



# **An updated estimate of the market risk premium**

**REPORT PREPARED FOR AURIZON NETWORK**

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# An updated estimate of the market risk premium

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# 1 Executive summary

1 Frontier Economics has been retained by Aurizon Network to provide an update to the report we prepared in November 2016 in relation to the appropriate estimate of the market risk premium (MRP) to use in the Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM). The MRP is an input to determining the cost of equity to apply to Aurizon Network during the regulatory period commencing 1 July 2017.

2 In its 2014 Market Parameters Decision, the QCA adopted a MRP estimate of 6.5% based on the evidence available through to the end of 2013 and stated that “the market risk premium varies over time” and would have to be re-estimated at the time of each determination.<sup>1</sup>

3 In this report, we set out the most recently available estimates of the MRP using each of the estimation methods to which the QCA indicates in the Market Parameters Decision it will have regard. This includes new information that was not available at the time of our November 2016 report. We have identified this new information, and also placed it in context in relation to the various assessment methods previously foreshadowed by the QCA.

4 Our primary conclusions are:

- a. The estimates of the MRP, using the estimation approaches set out in the 2014 Market Parameters Decision, have generally increased materially since that decision;
- b. The approach that we applied to distil the evidence into a single MRP estimate in our November 2016 report<sup>2</sup> currently produces an MRP estimate of 7.6% which is consistent with the conclusion of our November 2016 which provided an estimate of the MRP of 7.55%. This indicates that updated market data and current conditions continue to support an MRP in the order of 7.5%;
- c. Applying the framework laid out in our November 2016 report, but having regard to all of the estimation approaches set out in the Market Parameters Decision, currently produces an estimate of 7.5%. For the reasons set out in the report, we consider that this approach produces a lower bound estimate; and
- d. Consequently, we conclude that an appropriate estimate of the MRP, updated to reflect currently available data and the

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<sup>1</sup> QCA, 2014, Market Parameters Decision, p. 81.

<sup>2</sup> Frontier Economics, 2016, *The market risk premium*, November.

applicability of each estimation method to the current market conditions, is at least 7.5%.

- 5 In relation to each of the estimation methods to which the QCA has regard:
- a. The **Ibbotson** estimates are averages over 50 or 100 years, so they change very slowly over time. They have not changed materially since the Market Parameters Decision.
  - b. The **Siegel** estimates incorporate the average yield on inflation-indexed government bonds since those bonds began trading in 1987. That average has decreased materially, and consequently the Siegel estimate of the MRP has increased materially, since the Market Parameters Decision and Aurizon Network's UT5 submission.
  - c. The **Cornell** approach, properly applied to the prevailing market data, indicates a material increase in the MRP since the Market Parameters Decision and Aurizon Network's UT5 submission.
  - d. The **Fernandez** survey estimate has increased materially since the Market Parameters Decision and Aurizon Network's UT5 submission.
  - e. The estimates from **independent expert valuation reports**, properly applied to the prevailing market data, indicate a material increase in the MRP since the Market Parameters Decision and Aurizon Network's UT5 submission.
  - f. The **Wright** estimates have increased materially since the Market Parameters Decision and Aurizon Network's UT5 submission.
  - g. The **market indicators** estimates have increased materially even since Aurizon Network's UT5 submission.

- 6 In summary, updating the various estimation methods for more recent data, assessing the applicability of each estimation method to current market conditions and having regard to other current market indicators, continues to support a MRP of greater than 7.5%, consistent with the conclusions of our November 2016 report. The updated information also indicates that the MRP has increased materially since the time of the Market Parameters Decision and is currently above 7.5%.

## 2 Setting the MRP allowance

### 2.1 The role of the MRP in the regulatory process

7 Within the CAPM, the MRP is a parameter that reflects the additional return, over and above the risk-free return, that investors would require from an investment of average risk. As for all other determinants in the WACC, it is appropriate and important that the market risk premium is determined using data that is as up to date as possible and that the methodologies applied are considered for relevance in the context of current market conditions.

8 As well as allowing a determination that will, as closely as possible, be reflective of the market at the time of commencement of the regulatory period, this use of the most recent data ensures consistency of assessment of each component of the WACC to the same most recent empirical data.

9 It should be expected, and it has been accepted, that the MRP varies over time as market conditions change. For example, as market conditions change, investors might reassess the amount of risk that is involved in a particular investment or the return that they require for bearing risk. This is consistent with the fact that regulatory estimates (across a range of jurisdictions and industries) of the debt risk premium have varied materially over the last 10 years – if the return premium for bearing a certain amount of risk varies materially for debt securities, it follows that it must also vary for equity securities.

10 In this regard, the Australian Energy Regulator (AER) states that:

Evidence suggests the MRP may vary over time. In their advice to the AER, Professor Lally and Professor Mackenzie and Associate Professor Partington have expressed the view that the MRP likely varies over time.<sup>3</sup>

11 We also agree, and consider it to be uncontroversial, that:

...the market risk premium is forward-looking,<sup>4</sup>

and that:

The likelihood that the premium is time-varying is generally well accepted<sup>5</sup>

and that:

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<sup>3</sup> AER, 2013, Rate of Return Guideline: Explanatory Statement, p. 91.

<sup>4</sup> QCA, 2013, MRP Discussion Paper, p. 9.

<sup>5</sup> QCA, 2014, Market Parameters Decision, p. 57.

...the market risk premium varies over time.<sup>6</sup>

## 2.2 The approach to estimating the MRP

12 The QCA has traditionally relied on four methods for estimating the MRP:<sup>7</sup>

- a. The long-run mean of historical excess returns, referred to as the **Ibbotson** method;<sup>8</sup>
- b. The long-run mean of historical excess returns minus a deduction for the extent to which actual historical inflation was higher than the QCA's estimate of what investors expected inflation to be, referred to as the **Siegel** method;<sup>9</sup>
- c. Recent responses to (mainly academic) surveys about the MRP, referred to as the **Survey** method; and
- d. The dividend discount method, which produces a forward-looking estimate of the market risk premium implied by current stock prices and forecasted dividends, referred to as the **Cornell** method.<sup>10</sup>

13 The Market Parameters Decision also considers the historical real returns method (referred to as the **Wright** method) and independent expert valuation reports (which are considered to be a form of survey evidence).<sup>11</sup>

14 it's the Market Parameters Decision indicated that a wider range of "market related evidence" would be considered and that the approach would be to apply judgment to the evidence that is available at the time of each determination:

...the QCA has refined its methodology by modifying its traditional methods and examining additional information, including current financial market related evidence. The broader range of evidence does not readily lend itself to an averaging and

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<sup>6</sup> QCA, 2014, Market Parameters Decision, p. 81.

<sup>7</sup> As set out below, some of the labels the QCA uses or adopts for some of the methods do not necessarily provide an accurate description of their nature or character.. However, for convenience we adopt the QCA's naming convention in relevant places throughout this report.

<sup>8</sup> Ibbotson Associates, now part of Morningstar, is one of a number of sources of historical excess returns data.

<sup>9</sup> The "Siegel method" was developed by a consultant that has been previously engaged by the QCA (Dr Martin Lally), said to be based on a paper published by Jeremy Siegel in 1988. As far as we are aware, the so called "Siegel method" for estimating the MRP has never been used or advocated by Siegel.

<sup>10</sup> This method is based on Cornell (1999). However, the QCA makes a number of fundamental adjustments to the method advocated by Cornell, which we discuss in the body of the report.

