The required return on equity for DBCT

REPORT PREPARED FOR DBCT MANAGEMENT PTY LTD

September 2015

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Figures

1 Background and conclusions

1.1 Overview and instructions

1 Frontier Economics (**Frontier**) has been retained by DBCT Management Pty Ltd (**DBCT**) to provide our views on issues relating to the estimation of the required return on equity using the Capital Asset Pricing Model (**CAPM**). We have been asked to consider the regulatory framework used by the Queensland Competition Authority (**QCA**) and to respond to the QCA's Market Parameters Decision and the Aurizon UT4 Draft Decision insofar as they relate to the required return on equity.

1.2 Summary of conclusions

2 Our main conclusions are as follows:

a. The risk-free rate should be set to the contemporaneous yield on 10-year government bonds – for the reasons set out in Frontier Economics (2015, Term). The relevant rate at the time of this report was 2.8% p.a.;

b. All of the available evidence points to an equity beta estimate of at least 1.0 for DBCT:

   i. The QCA originally selected an equity beta estimate of 1.0 to reflect the systematic risk of the expanded port. That expansion is now complete;

   ii. In setting the equity beta to 1.0, the QCA noted that the coal price was an important driver of systematic risk for DBCT. Since its previous decision, the coal price has declined materially. Other things equal, this would have the effect of increasing systematic risk – at lower coal prices, DBCT's cash flows will be even more sensitive to further declines in the coal price;

   iii. Port users have agreed to an equity beta of 1.0 as part of commercial arrangements with DBCT;

   iv. The ratings agencies have materially reduced the credit rating of Peabody, which accounts for 25% of total DBCT volume. This has the effect of increasing the systematic risk of DBCT's cash flows relative to previous regulatory determinations;

   v. The ratings agencies have reduced the ratings of coal ports generally, due in large part to the decline in the credit worthiness of customers. If the risk of first-ranking

debt has increased, it must be the case that the risk of residual equity in the same firm has also increased;

vi. There is now a real threat of competition that exposes DBCT to increased commercial risk, which has the effect of increasing the equity beta relative to previous determinations;

vii. The appropriate comparators for DBCT are commercial port operators and DBCT is likely to have higher systematic risk than those comparators for the following reasons:

1. Long-term take-or-pay contracts are a standard feature of commercial arrangements. DBCT's contracts have a shorter term and require less forward notice of extension. Also DBCT has three quarters of its contracts due to expire during the next regulatory period;

2. The socialisation of losses from customer defaults is also a feature of commercial arrangements. The interaction of the loss socialisation contract provisions and the regulatory regime put DBCT at a disadvantage to its peers in creating a delay between a loss from a default and recovery from other customers.

viii. The mean raw equity beta estimates for the Port of Tauranga, Asciano, and the port business examined by Grant Samuel, is 1.08 and the re-levered equity beta estimates are higher again; and

ix. The Conine re-levered equity beta estimates are:

1. 2.92 for Asiano Ltd – the only comparator identified by Grant Samuel; and

2. 1.24 for the Port of Tauranga – the only remaining comparator previously identified by the QCA; and

c. The market risk premium should be set to 8.1% on the basis of estimates from the following approaches:

i. Mean historical excess returns (Ibbotson) – 6.6%;

ii. Mean historical real returns (Wright) – 8.8%

iii. Dividend discount model – 8.6%

iv. Independent expert valuation reports – at least 7.4%.

d. These parameter estimates produce an estimate of the required return on equity of 10.9%.

2 The risk-free rate

3 For the reasons set out in our companion report (Frontier 2015 Term), our view is that a long-term risk-free rate should be used when estimating the required return on equity for regulated infrastructure firms. Consequently, we use the yield on 10-year government bonds as a proxy for the risk-free rate. At the time of this report, the 10-year yield was approximately 2.8%,[1] so we adopt that rate in our analysis.

[1] Source: RBA.

3 Equity beta

3.1 Background and context

3.1.1 Selection of comparators

4 For its 2005 DBCT Draft Decision, the QCA commissioned ACG to advise on the appropriate equity beta estimate. ACG identified three "comparator" firms:

a. Port of Tauranga (a small port in New Zealand);

b. Macquarie Office Trust; and

c. Macquarie Infrastructure Group.

5 On the basis of estimates for these three firms, ACG recommended that the appropriate range for the equity beta for DBCT was 0.56 to 0.78, and that the 0.65 estimate for the Port of Tauranga was "an important benchmark." The QCA consequently adopted an equity beta estimate of 0.66 in its draft decision.

6 The QCA's draft decision proved to be highly controversial and drew a raft of submissions from a variety of stakeholders. Specifically, the QCA noted that:

> …stakeholders argued that ACG's comparators are questionable at best and irrelevant at worst. In particular, stakeholders noted that only one comparator is from the same industry as DBCT (ports) while the other two are in different lines of business…Stakeholders' basic concern, therefore, was that the comparators ultimately do not bear the same systematic risks as DBCT (DBCT Management.[2]

7 This led the QCA to ask ACG to reconsider its advice on equity beta in light of the stakeholder submissions. The QCA reports that the outcome of that reconsideration was a material increase in the ACG recommendation:

> In re-evaluating its original analysis in the light of stakeholder comments, ACG accepted that it:
>
> (i) placed too much weight on the Port of Tauranga, given statistical uncertainties; and
>
> (ii) should have excluded Macquarie Office Trust from the comparator sample.
>
> In light of these considerations, ACG believed that a revised equity beta of 0.80 (asset beta of 0.40) is a reasonable estimate in the case of DBCT.[3]

8 However, given that ACG began with a set of three comparator firms and it then eliminated one and down-weighted another, the resulting sample is so small as to be entirely incapable of providing any sort of statistical reliability whatsoever.

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[2] DBCT 2005 Final Decision, p. 171.

[3] DBCT 2005 Final Decision, p. 148.

9 That is, one of the key considerations when estimating the equity beta for DBCT is the lack of appropriate comparator firms. This was the case in 2005 and remains the case today.

3.1.2 Relevant port characteristics

10 As part of its re-examination of the equity beta, ACG considered the proposed expansion of the port. ACG concluded that the expanded port would have a materially higher systematic risk than the existing port facilities, explaining its position as follows:

> …ACG noted that the future outlook for DBCT has now changed with major expansions currently being contemplated by DBCT Management and users. In this context, ACG advised the Authority that the demand underpinning any significant increment to DBCT's existing capacity may not be as secure as the demand for current capacity. For example, ACG argued that new capacity for DBCT would have limited long run contract protection, as its asset life would significantly exceed the length of long term contract protection.
>
> As a result, ACG indicated to the Authority that it considered a higher equity beta should apply in this context.[4]

11 As set out further below, this effect has been exacerbated since the ACG report was prepared. Since that time, contract lengths have reduced from 10 to 5 years. Thus, on average, DBCT now has only 4.5 years of contract coverage and this will reduce to 2.5 years when all of the existing contracts have been rolled over. By contrast, it is not until 2054 that DBCT is scheduled to recover its initial investment.

12 The QCA concluded that the ACG revised equity beta of 0.8 was appropriate for the existing port facilities, but accepted that a higher equity beta of 1.0 would be required once the port expansion was complete:

> In the particular case of DBCT, the Authority accepts ACG's advice that the proposed expansion beyond 60 mtpa involves an increase in overall risk, notwithstanding the measures put in place by the Authority to mitigate the risk. The Authority also accepts that there is a need to ensure that there is no regulatory impediment to expansion of the port.
>
> Therefore, taking all factors to account, the Authority has determined to accept the equity beta of 1.0 proposed by DBCT Management in its response to the Authority's draft decision.
>
> In reaching this decision, the Authority contemplated adopting a 'two-tier' approach to DBCT's rate of return under which the 8.54% WACC would apply until DBCT is substantively expanded, at which point the WACC would increase to 9.02% (equity beta of 1.0) for the entire terminal. While the Authority believes that this approach may demarcate the different risk profiles of the existing and expansion assets, such an approach introduces uncertainties and unnecessary complexity.

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[4] DBCT 2005 Final Decision, p. 148.

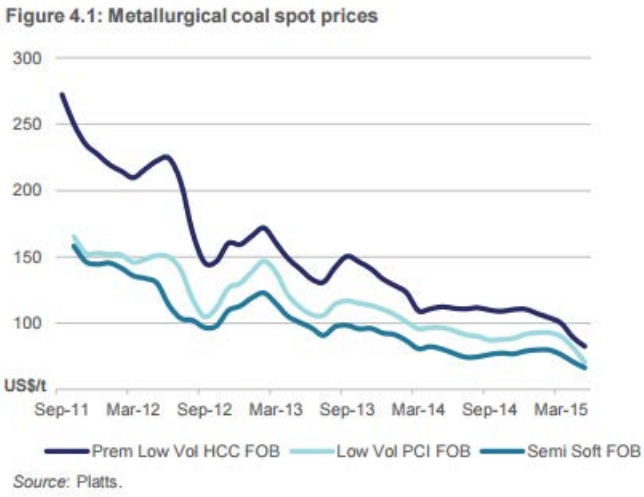
> As a consequence, the Authority has sought to make a clear and definitive determination on this matter now.[5]

13 The QCA's final decision was to adopt an equity beta of 1.0. In reaching this conclusion, the QCA made particular note of the fact that the coal price was a significant driver of systematic risk for DBCT, especially after the port expansion:

> Even though the economics of expansion appear fundamentally sound given the currently buoyant coal market, the Authority notes that coal prices have been volatile in the past, and therefore, the volume risk for significant new capacity is real. As a consequence, the Authority's view is that investors in a major expansion of the terminal would likely require relatively higher compensation for it. In this context, the Authority notes that DBCT Management argued that an equity beta of one would place it on a par with its real world peers.[6]

14 Of course, since the QCA's 2005 and 2010 DBCT decisions, coal prices have fallen materially, such that, other things being equal, DBCT would now be at least as exposed to this driver of systematic risk. The material fall in coal prices is illustrated in Figure 1 below.

Figure 1: Australian metallurgical coal prices



Source:http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/req/REQ-June15.pdf

15 In addition, since the QCA's 2005 DBCT decision, the competitive environment has changed materially. There are now a number of other competitive port alternatives available to mining companies, aided by the integration of the coal network infrastructure. These competitive alternatives to DBCT include:

a. The construction of the Goonyella to Abbot Point Extension (GAPE) by Aurizon Network means that northern Bowen Basin mines that would previously have shipped through DBCT can

[5] DBCT 2005 Final Decision, p. 150.

[6] DBCT 2005 Final Decision, p. 148.

now utilise the Abbot Point Coal Terminal. The expansion of the Abbot Point terminal and the construction of the GAPE rail link was entirely underwritten by coal contracts from customers who would have previously had no alternative to shipping through DBCT;

b. BMA's Hay Point coal terminal, which is effectively adjacent to DBCT, could become a multi-user facility to the extent that it has capacity in excess of its own requirements; and

c. Aurizon Network's Wiggins Island Rail Project (WIRP) involves the development of new lines and the upgrading of existing lines to service the Wiggins Island Coal Export Terminal (WICET). This allows mines in the Southern Bowen Basin to ship through WICET. Thus, any excess capacity at WICET (e.g., due to default or non-renewal by an existing customer) would present competition for DBCT.

16 Thus, DBCT is materially more exposed to real competition than at the time of the QCA's 2005 decision. Customers now have real competitive options to both the North (Abbot Point) and South (WICET) of DBCT.

3.1.3 Other relevant benchmarks

Victorian ports

17 In its 2005 final decision, The QCA noted that the Victorian regulator had adopted equity betas that, when regeared to 60% debt, were 0.95 for the Victorian Channels Authority and 1.20 for Melbourne Ports Corporation.[7]

2006 and 2010 access undertakings

18 In its 2010 draft access undertaking, DBCT Management proposed an equity beta of 1.0 that was unchanged from its 2006 access undertaking. The QCA approved that estimate without further consideration.

3.1.4 Grant Samuel independent expert report

19 In its 2010 independent expert report for Prime Infrastructure, Grant Samuel sought to estimate an equity beta for DBCT. Grant Samuel found this to be a difficult task. They began by noting the complexity of the task and the limitations of the CAPM:

> …the measurement of historical data such as risk premia and beta factors is subject to very high levels of statistical error. Measurements vary widely depending on factors such as source, time period and sampling frequency;
>
> the measurement of beta is often based on comparisons with other companies. None of these companies is likely to be directly comparable to the entity for

[7] DBCT 2005 Final Decision, p. 174.

