Attachment M.9

Attachment M9_SFG_Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network

18 February, 2015

Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network

Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA PowerNetworks and United Energy

18 February 2015

PO Box 29, Stanley Street Plaza
South Bank QLD 4101
Telephone +61 7 3844 0684
Email s.gray@sfgconsulting.com.au
Internet www.sfgconsulting.com.au

SFG CONSULTING

Level 1, South Bank House
Stanley Street Plaza
South Bank QLD 4101
AUSTRALIA

Contents

1. Preparation of this report

1. SFG Consulting (**SFG**) has been retained by a number of energy distribution businesses[1] to provide our views on how the dividend discount model can be used in the process of estimating the required return on equity for the benchmark efficient entity under the National Electricity Rules and National Gas Rules (**Rules**).
2. In particular, we have been asked to provide an opinion that uses the dividend discount model to estimate the return on equity that is commensurate with the efficient financing costs of (1) a benchmark efficient entity and (2) the average firm in the market, and which is reflective of prevailing conditions in the market for funds.
3. We have also been asked to respond to matters raised in the draft determinations by the Australian Energy Regulator (**AER**) for the network firms. These matters include the role and best estimate of the long run growth rate in dividends, and the impact of recent changes in the risk-free rate. We have been asked to consider theoretical restrictions on empirical estimates, and different approaches for grossing up stock returns for the value of imputation credits.
4. We have also been asked to consider any comments raised by the AER, other regulators or their consultants on matters that include whether the dividend discount model applies in Australia, the best version of the dividend discount model, and the best inputs into the dividend discount model.
5. We have been asked to provide an opinion report that:
    a) Reviews and responds, where appropriate, to matters raised in the draft decision on the use of the DGM to estimate the return on equity, including (but not limited to):
        i. the role and best estimate of the long-run growth rate of dividends; and
        ii. the impact of any recent changes in the risk-free rate.
    b) Updates, insofar as practicable, the estimates of the returns on equity from the Earlier Report for:
        i. any new data available since the Earlier Report;
        ii. matters raised in the draft decision; and
        iii. any other matters considered relevant in light of the draft decision that were not considered in preparing the Earlier Report.
6. In preparing the report, we have been asked to:
    a) consider different approaches to applying the DGM to both the benchmark firm and the market, including any theoretical restrictions on empirical estimates;
    b) consider different approaches for grossing up stock returns for the value of imputation credits, assuming gamma estimates of 0.25 and (as an alternative scenario) 0.4;
    c) consider the stability of estimates of the return on equity over time;
    d) consider any comments raised by the AER, other regulators or their consultants including (but not limited to) (i) whether the DGM applies in Australia, (ii) the best version of the DGM, or (iii) the best inputs to the DGM;
    e) use robust methods and data; and
    f) use the sample averaging period of 2 January to 30 January 2015 (inclusive) to estimate any prevailing parameter estimates needed to populate the DGM.

[1] The businesses Jemena Gas Networks, Jemena Electricity Networks, ActewAGL Electricity, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA PowerNetworks and United Energy.

7. Our instructions are set out in Appendix 1 to this report.

8. This report has been authored by Professor Stephen Gray and Dr Jason Hall. Stephen Gray is Professor of Finance at UQ Business School, The University of Queensland and Director of SFG Consulting, a specialist corporate finance consultancy. He has Honours degrees in Commerce and Law from The University of Queensland and a PhD in financial economics from Stanford University. He teaches graduate level courses with a focus on cost of capital issues, has published widely in high-level academic journals, and has more than 15 years' experience advising regulators, government agencies and regulated businesses on cost of capital issues. Jason Hall is Lecturer in Finance at the Ross School of Business, The University of Michigan and Director of SFG Consulting. He has an Honours degree in Commerce and a PhD in finance from The University of Queensland. He teaches graduate level courses with a focus on valuation, has published 15 research papers in academic journals and has 17 years practical experience in valuation and corporate finance. Copies of the authors' curriculum vitas are attached as an appendix to this report.

9. The opinions set out in this report are based on the specialist knowledge acquired from our training and experience set out above.

10. We have read, understood and complied with the Federal Court of Australia Practice Note CM7 Expert Witnesses in Proceedings in the Federal Court of Australia.

2. Introduction

2.1 Context

11. This report needs to be placed in context of a debate that has evolved over a period of almost two years. The context is important in order to avoid replicating the exact analysis and argument that has already been submitted.

12. From June 2013 to October 2013, we submitted a series of three reports to the AER relating to the use of the dividend discount model. We used the dividend discount model to estimate the cost of equity for the Australian listed equity market as a whole, and for a sub-sample of nine listed energy network businesses.[2]

13. In December 2013, the AER released its final guideline on the cost of equity. The AER had regard to dividend discount model estimates of the cost of equity in order to estimate the market risk premium. The AER's estimate of the market risk premium in December 2013 was 6.5%, a figure which accounted for both historical average excess returns on the Australian share market,[3] and contemporaneous information about the cost of equity, including dividend discount model analysis. If we use the average yield on 10-year government bonds of 4.29%[4] over the month of December 2013 as a proxy for the risk-free rate, then the implied AER estimate of the expected market return as at December 2013 would be 10.79%.

14. In May 2014, we submitted a report to the AER on the dividend discount model[5] that addressed a number of specific issues in relation to the implementation of the dividend discount model to estimating the cost of equity for the market, and the cost of equity for a benchmark energy network.

15. An important motivation for the report of May 2014 was to provide a detailed reconciliation as to why different applications of the general model called the *dividend discount model* yield different estimates for the expected return on the market. Our preferred application of the dividend discount model differs from that of the AER in a number of respects and we documented the implication of each difference one at a time. That is, we showed what happens to the cost of equity estimates over a 12 year period under each individual difference in approach. This means that, even if the AER did not agree with our preferred approach in every respect, the AER might see merit in adjusting its own approach to some degree to generate more reliable estimates of the cost of equity.

16. The detailed reconciliation of the different approaches to estimating the cost of equity is not repeated here. We make reference to the report of May 2014 where appropriate. The emphasis of this report is therefore on what the AER has concluded in its draft determinations for the network firms, what we consider to be an appropriate market cost of equity, and the implications for the cost of equity for a benchmark energy network.

17. In November 2014, the AER released its draft determination for JGN, along with draft determinations for a number of other businesses.[6] In this draft determination, the AER estimated a market risk premium of 6.5%[7], the same assumption adopted in the guideline. The risk-free rate

[2] Dividend discount model estimates of the cost of equity (June), prepared for the Energy Networks Association (**ENA**); Reconciliation of dividend discount model estimates with those compiled by the AER (October), prepared for the ENA; and Cost of equity estimates implied by analyst forecasts and the dividend discount model (October), prepared for the Victorian electricity distribution networks.

[3] The term *excess returns* refers to returns above an estimate of the risk free rate of interest.

[4] The Reserve Bank of Australia reports a yield to maturity on 10 year government bonds of 4.24%. The effective annual rate, given semi-annual coupon payments, is $(1 + 0.0424 \div 2)^2 - 1 = 1.0212^2 - 1 = 4.29\%$.

[5] Alternative versions of the dividend discount model and the implied cost of equity (May).

[6] For ease of exposition throughout the report we reference the JGN Draft Determination rather than the suite of draft determinations for the network firms.

[7] JGN Draft Determination, Attachment 3, Sub-section 3.1, p. 10, Sub-section 3.4.1, pp. 29 and 76.

adopted in the draft determination was 3.55%[8] and so the AER's implied estimate of the expected return on the market is 10.05%.

18. In reaching the conclusion that the market risk premium is 6.5%, the AER places primary reliance upon historical excess returns stating:

> We are satisfied this is the most robust source of evidence for estimating a 10 year forward looking MRP. This position is consistent with the Rate of Return guideline (Guideline). Therefore, we have the most reliance to this source of information in estimating the MRP.
>
> Under current market conditions, we consider historical excess returns produce a MRP estimate of 6.0 per cent from within a range of 5.1 to 6.5 per cent.[9]

19. This means that the AER's best estimate of the market risk premium, if we had no information to determine whether the market risk premium should lie above or below the historical average, would be 6.0%.[10] The range of 5.1% to 6.5% reported above comes from consideration of different time periods for computing the historical average, and consideration of both geometric and arithmetic averages. Discussion of the merits of different time periods and averaging are outside the scope of this report. The key point is that the AER's inference from the historical data is that its best estimate of the market risk premium based upon past market returns is 6.0%, and that the historical data could also support an estimate as low as 5.1% or as high as 6.5%, if we had no reason to think that today's premium is above or below average.

20. The AER reported estimates of the market risk premium from the AER's application of the dividend discount model. The range of market risk premium estimates reported by the AER was 6.6% to 7.8%.[11] The lower bound of the AER's range is based upon an assumption that the long term dividend growth of listed companies is 4.0% in nominal terms (1.5% in real terms given an inflation assumption of 2.5%) and that this long term growth rate is achieved in the third forecast year. The upper bound of the AER's range is based upon an assumption that the long term dividend growth of listed companies is 5.1% in nominal terms (2.5% in real terms) and that this long term growth rate is achieved in the 10th forecast year, with a gradual transition from year two growth to year 10 growth.[12] The application that assumes constant growth from year three onward is referred to by the AER as the *two stage model* and the application that includes a transition to long term growth from year three to year 10 is called the *three stage model*.

21. The AER's best estimate of the market risk premium implied by the dividend discount model is 7.4%, which is based upon a 4.6% nominal long term growth rate (2.0% in real terms) achieved in forecast year 10.[13] The AER states it has advice from one consultant that supports the 4.6% long term growth rate (Lally, 2013) and advice from other consultants that suggest a lower growth rate is appropriate (Mackenzie and Partington, 2013).[14] The AER states that its two stage model is used as a cross check on the three stage model.

22. To summarise, in the draft determination for JGN, the AER's best estimate of the market risk premium based upon analysis of historical excess return is 6.0%, which implies an estimate for the market return of 9.55% (using the risk-free rate of 3.55%). The AER's best estimate of the market risk premium using the dividend discount model is 7.4%, which implies an estimate for the market return

[8] JGN Draft Determination, Attachment 3, Sub-section 3.1, p. 10. This is the estimated yield to maturity on 10 year government bonds for the 20 business day period from 17 September 2014 to 15 October 2014.

[9] JGN Draft Determination, Attachment 3, Sub-section B.1, p. 194.

[10] Network businesses have submitted that the historical excess returns alone support an estimate of the market risk premium of 6.56%, computed over the period from 1883 to 2013 (NERA, 2014).

[11] JGN Draft Determination, Attachment 3, Sub-section 3.4.1, p. 77, and Sub-section B.2, Table 3-41, p. 200.

[12] The market risk premium estimates also rely upon assumptions that the corporate tax rate is 30%, that 75% of dividends are franked and that a distributed credit is worth 60% of face value.

[13] Throughout the JGN Draft Determination, the long term growth rate is referred to as the baseline estimate or as a reasonable estimate.

[14] JGN Draft Determination, Attachment 3, Sub-section B.2.1, p. 200, Sub-section C.2.1, p. 215 to 216.

of 10.95%. In its determination the AER adopted an estimate for the market risk premium of 6.5%, which implies an estimate for the market return of 10.05%.

23. Over the month of January 2015 the average yield on 10 year government bonds was 2.66%.[15] In the report we simply refer to this as the *risk free rate*. If the AER was to maintain of expected market returns of 10.95% from the dividend discount model, the market risk premium estimate would be 8.29%. This is 1.79% above the AER's most recent estimate of the market risk premium, and 2.29% above what the AER considers to be the market risk premium based upon historical average returns (that is, if there was no information to suggest the market risk premium is above or below average).[16]

2.2 Areas of agreement and disagreement

24. To place the consideration of the AER in context of our views, we outline the specific areas of agreement and disagreement below.

2.2.1 Areas of agreement

Transition period

25. We agree that a transition towards long run growth from year three to year 10 is appropriate.[17] However we disagree with the AER's view that a lower bound on the expected market cost of equity can be constructed using no transition from year two onwards and progressing straight to long term growth in year three. It is not likely that the market expectation is for the growth rate in earnings per share of listed companies to progress from well above the long run growth rate in the economy to less than the long run growth rate in the economy in just three years. If the AER is to consider a range from different transition periods, then the mid-point of that range should be the baseline assumption of 10 years.

26. The AER states that its results from assuming long term growth from year three onwards are used as a cross check on its results based upon a transition period. We do not agree that the results can be used as a cross check because there is no indication as to what this cross check means. If the results from the two sets of alternative assumptions differ, does this mean we should place more emphasis on the main results that assume a transition period, or less emphasis on the results that assume a transition period?

27. **In our view a transition to a long term growth rate over 10 years is appropriate.**

[15] The Reserve Bank of Australia reports a yield to maturity on 10 year government bonds of 2.64%. The effective annual rate, given semi-annual coupon payments, is $(1 + 0.0264 \div 2)^2 - 1 = 1.0132^2 - 1 = 2.66\%$.

[16] The market return is estimated using data over a two month period ending 31 December 2014. It is our best estimate of the expected market return from the dividend discount model on 31 December 2014. The risk free rate used to estimate the market risk premium is 2.66% estimated as an average yield over the month of January 2015. Over the month of December 2014 the average yield on 10 year government bonds was 2.74%. So there is little change in the risk free rate from December 2014 to January 2015. So the underlying assumption is that the expected market return at the end of December 2014 is the same as the expected market return at the end of January 2015. The trailing 12 month dividend yield on the ASX 200 averaged 4.35% for both December 2014, and January 2015, and the trailing 12 month price earnings ratio averaged 15.2 over December 2014 and 15.6 over January 2015. So there is no reason to think that the expected market return has undergone a material change over this one month time period. The estimated market cost of equity based upon the AER approach, and assuming a 4.6% growth rate is 11.2% over the two months ending December 2014, and remains 11.2% over the two months ending January 2015.

[17] We made this specific recommendation in our series of earlier reports.

No term structure

28. We agree with the AER that it is not appropriate to incorporate a term structure assumption into the estimated cost of equity. The term structure assumption means that there is a progression from a near term cost of equity to a long run cost of equity over the transition period. In our previous analysis we documented that this leads to very large fluctuations in the expected market return from one period to the next, and that there is no reasonable basis for concluding whether or not a term structure even exists.

29. **In our view the best estimate of the expected market return is one that is constant over all forecast years.**

2.2.2 Areas of disagreement

Long term growth and GDP growth

30. We disagree that long term growth should be estimated at less than the overall growth rate in the economy. The AER's baseline estimate for long term growth is based upon the assumption that real growth in gross domestic product (GDP) is 3.0%, inflation is 2.5% and that real growth in earnings per share will be 1.0% less than real GDP growth. We refer to this as the *GDP minus 1%* assumption.

31. In our report of May 2014 we documented the following empirical result. In recent decades, in both Australia and the United States (U.S.), real earnings per share growth of listed companies has met or exceeded real GDP growth. The period over which this has occurred aligns with the period of material reductions in inflation in both countries, and with the period over which central banks have specifically attempted to maintain inflation within a narrow range. The empirical evidence which forms the basis for the AER's *GDP minus 1%* assumption is from earnings per share growth and GDP growth from the period which precedes the current regime. Further, there has been a substantial increase in price-earnings ratios from the earlier to the latter regime.

32. So we have a period of low price-earnings ratios, low earnings per share growth and high inflation, followed by a period of high price-earnings ratios, high earnings per share growth and low inflation. By using a low growth rate assumption that is attributed to the early time period, the AER analysis necessarily leads to a low estimate of the expected market return.

33. The AER's response to this analysis is that it could have been distorted by analyst forecasts having an upwards bias.[18] The comment of the AER has nothing to do with the analysis of earnings per share growth that was presented in our paper of May 2014. The AER has not made any reference to the different rates of growth in actual earnings per share in different time periods, coinciding with different inflation regimes and price-earnings ratios, in two markets.

34. **In our view, *if* the long term growth estimate is to be made with reference to GDP growth the best estimate of real long term growth is equal to an estimate of real GDP growth.**

Long term growth and the concept of forever

35. The AER has made the argument that any estimate of long term growth that exceeds an estimate of long term growth in the economy is implausible because if this continued forever then listed company earnings would eventually be larger than aggregate economic output. Specifically, the AER referred to our average estimate of long term growth of 5.8% and stated that this was implausibly high because it was above estimated GDP growth.

[18] JGN Draft Determination, Attachment 3, Sub-section C.2.1, p. 217.

36. We disagree that any estimate of long term growth that exceeds an estimate of GDP growth must be ruled out. There are two reasons for this. First, we need to remember that the GDP growth rate is an *estimate*, and the earnings per share growth rate is an *estimate*. It could be the case that the economy might be expected to grow at a rate different from 5.6%, such as 5.8%, and that our estimate of long term growth in earnings per share in the same as GDP growth. The AER rationale is that the GDP growth estimate of 5.6% is fact and any estimate of earnings per share growth above this figure must be ruled out.

37. Secondly, we pointed out to the AER that what really matters for valuation is cash flows over the next 100 years. For example, at a growth rate of 5% and a discount rate of 10%, 99% of the present value of expected cash flows forever is from the first 100 years. No one has disagreed with the mathematics that if earnings grow at a higher rate than GDP, earnings would eventually exceed GDP. Where we disagree is whether the "forever" argument matters or not. If we simply re-phrase the question, "Could the earnings per share of a large listed company keep pace with the growth of the economy for 100 years?" then the AER's argument that this simply cannot happen no longer applies. And it is worth re-stating that the earnings per share of the large listed companies in Australia and the U.S. **have** kept pace with GDP growth over the recent decades of low inflation.

38. **In our view there is no merit to the argument that assuming earnings per share growth for valuation purposes cannot match GDP growth on the basis that, mathematically, eventually earnings of listed companies would exceed GDP. There could well be equivalent growth rates for earnings per share and GDP for the next 100 years which is what matters for the present value computation.**

Imputation credits

39. We disagree with the manner in which the AER accounts for imputation credits in its market return estimate, in comparison to the manner in which the AER accounts for imputation credits in the AER's post-tax revenue model. In several previous papers we have documented that the AER embeds an assumption in its post-tax revenue model that is different to the assumption the AER adopts in estimating the expected market return. This comment applies to the AER's dividend discount model analysis, and in the AER's analysis of historical excess returns and historical real returns.

40. The implication of these different approaches to imputation is that in estimating the market return, the AER assumes a comparatively low value for imputation credits. But then, if the AER's post-tax revenue model is populated with the same market return estimate, and if there are no timing issues relating to tax payments (like regulatory versus tax depreciation or tax losses carried forward), the assumed value for imputation credits is comparatively high. This means that the allowed returns from dividends and capital gains in the model is lower than what the AER assumes in its market return estimate.

41. In Section 4 we explain the distinction again with reference to recent AER assumptions, figures contained in the draft determination for JGN, and the actual model used by the AER in computations.

42. **Our view is that the AER can either amend its post-tax revenue model or make an adjustment to the market return assumption to resolve this inconsistency. Our only viable option in this report is to adjust the market return estimates, so our conclusions on market return are based upon the formula that total return = return from dividends and capital gains × 1.1071. The basis for this formula is presented in Section 4.**

Estimation approaches and datasets

43. We disagree with the view of the AER that our approach to inferring cost of capital estimates from analyst earnings forecasts introduces complexity without meaningful improvements in estimates of the cost of capital. We have documented that the relative stability of our cost of capital estimates over time is due to a series of individual methodological choices. We consider that careful analysis of more detailed information does lead to more reliable cost of capital estimates. Our view is that what the AER characterises as complexity could be better characterised as making an attempt to improve the reliability of cost of capital estimates by paying attention to detail.

