Appendix E

Response to the UT5 Draft Decision on the market risk premium

REPORT PREPARED FOR AURIZON NETWORK

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1 Executive summary

1 Frontier Economics has been retained to review and respond to the Queensland Competition Authority's (QCA's) market risk premium (MRP) allowance in its Draft Decision[1] in relation to Aurizon Network's (Aurizon's) 2017 Draft Access Undertaking for the UT5 period.

1.1 Key findings

2 Our key conclusions in relation to the MRP allowance in the UT5 Draft Decision are set out below.

No increase in MRP allowance (see Section 2 of this report):

3 The UT5 Draft Decision does not increase the MRP estimates relative to previous decisions. The 10-year MRP of 6.5% and the 4-year MRP of 7.0% are both consistent with previous QCA decisions. The only change is that the UT5 Draft Decision uses a 4-year MRP to correct an inconsistency in the implementation of the CAPM.

4 That is, the QCA now seeks to implement the CAPM in an internally consistent way by pairing a 4-year risk-free rate with an MRP estimated relative to that same 4-year risk-free rate. We agree that there must be consistency between the two risk-free rates that are used in the CAPM formula.[2] However, it is important not to confuse the removal of the previous inconsistency in the QCA's implementation of the CAPM with an increase in the MRP allowance.

5 The stability of the MRP estimates appears to be inconsistent with the UT5 Draft Decision's own conclusion that there is evidence of an increase in market risk premiums in the prevailing market conditions.

6 For example, the UT5 Draft Decision notes that:

> …estimates from four of the five methods have increased, in some cases materially, since the DBCT final decision—our most recent assessment of the MRP, which applied an MRP of 6.5 per cent[3]

and that:

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[1] QCA, Aurizon Network's 2017 draft access undertaking, Draft Decision, December 2017 (Draft Decision).

[2] However, we note that our preference would be to use the same 10-year risk-free rate in both places, for reasons set out below and in our companion report on the term of the risk-free rate.

[3] UT5 Draft Decision, p. 84.

> …a component of the survey estimate (that is, the Fernandez et al. 2017 survey result) has materially increased, from 6.0 per cent to 7.6 per cent, since our previous assessment.[4]

7   The UT5 Draft Decision also explains that an increase in the MRP is plausible in the prevailing market conditions:

> As the QCA estimates the MRP for the regulatory term, it could be anticipated that short-term market fluctuations during the regulatory cycle result in the true MRP being either higher or lower than the MRP estimated at the previous regulatory reset.

> Further, 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.[5]

Amalgam of 4-year and 10-year MRP estimates (see Section 2 of this report):

8   The UT5 Draft Decision takes a weighted average of the estimates from a range of MRP estimates,[6] some of which have been computed relative to the 4-year risk-free rate and some of which are relative to a 10-year risk-free rate.   This produces an amalgam of 4-year and 10-year MRP estimates.

9   Our view is that all approaches should seek to estimate a 4-year MRP, and that it would be straightforward for the QCA to implement such an approach consistently.

Choices made when considering the relevant evidence (see Section 3 of this report):

10   In a number of places in the UT5 Draft Decision, the QCA makes choices about how to implement its MRP estimation procedures and about the relative weight to apply to each piece of evidence.   The implementation of these choices disproportionately results in a reduction of the MRP allowance adopted in the Draft Decision.

11   The relative weights applied in the Draft Decision are not well justified:

> a. The Draft Decision applies material weight to the "Siegel" approach developed for the QCA. Our view is that approach should receive no weight.

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[4] UT5 Draft Decision, p. 84.

[5] UT5 Draft Decision, p. 81.

[6] UT5 Draft Decision, p. 83.

b. The Draft Decision concludes that the Ibbotson/Siegel and Wright approaches are equally justified, but gives materially more weight to the former.

12 In relation to the survey approach:

a. MRP estimates are computed relative to the 10-year risk-free rate instead of the 4-year rate, even though the evidence shows respondents to be using the 10-year rate.

b. MRP estimates are computed as a blend of ex-imputation and with-imputation estimates, even though with-imputation estimates are required.

c. Survey respondents clearly use a risk-free rate above the prevailing government bond yield, but the Draft Decision does not take this important information into account.

d. The Draft Decision reduces the weight applied to the Fernandez survey on the basis of concerns about sample size. However, the sample size is comparable to past Fernandez surveys.

13 In relation to the Cornell (DGM) approach:

a. The Draft Decision makes a number of adjustments when implementing the Cornell approach, all of which have the effect of reducing the MRP estimate, including:

  i. The QCA makes a reduction of 0.5%, 1.0% and 1.5% to its estimate of long-run GDP growth; and

  ii. The QCA assumes that investors have two different required returns on equity, an 11.8% required return on all cash flows beyond year 10 and a lower required return on all cash flows before year 10.

b. MRP estimates are computed relative to the 10-year risk-free rate instead of the 4-year rate, even though the evidence shows respondents to be using the 10-year rate.

c. The effect of freezing the 5.8% estimate of the long-run risk-free rate at its 2013 level (while all other aspects of the calculation are updated to reflect current data) is to materially reduce the MRP estimate.