<sup>11</sup> The QCA had regard to the Wright method when setting the MRP in its Market Parameters Decision – see UT4 Final decision, p. 243. The historical real returns method is a common method for estimating the MRP and has been used extensively by UK regulators. Wright is one of many experts to have advocated the use of this approach.

rounding procedure. As a result, the QCA will assess the information at hand and exercise its judgment to reach a final view on the appropriate estimate of the market risk premium.<sup>12</sup>

15 The approach of considering a variety of accepted measures updated to the most recent information is an appropriate means of ensuring that all relevant factors that may apply at a relevant time are taken into account in determining the market risk premium. Regard should be had to methods of measuring the market risk premium that have broad acceptance and application, with the regard (or weighting) applied to each being reflective of their relevance to current market conditions.

16 Ultimately it is imperative that the allowed market risk premium across contemporaneous regulatory determinations in different Australian jurisdictions and different industries is the same, or at least substantially similar. For the allowed market risk premium to differ across regulators applying it at the same time would have clear implications for allocative efficiency in that it may skew investment decisions, particularly if those market risk premiums were not reflective of the prevailing conditions in the equity market.

17 Accordingly, it is appropriate to apply accepted methodologies updated to reflect the most recent available market information. The Market Parameters Decision indicates support for this principle.

18 This report has been prepared to supplement the November 2016 report by updating relevant information and assessing the continuing applicability of different methodologies to current market conditions.

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

19 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%.<sup>13</sup> Thus, the allowed return for a firm with an equity beta of 0.8 was 9.5% at that time.<sup>14</sup>

20 By August 2016, the government bond yield had fallen to 1.9%.<sup>15</sup> The application of the same MRP to that figure produces an allowed return for a firm with a beta

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<sup>12</sup> QCA, 2014, Market Parameters Decision, p. 15.

<sup>13</sup> QCA, 2014, Market Parameters Decision, p. 72.

<sup>14</sup>  $4.29\% + 0.8 \times 6.5\%$ .

<sup>15</sup> RBA.



of 0.8 of 7.1%,<sup>16</sup> Which implies that the cost of equity capital declined by more than a quarter over a two-year period.

21 By August 2017, the government bond yield had recovered to 2.6%, such that the same MRP would now produce an allowed return on equity of 7.8%. 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.

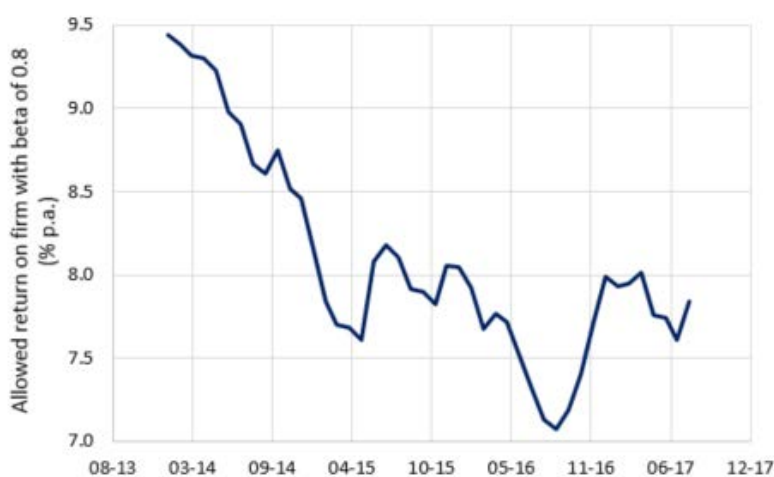
22 For a firm with a beta of 0.8, the application of a constant 6.5% MRP implies that the required return on equity was:

- a. Approximately 8% at the beginning of 2016;
- b. 7.1% in the middle of 2016; and
- c. Back to 8% by the end of 2016.

23 The variability in allowed returns is even material on a month-by-month basis. For example, in 2017 the 10-year government bond yield was as low as 2.36% in June and as high as 2.70% in both May and July. A differential of 30 basis points is highly material and would arise simply from the selection of which month to use as the rate-setting period.

24 The variability in allowed returns, that flows from the adoption of a fixed MRP allowance, is illustrated in Figure 1 below.

Figure 1: Estimate of the required return on equity for a firm with beta of 0.8 and 6.5% fixed MRP.



Source: QCA Market Parameters Decision; RBA 10-year government bond yields.

25 The implications of adopting a non-time-variant MRP are also illustrated sharply by circumstances around the time of financial crises. For example, the yield on 10-

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<sup>16</sup> 1.9% + 0.8×6.5%.

year Australian government bonds, which was 6.4% in July 2008 (prior to the collapse of Lehman Brothers), had fallen 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.

26 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 outcome is the mechanical result of adding a constant MRP to the prevailing government bond yield.

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

27 In our report of November 2016,<sup>17</sup> 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 a finding that, due to a fall in the risk free rate since the Market Parameters Decision, investors have reduced their required return on equity by over a third since the Market Parameters Decision was produced.

28 Rather, the evidence from a 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:<sup>18</sup>

- 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 as recently as August 2017, IPART has adopted a mid-point MRP estimate of 7.8%, based on a 50/50 weighting to long-run historical estimates and current forward-looking estimates;<sup>19</sup>
- c. Corporate advisory firms such as McKinsey and NERA-US; and
- d. Independent expert firms such as EY, KPMG, Deloitte, and Lonergan Edwards.<sup>20</sup>

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<sup>17</sup> Frontier Economics, 2016, *The market risk premium*, November.

<sup>18</sup> The relevant references are set out in our earlier report: Frontier Economics, 2016, *The market risk premium*, November.

<sup>19</sup> IPART, August 2017, WACC Biannual Update.

<sup>20</sup> The relevant references are set out in our earlier report: Frontier Economics, 2017, *Recent evidence on the market risk premium*, May.

29 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 relatively stable, indicating that in recent years the MRP has varied to absorb at least some of the volatility in government bond yields.

## **2.5 Application of updated information to the MRP**

30 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 the remainder of this report we present the most recently available estimates of the MRP from each of the estimation methods set out in the Market Parameters Decision and comment on whether the current market conditions make any of those methodologies more or less relevant.

## 3 Ibbotson approach

### 3.1 Methodology

31 The Ibbotson estimate of the MRP is computed as the mean excess return over a long historical period. The excess return in each year of the historical period is defined as the return that an investor would have received over the year from an investment in the broad stock market index, less the return that could have been earned on 10-year government bonds. In the Market Parameters Decision (p. 20) the QCA indicates that its preferred historical period for application of the Ibbotson approach is that which begins in 1958.

### 3.2 Current estimates

32 The 2014 Market Parameters Decision considered historical excess returns (Ibbotson) estimates of the MRP using annual data through to the end of 2013. Since this approach is based on long-term historical means, the resulting MRP estimates are very stable over time as each year produces only one additional data point to add to the mean calculation.

33 We have updated the Ibbotson estimates to the end of 2016. In computing these estimates, we use (without endorsing) a theta of 0.56, which is consistent with the Market Parameters Decision gamma estimate of 0.47.<sup>21</sup> We report estimates with and without the NERA correction for dividend yields in the early years of the sample period – again for the purposes of consistency with the approach adopted in the Market Parameters Decision.<sup>22</sup> The relevant estimates are set out in Table 1 below.

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<sup>21</sup> QCA, 2014, Market Parameters Decision, p. 24.

