and econometrics. I have published widely in high-level academic journals, and I have more than 20 years of practical finance consulting experience.
2. My teaching, research and consulting experience extends to issues relating to statistical analysis and econometric modelling. I have published widely in the areas of financial econometrics and empirical finance, including papers in relation to the estimation of WACC parameters. I have also prepared numerus reports for firms and regulatory bodies relating to the estimation of regulatory WACC parameters.
3. A copy of my curriculum vitae has been provided with this report.
4. My opinions set out in this report are based on the specialist knowledge acquired from my training and experience set out above. I have been provided with a copy of Chapter 11 Part 5 of the Queensland Uniform Civil Procedure Rules 1999. I have read, understood and complied with the Rules.
5. I have been assisted in the preparation of this report by Dinesh Kumareswaran and James Key from Frontier Economics.

1.2 Summary of key conclusions

1.2.1 A fixed MRP allowance is implausible

6. The QCA currently derives an estimate of the MRP using five different techniques (the Ibbotson method, the Siegel method, the Cornell method, the Wright method and survey evidence). Estimates from these various methods are combined together in a qualitative and non-transparent manner to produce a single allowed MRP.
7. The QCA has consistently acknowledged, over several years, that the true MRP is not fixed but changes over time with changes in financial market conditions. In my view, it is obvious that the risk premium that investors would require during a deep recession or financial crisis differs from that during a strong economic expansion. However, the QCA has set an effectively fixed MRP allowance of 6.5% (relative to the 10-year risk-free rate) in every regulatory determination since 2014,[1] even as the estimates from the five methods have changed materially.

[1] Although the QCA's headline MRP allowance has varied between 6.5% and 7.0%, on a like-with-like basis the allowed MRP relative to the 10-year risk-free rate has remained fixed at 6.5%.

8. As a result, the return on equity allowance set by the QCA has moved in lock-step with changes in government bond yields and has fallen materially since 2014 to historical lows as the QCA's estimate of the risk-free rate has declined. The QCA's allowed return on equity for every business that it regulates is now near the historical low – as effectively fixed risk premiums are added to historically low government bond yields. This 'fixed MRP' approach also implies that the required return on equity *fell* materially during the peak of the GFC – clearly that approach does not produce plausible estimates.

9. The outcomes delivered by the 'fixed MRP' approach are also inconsistent with those delivered by other regulators such as IPART. Like the QCA, IPART has accepted that the MRP changes as market conditions change. However, unlike the QCA, IPART's MRP estimates over time have actually reflected changing market conditions, and have been plausible as market conditions have changed.

1.2.2 A proposed MRP allowance

10. In my view, the most reliable estimate of the MRP is obtained by assigning material weight to:

    a Estimates of the MRP that are based on long-run historical data; and

    b Estimates of the MRP that are based on current forward-looking market data.

11. The historical estimates provide an anchor for the MRP estimate – being an estimate that reflects the long-run average market conditions. These estimates have the advantage of being based on large data sets, which results in estimates being more statistically precise. However, they have the disadvantage of not reflecting the prevailing market conditions, particularly during periods where the prevailing conditions differ materially from the long-run average conditions. Such is the case now, as government bond yields are at levels never before seen.

12. In my view, an appropriate estimate of the MRP is obtained by applying equal weight to long-run average historical estimates and forward-looking prevailing estimates.

13. For the historical estimates, I apply equal weight to the Ibbotson and Wright/Total Market Return (TMR) approaches. I consider that these two approaches represent the ends of a spectrum:

    a At one extreme, the Ibbotson approach assumes that the MRP is constant such that the total required return on equity rises and falls one-for-one with changes in government bond yields; and

    b At the other extreme, the Wright/TMR approach assumes that the real required return on equity is constant so that every change in the risk-free rate is absorbed by an offsetting change in the MRP.

14. In my view, the truth lies between these two extremes. Consequently, I take, as my estimate from historical data, the mid-point of the Ibbotson and Wright estimates, which is 7.8%.

15. My forward-looking DGM estimate is 7.7%.

16. Applying equal weight to the historical and forward-looking estimates produces a final MRP estimate of 7.75%.

17. This implies a total required return on equity of 9.45%.[2] I note that this is materially lower than the QCA's estimate of the long-run average return on equity of 11.2%.

[2] Where the current 10-year government bond yield is 0.9%.

2 Background and context

2.1 Overview

18. This section explains how the QCA's current approach to estimating the MRP has evolved over time.

19. The last time the QCA undertook a fundamental review of its approach to estimating the MRP was in 2014, when it published its Cost of Capital Market Parameter Decision (Market Parameters Decision).[3] Since then, the QCA has made incremental refinements to the approach to determining the allowed rate of return, and to estimating the MRP.

20. As I discuss in Section 3 of this report, the QCA has consistently accepted that the true MRP—which cannot be observed so must be estimated—is not constant. Rather, the MRP changes as market conditions change. However, while the QCA's approach to estimating the MRP has evolved over time, it has, since 2014, consistently delivered MRP allowances that have remained effectively fixed, even as market conditions have changed.

2.2 2014 Market Parameters Decision

21. Prior to 2014, the QCA had relied on four techniques to estimate the MRP:

    a The **Ibbotson approach**, which measures the average historical excess returns on the Australian stock market from 1883 onwards;

    b The **Siegel method**, which is essentially the Ibbotson method, except that historical returns on the market are adjusted to account for the fact that inflation in some past years turned out to be higher than market expectations;

    c The **Cornell method**, which involves implementing a two-stage Dividend Growth Model (DGM), whereby the required return on equity for the market as a whole is estimated as the discount rate required in order to set the present value of forecast stream of dividends equal to the current value of the market portfolio; and

    d **Survey evidence**, which examines the self-reported views on the MRP of finance and economics academics, analysts and managers of companies who respond to surveys.

22. Once the QCA had derived an estimate of the MRP using each of these four methods, the QCA derived a final MRP estimate by:

    a Calculating an equal-weighted average across the four estimates; and then

    b Rounding the resulting estimate to the nearest percentage point.[4]

23. This process consistently delivered an MRP point estimate of 6.0%.[5]

[3] QCA, Cost of capital: market parameters, Final Decision, August 2014 (Market Parameters Decision).

[4] Market Parameters Decision, p.16.

[5] Market Parameters Decision, p.15.

24. The Market Parameters Decision affirmed that in future price reviews the QCA would continue to use these four methods, albeit with some changes to the way each of the methods would be implemented.

25. The QCA also decided in the Market Parameters Decision that:

    a It would no longer apply a mechanistic rule for combining estimates from different approaches together to arrive at an overall MRP estimate but would instead apply its own "regulatory judgment in determining a point estimate."[6] The effect of this approach has been that the relative weights applied to each of the four estimates has apparently changed over time, but in such a way that the final allowed MRP has remained constant.

    b It recognised the need to "set aside the whole number rounding rule from the past approach" but did not explain what rounding rule it would apply in future when determining the overall MRP point estimate.[7] The QCA has clarified in subsequent decisions that rounding the MRP point estimate to the nearest half percent is now "the QCA's standard approach."[8]

26. The QCA concluded in its Market Parameters Decision that, given the evidence available at that time:

    a The Ibbotson method supported an MRP range of 6.0% to 6.7% (over five different historical sampling periods), with an estimate of 6.5% for the QCA's preferred sampling period of 1958 to 2013;

    b The Siegel method supported an MRP range of 4.0% to 6.5% (over the five historical sampling periods applied when deriving the Ibbotson estimates), with an estimate of 5.5% for the QCA's preferred sampling period of 1958 to 2013;

    c The Cornell method supported an MRP range of 5.5% to 8.0%, with a median estimate of 6.9%;

    d Survey evidence indicated a median estimate (adjusted for dividend imputation credits) of 6.2%; and

    e The QCA considered 6.5% to be a reasonable point estimate of the MRP, taking account of the evidence from the four methods above, as well as analysis of various market indicators.[9]

[6] Market Parameters Decision, p.9.

[7] Market Parameters Decision, p.82.

[8] For instance, QCA, 2019, Queensland Rail's 2020 DAU, p.39.

[9] These indicators included measures of stock market volatility, corporate debt premiums and liquidity premiums on government bonds.

2.3 Decisions between 2014 and 2017

27. Between 2014 and 2017, the QCA made only two decisions on the MRP in which it considered the empirical evidence from its various estimation methods afresh. These were in relation to Aurizon Network's 2014 DAU and DBCT's 2015 DAU.[10]

28. In both of those decisions, the QCA indicated that it had followed the MRP methodology developed in the Market Parameters Decision and also adopted the same estimate of the MRP, 6.5%, as was adopted in the Market Parameters Decision.

29. As **Table 1** shows, the QCA adopted the same point estimate of 6.5% notwithstanding that the evidence, particularly the survey and Cornell evidence, indicated that the MRP had changed since 2014.