1.2 Author of report

14 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 graduate level courses with a focus on cost of capital issues, I have published widely in high-level academic journals, and I have more than 20 years' experience advising regulators, government agencies and regulated businesses on cost of capital issues. I have published a number of papers that specifically address beta estimation issues. A copy of my curriculum vitae is attached as an appendix to this report.

15   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 the Federal Court's Expert Evidence Practice Note GPN-EXPT, which comprises the guidelines for expert witnesses in the Federal Court of Australia. I have read, understood and complied with the Practice Note and the Harmonised Expert Witness Code of Conduct that is attached to it and agree to be bound by them.

16   I have been assisted in the preparation of this report by Dinesh Kumareswaran and Simon Lang from Frontier Economics.

2 No increase in MRP estimates, despite evidence of a higher required risk premium

2.1 Background and context

17 The QCA's approach is to set the allowed return on equity using the Sharpe-Lintner CAPM:

$$r_e = r_f + \beta(r_m - r_f)$$

where:

    a. r_f represents the **risk-free rate** of return. This is the return that is available to investors on an investment that is completely free of risk. Commonwealth government bonds are usually assumed to be such a risk-free investment;

    b. r_m represents the **required return on the market portfolio**, which represents the return that investors would require for investing in an asset with average risk; and

    c. β represents the **equity beta**, which indicates the extent to which the particular investment has more or less risk than average.

18 In the context of this model, the market risk premium (MRP) can be defined as the difference between the estimate of the required return on the market portfolio and the risk-free rate:

$$MRP = r_m - r_f.$$

19 This MRP then represents the additional return (over and above the risk-free rate of return) that investors would require to invest in an asset of average risk.

20 This is equivalent to noting that the estimate of the required return on the market portfolio can be separated into two components – the risk-free rate and the MRP:

$$r_m = r_f + MRP.$$

21 In its Market Parameters Decision, and in all subsequent decisions prior to the UT5 Draft Decision, the QCA has adopted a MRP of 6.5% relative to the prevailing 10-year risk-free rate. Thus, the QCA's estimate of the required return on the market portfolio can be obtained by adding 6.5% to the 10-year risk-free rate over the averaging period for the relevant decision.

2.2 Approach adopted in the UT5 Draft Decision

22 Applying the Market Parameters approach at the time of the UT5 Draft Decision would produce an estimate of the required return on the market of 8.9% because

the 10-year risk-free rate at that time was 2.4%.[7] That is, the approach set out in the Market Parameters Decision, applied using risk-free rates at the time of the UT5 Draft Decision, would be consistent with investors requiring a return of 8.9% to invest in an asset of average risk.

23   However, in its UT5 Draft Decision, the QCA has changed its approach to the MRP. In the Draft Decision, the QCA has reported its MRP relative to a short-term risk-free rate that matches the length of the relevant regulatory period, which the QCA has taken to be four years in the case of UT5.

24   In this regard, the UT5 Draft Decision states that a number of stakeholders have noted that the QCA's previous approach uses a 4-year risk-free rate in one place in the CAPM formula and a 10-year risk-free rate in the other:

> In the UT5 context, as well as in other recent undertaking considerations, some stakeholders have raised the concern that the QCA uses a risk-free rate matching the term of the regulatory cycle in the first term in the cost of equity but a 10-year rate in estimating the MRP.[8]

25   This internal inconsistency has led the QCA to now adopt an MRP allowance relative to the 4-year risk-free rate, so that the same risk-free rate is used in both places in which it appears in the CAPM equation. The UT5 Draft Decision states that:

> We have undertaken further analysis of historical bond rates for the purpose of estimating a four-year risk free rate for the MRP.[9]

26   In its UT5 Draft Decision, the QCA has adopted a 4-year risk-free rate of 1.9% and a MRP (relative to that rate) of 7.0%. Thus, the estimate of the required return on the market that the QCA has adopted for its UT5 Draft Decision is 8.9%.[10]

27   That is, the estimate of the required return on the market (i.e., the required return for a company of average risk) is the same as it would have been under the QCA's previous approach:

      a.   Under its previous approach, the QCA would have set the required return for the average firm to 8.9%; and

      b.   Under the UT5 approach, the QCA sets the required return for the average firm to 8.9%.

28   In summary, the approach adopted in the UT5 Draft Decision results in precisely the same estimate of the required return on equity for the average firm as would

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[7] That is, 2.4% + 6.5% = 8.9%.

[8] UT5 Draft Decision, p. 476.

[9] UT5 Draft Decision, p. 476.

[10] That is, 1.9% + 7.0% = 8.9%.

have been obtained from the QCA's previous approach. The UT5 Draft Decision does not increase the MRP estimate relative to the Market Parameters Decision. At the time of both decisions:

    a. The MRP relative to the 10-year risk-free rate is estimated to be 6.5%; and

    b. The MRP relative to the 4-year risk-free rate is 7.0%.

29   By way of analogy, if a temperature is reported at 0 degrees Celsius at one time, and then as 32 degrees Fahrenheit at another, there has been no increase. In both cases, the temperature is 0 when measured on the Celsius scale and 32 when measured on the Fahrenheit scale.