44. The AER makes the point that stability of the cost of capital estimates over time does not establish that the estimates are better. It could be the case that the true cost of capital varies more over time. But the preference of the AER for its more volatile cost of capital estimates is not borne out in its final estimates of the market risk premium in determinations. The AER has never departed from the assumption that the market return is either 6.0% or 6.5% above the government bond rate. So on the one hand the AER has a less stable series of cost of capital estimates over time (which on average imply a market risk premium of 6.56% from 2006 to 2014), and which the AER suggests could reflect the true variation in the cost of capital over time. Yet the AER gives little consideration to the cost of capital estimates over time because they might not reflect the true variation in the cost of capital.

45. **Our view is that the most reliable cost of capital estimates can be generated from the use of price targets, matched in time with the release of earnings per share forecasts by the same analyst, and with a long term growth estimate made jointly with the cost of equity estimate.**

2.3 Cost of capital estimates

46. Ultimately we need to reach conclusions on the best estimates of the expected market return and the cost of equity for a benchmark energy network. Our conclusions are as follows.

47. **Our best estimate of the expected market return is 11.37% and the market risk premium estimate is 8.72% compared to the risk free rate of 2.66%. This is based upon market return estimates over the two month period from November to December 2014. This is also based upon an assumption that the value of an imputation credit (gamma) is 0.25, and total returns = returns from dividends and capital gains × 1.1071. The basis for this equation is that it leads to a market return that is consistent with the equations embedded in the AER's post-tax revenue model.**

48. **Our view is that analysis of share prices and earnings forecasts implies that listed energy networks have an equity risk premium that is 0.94 times the market risk premium.[19] Given the market risk premium estimate of 8.72% and the risk-free rate of 2.66%, the equity risk premium for a benchmark energy network is estimated at 8.19%[20] and the cost of equity for a benchmark energy network is estimated at 10.85%.[21]**

[19] We refer to the figure of 0.94 as the risk premium ratio and it gives an equivalent cost of equity as using a beta estimate of 0.94 in the Sharpe-Lintner Capital Asset Pricing Model.

[20] 0.94 × 0.0872 = 8.19%.

[21] 0.0266 + 0.0819 = 10.85%.

3. The long term growth assumption in the AER's preferred approach

3.1 Introduction

49. The section of the report is devoted to the debate over the best estimate of long term growth, for application to the AER's preferred dividend discount model approach. All dividend discount model computations reported in this section are based upon the AER's preferred assumptions regarding model, transition period, dataset and accounting for imputation credits. In other sections of the report we consider whether a long term growth rate needs to be specified in advance, but that is a separate issue.

50. In the first sub-section below, we consider the AER's constraint on growth – that real growth in earnings per share cannot exceed real GDP growth. We make the point that the AER has ruled out growth rate assumptions that are reasonable because they lead to expected returns that are similar to the returns we have actually observed in the market. According to the AER's constraint on growth, the AER rules out market cost of equity estimates that we have actually observed for over 100 years.

51. In the second sub-section we consider the relationship between real growth in earnings per share and real GDP growth that we have actually observed. This analysis was presented to the AER in our report of May 2014, but was not fully considered by the AER. The AER's commentary on the analysis was that it could be affected by optimistic analyst forecasts for earnings per share. The analysis relies upon the actual earnings per share of listed companies. We make the important point that the AER's empirical basis for its *GDP minus 1%* assumption is not present in the recent decades of low inflation and high price-earnings ratios. In the recent regime, earnings per share growth matches or exceeds GDP growth. The AER is trying to estimate the market cost of equity today, when inflation is low and price-earnings ratios are high, by imposing a growth rate constraint from a period when inflation is high and price-earnings ratios are low. The implication is that the AER's low growth rate assumption leads to a low estimate of the expected market return.

3.2 The *GDP minus 1%* growth constraint rules out returns that actually happened

52. There is an extensive literature on the use of the dividend discount model for estimating the cost of equity. The expansion of this literature mirrored the availability of analyst forecasts of earnings and dividends, from which the cost of equity can be derived. There is no debate in the literature that a reasonable valuation model for stocks is the dividend discount model, and on this issue there is agreement between us and the AER. The most contentious issue in the literature is how to make estimates of earnings and dividends outside of the short window for which analyst forecasts are available.

53. This argument boils down into two questions: (1) What long term growth rate is sustainable; and (2) How long will it take to transition to long-term growth? Those two questions are relevant for estimating the cost of equity for the market, sub-samples based upon industry, size or book-to-market ratio, and individual firms.

54. At the heart of the matter is the issue of what historical stock returns imply for expected future returns. At first glance it may seem that past returns, and expectations of future returns implied by stock prices and earnings, are separate issues. But they are not entirely separate issues for the following reason. This reason has implications for the assumptions about long term growth.

55. We replicated the AER approach to estimating the market return using the dividend discount model. We used the consensus dividends per share estimates on the ASX200 reported by Bloomberg

computed over two month periods, and assumed a long-term growth rate of 4.6%[22], that a distributed imputation credit was valued at 0.60 (theta = 0.60), a corporate tax rate of 30% and that 75% of dividends were franked. We repeated this analysis six times per year for every two month period for the nine years for which consensus forecasts were available, which was January 2006 to December 2014. This means that there are 54 estimates of the expected market return.[23] This analysis yields the following results over the last nine years.

a) On average the expected market return is 11.44%.

b) Assuming an inflation expectation of 2.50% for all periods, for consistency with the AER assumption on inflation, the average expected real market return is 8.72%.[24]

56. Then, we replicated the AER approach to estimating the market return by making just one change in assumption. We assumed long term growth of 5.6%[25], under the assumption that real long term growth in dividends per share and earnings per share is 3.0%, consistent with the AER's view on long term GDP growth. This analysis yields the following results over the last nine years.

a) On average the expected market return is 12.25%.

b) Assuming an inflation expectation of 2.50% for all periods, for consistency with the AER assumption on inflation, the average expected real market return is 9.51%.[26]

57. So the impact of the different long term growth assumptions represents, on average, a 0.81% difference in nominal market returns and a 0.79% difference in real market returns.

58. The AER has compiled estimates of the historical average market returns in real terms, and then adjusted those returns for an expected inflation rate of 2.5% to compute nominal expected returns. This is part of the analysis the AER refers to as the Wright approach.[27] The AER reports a range of estimates of historical average real returns based upon different time periods. That range is 7.4% to 10.1%, which translates to a range for nominal returns of 10.1% to 12.8%. Whether or not this represents the best estimate of historical real returns for listed companies is beyond the scope of our report. Our point is that it represents what the AER considers to be the real returns that have been observed in the past. We do not want our analysis to be contaminated by a debate over what networks and the AER consider to be the most useful estimates of historical real returns.

59. The AER considers that a long term growth rate of 4.6% is its best estimate. The AER also considers that long term growth rate assumptions of 4.0% to 5.1% are plausible because that is the range of long term growth assumptions the AER uses in its dividend discount model analysis. But the AER considers a long term growth rate of 5.6% to be implausible.

60. However, under both the 4.6% and 5.6% growth assumptions the average real market cost of equity lies comfortably within the AER's estimates of historical real average returns. Both the average real market return of 8.72% (from the 4.6% growth assumption) and 9.51% (from the 5.6% growth assumption) lie within the range of 7.4% to 10.1%.

[22] The figure we actually use in all computations is 4.55%, based upon a long term inflation expectation of 2.5% and a long term real growth expectation of 2.0%. The computation is nominal growth of 1.020 × 1.025 – 1 = 4.55%.

[23] There are six estimates per year over the nine year forecast period.

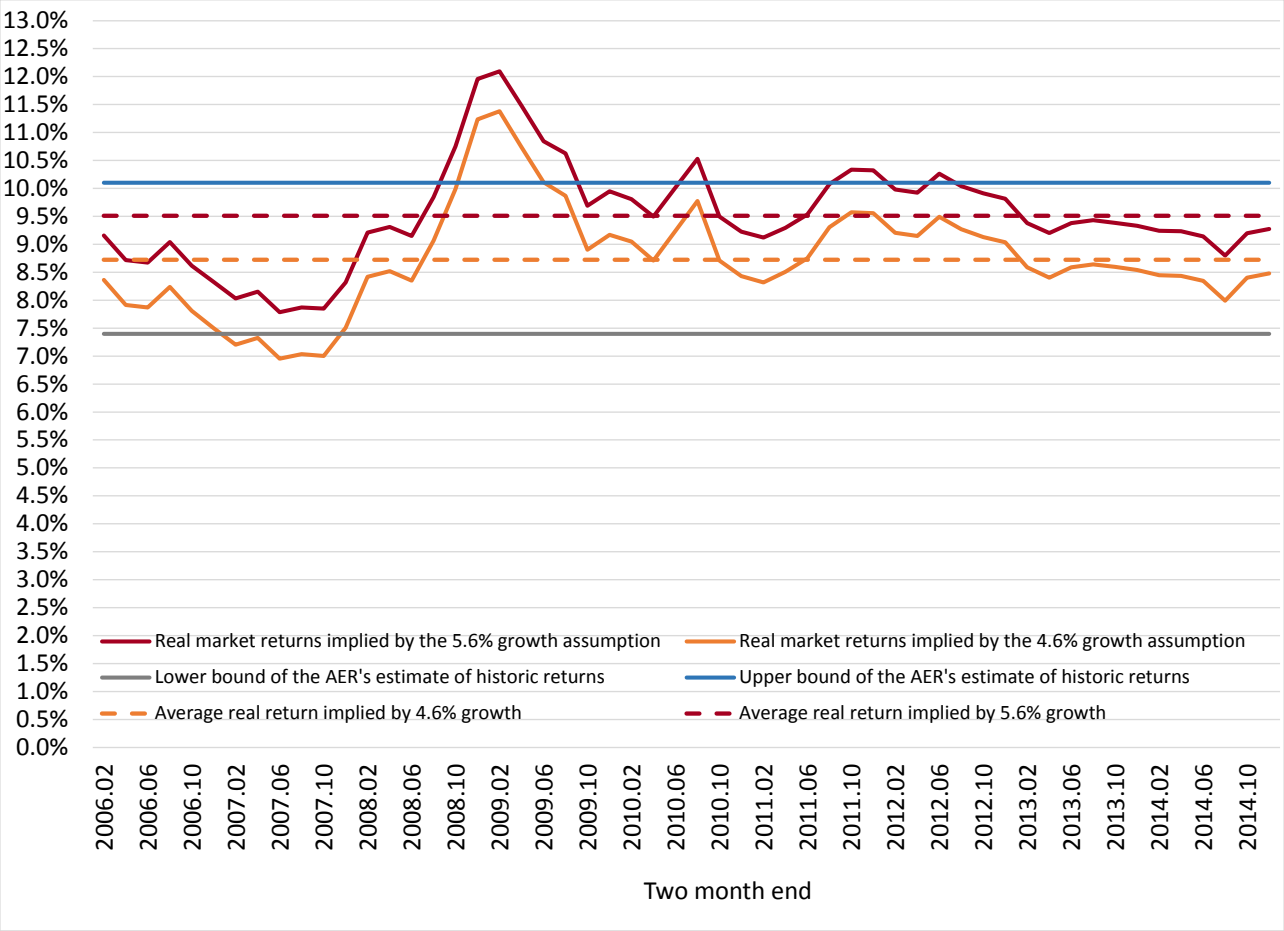
[24] As an alternative assumption if we estimate inflation with reference to the difference in yields on fixed coupon 10 year bonds and inflation-linked 10 year bond in the second month of the two month period the average expected real market return is 8.58%. The average implied inflation rate over the period is 2.65% from government bond yields.

[25] The figure we actually use in all computations is 5.575%, based upon a long term inflation expectation of 2.5% and a long term real growth expectation of 2.0%. The computation is nominal growth of 1.030 × 1.025 – 1 – 5.575%.

[26] Under inflation expectations implied by government bond yields the average expected real market return is 9.36%.

[27] JGN Draft Determination, Attachment 3, Sub-section 3.4.1, Table 3-19, p. 86.

Figure 1. Market cost of equity estimates using the AER approach



61. This is illustrated in Figure 1 which shows the time series of real market cost of equity estimates, using the AER preferred approach in its entirety, but with two alternative growth assumptions, 4.6% and 5.6%. The grey and blue lines represent the lower and upper bounds of the AER's estimate of real market returns observed on average. The dotted lines represent the average estimates of the expected market returns from 2006 to 2014. The orange and red lines represent real market cost of equity estimates every two months. The cost of equity estimates are low in 2007, increase in 2008 and 2009, and then decline in more recent years. The key point is that the average real cost of equity estimates, over 2006 to 2014 at 5.6% growth, are within the AER's range of real returns actually observed.

62. This means that the AER has ruled out an assumption about long term growth which generates market cost of capital estimates that are consistent with the historical average returns that we have actually observed. According to the AER's own analysis, investors have earned real returns on the Australian stock market of around 7.4% to 10.1%. According to recent share prices, earnings forecasts and dividend forecasts, and assuming that earnings growth can match GDP growth, investors would expect to earn real returns of 9.51%.

63. The AER view that growth cannot be 5.6%, and therefore real returns cannot be 9.51%, does not seem to make logical sense. It seems unreasonable to assume that stock prices cannot reflect an expected return that is the same as we have observed on average over an extended period of time.

64. We can draw the same implication from analysis of the most recent two month period ending in December 2014. For this period we have the following results.

    a) Under the 4.6% growth assumption the expected market return is 11.19% which is 8.48% in real terms. This lies within the AER's range for historical real returns of 7.4% to 10.1%.

    b) Under the 5.6% growth assumption the expected market return is 12.01% which is 9.28% in real terms. This lies within the AER's range for historical real returns of 7.4% to 10.1%.

65. **Our view is that the AER's *GDP minus 1%* assumption places a constraint on the expected real market return that is inconsistent with the returns that we have actually observed on the market. There is no reason to impose this constraint on the long term growth assumption. As we explain in the next sub-section an assumption that earnings per share growth keeps pace with GDP growth is just what is implied by the recent decades of low inflation and high price-earnings ratios.**

3.3 Historical GDP growth and earnings per share growth

3.3.1 Relevant data shows that real earnings per share growth matches real GDP growth

66. In our report of May 2014 we presented empirical analysis on the relationship between growth in real earnings per share and real GDP.[28] The AER's empirical basis for its *GDP minus 1%* assumption is that over a long period of time real growth in earnings per share has lagged behind real GDP growth.

67. For stocks listed in Australia and the U.S., we found that whether real earnings per share growth matched real GDP growth depended upon which time period was examined. In both markets there is a point at which inflation exhibited a notable decline, and this point coincided with central bank efforts to maintain inflation within a narrow range. In Australia, average inflation was 9.6% from 1969 to 1990, and then 2.7% from 1990 to 2013. In the U.S., average inflation was 8.0% from 1969 to 1981 and then 2.9% from 1981 to 2013.[29]

68. We also documented something important about stock prices and earnings over these time periods, by computing price versus 10 year trailing earnings per share in real terms.[30] The price-earnings ratios are systematically higher during the latter, low inflation regime. For Australian-listed stocks, the median ratio of price to 10 year trailing earnings per share rises from 12.2 to 19.8. For U.S.-listed stocks, the median price to 10 year trailing earnings per share rises from 8.9 to 21.1.

69. So we have two distinct time periods in both markets – a period of high inflation and low price-earnings ratios followed by a period of low inflation and high price earnings ratios. We examined the growth in real earnings per share and real GDP over these two time periods and reported the following results.[31]

    a) In Australia, during the high inflation/low PE period of 1969 to 1990, average real earnings per share growth was 1.8%, which lagged behind real GDP growth of 3.0%. This is consistent with the *GDP minus 1%* assumption. But during the low inflation/high PE period of 1990 to 2013, average real earnings per share growth was 5.0% which exceeded real GDP growth of 3.4%. This is inconsistent with the *GDP minus 1%* assumption.

    b) In the U.S., during the high inflation/low PE period of 1969 to 1981, average real earnings per share growth was 2.0%, which lagged behind real GDP growth of 3.1%. This is consistent with the *GDP minus 1%* assumption. But during the low inflation/high PE period of 1981 to 2013, average real earnings per share growth was 2.8% which was just below real GDP growth of 2.9%. This is inconsistent with the *GDP minus 1%* assumption.

70. So the question then is, "What is the best assumption about the relationship between earnings per share growth and GDP growth at present?" The data that supports the AER's *GDP minus 1%* assumption is from the former high inflation/low PE ratio period. The data that supports a growth assumption equal to GDP growth is from the current low inflation/high PE ratio period.

[28] SFG (2014), Sub-section 4.2.3, pp. 32 to 44.
[29] SFG (2014), Sub-section 4.2.3, Table 9, p. 39.
[30] SFG (2014), Sub-section 4.2.3, Figure 5, pp. 40 to 41.
[31] SFG (2014), Sub-section 4.2.3, Table 9, p. 39. The underlying data on prices and earnings per share is reported in datasets of Global Financial Data.

71. The key point is that if the AER was trying to estimate the cost of capital for a market with low price-earnings ratios and high inflation, a real growth rate that is 1% lower than GDP growth would be appropriate. But the AER is trying to estimate the cost of capital for a market with high price-earnings ratios and low inflation, and in this market a real growth rate equal to GDP growth is appropriate.

72. **Our view is that if a growth assumption is made with reference to GDP growth, the best assumption is that earnings per share growth is equal to GDP growth.**

3.3.2 There is no support for the AER's 4.6% estimate to be labelled as generous

73. In relation to the prior evidence relied upon by the AER there is one important issue that needs to be clarified. The AER refers to advice from McKenzie and Partington (2013) that its 4.6% growth assumption could be "somewhat on the generous side."[32] The AER retained its 4.6% growth assumption as its best estimate of long term growth but this quote illustrates that it has also received advice that it could adopt a lower growth rate. The AER also presents sensitivity analysis using a lower growth rate computed by McKenzie and Partington (2013).

74. In our May 2014 report we referred to the computations performed by McKenzie and Partington (2013).[33] They compiled a set of growth rate estimates from analysis conducted over different time periods and using different assumptions. This appears in Table 10 of our 2014 report.[34] In the final column of that table we report the nominal growth rates that McKenzie and Partington rely upon to reach the conclusion that the AER is being somewhat generous. On average, excluding the high and low growth rates, the nominal growth rate estimate is 3.78%. As this is below the 4.6% rate assumed by the AER, McKenzie and Partington (2013) consider the AER to be somewhat generous.

75. We questioned whether there was a transposition error in compilation of the table. In rows 4 to 7 of the table there is a series of nominal growth rate estimates that lie within the range of 0.31% to 1.54%. In our report of May 2014 we suggested that these are actually meant to be real growth rate estimates, and so there was a mis-match of real and nominal growth rates in the 3.78% average relied upon by McKenzie and Partington (2013).

76. We raised this as simply a transposition error on the basis that it was unlikely to be the case that the nominal growth rate estimates in those four rows were actually meant to be within the range of 0.31% to 1.54%. These values, if true, would imply that the growth of listed companies was so low that the particular companies could not actually keep pace with inflation. For those four rows the implied real growth rate would be within the range of –0.94% to –2.14%, assuming inflation of 2.5%.[35]

77. In their response, McKenzie and Partington (2014) state that the numbers in question are indeed meant to represent nominal growth rate estimates. They consider that no adjustments are necessary.