Table 1: MRP estimates and evidence relied upon by QCA in decisions between 2014 and 2017

	2014 Market Parameters Decision	Aurizon 2014 and 2016 DAUs	DBCT 2015 DAU
Date	August 2014	April 2016	November 2016
Ibbotson method	6.0% to 6.7%	5.8% to 6.6%	5.7% to 6.4%
Siegel method	4.0% to 6.5%	4.1% to 6.4%	4.0% to 6.3%
Cornell method	5.5% to 8.0%	5.6% to 8.3%	6.0% to 8.0%
Surveys	6.20%	6.80%	6.00%
QCA allowed point estimate	**6.50%**	**6.50%**	**6.50%**

Source: QCA decisions.

2.4 Decisions since 2017

2.4.1 Seqwater Bulk Water Price Review 2018

30. In its draft decision in relation to the Seqwater Bulk Water Price Review 2018-21 in November 2017, the QCA stated that having updated its MRP estimates, it considered that the best empirical estimate of the MRP was 7.0% at that time:

> *We updated our MRP estimation methods for recent data, and assessed each resulting estimate on the basis of the relative strengths and weaknesses of the underlying method. In coming to a point estimate, we took these considerations into*

[10] The QCA did make determinations for the Gladstone Area Water Board in May 2015 and Queensland Rail in June 2016. But, in both these instances, the regulated business simply adopted the MRP estimate of 6.5% determined by the QCA in its Market Parameters Decision.

account and exercised our judgement. Our conclusion is that the best empirical estimate of the MRP is 7.0 per cent at this time.[11]

31. The QCA adopted this MRP estimate of 7.0% in its March 2018 final decision for Seqwater.

32. The QCA did not present, in its draft or final decisions, its updated evidence on the MRP or why it had adopted a higher estimate than in decisions since the Market Parameters Decision.

2.4.2 Aurizon Network 2017 DAU

33. The QCA's final decision in relation to Aurizon Network's 2017 DAU explained that it had departed methodologically from the Market Parameters Decision in two key ways, as explained below.

Attribution of weight to the 'Wright' or 'Total Market Return (TMR)' approach

34. The QCA concluded that estimates from the Wright approach "should receive greater emphasis than before."[12] The Wright approach, which is used routinely by economic regulators in the UK to estimate the MRP where it is called the 'TMR' approach, involves the following steps:

    a Estimate the real return on the market portfolio each year for some historical period using the Fisher relationship;[13]

    b Take the average real market return over the relevant historical period;

    c Use the Fisher relation, and a contemporaneous estimate of expected (forward-looking) inflation to obtain an estimate of the nominal required return on the market; and

    d Subtract the contemporaneous estimate of the risk-free rate from the estimate of the nominal required return on the market determined in the previous step.

35. While a number of stakeholders, including the QCA's consultant on MRP, Dr Lally, had submitted in 2014 that the QCA should have regard to the Wright/TMR approach, the QCA determined in its Market Parameters Decision that it would not give that method any significant weight. Accordingly, the Wright/TMR method was not included among the approaches the QCA said it would use to estimate the MRP.

36. In its Aurizon Network 2017 DAU final decision, the QCA revisited the empirical analysis that had led it to reject the Wright/TMR approach in the Market Parameters Decision. In doing so, it recognised that analysis suffered from limitations that meant it was not possible to reject the Wright/TMR approach decisively.[14] For this reason, and taking account of the recommendations

[11] Seqwater Bulk Water Price Review 2018 draft decision, p. 54.

[12] Aurizon Network 2017 DAU final decision, p. 82.

[13] The Fisher relationship is the following: $r_{m,t}^{real} = \frac{1+r_{m,t}^{nominal}}{1+inflation_t} - 1$, where $r_{m,t}^{real}$ is the real return on the market at time t, $r_{m,t}^{nominal}$ is the nominal return on the market at time t, and $inflation_t$ is a measure of outturn inflation at time t.

[14] A key implication of the Wright approach is that the total required return on equity for the market as a whole is relatively stable. In the context of a risk-free rate that can be observed as varying over time, this would mean that the MRP varies inversely with the risk-free rate in order that the overall return on equity remains stable. In the Market Parameters Decision the QCA had undertaken empirical analysis to test this and concluded that there was evidence that there was "relatively greater stability in the MRP than the real return on equity over time." In the Aurizon Network 2017 DAU final decision, the QCA acknowledged that its empirical analysis was not determinative or conclusive because it had been unable to test the statistical significance of the difference between variances of the MRP and real return time series.

of Dr Lally, the QCA concluded that it should now give more regard to estimates from the Wright/TMR approach.

Attribution of greater weight to the Cornell method

37. The QCA determined in the Aurizon Network 2017 DAU final decision that it should give greater weight to estimates derived from its Cornell method.

38. The QCA stated that:

> *We have placed greater emphasis on current market conditions. By doing so, we believe that our consideration of evidence from historical information and prevailing market conditions is evenly balanced.*[15]

39. And that:

> *...the Cornell-type DGM, notwithstanding the volatility of estimates from that method, should be given more emphasis, as it is the only method that is fully forward-looking. In this context, we make the observation that the Ibbotson and Cornell DGM are the only two methods that are completely distinct estimators (i.e. the former being historical and the latter being forward-looking). Other methods are variants of these two principal methods.*[16]

Overall MRP point estimate

40. Having considered the evidence available, the QCA concluded that the appropriate point estimate for the MRP was 7.0%.

41. While it appeared as though the QCA had increased the MRP allowance from its previous estimate of 6.5%, in fact the adoption of a 'higher' MRP allowance simply reflected the fact that the QCA had, for the first time, applied an explicit correction to address an inconsistency in the term to maturity of the risk-free rate estimate used in the first term of the CAPM formula and the term to maturity of the risk-free rate underpinning its MRP estimate.

42. Specifically, the CAPM formula developed by Sharpe (1964) and others is:

$$E[r_i] = r_f + \beta_i\left(E[r_m] - r_f\right).$$

Internal consistency requires that the same figure should be adopted for r_f in the two places in which it appears in the CAPM formula. If the first r_f term reflects four-year government bond yields, for example, but the MRP $\left(E[r_m] - r_f\right)$ is estimated with reference to the ten-year yield, there is an inherent inconsistency. This inconsistency can be addressed by adjusting the MRP estimate to 'convert' it to one that is relative to four-year government bond yields.

43. Prior to the Aurizon Network 2017 DAU final decision, the QCA had recognised this inconsistency in its approach to the term to maturity of the risk-free rate in different parts of the CAPM formula, but considered that such an inconsistency was "unavoidable" and no attempt was made to correct for this inconsistency. For example, in the Aurizon Network 2014 DAU final decision the QCA stated that:

> *Inconsistent use of the term for the risk-free rate in the CAPM is unavoidable. For the same reasons set out in the MAR draft decision and our market parameters decision,*

[15] Aurizon Network 2017 DAU final decision, p. 82.

[16] Aurizon Network 2017 DAU final decision, p. 82.

> *we considered that setting different terms for the risk-free rate in the first and second parts of the CAPM—in order to combine satisfying the NPV=0 principle with long-term estimates of the market risk premium—is the most appropriate option for regulatory purposes.*[17]

44. However, in the Aurizon Network 2017 DAU final decision the QCA made an explicit quantitative adjustment to the MRP estimates to recognise the fact that it was applying a four-year term to maturity assumption when estimating the risk-free rate term used in the first term of the CAPM formula. **Table 2** shows that the QCA adjusted all of the MRP estimates it considered, except its Cornell estimates, to reflect its desire to apply a four-year term to maturity for the risk-free rate. The effect of these adjustments was to increase the Ibbotson, Siegel, survey and Wright estimates. These corrections also resulted in an increase in the QCA's allowed MRP point estimate from 6.5% to 7.0%.

Table 2: QCA's conversion of MRP estimates from a 10-year term to a 4-year term

	10-year term to maturity	4-year term to maturity
Ibbotson method	6.30%	6.60%
Siegel method	5.60%	5.90%
Cornell method	5.6% to 7.5%	5.6% to 7.5%
Surveys	6.4% to 7.2%	6.6% to 7.4%
Wright method	9.00%	9.50%
QCA allowed point estimate	**6.50%**	**7.00%**

Source: Aurizon Network 2017 DAU final decision, pp. 45-46.

45. The QCA was unambiguous in its Aurizon Network 2017 DAU final decision, stating that had it sought to estimate the MRP assuming a 10-year risk-free rate, it would have set an MRP allowance of 6.5% (consistent with the Market Parameters Decision and every QCA decision between 2014 and 2017) rather than 7.0%. For example, the QCA stated that:

> *To the extent that a 10-year MRP was to be estimated, the QCA considers 6.5 per cent would be appropriate.*[18]

46. And that:

> *…having taken into account the circumstances before the QCA—including, but not limited to, the level and term of risk-free rates, the robustness of the data available, the range of MRP estimates and the overall return on equity proposed by the QCA's*

[17] Aurizon Networks 2014 DAU final decision, p. 215.