30   Similarly, the UT5 Draft Decision does not increase the MRP estimate. The 10-year MRP is the same as in previous decisions and the 4-year MRP is also unchanged.

31   What *has* changed in the UT5 Draft Decision is that the QCA now seeks to implement the CAPM in an internally consistent way by pairing a 4-year risk-free rate with an MRP estimated relative to that same 4-year risk-free rate. We agree that there should be consistency between the two risk-free rates that are used in the CAPM formula.[11] However, it is important not to confuse the correction of the previous inconsistency with an increase in the MRP allowance.

32   In the remainder of this section, we address what we consider to be two material issues with the approach adopted in the UT5 Draft Decision:

    a. As set out above, the UT5 Draft Decision does not increase MRP estimates relative to those set out in the Market Parameters Decision, even though the Draft Decision states that the evidence supports an increase in the MRP; and

    b. For a number of the methods, the MRP is still computed relative to the 10-year risk-free rate. Thus, the resulting estimate is an amalgamation of 4-year and 10-year MRP estimates – akin to averaging over some temperatures measured in Celsius and some in Fahrenheit. Thus, the inconsistency has not been fully removed because the final MRP allowance still depends materially on the 10-year risk-free rate.

2.3   Evidence of an increase in the MRP

33   The UT5 Draft Decision notes that:

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[11] However, we note that our preference would be to use the same 10-year risk-free rate in both places, for reasons set out below and in our companion report on the term of the risk-free rate.

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> …estimates from four of the five methods have increased, in some cases materially, since the DBCT final decision—our most recent assessment of the MRP, which applied an MRP of 6.5 per cent[12]

and that:

> …a component of the survey estimate (that is, the Fernandez et al. 2017 survey result) has materially increased, from 6.0 per cent to 7.6 per cent, since our previous assessment.[13]

34   The UT5 Draft Decision also explains that an increase in the MRP is plausible in the prevailing market conditions:

> As the QCA estimates the MRP for the regulatory term, it could be anticipated that short-term market fluctuations during the regulatory cycle result in the true MRP being either higher or lower than the MRP estimated at the previous regulatory reset.

> Further, 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.[14]

35   However, as explained above, the QCA's estimates of:

    a. A 10-year MRP of 6.5% and

    b. A 4-year MRP of 7.0% are unchanged in the UT5 Draft Decision.

36   The only change is that the QCA now consistently pairs a 4-year MRP with a 4-year risk-free rate.

37   The stability of the MRP estimates appears to be inconsistent with the Draft Decision's observation of evidence of an increase in market risk premiums in the prevailing market conditions.

38   The UT5 Draft Decision cites a "plausible negative correlation between the risk-free rate and the MRP"[15] as one of the reasons for an increase in the MRP in the prevailing market conditions. That is, if the risk-free rate and MRP are negatively correlated, the MRP would increase to (at least partially) offset any fall in the MRP. This would result in a more stable headline required return on equity. It would then follow that the MRP has risen since the Market Parameters Decision to (at least partially) offset the decline in government bond yields over the last four years.

39   In our previous report,[16] we cited evidence from a range of central banks, market participants and other regulators (including the ERA, IPART, Ofgem and FERC)

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[12] UT5 Draft Decision, p. 84.

[13] UT5 Draft Decision, p. 84.

[14] UT5 Draft Decision, p. 81.

[15] UT5 Draft Decision, p. 81.

[16] Frontier Economics, 2016, *The market risk premium*, November, Section 2.6.

recognising that the total market return is relatively stable as declines in the risk-free rate are at least partially offset by an increase in the MRP.

40   More recently, the same point has been made in a study commissioned by Ofwat. PwC Economics (2017)[17] state that:

> We support the view that there is greater stability of TMR [total market return] assumptions compared to bond yields. This has resulted in the shift in emphasis in regulatory cost of capital calculations away from estimating the risk-free rate separately from the equity market risk premium and instead estimating the TMR and then deconstructing into its constituent elements. This approach also means that the precise selection of the RFR and EMRP are of lesser importance.

> Our approach is consistent with a negative relationship between the risk-free rate and the equity market risk premium, so that as interest rates have fallen, the equity market risk premium has risen, resulting in smaller movements in the TMR. [18]

41   PwC Economics (2017) go on to demonstrate the negative correlation between risk-free rates and the equity MRP as in Figure 1 below.

Figure 1: Relationship between risk-free rate and MRP: UK data
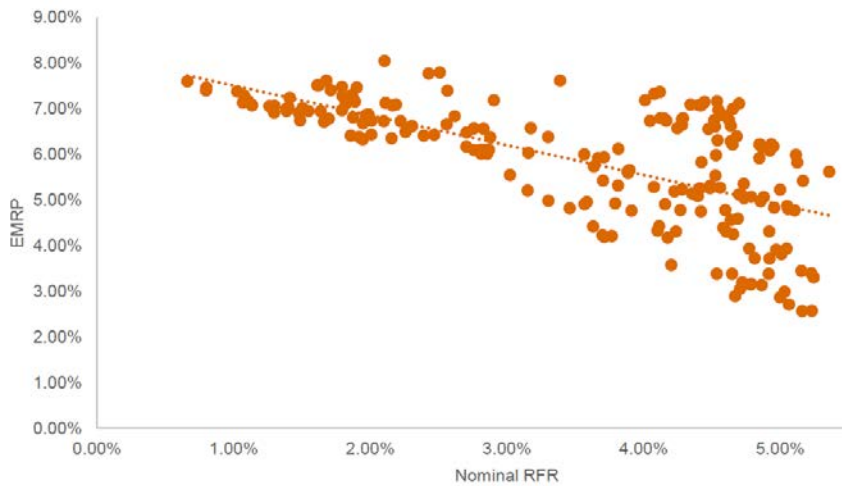
*Source: PwC Economics (2017), Figure 2, p. 11.*

42   PwC Economics (2017, Paragraph 3.6) conclude that the decline in risk-free rates has been at least partially offset by an increase in the MRP.