> which the discount rate is being calculated and may operate in widely varying markets.[8]

20 Grant Samuel went on to state that:

> In this context, regulators undertake extremely detailed analysis of discount rate calculations and each of the relevant variables. Grant Samuel has had regard to this analysis (particularly in relation to Prime's assets) but in Grant Samuel's view it can give a misleading impression of the precision about what is, in reality, a relatively crude tool of unproven accuracy that gives, at best, a broad approximation of the cost of capital.[9]

21 In relation to beta estimates, Grant Samuel warned that:

> …there are very significant measurement issues with betas which mean that only limited reliance can be placed on such statistics. Even measurement of historical betas is subject to considerable variation. There is no "correct" beta.[10]

22 Having warned about the unreliability of its beta estimates, grant Samuel went on to attempt to estimate the equity beta for DBCT. It was able to identify only a single comparator – Asciano Group Ltd. Two estimates of beta were available for Asciano, 1.33 relative to the Australian market and 1.11 relative to a world market index.[11] It is only the former that would be relevant to the way the QCA implements the CAPM.

23 Grant Samuel also examined a number of port companies as comparators for Prime's Euroports business. Bloomberg reported beta estimates for 12 international ports, 8 of which were above 1.0. The mean and median of the estimates were 1.05 and 1.12, respectively.[12]

24 Grant Samuel then concluded as follows:

> A beta in the range 0.7-0.8 has also been adopted for DBCT. While this appears low, none of the other listed ports are regulated.[13]

25 Grant Samuel provided no explanation whatsoever about:

a. Why it ignored the equity beta estimate of 1.33 for the only comparator it identified for DBCT (Asciano); or

b. Why it adopted a beta estimate for DBCT that was in the order of 30% below the beta estimates for other port companies (i.e., how it knew to reduce the beta estimate by 30% and not 5% or 10% in relation to DBCT's regulatory environment); or

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[8] Grant Samuel (2010), Appendix 1, p. 2.

[9] Grant Samuel (2010), Appendix 1, p. 2.

[10] Grant Samuel (2010), Appendix 1, p. 2.

[11] Grant Samuel (2010), Appendix 1, p. 8.

[12] Grant Samuel (2010), Appendix 1, pp. 9-10. Bloomberg beta estimates relative to the relevant local index, using monthly data over four years.

[13] Grant Samuel (2010), Appendix 1, pp. 9-10. Bloomberg beta estimates relative to the relevant local index, using monthly data over four years.

c. Why it considered DBCT's regulatory environment to be the only factor that distinguished DBCT from other ports (e.g., why it did not consider DBCT's stranding risk to be a material consideration).

26 In summary, Grant Samuel presents no empirical support whatsoever for its equity beta estimate. It simply sets out the relevant empirical evidence (all of which points to an estimate above 1.0) and then declares that its final estimate is one that "appears low."[14]

27 Moreover, Grant Samuel also reports that Asciano had leverage of less than 50% over the beta estimation period and that the average leverage of the port comparators was less than 20%. Consequently, equity beta estimates re-geared to 60% would be even higher.

28 At this point, Grant Samuel records a further warning

> …considerable caution is warranted in selecting a beta for Prime's assets: all of the data is subject to significant statistical error. [15]

29 Consequently, we would place negligible weight on Grant Samuel's final equity beta estimate as every piece of market evidence considered by Grant Samuel supports an equity beta materially above 1.0. Grant Samuel are unable to point to a single piece of market evidence to support their final equity beta estimate.

30 We also note that the Grant Samuel estimate is now more than five years out of date and consequently of no relevance for that reason alone.

3.1.5 Credit rating changes

31 At the time of its 2010 access arrangement, DBCT[16] had a credit rating of BBB+/Baa2.[17] For example, in its November 2009 Ratings Action, Moody's stated that:

> The outlook on DBCT's Baa2 rating is stable, reflecting the strengthening in Prime Infrastructure's credit profile, as well as the improved operating outlook for coking coal, driven by the strong demand from China. The stable outlook also considers the recent completion of the terminal's expansion project, taking capacity to 85 million tonnes per annum ("mtpa").[18]

32 Since its last access arrangement, DBCT's credit rating has come under pressure due to the material decline in export coal prices and the material deterioration of the credit quality of one of DBCT's major customers. Specifically, in its July

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[14] Grant Samuel (2010), Appendix 1, pp. 9-10. Bloomberg beta estimates relative to the relevant local index, using monthly data over four years.

[15] Grant Samuel (2010), Appendix 1, p. 10.

[16] The rating is formally issued for DBCT Finance Pty Ltd.

[17] These are the Standard and Poor's and Moody's ratings, respectively.

[18] https://www.moodys.com/research/Moodys-confirms-DBCTs-Baa2-rating-outlook-stable--PR_190985, emphasis added.

2014 Update, Standard and Poor's reduced its rating for DBCT from BBB+ to BBB, and stated that:

> Recently global coal markets have experienced increasing stress, highlighted by weak prices that have affected the coal mining industry's profitability and led to some restructuring through asset sales and material cost-cutting measures.
>
> The challenging operating environment was one of the factors leading to the lowering of the ratings on Peabody Energy Corp., DBCT's largest single customer, to 'BB-', or two notches below where the rating was 12 months ago.
>
> The action on Peabody has resulted in the material weakening of DBCT's customers' overall credit quality, which has resulted in us lowering the cap on the DBCT rating by one notch to 'BBB'.[19]

and that:

> The rating action reflects the weakened credit quality of DBCT's customers, which was greatly influenced by the recent lowering of the issuer credit ratings on Peabody to 'BB-'. Peabody has contracts for about 25% of DBCT's overall capacity. Also impacting the reassessment of the customers' creditworthiness was the recent sale by Rio Tinto of the Clermont mine to a Glencore-led joint venture, resulting in the contractual payments to DBCT relating to that mine coming from parties with a weaker credit quality.
>
> Overall, we now assess the combined credit quality of all the customers to be commensurate with a 'BBB' rating.[20]

33 Moody's have recently made a similar point in revising their rating outlook from Baa2 Stable to Baa2 Negative:

> The negative outlook reflects the increasing downside risk for DBCT's credit profile, given the rising counterparty risk emanating from the continued weakness in the coal market. Consequently, DBCT's counterparty risk exposure has increased, which mainly arises from mines owned by Peabody Energy Corporation (B3, negative) shipping through DBCT's terminal.[21]

Moody's go on to show the material deterioration in Peabody's credit rating since DBCT's previous access arrangements, reproduced in Figure 2 below. Moody's go on to note that Peabody represents a quarter of the volume (and consequently revenue) of DBCT.[22]

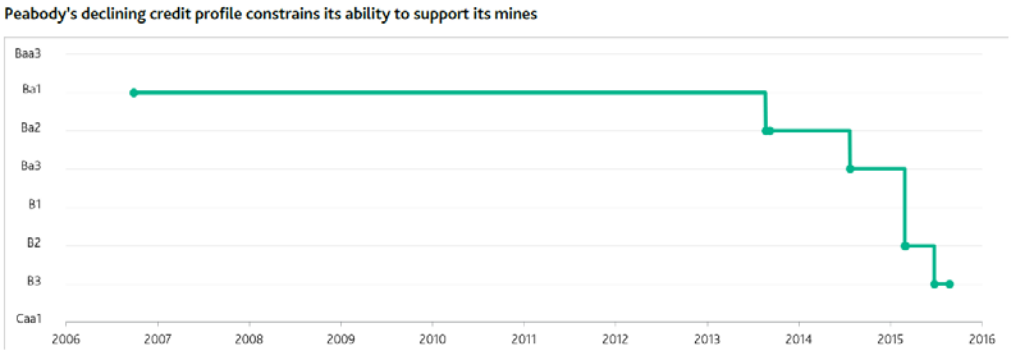
[19] Standard and Poor's DBCT Update, 31 July 2014, p. 2.

[20] Standard and Poor's DBCT Update, 31 July 2014, p. 2.

[21] Moody's DBCT Ratings Report, 25 August 2015, p. 1.

[22] Moody's DBCT Ratings Report, 25 August 2015, p. 4.

Figure 2: Peabody credit rating



Source: Moody's DBCT Ratings Report, 25 August 2015, p. 3.

34 Moody's has also recently changed its outlook for NCIG from positive to stable due to concerns about the credit quality of its customers:

> The change in outlook to stable from positive primarily captures the impact of the ongoing deterioration in coal market conditions on NCIG's credit profile…the declining coal price is weakening the financial position of NCIG's contractual counterparties, which is a fundamental credit driver given they are the source of NCIG's cash flows.
>
> The owners of certain of NCIG's mine counterparties have reported ongoing weak financial performance from their Australian coal mine portfolios, a factor which increases the likelihood of counterparty default.[23]

35 In summary, the material weakening of the credit quality of coal port customers has resulted in a deterioration of the credit ratings and ratings outlooks for those coal ports. Thus, the ratings agencies consider that the risk of coal port debt securities has increased in recent years. If the risk of first-ranking debt has increased, it must be the case that the risk of residual equity in the same firm has also increased. Other things being equal, this indicates an increase in the equity beta in recent years.

3.1.6 The relevance of contractual terms

Take or pay contracts

36 It is common for coal ports to write long-term take-or-pay contracts with their customers as a way of providing them with security about volumes. Under this arrangement, each customer contracts to provide a specified volume some years in advance. The customer will then pay for that contracted volume whether they use it or not. Our understanding is that such take-or-pay contracts are standard features of commercial port agreements.

37 Our understanding is that:

a. At the time of its 2006 access undertaking, DBCT had negotiated 10-year take-or-pay contracts with its counterparties;

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[23] Moody's NCIG Ratings Press Release, 2 September 2015, p. 4.

b. The current set of contracts are for 5-year terms and require customers to provide 12 months' notice of their intention to extend the contract; and

c. Contracts pertaining to approximately three quarters of total annual volume are due to expire within the forthcoming regulatory period.

38 That is, relative to earlier regulatory periods, the risk to DBCT has increased due to the reduction in the length of the contract terms and the fact that a very high proportion of contracts expire during a short period, which also happens to coincide with materially lower coal prices.

Contract roll-over

39 Another relevant comparison is between DBCT and its unregulated peers. Our understanding is that:

a. 10-year take-or-pay agreements are the industry standard; and

b. A number of coal port user agreements require users to extend their contracts every 12 months, so that the contracts always have 10 years to maturity. If a user does not extend the contract, their prices will increase. For example, WICET and NCIG have such provisions in their contractual arrangements.

40 By contrast, DBCT has shorter term contracts and no provision for the regular extension of contract terms. Rather, a DBCT user could simply allow their contract to expire and DBCT would have no more than 12 months' notice. Thus, DBCT faces more risk than these commercial counterparts.

Socialisation of losses

41 Another term that is common in coal port user agreements is the socialisation of losses due to the default of one of the users. That is, if one user defaults on its take-or-pay commitments, the prices paid by other users will increase. Moody's have recently referred to such a provision in their credit assessment of NCIG:

> Whilst NCIG has the contractual ability to socialize lost revenue following the hypothetical default of a counterparty amongst the remaining counterparties, this contractual mechanism remains untested…nevertheless, we recognise that the counterparties' obligations to, amongst other protection measures, provide guarantees for 12 months of their take-or-pay obligations provides a level of support.
>
> A possible downside scenario is that following a counterparty failure, NCIG is unable to fully socialize the lost revenue as a result of certain of the remaining counterparties - and/or their owners - not having the capacity to fully fund the required increase in tariffs. Such a situation would reduce NCIG's financial flexibility.[24]

[24] Moody's NCIG Ratings Press Release, 2 September 2015, p. 4.

42 An important point here is that the socialisation of losses occurs under commercial contract terms, rather than via the type of "unders and overs" provision that is a key part of the revenue cap arrangements for electricity transmission and distribution businesses. That is, in respect of the socialisation of losses, DBCT is much more akin to other coal port operators than electricity network businesses.

43 Another key point here is that if a user default occurs because coal prices have fallen, other users may be unable (or unwilling) to pay higher prices. Thus one default may cause a spiral of subsequent defaults and further price increases. Standard and Poor's have recently made this point:

> We note that the contractual and regulatory framework provides some protection against material deterioration of the credit quality of a customer, whereby, at a five-year tariff reset, the revenue previously earned from a defaulted customer is "socialised" among the customer base by spreading the revenue base across the other performing customers. This, in our view, would be of greater value if the weakening of a given customer was driven by specific company factors rather than the performance of the coal sector in Queensland as a whole.[25]

44 Thus, the fact that coal prices have fallen materially since DBCT's previous access undertakings reduces the effectiveness of the loss socialisation provision of its user contracts.

45 Another feature of loss socialisation provisions is the lag between any default and the socialisation of any resulting losses. Moody's have recently noted that, on this dimension, DBCT is at a disadvantage relative to its peers:

> Whilst DBCT has the contractual right to socialize lost revenue due to a user default, such socialization only occurs from the earlier of (i) the user's scheduled contract termination date, (ii) the assignment of the user's capacity allocation to another party and (iii) the next regulatory reset. We consider this lag to be a potential cause of cash flow volatility.[26]

46 Thus, the risk to DBCT is (other things being equal) greater than that of its peers – particularly if DBCT should suffer a default in the early part of a regulatory period.