[18] Aurizon Network 2017 DAU final decision, p. 46.

decision—the QCA's considers that an MRP of 6.5 per cent would apply for a 10-year term.[19]

47. The last determination made by the QCA before the Aurizon Network 2017 DAU final decision in which it set out fully its MRP analysis was the DBCT 2015 DAU final decision in November 2016. It is worth noting that since that DBCT decision, the QCA's MRP estimates under each of its preferred methods had *fallen*—as demonstrated below in **Table 3**. This was true particularly for the Cornell and Wright estimates, which the QCA stated "reflect current market conditions."[20] Further, in both decisions (assuming a 10-year term for the MRP) the QCA arrived at an overall MRP point estimate of 6.5%. Hence, neither the changes in the market evidence, nor the greater weighting the QCA claims it had given to the Cornell and Wright methods explain the QCA's increase in the MRP estimate from 6.5% to 7.0% in the Aurizon Network 2017 DAU final decision.

48. That is, the increase in the MRP allowance to 7.0% was not due to an increase in the empirical estimates, or a change in the QCA's weighting scheme, but simply due to the MRP now being expressed relative to a 4-year risk-free rate rather than to a 10-year rate.

Table 3: MRP estimates considered by the QCA in DBCT 2015 DAU final decision and the Aurizon Network 2017 DAU final decision: 10-year basis

	DBCT 2015 DAU final decision	Aurizon Network 2017 DAU final decision
Date	November 2016	December 2018
Ibbotson method	6.4%	6.30%
Siegel method	5.5%	5.60%
Cornell method	6.0% to 8.0%	5.6% to 7.5%
Surveys	6.0% to 6.8%	6.4% to 7.2%
Wright method	9.20%	9.00%
QCA allowed point estimate	**6.50%**	**6.50%**

Source: DBCT 2015 DAU final decision, p. 78; Aurizon Network 2017 DAU final decision, p. 46.

49. Based on the analysis above, it is clear that the QCA's move from an MRP allowance of 6.5% to 7.0% reflected its efforts to address the problem of inconsistency in the term to maturity of the risk-free rates applied in different parts of the CAPM formula. The uplift in the MRP estimate to 7.0% cannot be attributed to the QCA actually placing "greater emphasis on current market conditions" or giving greater weight to the Cornell and Wright estimates than it had given in the past.

[19] Aurizon Network 2017 DAU final decision, p. 47.

[20] Aurizon Network 2017 DAU final decision, p. 44.

50. Although it was not explained in the Decision, it seems very likely that the QCA's conclusion in the Seqwater Bulk Water Price Review 2018-21 decision that 7.0% represented the best estimate of the MRP similarly reflected an attempt to achieve consistency in the risk-free rate terms used in different parts of the CAPM formula. Seqwater is subject to a three-year regulatory period, and the QCA's approach in its March 2018 determination for Seqwater was to apply a three-year risk-free rate in order to reflect the length of the regulatory period.[21]

2.4.3 Queensland Rail 2020 DAU

51. The QCA published its draft decision in relation to Queensland Rail's 2020 DAU in April 2019. In that draft decision the QCA changed its long-standing convention of matching the term of the risk-free rate to the length of the regulatory period, instead adopting a 10-year risk-free rate in line with the practice of other regulators in Australia.[22]

52. In that draft decision, the QCA appears to have followed the same framework it used in the Aurizon Network 2017 DAU decision, but has estimated the MRP relative to the 10-year risk-free rate. The QCA's updated MRP estimates from the Queensland Rail final decision are presented below in **Table 4.**

Table 4: QCA's MRP estimates in the Queensland Rail 2020 DAU decision

Method	10-year term to maturity
Ibbotson method	6.50%
Siegel method	5.80%
Cornell method	4.70%
Surveys	6.40%
Wright method	10.30%
QCA allowed point estimate	**6.50%**

Source: Queensland Rail 2020 DAU decision, p. 48.

53. The QCA concluded that, given the updated MRP evidence and its decision to adopt a 10-year risk-free rate, the appropriate estimate of the MRP was 6.5%:

> *Given the updating of the various MRP estimates and the use of a 10-year risk free rate, we consider that Queensland Rail's proposal of an MRP of 7 per cent is not appropriate to approve. Instead, we consider that an MRP of 6.5 is appropriate.*[23]

54. That is, once again, the QCA adopted an MRP allowance (consistent with a 10-year term to maturity) of 6.5%.

[21] Seqwater Bulk Water Price Review 2018 final decision, p. 61.

[22] Queensland Rail 2020 DAU draft decision, p. 32.

[23] Queensland Rail 2020 DAU draft decision, p. 39.

3 Problems with a fixed MRP allowance

3.1 The QCA accepts that the MRP varies with market conditions

55. Several aspects of the QCA's Market Parameters Decision recognised that the true MRP is not constant over time but rather changes as market conditions change. For example, the QCA stated that:

> *...the market risk premium varies over time and its relationship with the risk-free rate likely changes,*[24]

and that:

> *The likelihood that the premium is time-varying is generally well accepted.*[25]

56. The QCA also considered at length whether its methodology had produced MRP estimates that were too low in a post-GFC environment in which interest rates had remained persistently low and there was some evidence of heightened financial uncertainty. Implicit within this aspect of the Market Parameters Decision was a recognition by the QCA that the true MRP required by investors is not fixed but changes with market conditions. If this were not the case, then there would have been no need for the QCA to even consider whether its methodology had delivered unreasonably low MRP estimates in certain market conditions.

57. The QCA noted that:

> *There is no question that market volatility increased during the GFC and that the market risk premium was probably elevated as a result.*[26]

58. Again, in the quote above the QCA recognises that the MRP probably rose during the GFC.

59. In the context of considering whether it should utilise the Wright/TMR approach, the QCA acknowledged that it could not:

> *...preclude a possible negative relationship between the risk-free rate and the market risk premium. The question is the strength of the relationship, which is difficult to determine.*[27]

60. More recently, in the Aurizon Network 2017 DAU draft decision the QCA reaffirmed that:

[24] Market Parameters Decision, p. 81.

[25] Market Parameters Decision, p. 57.

[26] Market Parameters Decision, p.22.

[27] Market Parameters Decision, p.22.

> *...it is likely that the MRP varies over time. This point is relevant given the observably low risk-free rate and the plausible (negative) correlation between the risk-free rate and the MRP.*[28]

61. Hence, the QCA has consistently accepted that the true MRP changes as market conditions change.

3.2 The QCA has consistently set an MRP allowance of 6.5% (relative to the 10-year risk-free rate) since 2014

62. In every determination since the 2014 Market Parameters Decision, the QCA has effectively adopted the same MRP allowance of 6.5% relative to the 10-year risk-free rate.

63. This is evident from **Table 5** below, which presents the MRP allowance published by the QCA in various decisions, assuming that the risk premium is measured relative to a 10-year risk-free rate (final column in the Table). The 'normalised 10-year MRP' is calculated by subtracting from the QCA's MRP allowance (column A) the spread between the risk-free rate adopted by the QCA in its decision and the contemporaneous yield on 10-year government bonds (column C).[29]

[28] Aurizon Network 2017 DAU draft decision, p. 82.

[29] I calculated the contemporaneous 10-year yield using the same 20-day averaging period used by the QCA in its decisions to determine the risk-free rate allowance.

Table 5: QCA MRP allowances since 2014

QCA Decision	Allowed MRP (A)	Term of RFR in MRP (B)	Spread between allowed RFR and 10-year CGS rate (C)	Normalised 10-Year MRP (A – C)
2014 Market Parameters Decision	6.5%	10	-	6.5%
DBCT 2015 DAU	6.5%	10	-	6.5%
Queensland Rail 2015 DAU	6.5%	10	-	6.5%
Aurizon Network 2017 DAU	7.0%	4	0.5%	6.5%
2018 Seqwater Bulk Water Pricing Review	7.0%	3	0.7%	6.3%
Queensland Rail 2020 DAU	6.5%	10	-	6.5%

Source: Various QCA decisions, Frontier Economics analysis.