78. This issue continues to be a source of disagreement and we hope to clarify the issue in the current report with reference to the specific numbers. Our computations of nominal growth for the rows in question are presented below.

    a) With respect to row 4 of the table, the Lally/Bernstein estimate of real GDP growth is 3.0%. This implies that the Lally/Bernstein estimate of nominal GDP growth is 5.6% if we assume 2.5% inflation.[36]

[32] JGN Draft Determination, Attachment 3, Sub-section B.2.1, p. 200, Sub-section C.2.1, p. 215 to 216. This is the AER quoting advice from McKenzie and Partington (2013).
[33] McKenzie and Partington (2013), Section 3, Table 2, p. 16.
[34] SFG (2014), Sub-section 4.2.3, Table 10, p. 43.
[35] That is, if nominal growth is 0.31% then real growth = (1 + nominal growth) ÷ (1 + inflation) – 1 = 1.0031 ÷ 1.0250 – 1 = –2.14%. And if nominal growth is 1.54% then real growth = (1 + nominal growth) ÷ (1 + inflation) – 1 = 1.0154 ÷ 1.0250 – 1 = –0.94%.
[36] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.030 × 1.025 – 1 = 5.575%.

The downward adjustment to real GDP growth to arrive at real dividend growth is 2.4%. This means that the estimate of real dividend growth is 0.6%, computed as 3.0% – 2.4% = 0.6%. This implies that the Lally/Bernstein estimate of nominal dividend growth is 3.1%.[37]

b) With respect to row 5 of the table, the CEG/Bernstein estimate of real GDP growth is 3.9%. This implies that the CEG/Bernstein estimate of nominal GDP growth is 6.5%.[38]

The downward adjustment to real GDP growth to arrive at real dividend growth is 2.4%. This means that the estimate of real dividend growth is 1.5%, computed as 3.9% – 2.4% = 1.5%. This implies that the CEG/Bernstein estimate of nominal dividend growth is 4.0%.[39]

c) With respect to row 6 of the table, the Lally/Barra estimate of real GDP growth is 3.0%. This implies that the Lally/Barra estimate of nominal GDP growth is 5.6%.[40]

The downward adjustment to real GDP growth to arrive at real dividend growth is 2.7%. This means that the estimate of real dividend growth is 0.3%, computed as 3.0% – 2.7% = 0.3%. This implies that the Lally/Barra estimate of nominal dividend growth is 2.8%.[41]

d) With respect to row 7 of the table, the CEG/Barra estimate of real GDP growth is 3.9%. This implies that the CEG/Barra estimate of nominal GDP growth is 6.5%.[42]

The downward adjustment to real GDP growth to arrive at real dividend growth is 2.7%. This means that the estimate of real dividend growth is 1.2%, computed as 3.9% – 2.7% = 1.2%. This implies that the CEG/Barra estimate of nominal growth is 3.7%.[43]

79. We reiterate the view that the table relied upon by McKenzie and Partington (2013, 2014) contains a mix of real growth rates and nominal growth rates in the final column. McKenzie and Partington (2014) disagree. They perform the following computation with respect to row 4 of the table.[44]

80. [(1 + Real GDP growth) × (1 + Inflation) – 1] – [(1 + Downward adjustment) × (1 + Inflation) – 1]

= [(1 + 0.030) × (1 + 0.025) – 1] – [(1 + 0.024) × (1 + 0.025) – 1]

= 5.575% – 4.960%

= 0.615%[45]

81. The figure of 5.575% shown immediately above is nominal GDP growth. The figure of 4.960% is a downward adjustment to GDP growth (2.4%) that has then had inflation incorporated into it. So the assumption underpinning this calculation is that nominal dividend growth will be **4.960% less** than nominal GDP growth.

82. Our view is that this is not correct, and simply results from either a transposition or computational error. The papers and datasets relied upon in the table **do not** suggest that nominal dividend growth will be almost 5% lower than nominal GDP growth.[46]

83. If we interpret the figures under most of the column headers of Table 2 of McKenzie and Partington (2013) as being correct, but make a logical correction to some of the results in the final column, then a different result emerges for the long run average rate of growth in nominal dividends. The final

[37] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.006 × 1.025 – 1 = 3.115%.
[38] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.039 × 1.025 – 1 = 6.497%.
[39] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.015 × 1.025 – 1 = 4.037%.
[40] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.030 × 1.025 – 1 = 5.575%.
[41] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.003 × 1.025 – 1 = 2.807%.
[42] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.039 × 1.025 – 1 = 6.497%.
[43] Nominal growth = (1 + real growth) × (1 + inflation) – 1 = 1.012 × 1.025 – 1 = 3.730%.
[44] McKenzie and Partington (2014), Part A4, pp. 33 to 34.
[45] This computation is rounded to 0.62% in the text and the table of McKenzie and Partington (2013).
[46] The original research articles upon which the McKenzie and Partington (2013, 2014) analysis is based are discussed in Sub-section 4.2.3 of our report of May 2014 (SFG DDM 2014). The title of the paper, "The two percent dilution", is drawn from the estimated 2% difference between GDP growth and dividends per share growth.

column is indeed for the long run growth rate of nominal dividends. Excluding the minimum and maximum, as McKenzie and Partington (2013), the average nominal growth rate in the table is 4.40%. This can be compared to the AER's 4.6% growth assumption. This means that the conclusion reached by McKenzie and Partington (2013, 2014) that the AER is being somewhat generous with its 4.6% growth assumption no longer holds.

84. **Our view is that if a growth estimate is made with reference to GDP growth, the best assumption is that earnings per share growth is equal to GDP growth. Further, the suggestion by the AER and McKenzie and Partington (2013, 2014) that the *GDP minus 1%* assumption is being somewhat generous is not correct. The proposition by McKenzie and Partington (2013, 2014) is not consistent with the growth in real earnings per share during the low inflation/high PE time period. And even if the research relied upon by McKenzie and Partington (2013, 2014) was accepted, this research does not imply that the *GDP minus 1%* assumption is generous. The figures relied upon by McKenzie and Partington (2013, 2014) imply a growth rate (4.4%) that is almost the same as the AER's 4.6% assumption.**

3.3.3 The adoption of a growth rate forever

85. In our report of May 2014 we considered the issue of whether it is reasonable to think that listed companies can grow earnings at a rate that exceeds growth in the aggregate economy forever. It is mathematically true that this cannot happen because eventually those listed company profits would be the entire economic output.

86. We went on to make the point that this *forever* argument is not a reason to rule out growth in listed company earnings for the period which matters for valuation, which is 100 years or less.[47] Our point is that we could observe listed companies exhibiting earning per share growth at 5.6% for decades, and that this is a reasonable assumption to be incorporated into cost of capital estimation. As discussed in the prior section, it is also the assumption that is consistent with the actual earnings per share growth of listed companies in the current low inflation/high PE time period.

87. The AER's response is that the concept embedded in its application of the dividend discount model, and our own application, is an infinite time period.[48] The AER then states that if the AER did accept our proposition that the market will not revert to a long term growth rate for an extended period of time we should account for this by modifying the length of the transition period rather than the long term growth rate.

88. This response of the AER provides cursory attention to this issue. Our point is that the AER has made a strong assumption about long term growth on the basis that it would be nonsensical to have listed company earnings overtake the size of the economy. But it is not nonsensical to consider that listed company earnings will keep pace with the economy for long enough to actually matter in computing the expected return.

89. To explain with a simple example, as mentioned above, using the AER's preferred dividend discount model, dataset and assumptions, but modifying the growth rate to 5.6%, our estimate of the market return over November and December 2014 is 12.01%. The AER says that the growth rate of 5.6% cannot occur because at some point the market's earnings are too large compared to the economy. What if we just wrote down the present value equation and ignored all the dividends after 80 years? So we assume not just low growth after 80 years, but no dividends whatsoever. Under this assumption that expected market return is 11.95%. This means that ignoring all cash flows after 80 years reduces the estimated cost of equity by just 0.06%.

[47] SFG (2014), Sub-section 4.2.3, p. 33.
[48] JGN Draft Determination, Sub-section C.2.1, p. 217.

90. **Our view is that if a growth assumption is made with reference to GDP growth, the best assumption is that earnings per share growth is equal to GDP growth. We disagree with the argument that this equality can be ruled out because mathematically the growth of listed companies cannot exceed the output of the economy. It is not unreasonable to assume that earnings growth matches GDP growth for the period of time that actually matters for valuation.**

3.4 The two stage "cross check" has no basis

91. The AER presents two sets of dividend discount model estimates. The AER's preferred dividend discount model analysis incorporates a transition from short term growth to long term growth over an eight year period ending in year 10. The AER also presents results from what is referred to as a two stage model, in which there is an assumption that long term dividend growth begins in year three.

92. The AER states that is uses the two stage model results as a "cross check."[49] There is no reasonable basis for using these results as a cross check, and it is unclear what the AER means by a cross check. We know that the cost of equity estimates from the two stage model are always lower than the cost of equity estimates from the three stage model.[50] We also know the reason why the cost of equity estimate are always lower under the two stage model. This occurs because dividend growth over the first two forecast years is higher than the AER's long term growth assumption. What the AER labels as a two stage model is simply a model in which we assume lower growth in dividends over forecast years three to 10. If we assume lower growth in dividends, we end up with lower cost of equity estimates.

93. This simply means that the AER computes an estimate of the expected market return under its own assumption (transition from year two growth to long term growth in year 10) and then assumes lower growth and arrives at lower market return estimates. In the AER's most recent analysis, assuming lower growth from years three to 10 reduces the market cost of equity by 0.2%.[51]

94. The AER has nine years of data available upon which to generate market based cost of capital estimates under the dividend discount model. The AER states that the two stage results can be used as a cross check on the three stage results but it is not clear in what situation a conclusion would change on the basis of this cross check. If analysts assume high growth in years one and two, compared to the AER's long term growth assumption, there will be a greater divergence of cost of capital estimates from the two stage and three stage models.

95. However, the AER reaches no conclusion on whether this divergence would lead the AER to give *more* emphasis to the three stage model (under the assumption that high growth continues for a while longer) or *less* emphasis to the three stage model (under the assumption that the high short term growth over years one and two is an anomaly).

96. **Our view is that the AER's two stage model results are irrelevant because the AER provides no basis upon which they can be interpreted. From the AER's reasoning there is no indication as to whether the cross check acts to reinforce or question the three stage model results.**

[49] JGN Draft Determination, Sub-section C.2.4, p. 222.
[50] AER Rate of Return Guideline, Explanatory Statement, Appendix, E, Sub-section E.2, Figure E.1, p. 118.
[51] JGN Draft Determination, Attachment 3, Sub-section C.4, Table 3-47, p. 231.

4. Imputation

4.1 Introduction

97. In our previous series of reports and those of the AER, a point of contention has been how imputation credits are incorporated into the expected return on the market, and in the AER's post-tax revenue model (and that of JGN). This point of contention is not related to the assumed value of imputation credits. The debate is over how imputation credits should be accounted for in the expected market return, given a particular set of assumptions about the value of credits.

98. The AER considers that the best estimate of the value of imputation credits (gamma or γ) is 0.4.[52] This is the figure that is used by the AER in estimating the allowed revenue stream for regulated energy networks. The AER also considers that the best estimate of a distributed imputation credit (theta or θ) is 0.6.[53] This is the figure that is used by the AER in estimating the expected market return.

99. The point we have made previously, and maintain in this report, is that the AER makes an assumption about imputation credits in estimating the market return that implies a comparatively low value for imputation credits, but embedded in the AER's post-tax revenue model is an assumption of a comparatively high value for imputation credits. The AER considers that we have mis-characterised the way in which the AER accounts for imputation credits. So in this section we re-phrase the issue with direct reference to the computations from market return estimates and the AER's post-tax revenue model.

100. Our view remains that the AER should either estimate the market return in a manner consistent with the AER's post-tax revenue model, or adjust the post-tax revenue model so that the AER accounts for imputation credits in a consistent manner to the market return estimate.

4.2 What is the assumed return from imputation credits in market return estimates from the AER's dividend discount model?

101. Suppose we consider the case in which the risk free rate is 3.55%, the market risk premium is 7.4%, the rate of long term growth in dividends is 4.6%, the corporate tax rate is 30%, and 75% of dividends are franked. In the draft decision for JGN, these are the figures reported by the AER in its dividend discount model analysis. In aggregate these assumptions mean that:

a) The expected market return is 10.95% (risk free rate + market risk premium);

b) The long term dividend growth rate is 4.6%;

c) The long term dividend yield including cash and imputation components is 6.35% (market return – long term growth rate);

d) The cash component of the long term dividend yield is 5.32% (explained below); and

e) The imputation component of the long term dividend yield is 1.03% (explained below).

102. The disaggregation of the dividend yield into the cash component and the imputation component is explained in the following equation.

[52] Energy network businesses consider a figure of 0.25 for the value of imputation credits (gamma) to be appropriate.

[53] Energy network businesses consider a figure of 0.35 for the value of a distributed credit (theta) to be appropriate.

$$Market\ return = Cash\ dividend\ yield + Imputation\ credit\ yield + Growth$$
$$= Cash\ dividend\ yield + Cash\ dividend\ yield$$
$$\times \left[\frac{Corporate\ tax\ rate}{1 - Corporate\ tax\ rate} \times Value\ of\ a\ distributed\ credit \times \%\ of\ dividends\ franked\right] + Growth$$
$$0.1095 = 0.0532 + 0.0532 \times \left[\frac{0.30}{1 - 0.30} \times 0.60 \times 0.75\right] + 0.0460$$
$$0.1095 = 0.0532 + 0.0532 \times 0.1929 + 0.0460$$
$$0.1095 = 0.0532 + 0.0103 + 0.0460$$

103. This means that, in estimating the market return using the dividend discount model, the AER assumes that the imputation benefit is 1.03%. The return from dividends and capital gains is 9.92%. The AER uses the same imputation adjustment in forming conclusions from historical excess returns and historical real market returns, using data compiled by Brailsford, Handley and Maheswaran (2012).

4.3 What is the assumed return from imputation credits from the AER's post-tax revenue model?

104. Having computed a grossed-up return that includes the AER's assessment of the benefits of imputation credits, the PTRM then *removes* the assumed benefit of imputation credits to set the allowed return on equity for the firm. The problem is that when the AER includes the benefit of imputation credits it uses a figure of 1.03% and when it removes the value of imputation credits it uses a figure of 1.60%. This leaves a shortfall of 0.57% due to the inconsistent application of the same parameter in two steps of the same estimation process. It is an internal calculation error.

105. The point of disagreement between us and the AER is over just what adjustment for imputation credits is actually made in the AER's post-tax revenue model. Our view is that if the AER was to use the AER's post-tax revenue model, and input figures for the average firm in the market (so the cost of equity is 10.95%) that the implied return from imputation credits is 1.60%, which is higher than the 1.03% assumption as shown above.

106. The computation that we consider embedded within the AER's post-tax revenue model, for the case in which the cost of equity is equal to the market return of 10.95%, is shown in the equation below. The comparison between the return components in the market return and the post-tax revenue model is summarised in Table 1.

$$Market\ return = Return\ from\ dividends\ and\ capital\ gains + Imputation\ benefit$$

$$Market\ return = \left\{\left[\frac{1 - Corporate\ tax\ rate}{1 - Corporate\ tax\ rate\ \times (1 - Gamma)}\right] \times Market\ return\right\} + Imputation\ benefit$$

$$0.1095 = \left\{\left[\frac{1 - 0.30}{1 - 0.30\ \times (1 - 0.40)}\right] \times 0.1095\right\} + 0.0160$$

$$0.1095 = \{0.8535 \times 0.1095\} + 0.0160$$

$$0.1095 = 0.0935 + 0.0160$$

Table 1. Total return disaggregation from the AER's market return estimate and revenue model (%)

	Market return estimate	AER post-tax revenue model
Returns from capital gains and dividends	9.92	9.35
Imputation benefit	1.03	1.60
Total return	10.95	10.95

107. The AER does not agree that what we have previously presented appropriately characterises the post-tax revenue model. Our view is that the post-tax revenue model makes an adjustment for imputation credits which assumes cash flows that are expected to be constant in perpetuity, the same assumption embedded in Officer (1994). The AER states that the model does not embed an assumption that cash flows are expected to be a level perpetuity, but rather the calculations reflect the particular tax position of each firm.[54]

108. To illustrate this point the AER reports a set of figures in Table 3-44 which show what the imputation credit would be under the computation we illustrate directly above, versus the imputation benefit that is actually generated by the post-tax revenue model for individual businesses.[55] There is a column showing what the imputation benefit would be for a network business with total equity return of 8.10%[56] under the perpetuity equation, that we say is embedded into the PTRM. The reported figure for imputation benefit is 1.19%, computed as $(1 - 0.8537) \times 0.0810 = 1.19\%$. This is analogous to the figure of 1.60% we computed above for the average firm.

109. There is another column in which the AER reports an estimate of the actual imputation credit yield generated by the post-tax revenue model applied to individual businesses. Figures range from 0.75% to 1.24% across the seven networks and, on average, are 1.01%. So on average the assumed imputation credit benefit from the models reported is 1.01%, compared to 1.19% that would be implied by a perpetuity assumption. The AER reports that the assumed imputation benefit is, on average, 0.17% less than implied by the perpetuity assumption. This leads the AER to conclude that the PTRM does not apply the perpetuity formula set out above and consequently to reject our submission on this issue.

110. To understand the differences in the computations described above we opened the TransGrid post-tax revenue model and made one simple change. We set the tax depreciation equal to regulatory depreciation. If depreciation on the tax asset base and regulatory depreciation are set to be equal, then the model generates returns from imputation benefits of exactly 1.19%, and returns from dividends and capital gains of 6.91% for total equity returns of 8.10%. The same proportion of returns from imputation benefits versus returns from dividends and capital gains occurs in each year. That is, in each year, 15% of returns is assumed to come from imputation benefits and 85% of returns is assumed to come from dividends and capital gains.

111. The difference between the AER computations of imputation benefits and those implied by the perpetuity equation are caused entirely by small timing distortions due to tax payments for specific firms. Tax losses carried forward is another example in addition to the depreciation example we referred to. But for these timing differences for specific firms, the calculation of the imputation benefit in the PTRM exactly matches the figure from the application of the perpetuity equation – as we have previously explained. This is because the perpetuity equation is clearly embedded within the **Analysis** sheet of the PTRM. However, it is well accepted that the actual tax position of a specific firm is not relevant to regulatory calculations. What is relevant is the tax position of the efficient

[54] JGN Draft Determination, Sub-section B.6.4, p. 211.
[55] JGN Draft Determination, Sub-section B.6.4, p. 211.
[56] Cost of equity = Risk free rate + Beta × Market risk premium = 0.0355 + 0.7 × 0.065 = 0.0355 + 0.0455 = 8.10%.

benchmark entity, for which there would be no particular reason to assume any systematic timing differences, in which case the formula would apply precisely.

112. More importantly, tax losses have nothing to do with the fundamental difference between the perpetuity assumption and the growing cash flows of an actual case. As illustrated with respect to the TransGrid example, if the timing issues relating to tax are removed, we still have the case in which the true cash flows are growing – they are not a level perpetuity – but the PTRM's computed imputation benefit is the same as that which results from assuming a level perpetuity. Thus, the problem remains – the AER's calculation of the benefit from imputation in one step of its estimation process (based on actual growing business cash flows) is inconsistent with its calculation in another step of the same estimation process (the application of a formula based on perpetuity cash flows). This internal inconsistency leads to shareholders being systematically under-compensated.