47 In summary:

a. The socialisation of losses occurs under commercial contract terms, rather than via the type of "unders and overs" provision that is a key part of the revenue cap arrangements for electricity transmission and distribution businesses. That is, in respect of the socialisation of losses, DBCT is much more akin to other coal port operators than electricity network businesses;

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[25] Standard and Poor's DBCT Update, 31 July 2014, p. 2.

[26] Moody's DBCT Ratings Report, 25 August 2015, p. 2.

b. The fact that coal prices have fallen materially since DBCT's previous access undertakings reduces the effectiveness of the loss socialisation provision of its user contracts; and

c. The interaction of the loss socialisation contract provisions and the regulatory regime put DBCT at a disadvantage to its peers in creating a delay between a loss from a default and recovery from other customers.

3.2 Conceptual analysis

48 In his report to the QCA as part of its 2004 WACC review, Lally (2004) set out a list of firm characteristics that are conceptually related to the systematic risk or beta of the firm's cash flows. We consider each of those characteristics in turn below:

a. **Income elasticity of demand**.[27] Lally states that firms that produce necessities are likely to have relatively inelastic demand for their product and consequently have lower betas. He cites monopoly electricity and gas distribution firms as an example of firms with highly inelastic demand. DBCT would have always faced a more elastic demand curve than energy distribution firms, because use of its service is contingent on the profitability of local mines – it is not providing a service that is essential for the physical life of its customers. Moreover, income demand elasticity is likely to have increased since the QCA's last determination as the threat of competition is now more pronounced.

b. **The nature of the customer**.[28] Lally states that firms that service the public are likely to have lower betas than firms that service other businesses. Again, he cites electricity distribution as an example of firms at one end of the spectrum, given their largely public customer bases. Another factor that implies a lower beta is the fact that electricity distributors service a large number of residential customers. This is in direct contrast to DBCT, which services a small number of corporate customers.

c. **Pricing structure**.[29] Lally states that firms with more fixed revenues are likely to have lower betas. He again uses the example of electricity distribution businesses as the extreme example of firms that have revenue streams that are largely fixed.

[27] Lally (2004), p. 80.

[28] Lally (2004), p. 80.

[29] Lally (2004), p. 81.

As set out above, DBCT's pricing structure is similar to the commercial pricing structure adopted by other ports.

d. **Contract duration**.[30] Lally notes that there are a number of dimensions to the consideration of contract duration. The aspect that is most relevant to DBCT is the extent to which it is constrained from increasing prices in response to adverse cost shocks. For example, the fact that DBCT is unable to easily increase prices in response to shocks to costs such as wage rates or interest rates, during a regulatory period, will serve to increase systematic risk.

e. **Regulation**.[31] Lally states that the effect of regulation depends on the frequency of regulatory resets. Specifically, he states that firms with long re-set periods (5 years) are likely to have higher betas than otherwise identical unregulated firms. He explains that this is due to the greater exposure to cost shocks arising from the regulatory process.

   In our view, the QCA's current approach to the allowed return on equity magnifies this regulatory effect. The QCA's approach is to set the allowed return on equity by adding an effectively fixed risk premium to the government bond yield of the day. Thus, the allowed return varies up and down with changes in the government bond yield. In our view, there is overwhelming evidence to support the proposition that required returns in the market are much more stable than the QCA's allowances. Specifically, government bond yields tend to be very low during financial crises, when risk premiums are at their highest. Thus, the QCA's approach tends to under-compensate investors during crises and economic downturns. The opposite occurs during bull markets and economic expansions. This magnifies the firm's systematic risk – by under-compensating in down markets and over-compensating in up markets.

f. **Monopoly power**.[32] Lally states that firms with a high degree of monopoly or market power may have lower betas if they are able to use their market power to shield their cash flows from economy-wide shocks. Since the QCA's last determination, DBCT's monopoly power has diminished considerably as the threat of competition is now more pronounced.

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[30] Lally (2004), p. 81.

[31] Lally (2004), p. 81.

[32] Lally (2004), p. 82.

g. **Real options**.[33] Lally specifically refers to the option to adopt new products as being a characteristic that is likely to increase the systematic risk of the firm – as those growth options are likely to be sensitive to shocks to the economy. Again, he singles out electricity and gas transmission firms as being at the lower end of the spectrum on this metric.

h. **Operating leverage**.[34] Lally notes that the conventional view is that high operating leverage (the ratio of fixed to variable costs) is associated with higher betas. However, he places little weight on this characteristic because the empirical evidence is mixed.

i. **Market weight**.[35] Lally notes that a company that has a larger weight in the market index that is being used to estimate beta is likely to have a beta estimate drawn towards 1. He notes that this is unlikely to be an important consideration unless the firm represents 5% or more of the market index, which DBCT does not.

49 We make three important observations about the above list:

a. A conceptual analysis cannot be used to produce a point estimate of beta. At most, conceptual analyses can be used to make directional inferences about whether one type of firm is likely to have higher or lower systematic risk than another, and about whether a particular firm's systematic risk is likely to be increasing or decreasing over time.

b. All of the considerations in the above list relate to the systematic risk of the firm's operations – the asset beta. The ultimate task at hand is to estimate the equity beta, which is a function of the asset beta and leverage (the relative proportion of debt financing). It would be wrong to draw conclusions about the equity beta from considerations about the asset beta without also considering leverage. For example, it is generally accepted that many regulated infrastructure assets have asset betas that are lower than for the average firm. But these same firms tend to have leverage that is double that of the average firm (60% vs. 30%). These effects act in offsetting directions, in which case the net implications for the equity beta are unclear.

c. All of the considerations in the above list relate to the correlation between the firm's cash flows and movements in the broad economy. Beta is also affected by sensitivity to changes in

[33] Lally (2004), p. 83.

[34] Lally (2004), p. 83.

[35] Lally (2004), p. 83.

discount rates. That is, there are two components to the assessment of firm value – future cash flows and the discount rates or required returns that are applied to them. From time to time there are shocks to required returns. For example, during financial crises, investors increase the returns that they require to hold risky assets. Some firms are more sensitive to these shocks to required returns. In particular, firms with high leverage are more sensitive to shocks to interest rates and the cost of debt. For example, a firm with relatively stable and predictable cash flows may have low cash flow risk, but if it is also highly levered, it will have higher than average sensitivity to discount rate shocks.

50 In our view, the primary conclusions that can be drawn from consideration of Lally's conceptual factors are:

a. The conceptual factors set out above suggest that the systematic risk of DBCT is likely to be higher than when the QCA last estimated beta. The reasons for this conclusion are:

   i. Coal prices have declined materially, which increases the risk of customers reducing volumes in the future and of being unable to meet scheduled payments;

   ii. The ratings agencies have materially reduced the credit rating of Peabody, which accounts for 25% of total DBCT volume;

   iii. The ratings agencies have reduced the ratings of coal ports, due in large part to the decline in the credit worthiness of customers; and

   iv. There is now a real threat of competition that exposes DBCT to increased commercial risk.

b. The conceptual factors set out above suggest that DBCT is likely to be in an entirely different risk class to electricity and gas distribution and transmission firms. The reasons for this conclusion are:

   i. Energy networks are distributing an essential service to a large number of public customers, whereas DBCT is providing a commercial service to a small number of corporate customers;

   ii. Energy networks have essentially fixed revenue streams that are effectively immunised against customer defaults, whereas DBCT's revenues are not; and

   iii. Energy networks are natural monopolies with no real competition, whereas DBCT faces real commercial competition for the same service.

3.3 Equity beta estimates

51 The usual approach for estimating equity betas is to consider a set of comparable firms. However, as explained above, finding an appropriate set of comparators for DBCT has proved to be a difficult task:

a. The QCA has previously considered three comparators, only one of which (the Port of Tauranga) remains in existence today;

b. Grant Samuel identified only a single comparator for DBCT (Asciano Ltd); and

c. Grant Samuel also estimated betas for a number of ports, including the Port of Tauranga.

52 Although none of these firms is a perfect comparator for DBCT, they remain the best available set of comparators. We have compiled equity beta estimates for the Port of Tauranga, Asciano, and the port business examined by Grant Samuel, as set out in Table 1 below. The table displays estimates raw beta estimates and the Blume-adjusted beta estimates that are computed by Bloomberg. The mean raw and adjusted beta estimates are above 1.0. Table 1 also shows that the mean market value leverage (D/V) for the comparator firms is less than half of the 60% leverage that is adopted for DBCT. Consequently, the re-levered equity beta estimates would be even greater again. For example, applying the Conine re-levering formula with debt beta of 0.2, tax rate of 30% and gamma of 0.47, the re-levered equity beta estimates are:

a. 2.92 for Asciano Ltd – the only comparator identified by Grant Samuel; and

b. 1.24 for the Port of Tauranga – the only remaining comparator previously identified by the QCA.

Table 1. Comparable firm beta estimates

Port	Beta (Raw)	Beta (Adjusted)	Leverage
Asciano	1.89	1.59	0.32
Bintulu Port Holdings BHD	0.50	0.67	0.23
China Merchants HLDGS INTL	1.16	1.10	0.19
COSCO PACIFIC LT	1.62	1.41	0.33
Dalian Port PDA Co LTD	0.86	0.91	0.30
DP World LTD	0.65	0.76	0.31
Eurokai GmbH & Co KGaA	1.13	1.09	0.17
Forth Ports Ltd	1.24	1.16	0.29
Hamburger Hafen Und Logistik	1.21	1.14	0.24
Lyttelton Port Co Ltd	0.57	0.71	N/A
Port of Tauranga LTD	0.71	0.80	0.11
Shanghai Intl Port Group Co Ltd	1.04	1.03	0.13
Shenzen Chiwan Whark HLDG	0.81	0.88	N/A
Tianjin Port Co Ltd	0.82	0.88	0.39
Tianjin Port DVLP HLDS Ltd	1.52	1.35	0.67
Xiamen International Port	1.52	1.35	0.42
Mean	**1.08**	**1.05**	**0.29**

Source: Bloomberg.

3.4 Conclusions in relation to equity beta

53 In our view, all of the available evidence points to an equity beta estimate of at least 1.0 for DBCT:

a. The QCA originally selected an equity beta estimate of 1.0 to reflect the systematic risk of the expanded port. That expansion is now complete;

b. In setting the equity beta to 1.0, the QCA noted that the coal price was an important driver of systematic risk for DBCT. Since its previous decision, the coal price has declined materially. Other things equal, this would have the effect of increasing systematic risk – at lower coal prices, DBCT's cash flows will be even more sensitive to further declines in the coal price;

c. Port users have agreed to an equity beta of 1.0 as part of commercial arrangements with DBCT;

d. The ratings agencies have materially reduced the credit rating of Peabody, which accounts for 25% of total DBCT volume. This has the effect of increasing the systematic risk of DBCT's cash flows relative to previous regulatory determinations;

e. The ratings agencies have reduced the ratings of coal ports generally, due in large part to the decline in the credit worthiness of customers. If the risk of first-ranking debt has increased, it

must be the case that the risk of residual equity in the same firm has also increased;

f. There is now a real threat of competition that exposes DBCT to increased commercial risk, which has the effect of increasing the equity beta relative to previous determinations;

g. The appropriate comparators for DBCT are commercial port operators and DBCT is likely to have higher systematic risk than those comparators for the following reasons:

    i. Long-term take-or-pay contracts are a standard feature of commercial arrangements. DBCT's contracts have a shorter term and require less forward notice of extension. Also DBCT has three quarters of its contracts due to expire during the next regulatory period;

    ii. The socialisation of losses from customer defaults is also a feature of commercial arrangements. The interaction of the loss socialisation contract provisions and the regulatory regime put DBCT at a disadvantage to its peers in creating a delay between a loss from a default and recovery from other customers.

h. The mean raw equity beta estimates for the Port of Tauranga, Asciano, and the port business examined by Grant Samuel, is 1.08 and the re-levered equity beta estimates are higher again;

i. The Conine re-levered equity beta estimates are:

    i. 2.92 for Asiano Ltd – the only comparator identified by Grant Samuel; and

    ii. 1.24 for the Port of Tauranga – the only remaining comparator previously identified by the QCA.

4 The market risk premium

4.1 Overview

54 The first part of this section reviews the QCA's current approach for estimating the market risk premium (**MRP**), pointing out the problems and inconsistencies in the QCA approach. We then set out our preferred approach for estimating the MRP and present current estimates. We note that several of the key aspects of our preferred approach have been adopted by other Australian regulators.

4.2 No basis for the QCA point estimate

4.2.1 The QCA's previous approach

55 Prior to its recent Market Parameters Decision, the QCA's approach to estimating the MRP was to take the equally-weighted mean of four approaches and then to round to the nearest full percentage point. The four approaches adopted by the QCA have been:

a. Ibbotson (historical excess returns);

b. Siegel (historical excess returns reduced to reflect the extent to which actual real returns on government bonds may have been lower than expectations);

c. Surveys; and

d. Cornell (dividend discount model).