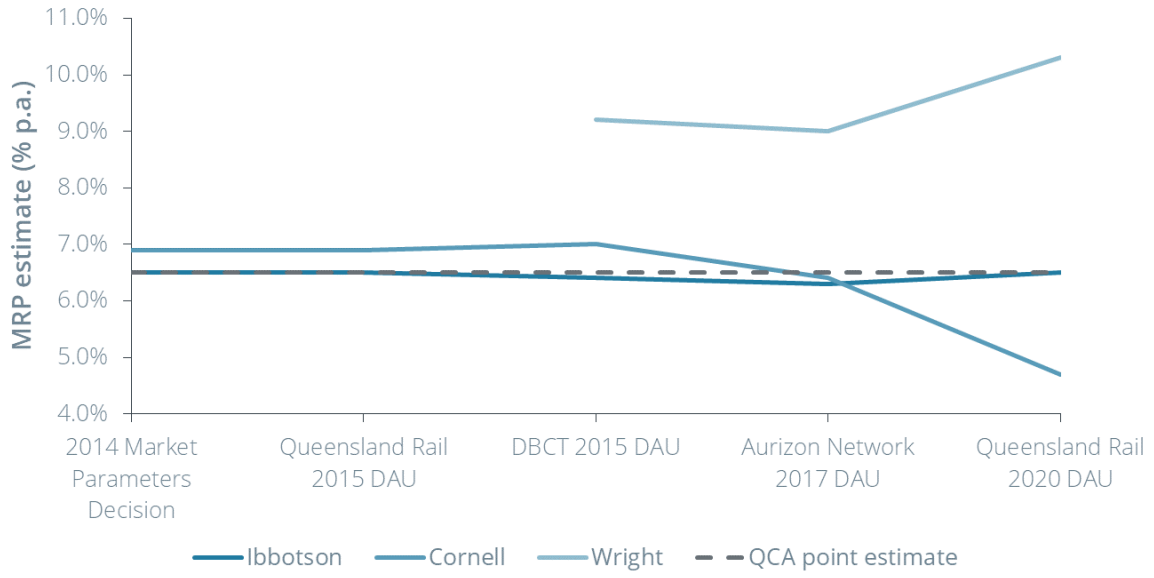
64. I note that in some of these decisions, the QCA treats the MRP as a "non-time-variant" WACC parameter.[30] This contradicts the QCA's statements that the MRP varies over time as market conditions change, and its insistence that its MRP estimates reflect current market conditions as they evolve.

65. Indeed, as **Figure 1** below shows, the QCA's MRP point estimates are much more consistent with the Ibbotson evidence (which reflects slow-moving averages of long-run historical excess returns) than estimates from either the Cornell or Wright estimates, which the QCA acknowledges explicitly are "methods that reflect current market conditions."[31]

[30] See, for example, the Queensland Rail 2015 DAU draft decision (pp. 64-66). In that decision the only parameters the QCA identifies as "time-variant parameters" are the risk-free rate and the debt margin. All other parameters, including the MRP, are taken by the QCA to be "non-time-variant" WACC parameters."

[31] Aurizon Network 2017 DAU final decision, p. 44.

Figure 1: QCA MRP point estimates compared to QCA's Ibbotson, Cornell and Wright estimates in various decisions



Source: QCA decisions.

3.3 Implications of a fixed, non-time-variant approach to the MRP

66. The Market Parameters Decision adopted an MRP estimate of 6.5% on the basis of data as at December 2013, when the 10-year government bond yield was 4.29%.[32] Thus, the allowed return for a firm with an equity beta of 0.8 was 9.5% at that time.[33]

67. By August 2016, the government bond yield had fallen to 1.9%.[34] The application of the same MRP to that figure produces an allowed return for a firm with a beta of 0.8 of 7.1%,[35] which implies that the cost of equity capital declined by more than a quarter over a two-year period.

68. By August 2017, the government bond yield had recovered to 2.6%, such that the same MRP then produced an allowed return on equity of 7.8%. In August 2019, the government bond yield had fallen to 0.9%, such that the allowed return on equity for the same firm had fallen to 6.1%. That is, if a constant MRP is applied, the volatility in government bond yields flows one-for-one into volatility in the allowed return on equity.

69. For a firm with a beta of 0.8, the application of a constant 6.5% MRP implies that the required return on equity:

    a Was approximately 8.0% in December 2015;

    b Fell to 7.1% by September 2016;

[32] Market Parameters Decision, p. 72.

[33] 4.29% + 0.8×6.5%.

[34] RBA.

[35] 1.9% + 0.8×6.5%.

c Increased back to 8.0% by December 2016; and

d Fell again to 6.1% by August 2019.

70. That is, according to the QCA's approach, the required return for a regulated monopoly business fell by 90 basis points, and then increased by 90 basis points, within the space of just 12 months, and subsequently fell by 190 basis points over two years.

71. A regulated business having its allowed returns set during 2016 in line with the QCA methodology would have faced a lottery, with the regulatory outcome driven entirely by the vagaries of financial markets and the timing of the QCA determination in that year.

72. The variability in allowed returns that flows from the adoption of a fixed MRP allowance is illustrated in **Figure 2**.

Figure 2: **The allowed required return on equity with beta of 0.77 and 6.5% fixed MRP**

Source: RBA 10-year government bond yields; Frontier Economics analysis.

73. The implications of adopting an effectively constant MRP are also illustrated sharply by circumstances around the time of financial crises. For example, the yield on 10-year Australian government bonds was 6.4% in July 2008 (prior to the collapse of Lehman Brothers) and then fell to 4.2% by the end of that year. This dramatic fall in yields was due to a flight-to-quality, whereby investors moved funds out of risky investments into safe and liquid government bonds.

74. However, the approach of adding a fixed MRP to the prevailing government bond yield implies that the required return on equity actually *fell* by 2.2 percentage points over the peak of the global financial crisis. The implication is that a financial crisis serves to *reduce* the cost of equity capital. This implausible outcome is the mechanical result of adding a constant MRP (of the sort that the QCA has repeatedly determined since 2014) to the prevailing government bond yield.

3.4 Is the required return on equity as volatile as a constant MRP approach suggests?

75. In the Frontier Economics report submitted to the QCA in November 2016,[36] Section 2.6 sets out a broad set of evidence that supports the conclusion that the required return on equity has been remarkably stable since the Market Parameters Decision. That evidence is inconsistent with an approach that sets the allowed return on equity to follow, one for one, the dramatic swings that we have seen in government bond yields.

76. Rather, the evidence from a whole range of respected market participants is consistent with the proposition that the required return on equity has remained relatively stable even as government bond yields have fallen. This position is supported by:[37]

    a Central banks such as the Reserve Bank of Australia and the Federal Reserve Bank of New York;

    b Other regulators such as Ofgem, FERC, the ERA, and IPART. Indeed, in February 2021, IPART adopted a mid-point MRP estimate of 7.2%, based on a 50/50 weighting to long-run historical estimates and current forward-looking estimates;[38]

    c Corporate advisory firms such as McKinsey and NERA-US; and

    d Independent expert firms such as EY, KPMG, Deloitte, and Lonergan Edwards.[39]

77. That is, the market evidence suggests that, over recent years, the required return on equity has not moved up and down one-for-one with the material changes in government bond yields. Rather, the required return on equity has remained more stable, indicating that in recent years the MRP has increased to absorb at least some of the dramatic fall in government bond yields.

3.5 Application of updated information to the MRP

78. On the basis that the MRP must be assessed having regard to all relevant evidence and in light of the most up to date information, in section 5 of this report I set out an estimate of the MRP that reflects the prevailing market conditions.

[36] Frontier Economics, 2016, *The market risk premium*, November.

[37] The relevant references are set out in our earlier report: Frontier Economics, 2016, *The market risk premium*, November.

[38] IPART, February 2021, WACC Biannual Update.

[39] The relevant references are set out in our earlier report: Frontier Economics, 2017, *Recent evidence on the market risk premium*, May.

4 IPART's approach to estimating the MRP

79. The two previous sections explained that:

    a The QCA has consistently accepted that the true MRP is not fixed but changes over time; and

    b The QCA has stated in recent decisions that it has placed greater emphasis on current market conditions when estimating the MRP than it has done in the past; however

    c The QCA has effectively adopted a fixed MRP estimate of 6.5% in every decision since 2014, even though market conditions have changed materially since then. There is no evidence that the QCA's MRP estimates change to reflect the changes in the prevailing market conditions. Rather, the QCA's estimates are more in line with long-run historical excess returns evidence of the kind reflected in its Ibbotson estimates.

80. In this section, I review the approach to estimating the MRP adopted by another regulator, IPART. Like the QCA, IPART has recognised that the MRP is not fixed, but varies over time as market conditions change. However, unlike the QCA, IPART has developed a methodology for estimating the MRP that:

    a Reflects the prevailing market conditions; and

    b Produces plausible return on equity allowances that do not suffer from the shortcomings of the QCA's estimates described in Section 3.

4.1 IPART's 2013 WACC methodology review

81. In December 2012, IPART initiated a fundamental review of its rate of return methodology. The impetus for that review was a concern from IPART that its cost of capital methodology at that time (which shares a number of features with the QCA's) was, in the wake of the GFC, no longer fit for purpose. At the conclusion of that review, in December 2013, IPART published the details of its new rate of return methodology.[40]

82. The new methodology included a number of major improvements on IPART's previous approach. One of the main changes was a recognition by IPART that its previous approach to estimating the cost of equity involved a deep inconsistency that had been exposed by the GFC. Specifically, under the previous approach, IPART estimated the return on equity using the CAPM by coupling:

    a An estimate of the prevailing risk-free rate (calculated by taking a 20-day average of yields on Commonwealth Government Securities as close as practicable to the commencement of the regulatory period); with

    b A fixed MRP estimate (6%) in all determinations.

[40] IPART, Review of WACC methodology, final report, December 2013 (IPART 2013 WACC methodology).

83. Adding a fixed MRP to the prevailing government bond yield mirrors the QCA approach. IPART was concerned that its use of this approach exclusively was leading to nonsensical estimates of the required return on equity because, essentially, these estimates would move in lock-step with changes in the risk-free rate. IPART was particularly concerned about the fact that its 'constant MRP' approach implies that the required return on equity *fell* dramatically during the peak of the GFC as government bond yields declined.