113. Our point is that if we (1) use exactly the same model, and (2) regulatory depreciation equal to tax asset depreciation (so that there are no small timing distortions due to tax payments), (3) and insert a cost of equity of 10.95% into the model:

a) the implied return from imputation benefits is 1.60%; and

b) the implied return from dividends and capital gains is 9.35%.[57]

114. So our point is that when the AER considers its estimate of the market return, and accounts for imputation benefits in the dividends, the assumed benefit is comparatively small (1.03% in the dividend discount model example). But if we use the same model that the AER uses to estimate revenue and use the same market cost of equity (10.95%) the assumed benefit is comparatively large (1.60%). This results in a shortfall of 0.57% in the allowed return on equity for an average firm. Our view is simply that the AER should apply the same assumed value of imputation credits throughout its estimation approach. The AER's claim that the PTRM does not embed the perpetuity formula is wrong. The AER was misled to that conclusion by its failure to consider small tax timing differences for the specific firms that it examined.

4.4 What does this mean for the market return estimate?

115. We have consistently stated that to resolve this inconsistency the AER could either alter the post-tax revenue model, or alter the market return estimate that is input into the model. Our only viable option here in reaching a conclusion on the market return is to propose a market return that is consistent with the computations in the AER's post-tax revenue model. In the current report, we present market return estimates under both approaches [an adjustment to dividends using the value of a distributed credit (theta) and an adjustment to total returns using the value of imputation credits (gamma)]. But our conclusions are based upon the latter adjustment that is consistent with the AER's post-tax revenue model.

116. In summary:

a) When an adjustment for imputation credits is incorporated into dividends, and if the value of a distributed imputation credit (theta) is assumed to be 0.60, we have the following equation:

Total return = Return from dividends and capital gains + Dividend yield × 0.1929.[58]

b) When an adjustment for imputation credits is incorporated into dividends, and if the value of a distributed imputation credit (theta) is assumed to be 0.35, we have the following equation:

Total return = Return from dividends and capital gains + Dividend yield × 0.1125.[59]

[57] The step by step algebra and computations that lead to this result have been presented several times so are not repeated here.
[58] 0.1929 is computed as corporate tax rate ÷ (1 – corporate tax rate) × % franked × value of a distributed credit = 0.30 ÷ (1 – 0.30) × 0.75 × 0.60 = 0.1929.

c) When an adjustment for imputation credits is incorporated into total returns, and if the value of an imputation credit (gamma) is assumed to be 0.40, we have the following equation:

Total return = Return from dividends and capital gains × 1.1714.[60]

d) When an adjustment for imputation credits is incorporated into total returns, and if the value of an imputation credit (gamma) is assumed to be 0.25, we have the following equation:

Total return = Return from dividends and capital gains × 1.1071.[61]

117. **Given that the energy network businesses have proposed an estimate for the value of imputation credits (gamma) of 0.25, and that we adjust total returns in a manner consistent with the AER's post-tax revenue model, in our conclusions we estimate market returns including imputation credits as the return from dividends and capital gains × 1.1071.**

[59] 0.1125 is computed as corporate tax rate ÷ (1 – corporate tax rate) × % franked × value of a distributed credit = 0.30 ÷ (1 – 0.30) × 0.75 × 0.35 = 0.1125.

[60] 1.1714 is computed as 1 ÷ {(1 – corporate tax rate) ÷ [(1 – corporate tax rate × (1 – gamma)]} = 1 ÷ {(1 – 0.30) ÷ [(1 – 0.30 × (1 – 0.40)]} = 1 ÷ 0.8537 = 1.1714.

[61] 1.1071 is computed as 1 ÷ {(1 – corporate tax rate) ÷ [(1 – corporate tax rate × (1 – gamma)]} = 1 ÷ {(1 – 0.30) ÷ [(1 – 0.30 × (1 – 0.25)]} = 1 ÷ 0.9032 = 1.1071.

5. Estimates of the cost of equity for the market and listed energy networks

5.1 Introduction

118. In this section we present estimates of the market cost of equity over time using our simultaneous estimation technique. We also present estimates of the cost of equity for listed energy networks based upon estimates of their risk premiums above the risk free rate, compared to the market risk premium, over time. In relation to our final conclusions on the cost of equity, that rely upon our estimation technique, we are essentially updating prior analysis but with averages over two months rather than six months, in response to concerns of the AER. In relation to other cost of equity estimates, in particular those derived from the AER's preferred approach and dataset, we document that even if the AER approach and dataset was adopted, the implied market risk premium is well above the AER's current assumption of 6.5%.

119. We compare the expected market return resulting from our estimation approach to that of the AER, under growth assumptions of both 4.6% and 5.6%.[62] We also compare market cost of equity estimates to those reported by Bloomberg, after making an adjustment for imputation credits. Throughout the presentation of the results we address concerns raised by the AER in its draft determination for JGN.

5.2 Data and estimation approach

120. For Australian-listed firms we compiled individual analyst forecasts of earnings per share, dividends per share and price targets over the 12.5 year period from 1 June 2002 to 31 December 2014 from the Institutional Brokers' Estimate System ("IBES"). The data comprises 605 separate stocks, 902 separate analysts and 52,264 sets of analyst forecasts. In any given two month period the number of stocks used to compile the market cost of equity ranges from 73 to 268. From July 2004 to December 2014 this range is 102 to 268 stocks. An observation only enters the dataset if earnings per share forecasts are available for two forecast years, and a price target is entered within a 28 day period from the date the earnings per share forecasts are made.

121. We then grouped the sample into two month intervals according to the announcement date of the year one earnings per share forecast. This is a departure from our previous process whereby we grouped the sample into six month intervals. This change was prompted by criticism from the AER that our six month averaging process means that our analysis is likely to include outdated forecasts.[63] So now we have a direct comparison of our market cost of equity estimates computed using *individual* analyst forecasts over a two month period, and the AER's market cost of equity estimates computed using *consensus* analyst forecasts over a two month period.

122. We disagree with the AER's critique of our estimation approach and dataset covered in Sub-section C.2.5 of the draft determination for JGN. Most areas of disagreement between us and the AER have been covered in previous reports. There is little more to add, so we summarise the areas of disagreement only briefly. The areas of disagreement can be split into two parts that are entirely distinct: (1) the compilation of a dataset, and (2) how that dataset is analysed.

123. With respect to the compilation of a dataset, we consider a more reliable cost of equity estimate will result from analysis of individual analyst forecasts matched with analyst price targets issued at the same point in time. The AER disagrees with the use of price targets, and has a preference for market prices. The AER also questions whether it is worthwhile compiling a dataset from individual analyst forecasts for minimal change in the overall results.

[62] The actual growth rates used in computations are 4.550% and 5.575%, based upon real growth rates of 2% and 3%, respectively, and an inflation assumption of 2.5%.

[63] JGN Draft Determination, Attachment 3, Sub-section C.2.5, p. 224.

124. On the issue of price targets versus market prices, the AER continues to suggest that analysts are overly optimistic and that this potential bias is a reason to question the usefulness of cost of equity estimates based upon analyst forecasts.[64] We have consistently maintained the view that, given that it is difficult to determine whether an analyst is optimistic or not, the best way to handle this concern is to assume that any potential bias incorporated into an earnings forecast is also incorporated into that same analyst's price target. Our use of price targets lowers the estimated cost of capital, compared to the use of market prices. Despite continued reference to potential analyst bias the AER has never performed a computation using analyst forecasts, price targets, or share prices, to illustrate the potential bias, or made any other attempt to estimate the cost of capital in a manner that accounts for potential bias.

125. Completely aside from the issue of price targets versus market prices is the issue of time matching of prices and the release of analyst forecasts. An observation enters our dataset only if the price target is released within a 28 day window of the analyst's earnings forecast. So our view is that this time matching ensures that we measure the cost of capital that is inferred from an analyst's forecast of earnings made with the same information as the analyst's estimate of a fair share price. In our May 2014 report we performed a comparison to show how much more volatile the cost of equity estimate would be over time if we use exactly the same underlying data, but instead compute average analyst earnings forecasts and align average earnings forecasts with prices from different points in time. This means we isolated the impact of using stale analyst forecasts to compile consensus estimates of earnings. We showed that volatility of the cost of capital estimate goes up just because of this time mis-match.

126. The AER has responded by stating that analysts are slow to update their forecasts, but we do not know how much of a lag occurs between the analyst's receipt of information and an adjustment to the analyst's forecasts.[65] Specifically, the AER makes the following comment.

> McKenzie and Partington have observed that analysts make sluggish adjustments to the information in prices. For this reason, matching the dates of analysts' forecasts and prices will not necessarily match the information in the analysts' forecast and prices. Matching information sets would require using lagged prices. However, the appropriate lag is unknown. Even if we knew the appropriate lag, it could vary across analysts and time.

127. This issue is not complex and can be illustrated with a simple example. The analyst makes a forecast of earnings per share on 1 January 2015 of $1.00. The share price was $18.00 on 1 December 2014, $20.00 on 1 January 2015, and $22.00 on 1 February 2015. Given this information if we are to estimate the cost of capital we have three choices. We can either assume that on 1 January 2015 when the analyst released the earnings per share to the analyst's clients, this earnings per share forecast reflected information available to the analyst up to 1 January 2015, and the analyst based the earnings per share forecast on the same information available to the market. This is our assumption.

128. An alternative assumption is that the analyst is slow to enter the forecast in the database and based the earnings per share forecast on information that was a month old. So we could match the analyst earnings forecast with the share price of $18.00 from a month ago. This assumption does not reflect the analyst adjustment of earnings forecasts that actually occurs. It is true that analysts only update their forecasts infrequently. But when they do update their forecasts they incorporate information available to them at the time.

129. A third assumption is that we could match the analyst forecast with the share price of $22.00 from 1 February 2015. At this time the market price has moved but the analyst forecast in the database has not changed. This is the sluggish adjustment to new information that McKenzie and Partington (2013) are referring to. New information is available to the analyst but the forecast is not updated on a

[64] JGN Draft Determination, Attachment 3, Sub-section C.2.6, p. 225.
[65] JGN Draft Determination, Attachment 3, Sub-section C.2.5, p. 224.

continuous basis. So it is the sluggish adjustment to new information that is the reason to match the price date with the release date of the analyst forecast.

130. In simple terms share prices incorporate new information faster than analyst forecasts. So the price of $22.00 in our example reflects more information than the analyst forecast. The longer it takes the analyst to change the forecast, the more stale is the analyst's estimate. This is the reason to match the forecast with the $20.00 share price, and the reason not to match the forecast with the $22.00 price observed a month later. The AER approach using consensus forecasts means that it matches the $22.00 price with an average of forecasts that have been released over a prior period. We get a closer match between information in prices and forecasts.

131. In summary, if we were to choose the share price which is most likely to reflect the same information that is reflected in the analyst's earnings forecast, we would select the price observed on the same date that the analyst forecast is released. The commentary by the AER amounts to the idea that something else might be a better price estimate but there is no conclusion by the AER on what is the better alternative.

132. With respect to what sort of analysis is done with the data, the AER maintains the position that our approach is unnecessarily complex, and we continue to disagree with this position. Our contention is that performing many computations is not the same as performing complex computations, so the analysis is not unreasonably complex.

133. The AER's position on the merits of its dataset and approach are at odds with its implementation of the dividend discount model for decision-making. In analysis presented below, we present market cost of equity estimates over time using the AER's approach and dataset, for the full nine year period from 2006 to 2014 for which consensus data on the ASX200 is available. Over this time period the AER has never departed from an estimate of the market risk premium of 6.0% to 6.5%.

134. The market risk premium implied by the AER's approach over the same time period has ranged from 3.33% to 9.87% and on average has been 6.56%. It has fallen below 5.0% 13 times out of 54 periods (24% of the time) and been above 7.5% 16 times out of 54 periods (30% of the time). So more than half the time the AER has received a signal that the market risk premium is at least 1.0% below the lowest market risk premium estimate it has ever adopted (6.0%), or at least 1.0% above the highest market risk premium estimate it has ever adopted (6.5%).

135. This means that the AER has placed little reliance on the market risk premium estimates implied by share prices and analyst forecasts. We agree that the AER should consider both historical returns information and contemporaneous information in reaching a decision on the market risk premium and have expressed the same previously. But we also believe it is possible to take steps (matched timing of price dates and forecast release dates, use of price targets, use of individual analyst forecasts, and empirical estimation procedures) which provide more confidence that the contemporaneous information can be relied upon. This is the basis for the series of choices we have made in compiling and analysing data. Our objective is to improve the reliability of the market-based cost of capital estimates, allowing us to place more reliance on timely estimates of the cost of capital.

5.3 Cost of equity for the market

5.3.1 Overview

136. In this sub-section we present our estimates of the cost of equity for the market. We begin with a presentation of cost of equity estimates over time, and at the end of December 2014, under the assumption that imputation credits are accounted for in dividends. The purpose of this comparison is so we can directly compare:

a) The results of the AER estimation approach and datasets at long term growth rates of 4.6% versus 5.6%.

b) The results of the AER estimation approach and dataset versus our estimation approach and dataset without the comparison being affected by any disagreement over the treatment of imputation credits.

c) The results of the AER estimation approach and dataset, and our estimation approach and dataset, versus the approach of the AER to add either 6.0% or 6.5% to the risk free rate in estimating the expected market return.

137. The main implication of this comparison is that, at present, there is a stark divergence in the market cost of equity estimates resulting from application of all of the dividend discount models compared to the market cost of equity based upon adding 6.0% or 6.5% to the risk free rate.

138. We follow with a presentation of our results that incorporates an adjustment for imputation credits based upon total returns, as outlined in Section 4. This forms the basis for our conclusions regarding the best estimate of the expected market return. The reason this forms the basis for the best estimate of the expected market return is that it provides for returns from dividends and capital gains that match the returns from dividends and capital gains resulting from the AER's post tax revenue model.

5.3.2 Market cost of equity estimates accounting for imputation in dividends

Market return assuming that a distributed imputation credit is worth 60% of face value (AER assumption)

139. We begin with a presentation of results based upon the assumption that the value of a distributed imputation credit (theta) is 0.60. The variation in the market cost of equity estimates over time is illustrated in Figure 2. Estimates are computed every two months over the 12.5 year period from July 2002 to December 2014.[66] Results for the individual two month periods are presented in Table 2, contained in an appendix. This table also presents average estimates for different time periods.

140. The orange line represents the market cost of equity estimates that result from the estimation approach of the AER and the AER's 4.6% long term growth assumption.

a) On average over the nine years from 2006 to 2014 for which data is available, the market cost of equity estimate is 11.44%. This represents an average market risk premium of 6.56% compared to the average risk free rate of 4.88%.

b) At the end of December 2014 the implied cost of equity is 11.19%. This represents a market risk premium of 8.53% compared to the risk free rate of 2.66%.[67]

141. The red line represents the market cost of equity estimates that result from the estimation approach of the AER, but incorporating a 5.6% long term growth assumption.[68]

a) On average over the nine years from 2006 to 2014 for which data is available, the market cost of equity estimate is 12.25%. This represents a market risk premium of 7.37% compared to the average risk free rate of 4.88%.

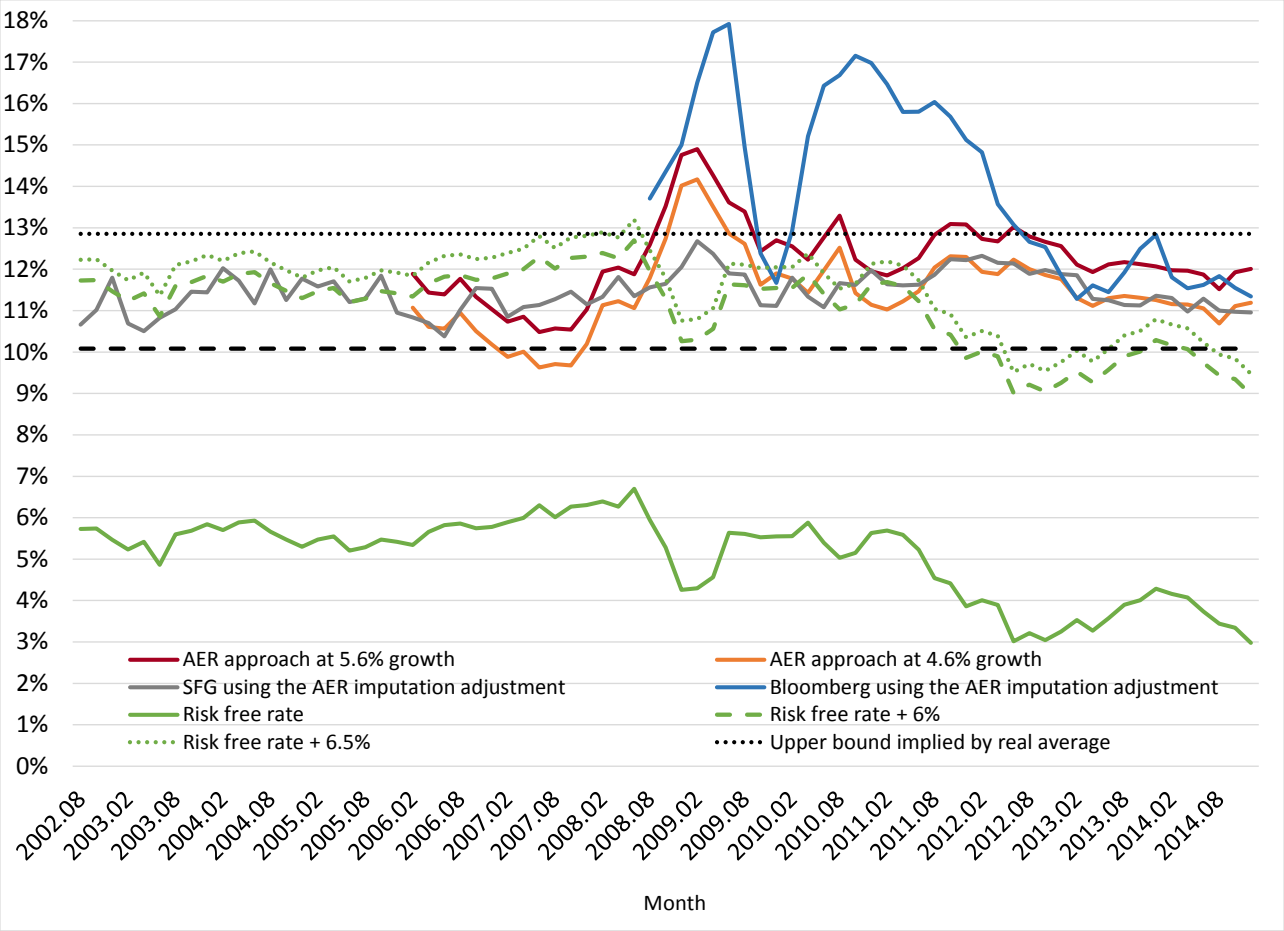
b) At the end of December 2014 the implied cost of equity is 12.01%. This represents a market risk premium of 9.35% compared to the risk free rate of 2.66%.

[66] All estimates reported in the figure have been compiled assuming a distributed credit is valued at 0.60 of face value, and accounting for imputation in the dividend stream. In subsequent analysis we present estimates under the alternative adjustment for imputation credit value that is embedded within the AER post-tax revenue model.

[67] This is the risk free rate over January 2015.

[68] We believe that a 5.6% growth rate is appropriate *if* GDP growth is used as a reference point for earnings per share growth.

Figure 2. Market-capitalisation-weighted estimates (Nominal market return assuming theta = 0.6 and accounting for imputation in dividends)



142. The blue line represents the market cost of equity estimates derived from the Bloomberg reported estimates of the market risk premium (averaged over two months), with an adjustment for imputation in the dividend component of returns.

a) On average over the 6.5 years from July 2008 to December 2014 the implied cost of equity is 13.96%. This represents a market risk premium of 9.51% compared to the average risk free rate of 4.45%. Over the same 6.5 year period the average implied cost of equity from the AER approach is 11.83% (7.39% market risk premium) under the 4.6% growth assumption and 12.63% (8.18% market risk premium) under the 5.6% growth assumption.

b) At the end of December 2014 the implied cost of equity is 11.34%. This represents a market risk premium of 8.69% compared to the risk free rate of 2.66%.