43   The same results apply in relation to the Australian data. Figure 2 below shows the relationship between the risk-free rate and the prevailing MRP computed using the AER's DGM approach.

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[17] PwC Economics, 2017, *Updated analysis on cost of equity for PR19*, December.

[18] PwC Economics (2017), Paragraphs 3.3 to 3.4.

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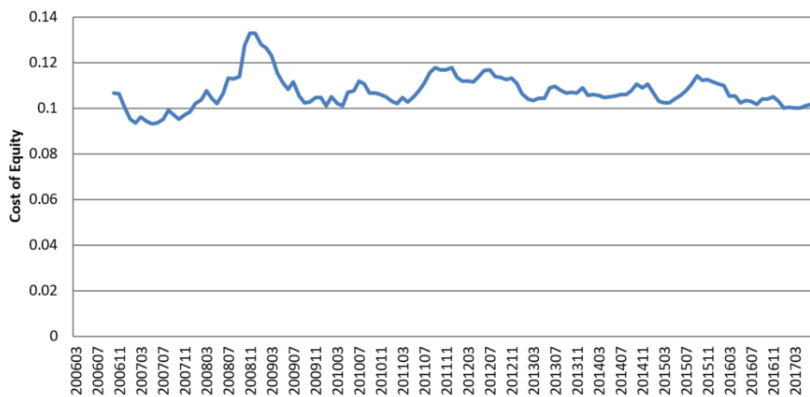
Figure 2: Relationship between risk-free rate and MRP: Australian data
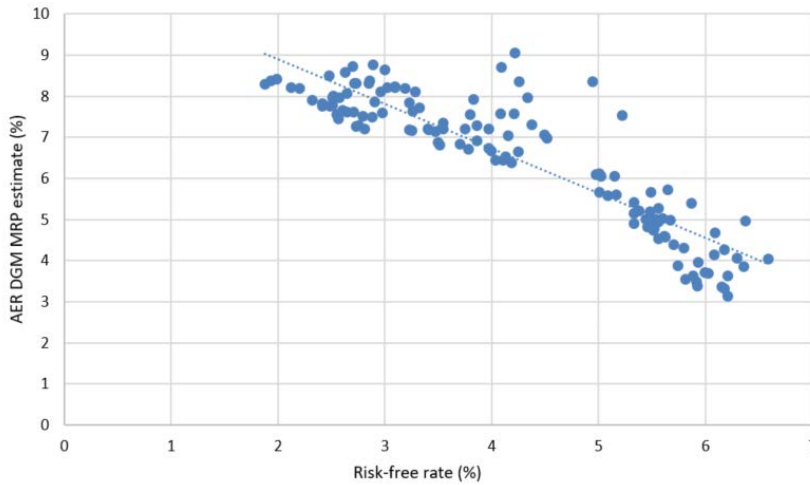
Source: AER DGM approach. Frontier Economics calculations.

44   In the Australian data, the correlation is very strong, at -0.9. This results in a stable total required return on equity (total market return) as illustrated in Figure 3 below.

Figure 3: Total market return: Australian data

Source: AER DGM approach. Frontier Economics calculations.

45   By contrast, the QCA's approach has been to keep the 10-year MRP fixed at 6.5% from the time of the Market Parameters Decision through to the present, including in the UT5 Draft Decision. The fact that this has occurred even as the risk-free rate has declined materially is inconsistent with all of the evidence presented in this section, and in our previous report. It is particularly inconsistent with the recognition that:

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> …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.[19]

2.4 Maintenance of a 10-year MRP for some estimation methods

46 In the UT5 Draft Decision, the QCA maintains its practice of using a range of estimation methods to inform its estimate of the MRP. For some of these methods, the QCA has revised its estimation approach to replace 10-year risk-free rates with 4-year risk-free rates. The result from these methods is an estimate of the 4-year MRP. However, for other approaches, the QCA has made no change to its previous approach, so those approaches continue to produce estimates of a 10-year MRP.

47 The UT5 Draft Decision then takes a weighted average of the estimates from the various approaches,[20] which results in an amalgam of 4-year and 10-year MRP estimates. As explained below, our view is that all approaches should seek to estimate a 4-year MRP, and that it would be straightforward for the QCA to implement such an approach consistently.

48 In the remainder of this section, we consider the estimation methods that have not been adjusted to produce estimates of the 4-year MRP.