56 That approach resulted in the QCA adopting a fixed 6% estimate in every one of its decisions.

4.2.2 The revised QCA approach

57 In its Market Parameters Decision and UT4 Draft Decision, the QCA has indicated that it proposes to change from its traditional approach to estimating MRP. The QCA has stated that it will consider a wider range of evidence and apply its judgment when distilling that range of evidence into a single point estimate.[36] In its Market Parameters Decision, the QCA stated that:

> …the QCA considers it is no longer appropriate to base the market risk premium on an average of equally weighted estimates produced by various methods. Appropriate weights will be difficult to specify and some information will be qualitative. The QCA will consider a range of evidence and will apply judgement in arriving at an estimate of the market risk premium. This approach will be more flexible and allow greater consideration to be given to current market conditions than in previous reviews. Accordingly, this approach will give

[36] We note that other Australian regulators (including the AER and ERA) have also indicated that they will consider a broader range of evidence when estimating the MRP.

> the flexibility to move the allowed market risk premium in the cost of equity above or below its long-run average of 6.0% on a periodic basis based on current market conditions.[37]

58 Similarly, in its UT4 Draft Decision the QCA stated that:

> As discussed and explained in detail in the Market Parameters Decision, we consider it is no longer appropriate to base estimates of the market risk premium on a mechanically rounded average of equally weighted estimates produced by the various methods we have considered in our assessment. Instead, we have used a number of valid methods and current information to form a range and then applied our best judgement to determine a final point estimate, based on a broader consideration of the evidence at hand.[38]

59 However, it seems that the QCA has actually adopted precisely the same mechanistic approach as it has previously adopted, except that it now rounds to the nearest half percent rather than the nearest full percent. For example:

a. The QCA again reports estimates for four approaches – the same four approaches that it has always used;[39]

b. The QCA reports the equally-weighted mean of the four approaches – as per its previous approach;[40] and

c. Even though the QCA reports different mean values in its Market Parameters Decision and its UT4 Draft Decision, it rounds both to the same 6.5%.[41]

60 Table 2 summarises the QCA's two recent decisions in relation to MRP. In both cases, the QCA sets out its favoured estimates for the same four approaches it has always used and then specifies a final point estimate, rounded to the nearest 0.5%.

[37] QCA Market Parameters Decision, pp. 23-23.

[38] QCA UT4 Draft Decision, p. 237.

[39] QCA UT4 Draft Decision, p. 234; QCA Market Parameters Decision, p. 23.

[40] QCA UT4 Draft Decision, p. 234; QCA Market Parameters Decision, p. 23.

[41] QCA UT4 Draft Decision, p. 234; QCA Market Parameters Decision, p. 23.

Table 2. QCA MRP estimates

Approach	Market Parameters Decision	UT4 Draft Decision
Ibbotson	6.5	6.5
Siegel	5.5	5.5
Surveys/Experts	6.2	6.8
Cornell	6.9	7.1
Mean	6.3	6.5
Median	6.4	6.7
Other evidence/Rounding	+0.2	0.0
Final Estimate	6.5	6.5

Source: QCA Market Parameters Decision and UT4 Draft Decision.

61 In its Market Parameters Decision, the QCA reports the equally-weighted mean over its four approaches of 6.3% and then selects a final point estimate of 6.5%:

> An estimate of 6.5% is marginally above the 'mechanical' average of 6.3% from applying the previous approach. The QCA's view is that the information provided by expanding the range of information to include current conditions does not provide support for a number higher than 6.5%.[42]

62 For its UT4 Draft Decision, the equally-weighted mean is 6.5% (which differs from the previous decision due to the correction of errors and different timing). Again, the QCA selects a final point estimate of 6.5%. The QCA states that it has:

> …applied our best judgement to determine a final point estimate, based on a broader consideration of the evidence at hand. On this basis, we consider a reasonable estimate of the market risk premium for the 2014 DAU period is 6.5%.[43]

63 In both decisions, the QCA refers to additional evidence including volatility estimates, debt risk premiums and the Wright approach. However, it seems that none of this additional information has received any real weight. That is, although the QCA has discussed this additional information and has concluded that it is relevant, it appears to have had no impact at all on the final estimate.

64 That is, it appears that the equally-weighted mean (over the four approaches) has not been adjusted in accordance with the additional information, but has simply been rounded to the nearest 0.5%. In the Market Parameters Decision, the QCA adjusts its standard mean estimate upwards by 0.2%. In the UT4 Draft Decision, the QCA makes no adjustment at all to its mean estimate. These adjustments are consistent with the QCA rounding to the nearest 0.5%, but they are not consistent with the QCA having regard to the additional information. If it was the additional information that had caused the QCA to adjust its mean estimate by 0.2% in the Market Parameters Decision, the same additional information

[42] QCA Market Parameters Decision, p. 23.

[43] QCA UT4 Draft Decision, p. 237.

would have resulted in an uplift to the mean estimate in the UT4 Draft Decision – but it did not.

65 By contrast, the QCA indicates that it has not applied a mechanistic averaging and rounding procedure:

> The broader range of evidence does not readily lend itself to an averaging and 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.[44]

66 However, this statement is difficult to reconcile with the evidence set out above. If the QCA has not simply rounded the mean to the nearest 0.5%, it should explain in its Final Decision how it arrived at the same 6.5% estimate in its Market Parameters and UT4 decisions, even though the evidence differed across these two cases. That is, even though the evidence changed, the QCA's point estimate did not.

67 In our view, it is not appropriate for a decision maker to simply list the evidence that has been considered and to then select a point estimate based on its "judgment" without any further explanation. Good regulatory process requires detailed and robust explanation of how and why the judgment was applied, including explanation of the relative weights applied to each piece of evidence and the reasons for rejecting any evidence that was not afforded any weight.

4.2.3 The QCA's range and point estimate

68 In its UT4 Draft Decision, the QCA sets out what it considers to be a reasonable range for MRP as follows:

> …we consider it is prudent to consider a range of estimates from a number of different methods before determining a final point estimate. We considered this issue in detail in our Market Parameters Decision.
>
> Based on our analysis, we have developed a range of 5.0% to 7.5% for the market risk premium at this time:
>
> - the lower bound of 5.0% is based on the Siegel estimates—the lower bound is 50 basis points below 5.5%, which is the estimate from the time series of 1958-2013, the longest series of high quality data
> - the upper bound is based on the Cornell estimate—the upper bound of 7.5% is 40 basis points above the median estimate of 7.1%.[45]

69 However, the QCA provides no explanation whatsoever for:

a. Why it is appropriate to set the lower bound of the range 50 basis points below the QCA's preferred Siegel estimate (which is the minimum of its four estimates);

b. Why it is appropriate to set the upper bound of the range 40 basis points above the QCA's preferred Cornell estimate, and why the

[44] QCA Market Parameters Decision, p. 15.

[45] QCA UT4 Draft Decision, p. 237.

upper bound is set to 7.5%, when three of the six Cornell estimates produced by the QCA are at or above 7.5%;

c. Why there is an asymmetry in the sense that the lower and upper bounds are determined by applying adjustments of 50 and 40 basis points, respectively. The upper and lower bounds also appear to have been rounded to the nearest 0.5%; and

d. What role the range has in the process of arriving at the final point estimate.

70 If a range is to be computed, the QCA should explain how that range has been determined and how it has been used. In our view, it is not appropriate for a regulatory authority to say no more than that the range is "based on our analysis." [46]

71 In selecting a point estimate from within the range, the QCA states that:

> Based on this range, we consider that the most appropriate estimate of the market risk premium at this time is 6.5%, based on our analysis of:
>
> - Ibbotson estimates—the Ibbotson estimates provide a range of 5.8%–6.6% over all sample periods, with an estimate of 6.5% for the period 1958–2013
> - Siegel estimates—the range for the Siegel estimates is 4.1%–6.4%, with an estimate of 5.5% for the period 1958–2013
> - survey evidence / independent expert report estimates—survey data and independent experts' reports support an estimate of 6.0% (excluding imputation credits) and 6.8% (including imputation credits)
> - Cornell dividend growth estimates—the Cornell range is 5.6%–8.3%, with a median estimate of 7.1%
> - conditional information—additional sources of information include volatility measures and corporate debt premiums. We also considered the relationship between the risk-free rate and the market risk premium.
>
> As discussed and explained in detail in the Market Parameters Decision, we consider it is no longer appropriate to base estimates of the market risk premium on a mechanically rounded average of equally weighted estimates produced by the various methods we have considered in our assessment. Instead, we have used a number of valid methods and current information to form a range and then applied our best judgement to determine a final point estimate, based on a broader consideration of the evidence at hand. On this basis, we consider a reasonable estimate of the market risk premium for the 2014 DAU period is 6.5%.[47]

72 That is, the QCA explains its selection of a 6.5% MRP by listing its estimates from each of its four traditional approaches, and then noting that it has "applied our best judgment to determine a final point estimate."[48] There is no explanation at all of how the QCA has applied its judgment or how that judgment led to an

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[46] QCA UT4 Draft Decision, p. 237.

[47] QCA UT4 Draft Decision, p. 237.

[48] QCA UT4 Draft Decision, p. 237.

estimate of 6.5%. There is also no explanation of how the QCA's judgment led it to adopt the same estimate of 6.5% in the Market Parameters and UT4 decisions, even though the set of evidence differed in those two cases.

73 In our view, the QCA should explain how its judgment has been applied to select a point estimate from within a wide range. For example:

a. Did the QCA's judgment lead it to assign more weight to the estimates from some approaches than others? How much? Why?;

b. Did the QCA's consideration of "conditional information" have any impact on its final point estimate? How much? Why?;

c. How was the range determined? What role does the range have in determining the point estimate? Why was a range determined in the UT4 Draft Decision, but not in the Market Parameters Decision?

74 If the MRP point estimate was computed by taking the mean of the estimates from the QCA's four usual approaches and rounding to the nearest 0.5%, then the QCA should state that.

4.3 The QCA estimates suggest that the required return on equity capital is at historical lows

4.3.1 The changes to the QCA approach

75 As set out above, the QCA's previous approach to estimating the MRP has been to take the equally-weighted mean of four approaches (Ibbotson, Siegel, surveys and Cornell) and then to round to the nearest full percentage point. As we noted in a previous report to the QCA,[49] the practice of estimating the required return on equity by adding a fixed risk margin to the contemporaneous government bond yield implies that since the onset of the GFC the required return on equity has been lower than at any time since World War II. This is because government bond yields have been at historical lows since the onset of the GFC. In our view, the suggestion that the GFC and European debt crises served to *lower* the required return on equity capital is not one that can be treated seriously.

76 In summary, the QCA's previous mechanistic approach of adding a fixed margin to the contemporaneous government bond yield results in estimates that suggest that:

a. The required return on equity is low during financial crises and recessions; and

[49] SFG (2014 MRP).

b. The required return on equity is high during bull markets and economic expansions.

77 In its recent decisions, the QCA has recognised that its previous mechanistic approach of simply fixing the MRP to 6% in every decision has become untenable since the onset of the GFC. That approach does not produce sensible outcomes in market conditions, such as those that have existed since the onset of the GFC.

78 This has led the QCA to revise its approach for estimating MRP. As explained below, the main changes to the QCA approach for estimating MRP appear to be:

a. The QCA now makes a downward adjustment to long-term growth forecasts when implementing its Cornell dividend discount model. This results in Cornell estimates that are uniformly lower than those that would have been obtained under its previous approach;

b. When implementing the Cornell approach, the QCA now assumes that investors have two different required returns, one for cash flows over the next ten years and then a different required return for all subsequent cash flows;

c. The QCA now includes an adjustment for the assumed value of imputation credits in its survey estimates. In particular, the (with-imputation) survey estimate of the MRP has been increased from 6% to 6.8%; and

d. Whereas the QCA's previous approach was to take the mean of the four approaches and then round to the nearest full percentage point, the current approach appears to be to take the mean of the four approaches and to round to the nearest 0.5%.

4.3.2 Estimates from the proposed approach remain at historical lows

79 The QCA's revised approach continues to imply that since the onset of the GFC the required return on equity has been lower than at any time since World War II. Our view is that it is unreasonable to suggest that the GFC and European debt crises served to *lower* the required return on equity capital to levels never before seen in the post-war period. In our view, the QCA should:

a. Acknowledge that if the QCA's proposed approach had been applied in every year since World War II, it would never have produced estimates of the required return on equity that are as low as the present estimates;[50] and

[50] Alternatively, the QCA could provide an example of where its proposed approach would have produced an allowed return on equity that is lower than the value set out in its Market Parameters Decision.

b. Explain why the QCA considers that the current required return on equity actually is lower than at any time since World War II, such that its current estimate is appropriate.