143. The grey line represents the market cost of equity estimates that result from our estimation approach and dataset.

a) On average over the 12.5 years from July 2002 to December 2014 the implied cost of equity is 11.46%. This represents a market risk premium of 6.40% compared to the average risk free rate of 5.06%.

b) Over the nine years for which estimates can be computed using the AER approach, our estimates of the market return average 11.51% (compared to the 11.44% estimate under the AER approach and dataset) and the average market risk premium estimate is 6.62% (compared to 6.56% under the AER approach and dataset, using long term growth of 4.6% for dividends per share).

c) At the end of December 2014 the implied cost of equity is 10.96%. This represents a market risk premium of 8.30% compared to the risk free rate of 2.66%.

144. In the draft determination for JGN the AER questions the benefit of performing millions of simulations when it can get the same cost of capital estimate using consensus forecasts.[69] As reported above, *on average* the cost of capital estimates are about the same. But the cost of capital estimates are not the same throughout the entire time period. Our cost of capital estimates are higher than those implied by the AER approach in the lead up to the global financial crisis, and lower than those implied by the AER approach during the global financial crisis. The reason for the divergence between our cost of capital estimates and those of the AER is that when the market experiences large price movements, that is the very point at which stale earnings forecasts are likely to lead to a difference between the cost of capital estimate and the true cost of capital. When there is a large price movement in a short period of time, there is more of a mismatch between the information reflected in share prices and earnings estimates.

145. Our cost of capital estimates are more stable over time than those of the AER. This time series stability of the market cost of equity estimates is the result of a number of factors – not using stale earnings forecasts by ensuring that there is a match in time between the release of the analyst's earnings forecast and the price date, the use of target prices rather than market prices, and the joint estimation of the cost of equity and growth.

146. The AER points out that dispersion is not necessarily problematic,[70] meaning that the actual cost of equity could be changing over time. So stability of the estimate in itself does not necessarily mean the estimate is better. Yet the AER's actual conclusions on the market risk premium in determinations do not suggest the AER believes that its more volatile cost of equity estimates are a good proxy for the market cost of equity. As mentioned above the AER has never deviated from an estimate of the market risk premium outside of the range of 6.0% to 6.5%, despite the implications of share prices and earnings forecasts.

147. This point is most important right now. The green dotted lines represent estimates of the market cost of equity implied by adding either 6.0% or 6.5% to the risk free rate. In some periods the process of adding 6.0% to 6.5% leads to market cost of equity estimates above those implied by share prices and earnings forecasts, generally prior to 2008. Yet for almost the entire time period since government bond yields fell in 2008 the market cost of equity implied by share prices lies above the risk free rate + 6.0% to 6.5%. In particular, for the last 3.5 years there has never been a point at which the market cost of equity derived from share prices and earnings forecasts, using the AER's preferred approach, has fallen below the market return implied by adding 6.5% to the risk free rate.

148. This point is important because in estimating the market risk premium the AER makes it clear that most reliance is placed upon historical average excess returns. In estimating the market risk premium, the AER does not accept that a fall in government bond yields is a signal that the market risk premium has increased. Reinforcing this view, the AER's analysis of historical real returns (referred to by the AER as the Wright approach) is not considered at all in estimating the market return or market risk premium.

149. We now have a long time period over which government bond yields have declined, yet current estimates of the expected market return are about the same as the averages over the period for which data is available.[71] There is no reasonable basis for maintaining the current assumption that the market risk premium is 6.5%, given current government bond yields of 2.66% and the following computations.

[69] JGN Draft Determination, Attachment 3, Sub-section C.2.5, p. 223.
[70] JGN Draft Determination, Attachment 3, Sub-section C.2.5, p. 223.
[71] With the exception of Bloomberg estimates which began with the onset of the global financial crisis.

a) According to the AER's preferred estimation approach and assuming growth of 4.6% the implied market risk premium is 8.53%.

b) According to the AER's preferred estimation approach and assuming growth of 5.6%[72] the implied market risk premium is 9.35%.

c) According to the estimates reported by Bloomberg the implied market risk premium is 8.69%.

d) According to our estimates of the expected market return the implied market risk premium is 8.30%.

150. The AER maintains the view that the relationship between government bond yields and the market risk premium is unclear. We made the point in our May 2014 report that this issue cannot be understood without consideration of the reasons for movements in government bond yields, and the AER has not addressed this point. Our point is that in some instances government bond yields fall because there is a reduction in inflation, and this reduction in inflation would be a feature of a lower cost of capital for risky assets as well as the risk free asset. In other instances there might be a fall in real government bond yields because there is demand from investors for all investments, so investors push up the price of government bonds, corporate bonds, equities and other investments. So we could see asset prices in general go up, and therefore required returns in general go down. In other instances we could see a fall in real government bond yields because investors are willing to pay a higher price for the security of government bonds, so government bond prices go down, government bond yields go up, but the cost of capital on risky assets like equities goes up.

151. Over an extended period of time we can see that government bond yields have fallen further than cost of capital estimates for the market. So this is not the circumstance in which expected returns on the risk free investment and risky investments have fallen to the same degree. This is a circumstance in which the market risk premium has widened considerably.

152. Our view is that *if* an adjustment for imputation is incorporated into the dividend component of returns, and *if* a distributed imputation credit is valued at 60% of face value, the best estimate of the expected market return is 10.96%. This represents a market risk premium of 8.30% compared to the current risk free rate of 2.66%.

Market return assuming a distributed imputation credit is worth 35% of face value (energy network businesses assumption)

153. In the sub-section immediately above we present results under the AER assumption that the value of a distributed credit (theta) is 0.60. The AER also adopts an assumption that the value of imputation credits (gamma) is 0.40. Energy network businesses consider an appropriate estimate for the value of a distributed credit (theta) is 0.35, and that an appropriate value for imputation credits (gamma) is 0.25. So in the event that theta is assumed to be 0.35, we need an estimate of the expected market return that accounts for this change.

154. This lower assumption for the value of a distributed credit leads to the following results.

a) On average from 2002 to 2014, the expected market return is 11.08% and the market risk premium is 6.02%, compared to the average risk free rate of 5.06%.

b) For the two month period ending 31 December 2014, the expected market return is 10.67% and the market risk premium is 8.01%, compared to the current risk free rate of 2.66%.

155. Our view is that *if* an adjustment for imputation is incorporated into the dividend component of returns, and *if* a distributed imputation credit is valued at 35% of face value, the best

[72] This is our recommendation *if* a growth estimate is formed using GDP growth as a reference point.

estimate of the expected market return is 10.67%. This represents a market risk premium of 8.01% compared to the current risk free rate of 2.66%.

5.3.3 Market cost of equity accounting for imputation in a manner consistent with the AER's post-tax revenue model

Market return assuming that the value of an imputation credit (gamma) is 0.40

156. As discussed in Section 4, our view is that to arrive at a cost of equity estimate for the market that is consistent with the AER's treatment of imputation credits in the post-tax revenue model we need to adjust the total return estimate by a factor of 1.1714 if the value of imputation credits (gamma) is assumed to be 0.40, and by a factor of 1.1071 if the value of imputation credits (gamma) is assumed to be 0.25. So in this sub-section we first consider the AER's assumption that the value of imputation credits (gamma) is 0.40.

157. Our estimates of expected market returns are summarised below:

a) On average from 2002 to 2014, the expected market return from dividends and capital gains is 10.55% and the market risk premium is 5.48%, compared to the average risk free rate of 5.06%. Incorporating an adjustment for imputation, the expected market return is 12.35% and the market risk premium is 7.29%.

b) For the two month period ending 31 December 2014, the expected market return from dividends and capital gains is 10.27% and the market risk premium is 7.62%, compared to the risk free rate of 2.66%. Incorporating an adjustment for imputation, the expected market return is 12.03% and the market risk premium is 9.38%

158. **Our view is that *if* an adjustment for imputation is incorporated into market returns in a manner consistent with the AER's post-tax revenue model, and *if* the value of an imputation credit (gamma) is 0.40, the best estimate of the expected market return is 12.03%. This represents a market risk premium of 9.38%.**

Market return assuming that the value of an imputation credit (gamma) is 0.25

159. In this sub-section we present results that are consistent with both the AER's treatment of imputation credits in the AER's post-tax revenue model, and energy network businesses' proposed value of imputation credits (gamma) of 0.25. This means that the estimated market returns from dividends and capital gains are multiplied by 1.1071.

160. Our estimates of expected market returns are summarised below:

a) On average from 2002 to 2014, the expected market return from dividends and capital gains is 10.55%. So after incorporating an adjustment for imputation, the expected market return is 11.68%. This represents a market risk premium of 6.61% compared to the average risk free rate of 5.06%.

b) For the two month period ending 31 December 2014, the expected market return from dividends and capital gains is 10.27%. So after incorporating an adjustment for imputation, the expected market return is 11.37%. This represents a premium of 8.72% compared to the risk free rate of 2.66%.

161. **Our view is that *if* an adjustment for imputation is incorporated into market returns in a manner consistent with the AER's post-tax revenue model, and *if* the value of an imputation credit (gamma) is 0.25, the best estimate of the expected market return is 11.37%. This represents a market risk premium estimate of 8.72%.**

5.3.4 Conclusion on the expected market return

162. In a series of reports, including our report of May 2014, we made the point that the AER accounts for imputation differently in estimating the expected market return and market risk premium, compared to its treatment of imputation in the AER's post-tax revenue model. In the current report we document that if the AER was to put market parameters into its post-tax revenue model it would arrive at lower allowed returns to equity holders from dividends and capital gains, compared to what it assumes in setting the market risk premium. The post-tax revenue model embeds an assumption that a high proportion of the return on equity is delivered in the form of imputation credits.

163. We re-state that the AER could resolve this inconsistency by reconfiguring its post-tax revenue model, or by adjusting its estimate of the market return to be consistent with the current post-tax revenue model. Given that this report is devoted to the market return and market risk premium, and that the post-tax revenue model has not changed, the market cost of equity and market risk premium should be consistent with the model.

164. We also support the assumption that gamma be set equal to 0.25 for the following reasons. The Rules require an estimate of the value of imputation credits, and our view is that this represents market value, or in other words, value is what something is worth. The AER has reached no conclusion on market value of imputation credits that is any different to that determined by the Australian Competition Tribunal in 2011.[73] The AER lists evidence from market value studies but makes no inference that the best estimate of market value should change from the Tribunal's estimate. Our analysis of this issue is presented in a separate report on the value of imputation credits.

165. **This means that our best estimate of the expected market return at the end of December 2014 is 11.37% and the market risk premium estimate is 8.72% compared to the risk-free rate of 2.66%.**

5.4 Listed energy networks

166. Having made an estimate of the required market return, we turn our attention to the required return for listed energy networks. Our approach to this task is to estimate the risk premium for listed energy networks in each two month period, compared to the market risk premium. The average two month risk premium ratio across all observations for listed energy networks can then be used to estimate their cost of equity. The sample of listed energy networks is the same set of nine firms relied upon by the AER to estimate beta in the Sharpe-Lintner CAPM, and which has been detailed in our previous reports. Our cost of equity estimates for listed energy networks are presented in Table 3 contained in an appendix.

167. There are 235 observations available for analysis.[74] On average, across all 235 observations, the risk premium ratio is 0.94. The implication of this ratio is that if the market risk premium is estimated at 8.72%, we would estimate the risk premium for listed energy networks at 8.19% (that is, 0.94 × 0.0872 = 8.19%). With a risk free rate of 2.66% this represents an implied cost of equity for listed energy networks of 10.85.[75]

168. The use of all available data from 2002 to 2014 is analogous to using a long history of stock returns to estimate risk coefficients in a factor model, like the Sharpe-Lintner CAPM or the Fama-French model. We want to mitigate the risks associated with any individual cost of equity estimate.

[73] Australian Competition Tribunal, 2011, Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9, 12 May.

[74] A firm can only appear once in a given two month period. So, for example, if there are six firms for which we have cost of equity estimates in a given six month period, this represents six observations.

[75] Under the heading *Times series network risk premium* we report the product of 0.94 and the market risk premium for that six month period, and under the heading *Time series network cost of equity* we present the estimate of the network cost of equity from adding the risk free rate to the risk premium. The returns estimates presented in this table do not account for imputation tax benefits.

169. The AER considers that our analysis of the relative risk of energy networks generates unreasonably volatile estimates of the network cost of equity over time. This is summarised by Figure 3-18 of the draft determination for JGN.[76] That figure shows the cost of equity estimates for listed energy networks fluctuating from around 8.5% to 12.0% every six months.[77]

170. This is an inappropriate comparison to the AER's preferred technique for estimating the relative risk of an energy network business, which is to run regressions of stock returns on market returns. In this analysis the AER bases its conclusions on beta estimates drawn from more than two decades of stock returns in order to minimise the estimation error associated with any sub-sample of the data. If we run regressions of stock returns on market returns over six month periods we will also observe large fluctuations in the estimate of relative risk over time.

171. In our previous reports we have already provided substantial analysis in large samples across industries that the cost of capital estimates implied by share prices and analyst forecasts exhibit less dispersion than what is implied by beta estimates based upon historical stock returns. The AER has not considered this more appropriate like with like comparison, and merely points out that over small time periods in small samples there is noise in the cost of equity estimates.

172. The AER's other concerns with our analysis from the report of May 2014 include those listed below and we address these in turn. [78]

a) We have estimated beta as the ratio between a risk premium for network business and the market risk premium, when beta is the covariance between returns on the market and returns on the business, dividend by the variance of market returns. Our risk premium ratio is a way of summarising the difference between the cost of equity for an energy network and the market cost of equity. It allows us to estimate the cost of equity for an energy network under varying estimates of the market risk premium. So it has the same quantitative effect as a beta estimate, and it is correct that we have estimated the ratio as the AER describes.

   The point being made by the AER is that we have an indirect measure of beta, and it is not a direct measure based upon covariance and variance. That is also true. However, the AER concern is based upon its view that the *only* manner in which beta can be estimated is with a regression of stock returns on market returns. The AER has *never* attempted to measure beta using any other data source or estimation technique. It is not true that the only manner in which we can *estimate* beta is to regress stock returns on market returns.

b) We estimated beta using a smaller number of datapoints (which was 99 and is now 235 given two month periods) compared to the AER's beta estimates that rely upon hundreds of weekly stock returns. This is clearly an apples with oranges comparison. We cannot compare the usefulness of one estimation technique to another just by counting data points.

c) We used inappropriate weightings because we gave businesses with more analyst coverage more weight. This is not correct. Each data point represents the average cost of equity estimate for a given firm based upon all analyst coverage for that firm.

173. The most important paragraph to consider within the AER's objections is that which we repeat below.[79]

[76] AER Draft Determination for JGN, Attachment 3, Sub-section C.3, p. 230.

[77] In the present analysis we now compute cost of equity estimates every two months, but still estimate the risk premium ratio by considering all two month windows in the sample period.

[78] JGN Draft Determination, Attachment 3, Sub-section C.3, p. 229 to 230.

[79] JGN Draft Determination, Attachment 3, Sub-section C.3, p. 230.

> Further, the very high estimates from SFG's DGM, equating to an equity beta of 0.94 in the SLCAPM, appear inconsistent with the low risk nature of regulated natural monopoly businesses with very low elasticity of demand for their services. This is also inconsistent with empirical estimates, as reported in Professor Olan Henry's 2014 report.

174. There are two points to make with regard to this paragraph. First, the paragraph represents an extension to the AER's conceptual analysis in which the AER decided that the low business risk of an energy network (low asset beta) could not be offset by that network's high financial risk (60% leverage) so that the equity beta must be less than one. The extension to this conceptual analysis is that the risk premium ratio of 0.94 is also considered implausible by the AER. The inference is no longer that the AER considers a beta of one to be an upper bound on the risk of an energy network. Now, the upper bound for beta is less than 0.94.

175. The AER considers that, based upon its conceptual analysis, the equity beta of an energy network should be less than one. It is supported in this view by McKenzie and Partington (2014) who make the point that researchers have found relationships between variables that proxy for business risk and beta estimates. In contrast, McKenzie and Partington (2014) contend that the empirical relationship between measurements of leverage and beta estimates is less clear cut.

176. The basis for our disagreement with this theory is that neither the AER, nor McKenzie and Partington (2014) are able to explain how much impact low business risk has compared to high financial risk on equity beta. They do not actually question that, if an energy network made a decision to borrow more money that, all else equal, the risk to equity holders would go up and so would the cost of equity. The argument goes that (1) leverage leads to higher risk to equity holders and so increases the cost of equity, (2) we are unsure how much the cost of equity goes up as leverage goes up, but (3) even though we do not know how much the cost of equity goes up as leverage goes up it must be the case that beta cannot exceed one. At what leverage would the beta be more than one – 70%, 80%, 90%? Why is 60% leverage the point at which we can be sure that beta is less than one?

177. To ask this question in the reverse direction, how do we know that the upper bound is one? Could the upper bound be 0.90, or 0.95, or 1.05, or 1.10? The answer is that the conceptual analysis cannot answer the question of whether the upper bound is 0.90 or 1.10 or another number. The upper bound of one is listed purely for convenience because there is no conceptual basis for the conclusion that low asset risk is more or less offset by high financial risk.

178. Our second objection to the paragraph referred to above is that the magnitude of the relative risk premium is called into question because it is inconsistent with the regression-based beta estimates relied upon by the AER. It should be noted that the AER has only ever relied upon one measure of the risk of a benchmark energy network – the slope coefficient from a regression of stock returns on market returns. All we are doing in this analysis is providing another measure of risk of a benchmark energy network. Our measure of risk is higher than with the regression-based beta estimates. But that does not mean that the regression-based beta estimates are the reliable estimates of risk, and that the implied cost of capital is the unreliable measure of risk. There are two different approaches for measuring risk.

179. We have consistently expressed the view that the cost of equity for an energy network should be estimated with reference to multiple estimates of risk. This is because there is estimation error in those risk metrics. We consider that the consideration of each risk metric should depend upon an assessment of its relevance and reliability.

180. The commentary from the AER is to the effect that we should give *less* weight to a risk metric the *more* it contradicts the inference from the AER's primary risk metric. It is this approach to evaluating evidence that entrenches one set of information into the AER's conclusions on cost of capital.

181. **Our view is that analysis of share prices and earnings forecasts implies that listed energy networks have an equity risk premium that is 0.94 times the market risk premium. Given the market risk premium estimate of 8.72% and the risk-free rate of 2.66%, the equity risk**

premium for a benchmark energy network is estimated at 8.19%[80] and the cost of equity for a benchmark energy network is estimated at 10.85%.[81]

5.5 Summary of cost of equity estimates for the market and a benchmark energy network

182. There are three important conclusions from the dividend discount model analysis.

a) Across all approaches to estimating the market cost of equity from share prices and analyst forecasts, encompassing different datasets, models, long term growth assumptions and imputation adjustments, there is no support for maintaining an estimate for the market risk premium of 6.5%. Even if the AER approach is accepted in its entirety, the market risk premium estimate at present is 8.53%. Further, adding 6.5% to the current risk free rate of 2.66% gives an implied market return of 9.16%. The market return estimates generated by the AER's approach to the dividend discount model have never fallen below 9.48% over the nine years for which data is available.

b) Our best estimate of the expected market return at present is 11.37% which implies a market risk premium estimate of 8.72%. These estimates are consistent with the equations in the AER post-tax revenue model and an assumption that the value of imputation credits (gamma) is 0.25.

c) Our best estimate of the expected return for a benchmark energy network at present is 10.85%. This is based on a risk premium ratio of 0.94 and the market risk premium estimate of 8.72%. The risk premium ratio is measured over a period of 12.5 years to mitigate estimation error, just like regression-based estimates of beta are measured over an extended period to mitigate estimation error.