2.4.1 Survey estimates

49 In the 2014 Market Parameters Decision, the QCA assumed (reasonably in our view) that survey respondents supply a MRP estimate relative to the long-term (e.g., 10-year) government bond yield.

50 In the UT5 Draft Decision, the QCA abandons that approach in favour of the assumption that survey participants might supply a MRP estimate relative to the 4-year government bond yield. In this regard, the QCA states that:

> We also hold the view that there is no basis to assume that survey respondents define the MRP relative to the 10-year risk-free rate. Further, some respondents might even provide responses to very short-term rates.[21]

51 However, there *is* strong evidence that survey respondents use a 10-year risk-free rate – the "short-term" assumption is directly contradicted by the survey evidence itself:

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[19] UT5 Draft Decision, p. 81.

[20] UT5 Draft Decision, p. 83.

[21] QCA, 2017, UT5 Draft Decision, p. 477, emphasis added.

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a. The KPMG survey[22] indicates that the vast majority of respondents use a 10-year government bond yield or a figure even higher than that; and

b. The Fernandez survey[23] sets the 10-year government bond yield as the appropriate benchmark and shows that respondents are adopting a risk-free rate even higher than the 10-year yield.

52 Consequently, the QCA's survey estimate is downwardly biased in that it assumes that responses are relative to a shorter-term risk-free rate when they are clearly relative to a 10-year risk-free rate or even higher figure.

53 Moreover, the same survey estimates that were interpreted as 10-year MRPs in previous decisions are now interpreted as 4-year MRP's in the UT5 Draft Decision.

54 Finally, we note that a 4-year MRP estimate can be easily obtained from the survey data, as follows:

a. The QCA has concluded that surveys support an MRP of 7.0%, and our view is that this should be interpreted as an estimate of the 10-year MRP in the prevailing market conditions.

b. The 4-year risk-free rate is 0.5% less than the 10-year risk-free rate in the prevailing market conditions.

c. Consequently, the estimate of the 4-year MRP would be 7.5% – reflecting that the margin to the 4-year risk-free rate would be 0.5% greater than the margin to the 10-year risk-free rate.

2.4.2 Cornell DGM estimates

55 In its UT5 Draft Decision, the QCA uses the 10-year government bond yield when implementing the Cornell DGM approach.

56 The Cornell DGM approach first produces an estimate of the required return on the market. The prevailing risk-free rate is then deducted to produce an estimate of the MRP.

57 If one is seeking to estimate the MRP relative to the 4-year yield, one would simply deduct the prevailing 4-year yield from the Cornell estimate of the required return on the market. However, the QCA deducts the prevailing 10-year yield, and treats the resulting figure as an MRP relative to the 4-year yield.

[22] KPMG, 2017, Valuation practices survey, July, pp. 10-11.

[23] Fernandez, P., V. Pershin and I.F. Acin, Discount rate (risk-free rate and market risk premium used for 41 countries in 2017: A survey, ssrn.com/abstract=2954142.

58   In our view, this approach makes little sense – it is not clear why one would deduct the 10-year yield when the objective is to estimate the MRP relative to the 4-year yield.

59   The effect of the inconsistency is made clear when considering how this information is used within the CAPM, as shown in Figure 4 below.

Figure 4: Inconsistency in QCA approach to Cornell MRP estimate

$$r_e = r_f + \beta(r_m - r_f)$$

1. Estimate using Cornell   2. Subtract 10-year yield

3. Add back 4-year yield
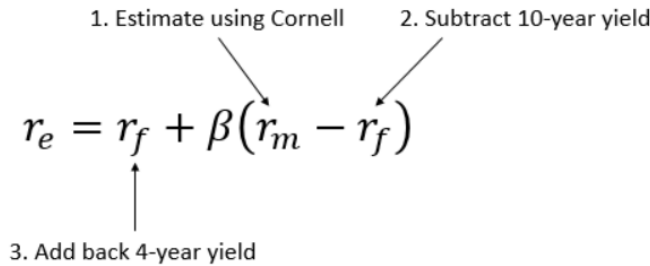
60   In the current market conditions, this inconsistency results in the MRP estimate being understated by 0.5%.

61   The UT5 Draft Decision explains the rationale for deducting the 10-year risk-free rate from the Cornell estimate of the MRP as follows:

> Specifically, in the regulatory context of estimating the MRP, an MRP estimate is sought for a finite time period. Standard estimates of the MRP from the DGM involve estimating the market cost of equity for an infinite period but then deducting a risk-free rate for a finite period. Lally demonstrates that the inconsistency between the infinite term for the market cost of equity and the finite term for the risk-free rate will bias the resulting estimate of the MRP. However, this bias can be reduced by matching, to the greatest extent possible, the term of the market cost of equity to the term of the risk-free rate. As the term of the market cost of equity is infinite, satisfying this condition means using the yield of the longest-term bond available (i.e. 10 years) for the risk-free rate. Following this process will produce an estimate of the MRP that is less biased than an estimate that arises from a process that deducts a shorter-term risk-free rate.[24]

62   In our view, the issue is much simpler than this complex-sounding explanation would suggest:

   a.   The QCA's Cornell approach produces an estimate of the required return on the market of 8.8%.

   b.   The QCA then deducts the prevailing 10-year risk-free rate of 2.4%, producing a 10-year MRP estimate of 6.4%.

   c.   If the QCA had instead deducted the prevailing 4-year risk-free rate of 1.9%, the result would be an estimate of the 4-year MRP of 6.9%.