80 In this regard, the QCA has stated that:

> …our view is that it is far from clear that current market conditions are sufficiently different from previous market conditions to warrant significant alteration to the approach we use to estimate the WACC and its parameters.[51]

81 But this is precisely the point – if current market conditions are not "sufficiently different from previous market conditions," why is it appropriate to set the allowed return on equity materially lower than ever before?

4.4 The Ibbotson approach

82 We agree that the Ibbotson approach is relevant evidence and that regard should be had to it. We have compiled historical stock returns through to the end of 2014 and have grossed-up post-1987 returns for imputation in the standard manner. Our resulting estimate of the MRP is 6.6%.

83 We note that this estimate must be interpreted as an estimate of the MRP in average financial market conditions – specifically, the average of the conditions that applied over the data period used. The extent to which the current financial market conditions differ from the historical average conditions (e.g., because the risk-free rate is at historical lows) would be relevant when determining the relative weight to be applied to the Ibbotson approach.

4.5 The Siegel approach

4.5.1 Overview

84 In our view, the Siegel approach should receive no material weight for three reasons:

a. It is not used by other regulators, practitioners, or academics.

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

c. 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.

4.5.2 The Siegel approach is not used by others

85 The QCA notes that the Siegel method:

> …is not used by other regulators[52]

[51] QCA UT4 Draft Decision, p. 199.

and that:

> …over 99% of survey respondents have said they do not use it to inform their market risk premium estimates. [53]

86 However, the QCA is not concerned about the fact that it is essentially unique in its use of the Siegel method:

> …in response to these arguments, the QCA simply notes that these arguments are not relevant, as the QCA's practice is to assess proposed methods on their merits — the QCA's view is that the Siegel method has merit.[54]

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

88 Every other regulator in the country has assessed the Siegel approach on its merits and concluded that it should receive zero weight. Moreover, 99.5% of survey respondents have assessed the Siegel approach on its merits and also concluded that it should receive no weight. Elsewhere, the QCA considers that the survey respondents (who overwhelmingly reject the Siegel approach) should be considered to be well informed in that the:

> …participants can be considered sophisticated investors and/or market observers (including academics).[55]

89 Moreover, for other aspects of MRP estimation, the QCA does have material regard to the approach adopted by other Australian regulators.[56]

90 In summary, the fact that almost everyone who considers the Siegel approach decides to give it no weight is a relevant consideration in determining how much weight it should be afforded when estimating MRP.

4.5.3 The data is not available to implement the Siegel approach

91 The QCA's preferred historical data period now begins in 1958.[57] Consequently, implementation of the Siegel approach requires estimates of:

a. The actual real government bond yield every year since 1958; and

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

92 For the expected real government bond yield every year, the QCA uses the Commonwealth government inflation-indexed bond yield. However, these bonds only began trading in 1987, so no estimates are available for the first 30 or

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

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

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

[55] QCA UT4 Draft Decision, p. 232.

[56] QCA UT4 Draft Decision, pp. 236-237.

[57] QCA Market Parameters Decision, p. 20.

so years of the required sample period. This leads the QCA to *assume* that the mean of the expected real yield from 1958-1987 would be the same as the mean from 1987-2013. This would 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%.[58]

93 In our view, the fact that the data required to implement the Siegel approach is not available should go to the weight that is applied to it. However, the UT4 Draft Decision does not explicitly address the fact that implementation of the Siegel approach requires the QCA to *assume* 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.

4.5.4 The basis for the Siegel papers has not eventuated

94 The Siegel papers are based on the notion that the high real government bond returns in the 1980s are expected to continue in the future. For example, Siegel (1992) states that:

> The last 10 years represent only about 5 per cent of the total time examined in this study, but the period since 1980 contains the highest real long-term bond returns during any consecutive 10-year period since 1884 and the highest real short-term bond returns since the 19th century (excepting the sharp deflationary periods of the Depression). It is not unreasonable to assume that the current higher real rates will turn out to be more characteristic of future returns than the unusually low real rates of the earlier part of this century[59]

and Siegel (1999) states that:

> The real return on fixed income assets is likely to be significantly higher than that estimated on earlier data. This is confirmed by the yields available on Treasury inflation-linked securities, which currently exceed 4%.[60]

95 That is, 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.

96 Figure 3 below shows that the yield on Australian inflation-indexed government bonds was above 4% during the 1980s and early 1990s – around the time the Siegel papers were being prepared. Contrary to the basis of the Siegel papers, real yields have *not* stayed at that level, but have reduced steadily. They have been

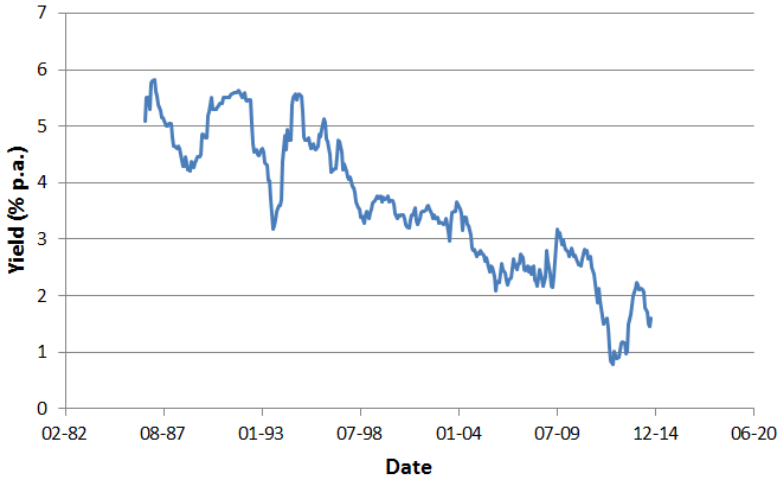
[58] Source: RBA, Table F2.

[59] Siegel (1992), p. 37.

[60] Siegel (1999), p. 15.

below 3% for almost all of the last 10 years and below 2% for almost all of the last three years.

Figure 3: Yield on Commonwealth government inflation-indexed bonds



Source: RBA

4.5.5 Relative weighting of Ibbotson and Siegel approaches

97 The QCA considers two approaches for analysing the historical excess returns data – the Ibbotson and Siegel approaches. Under its proposed approach, it appears that the QCA intends to apply equal weight to the Ibbotson and Siegel approaches. In particular, in its Market Parameters Decision, the QCA concluded that the long-term average MRP is 6%:

> The QCA considers that a reasonable estimate of the long-term average market risk premium remains at 6.0%.[61]

98 The QCA has also indicated that its Ibbotson and Siegel approaches provide estimates of the long-term average MRP, whereas the QCA considers its survey and Cornell estimates to be forward-looking and more reflective of contemporaneous market conditions. Indeed, the QCA refers to the former as being "historical averaging" methods and the latter as being "forward-looking methods."[62] Thus, the QCA considers the Ibbotson and Siegel methods to contain information about the long-run average MRP and the survey and Cornell estimates to contain information about the contemporaneous MRP.

99 The QCA's preferred estimates from the Ibbotson and Siegel approaches are 6.5% and 5.5%, respectively.[63] Thus, the long-run average estimate appears to be an equally-weighted average of the two estimates.

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[61] QCA Market Parameters Decision, p. 15.

[62] QCA Market Parameters Decision, p. 16.

[63] QCA Market Parameters Decision, p. 23.

4.5.6 Summary and conclusions

100 In our view, the Ibbotson and Siegel approaches should not receive the same weight. Rather, the Siegel approach should receive no weight at all and historical excess returns should be analysed using the Ibbotson approach.[64] The reasons for this conclusion are:

a. The Siegel approach is not used by other regulators, practitioners, or academics.

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

c. 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.

4.6 Survey responses

4.6.1 Background

101 The QCA has traditionally placed some reliance on survey responses when estimating the MRP. However, there are several weaknesses in the survey data. For example, McKenzie and Partington (2011, 2012) conclude that survey evidence suffers from "potential problems" and sets out a list of those problems.[65] Moreover, the Australian Competition Tribunal has concluded that:

> Surveys must be treated with great caution when being used in this context. Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.
>
> When presented with survey evidence that contains a high number of non-respondents as well as a small number of respondents in the desired categories of expertise, it is dangerous for the AER to place any determinative weight on the results.[66]

102 In essence, the Tribunal requires that three conditions must be met for survey responses to be given any material consideration:

a. The survey must be timely – there must have been no change in the prevailing conditions in the market for funds since the survey was administered;

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[64] We also recommend that weight be given to the Wright approach, in which the market return is estimated as the average real return from historical data, adjusted for a current estimate of inflation.

[65] SFG (2013), p. 19.

[66] Application by Envestra Ltd (No 2), ACompT 3, Paragraphs 162-163.

b. There must be clarity about precisely what respondents were asked so that there is no ambiguity about how to interpret their responses; and

c. The survey must reflect the views of the market and not a sample that is small, unresponsive, or without sufficient expertise.

103 Unfortunately, as set out below, none of these requirements are met by the survey responses on which the QCA has previously relied.[67]

4.6.2 Reliability

104 The QRC WACC submission refers to a single survey – Fernandez et. al. (2013a), which asks respondents about MRP values for 2012. McKenzie and Partington (2013) note that the survey cited by the QRC has been superseded by a more recent survey by the same author, Fernandez (2013b), which asks respondents about MRP values for 2013. McKenzie and Partington (2013) note that the more timely survey reports a mean MRP estimate of 6.8% compared with 6% from the previous survey. However:

a. The results are based on only 17 participants;

b. There is no information about the qualifications of respondents;

c. There is no information about the non-response rate;

d. There is no information about what the respondents use their estimate of MRP for (e.g., classroom examples vs. long-term equity investment decisions);

e. There is no information about the values that participants use for other WACC parameters (e.g., whether they are using higher values of the risk-free rate in lieu of a higher value for MRP); and

f. There is a wide dispersion of estimates among the 17 participants.

105 In our view, it is difficult to imagine that any survey could fare worse against the criteria set out by the Tribunal.

106 McKenzie and Partington (2013) also refer to a survey compiled by Asher (2011). That survey has also been superseded by a more recent survey by the same author, Asher (2012). Both of these survey reports are two-page notes in a magazine. The Asher (2012) survey is sandwiched between letters to the editor and the puzzle page, which notes that the name of the South Australian town of Glenelg is a palindrome. Moreover, more than 12% of the respondents indicated that there was no risk premium at all and the text commentary indicates that respondents provided different answers for assets in different risk classes. This is a clear indication that the respondents were not providing estimates of MRP for use in the Sharpe-Lintner CAPM. In our view, the Asher surveys should therefore receive no weight at all.

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[67] SFG (2013), Paragraph 96.

4.6.3 Representativeness

107 Lally (2013) suggests that the Fernandez surveys may not reflect the views of investors who actually provide equity capital in the market. He suggests that actual equity investors may arrive at their estimate of MRP using a different set of information to that used by survey respondents. In particular, he states that:

> However, the respondents to these surveys are academics, analysts and managers rather than investors per se.[68]

108 The fact that the survey results do not reflect the views or requirements of actual investors is another factor that might lead to them being afforded less (or zero) weight.

4.6.4 Stability

109 In a previous report to the QCA (SFG 2013), we stated that survey estimates of MRP, like estimates using the long-run average of historical excess returns, are "very slow-moving over time." Lally (2013) takes issue with this conclusion on the basis that a new survey tends to be available every year, stating that "SFG's claim is false."[69] However, the issue is not about how frequently the estimate can be updated, but about whether it changes over time. The long-run historical average can also be updated every year, but it clearly will not change materially from one year to the next.

110 Lally (2013) also notes that the QCA has previously used the Fernandez surveys to inform its estimate of MRP. The mean and median MRP estimates for Australia from the Fernandez surveys are set out in Figure 4 below. These figures clearly *are* very slow-moving over time. Indeed Fernandez himself notes that:

> The median has been remarkably stable: 6% for USA and Australia.[70]

and even Lally (2013), later in his report, concludes that between 2007 and 2012 "there has been no significant movement"[71] in the Fernandez survey results.

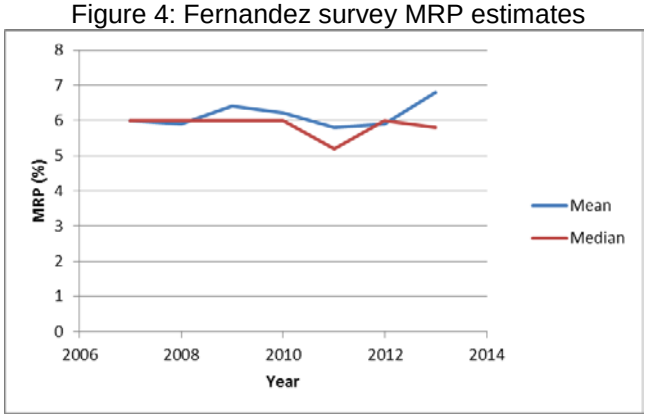
[68] Lally (2013), p. 23.