[80] 0.94 × 0.0872 = 8.19%.

[81] 0.0266 + 0.0819 = 10.85%.

6. Conclusion

183. Our conclusions are summarised below.

184. On the issue of the best estimate of long term earnings growth, if long term growth is used as an input into the dividend discount model and made with reference to long term GDP growth:

a) The AER's *GDP minus 1%* assumption places a constraint on the expected real market return that is inconsistent with the returns we have actually observed on the market. The AER assumption rules out the possibility that the cost of capital today is within the AER's estimate of the returns actually earned in the past.

b) The AER's *GDP minus 1%* assumption is inconsistent with the actual relationship between earnings per share growth and GDP growth actually observed, in both Australia and the U.S., for the current regime of low inflation and high price-earnings ratios. The AER adopts a low growth assumption, based upon a period of high inflation and low price-earnings ratios, leading to a low cost of capital estimate for the current period of low inflation and high price-earnings ratios.

c) If a long term growth estimate is to be made with reference to GDP growth, the best estimate would be that earnings per share growth is equal to the expectation for GDP growth.

185. In relation to the manner in which imputation is accounted for in estimating the market return and the AER's post-tax revenue model:

a) If the AER's post-tax revenue model is populated with a cost of equity that is equal to the market return, for a case in which there are no timing distortions in relation to tax, but where the applicable firm is still experiencing growth, the model generates an imputation benefit that is exactly equal to what is implied by a perpetuity assumption.

b) This means that in the model there is a comparatively high assumed benefit from imputation credits, versus the assumed benefit from imputation credits when the return to the market portfolio is estimated using the AER's dividend discount model.

c) This inconsistency can be resolved either with an adjustment to the model, or an adjustment to the computation of expected market returns. In this report our only viable option is to estimate the market return in a manner consistent with the model.

186. In relation to the expected market return, and the cost of equity for a benchmark energy network, at present:

a) Across all approaches to estimating the market cost of equity from share prices and analyst forecasts, encompassing different datasets, models, long term growth assumptions and imputation adjustments, there is no support for maintaining an estimate for the market risk premium of 6.5%. Even if the AER approach is accepted in its entirety, the market risk premium estimate at present is 8.53%. Further, adding 6.5% to the current risk free rate of 2.66% gives an implied market return of 9.16%. The market return estimates generated by the AER approach have never fallen below 9.48% over the nine years for which data is available.

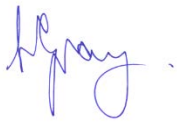
b) Our best estimate of the expected market return at present is 11.37% which implies a market risk premium estimate of 8.72%. These estimates are consistent with the equations in the AER post-tax revenue model and an assumption that the value of imputation credits (gamma) is 0.25.

c) Our best estimate of the expected return for a benchmark energy network at present is 10.85%. This is based on a risk premium ratio of 0.94 and the market risk premium estimate of 8.72%. The risk premium ratio is measured over a period of 12.5 years to mitigate

estimation error, in much the same way as regression-based estimates of beta are measured over an extended period to mitigate estimation error.

7. Declaration

187. We confirm that we have made all the inquiries that we believe are desirable and appropriate and no matters of significance that we regard as relevant have, to our knowledge, been withheld from the Court.



Professor Stephen Gray. Dr Jason Hall.

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9. Appendix 1: Cost of equity estimates over time

Table 2. Estimates of the market cost of equity over time (%)

Period	Rf	SFG (no imp)	SFG (θ = 0.60)	SFG (θ = 0.35)	SFG (γ = 0.40)	SFG (γ = 0.25)	AER 4.6% (θ = 0.60)	AER 5.6% (θ = 0.60)	R_f + 6.0%	R_f + 6.5%
2002.08	5.73	9.85	10.66	10.32	11.53	10.90			11.73	12.23
2002.10	5.74	10.24	11.02	10.69	11.99	11.33			11.74	12.24
2002.12	5.47	10.88	11.80	11.41	12.74	12.04			11.47	11.97
2003.02	5.23	9.82	10.69	10.33	11.50	10.87			11.23	11.73
2003.04	5.42	9.71	10.50	10.17	11.37	10.74			11.42	11.92
2003.06	4.86	9.95	10.83	10.46	11.66	11.02			10.86	11.36
2003.08	5.60	10.19	11.03	10.68	11.94	11.28			11.60	12.10
2003.10	5.69	10.56	11.46	11.08	12.37	11.69			11.69	12.19
2003.12	5.84	10.57	11.44	11.08	12.38	11.70			11.84	12.34
2004.02	5.70	11.17	12.02	11.67	13.08	12.37			11.70	12.20
2004.04	5.89	10.79	11.72	11.34	12.64	11.95			11.89	12.39
2004.06	5.93	10.28	11.17	10.80	12.04	11.38			11.93	12.43
2004.08	5.66	11.08	11.99	11.61	12.98	12.27			11.66	12.16
2004.10	5.47	10.31	11.26	10.86	12.07	11.41			11.47	11.97
2004.12	5.30	10.86	11.77	11.39	12.72	12.03			11.30	11.80
2005.02	5.47	10.71	11.58	11.22	12.55	11.86			11.47	11.97
2005.04	5.55	10.75	11.71	11.31	12.60	11.90			11.55	12.05
2005.06	5.21	10.24	11.20	10.80	11.99	11.34			11.21	11.71
2005.08	5.29	10.36	11.30	10.91	12.14	11.47			11.29	11.79
2005.10	5.47	10.81	11.85	11.42	12.67	11.97			11.47	11.97
2005.12	5.42	9.88	10.95	10.50	11.57	10.93			11.42	11.92
2006.02	5.34	9.81	10.84	10.41	11.49	10.86	11.07	11.88	11.34	11.84
2006.04	5.66	9.68	10.70	10.27	11.33	10.71	10.61	11.44	11.66	12.16
2006.06	5.82	9.31	10.38	9.93	10.91	10.31	10.57	11.39	11.82	12.32
2006.08	5.86	9.95	11.02	10.57	11.66	11.02	10.94	11.77	11.86	12.36
2006.10	5.75	10.46	11.54	11.09	12.26	11.59	10.50	11.33	11.75	12.25
2006.12	5.78	10.57	11.53	11.13	12.38	11.70	10.19	11.03	11.78	12.28
2007.02	5.89	9.93	10.85	10.47	11.63	11.00	9.88	10.73	11.89	12.39
2007.04	6.00	10.17	11.09	10.70	11.91	11.26	10.01	10.85	12.00	12.50
2007.06	6.30	10.11	11.14	10.71	11.85	11.20	9.63	10.48	12.30	12.80
2007.08	6.01	10.33	11.28	10.88	12.10	11.43	9.71	10.57	12.01	12.51
2007.10	6.27	10.59	11.46	11.09	12.40	11.72	9.68	10.55	12.27	12.77
2007.12	6.30	10.25	11.15	10.77	12.01	11.35	10.19	11.03	12.30	12.80
2008.02	6.39	10.42	11.33	10.95	12.21	11.54	11.13	11.94	12.39	12.89
2008.04	6.27	10.92	11.81	11.44	12.79	12.08	11.23	12.04	12.27	12.77
2008.06	6.70	10.46	11.35	10.98	12.25	11.58	11.06	11.88	12.70	13.20
2008.08	5.95	10.58	11.56	11.15	12.40	11.72	11.79	12.59	11.95	12.45
2008.10	5.28	10.66	11.65	11.24	12.48	11.80	12.74	13.52	11.28	11.78
2008.12	4.26	11.06	12.05	11.64	12.95	12.24	14.02	14.76	10.26	10.76
2009.02	4.30	11.69	12.68	12.27	13.69	12.94	14.17	14.90	10.30	10.80
2009.04	4.56	11.37	12.37	11.96	13.32	12.59	13.51	14.27	10.56	11.06
2009.06	5.63	10.98	11.90	11.52	12.86	12.16	12.86	13.62	11.63	12.13
2009.08	5.61	10.98	11.87	11.50	12.86	12.16	12.61	13.39	11.61	12.11
2009.10	5.52	10.34	11.13	10.80	12.11	11.45	11.63	12.43	11.52	12.02
2009.12	5.55	10.22	11.11	10.74	11.97	11.32	11.90	12.70	11.55	12.05
2010.02	5.55	10.95	11.79	11.44	12.83	12.12	11.77	12.55	11.55	12.05
2010.04	5.88	10.47	11.34	10.98	12.27	11.60	11.43	12.23	11.88	12.38
2010.06	5.40	10.22	11.08	10.72	11.97	11.31	11.97	12.76	11.40	11.90
2010.08	5.03	10.73	11.66	11.27	12.56	11.87	12.52	13.29	11.03	11.53
2010.10	5.15	10.67	11.62	11.22	12.50	11.81	11.43	12.23	11.15	11.65
2010.12	5.63	10.98	11.97	11.56	12.86	12.15	11.14	11.96	11.63	12.13
2011.02	5.69	10.66	11.64	11.23	12.49	11.80	11.03	11.85	11.69	12.19

Period	Rf	SFG (no imp)	SFG (θ = 0.60)	SFG (θ = 0.35)	SFG (γ = 0.40)	SFG (γ = 0.25)	AER 4.6% (θ = 0.60)	AER 5.6% (θ = 0.60)	R_f + 6.0%	R_f + 6.5%
2011.04	5.59	10.66	11.61	11.21	12.48	11.80	11.22	12.03	11.59	12.09
2011.06	5.23	10.74	11.62	11.25	12.58	11.89	11.47	12.27	11.23	11.73
2011.08	4.54	10.91	11.86	11.46	12.78	12.07	12.04	12.83	10.54	11.04
2011.10	4.42	11.24	12.24	11.82	13.16	12.44	12.31	13.09	10.42	10.92
2011.12	3.86	11.25	12.22	11.82	13.18	12.46	12.29	13.08	9.86	10.36
2012.02	4.01	11.37	12.32	11.93	13.32	12.59	11.94	12.73	10.01	10.51
2012.04	3.89	11.18	12.15	11.75	13.09	12.37	11.88	12.67	9.89	10.39
2012.06	3.02	11.24	12.14	11.76	13.16	12.44	12.23	13.02	9.02	9.52
2012.08	3.21	10.91	11.89	11.48	12.78	12.07	12.00	12.79	9.21	9.71
2012.10	3.05	11.08	11.98	11.60	12.97	12.26	11.86	12.66	9.05	9.55
2012.12	3.25	10.98	11.88	11.51	12.86	12.15	11.76	12.56	9.25	9.75
2013.02	3.53	11.05	11.86	11.52	12.94	12.23	11.30	12.11	9.53	10.03
2013.04	3.27	10.49	11.28	10.95	12.29	11.61	11.11	11.93	9.27	9.77
2013.06	3.57	10.47	11.25	10.92	12.26	11.59	11.30	12.11	9.57	10.07
2013.08	3.90	10.33	11.14	10.80	12.10	11.44	11.36	12.17	9.90	10.40
2013.10	4.01	10.29	11.13	10.78	12.05	11.39	11.31	12.12	10.01	10.51
2013.12	4.29	10.50	11.36	11.00	12.30	11.63	11.25	12.07	10.29	10.79
2014.02	4.16	10.46	11.30	10.95	12.25	11.58	11.16	11.97	10.16	10.66
2014.04	4.07	10.17	10.98	10.64	11.91	11.26	11.14	11.96	10.07	10.57
2014.06	3.74	10.46	11.29	10.94	12.25	11.58	11.05	11.87	9.74	10.24
2014.08	3.44	10.21	11.00	10.67	11.96	11.31	10.69	11.52	9.44	9.94
2014.10	3.35	10.21	10.97	10.65	11.96	11.30	11.11	11.93	9.35	9.85
2014.12	2.98	10.27	10.96	10.67	12.03	11.37	11.19	12.01	8.98	9.48
Average expected market return:										
2H02-2H14	5.06	10.55	11.46	11.08	12.35	11.68			11.06	11.56
2H02-2H05	5.52	10.43	11.33	10.96	12.22	11.55			11.52	12.02
1H06-2H14	4.88	10.59	11.51	11.12	12.41	11.73	11.44	12.25	10.88	11.38
1H06-1H08	6.02	10.20	11.16	10.76	11.94	11.29	10.43	11.26	12.02	12.52
2H08-2H14	4.45	10.74	11.64	11.26	12.58	11.89	11.83	12.63	10.45	10.95
Average market risk premium:										
2H02-2H14		5.48	6.40	6.02	7.29	6.61			6.00	6.50
2H02-2H05		4.91	5.81	5.43	6.70	6.02			6.00	6.50
1H06-2H14		5.71	6.62	6.24	7.52	6.84	6.56	7.37	6.00	6.50
1H06-1H08		4.17	5.14	4.74	5.92	5.27	4.40	5.24	6.00	6.50
2H08-2H14		6.30	7.19	6.82	8.14	7.45	7.39	8.18	6.00	6.50
2014.12		7.30	7.98	7.69	9.06	8.40	8.22	9.03	6.00	6.50

θ = 0.60 (or θ = 0.35) means that imputation is accounted for with an adjustment to dividends with an assumption that the value of a distributed imputation credit (theta) is 0.60 (or 0.35). γ = 0.40 (or γ = 0.25) means that imputation is accounted for with an adjustment to dividends with an assumption that the value of imputation tax credit (gamma) is 0.40 (or 0.25).

Table 3. Estimation of the cost of equity for a network business over time (%)

Period	N	Market cost of equity	Network cost of equity	Risk-free rate	Market risk premium	Network risk premium	Risk premium ratio	Time series network risk premium	Time series network cost of equity
2002.08	1	9.85	12.00	4.12	4.12	6.27	1.52	3.88	9.61
2002.10	1	10.24	10.00	4.50	4.50	4.26	0.95	4.24	9.98
2002.12	1	10.88	10.00	5.41	5.41	4.53	0.84	5.11	10.57
2003.02	.	9.82	.	4.58	4.58	.	.	4.32	9.56
2003.04	1	9.71	11.67	4.29	4.29	6.25	1.46	4.05	9.46
2003.06	1	9.95	12.50	5.09	5.09	7.64	1.50	4.81	9.67
2003.08	2	10.19	12.21	4.59	4.59	6.61	1.44	4.33	9.93
2003.10	2	10.56	10.59	4.87	4.87	4.90	1.01	4.60	10.29
2003.12	.	10.57	.	4.73	4.73	.	.	4.46	10.30
2004.02	3	11.17	12.34	5.47	5.47	6.64	1.21	5.16	10.86
2004.04	2	10.79	13.06	4.91	4.91	7.17	1.46	4.63	10.52
2004.06	1	10.28	12.00	4.35	4.35	6.07	1.40	4.10	10.03
2004.08	3	11.08	10.54	5.42	5.42	4.87	0.90	5.11	10.77
2004.10	1	10.31	12.00	4.83	4.83	6.53	1.35	4.56	10.03
2004.12	.	10.86	.	5.56	5.56	.	.	5.25	10.55
2005.02	2	10.71	11.21	5.24	5.24	5.74	1.10	4.95	10.42
2005.04	.	10.75	.	5.21	5.21	.	.	4.91	10.46
2005.06	.	10.24	.	5.03	5.03	.	.	4.75	9.96
2005.08	2	10.36	8.71	5.07	5.07	3.43	0.68	4.79	10.08
2005.10	2	10.81	10.21	5.34	5.34	4.74	0.89	5.04	10.51
2005.12	.	9.88	.	4.46	4.46	.	.	4.21	9.62
2006.02	3	9.81	8.44	4.47	4.47	3.10	0.69	4.21	9.56
2006.04	2	9.68	10.26	4.02	4.02	4.60	1.14	3.79	9.45
2006.06	1	9.31	11.00	3.49	3.49	5.18	1.48	3.30	9.12
2006.08	5	9.95	10.39	4.09	4.09	4.53	1.11	3.86	9.72
2006.10	3	10.46	11.03	4.72	4.72	5.28	1.12	4.45	10.20
2006.12	2	10.57	9.88	4.79	4.79	4.10	0.86	4.52	10.30
2007.02	3	9.93	8.92	4.04	4.04	3.03	0.75	3.81	9.70
2007.04	1	10.17	11.00	4.17	4.17	5.00	1.20	3.94	9.93
2007.06	1	10.11	12.00	3.81	3.81	5.70	1.50	3.60	9.90
2007.08	4	10.33	11.43	4.31	4.31	5.42	1.26	4.07	10.08
2007.10	4	10.59	8.96	4.32	4.32	2.69	0.62	4.07	10.34
2007.12	2	10.25	10.42	3.95	3.95	4.12	1.04	3.72	10.03
2008.02	3	10.42	9.79	4.03	4.03	3.39	0.84	3.80	10.19
2008.04	2	10.92	11.23	4.65	4.65	4.97	1.07	4.39	10.65
2008.06	1	10.46	13.50	3.76	3.76	6.80	1.81	3.55	10.25
2008.08	5	10.58	11.06	4.64	4.64	5.11	1.10	4.37	10.32
2008.10	3	10.66	9.40	5.37	5.37	4.12	0.77	5.07	10.35
2008.12	3	11.06	10.84	6.79	6.79	6.58	0.97	6.41	10.67
2009.02	4	11.69	9.57	7.39	7.39	5.28	0.71	6.97	11.27
2009.04	4	11.37	9.68	6.81	6.81	5.12	0.75	6.42	10.99
2009.06	6	10.98	9.90	5.35	5.35	4.26	0.80	5.04	10.68
2009.08	6	10.98	9.78	5.37	5.37	4.17	0.78	5.07	10.68
2009.10	4	10.34	10.12	4.81	4.81	4.59	0.95	4.54	10.07
2009.12	6	10.22	9.34	4.67	4.67	3.79	0.81	4.41	9.96
2010.02	5	10.95	12.27	5.40	5.40	6.72	1.24	5.09	10.65
2010.04	4	10.47	10.99	4.59	4.59	5.12	1.11	4.34	10.21
2010.06	5	10.22	9.15	4.82	4.82	3.75	0.78	4.55	9.94
2010.08	5	10.73	11.13	5.69	5.69	6.09	1.07	5.37	10.40
2010.10	6	10.67	9.63	5.52	5.52	4.48	0.81	5.21	10.36
2010.12	5	10.98	11.80	5.34	5.34	6.17	1.15	5.04	10.67
2011.02	6	10.66	10.10	4.97	4.97	4.41	0.89	4.69	10.38

Period	N	Market cost of equity	Network cost of equity	Risk-free rate	Market risk premium	Network risk premium	Risk premium ratio	Time series network risk premium	Time series network cost of equity
2011.04	3	10.66	10.76	5.07	5.07	5.17	1.02	4.78	10.37
2011.06	6	10.74	10.74	5.51	5.51	5.52	1.00	5.20	10.42
2011.08	5	10.91	10.29	6.36	6.36	5.75	0.90	6.00	10.55
2011.10	4	11.24	8.39	6.82	6.82	3.97	0.58	6.44	10.85
2011.12	6	11.25	9.78	7.39	7.39	5.91	0.80	6.98	10.84
2012.02	6	11.37	11.68	7.36	7.36	7.67	1.04	6.95	10.96
2012.04	4	11.18	12.14	7.28	7.28	8.24	1.13	6.87	10.77
2012.06	5	11.24	10.44	8.22	8.22	7.43	0.90	7.75	10.77
2012.08	6	10.91	9.71	7.69	7.69	6.50	0.84	7.26	10.47
2012.10	3	11.08	10.46	8.03	8.03	7.42	0.92	7.58	10.62
2012.12	5	10.98	9.99	7.72	7.72	6.74	0.87	7.29	10.54
2013.02	5	11.05	10.50	7.52	7.52	6.97	0.93	7.10	10.63
2013.04	4	10.49	9.64	7.22	7.22	6.37	0.88	6.81	10.08
2013.06	4	10.47	9.01	6.90	6.90	5.44	0.79	6.51	10.08
2013.08	5	10.33	9.68	6.44	6.44	5.78	0.90	6.07	9.97
2013.10	3	10.29	9.19	6.28	6.28	5.18	0.83	5.92	9.93
2013.12	4	10.50	9.67	6.22	6.22	5.38	0.87	5.87	10.15
2014.02	4	10.46	10.61	6.29	6.29	6.45	1.03	5.94	10.10
2014.04	2	10.17	8.78	6.10	6.10	4.70	0.77	5.75	9.82
2014.06	3	10.46	8.76	6.72	6.72	5.02	0.75	6.34	10.08
2014.08	5	10.21	8.48	6.77	6.77	5.04	0.74	6.39	9.83
2014.10	1	10.21	9.00	6.86	6.86	5.65	0.82	6.48	9.82
2014.12	3	10.27	9.83	7.30	7.30	6.85	0.94	6.89	9.86
Average	**3**	**10.55**	**10.43**	**4.12**	**5.48**	**5.40**	**1.00**	**5.17**	**10.24**
All	**Average risk premium ratio across all 235 network cases**						**0.94**		

All figures reported in this table exclude any adjustment for imputation tax credits.