[24] UT5 Draft Decision, pp. 489-490.

63   Another way of considering this issue is that the same 6.4% figure cannot be simultaneously the best prevailing estimate of the 10-year MRP and the best prevailing estimate of the 4-year MRP. The QCA has consistently interpreted the Cornell approach as producing an estimate of the 10-year MRP. The UT5 Draft Decision uses the same Cornell approach that has been adopted in every decision since the 2014 Market Parameters Decision.   Consequently, it should be interpreted as the QCA's estimate of the 10-year MRP. If the premium relative to the 2.4% 10-year risk-free rate is 6.4%, it follows that the premium relative to the 1.9% 4-year risk-free rate must be 6.9%.

3 Choices made when considering the relevant evidence

3.1 Overview

64   In a number of places in the UT5 Draft Decision, the QCA makes choices about how to implement its MRP estimation procedures and about the relative weight to apply to each piece of evidence. This section of the report demonstrates that the implementation of these choices disproportionately results in a reduction of the MRP allowance adopted in the Draft Decision.

3.2 Relative weights applied to estimates from different approaches

65   The UT5 Draft Decision sets out the derivation of the allowed MRP of 7.0% as a weighted average of a set of estimates from different approaches, as summarised in Table 1 below.

Table 1: UT5 Draft Decision MRP estimates

Method	Point estimate	Weight
Ibbotson	6.6%	25%
Siegel	5.9%	15%
Cornell	6.4%	25%
Surveys	7.0%	20%
Wright	9.5%	15%
Weighted average	7.0%	

Source: QCA December 2017 UT5 Draft Decision, p. 83.

66   In our view, there are a number of issues relating to the QCA's proposed weighting scheme, all of which tend to reduce the final estimate.

The Siegel approach is unreliable and inappropriate and should not be afforded material weight.

67   As noted in our previous report:[25]

   a.   The "Siegel" approach is the QCA's own invention and is not used by regulators, practitioners or academics;

   b.   It is unorthodox to revise the historical data by:

      i.   Identifying which historical events would have been expected by investors at the time, and which would have been unexpected by investors at the time; and

      ii. Making an adjustment to convert the data into what one considers it would have looked like if the unexpected events had not occurred.

         This is because there is no objective standard by which particular historical data periods may be said to be unexpected and therefore in need of "adjustment."

   c.   The data required to implement the Siegel approach is not available, requiring strong assumptions to be made; and

   d.   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.

68   The UT5 Draft Decision makes two main responses to our submissions on the "Siegel" method. The first point relates to our submission about identifying which historical events would have been expected by investors at the time, and which would have been unexpected by investors at the time and making an adjustment to convert the data into what one considers it would have looked like if the unexpected events had not occurred. On this point, the UT5 Draft Decision states that:

> While we acknowledge that shocks of short duration might tend to offset over a long time period, not all shocks, or sources of bias, are necessarily equal.[26]

69   The Draft Decision goes on to conclude that, because the high-inflation period persisted for so long (50 years), the historical data set may not be long enough to offset it.[27]

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[25] Frontier Economics, 2017, *An updated estimate of the market risk premium*, September.

[26] UT5 Draft Decision, p. 479.

[27] UT5 Draft Decision, p. 479.

70 Logically, however, it cannot be that an event that persisted for 50 years could have been unexpected for its entire duration. That is, it cannot be that investors across the market were surprised by inflation outcomes year after year for 50 consecutive years. Logically it simply cannot be that an event is simultaneously unexpected and so long-lasting that it dominates the historical data set.

71 Moreover, 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.[28]

72 In Figure 5 below (drawn from our previous report) we plot the real yield on 10-year government bonds for each year of the 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 – and they do appear to offset.