84. For example, IPART noted that:

> *In relatively stable market conditions, there may be a little difference between long-term historic and current market implied estimates of the expected MRP. Since the GFC, market conditions have become significantly more volatile. Estimates of the market implied expected MRP are currently above the historic long-term average of 6%.*
>
> *The application of the CAPM using a stable historic MRP (of 6%) and a prevailing market rate for the risk free rate means that the cost of equity will move in synchronicity with the risk free rate for a given level of equity beta. If the risk free rate fluctuates significantly so will the cost of equity.*
>
> *In late 2008/early 2009, and then again from late 2011, the risk free rate fell to a 50-year low. The overall effect is that the regulatory cost of equity has fallen and may underestimate the cost of equity for regulated businesses when the risk free rate is low. Conversely, it may overestimate the cost of equity when the risk free rate is high.*[41]

85. IPART went on to explain that:

> *…estimated risk premiums are not stable through time. Risk premiums tend to move in the opposite direction to the risk free rate. As investors may respond to recent losses on riskier assets by shifting to safer assets, prices of those assets are likely to fall, increasing the expected rate of return for a given flow of future dividends. In periods of high risk aversion there is a flight from risky assets to safe assets (such as the risk free rate). This tends to push up the price of safe assets, thereby pushing down their yields. Thus, in these circumstances, a falling risk free rate tends to be associated with rising equity risk premiums (and vice versa).*
>
> *To the extent there is a negative relationship between the risk free rate and the risk premiums on listed equities, the required return of the equity market (being the sum of risk free rate and the market risk premium) is relatively more stable than its individual components.* [42]

86. Following this realisation, and after extensive consultation with stakeholders, IPART introduced a new approach, which involved:

    a Deriving an estimate of the cost of equity using only current market data, whereby a contemporaneous estimate of the risk-free rate (computed by taking a 40-day average of prevailing government bond yields) would be coupled with a contemporaneous estimate of

[41] IPART, Review of method for determining the WACC: Dealing with uncertainty and changing market conditions, December 2012 (IPART discussion paper) p. 55.

[42] IPART discussion paper, pp. 57-58.

the MRP (computed using a range of techniques, several of which are versions of the DGM). IPART refers to this estimate as the 'current' cost of equity.

b Deriving an estimate of the cost of equity using only long-term historical averages, whereby a long-term risk-free rate (computed by taking a 10-year historical average of government bond yields) is coupled with an MRP reflecting long-term historical excess returns (typically 6%). IPART refers to this estimate as the 'long-term' or 'historic' cost of equity.

c As a default position, determining the allowed cost of equity by giving equal weighting to the current and long-term estimates.

87. Under this approach, IPART's default MRP allowances are set by giving 50/50 weighting to historical excess returns evidence (i.e., Ibbotson estimates) and DGM evidence (i.e., Cornell-type estimates). That is, IPART uses only two MRP estimation techniques.

88. In this regard, I note that the QCA has observed that:

> *…the Ibbotson and Cornell DGM are the only two methods that are completely distinct estimators (that is, the former being historical and the latter being forward-looking). Other methods are variants of these two principal methods.*[43]

4.2 IPART's 2018 WACC methodology review

89. In July 2017, IPART commenced another review of its rate of return methodology. IPART's final methodology decision was published in February 2018. IPART determined that it would retain the key elements of the MRP approach it developed in the 2013 review. Namely, IPART decided that it would:

a Continue to estimate a 'current' cost of equity by pairing a current estimate of the risk-free rate with a current estimate of the MRP (determined largely by examining the outputs of five DGMs);[44]

b Continue to estimate a 'long-term' cost of equity by pairing a 10-year average of the government bond yields with a fixed estimate of the long-term MRP of 6%; and

c Determine the default MRP allowance by giving equal weighting to the current and long-term estimates—effectively giving 50/50 weighting to Ibbotson-type estimates and Cornell-type estimates.

90. In arriving at this conclusion, IPART reiterated that the approach that it followed prior to the 2013 review (and the approach the QCA has effectively adopted) produces invalid estimates of the required return on equity:

> *We consider it would be invalid to combine a current risk-free rate with a historic MRP, because the result of that calculation would not represent the state of the equity market at any point of time. By combining a current estimate of the risk-free rate with a current MRP estimate, we can approximate the current market price of equity. Likewise, by combining a historic estimate of the risk-free rate with a historic MRP estimate, we can approximate the historic average market price of equity.*

[43] Aurizon Network 2017 DAU final decision, p. 44.

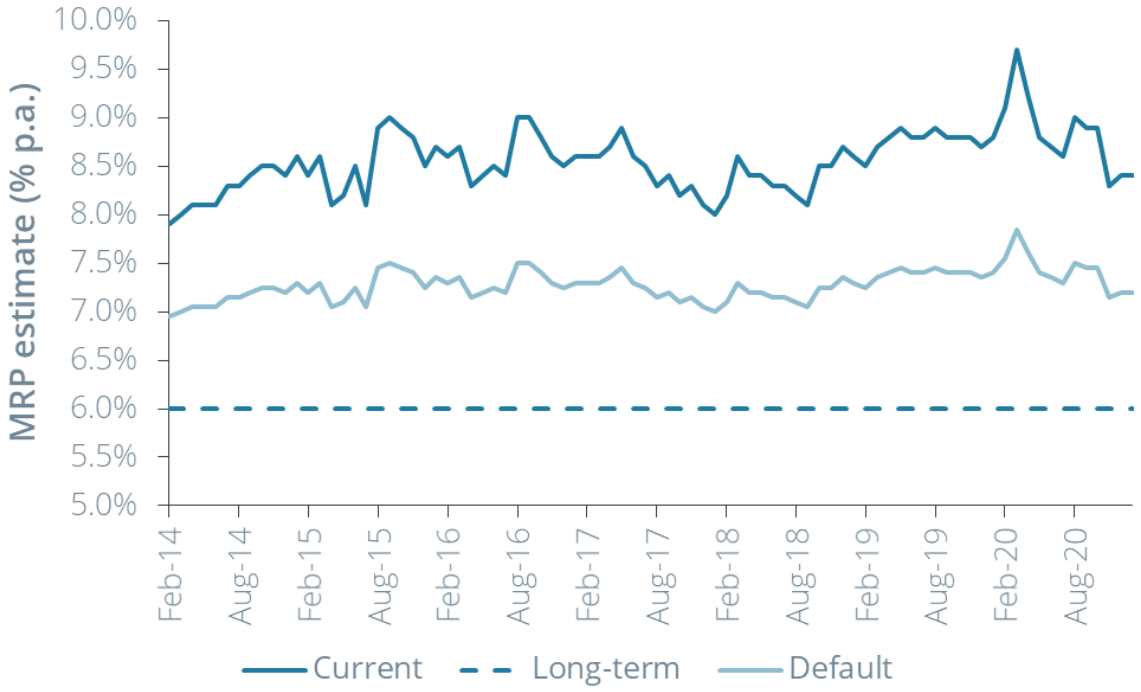
[44] IPART decided that it would make some minor refinements to one of the techniques it uses to derive its current MRP estimate, and the way in which it weights estimates from different methods. See IPART 2018 WACC methodology, p. 47.

Either of these benchmarks would be a valid point of reference. When we combine the risk-free rates and MRP estimates in this time-consistent way, the current cost of equity is closer to the historic average cost of equity than either of them is to the time-inconsistent sum.[45]

4.3 Outcomes of the IPART approach and lessons for the QCA

91. **Figure 3** below plots IPART's MRP estimates (as presented in its biannual WACC updates) since February 2014, following the introduction of its revised rate of return methodology in December 2013.

Figure 3: **IPART's MRP estimates since February 2014**



Source: IPART biannual WACC updates.

92. There are two key differences between IPART's MRP estimates and the QCA's estimates over the same period:

    a Unlike the QCA's MRP estimates (which have remained unchanged at 6.5%), IPART's estimates have evolved over time to reflect changes in market conditions. This is due to the fact that IPART gives explicit and equal weight to current estimates of the MRP, which reflect prevailing market conditions; and

    b IPART's MRP estimates (expressed relative to a 10-year risk-free rate) were materially higher (nearly 80 basis points, on average) than the QCA's fixed estimate of 6.5% over the same period. IPART has recognised that the MRP since 2014 has probably been materially higher than is implied by long-run average historical excess returns.