10. Appendix 2: Instructions

Expert Terms of Reference

Applying the dividend growth model in Australia, update

Jemena Gas Networks
2015-20 Access Arrangement Review

AA15-570-0061

Version C – 12 January 2015

Contact Person

Cameron Herbert

Senior Legal Counsel

Jemena Limited

ABN 95 052 167 405

321 Ferntree Gully Road
Mt Waverley VIC 3149

Postal Address:

Locked Bag 7000
Mt Waverley VIC 3149

Ph: (03) 8544 9000

Fax: (03) 8544 9888

Version	Status	Date	Prepared	Checked	Authorised
A	Draft	10/12/14	E Grace-Webb		
B	Draft	12/12/14	E Grace-Webb	G+T	
C	Final	12/02/15	E Grace-Webb		E Grace-Webb

Contents

1 Background

Jemena Gas Networks (**JGN**) is the major gas distribution service provider in New South Wales (**NSW**). JGN owns more than 25,000 kilometres of natural gas distribution system, delivering approximately 100 petajoules of natural gas to over one million homes, businesses and large industrial consumers across NSW.

JGN submitted its revised Access Arrangement proposal (**proposal**) with supporting information for the consideration of the Australian Energy Regulator (**AER**) on 30 June 2014. The revised access arrangement will cover the period 1 July 2015 to 30 June 2020 (July to June financial years). The AER published its draft decision on this proposal on 27 November 2014. JGN must submit any additions or other amendments to its proposal by 27 February 2015.

As with all of its economic regulatory functions and powers, when assessing JGN's revised Access Arrangement under the National Gas Rules and the National Gas Law, the AER is required to do so in a manner that will or is likely to contribute to the achievement of the National Gas Objective, which is:

> "to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."

For electricity networks, the AER must assess regulatory proposals under the National Electricity Rules and the National Electricity Law in a manner that will or is likely to achieve the National Electricity Objective, as stated in section 7 of the National Electricity Law.

Where there are two or more possible decisions in relation to JGN's revised Access Arrangement that will or are likely to contribute to the achievement of the National Gas Objective, the AER is required to make the decision that the AER is satisfied will or is likely to contribute to the achievement of the National Gas Objective to the greatest degree.

The AER must also take into account the revenue and pricing principles in section 24 of the National Gas Law and section 7A of the National Electricity Law, when exercising a discretion related to reference tariffs. The revenue and pricing principles include the following:

> "(2) A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in—

(1) providing reference services; and

(2) complying with a regulatory obligation or requirement or making a regulatory payment.

> (3) A service provider should be provided with effective incentives in order to promote economic efficiency with respect to reference services the service provider provides. The economic efficiency that should be promoted includes—
>
> (a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services…

[…]

(5) A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.

(6) Regard should be had to the economic costs and risks of the potential for under and over investment by a service provider in a pipeline with which the service provider provides pipeline services."

Some of the key rules that are relevant to an access arrangement and its assessment are set out below.

Rule 74 of the National Gas Rules, relating generally to forecasts and estimates, states:

(a) Information in the nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate.

(b) A forecast or estimate:

(a) must be arrived at on a reasonable basis; and

(b) must represent the best forecast or estimate possible in the circumstances.

Rule 87 of the National Gas Rules, relating to the allowed rate of return, states:

1. Subject to rule 82(3), the return on the projected capital base for each regulatory year of the access arrangement period is to be calculated by applying a rate of return that is determined in accordance with this rule 87 (the allowed rate of return).

2. The allowed rate of return is to be determined such that it achieves the allowed rate of return objective.

3. The allowed rate of return objective is that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services (the allowed rate of return objective).

4. Subject to subrule (2), the allowed rate of return for a regulatory year is to be:

    1. a weighted average of the return on equity for the access arrangement period in which that regulatory year occurs (as estimated under subrule (6)) and the return on debt for that regulatory year (as estimated under subrule (8)); and

    2. determined on a nominal vanilla basis that is consistent with the estimate of the value of imputation credits referred to in rule 87A.

5. In determining the allowed rate of return, regard must be had to:

    2. relevant estimation methods, financial models, market data and other evidence;

3. the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and

4. any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.

Return on equity

6. The return on equity for an access arrangement period is to be estimated such that it contributes to the achievement of the allowed rate of return objective.

7. In estimating the return on equity under subrule (6), regard must be had to the prevailing conditions in the market for equity funds.

[Subrules (8)–(19) omitted].

The equivalent National Electricity Rules are in clauses 6A.6.2 (for electricity transmission) and 6.5.2 (for electricity distribution).

In its proposal, JGN submitted the expert report of SFG (the **Earlier Report**), as a suitable qualified independent expert (**Expert**), on using the dividend growth model (**DGM**) to estimate a return on equity that complies with the requirements of the National Gas Law and Rules and National Electricity Law and Rules, including as highlighted above.[1] The AER draft decision considered this expert report.

In this context, JGN seeks a further report from SFG that reviews and, where appropriate, responds to matters raised in the draft decision on the use of the DGM. JGN seeks this expert report on behalf of itself, Jemena Electricity Networks, ActewAGL, Ausgrid, Ausnet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA PowerNetworks and United Energy.

2 Scope of Work

The Expert will provide an opinion report that:

1. Reviews and responds, where appropriate, to matters raised in the draft decision on the use of the DGM to estimate the return on equity, including (but not limited to):

   (a) the role and best estimate of the long-run growth rate of dividends; and

   (b) the impact of any recent changes in the risk-free rate.

2. Updates, insofar as practicable, the estimates of the returns on equity from the Earlier Report for:

[1] *SFG*, 15 May 2014, *Alternative versions of the dividend discount model and the cost of equity*.

(a) any new data available since the Earlier Report;

(b) matters raised in the draft decision; and

(c) any other matters considered relevant in light of the draft decision that were not considered in preparing the Earlier Report.

In preparing the report, the Expert will:

A. consider different approaches to applying the DGM to both the benchmark firm and the market, including any theoretical restrictions on empirical estimates;

B. consider different approaches for grossing up stock returns for the value of imputation credits, assuming gamma estimates of 0.25 and (as an alternative scenario) 0.4;

C. consider the stability of estimates of the return on equity over time;

D. consider any comments raised by the AER, other regulators or their consultants including (but not limited to) (i) whether the DGM applies in Australia, (ii) the best version of the DGM, or (iii) the best inputs to the DGM;

E. use robust methods and data; and

F. use the sample averaging period of 2 January to 30 January 2015 (inclusive) to estimate any prevailing parameter estimates needed to populate the DGM.

3 Information to be Considered

The Expert is also expected to consider the following information:

- such information that, in Expert's opinion, should be taken into account to address the questions outlined above;
- relevant literature on the value of imputation credits;
- the AER's Rate of Return Guideline, including explanatory statements and supporting expert material;
- material submitted to the AER as part of its consultation on the Rate of Return Guidelines; and
- previous decisions of the AER, other relevant regulators and the Australian Competition Tribunal on the value of imputation credits and any supporting expert material, including the recent draft decisions for JGN and electricity networks in ACT, NSW and Tasmania.

4 Deliverables

At the completion of its review the Expert will provide an independent expert report which:

- is of a professional standard capable of being submitted to the AER;
- is prepared in accordance with the Federal Court Practice Note on Expert Witnesses in Proceedings in the Federal Court of Australia (CM 7) set out in Attachment 1, and includes an acknowledgement that the Expert has read the guidelines [2];
- contains a section summarising the Expert's experience and qualifications, and attaches the Expert's curriculum vitae (preferably in a schedule or annexure);
- identifies any person and their qualifications, who assists the Expert in preparing the report or in carrying out any research or test for the purposes of the report;
- summarises JGN's instructions and attaches these term of reference;
- includes an executive summary which highlights key aspects of the Expert's work and conclusions; and
- (without limiting the points above) carefully sets out the facts that the Expert has assumed in putting together his or her report, as well as identifying any other assumptions made, and the basis for those assumptions.

The Expert's report will include the findings for each of the five parts defined in the scope of works (Section 2).

5 Timetable

The Expert will deliver the final report to Jemena Regulation by **13 February 2015**.

6 Terms of Engagement

The terms on which the Expert will be engaged to provide the requested advice shall be:

- as provided in accordance with the Jemena Regulatory Consultancy Services Panel arrangements applicable to the Expert.

[2] Available at: http://www.federalcourt.gov.au/law-and-practice/practice-documents/practice-notes/cm7.

ATTACHMENT 1: FEDERAL COURT PRACTICE NOTE

Practice Note CM 7

EXPERT WITNESSES IN PROCEEDINGS IN THE FEDERAL COURT OF AUSTRALIA

Commencement

1. This Practice Note commences on 4 June 2013.

Introduction

2. Rule 23.12 of the Federal Court Rules 2011 requires a party to give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see **Part 3.3 - Opinion** of the *Evidence Act 1995* (Cth)).

3. The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence[3], and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

Guidelines

1. General Duty to the Court[4]

1.1 An expert witness has an overriding duty to assist the Court on matters relevant to the expert's area of expertise.

1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential.

1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

2. The Form of the Expert's Report[5]

2.1 An expert's written report must comply with Rule 23.13 and therefore must

(a) be signed by the expert who prepared the report; and

(b) contain an acknowledgement at the beginning of the report that the expert has read, understood and complied with the Practice Note; and

(c) contain particulars of the training, study or experience by which the expert has acquired specialised knowledge; and

(d) identify the questions that the expert was asked to address; and

(e) set out separately each of the factual findings or assumptions on which the expert's opinion is based; and

---

[3] As to the distinction between expert opinion evidence and expert assistance see *Evans Deakin Pty Ltd v Sebel Furniture Ltd* [2003] FCA 171 per Allsop J at [676].

[4] The "*Ikarian Reefer*" (1993) 20 FSR 563 at 565-566.

[5] Rule 23.13.

(f) set out separately from the factual findings or assumptions each of the expert's opinions; and

(g) set out the reasons for each of the expert's opinions; and

(ga) contain an acknowledgment that the expert's opinions are based wholly or substantially on the specialised knowledge mentioned in paragraph (c) above[6]; and

(h) comply with the Practice Note.

2.2 At the end of the report the expert should declare that "[the expert] has *made all the inquiries that* [the expert] *believes are desirable and appropriate and that no matters of significance that* [the expert] *regards as relevant have, to* [the expert's] *knowledge, been withheld from the Court*."

2.3 There should be included in or attached to the report the documents and other materials that the expert has been instructed to consider.

2.4 If, after exchange of reports or at any other stage, an expert witness changes the expert's opinion, having read another expert's report or for any other reason, the change should be communicated as soon as practicable (through the party's lawyers) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court[7].

2.5 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report.

2.6 The expert should make it clear if a particular question or issue falls outside the relevant field of expertise.

2.7 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports[8].

3. Experts' Conference

3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

J L B ALLSOP
Chief Justice
4 June 2013

[6] See also *Dasreef Pty Limited v Nawaf Hawchar* [2011] HCA 21.

[7] The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565

[8] The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565-566. See also Ormrod *"Scientific Evidence in Court"* [1968] Crim LR 240

11. Appendix 3: Curriculum Vitas of Professor Stephen Gray and Dr Jason Hall

Stephen F. Gray

University of Queensland
Business School
Brisbane 4072
AUSTRALIA
Office: +61-7-3346 8032
Email: s.gray@business.uq.edu.au

Academic Qualifications

1995 Ph.D. (Finance), Graduate School of Business, Stanford University.
Dissertation Title: Essays in Empirical Finance
Committee Chairman: Ken Singleton
1989 LL.B. (Hons), Bachelor of Laws with Honours, University of Queensland.
1986 B.Com. (Hons), Bachelor of Commerce with Honours, University of Queensland.

Employment History

2000-Present Professor of Finance, UQ Business School, University of Queensland.
1997-2000 Associate Professor of Finance, Department of Commerce, University of Queensland and Research Associate Professor of Finance, Fuqua School of Business, Duke University.
1994-1997 Assistant Professor of Finance, Fuqua School of Business, Duke University.
1990-1993 Research Assistant, Graduate School of Business, Stanford University.
1988-1990 Assistant Professor of Finance, Department of Commerce, University of Queensland.
1987 Specialist Tutor in Finance, Queensland University of Technology.
1986 Teaching Assistant in Finance, Department of Commerce, University of Queensland.

Academic Awards

2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
2002 Journal of Financial Economics, All-Star Paper Award, for Modeling the Conditional Distribution of Interest Rates as a Regime-Switching Process, JFE, 1996, 42, 27-62.
2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching (a University-wide award).
1999 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
1999 KPMG Teaching Prize, Department of Commerce, University of Queensland.
1998 Faculty Teaching Prize (Business, Economics, and Law), University of Queensland.
1991 Jaedicke Fellow in Finance, Doctoral Program, Graduate School of Business, Stanford University.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.
1986 University Medal in Commerce, University of Queensland.

Large Grants (over $100, 000)

- Australian Research Council Linkage Grant, 2008—2010, Managing Asymmetry Risk ($320,000), with T. Brailsford, J.Alcock, and Tactical Global Management.
- Intelligent Grid Cluster, Distributed Energy – CSIRO Energy Transformed Flagship Collaboration Cluster Grant, 2008-2010 ($552,000)
- Australian Research Council Research Infrastructure Block Grant, 2007—2008, Australian Financial Information Database ($279,754).
- Australian Research Council Discovery Grant, 2006—2008, Capital Management in a Stochastic Earnings Environment ($270,000).
- Australian Research Council Discovery Grant, 2005—2007, Australian Cost of Equity.
- Australian Research Council Discovery Grant, 2002—2004, Quantification Issues in Corporate Valuation, the Cost of Capital, and Optimal Capital Structure.

- Australian Research Council Strategic Partnership Grant, 1997—2000, Electricity Contracts and Securities in a Deregulated Market: Valuation and Risk Management for Market Participants.

Current Research Interests

Benchmark returns and the cost of capital. Corporate Finance. Capital structure. Real and strategic options and corporate valuation. Financial and credit risk management. Empirical finance and asset pricing.

Publications

Gray, S., I. Harymawan and J. Nowland, (2014), "Political and government connections on corporate boards in Australia: Good for business?" *Australian Journal of Management,* forthcoming.

Brailsford, T., S. Gray and S. Treepongkaruna, (2013), "Explaining the bid-ask spread in the foreign exchange market: A test of alternate models," *Australian Journal of Management,* forthcoming.

Faff, R., S. Gray and M. Poulsen, (2013), "Financial inflexibility and the value premium," *International Review of Finance,* forthcoming.

T. Fitzgerald, S. Gray, J. Hall and R. Jeyaraj, (2013), "Unconstrained estimates of the equity risk premium" *Review of Accounting Studies,* 18, 560-639.

Gray, S. and J. Nowland, (2013), "Is prior director experience valuable?" *Accounting and Finance,* 53, 643-666.

Chen, E. T., S. Gray and J. Nowland, (2012), "Family representatives in family firms" *Corporate Governance: An International Review*, 21(3), 242-263.

Treepongkaruna, S., R. Brooks and S. Gray, (2012), "Do Trading Hours Affect Volatility Links in the Foreign Exchange Market?" *Australian Journal of Management*, 37, 7-27.

Chen, E. T., S. Gray and J. Nowland, (2012), "Multiple founders and firm value" *Pacific Basin Finance Journal*, 20, 3, 398-415.

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Gray, S., C. Gaunt and Y. Wu, (2010), "A comparison of alternative bankruptcy prediction models," *Journal of Contemporary Accounting and Economics*, 6, 1, 34-45.

Feuerherdt, C., S. Gray and J. Hall, (2010), "The Value of Imputation Tax Credits on Australian Hybrid Securities," *International Review of Finance*, 10, 3, 365-401.

Gray, S., J. Hall, D. Klease and A. McCrystal, (2009), "Bias, stability and predictive ability in the measurement of systematic risk," *Accounting Research Journal*, 22, 3, 220-236.

Treepongkaruna, S. and S. Gray, (2009), "Information volatility links in the foreign exchange market," *Accounting and Finance*, 49, 2, 385-405.

Costello, D., S. Gray, and A. McCrystal, (2008), "The diversification benefits of Australian equities," *JASSA*, 2008, 4, 31-35.

Gray, S. and J. Hall, (2008), "The Relationship Between Franking Credits and the Market Risk Premium: A Reply," *Accounting and Finance*, 48, 1, 133-142.

Gray, S., A. Mirkovic and V. Ragunathan, (2006), "The Determinants of Credit Ratings: Australian Evidence," *Australian Journal of Management,* 31(2), 333-354.

Choy, E., S. Gray and V. Ragunathan, (2006), "The Effect of Credit Rating Changes on Australian Stock Returns," *Accounting and Finance*, 46(5), 755-769.

Gray, S. and J. Hall, (2006), "The Relationship Between Franking Credits and the Market Risk Premium," *Accounting and Finance*, 46(3), 405-428.

Gray, S. and S. Treepongkaruna, (2006), "Are there non-linearities in short-term interest rates?" *Accounting and Finance*, 46(1), 149-167.

Gray, P., S. Gray and T. Roche, (2005), "A Note on the Efficiency in Football Betting Markets: The Economic Significance of Trading Strategies," *Accounting and Finance*, 45(2) 269-281.

Duffie, D., S. Gray and P. Hoang, (2004), "Volatility in Energy Prices. In V. Kaminski," (Ed.), *Managing Energy Price Risk: The New Challenges and Solutions* (3rd ed.). London: Risk Books.

Cannavan, D., F. Finn and S. Gray, (2004), "The Value of Dividend Imputation Tax Credits in Australia," *Journal of Financial Economics*, 73, 167-197.

Gray, S. and S. Treepongkaruna, (2003), "Valuing Interest Rate Derivatives Using a Monte-Carlo Approach," *Accounting and Finance*, 43(2), 231-259.

Gray, S., T. Smith and R. Whaley, (2003), "Stock Splits: Implications for Investor Trading Costs," *Journal of Empirical Finance*, 10, 271-303.