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

Choices made when considering the relevant evidence

Figure 5: Real yield on 10-year Australian government bonds
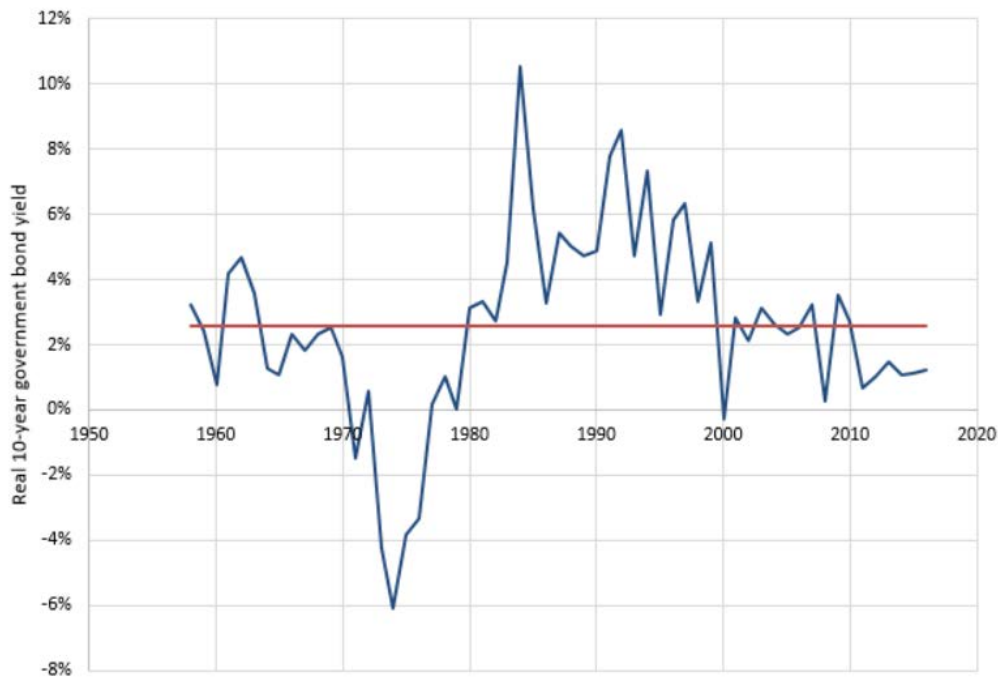
Source: RBA. Data is annual through to end 2016, consistent with QCA's annual application of the Siegel approach.

73   The UT5 Draft Decision also responds to our observation on the availability of data. We have previously noted that the Market Parameters Decision assumed that the expected real yield from 1958-1987 would be the same as the mean real yield on inflation-indexed bonds from 1987-2013. We concluded that 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%.[29] Our view is that 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.

74   The UT5 Draft Decision concludes that such an extrapolation *is* sufficiently reliable.[30] However, we remain of the view that extrapolating a volatile series thirty years beyond the end of that series is an unreliable approach for the reasons set out above and in our previous report.

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[29] Source: RBA, Table F2.

[30] UT5 Draft Decision,

The Ibbotson/Siegel approach receives disproportionate weight relative to the Wright approach

75   The Ibbotson and Siegel approaches are based on the assumption that the MRP is constant in all market conditions, whereas the Wright approach is based on the assumption that the MRP varies over time indirectly with changes in the risk-free rate.

76   In its UT5 Draft Decision, the QCA notes that it has attempted to test the Ibbotson/Siegel and Wright assumptions and concludes that there is no significant difference between the two.[31]

77   However, the QCA applies almost three times as much weight to the Ibbotson/Siegel approach as to the Wright approach. Table 1 above shows that the Ibbotson and Siegel approaches receive a combined weight of 40% and that the Wright approach receives only 15% weight.

3.3   Choices made in relation to survey estimates

78   In the UT5 Draft Decision, the QCA has made a number of choices about how to interpret the evidence of survey estimates of the MRP. The choices that have been made have the effect of reducing the MRP allowance.

Adjustment for the term of the risk-free rate

79   As set out in the previous section, whereas the survey approach has been interpreted as providing estimates of the 10-year MRP in prior decisions, the UT5 Draft Decision interprets it as providing estimates of the 4-year MRP. This is contrary to the evidence in the same surveys that respondents are adopting a 10-year risk-free rate or even higher figure.

Adjustment for imputation credits

80   Every other approach in the Draft Decision that is used to estimate the MRP has been adjusted to reflect the QCA's assumed value of imputation credits.[32] That is, all other approaches produce *with-imputation* estimates of the MRP.

81   The UT5 Draft Decision concludes that the survey method produces final estimates of 6.6% without-imputation and 7.4% with-imputation.[33] These two figures are then averaged (producing 7.0%) before being combined with the (exclusively) with-imputation estimates from the other approaches.

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[31] QCA, 2017, UT5 Draft Decision, p. 493.

[32] That is, a gamma of 0.46.

[33] QCA, 2017, UT5 Draft Decision, p. 83.

Choices made when considering the relevant evidence

82   In our view, a with-imputation estimate should be used for two reasons:

      a. The regulatory framework adopted by the QCA requires a with-imputation estimate of the MRP; and

      b. All of the other approaches produce with-imputation estimates, so the survey estimate should be derived on the same basis for consistency.

Adjustment for margin to risk-free rate

83   As noted in our previous report, Fernandez (2017) documents that survey respondents were adding their 7.8% estimate of the MRP to a risk-free rate of 3% at a time when the 4-year government bond yield was approximately 2%. Thus, it would be wrong to conclude that the Fernandez survey supported an approach whereby the reported MRP was added to the prevailing 4-year government bond yield when that is clearly inconsistent with the survey responses.

84   Similarly, the KPMG survey reports that:

      a. Australia's current low-interest environment has resulted in some valuers adjusting the market risk premium upwards by either 0.5% or 1.0%;[34] and

      b. The vast majority of respondents are currently using risk-free rates that are well above the prevailing 10-year government bond yield.[35] In fact, the KPMG website indicates that, in relation to the 2017 Valuation Practices Survey, the most commonly used risk-free rate was 4.5%.[36]

85   In summary, the assumption that survey respondents pair their MRP response with the prevailing 4-year government bond yield is inconsistent with the survey evidence itself and results in a downward bias to the allowed return on equity.