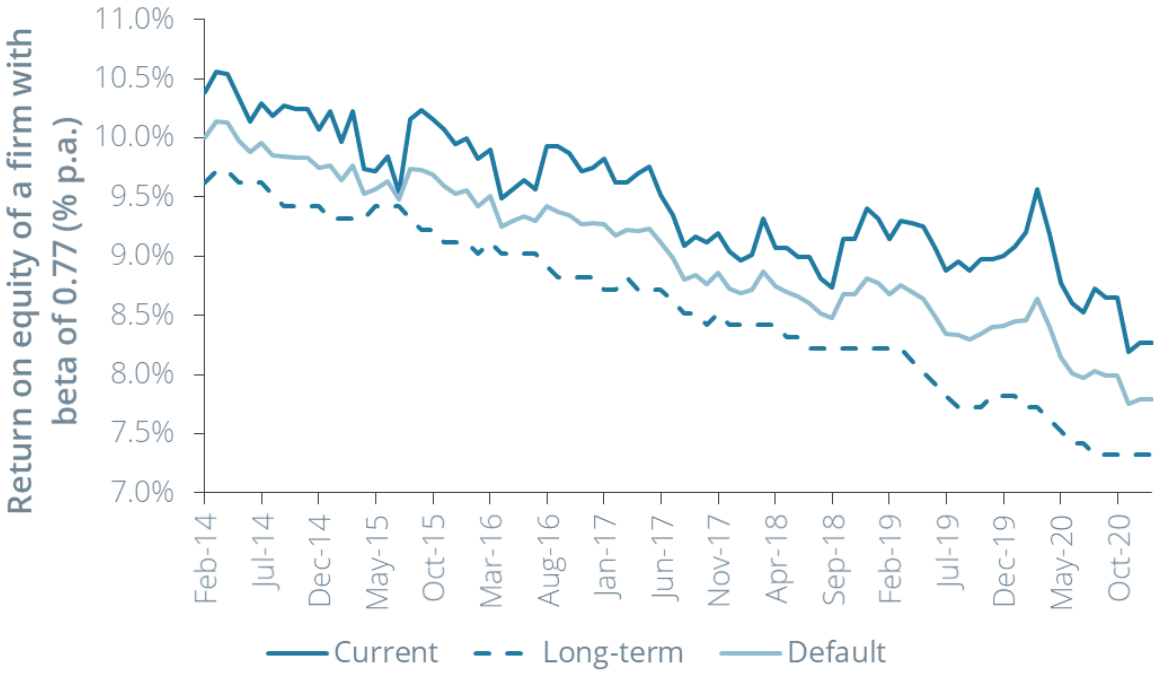
93. As a result, IPART's overall return on equity estimates have remained relatively stable (though not constant) over time. This is demonstrated in **Figure 4**, which plots IPART's biannual return on

[45] IPART 2018 WACC methodology, pp. 51-52.

equity estimates (for a notional firm with a beta of 1) since February 2014. Between February 2014 and February 2019, IPART's return on equity estimates declined by approximately 120 basis points. By contrast, the QCA's methodology would imply that the return on equity for a firm with a beta of one fell by approximately 200 basis points.

94. In my view, IPART's methodology produces more plausible return on equity estimates as financial market conditions change.

Figure 4: IPART's return on equity estimates since February 2014



Source: IPART biannual WACC updates.

95. I consider that the IPART approach provides two key lessons:

    a It is possible for a regulator to develop a methodology that genuinely reflects changing market conditions in its MRP estimates; and

    b It is possible for such a methodology to weight the relevant evidence in a systematic and transparent way to derive economically plausible estimates of the MRP. Such an approach leaves little room for "qualitative regulatory judgment" to be employed in an inconsistent and ambiguous manner to arrive at a pre-determined MRP outcome. Under IPART's approach, the allowed MRP is determined by the evidence.

96. Finally, I note that the IPART estimates indicate that the MRP has increased to partially (but not fully) offset the decline in government bond yields to their current historically low levels. This results in the estimate of the total required return on equity being more stable than either of the component pieces – the risk-free rate and the MRP. It also highlights the danger of pairing a long-run historical estimate of the MRP with the prevailing risk-free rate.

5 Recommended approach to estimating the MRP

5.1 Overview

97. This section sets out the reasons for recommending that the MRP be estimated by:

    a Applying material weight to the Ibbotson and Wright/TMR approaches for analysing the long-run historical data. These two approaches represent the ends of a spectrum:

        i At one extreme, the Ibbotson approach assumes that the MRP is constant such that the total required return on equity rises and falls one-for-one with changes in government bond yields; and

        ii At the other extreme, the Wright/TMR approach assumes that the real required return on equity is constant so that every change in the risk-free rate is absorbed by an offsetting change in the MRP.

        In my view, the truth lies between these two extremes, in which case both should be given material weight.

    b Applying material weight to estimates from a standard, well-accepted DGM approach, as an estimate of the forward-looking MRP;

    c Applying no weight to the QCA's 'Siegel' approach because it produces inappropriate and unreliable estimates; and

    d Applying no weight to survey responses because that approach produces inappropriate and unreliable estimates.

5.2 Critique of the QCA's MRP techniques

98. This section provides a critique of the individual techniques that the QCA currently relies on to estimate the MRP, presents an alternative estimation approach that I consider produces more reliable MRP estimates, and implements that alternative approach to produce what I consider is the forward-looking estimate of the MRP that best reflects prevailing market conditions.

99. Frontier Economics has previously provided the QCA with detailed analysis of what we consider to be the strengths and weaknesses of the various approaches that the QCA uses to inform its estimate of the MRP. For example, our views are set out in some detail in our report dated September 2017 and titled *An updated estimate of the Market Risk Premium*. In the remainder of this section, I provide a summary of these views and then draw conclusions about the appropriate approach for estimating the MRP in the current market conditions.

5.3 Ibbotson method

100. I agree with the QCA that the Ibbotson approach provides relevant evidence for the purpose of estimating the MRP – recognising that this approach, by definition, produces an estimate of the MRP that reflects the average market conditions over the historical period that is examined.

101. In the Market Parameters Decision, the QCA indicates that its preferred implementation of the Ibbotson approach is to take the arithmetic mean over the period that begins in 1958, so I follow that approach.

102. Updating the AER Ibbotson (or 'historical excess returns') estimate for the period 1958-2020, and using a value of theta of 0.35 (consistent with a gamma estimate of 0.25) yields an estimate of 6.37%, which I adopt in the calculations below.

5.4 Siegel Method

5.4.1 Overview

103. In my view, the Siegel approach should receive no material weight for three reasons:

    a It is not used by other regulators, practitioners, or academics, including Siegel himself;

    b The Siegel paper is based on the notion that the high real government bond returns in the 1980s are expected to continue in the future. However, precisely the reverse has occurred; and

    c The data required to implement the Siegel approach is not available, requiring strong assumptions to be made to 'fill in the gaps'.

5.4.2 The Siegel approach is not used by others

104. I note that the 'Siegel' method was not developed by Siegel, but rather by Dr Lally, based on his reading of work by Siegel.

105. The QCA has previously recognised that the Siegel method:

> *…is not used by other regulators*[46]

and that:

> *…over 99% of survey respondents have said they do not use it to inform their market risk premium estimates.*[47]

106. However, the QCA has also stated that it is not concerned about the fact that it is essentially unique in its use of the Siegel method:

[46] QCA UT4 Draft Decision, p. 230.

[47] QCA UT4 Draft Decision, p. 230.

> *...in response to these arguments, the QCA simply notes that these arguments are not relevant, as the QCA's practice is to assess proposed methods on their merits — the QCA's view is that the Siegel method has merit.*[48]

107. That is, the QCA's response to the evidence that virtually everyone else ignores the Siegel approach is that virtually everyone else is wrong.

108. By contrast, my view is that the fact that almost everyone who considers the Siegel approach decides to give it no weight is a relevant consideration.

5.4.3 The proposed basis for the Siegel adjustment is not borne out in the data

109. The Market Parameters Decision indicated that the basis for consideration of the Siegel adjustment is that real returns on US government bonds were unusually low prior to 1990:

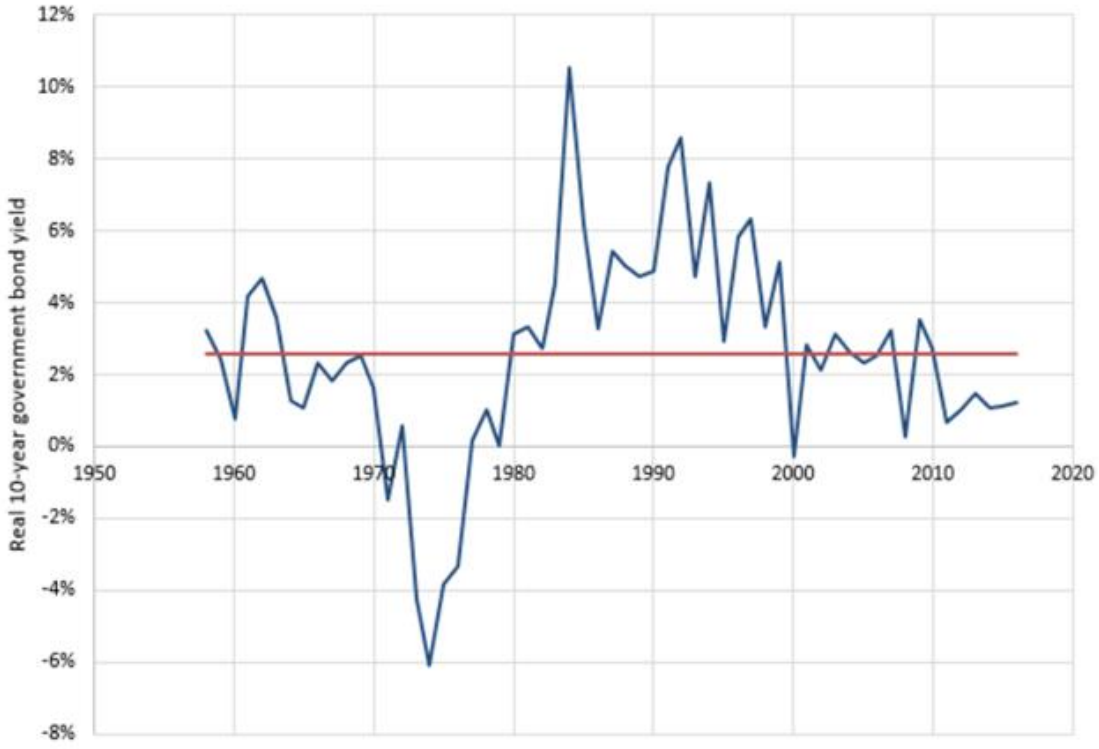
> *In the context of the United States, Siegel demonstrates that over the sub-period, 1926-1990, the Ibbotson estimate of the market risk premium is atypically high due to the unusually low real returns on bonds during that period from unexpected inflation.*[49]