[69] Lally (2013), p. 7.

[70] Fernandez (2010), p. 6.

[71] Lally (2013), p. 64.

Figure 4: Fernandez survey MRP estimates



Source: Fernandez surveys.

111 The period covered by Figure 4 includes the last year of a remarkable bull market and the peak of the GFC and European debt crises, yet the estimate is essentially stable at approximately 6% throughout. That is, there is something about the phrasing of the questions and the nature of the small sample of respondents that (empirically) has had the effect of producing an estimate of close to 6% during all market conditions since 2007.

112 The Fernandez surveys pertaining to 2012 and 2013 both report that the vast majority have based their MRP values on the Ibbotson estimate, historical data, or textbooks. The fact that the vast majority of respondents have provided MRP values that are historical averages that are very slow to move (rather than contemporaneous forward-looking estimates) is consistent with the stability of the survey averages over different market conditions.

113 In our view, it is difficult to reconcile this evidence with Associate Professor Lally's conclusion that survey methods "are likely to respond quickly to changes in the true MRP."[72] Rather, the survey evidence appears to simply regurgitate the long-run historical average excess return.

4.6.5 Incorporation of imputation credits

114 None of the Fernandez surveys make any mention of imputation credits. In our view, the most reasonable interpretation is that the survey responses represent unadjusted MRP estimates – the same definition of MRP that is used for all other countries. However, it is possible that some survey respondents may have provided adjusted MRP estimates that do reflect their particular estimate of the effect of imputation credits. In this regard, Lally (2013) conjectures that:

a. Some academic respondents may have adjusted their estimate of MRP to reflect their own estimate of the effect of imputation credits; and

b. Although the market practice is to make no adjustment at all in relation to imputation credits, some practitioners may "have been

[72] Lally (2013), p. 9.

> influenced to some degree by the 6% estimate generally used by Australian regulators and this estimate does incorporate the effects of imputation."[73]

115 All of this points to at least three additional reasons why the Fernandez survey results should not be afforded any material weight:

a. There is no way of knowing whether the results reflect an unadjusted MRP or an MRP that reflects some assumed value of imputation credits. That is, we have an estimate, but there is no way of knowing what it is an estimate of;

b. There is no way of knowing how many respondents may have made an adjustment for imputation credits, or what adjustment they might have made. To the extent that any of the respondents made an adjustment that is inconsistent with the regulator's estimate of gamma, the survey MRP value is not comparable to the regulatory MRP estimate. In particular, the QCA's estimate of 0.625 for the value of distributed imputation credits is unique, in which case there is no reason to suggest that any survey respondent would have provided an MRP estimate that is consistent with the QCA definition; and

c. To the extent that survey respondents may simply be regurgitating previous regulatory estimates (as Lally (2013, p.15) conjectures), the survey produces output that is neither independent nor forward-looking.

116 In our view, it is highly likely that the Fernandez survey participants have provided ex-imputation estimates of MRP, consistent with the dominant market practice. In this case, the ex-imputation estimates would have to be adjusted to incorporate the assumed value of imputation credits, or not used at all.

4.6.6 Conclusions in relation to survey data

117 Because the survey responses fare so poorly against the criteria set out by the Australian Competition tribunal, our view is that they should not be relied upon when estimating the MRP. In our view, information set out in independent expert valuation reports is likely to provide a better guide to the returns that are required by real-world investors.

[73] Lally (2013), p. 15.

4.7 Independent expert valuation reports

4.7.1 The QCA's misinterpretation of independent expert reports

118 The QCA's approach is to estimate the required return on equity for the average firm by adding its estimate of the MRP to the contemporaneous five-year government bond yield. The UT4 Draft Decision concludes that independent expert valuation reports support an (ex-imputation) MRP of 6%.[74] Thus, the suggestion is that the independent expert valuation reports are consistent with an approach whereby the (ex-imputation) required return on equity for the average firm can be estimated by adding 6% to the five-year government bond yield.

119 However, nothing could be further from the truth. In no sense do the independent expert reports provide any support whatsoever for the contention that the required return on equity can be estimated by adding 6% to the five-year government bond yield. We explained this point in a previous submission to the QCA,[75] as summarised below.

120 Our previous submission to the QCA noted that SFG Consulting (2013 IER) examine all of the independent expert valuation reports from January 2008 to April 2013 that set out a cost of capital calculation. Figure 5 below shows a comparison between:

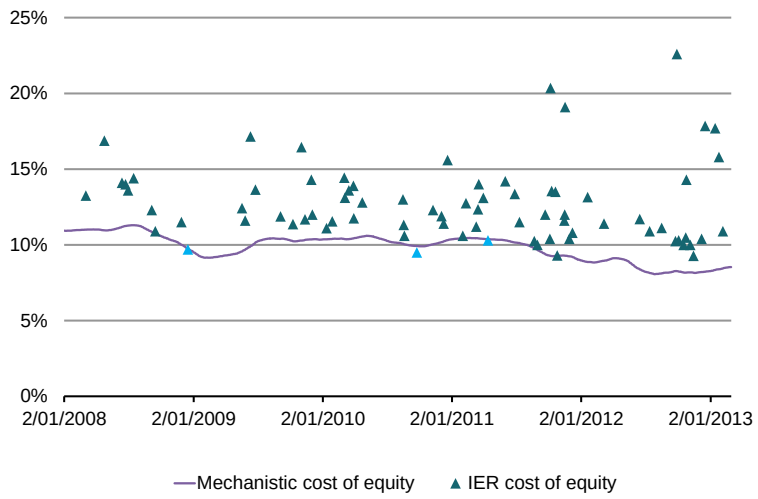
a. Mechanistic estimates of the required return on the market (10-year government bond yield plus 6%); and

b. Independent expert estimates of the final required return on equity for firms for which the independent expert adopted an equity beta estimate between 0.75 and 1.25. The sample of firms was restricted to those with an equity beta estimate close to 1.0 to ensure a reasonable basis of comparison with an estimate of the required return on the market (which also has a beta of 1.0).

[74] QCA UT4 Draft Decision, p. 232.

[75] SFG (2014 MRP).

Figure 5: Expert report cost of equity estimates (for beta estimates between 0.75 and 1.25) compared to mechanistic market cost of equity (for beta of 1.0)



Source: SFG (2013 IER), p. 29.

121 The striking feature of this graph is that, with three exceptions, every one of the independent expert estimates of the required return on equity is higher than the mechanistic estimate. The three exceptions all have equity beta estimates between 0.75 and 0.80 – below the market beta of 1.0 – and all have cost of equity estimates that are only marginally below the mechanistic estimate of the market cost of equity.

122 SFG (2013 IER) also determine, for each report in their sample, the overall cost of equity capital estimated by the independent expert. The average cost of equity capital calculated for the entire sample (2008-2013) is 14.4%, within a range of 9.3% to 35%.

123 They then compare:

a. The independent expert's estimate of the required return on equity for each firm; with

b. An estimate formed by inserting the following values into the Sharpe-Lintner CAPM:

   i. Contemporaneous 10-year government bond yield for risk-free rate;

   ii. 6% for market risk premium; and

   iii. The equity beta estimate adopted by the independent expert.

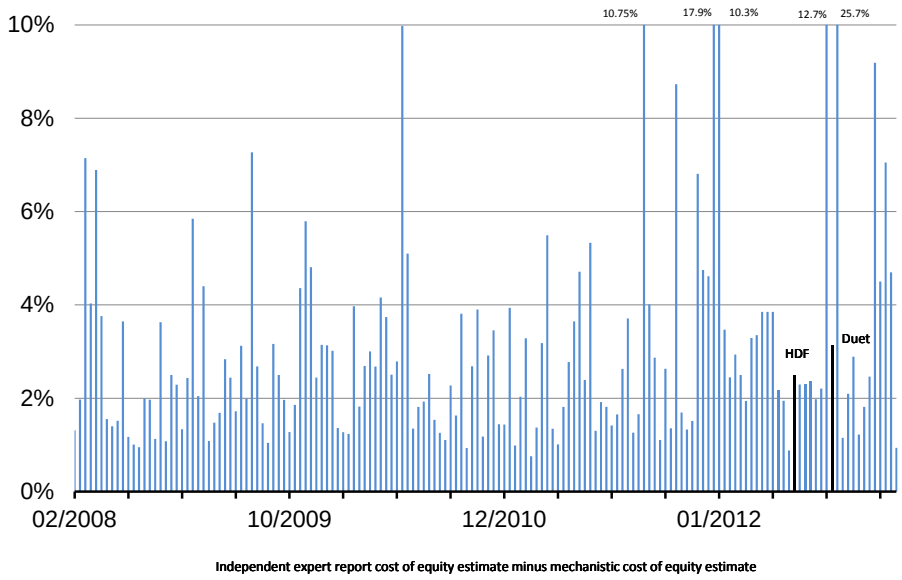
124 The average estimate of the required return on equity from the former approach is 14.4%, and the average from the latter approach is 11.1%. The pair-wise comparisons of the two estimates for each asset are set out in Figure 6 below, which shows that in every case the mechanistic estimate is below the figure that is adopted in the independent expert report. In that figure, the vertical scale is capped at 10% to show sufficient detail, but in a number of cases the difference

is even greater than that. In almost every case, the difference is greater than 1% and the difference is greater than 2% in many cases.

125 The results for the 2012-13 period are particularly striking. In almost every case the difference between the two estimates exceeds 2% and the average differential of 4.1% is substantially higher than for the earlier period.

126 Highlighted in the graph are the differences between the expert estimate and the mechanistic estimate for the only two utilities companies in the data (Hastings Diversified Fund and the Duet Group) in the recent period sub-sample. Both show that the market-based assessment of the cost of equity is materially higher than the mechanistic approach would suggest. That is, the approach that the independent experts have taken in the Hastings and Duet cases has resulted in estimates of the required return on equity that are materially greater than the mechanistic approach would suggest – in line with all of the other expert reports in the sample.

Figure 6: Difference between expert report and adjusted mechanistic estimates of cost of equity



Source: SFG (2013 IER), p. 30.

127 In summary, independent experts clearly do *not* estimate the (ex-imputation) required return on equity by adding 6% to the risk-free rate.

128 Moreover, independent expert reports adopt a range of approaches for increasing the estimate of the required return on equity for the current market conditions. These approaches included:

a. Increasing the estimate of MRP (The mean MRP estimate over the sample of reports was 6.4%. Many of the reports adopted estimates above 6% and none adopted estimates below 6%)[76];

[76] Full details of the sample and methodology are set out in SFG (2013 IER).

b. Using a value of the risk-free rate that exceeded the spot government bond yield. On average, the sample of reports adopted a risk-free rate 0.5% above the contemporaneous 10-year government bond yield; and/or

c. Adding an uplift margin to the CAPM estimate of the required return on equity.

129 That is, independent experts do not use the CAPM the same way that the QCA uses it. It would be misleading to adopt a 6% MRP[77] on the basis of these independent expert reports, but to ignore all of the uplifts to the required return on equity that were contained in those same reports.

4.7.2 The misleading use of the median estimate

130 In its analysis of independent expert reports, the QCA adopts a median (ex-imputation) MRP estimate of 6%. The QCA explains the basis for its use of the median estimate as follows:

> On request, SFG Consulting provided us with copies of 29 independent expert reports considered relevant. Our assessment of these reports suggests they support a base mean market risk premium of 6.4% (as contended by SFG Consulting) and a median estimate of 6.0% (excluding imputation credits). However, we consider that the more appropriate statistic is the median, to eliminate the influence of outliers in this small sample.[78]

131 However, in the sample of independent expert reports, there are no outlier estimates of the ex-imputation MRP. In fact, the distribution of estimates is as set out in Table 3 below. As well as being the median estimate, 6% is also the *minimum* estimate. None of the reports that were evaluated by the QCA adopts an estimate below 6%, but 41% of them adopt an estimate above 6%. We also note that there are no outliers in the sense that the maximum estimate (6-8%) is adopted by 24% of the reports.

Table 3. Independent expert estimates of ex-imputation MRP

Estimate	Frequency
6%	59%
7%	14%
6-7%	3%
6-8%	24%

Source: Independent expert reports

132 Our view is that the estimates adopted in the expert reports are much better characterised by the mean estimate of 6.4%.

[77] The QCA's estimate of the ex-imputation MRP from independent expert reports.

[78] QCA UT4 Draft Decision, p. 232.