<sup>22</sup> The raw Ibbotson estimates of the MRP are based on excess returns compiled by Brailsford, Handley and Maheswaran (2008, 2012). In a submission to the AER in June 2013, NERA (2013) identified and corrected a number of inaccuracies in the adjustments that were made in the Brailsford et al calculations. In particular, the data for part of the period examined by Brailsford et al were sourced from Lamberton (1961). The Lamberton data reported the mean dividend yield where the mean was taken only over those companies that paid dividends. Consequently, it overstated the dividend yield in that it excluded from the calculation those companies that did not pay any dividends at all. This led Brailsford et al to adjust all of the Lamberton data points using an adjustment based on the proportion of firms that paid no dividends in 1966. NERA show that the proportion of firms that paid no dividends in 1966 was materially different to the proportion that paid no dividends during each of the years actually covered by the Lamberton data. That is, the Brailsford et al adjustment is inaccurate in such a way that it creates a systematic downward bias. NERA (2013) correct the bias in the Brailsford et al (2008, 2012) estimates and go on to make a more accurate and appropriate adjustment according to the proper contemporaneous proportion of non-dividend-paying stocks for each year of the Lamberton data period. See Brailsford, T., J. Handley and K. Maheswaran, 2008, Re-examination of the historical equity risk premium in Australia, *Accounting and Finance* 48, 73-97; Brailsford, T., J. Handley and K. Maheswaran, 2012, The historical equity risk premium in Australia:

Table 1: Updated estimates of the MRP from the Ibbotson approach

Start year	Historical excess return (% p.a.)		
	Ending in 2013	Ending in 2016 – no correction	Ending in 2016 – NERA correction
1883	6.3	6.3	6.7
1937	6.0	6.0	6.0
<b>1958</b>	<b>6.5</b>	<b>6.5</b>	<b>6.5</b>
1980	6.2 <sup>a</sup>	6.4	6.4
1988	6.0	6.0	6.0

Source: QCA Ibbotson MRP estimates updated to end 2016 by Frontier Economics.

Note: a. Our estimate for the sample period beginning in 1980 is 6.4%. We have used the data compiled by the AER. We are unsure why this one figure does not match the estimates produced by the QCA.

34 In its Market Parameters Decision, the QCA concluded that the Ibbotson approach supported estimates in the range of 6.0% to 6.7% and that the best available point estimate was 6.5%:

In summary, the Ibbotson historical averaging method for the market risk premium produces estimates ranging from 6.0% to 6.7%, depending on the particular historical series chosen. The estimate over the longest period of high quality data (i.e. 1958–2013) is 6.5%.<sup>23</sup>

35 The QCA reiterated that it considered the best available estimate to be that based on the longest available period of high quality data, being the period beginning in 1958:

While the QCA has considered all sampling periods, its preferred sampling period is 1958–2013. This series has the property of being the longest series of high quality data.<sup>24</sup>

36 Table 1 above shows that the conclusions drawn in the Market Parameters Decision remain valid. As would be expected, the addition of three data points to each of the historical samples has had little impact on the long-term averages. In particular, the preferred estimate using data from 1958 remains at 6.5% and the range remains 6.0% to 6.7%.

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Post-GFC and 128 years of data, *Accounting and Finance*, 237-247; Lamberton, D., 1961, “Ordinary share yields: A new statistical series,” *Sydney Stock Exchange Official Gazette*, 14 July; and NERA, 2013, The market, size and value premiums, June.

<sup>23</sup> QCA, 2014, Market Parameters Decision, p. 59.

<sup>24</sup> QCA, 2014, Market Parameters Decision, p. 20.

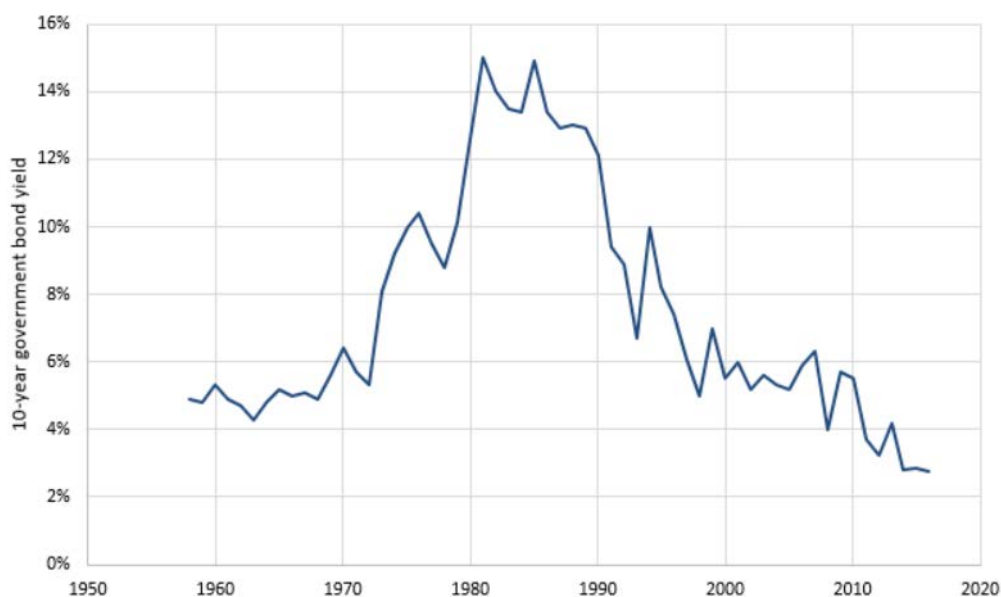
### **3.3 Limitations of the Ibbotson approach in the current market conditions**

#### **3.3.1 The Ibbotson estimates reflect average historical market conditions**

37 The Market Parameters Decision gives most weight to the Ibbotson estimate that is based on an average using data beginning in 1958. Self-evidently, the result is an estimate of the MRP that is commensurate with the average market conditions over the sample period that is used. Thus, the 6.5% MRP estimate is one that would be appropriate to use if the expected market conditions during the particular regulatory period were expected to be reflective of the average market conditions over the last 58 years. It follows that the use of a MRP value of 6.5% would not be reflective of, or commensurate with, prevailing market conditions in circumstances where those market conditions differed from the average conditions over the post 1958 period.

38 Figure 2 below shows the history of 10-year government bond yields from 1958 through to the present. The figure shows that the prevailing government bond yields are materially lower than the average yields over the period. Indeed, the bond yields for 2014, 2015 and 2016 are the three lowest over the entire period. This indicates that, at least on the dimension of interest rates, the prevailing market conditions are quite unlike the average conditions over the post-1958 period that has been used to estimate the MRP.

Figure 2: 10-year government bond yields



Source: RBA.

39 In its Market Parameters Decision, the QCA stated its conclusion that there may be a negative relationship between the risk-free rate and MRP as at the end of 2013:

The QCA's view is that there could be a negative relationship at this time.<sup>25</sup>

40 That is, the QCA recognised that the total required return on equity may not have declined one-for-one with the fall in risk-free rates. Rather, the MRP may have increased to at least partially offset the fall in risk-free rates – a negative relationship in the then prevailing market conditions.

41 Since the 2014 Market Parameters Decision, risk-free rates have fallen even further, with rates over the last three calendar years being the lowest ever on record.

42 In our view, when having regard to the Ibbotson evidence, it is important to recognise that:

- a. The Ibbotson approach can only produce an estimate of the MRP that is consistent with average market conditions;
- b. Current market conditions differ from the historical average market conditions in that government bond yields have been at historical lows in the three years since the 2014 Market Parameters Decision; and

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<sup>25</sup> QCA Market Parameters Decision, p. 22.

- c. There can be a negative relationship between risk-free rates and the MRP in certain market conditions. That is, the total required return on equity may not always move one-for-one with changes in the risk-free rate – it is possible that the MRP may increase to at least partially offset falls in the risk-free rate.

43 Accordingly there is a strong basis for assuming that a MRP of 6.5% using the Ibbotson approach would be at the lower end of the range of the potential MRP as at 1 July 2017.