Introduction of the KPMG survey

86   In its UT5 Draft Decision, the QCA notes that the Fernandez (2017) survey estimate is based upon 26 responses for Australia and expresses concern about that sample size. This leads the QCA to place equal weight on the KPMG (2017) survey. The introduction of the KPMG estimate is explained as follows:

> Therefore, while we have taken the Fernandez et al. 2017 estimate into account, we conclude it should be treated with caution. Accordingly, as a cross-check, we also examined survey results from the most recent KPMG valuation survey (2017), which

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[34] KPMG, 2017 Valuation Practices Survey, p. 11.

[35] KPMG, 2017 Valuation Practices Survey, p. 10.

[36] https://home.kpmg.com/au/en/home/insights/2017/07/valuation-practices-survey-2017.html.

surveys a number of valuation practitioners. In this survey, the most commonly adopted estimate for the MRP was 6.0 per cent (also the median).[37] We have taken this estimate into account to complement the Fernandez et al. 2017 estimate when computing the survey component of the overall survey estimate.[38]

87   The Fernandez surveys for 2009,[39] 2010,[40] 2011,[41] and 2012[42] (i.e., prior to the Market Parameters Decision) were based on sample sizes of 23, 21, 40 and 17. Thus, the current Fernandez survey is of similar size to many of the previous Fernandez surveys that have received material weight in previous decisions.

88   In his advice to the QCA, Lally (2017) suggests that the Fernandez (2017) figures may be the subject of a computation error, typo or transcription error.[43] We are unaware of any evidence to support this conjecture, nor any reason why the current survey may be more susceptible to such errors than previous surveys by the same author.

3.4   Adjustments made in relation to Cornell estimates

Downward adjustments

89   In our previous report, we set out a number of adjustments that the QCA makes when constructing its Cornell DGM estimates of the MRP, explaining why we consider that those special adjustments are unwarranted.[44] The key adjustments are:

>   a.   The QCA makes a reduction of 0.5%, 1.0% and 1.5% to its estimate of long-run GDP growth; and

[37] The UT5 Draft Decision makes no mention of the fact that there are zero responses less than 6% and a number of responses above 6%, some above 7.5%. It simply adopts 6% as the estimate obtained from that survey.

[38] UT5 Draft Decision, p. 483.

[39] Fernandez, P & del Campo, J 2009, 'Market Risk Premium Used in 2008 by Professors: A Survey with 1,400 Answers', Working Paper, IESE Business School, University of Navarra, 16 April.

[40] Fernandez, P & del Campo, J 2010, 'Market Risk Premium Used in 2010 by Professors: A Survey with 1,500 Answers', Working Paper, IESE Business School, University of Navarra, 15 May.

[41] Fernandez, P, Aguirreamalloa, J, & Corres, L 2011, 'Market Risk Premium Used in 56 Countries in 2011: A Survey with 6,014 Answers', Working Paper, IESE Business School, University of Navarra, 25 April.

[42] Fernandez, P, Aguirreamalloa, J, & Linares, P 2013, 'Market Risk Premium and Risk Free Rate Used for 51 Countries in 2013: A Survey with 6,237 Answers', Working Paper, IESE Business School, University of Navarra, 26 June.

[43] Lally (2017), p. 20.

[44] Frontier Economics, 2017, An updated estimate of the market risk premium, September.

b. The QCA assumes that investors have two different required returns on equity, an 11.8% required return on all cash flows beyond year 10 and a lower required return on all cash flows before year 10.

90   We have elsewhere set out our detailed reasons for concluding that these adjustments are unwarranted, so we do not repeat them here.[45] However, we note that both of these adjustments have the effect of materially reducing the Cornell estimate of the MRP.

91   In addition to those downward adjustments, there are two more issues that arise in relation to the QCA's most recent estimates.

The Cornell estimate is computed relative to the 10-year risk-free rate

92   We have noted in the previous section that the QCA's Cornell estimate is derived relative to the 10-year government bond yield and then interpreted as an estimate of the 4-year MRP.

The QCA has not updated its long-run mean estimate

93   In its 2014 Market Parameters Decision, the QCA set its assumed long-run required return to 11.8%.[46] This was computed by adding the QCA's assumed long-run MRP of 6% to an assumed long-run 10-year risk-free rate of 5.8%. The latter figure is obtained by:

a. Taking the average yield on inflation-indexed bonds from July 1993 through to October 2013 (when the Market Parameters calculations were performed) of 3.22%; and

b. Increasing for expected inflation of 2.5% using the Fisher relation.

94   In the UT5 Draft Decision, all other elements of the MRP calculation are updated to reflect the most recent data but the 5.8% figure has apparently not been updated.[47] If that figure is updated from October 2013 to the present, the result is a decline to 5.4%.

95   This has the effect of materially reducing the "post 10 years" return, and consequently materially increasing the estimate of the required return over the first 10 years.

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[45] Frontier Economics, 2017, An updated estimate of the market risk premium, September.

[46] QCA, 2014, Market Parameters Decision, p. 71.

[47] QCA, 2017, UT5 Draft Decision, pp. 485-486.

96   In summary, the effect of freezing the 5.8% figure at its 2013 level (while all other aspects of the calculation are updated to reflect current data) is to materially reduce the MRP estimate.