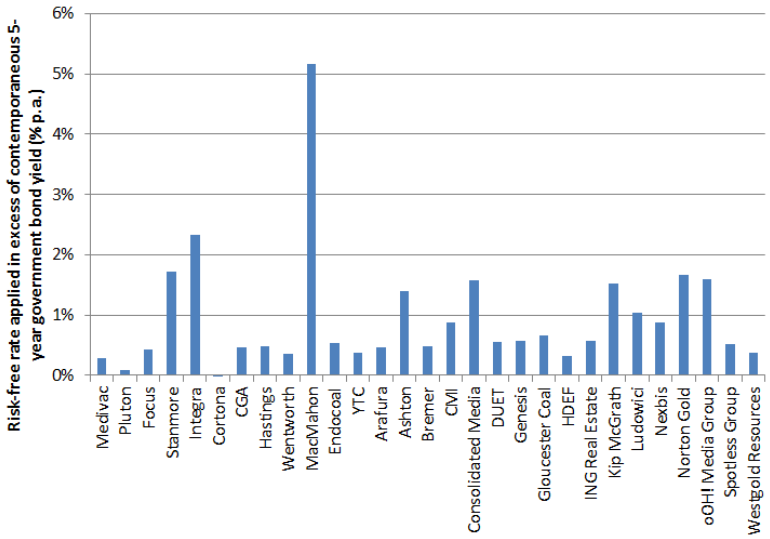
133 Moreover, even the 6.4% mean is understated in that a number of reports set out a range, but then indicate their preference for an estimate above the mid-point. For example:

> We have noted that the current market risk premium is 8%. This has been sourced from Bloomberg. The market risk premium is derived on the basis of capital weighted average return of all members of the S&P 200 Index minus the risk free rate is dependent on the ten year government bond rates. For the purpose of our report we have adopted a market risk premium of 6 to 8 percent.[79]

4.7.3 The risk-free rate adopted in the QCA sample

134 The QCA approach is to pair its estimate of MRP with the contemporaneous five-year government bond yield. However, the independent expert reports that the QCA considers do not pair their estimates of MRP with the contemporaneous five-year government bond yield. By contrast, the independent expert reports adopt a risk-free rate that is, on average, 0.93% higher than the contemporaneous five-year government bond yield, as set out in Figure 7 below.

Figure 7: Difference between expert report risk-free rate and contemporaneous five-year government bond yield



Source: Independent expert reports, SFG analysis.

135 Thus it would be misleading to suggest that independent expert reports support the practice of pairing a 6% (ex-imputation) MRP with the contemporaneous five-year government bond yield. *None* of the independent expert reports considered by the QCA have done that.

136 There are two primary reasons why independent experts adopt a risk-free rate that is higher than the QCA estimate:

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[79] BDO Corporate Finance (WA) Pty Ltd, Pluton Resources Limited - Independent Expert's Report, 17 October 2012. P. 37.

a. Independent experts use the ten-year government bond rate, whereas the QCA uses the five-year rate. For example:

> In Australia, the 10-year Commonwealth Government bond yield is used as a proxy for the risk-free rate…We have adopted a risk free rate, based on the yield as at the valuation date of Australian Commonwealth Government 10 year debt.[80]

b. Some independent experts adopt a risk-free rate above the contemporaneous government bond yield as a means of increasing the standard CAPM estimate to better reflect required returns in the current market conditions. For example:

> Based on a historical analysis of the risk free rate using the 10 year Australian Government bond rate, a long term range of 5.2% to 5.4% appears appropriate. On this basis, in determining an appropriate risk free rate we have considered the 10 year Australian Government bond yield as at 31 August 2012 of 3.11% and add a further 2.00%. These inputs combined result in a risk free rate of 5.11%.[81]

4.7.4 The required return adopted in the QCA sample

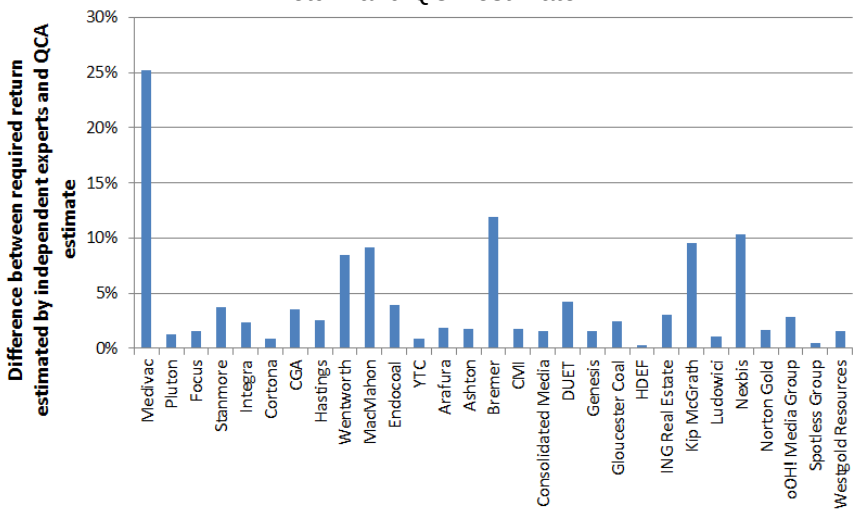
137 The QCA interprets the independent expert reports as supporting an ex-imputation MRP of 6%. Under the QCA approach, this implies that the ex-imputation required return can be estimated as the contemporaneous five-year government bond yield plus equity beta times 6%. This QCA estimate of the ex-imputation required return on equity can then be compared with the corresponding independent expert estimate, as in Figure 8 below.[82]

[80] RSM Bird Cameron Corporate Pty Ltd (2012), Medivac Limited Financial Services Guide and Independent Experts Report 12 October, p. 56 - in Medivac Limited, Notice of Annual General Meeting & Explanatory Statement.

[81] Ernst & Young (2012), Independent Expert's Report and Financial Services Guide Integra Mining Limited Proposed acquisition by Silver Lake Resources Limited, 7 November, p. 84 - in Scheme Booklet – A recommended merger by scheme of arrangement between Integra Mining Limited and Silver Lake Resources Limited.

[82] The independent expert estimates of the ex-imputation required return on equity is computed by taking the mid-point estimates of the risk-free rate, beta and MRP. The QCA estimate is computed using the contemporaneous five-year government bond yield, MRP of 6.5% and the same beta estimate as adopted by the respective independent expert reports.

Figure 8: Difference between independent expert report (ex-imputation) required return and QCA estimate



Source: Independent expert reports, SFG analysis.

138 The independent expert report estimates of the ex-imputation required return on equity are uniformly higher than the QCA estimates of the same thing. That is, the independent expert reports do not support the use of an (ex-imputation) 6% MRP being used in the QCA's WACC estimation process.

4.7.5 Summary and conclusions

139 The independent expert reports considered by the QCA do *not* support the notion that an ex-imputation required return of 6% can be paired with the contemporaneous five-year government bond yield, as the QCA suggests. That approach produces estimates of the ex-imputation required return on equity that are lower than every single expert estimate considered by the QCA.

140 The use of a median estimate is also statistically misleading in a setting where there are no observations below the median and 41% of the observations above it. In our view, the mean estimate of 6.4% is a more appropriate summary statistic in this case.

141 Even an ex-imputation MRP of 6.4% produces required return on equity estimates that are below those adopted by independent experts – if it is paired with the contemporaneous yield on five-year government bonds. This is because independent experts generally use the 10-year bond when estimating the risk-free rate, and because they include other uplift factors when estimating the required return on equity. Consequently, it is our view that the independent expert reports that were considered by the QCA support an *ex-imputation* MRP of *at least* 6.4%. This corresponds to a with-imputation MRP of at least 7.39%.

4.8 The Wright approach

4.8.1 Overview

142 One source of data for estimating the market risk premium is historical stock returns. There are two ways to process the historical returns data:

a. The *Ibbotson* approach assumes that the MRP is constant over all market conditions and the required return on equity varies one-for-one with changes in the risk-free rate; and

b. The *Wright* approach assumes that the real required return on equity is more stable and the MRP varies (inversely with changes in the risk-free rate) over different market conditions.

143 These two approaches are the end points of the theoretical spectrum. At one extreme is the Ibbotson approach, which implies that the MRP is constant across the whole range of market conditions that occurred over the relevant historical period. At the other end of the spectrum is the Wright approach, which implies that the MRP varies inversely with the risk-free rate such that the overall required return on equity is stable over time.

144 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; and

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:

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

145 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.

4.8.2 QCA assessment of the Wright approach

146 The Lally (2013) report commissioned by the QCA recommends that the Wright approach should be given material weight:

> I consider that the set of methodologies considered by the QCA should be augmented by one involving estimating the expected real market cost of equity from the historical average actual real return and then…converting the

> estimate of the expected real market cost of capital to its nominal counterpart.[83]

147 In recommending that the QCA should use the Wright approach to inform its estimate of the MRP, Lally (2013 QCA) concluded that:

> …estimating the expected real market cost of equity from the historical average real market return, converting this to nominal terms using prevailing expected inflation and then deducting the prevailing nominal risk free rate…Relative to the Ibbotson methodology, this approach assumes that the expected real market cost of equity rather than the MRP is constant over time, and therefore will be superior to the Ibbotson approach if the expected real market cost of equity is more stable over time than the MRP. [84]

148 That is, 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 two approaches set out above are the end points of a spectrum. The first assumes that the MRP is constant 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 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"[85] and consequently recommends that both approaches should be given some weight.

149 In its recent Guideline,[86] the AER has stated that it too will have regard to the Wright approach when determining the allowed return on equity. In setting out its reasons for having regard to the Wright approach, the AER noted that the Wright approach is likely to produce allowed returns on equity that are more stable over time than those produced by its previous mechanistic implementation of the Sharpe-Lintner CAPM:

> …the Wright approach for implementing the Sharpe–Lintner CAPM will result in estimates of the return on equity that may be relatively stable over time. The informative use of these implementations of the Sharpe–Lintner CAPM, in addition to other information, is expected to lead to more stable estimates of the return on equity than under our previous approach.[87]

150 The AER also noted that more stability in the allowed return on equity was favoured by a broad cross section of stakeholders and is more likely to properly reflect the efficient financing costs of a benchmark efficient entity.[88]

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[83] Lally (2013), p. 3.

[84] Lally (2013 QCA), p. 6.

[85] Lally (2013), p. 6.

[86] AER (2013), Draft rate of return guideline, p. 7, affirmed in the AER's Final Guideline.

[87] AER (2013), Draft rate of return guideline: Explanatory statement, p. 13.

[88] AER (2013), Draft rate of return guideline: Explanatory statement, p. 69.

151 The AER also considers the Wright approach to have the attractive features of transparency and replicability – relative to its previous mechanistic implementation of the CAPM:

> …we consider that implementing the Wright approach is more transparent and replicable than our standard implementation of the Sharpe–Lintner CAPM.[89]

152 Moreover, Siegel (1999) also concludes that real stock returns have "displayed remarkable long-term stability" which is entirely consistent with the use of the Wright approach:

> The real return on stocks, as I have emphasised [1998] has displayed a remarkable long-term stability…The relative stability of long-term real equity returns is in marked contrast to the unstable real returns on fixed income assets.[90]

153 The QCA concludes that:

> …the QCA will have regard to the Wright estimates in forming a view on an appropriate estimate of the market risk premium. This position is consistent with the position of the AER in its Rate of Return Guideline.[91]

154 However, this conclusion is difficult to reconcile with the fact that the QCA has not even presented an estimate for the Wright approach in its UT4 Draft Decision. It is not clear how the QCA will "have regard to the Wright estimates" if they are never even computed.

4.8.3 Wright vs. Siegel

155 The Wright approach is designed to adjust for the possibility that average inflation over some historical period might be higher than *current* expected inflation. By contrast, the Siegel approach is designed to adjust for the possibility that average inflation over some historical period might have been higher than what the market was expecting *at that time*. That is:

a. The Wright approach would be adopted if one expects that future inflation will differ from past inflation; and

b. The Siegel approach would be adopted if one thought that past inflation might have turned out to be systematically higher than what investors were expecting at the time.

156 The Wright approach requires an estimate of current expected inflation. By contrast, the Siegel approach requires an estimate of what investors were expecting inflation to be each year since 1958.

157 However, the QCA appears to consider the Wright and Siegel approaches to be alternative methods for adjusting for the same thing:

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[89] AER (2013), Draft rate of return guideline: Explanatory statement, p. 186.

[90] Siegel (1999), p. 12.

[91] QCA UT4 Draft Decision, p. 236.

> …the QCA considers that the adjustment for unexpected inflation incorporated in the Siegel method is valid and relevant when estimating an expected as opposed to an actual return. For this reason, the QCA considers that the Siegel method better addresses the unexpected inflation issue relative to the Wright method.[92]

158 As set out above, these two approaches make adjustments for entirely different things (inflation declining vs. inflation differing from expectations). They are clearly not two alternative methods for addressing the same "unexpected inflation issue."