### **3.4 Conclusions and recommendations**

44 In our view:

- a. The Ibbotson evidence as updated to the end of 2016 continues to support an MRP point estimate of 6.5%.
- b. However, this should be regarded as a conservative MRP in the current market conditions due to the following factors:
  - i. The Ibbotson approach can only produce an estimate of the MRP that is consistent with average market conditions;
  - ii. Current market conditions differ from the historical average market conditions, as reflected in the fact that government bond yields have been at historical lows in the three years since the 2014 Market Parameters Decision; and
  - iii. There can be a negative relationship between risk-free rates and the MRP in certain market conditions. That is, the total required return on equity may not always move one-for-one with changes in the risk-free rate – it is possible that the MRP may increase to at least partially offset falls in the risk-free rate.



## 4 Siegel approach

### 4.1 Methodology

45 The Market Parameters Decision explains the implementation of the Siegel approach as follows:

- a. Begin with the Ibbotson estimate;
- b. Add the average real risk-free rate over the relevant historical period, computed by reducing the nominal risk-free rate for observed inflation each year; and
- c. Subtract an estimate of the real risk-free rate that investors would have been expecting, computed as the average real risk-free rate from inflation-indexed government bonds over the longest period for which that data is available.<sup>26</sup>

46 The difficulties associated with the Siegel approach are addressed at section 4.2.2 of our November 2016 report.

### 4.2 Current estimates

47 We have updated the Siegel estimates from the Market Parameters Decision to incorporate the additional data that has become available through to the end of 2016. The results, which are set out in Table 2 below, indicate that the more recent data supports higher estimates than at the time of the Market Parameters Decision. The main reason for this increase is a reduction in the estimate of the average real risk-free rate from inflation-indexed government bonds used in step (c) above.

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<sup>26</sup> QCA, 2014, Market Parameters Decision, p. 59.

Table 2: Updated estimates of the MRP from the Siegel approach

Start year	Historical excess return with QCA Siegel adjustment (% p.a.)		
	Ending in 2013	Ending in 2016 – no correction	Ending in 2016 – NERA correction
1883	5.0	5.3	5.7
1937	3.9	4.2	4.2
<b>1958</b>	<b>5.5</b>	<b>5.7</b>	<b>5.7</b>
1980	6.5	6.8	6.8
1988	6.0	6.0	6.0

Source: QCA Siegel MRP estimates updated to end 2016 by Frontier Economics.

48 We note that the data from the preferred period of post-1958 data currently supports an estimate of 5.7%, an increase of 30 basis points relative to the estimate based on the Siegel approach in our November 2016 report, and 20 basis points since the Market Parameters Decision.

### 4.3 Limitations of the Siegel approach in the current market conditions

49 Because the Siegel approach begins with the Ibbotson estimates, all of the issues in relation to the Ibbotson approach set out above also apply to the Siegel approach. In the remainder of this section, we review a number of additional issues that apply specifically to the Siegel approach.

#### 4.3.1 Making “adjustments” to the historical data is an unorthodox approach

50 The basis for the Siegel approach is that inflation was unexpectedly high during certain historical periods and this resulted in the real yields on government bonds being lower over the course of year than what investors might have expected at the beginning of that year. Thus, the actual real yield on government bonds is replaced by the regulator’s estimate of what investors might have expected it to be.

51 In our view, it is unorthodox to revise the historical data by:

- a. 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

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

52 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.”

53 In our view, a better approach is to consider the historical data as it is, rather than as it would have been if events had played out in accordance with some particular set of proposed expectations. The whole point of using a long historical period is that there will be a variety of events, some of which will tend to increase the average and some of which will tend to decrease the average. Over a long period, the effects of such events will tend to average out.

### **4.3.2 The proposed basis for the Siegel adjustment is not borne out in the data**

54 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:

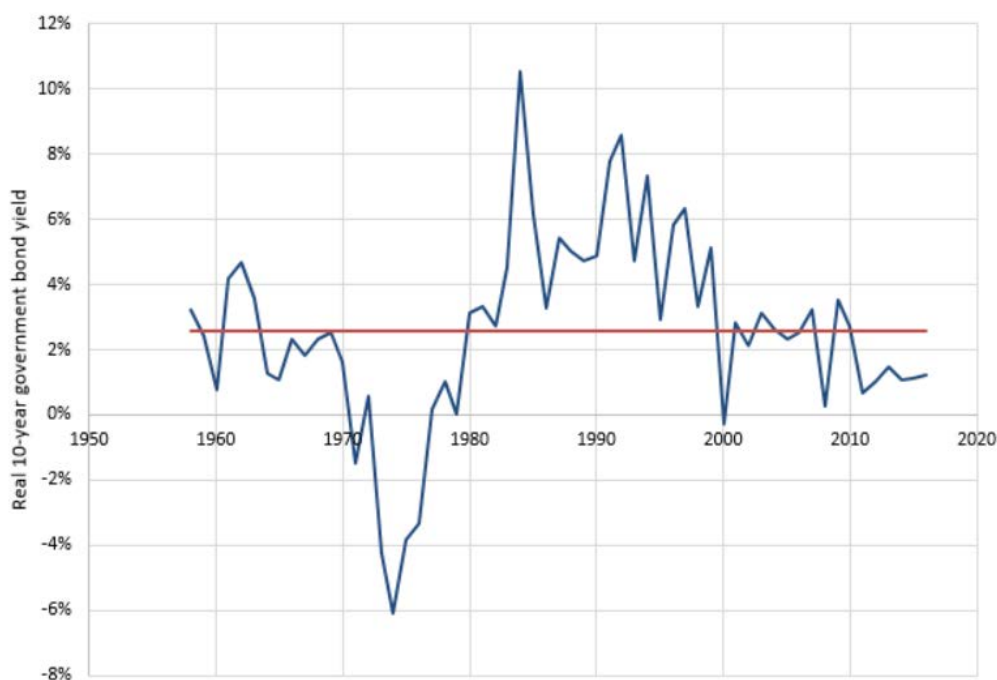
In the context of the United States, Siegel demonstrates that over the sub-period, 1926-1990, the Ibbotson estimate of the market risk premium is atypically high due to the unusually low real returns on bonds during that period from unexpected inflation.<sup>27</sup>

55 In Figure 3 below, 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.

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<sup>27</sup> QCA, 2014, Market Parameters Decision, p. 59.

Figure 3: 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.

### 4.3.3 The required data is not available to implement the Siegel approach

56 The 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 3 above); and
- b. The expected real government bond yield every year since 1958.

57 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%.<sup>28</sup> That is, there is no objective basis for estimating the expected real government bond yield for the required

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<sup>28</sup> Source: RBA, Table F2.

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.

58 In our 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.

## 4.4 Conclusions and recommendations

59 In our view, closer analysis demonstrates that the assumptions underlying the Siegel approach are unwarranted and there is no proper basis for using the Siegel approach:

- a. If the Siegel approach is to be used, it supports an MRP point estimate of 5.7%, an increase of 30 basis points relative to the estimate based on the Siegel approach in our November 2016 report, and 20 basis points since the 2014 Market Parameters Decision.
- b. Prior to the Siegel approach being used or weight being given to it, the following matters should be addressed:
  - i. The criteria for determining whether a particular feature of the historical data was unexpected and therefore in need of adjustment; and
  - ii. The reasoned basis for extrapolating the average inflation-indexed government bond yield over the post-1987 period back to 1958 and any impacts this may have on the robustness of the estimates.

60 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 3 above. That is, the predictions on which the Siegel method is based have turned out to be quite inconsistent with the observed data.

61 Accordingly we consider that the Siegel approach does not produce an accurate estimate of the MRP in current market conditions. However, we note that the Siegel estimate has increased since the Market Parameters Decision, corroborating the increase in other methods used to estimate the MRP.