110. **Figure 5** below plots the real yield on 10-year government bonds for each year of the QCA's preferred post-1958 sample period. This figure shows that there is no consistent pattern in real yields. There is a period of negative real rates in the 1970s and a period of very high real rates in the 1980s. The low real rates in the 1970s look no more out of place than the high real rates of the 1980s and 1990s. The former period is approximately 8 percentage points below the mean (shown in red) and the latter is approximately 8 points above it. If low real rates tend to increase the MRP estimate and high real rates tend to decrease it, there are periods of both in the relevant data set.

[48] QCA Market Parameters Decision, p. 62.

[49] QCA, 2014, Market Parameters Decision, p. 59.

Figure 5: **Real yield on 10-year Australian government bonds**



Source: RBA. Data is annual through to end 2016, consistent with QCA's annual application of the Siegel approach.

5.4.4 The required data is not available to implement the Siegel approach

111. The QCA's preferred historical data period begins in 1958, so implementation of the Siegel approach requires estimates of:

    a The actual real government bond yield every year since 1958 (shown in **Figure 5** above); and

    b The expected real government bond yield every year since 1958.

112. For the expected real government bond yield every year, the Commonwealth government inflation-indexed bond yield is used. However, these bonds only began trading in 1987, so no estimates are available for the first 30 or so years of the required sample period. In the Market Parameters Decision, it was therefore assumed that the mean of the expected real yield from 1958-1987 would be the same as the mean from 1987-2013. This might be a reasonable assumption if real yields were stable over time, but they are not – in the 1987-2013 period the real yield on indexed bonds varied between 0.79% and 5.83%. That is, there is no objective basis for estimating the expected real government bond yield for the required period. Extrapolating the post-1987 average back to 1958 to fill the hole in the available data is an unreliable method, given the volatility in the data.

113. In my view, the fact that implementation of the Siegel approach requires an assumption that the (highly variable) indexed bond yield would have the same mean over the 30 years of missing data as for the 25 years of available data is a factor that is relevant to the weight (if any) that should be given to it.

5.4.5 Conclusions on the Siegel approach

114. In my view, there is no proper basis for giving weight to the Siegel approach.

115. When the Siegel papers were written, real returns on government bonds were materially higher than their long-run average. The basis of the Siegel papers was that the then high real government bond returns would continue to remain high into the future – that future real returns on government bonds would be higher than their historical average. However, since the Siegel papers were written, real government bond returns have fallen materially. In particular, inflation-indexed government bond yields have been at historical lows for some years now, as shown in **Figure 5** above. That is, the predictions on which the Siegel method is based have turned out to be quite inconsistent with the observed data.

116. Accordingly, my view is that the Siegel approach does not produce an appropriate estimate of the MRP in current market conditions and it should be given no weight.

5.5 Cornell method

5.5.1 Overview

117. The QCA defines its specification of the DGM approach to estimating the MRP to be the 'Cornell' method. This label is a misnomer in that the approach is unique to the QCA – it is materially different, and produces materially different estimates, from any approach used or advocated by Cornell.

118. In its 2014 Market Parameters Decision, the QCA materially changed the way it implements its Cornell approach – changes that effectively guarantee that it will systematically produce lower estimates of the MRP.

119. Applying the QCA's revised methodology, as at March 2021, yields estimates of:

    a 4.6%-6.4%, with a median of 5.33%, based on a gamma of 0.484; and

    b 3.3%-5.2%, with a median of 4.11%, based on a gamma of 0.25.

120. In my view, the QCA's current implementation of its Cornell approach is inappropriate in that it will systematically underestimate the prevailing MRP. Consequently, my view is that it should receive no weight. In its place, I consider DGM estimates of the MRP used by other Australian regulators that use more standard and recognised specifications of the DGM.

5.5.2 The QCA's revised methodology

121. Prior to its 2014 Market Parameters Decision, the QCA used a relatively standard specification of the DGM whereby the implied market return was derived from current stock prices and forecasted future dividends. This approach produced a single estimate of the required market return, from which the prevailing government bond yield was deducted to produce an estimate of the prevailing MRP.

122. However, in its Market Parameters Decision, the QCA introduced the concept of two discount rates – one that applied for the first 10 years and a different rate that applied for year 11 and beyond. Specifically, the QCA now assumes that equity investors will use a long-run discount rate for all cash flows beyond Year 10. For example, the QCA currently assumes that investors will

discount subsequent cash flows back to Year 10 using a discount rate of 11.2%[50] and then apply a different rate to further discount the cash flow back to the present. In my view, there are a number of problems with this unconventional approach, as set out below.

5.5.3 The new methodology creates a systematic downward bias

123. The first problem with the assumption of different returns being required over different time horizons is that the higher assumed future returns will never be realised.

124. Suppose, for example, that equity investors require a return of 10% p.a. over the next 20 years and that market conditions remain stable over time. If the regulator sets the allowed return to 10% p.a., investors will receive just the return that they require.

125. Now suppose that the regulator forms a view that investors in this sort of firm would require a return of 9% p.a. over the first 10 years and 11% p.a. over the subsequent 10 years. At the beginning of the next regulatory period, the regulator will set an allowed return of 9% on the basis that investors require a 9% return in the short term, followed by an 11% thereafter. However, the same logic will apply at the beginning of *every* regulatory period, so the regulator will always set an allowed return of 9%. Investors will never receive the higher future return that is required to balance things out.

5.5.4 The allowed return becomes an assumption rather than an estimate

126. The standard approach to implementing the dividend discount approach involves estimating a single required return to be applied to all future cash flows. The QCA's current approach, however, is to use two discount rates – an assumed rate that applies to cash flows beyond 10 years and a short-term rate that applies to cash flows over the first 10 years. These two rates must, by construction, balance out to the standard single rate over the long run.

127. Consequently, if one assumes a high rate for the post period, the rate for the pre period will be lower, and vice versa. That is, the allowed return for the pre period is simply a function of the assumption that is made about the return for the post period. Moreover, there is no accountability in relation to the assumption about the required return in the post period because, as shown above, the latter period never arises in the regulatory setting – for every regulatory determination, the regulator will always be considering only the return that is required over the immediate short-term.

128. That is, the allowed return over a forthcoming regulatory period can be reduced by simply stating that investors would require a higher return from cash flows more than 10 years in the future.

5.5.5 The regulatory allowance will be materially more volatile

129. The two-discount-rate approach has the effect of increasing the volatility of MRP estimates. To see this, suppose that the standard single estimate of the required return on the market is above 11.2%, say 13%. The approach of assuming that the post 10-year return is equal to 11.2% means that the pre 10-year return must be set above 13% so that the pre and post returns will average out to 13%.

[50] Calculated as the average 10-year real risk-free rate over the period July 1993 – March 2021, adding 2.5% midpoint inflation (a nominal risk-free rate of 5.2%) and a 6% long run market risk premium. See QCA, 2014, Market Parameters Decision, p. 71.

130. Symmetrically, if the standard single estimate is below 11.2%, the two-discount-rate approach produces a pre 10-year estimate below the single estimate.

131. That is, relative to the standard approach of using dividend discount models to estimate a single required return to apply to all cash flows, the two-discount-rate approach will produce more volatile allowed returns.