4.8.4 Current estimates of the Wright approach

159 The Market Parameters Decision does contain estimates of MRP for the Wright approach. In particular, the QCA reports an estimate of 7.4% for its preferred historical period of 1958-2013.[93]

160 Under the Wright approach, one first estimates the expected return on the market portfolio and then subtracts the contemporaneous risk-free rate from it. The risk-free rate used in the QCA's calculation is the 10-year government bond yield of 4.29% at the end of 2013. This implies an estimate of the expected return on the market of 11.7%, which is close to our own estimate of 11.8%. Both of these estimates include the QCA adjustment for imputation credits that it uses to estimate MRP.[94]

161 The current 10-year government bond yield is approximately 2.8%. This implies a current Wight MRP estimate of 8.9% (the QCA's 11.7% estimate of the required return on the market less the contemporaneous risk-free rate).

162 The ERA has recently used the Wright approach to estimate the MRP and has concluded that the appropriate estimate is 8.87%.[95]

4.8.5 Summary and conclusion

163 In our view:

a. The QCA should have proper regard to the Wright approach;

b. The QCA should explain how it has had regard to the Wright approach – including an explanation of how the QCA's consideration of the Wright approach affected its estimate of MRP;

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[92] Market Parameters Decision, p. 21.

[93] QCA Market Parameters Decision, Table 5, p. 88.

[94] For clarity, this differs from the QCA adjustment for imputation credits that is incorporated into its regulatory model to estimate cash flows.

[95] ERA (2015), ATCO Gas Final Decision, Paragraph 1199. We note that the ERA estimate is based on a lower estimate of the required return on the market (10.83%) and a lower risk-free rate (1.96%).

c. The current estimate of MRP from the Wright approach is 8.9% based on the QCA's figures.

4.9 Dividend discount model

4.9.1 The QCA approach

164 In its recent decisions, the QCA has altered its approach to estimating the MRP from the Cornell dividend discount model in two ways:

a. The QCA now makes a downward adjustment to long-term growth forecasts when implementing its Cornell dividend discount model. This results in Cornell estimates that are uniformly lower than those that would have been obtained under its previous approach. In a previous report to the QCA,[96] we have shown that the QCA's downward adjustment is based on dated US empirical data that has reversed since the mid-1990s; and

b. When implementing the Cornell approach, the QCA now assumes that investors have two different required returns, one for cash flows over the next ten years and then a different required return for all subsequent cash flows. This adjustment also has the effect of reducing the estimate of the MRP.

165 In a previous report to the QCA,[97] we consider both of these adjustments in some detail and conclude that neither adjustment should be made. We also note that:

a. The AER also proposes to make some downward adjustment to long-term growth forecasts, however such downward adjustments are not made by commercial data providers such as Bloomberg; and

b. We are unaware of anyone else ever having estimated two different MRPs – one MRP for the short to medium term and a different MRP for the longer term. This is another feature of the UT4 Draft Decision that is entirely unique.

4.9.2 Dividend discount estimates without the QCA downward adjustments

166 In this section, we consider what the QCA's dividend discount estimate of MRP would have been if the QCA procedure had been followed exactly, but for the downward adjustments set out above. In particular, we adopt all of the QCA's

[96] SFG (2014 DDM).

[97] SFG (2014 DDM).

parameter estimates and we follow the QCA approach of selecting the median estimate.

167 Our conclusions are that:

a. The standard implementation of dividend discount models is to estimate the discount rate that equates the forecasted dividends to the current share price. The QCA approach is unique in that the QCA estimates two different discount rates – one for the first 10 years and one for the subsequent period. If the QCA had estimated a single discount rate (and made no other changes to its process or parameter values) the estimate of the required return on the market portfolio would be 11.5%;

b. If the QCA had set its estimate of long-run dividend growth equal to long-run GDP growth, rather than applying three different discounts (and made no other changes to its process or parameter values) the estimate of the required return on the market portfolio would be 12.6%; and

c. If the QCA had applied neither of the above adjustments that it has recently introduced (and made no other changes to its process or parameter values) the estimate of the required return on the market portfolio would be 12.1%.

168 Table 4 summarises the Cornell dividend discount model estimates of the required return on the market. In all cases, we adopt the parameter estimates set out in the UT4 Draft Decision and the QCA version of the DDM. We estimate the required return on the market with and without the downward adjustments that the QCA has applied in its recently revised approach. We also note that the QCA adopts two different values for the risk-free rate in its UT4 Draft Decision, so we report the MRP estimate corresponding to each.

Table 4. QCA Cornell estimates of MRP

Estimation approach	Required market return (%)	MRP (%)
New QCA approach	11.2	8.4
No dual rate adjustment	11.5	8.7
No GDP discount adjustment	12.6	9.8
Neither adjustment	12.1	9.3

Source: QCA Cornell approach, SFG calculations, using risk-free rate of 2.8%.

169 In our view:

a. If the QCA version of the dividend discount model is to be used, it should be used without either of the adjustments that the QCA now proposes to apply; and

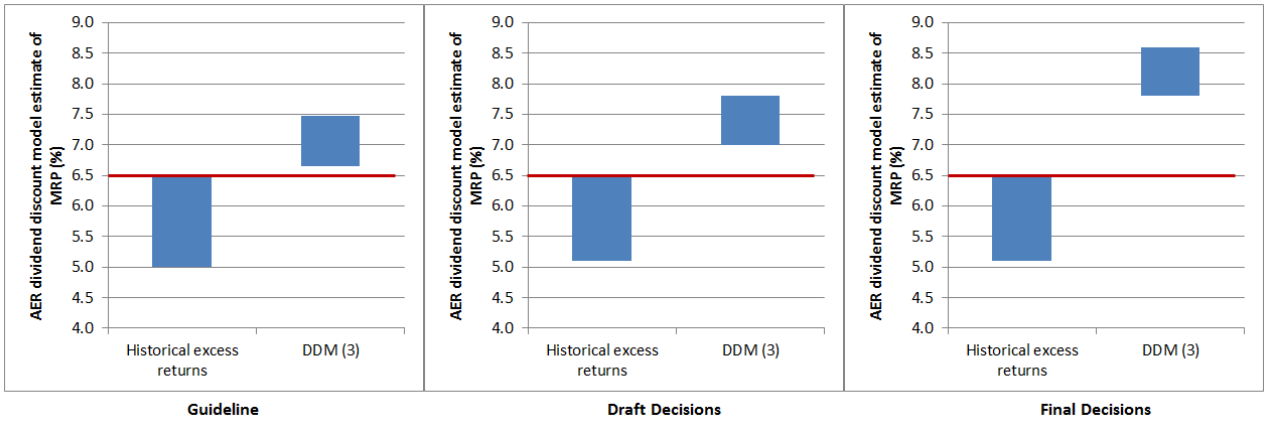
b. The MRP should be estimated with reference to the contemporaneous 10-year government bond yield, 2.8%.

170 Consequently, our preferred QCA-Cornell estimate of the MRP is 9.3%.

4.9.3 Other recent dividend discount estimates of the MRP

171 The AER also uses the dividend discount model to inform its estimate of the MRP. The evolution of the AER's dividend discount estimates of the MRP are summarised in Figure 9 below.

Figure 9: AER estimates of MRP from historical excess returns and the dividend discount model



Source: AER Rate of Return Guideline (December 2013), AER draft decisions (November 2014), AER final decisions (June 2015).

172 Figure 9 shows that:

a. The AER's primary range from historical excess returns has remained relatively stable, as would be expected for a long-term historical average;[98] and

98 The AER increased the lower bound of its primary range from 5.0% to 5.1% between the Guideline and its draft decisions, reflecting the additional annual observation that became available. The upper bound has remained fixed at 6.5% throughout.

b. The AER's dividend discount estimate has increased materially from Guideline to draft decisions to final decisions.[99]

173 The AER's preferred dividend discount estimate of MRP is based on its three-stage model and its mid-point 4.6% estimate of long term growth.[100] Using this approach, the AER's MRP estimates are:

a. 7.1% in its December 2013 Rate of Return Guideline (within a range of 6.7-7.5%);[101]

b. 7.4% in its draft decisions in November 2014 (within a range of 7.0-7.8%);[102] and

c. 8.2% in its June 2015 final decisions (within a range of 7.8-8.6%).[103]

174 That is, the AER's estimates indicate that the MRP has increased materially since the QCA's Market Parameters and UT4 decisions.

175 The ERA has also recently considered dividend discount estimates of the MRP in its ATCO Gas Final Decision. The ERA implements a model similar to that applied by the AER and reaches a preferred dividend discount estimate of the MRP of 8.2% within a range of 7.7-8.7%.[104] The ERA also considers a wider range of MRP estimates from other submissions, reports and regulatory determinations, concluding that the MRP could be as high as 9.7%, which the ERA adopts as the upper bound of its range for the MRP.[105] The ERA ultimately adopts a final point estimate of 7.6% after considering a set of relevant evidence.

176 In summary, there is a range of dividend discount estimates of the MRP. These estimates employ slightly different specifications and have been estimated at different points in time using different data. In general, we recommend:

a. Three-stage specifications of the model, such as the AER's preferred specification (because it is more reasonable to assume that the current high growth forecasts will revert to lower long-run forecasts over time, rather than in a single jump step);

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99 Figure 5 shows the AER's range for its preferred three stage dividend discount model. The AER state that it has lesser regard to estimates from its two stage model (the AER states this is used as a cross check), which also increase materially between the Guideline and the recent final decisions.

100 TransGrid Final Decision, Attachment 3, Table 3-36, p. 301 and Table 3-40, p. 305.

101 AER Rate of Return Guideline, Appendix D, p. 87.

102 TransGrid Draft Decision, Attachment 3, p. 200.

103 TransGrid Final Decision, Attachment 3, p. 301.

104 ERA (2015), ATCO Gas Final Decision, Paragraphs 1210-1211.

105 ERA (2015), ATCO Gas Final Decision, Paragraph 1217.

b. No downward adjustment to GDP growth forecasts (because the basis for such an adjustment has reversed since the mid-1990s); and

c. Contemporaneous estimates based on the 10-year government bond yield (because a long-term risk-free rate should be used).

177 We have computed an estimate on this basis using the AER's three-stage dividend discount specification, no downward adjustment to the GDP growth forecast, and the contemporaneous 10-year government bond yield. We have also adopted a theta estimate of 0.35. We adopt the resulting estimate of 8.6% as the dividend discount estimate of the MRP for the remainder of this report.

4.10 Relative weighting of evidence

178 For the reasons set out above, our view is that four sources of evidence should be used to inform the estimate of the MRP. The current estimate of each of those approaches is set out in Table 5 below. In all cases, the estimates are based on the current 10-year government bond yield of 2.8% and gamma and theta estimates of 0.25 and 0.35, respectively.

Table 5: Estimates of the required return on the market and MRP

Method	MRP	Required return on the market	Weight
Historical excess returns (Ibbotson)	**6.6%**	**9.4%**	**20%**
Historical real returns (Wright)	**8.8%**	**11.6%**	**20%**
Dividend discount model	**8.6%**	**11.4%**	**50%**
Independent expert valuation reports	**7.4%**	**10.2%**	**10%**
Weighted average			**8.1%**

Source: Risk-free rate of 2.8%. Gamma set to 0.25, theta to 0.35.

179 Some relevant summary statistics are as follows:

a. The equally-weighted mean is 7.9%;

b. The median is 8.0%; and

c. The mean of the Ibbotson and Wright approaches for analysing the historical stock return data is 7.7%.

In our view, regard should be had to all of the evidence in Table 5 above. In weighting the various pieces of evidence, our view is that the dividend discount estimate should receive relatively more weight as it is a recognised estimate of the forward-looking MRP, commensurate with the prevailing conditions in the market – whereas historical stock returns reflect the average market conditions

over the historical period. Consequently, we apply a 50% weight to that evidence.

We assign a slightly smaller 40% weight to evidence from historical stock returns. This evidence has the advantage of statistical reliability (given the long history of data that is available) but it has the disadvantage of (by its very nature) reflecting average market conditions over the historical period, which may differ from the prevailing market conditions. As explained above, we consider that the Ibbotson and Wright approaches represent the two end points of the spectrum for interpreting the historical stock return data, so we apply equal weight to each.

Also, as explained above, we consider the independent expert valuation reports to warrant a relatively smaller weighting because they provide less timely evidence and because it can be difficult to extract a single point estimate for use in the QCA approach, given that independent expert valuation professionals do not implement the CAPM in the mechanistic way of the QCA. Consequently, we assign a 10% weight to this evidence. We also note from above that we consider this evidence to support an MRP estimate of *at least* 7.4%. For all of these reasons, we adopt an MRP estimate of 8.1% (and a market return estimate of 10.9%) for the remainder of this report.

5 The required return on equity

180 When populating the Sharpe-Lintner CAPM, we adopt a risk-free rate of 2.8% and an expected return on the market of 10.9%, which equates to a market risk premium of 8.1%, as set out above. We maintain the CAPM beta estimate of 1.0 from the QCA's previous decisions. This produces an estimate of the required return on equity of 10.9%:

$$\begin{aligned} r_e &= r_f + \beta(r_m - r_f) \\ &= 2.8\% + 1.0(10.9\% - 2.8\%) = 10.9\%. \end{aligned}$$

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