## **5 Cornell approach**

### **5.1 Methodology**

62 The “Cornell” approach to estimating the MRP, as set out in the Market Parameters Decision, is a particular implementation of the dividend discount (or dividend growth) model. This approach begins with a forecast of expected future dividends on the market portfolio and then solves for the discount rate that equates the present value of those future dividends with the current market price. The implied discount rate is an estimate of the required return on the market portfolio. The prevailing 10-year government bond yield is then deducted to provide an estimate of the prevailing forward-looking MRP.

63 This implementation of the dividend discount model is unique in some respects. The particular features of this approach are set out in the following section.

### **5.2 Features of the Cornell approach adopted in the Market Parameters Decision**

#### **5.2.1 The general dividend discount approach to estimating the MRP**

64 The Cornell approach requires estimates of the current value of the relevant market portfolio and forecasts of the future dividends that are likely to be produced by that portfolio. Bloomberg provides data on:

- a. The current level of the ASX 200 stock market index; and
- b. Consensus analyst forecasts for the dividends that would be received by an investor who purchased all of the stocks in the index. Forecasts are available for the current and next two calendar years.

65 Since analyst forecasts are only available two years ahead, it is standard practice to apply an estimate of the expected long-run growth in dividends. The Market Parameters Decision considered two convergence periods – 10 years and 20 years. Under the first approach, the growth in dividends implied by analyst forecasts over the first two years converges linearly to the estimated long-run dividend growth rate over 10 years. Beyond year 10, dividends are expected to grow at the estimated long-run growth rate each year in perpetuity. Under the second approach, the convergence period is set to 20 years.

66 The Market Parameters Decision applied two additional features to the estimation of the MRP using the dividend discount approach that go beyond the standard approach set out by Cornell. Each of these additional features is reviewed below.

## 5.2.2 Reduction to the estimate of long-run dividend growth

67 When estimating the long-run dividend growth rate, the starting point is an estimate of the long-run expected growth in nominal GDP. The Market Parameters Decision adopted an estimate of 5.6% based on expected real growth of 3.0% and expected inflation of 2.5%.

68 The Market Parameters Decision then introduced the approach of making a deduction to the GDP growth rate on the basis that some of the growth in corporate profits is due to investments financed by newly issued equity:

Arnott and Ryan (2001) argue that the growth rate in dividends of current firms must be lower than the growth rate of GDP due to the 'dilution effect' from the creation of new firms in the future. They estimate that the dilution effect by itself reduces the expected growth rate by about 1.0%-2.0% (Arnott and Ryan, 2001: 67).

Bernstein and Arnott (2003) subsequently consider both this point and the matter of new share issues (net of share buybacks) and argue that taking both points into account reduces the expected growth rate by about 2.0% based on two comparisons. They first note that for a number of countries over the last century real GDP growth grew faster than the real growth rate in dividends per share by about 2.0%.

Second, they observe that the growth rate in market capitalisation grew at an annualised rate of 2.3% more than the growth in a capitalisation-weighted price index (Bernstein and Arnott, 2003: 50–52).

However, Lally (2013e) considered that the 2.0% deduction is too high for several reasons and proposed a deduction of 1.0% as being reasonable.<sup>29</sup>

69 The Market Parameters Decision considered deductions of 0.5%, 1.0% and 1.5%:  
...to accommodate the formation of new companies and the issuance of new equity in the future by existing companies.<sup>30</sup>

70 Thus, we deal with two issues below:

- a. The conceptual point that if corporate earnings from existing shares grow at the same rate as GDP, and if there are additional corporate earnings financed by new shares, the corporate sector's share of GDP will grow over time; and
- b. The empirical evidence of corporate earnings (from existing shares) growing more slowly than GDP.

71 We begin by noting that if the earnings of all listed companies grow at a faster rate than GDP, those corporate earnings will make up a larger proportion of GDP over time. However, the magnitude of this effect is very small. According to the

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<sup>29</sup> QCA, 2014, Market Parameters Decision, pp. 68-69.

<sup>30</sup> QCA, 2014, Market Parameters Decision, p. 72.

Australian Bureau of Statistics (ABS), over the calendar year 2013,<sup>31</sup> nominal GDP was estimated at \$1,556 billion.<sup>32</sup> The ABS also reports an estimate of company profits before tax, which stands at \$180 billion for 2013.<sup>33</sup> So pre-tax corporate profits are estimated at 11.6% of GDP. If GDP grows at 5.6% for 50 years, and pre-tax corporate profits grow faster, at (for example) 6.1% for 50 years, then pre-tax profits will reach 14.7% of GDP. Of course, these ratios would be even lower if we were to consider after-tax corporate profits.

72 In our view, the figures above do not provide a conceptual basis for applying a deduction to the GDP growth rate. That is, it would be wrong to make such an arbitrary deduction on the basis of a view that it is unreasonable to consider that the corporate sector would increase its share of GDP by only 3% over the next 50 years. That is, the conceptual rationale for the proposed deduction to the GDP growth rate is that if the growth of existing companies keeps pace with growth in the broad economy, and if new equity is issued over time, the implication is that the corporate sector's share of the broad economy will increase over time. The figures above illustrate that the quantum of any such effect is likely to be relatively small. In particular, it does not seem at all implausible that the corporate sector's share of national income might increase by 3% over the next 50 years.

73 In any event, our view is that WACC parameters should be estimated on the basis of empirical evidence from market data and not on the basis of conceptual propositions. In this regard, we turn to the (somewhat dated) empirical evidence presented by Bernstein and Arnott (2003) indicating that corporate profits tend to grow at a slower rate than GDP. We note that that phenomenon occurs only in older data prior to central bank inflation targeting, which occurred in the early 1980s in the US and in the early 1990s in Australia.

74 Table 3 below shows that real earnings per share (EPS) growth lags real GDP growth only in the period prior to central bank inflation targeting. For the last few decades, real EPS growth has matched or exceeded real GDP growth. Thus, making a deduction to GDP growth has no empirical support in data from recent decades.

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<sup>31</sup> We use data available at the time of the 2014 Market Parameters Decision. The same point holds if current data is used.

<sup>32</sup> ABS Table 5206.0, Series ID A2302467A, Gross domestic product: Current prices.

<sup>33</sup> ABS Table 5676.0, Series ID, A3531604T, Profit before Income Tax; Total (State); Total (Industry); Current Price; CORP.



Table 3: Real growth in corporate profits and GDP

	USA	Australia
High-inflation period	1969-1981	1969-1990
Real EPS growth	2.0%	1.8%
Real GDP growth	3.1%	3.0%
High-inflation period	Post-1981	Post-1990
Real EPS growth	2.8%	5.0%
Real GDP growth	2.9%	3.4%

Source: Australian Bureau of Statistics; Bernstein and Arnott (2003).

75 In summary, the approach of making a deduction to the GDP growth rate is to assume that investors form their expectations about the future growth in dividends on the basis of data from the 1970s and 1980s.

76 In our view, such an approach is inappropriate. Consequently, in our updated empirical estimates below we include estimates that are based on an unadjusted 5.6% growth rate.

### 5.2.3 The government bond yield is assumed to revert to 5.8% over ten years

77 In the Market Parameters Decision, it was assumed that equity investors will use a discount rate of 11.8% for all cash flows beyond Year 10. For example, investors will discount Year 12 cash flows back to Year 10 using a discount rate of 11.8% and then apply a different rate to further discount the cash flow back to the present. The 11.8% discount rate is based on a risk-free rate of 5.8% and a market risk premium of 6%.<sup>34</sup> In our view, there are a number of problems with this approach, as set out below.

#### ***There is a systematic downward bias***

78 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.