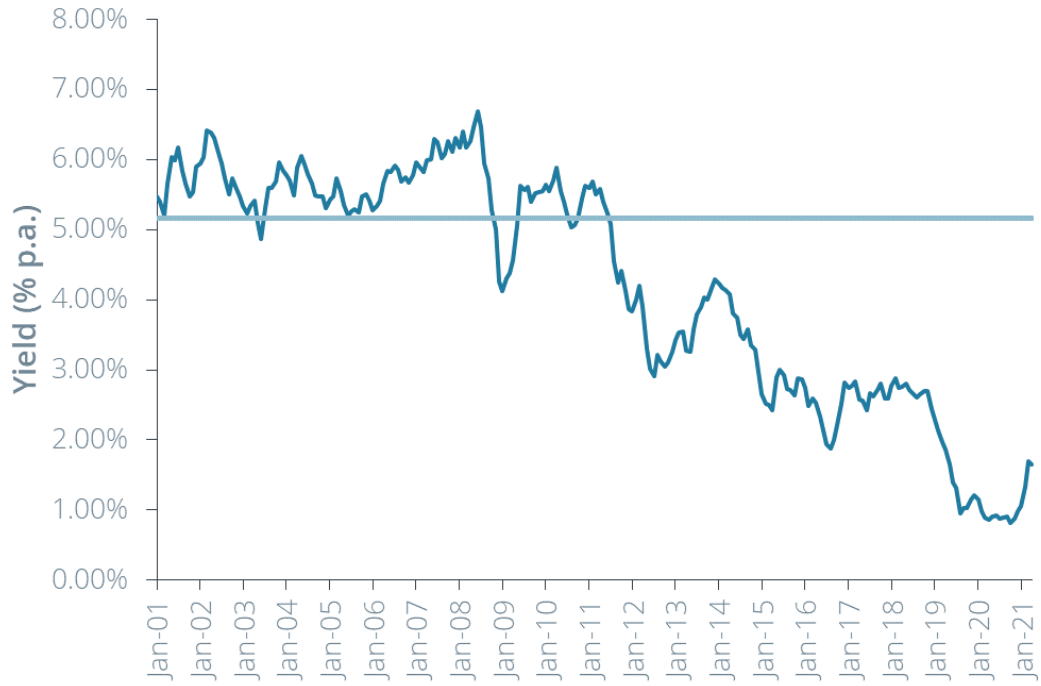
5.5.6 There is no basis for the assumption that the risk-free rate will return to 5.2% within 10 years

132. The basis for the assumption of a future required return of 11.2% is the assumption that investors will expect the government bond yield to increase to 5.2% over the next 10 years. The 5.2% figure is obtained by averaging yields since 1993, as illustrated in **Figure 6** below. That figure shows that government bond yields have fallen quite consistently since 1993.

133. It seems unlikely that the best estimate of the 10-year government bond yield 10 years in the future would always be 5.2%. Rather, it seems more likely that the expected future yield would be lower if the current yield is low and higher if the current yield is high.

134. At the time of the Market Parameters Decision, the 10-year government bond yield was 4.29% and it is now 1.7% as at March 2021. Thus, it is logical to suggest that the likelihood of the yield rising to 5.2% over the next 10 years is now materially lower than at the time of the Market Parameters Decision.

Figure 6: **Australian 10-year government bond yields**



Source: RBA.

5.5.7 The standard approach is to use the DGM approach to estimate a single required return to apply to all cash flows

135. The two-discount-rate approach is based on the notion that the regulator should compute something other than the required return on long-term equity capital. This differs from recent pronouncements by other regulators. For example, the AER has recently determined that allowing a return on equity that is commensurate with the return required by long-term providers of equity capital is precisely what it *should* be doing. In particular, the AER recognises:

> *…the long term nature of cash flows in equity investment, in general, and the long lived nature of the assets in an infrastructure business (such as electricity and gas service providers).*[51]

136. The AER also states that:

> *…in applying the CAPM, practitioners assume that the equity investment for an ongoing business is long term. This is because it generates a potentially infinite stream of cash-flows. Pratt and Grabowski (2010) and Damodaran (2008) both propose that, in general, an equity investment in an ongoing business is long term. They suggest, therefore, that for an ongoing business, the term of the equity should be measured as the duration of the long-term—and potentially infinite—series of cash flows.*[52]

and concludes that it will allow a return on equity that is commensurate with the return required by long-term providers of equity capital.

137. Similarly, dividend discount models are frequently used in independent expert valuation reports. In that context, a single discount rate is always used.

5.5.8 Current standard DGM estimates of the MRP

138. I note that the AER has published its DGM model allowing for it to be easily updated to reflect prevailing financial market data. I have updated that model and note that the AER's current base case DGM estimate is 7.0% as at March 2021 (based on a gamma of 0.25).

139. I also note that IPART considers a number of specifications of the DGM, which it distils into a single 'current' estimate of the MRP. IPART's February 2021 Biannual WACC Update reports a current MRP of 8.4%.[53]

5.5.9 Conclusions on the Cornell approach

140. In my view, the QCA's unique 'dual discount rate' approach has no proper basis and should not be used. Rather a standard specification of the DGM should be used. I note that the AER and IPART approaches currently produce estimates of 7.0% and 8.4%, respectively. I adopt a mid-point estimate of 7.7% in the calculations below.

[51] AER, 2013, Draft Rate of Return Guideline – Explanatory Statement, p. 181.

[52] AER, 2013, Draft Rate of Return Guideline – Explanatory Statement, p. 182.

[53] IPART, February 2021, WACC Biannual Update.

5.6 Wright/TMR method

141. I agree with the QCA that the Wright/TMR approach provides relevant evidence for the purpose of estimating the MRP.

142. In the Market Parameters Decision, the QCA indicates that its preferred implementation of the historical approaches is to take the arithmetic mean over the period that begins in 1958, so I follow that approach.

143. I have used the spreadsheet model that the AER has provided as part of its Rate of Return Guideline process.[54] I have taken the estimate based on the period 1958-2020 and using the prevailing 10-year government bond yield of 1.7% as at March 2021. This produces a Wright estimate of the MRP of 9.35% (theta of 0.35 and gamma of 0.25), so I adopt that figure in the calculations below.

5.7 Surveys

144. In its Market Parameters Decision, the QCA concluded that it would have regard to survey evidence reported each year by Spanish academic Pablo Fernandez.[55] In my view, these surveys should be afforded no weight for reasons including:

    a There is no information about the qualifications of respondents.

    b There is no information about the non-response rate.

    c The survey does not ask respondents what they are using the MRP for. It is unlikely that any of the respondents would be using the MRP to make real-world investment decisions. As Dr Lally has noted "The respondents to these surveys are academics, analysts, and managers rather than investors per se."[56]

    d No information is provided about whether respondents are providing an estimate of the MRP over the following year or ten years, or some other period.

145. In addition, the survey responses cannot be compared, on a like with like basis with the QCA's other estimates of MRP because:

    a Recent Fernandez surveys indicate that survey respondents pair their MRP estimates with a risk-free rate that is materially above the prevailing government bond yield. Thus the 'premium' reported by respondents is not relative to the same base rate as used by the QCA; and

    b The responses from survey participants do not reflect the QCA's estimated value of imputation tax credits.

146. For the reasons set out above, my view remains that the survey approach does not produce an appropriate estimate of the MRP in current market conditions and it should be given no weight.

[54] https://www.aer.gov.au/system/files/Historical%20excess%20returns%20and%20Wright%20approach%20data.XLSX.

[55] QCA, 2014, Market Parameters Decision, p. 65.

[56] Lally, M., 2013, Response to submissions on the risk-free rate and the MRP, Report for the Queensland Competition Authority, p. 23.

5.8 A more reliable approach to estimating the MRP

147. In my view, the most reliable estimate of the MRP is obtained by assigning material weight to:

    a Estimates of the MRP that are based on long-run historical data; and

    b Estimates of the MRP that are based on current forward-looking market data.

148. The historical estimates provide an anchor for the MRP estimate – being an estimate that reflects the long-run average market conditions. These estimates have the advantage of being based on large data sets, which results in estimates being more statistically precise. However, they have the disadvantage of not reflecting the prevailing market conditions, particularly during periods where the prevailing conditions differ materially from the long-run average conditions. Such is the case now, as government bond yields have fallen to levels never before seen.

149. In my view, an appropriate estimate of the MRP is obtained by applying equal weight to long-run average historical estimates and forward-looking prevailing estimates.

150. For the historical estimates, I apply equal weight to the Ibbotson and Wright/TMR approaches. I consider that these two approaches represent the ends of a spectrum:

    a At one extreme, the Ibbotson approach assumes that the MRP is constant such that the total required return on equity rises and falls one-for-one with changes in government bond yields; and

    b At the other extreme, the Wright approach assumes that the real required return on equity is constant so that every change in the risk-free rate is absorbed by an offsetting change in the MRP.

151. In my view, the truth lies between these two extremes. Consequently, I take, as my estimate from historical data, the mid-point of the Ibbotson and Wright estimates, which is 7.8%.[57]

152. As set out above, my forward-looking DGM estimate is 7.7%.

153. Applying equal weight to the historical and forward-looking estimates produces a final MRP estimate of 7.75%. This implies a total required return on equity of 9.45%.[58] I note that this is materially lower than the QCA's estimate of the average return on equity of 11.2%.

[57] The mid-point of 6.37% and 9.35%.

[58] Where the current 10-year government bond yield is 1.7%.

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