79 Suppose, for example, that equity investors require a return of 10% p.a. over the 20-years and that market conditions remain stable over time. If the regulator sets

<sup>34</sup> QCA, 2014, Market Parameters Decision, p. 71.

the allowed return to 10% p.a., investors will receive just the return that they require.

80 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.

### ***The allowed return becomes an assumption rather than an estimate***

81 The standard approach to implementing the dividend discount approach involves estimating a single required return to be applied to all future cash flows. The Market Parameters 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.

82 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.

83 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.

### ***The regulatory allowance will be materially more volatile***

84 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 11.8%, say 13%. The approach of assuming that the post 10-year return is equal to 11.8% means that the pre 10-year return must be set above 13% so that the pre and post returns will average out to 13%.

85 Symmetrically, if the standard single estimate is below 11.8%, the two-discount-rate approach produces a pre 10-year estimate below the single estimate.

86 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.

### ***There is no basis for the assumed 11.8% future required return***

87 The basis for the assumption of a future required return of 11.8% is the assumption that investors will expect the government bond yield to increase to 5.8% over the next 10 years. The 5.8% figure is obtained by averaging yields since 1993, as illustrated in Figure 4 below. That figure shows that government bond yields have fallen quite consistently since 1993.

88 It seems unlikely that the best estimate of the 10-year government bond yield 10 years in the future would always be 5.8%. 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.

89 At the time of the Market Parameters Decision, the 10-year government bond yield was 4.29% and it is now 2.6% as at August 2017. Thus, it is logical to suggest that the likelihood of the yield rising to 5.8% over the next 10 years is now materially lower than at the time of the Market Parameters Decision.

Figure 4: Australian 10-year government bond yields



Source: RBA.

90 If the two-discount-rate approach is to be used, our view is that it should not be based on the assumption that government bond yields will revert to 5.8% over the next 10 years. Rather, a better estimate of the government bond yield 10 years from now would be the forward rate.

91 Consequently, in the updated empirical estimates below, we set out estimates that are based on the QCA's two-discount-rate approach where the expected government bond yield 10 years in the future is set equal to the observed 10-year forward rate, rather than fixed to 5.8% in all market conditions. We emphasise that in our view the two-discount rate approach should not be used at all.

**The standard approach is to use dividend discount models to estimate a single required return to apply to all cash flows**

92 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), in particular.<sup>35</sup>

93 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.<sup>36</sup>

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

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

95 As stated previously in this report, it is important on a broader scale that the MRP determined by different regulators is the same or substantially similar, however determined, to ensure that there is not a skewing of investment decisions with implications for allocative efficiency.

### **5.3 Updated estimates**

96 We have updated the Cornell estimates using data from July 2017 and report the results in Table 4 below.

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<sup>35</sup> AER, 2013, Draft Rate of Return Guideline – Explanatory Statement, p. 181.

<sup>36</sup> AER, 2013, Draft Rate of Return Guideline – Explanatory Statement, p. 182.

Table 4: Contemporaneous estimates of the MRP from the AER's DGM approach

Growth rate (% p.a.)	MRP from single return approach (% p.a.)		MRP from two-return forward rate approach (% p.a.)	
	10-year convergence	20-year convergence	10-year convergence	20-year convergence
4.0	7.01	7.06	6.36	6.87
4.6	7.46	7.42	7.54	7.42
5.1	7.85	7.73	8.64	7.93
5.6	8.23	8.04	9.86	8.50

Source: Cornell approach, estimates for July 2017 computed by Frontier Economics. Forward rates and analyst dividend forecasts obtained from Bloomberg.

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In Table 4:

- a. We have used the same three long-run growth rates that the QCA adopts, plus we report results for a 5.6% growth rate for the reasons set out in Section 5.2.2 above;
- b. We have adopted 10-year and 20-year convergence periods (the period over which the current growth rate in dividends converges to the assumed long-term growth rate) in accordance with the QCA's approach;
- c. We report estimates from the standard single return approach, whereby a single return is derived to apply to all future cash flows; and
- d. We report estimates from a two-return approach, whereby the discount rate beyond the convergence period is based on the forward 10-year government bond yield reported by Bloomberg, rather than assuming a 5.8% figure in all market conditions.

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We note that the estimates from the single return approach are less sensitive to differences in the assumed growth rate and less sensitive to the length of the convergence period. For these reasons, and because the single return approach is appropriate, we focus primarily on those estimates.

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We note that the majority of the estimates in Table 4 are in the range of 7% to 8%. Our preference is for estimates at the upper end of that range because those estimates do not make an arbitrary deduction from the forecast GDP growth rate.

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We also note that the estimates for the QCA's preferred 4.6% growth rate are stable across all four estimation approaches at approximately 7.5%. This compares with a dividend discount estimate of the MRP of 8.09% in our November 2016 report and an estimate of 6.9% in the Market Parameters Decision.

## 5.4 Conclusions and recommendations

101 In considering the estimates from the Cornell approach, we begin by noting that the Cornell estimates that are based on a 4.6% growth rate and expected future risk-free rate that is consistent with the current market conditions are 7.54% and 7.42% for 10-year and 20-year convergence periods, respectively.

102 The Cornell estimates set out above support an MRP point estimate in the range of 7% to 8%. Adopting the mid-point of that range would provide an MRP estimate of 7.5%, which is consistent with the MRP if the approach adopted in the Market Parameters Decision were adopted with an expected future risk-free rate that is consistent with current market evidence.

103 In our view an MRP of 7.5% would be a lower bound from applying the Cornell approach as:

No deduction should be made to the forecasted GDP growth rate, for the reasons set out Section 5.2.2 above, which shows that corporate earnings growth has not been less than GDP growth; and

- a. A single required return should be estimated for the reasons set out in Section 5.2.3 above.

## 6 Survey evidence

104 Our report of May 2017<sup>37</sup> updates the survey evidence, in particular setting out the results of the Fernandez (2017) survey.<sup>38</sup> A summary of that evidence is set out in Table 5 below.

Table 5: Fernandez survey estimates of the MRP

Estimate	Fernandez et al (2013)		Fernandez et al (2017)	
	Mean	Median	Mean	Median
Raw estimate	5.9%	6.0%	7.3%	7.6%
Plus dividend imputation adjustment	6.7%	6.8%	8.1%	8.3%

Source: Fernandez et al (2013); Fernandez et al (2017). Note: The 2013 survey did not ask respondents about the risk-free rate that they used.

105 In our view, as set out in more detail in our May 2017 report:

- a. The 2017 Fernandez survey, assessed in the same manner as in the Market Parameters Decision, supports an MRP of 8.3%,<sup>39</sup>
- b. There is no reason to suggest that the Fernandez survey estimates incorporate a gamma of 0.47, so they would have to be adjusted to be compared with other QCA estimates.<sup>40</sup>

106 It should also be noted that Fernandez (2017) sets out evidence that survey respondents are using a risk-free rate materially above the prevailing government bond yield. This implies that an MRP above 8.2% should be used if it is to be inserted into a version of the CAPM that uses the prevailing government bond yield.

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<sup>37</sup> Frontier Economics, May 2017, Recent evidence on the market risk premium.

<sup>38</sup> 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](https://ssrn.com/abstract=2954142).

<sup>39</sup> That is, the median estimate is adjusted to include the value of imputation credits based on a gamma of 0.47.

<sup>40</sup> That is, the QCA has estimated all of its other MRP estimates on the basis of a gamma of 0.47. Given the remote possibility that any survey respondent would have grossed-up their response using a gamma of 0.47, the survey estimates are not directly comparable to estimates that have been so grossed-up.

## 7 Independent expert valuation reports

107 Our report of May 2017<sup>41</sup> updates the evidence from independent expert valuation reports. A summary of that evidence is set out in Table 6 below.<sup>42</sup>

Table 6: The effective MRP used in recent independent expert valuation reports

Independent expert	Required market return	Contemporaneous government bond yield	Effective MRP
Lonergan Edwards	10.0%	3.1%	6.9%
Grant Samuel	11.2%	2.5%	8.7%
Deloitte	9.6%	1.8%	7.8%
KPMG	10.4%	2.4%	8.0%

Source: Connect 4.

108 The evidence in Table 6 is that independent experts are using higher estimates of the MRP in a range of 6.9% to 8.7% noting that the lowest estimate uses a bond yield considerably higher than the current government bond yield.

109 The MRP figures set out in Table 6 are ex-imputation estimates. Consequently, before they can be compared to a with-imputation MRP, they must be grossed-up to reflect the assumed value of imputation credits. The QCA has previously estimated that this adjustment requires the addition of approximately 80 basis points.

110 In our view:

- a. The new evidence set out above demonstrates that independent experts are currently using market returns that are (on average) 7.9% higher than the prevailing government bond yield. These estimates expressly do not reflect any assumed benefit of imputation credits. Adding the QCA's imputation credit adjustment of 80 basis points results in an MRP estimate of 8.7%; and

111 We recognise that although some independent experts take a different path, they all reach the same conclusion – in the prevailing conditions in the market for equity funds, the required return on equity reflects an MRP above 8%.

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<sup>41</sup> Frontier Economics, May 2017, Recent evidence on the market risk premium.

<sup>42</sup> Grant Samuel applies an upward adjustment at the WACC level. To find the required return on the market, we simply strip out the return on debt component for the case where beta is set to 1.



## 8 Wright approach

### 8.1 Methodology

112 The Wright approach involves the following steps:

- a. Estimate the real return on the market portfolio each year for some historical period using the Fisher relation:

$$r_{m,t}^{real} = \frac{1 + r_{m,t}^{nominal}}{1 + inflation_t} - 1.$$

- 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:

$$r_m^{nominal} = \left(1 + \overline{r_m^{real}}\right) \left(1 + E[inflation]\right) - 1.$$

113 The Wright approach produces a direct estimate of the required return on the market. The implied MRP can be determined by deducting the contemporaneous estimate of the risk-free rate.

### 8.2 Current estimates

114 We have updated the Wright estimates to the end of 2016. In computing these estimates, we adopt (without endorsing) a theta of 0.56, which is consistent with the QCA's gamma estimate of 0.47.<sup>43</sup> The relevant estimates are set out in Table 7 below, which shows that the estimate for the preferred post-1958 sample period has increased from 7.4% to 8.9% since the time of the Market Parameters Decision.

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<sup>43</sup> QCA, 2014, Market Parameters Decision, p. 24.

Table 7: Wright approach estimates of the MRP

Sample start year	2013 estimate (% p.a.)	2017 estimate (% p.a.)
1883	7.1	8.6
1937	5.8	7.3
<b>1958</b>	<b>7.4</b>	<b>8.9</b>
1980	8.4	9.9
1988	7.9	9.2

Source: Wright approach estimates, updated to end 2016 by Frontier Economics. QCA Market Parameters Decision, p. 88.

### 8.3 Applicability of the Wright approach

115 As noted previously in this report it is important in determining the MRP that regard be had to all methodologies in a manner that is reflective of their applicability to current market conditions. In this regard we note that Dr Lally, the consultant commissioned by the QCA, recommends that the QCA should add the Wright approach to the four approaches it has traditionally considered. In recommending that the Wright approach should be used, Lally (2013) recognises that the Ibbotson and Wright approaches are the end points of a spectrum. The first effectively creates an outcome that the MRP is constant, due to adopting a mean estimation over an extended period, so that the required return on the market varies one-for-one with the risk-free rate. The second assumes that the (real) expected return on the market is constant so that the MRP varies inversely one-for-one with the risk-free rate. Lally (2013) concludes that the evidence on which end of the spectrum should be preferred is “not decisive”<sup>44</sup> and consequently recommends that both approaches should be given some weight.

116 As noted above for the Ibbotson and Siegel approaches, the estimation of the MRP has significant relevance when current market conditions are reflective of the average conditions that have applied over the extended period. Similarly the Wright approach adopts an estimation over a similar period and potentially suffers from the same flaw, albeit the outcome is at the other end of the spectrum. The current market conditions, and those that could be reasonably expected, over the regulatory period are substantially different from the average.

117 Reflecting on the comments of Dr Lally and the question as to the applicability of these estimation methodologies to current market conditions the weight that is

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<sup>44</sup> Lally (2013), p. 6.

applied to the Ibbotson/Siegel methodologies (on a combined basis) should be equivalent to the weight applied to the Wright approach.

118 It is also relevant to note that in a report prepared for UK regulator Ofgem, Wright and Smithers (2014)<sup>45</sup> conclude that:

Thus both historical and more recent evidence point to the same conclusion: in contrast to the stock return there is no evidence of stability in the risk-free rate, at any maturity. As a direct implication, there is no evidence of stability of the market equity premium. Without such evidence, **there is no empirical basis for the assumption that falls in risk-free rates should translate to falls in expected market returns.**<sup>46</sup>  
[Emphasis added]

This provides support for the fact that the Wright approach is as relevant and appropriate as other estimation methodologies.

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<sup>45</sup> Wright, S. and A. Smithers, 2014, "The cost of equity capital for regulated companies: A review for Ofgem,"

<sup>46</sup> Wright and Smithers (2014), p. 15.

## 9 Market indicators

119 In its Market Parameters Decision, the QCA indicated that it would have regard to evidence from a number of variables that have been shown, in the empirical finance literature, to be correlated with risk premia. The QCA refers to this as “conditional information” and notes that such information includes “volatility measures, corporate debt premiums, and liquidity premiums on government bonds” and also “the relationship between the risk-free rate and the market risk premium.”<sup>47</sup> To date, the QCA has considered that information in a qualitative manner and has not set out any particular MRP estimate that is supported by that information.

120 In our report of November 2016,<sup>48</sup> we set out a range of what we called “market indicators” that included:

- a. Earnings yield based upon year one forecast earnings relative to the risk free rate;
- b. Corporate bond spreads, based upon RBA estimates for 10 year BBB bonds;
- c. Volatility on the ASX200 implied by the prices of call and put options; and
- d. The term spread, which we proxy as the difference between the yield on 10 year government bonds and 2 year government bonds.

121 In that report, we also set out our approach for distilling the market indicator information into a single estimate of the MRP and concluded that the data at the time of that report supported an MRP of 6.85%.

122 We use that same approach for analysing market indicators in work that we perform for NSW regulator IPART.<sup>49</sup> IPART publishes updated WACC estimates every six months and one of the inputs into its MRP allowance is a market indicator estimate that Frontier Economics provides to them. Our process for producing that market indicators estimate is as set out in Section 7.2.2. of our November 2016 report.

123 Our most recent market indicators estimate of the MRP is 7.30%. This estimate uses data through to the end of June 2017 and was used in IPART’s August WACC

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<sup>47</sup> QCA, 2014, Market Parameters Decision, p. 82.

<sup>48</sup> Frontier Economics, November 2016, The Market Risk Premium, Section 7.2.2.

<sup>49</sup> The Independent Pricing and Regulatory Tribunal.

update.<sup>50</sup> The increase in the market indicators estimate of the MRP since our November 2016 report is driven by:

- a. A decrease in the 10-year government bond yield;
- b. An increase in the term spread (proxied by the difference in yield to maturity on 10-year and 2-year government bonds as reported by the RBA); and
- c. A small increase in the implied volatility of the ASX200 (proxied by the ASX 200 VIX index).

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<sup>50</sup> IPART, August 2017, WACC Biannual Update.

## 10 Comparison of MRP estimates

124 Table 8 below summarises the MRP estimates that the QCA relied upon in its 2014 Market Parameters Decision and compares them to the updated estimates set out in this report.

Table 8: Summary of MRP estimates

Method	Market Parameters Decision MRP (% p.a.)	Updated MRP (% p.a.)	Comments
Ibbotson	6.5	6.5	Data from 1958-2016.
Siegel	5.5	5.7	Data from 1958-2016.
Cornell	6.9	7.5	Both estimates based on 4.6% dividend growth rate. If a dividend growth rate of 5.6% was applied MRP estimate would be 8%.
Surveys	6.2	8.3	Market Parameter Decision estimate of 6.2 was incorrect, QCA has since updated to 6.8. If adjustment was made for risk-free rate, MRP estimate would be 9%.
IERs	6.2	7.9	Market Parameter Decision estimate of 6.2 was incorrect, QCA has since updated to 6.8.
Wright	7.4	8.9	Data from 1958-2016.
Market indicators	No specific estimate	7.3	IPART estimation approach.

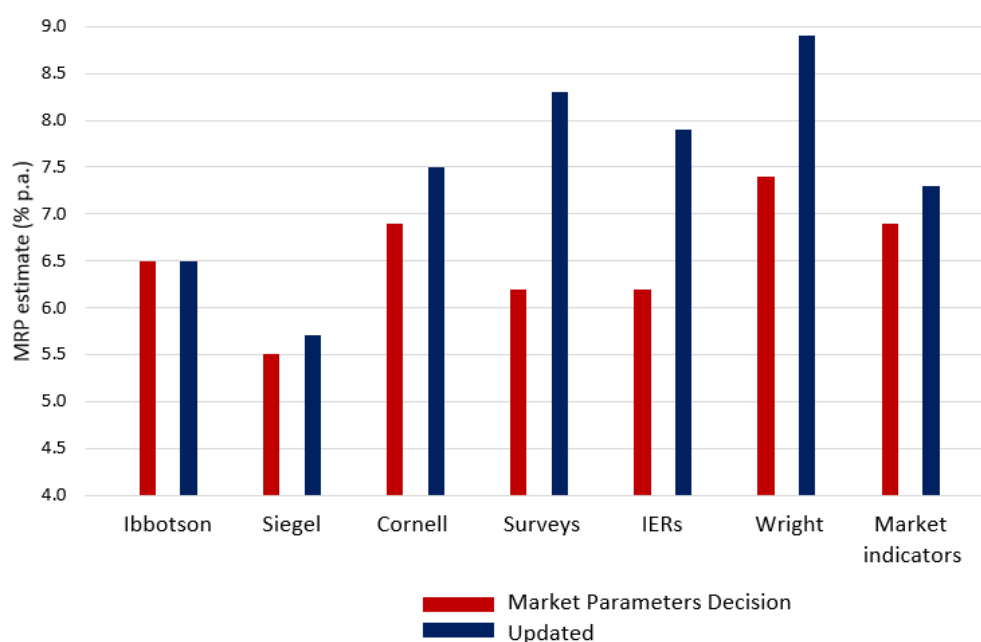
Source: QCA Market Parameters Decision; Updated estimates from above.

125 The change in MRP estimates since the time of the Market Parameters Decision is shown graphically in Figure 5 below.<sup>51</sup>

126 Table 8 and Figure 5 show that the Ibbotson estimate has remained at 6.5% due to the essentially fixed nature of that approach, and that all other estimates have increased materially. That is, the set of evidence that the QCA relied upon to set the MRP to 6.5% has changed materially in one direction since the time of its Market Parameters Decision.

<sup>51</sup> Note that since the QCA did not provide a specific estimate of MRP from the market indicators estimate in its Market Parameters Decision, we have used the estimate that we provided to IPART for its August 2014 WACC Update.

Figure 5: Comparison of MRP estimates



Source: QCA Market Parameters Decision; Updated estimates from above.

- 127 In our November 2016 report<sup>52</sup> we recommended an approach whereby:
- a. Regard is given to the historical data by applying equal weight to the Ibbotson and Wright estimates;
  - b. Regard is given to prevailing market information by applying weight to the evidence from the dividend discount model (Cornell) and market indicators approach; and
  - c. The estimates from the historical data and prevailing market information are given equal weight in setting the final MRP.

128 Having regard to the applicability of each evidence set to the context of the current market conditions we regard the approach adopted in our November 2016 report to continue to be a robust and sound approach to determining the MRP.

129 A comparison of the relevant estimates from our November 2016 report and from the current data is set out in Table 9 below. Since our earlier report, the final estimate has increased slightly, which affirms our earlier conclusion that the relevant evidence supports an MRP above 7.5%. We note that we have not contemplated the Siegel approach in this analysis. This is because the Siegel and Ibbotson estimates should not be considered to be separate independent estimates. Including both essentially amounts to double-weighting the historical average

<sup>52</sup> Frontier Economics, November 2016, The Market Risk Premium, Table 4, p. 38.

excess returns data. The Ibbotson approach is considered the more robust and generally accepted of the historical methodologies, but we note that even if the Siegel estimate was included as one of the historical data estimates the relevant evidence would still support an MRP of at least 7.5%.

130 More specifically, we note that the long-run historical estimates of MRP have not changed materially, the market indicators estimate has increased, and the dividend discount (Cornell) estimate is lower. In relation to the dividend discount estimate, we have noted above that there are a range of implementations of that model, with different growth rates and convergence periods. We have also noted above that we consider our mid-range figure of 7.5% to be a conservative estimate. All of this supports our conclusion that an MRP of at least 7.5% is supported by the current evidence.

Table 9: Summary of MRP estimates

Method	November 2016 report	Data available as at June 2017
Ibbotson	6.4	6.5
Wright	8.9	8.9
<b>Historical data</b>	<b>7.6</b>	<b>7.7</b>
Cornell	8.1	7.5
Market indicators	6.9	7.3
<b>Prevailing market data</b>	<b>7.5</b>	<b>7.4</b>
<b>Final estimate</b>	<b>7.5</b>	<b>7.6</b>

Source: Frontier Economics, November 2016, Updated estimates from above.

131 Our November 2016 report adopts the approach of having equal regard to estimates from historical data and current market data. Table 10 below contains the application of this general approach to all of the MRP estimation methods that were used in the Market Parameters Decision. The shows that the simple mean of all of the estimation approaches set out above is 7.5%. We consider that this approach produces a downwardly-biased estimate of the MRP in the current market conditions because:

- a. It gives weight to the Siegel estimate; and
- b. It doubles the weight applied to evidence from historical excess returns (the Ibbotson and Siegel approaches).



132 Consequently, we interpret the simple mean of 7.5% as a lower bound estimate and conclude that the relevant evidence supports an MRP above 7.5%.

Table 10: Summary of MRP estimates

Method	Current estimate
Ibbotson	6.5
Siegel	5.7
Wright	8.9
<b>Historical data</b>	<b>7.0</b>
Cornell	7.5
Surveys	8.3
IERs	7.9
Market indicators	7.3 <sup>a</sup>
<b>Prevailing market data</b>	<b>7.9</b>
<b>Mean estimate</b>	<b>7.5</b>

Source: Updated estimates from above.

Note: a: This figure is not used in the estimate from “prevailing market data” as the QCA has regard to market indicators in a qualitative way only.

133 In light of all of the evidence set out above, our view is that the Aurizon Network submission of an MRP of 7.0% is conservative, and that it has become more conservative since its November 2016 submission. Having regard to the evidence presented in this report being up to date as at the commencement of the current regulatory period, our view is that a revised application of a MRP of at least 7.5% would be appropriate.

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