Gray, S. and S. Treepongkaruna, (2003), "On the Robustness of Short-term Interest Rate Models," *Accounting and Finance*, 43(1), 87-121.

Gray, S. and S. Treepongkaruna, (2002), "How to Value Interest Rate Derivatives in a No-Arbitrage Setting," *Accounting Research Journal* (15), 1.

Gray, P. and S. Gray, (2001), "A Framework for Valuing Derivative Securities," *Financial Markets Institutions & Instruments*, 10(5), 253-276.

Gray, P. and S. Gray, (2001), "Option Pricing: A Synthesis of Alternate Approaches," *Accounting Research Journal*, 14(1), 75-83.

Dahlquist, M. and S. Gray, (2000), "Regime-Switching and Interest Rates in the European Monetary System," *Journal of International Economics*, 50(2), 399-419.

Bollen, N., S. Gray and R. Whaley, (2000), "Regime-Switching in Foreign Exchange Rates: Evidence from Currency Options," *Journal of Econometrics*, 94, 239-276.

Duffie, D., S. Gray and P. Hoang, (1999), "Volatility in Energy Prices. In R. Jameson," (Ed.), *Managing Energy Price Risk* (2nd ed.). London: Risk Publications.

Gray, S. and R. Whaley, (1999), "Reset Put Options: Valuation, Risk Characteristics, and an Example," *Australian Journal of Management*, 24(1), 1-21.

Bekaert, G. and S. Gray, (1998), "Target Zones and Exchange Rates: An Empirical Investigation," *Journal of International Economics*, 45(1), 1-35.

Gray, S. and R. Whaley, (1997), "Valuing S&P 500 Bear Market Warrants with a Periodic Reset," *Journal of Derivatives*, 5(1), 99-106.

Gray, S. and P. Gray, (1997), "Testing Market Efficiency: Evidence from the NFL Sports Betting Market," *The Journal of Finance*, 52(4), 1725-1737.

Gray, S. (1996), "Modeling the Conditional Distribution of Interest Rates as a Regime- Switching Process," *Journal of Financial Economics*, 42, 27-62.

Gray, S. (1996), "Regime-Switching in Australian Interest Rates," *Accounting and Finance*, 36(1), 65-88.

Brailsford, T., S. Easton, P.Gray and S. Gray, (1995), "The Efficiency of Australian Football Betting Markets," *Australian Journal of Management*, 20(2), 167-196.

Duffie, D. and S. Gray, (1995), "Volatility in Energy Prices," In R. Jameson (Ed.), *Managing Energy Price Risk*, London: Risk Publications.

Gray, S. and A. Lynch, (1990), "An Alternative Explanation of the January Anomaly," *Accounting Research Journal*, 3(1), 19-27.

Gray, S. (1989), "Put Call Parity: An Extension of Boundary Conditions," *Australian Journal of Management*, 14(2), 151-170.

Gray, S. (1988), "The Straddle and the Efficiency of the Australian Exchange Traded Options Market," *Accounting Research Journal*, 1(2), 15-27.

Teaching

Fuqua School of Business, Duke University, Student Evaluations (0-7 scale):

- Financial Management (MBA Core): Average 6.5 over 7 years.
- Advanced Derivatives: Average 6.6 over 4 years.
- Empirical Issues in Asset Pricing: Ph.D. Class

1999, 2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.

UQ Business School, University of Queensland, Student Evaluations (0-7 scale):

- Finance (MBA Core): Average 6.6 over 10 years.
- Corporate Finance Honours: Average 6.9 over 10 years.

2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching.
1999 Department of Commerce KPMG Teaching Prize, University of Queensland.
1998 Faculty Teaching Prize, Faculty of Business Economics and Law, University of Queensland.
1998 Commendation for Excellence in Teaching, University-wide Teaching Awards, University of Queensland.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.

Board Positions

2002 - Present: Director, Financial Management Association of Australia Ltd.
2003 - Present: Director, Moreton Bay Boys College Ltd. (Chairman since 2007).
2002 - 2007: External Risk Advisor to Board of Enertrade (Queensland Power Trading Corporation Ltd.)

Consulting

Managing Director, Strategic Finance Group: www.sfgconsulting.com.au.

Consulting interests and specialties, with recent examples, include:

- **Corporate finance**
  - ⇒ **Listed multi-business corporation:** Detailed financial modeling of each business unit, analysis of corporate strategy, estimation of effects of alternate strategies, development of capital allocation framework.

- **Capital management and optimal capital structure**
  - ⇒ **State-owned electricity generator:** Built detailed financial model to analyze effects of increased leverage on cost of capital, entity value, credit rating, and stability of dividends. Debt of $500 million issued.

- **Cost of capital**
  - ⇒ **Cost of Capital in the Public Sector:** Provided advice to a government enterprise on how to estimate an appropriate cost of capital and benchmark return for Government-owned enterprises. Appearance as **expert witness** in legal proceedings that followed a regulatory determination.
  - ⇒ **Expert Witness:** Produced a written report and provided court testimony on issues relating to the cost of capital of a cable TV business.
  - ⇒ **Regulatory Cost of Capital:** Extensive work for regulators and regulated entities on all matters relating to estimation of weighted-average cost of capital.

- **Valuation**

⇒ **Expert Witness:** Produced a written report and provided court testimony. The issue was whether, during a takeover offer, the shares of the bidding firm were affected by a liquidity premium due to its incorporation in the major stock market index.

⇒ **Expert Witness:** Produced a written report and provided court testimony in relation to valuation issues involving an integrated mine and refinery.

- **Capital Raising**
  - ⇒ Produced comprehensive valuation models in the context of capital raisings for a range of businesses in a range of industries including manufacturing, film production, and biotechnology.

- **Asset pricing and empirical finance**
  - ⇒ **Expert Witness:** Produced a written report on whether the client's arbitrage-driven trading strategy caused undue movements in the prices of certain shares.

- **Application of econometric techniques to applied problems in finance**
  - ⇒ **Debt Structure Review:** Provided advice to a large City Council on restructuring their debt portfolio. The issues involved optimisation of a range of performance measures for each business unit in the Council while simultaneously minimizing the volatility of the Council's equity in each business unit.
  - ⇒ **Superannuation Fund Performance Benchmarking:** Conducted an analysis of the techniques used by a large superannuation fund to benchmark its performance against competing funds.

- **Valuation of derivative securities**
  - ⇒ **Stochastic Volatility Models in Interest Rate Futures Markets:** Estimated and implemented a number of models designed to predict volatility in interest rate futures markets.

- **Application of option-pricing techniques to real project evaluation**
  - ⇒ **Real Option Valuation:** Developed a framework for valuing an option on a large office building. Acted as arbitrator between the various parties involved and reached a consensus valuation.
  - ⇒ **Real Option Valuation:** Used real options framework in the valuation of a bio-tech company in the context of an M&A transaction.

Jason Hall, PhD BCom(Hons) CFA

Lecturer in Finance
Ross School of Business
The University of Michigan (Room 4443)
701 Tappan Avenue
Ann Arbor, Michigan, USA 48104
Phone: +1 734 926 6989
Email: uqjhall@umich.edu
Research: http://ssrn.com/author=114606

Director
Frontier Economics and SFG Consulting
Level 1, South Bank House, Stanley Street Plaza
South Bank, Queensland, Australia 4101
Phone: +61 419 120 348
Email: jason.hall@frontier-economics.com.au
Website: frontier-economics.com.au
Skype: jason.lance.hall

Experience

2013-15	Ross School of Business, The University of Michigan (Lecturer in Finance)
2008	Ross School of Business, The University of Michigan (Visiting Assistant Professor in Finance)
2014-15	Frontier Economics (Director)
2000-15	SFG Consulting (Director)
2000-12	University of Queensland Business School, The University of Queensland (Senior Lecturer)
1997-99	Credit Suisse First Boston (Equities analyst)

Education

2005	PhD in finance from The University of Queensland
2003	Chartered Financial Analyst designation by the CFA Institute
1996	Bachelor of Commerce with First Class Honours from The University of Queensland

Research

Journal articles

Impact of sector versus security choice on equity portfolios, with Ben McVicar, *Applied Financial Economics*, 2013, 23 (12), 991 – 1004.

Unconstrained estimates of the equity risk premium, with Stephen Gray, Tristan Fitzgerald and Ravi Jeyaraj, *Review of Accounting Studies*, 2013, 18 (2), 560 – 639.

Market risk exposure of merger arbitrage in Australia, with Matthew Pinnuck and Matthew Thorne, *Accounting and Finance*, 2013, 53 (1), 185 – 215.

The value of imputation credits on hybrid securities, with Clinton Feuerherdt and Stephen Gray, *International Review of Finance*, 2010, 10 (3), 365 – 401.

Forecast accuracy and stock recommendations, with Paul Tacon, *Journal of Contemporary Accounting and Economics*, 2010, 6 (1), 18 – 33.

Speculation and e-commerce: The long and the short of IT, with Colin Ferguson, Matthew Pinnuck and Frank Finn, *International Journal of Accounting Information Systems*, 2010, 11 (2), 79 – 104.

Bias, stability and predictive ability in the measurement of systematic risk, with Stephen Gray, Drew Klease and Alan McCrystal, *Accounting Research Journal*, 2009, 22 (3), 220 – 236.

Leveraged superannuation, with Peter Dunn and Scott Francis, *Accounting and Finance*, 2009, 49 (3), 505 – 529.

Persistence in growth versus market expectations, with Matthew Tochterman, *Australian Journal of Management*, 2008, 33 (1), 169 – 199.

Relationship between franking credits and the market risk premium: A reply, with Stephen Gray, *Accounting and Finance*, 2008, 48 (1), 133 – 142.

Comment on 'Regulation and the term of the risk free rate: Implications of corporate debt', *Accounting Research Journal*, 2007, 20 (2), 81 – 86.

Valuation of mining projects using option pricing techniques, with Shannon Nicholls, *JASSA*, 2007, Issue 4 (Summer), 22 – 29.

Relationship between franking credits and the market risk premium, with Stephen Gray, *Accounting and Finance*, 2006, 46 (3), 405 – 428.

Electronic commerce investments, the resource-based view of the firm, and firm market value, with Colin Ferguson and Frank Finn, *International Journal of Accounting Information Systems*, 2005, 6 (1), 5 – 29.

Auditor conservatism and voluntary disclosure: Evidence from the Year 2000 systems issue, with Peter Clarkson and Colin Ferguson, *Accounting and Finance*, 2003, 43 (1), 21 – 40.

Working papers

Portfolio rebalancing and mutual fund tournament behavior, with Paul Tacon, Finance and Corporate Governance Conference 2011, FIRN Frontiers in Finance Conference 2011, Financial Management Association Annual Meeting 2012.

The impact of security analyst recommendations on the trading of mutual funds, with David Costello, AFAANZ Conference 2010 (Winner Best Paper in Finance), Australasian Finance and Banking Conference 2010.

Forecasting stock returns using investor flows under short-sales constraints, with Paul Tacon, Australasian Finance and Banking Conference 2011, Finance and Corporate Governance Conference 2012, AFAANZ Conference 2012, Financial Management Association Annual Meeting 2012, Southern Finance Association Annual Meeting 2012.

Presentations

Accounting and Finance Association of Australia and New Zealand Conference (5) 2005, 2007, 2009-10, 2012
Asian Finance Association Conference 2009
Australasian Finance and Banking Conference (2) 2008, 2010
Australian National University Seminar Series 2012
Coal Trade, hosted by AIC Worldwide 1999
Coaltrans Asia, hosted by Coaltrans Conference Limited 1999
Contemporary Accounting Research/Journal of Contemporary Accounting and Economics Joint Symposium 2009
CPA Mining and Energy Conference 2006
Financial Management Association 2012
First Annual Private Equity Conference, hosted by Television Education Network 2007
JBWere Family Business Conference 2010
Melbourne Centre for Consumer Finance Investment & Regulatory Symposium 2008
PhD Conference in Economics and Business, hosted by University of Western Australia 2003
Southern Finance Association 2012
University of Melbourne Seminar Series (2) 2005, 2010
University of Queensland Seminar Series 2008

Referee activity

Accounting and Finance (8 reviews) 2003, 2005, 2009-13
Accounting Research Journal (3 reviews) 2002, 2006, 2010
Applied Financial Economics (3 reviews) 2012-13
Australian Journal of Management 2012
Contemporary Economic Policy 2011
European Financial Management 2014
Financial Review 2013
International Journal of Emerging Markets 2013
International Review of Finance 2012
MIS Quarterly 2003
Quarterly Journal of Finance and Accounting 2010
Quarterly Review of Economics and Finance 2012

Research grants

PricewaterhouseCoopers/Accounting and Finance Association of Australia and New Zealand 2006: Returns, tax and volatility – Superannuation choice with a complete information set ($8,500)

Australian Research Council Discovery Grant 2002-4: Quantification issues in corporate valuation, the cost of capital and optimal capital structure ($126,000)

UQ New Staff Research Start-up Fund: The competitive advantage of investments in electronic commerce ($10,000)

Research students

PhD (1 student)

2012 – Paul Tacon

Honours (20 students)

2012 – Edward Parslow (Carnegie Wylie)
2011 – James Lamb (Port Jackson Partners)
2010 – Jeremy Evans (JP Morgan), Sarah Thorne (JP Morgan), Alexandra Dwyer (Reserve Bank of Australia)
2009 – Tristan Fitzgerald (UNSW), David Costello (National Australia Bank), William Toe (Ernst & Young)
2008 – Ben McVicar (Credit Suisse), Matthew Thorne (Credit Suisse)
2007 – Sam Turner (ABN Amro Morgans)
2006 – Paul Tacon (PhD, UQ), Ravi Jeyaraj (Navis Capital), Thomas Green (Crescent Capital), Alexander Pascal-Bossy (Macquarie)
2005 – Angela Gill (Wilson HTM), Andrew Wagner (Macquarie)
2004 – Matthew Tochterman (M. Fin. Eng., UC Berkeley), Justyna Lewandowska (JP Morgan), An Pham (UBS)

Masters (2 students)

2003 – Scott Francis (A Clear Direction Financial Planning), Hernando Barrero (PricewaterhouseCoopers)

PhD reader
Damien Cannavan 2012

Teaching

Ross School of Business, The University of Michigan
Valuation (2014-2015; MBA students; avg. rating 4.0)
Corporate Investing Decisions (2014; BBA students avg. rating 4.2)
Corporate Financing Decisions (2015; BBA students)
Corporate Financial Policy (2008; MBA students; avg. rating 4.3)

UQ Business School, The University of Queensland (Mean teacher ratings out of a possible 5.0)
Awarded undergraduate teaching prize 2009
Empirical Finance Honours (2009-12; PhD and Honours students; avg. rating 4.1)
Corporate Finance Honours (2005 & 2011; PhD and Honours students; avg. rating 4.7)
Investments & Portfolio Management (2002-7, 2009-10 & 2012; B.Com, MBA & M.Com students; avg. rating 3.8)
Corporate Finance (2002-4, 2006-10 & 2012; B.Com, MBA and M.Com students; avg. rating 3.8)
Finance (2005-6; M.Com students; avg. rating 3.7)
Corporate Finance and Investments (Mt Eliza Business School, Beijing 2003; MBA students)
Technology Valuation and Project Evaluation (Singapore 2004; Masters of Technology Management students)
Auditing (Summer 2000/1-2001/2; B.Com, MBA and M.Com students; avg. rating 3.8)

Executive education
Risk Management and Financial Analysis (Rabobank 2000-10)
Financial Analysis of Innovative Investments (UQ Business School 2007)
Credit Analysis (Queensland Treasury Corporation 2005)
Capital Management (UQ Business School 2004)
Making Critical Financial Decisions (UQ Business School 2003)
Business Valuation and Analysis (UQ Business School 2003)
Cost of Capital Estimation (UQ Business School 2003)
Analysis of Real Options (Queensland Treasury 2003)

Student competitions
Rotman International Trading Competition
Manager of the UQ Business School trading team (2007 & 2009-12) which competes annually at the University of Toronto amongst 50 teams. UQ is the 9th most successful entrant from 66 schools which have competed in any of the same years, finishing 3rd in 2010, 6th in 2007, 11th in 2009, 14th in 2011 and 18th in 2012.
UBS Investment Banking Competition
Judge for the UQ section 2006-7 & 2009-12. Faculty representative at the national section 2008.
JP Morgan Deal Competition
Judge for the UQ section 2007-8.
Wilson HTM Research Report Competition
Delivered two workshops as part of the 2006 competition and was one of three judges.

Industry engagement

From 2000-15, I have provided consulting services as a director of SFG Consulting and Frontier Economics (from November 2014). A selection of projects is listed below.

Retail electricity and gas margins in NSW (Independent Pricing and Regulatory Tribunal 2012)
In 2006-7 and 2009-10 I acted as part of a team which was engaged to estimate electricity costs and margins for electricity and gas retailers in NSW. We have been reappointed for 2012-13. My role related to the estimation of a profit margin which would allow the retailer to earn a return commensurate its systematic risk. The approach developed was novel in that the margin was derived without reference to any pre-defined estimate of the asset base. Rather, the margin was a function of the potential increases or decreases in cash flows which would result from changes in economic conditions. Reports are available from IPART.

Advice on rules to determine regulated rates of return (Australian Energy Markets Commission 2012)
The AEMC is considering changes to the rules relating to regulation of electricity and gas networks. Independent rule change proposals have been put forward by the Australian Energy Regulator and the Energy Users Association of Australia. Both groups argue that application of the existing rules by the regulator generate upwardly-biased estimates of the regulated rate of return. As part of a team I am currently providing advice to the commission on whether the rule change proposals provide evidence on an upward bias, and if so, whether the proposed amendments are likely to reduce the extent of any bias.

Expert evidence relating to regulated rates of return (Electricity network businesses 2011)

In April 2011 the Australian Competition Tribunal heard an appeal by electricity networks on the regulated rate of return set by the Australian Energy Regulator. The issue was the value of dividend imputation tax credits. The Tribunal directed us to perform a dividend drop-off study to estimate the value of a distributed credit. Largely on the basis of our evidence the Tribunal determined that an appropriate value for a distributed credit was 35 per cent of face value. The Tribunal determination is available on its website and our expert report is available on request.

Estimation of risks associated with long-term generation contracts (New South Wales Treasury 2010)

In 2010 the NSW Government privatised a segment of its electricity industry, by selling three electricity retailers and entering into two generation agreements termed GenTrader contracts. The state-owned generators agreed to provide generation capacity in exchange for a charge. The generators also agreed to pay penalties in the event that their availability was less than agreed. As part of a team, I provided advice to NSW Treasury on the risks associated with the contracts. The estimated penalties resulting from this analysis are used by NSW Treasury in their budgeting role and in providing forward-looking analysis to the Government.

Litigation support relating to asset valuation (Alcan 2006-7)

In 2006-7 I acted as part of a team which provided litigation support to Alcan in a dispute with the taxation authority in the Northern Territory. The dispute related to whether Alcan was required to pay stamp duty as a result of its acquisition of an additional 30 per cent interest in Gove Alumina Limited. One issue was whether the acquisition was land-rich, meaning that the proportion of the asset considered to be land exceeded a threshold triggering stamp duty.

Methodology for evaluating public-private partnerships (Queensland Treasury Corporation 2005)

In 2005 I acted as part of a team which advised QTC on evaluating public-private partnerships, which typically require subsidies to appeal to the private sector. We rebutted the conventional wisdom, adopted in NSW and Victoria, that the standard valuation approach is flawed for negative-NPV projects. Furthermore, we developed a technique to incorporate systematic risk directly into expected cash flows, which are then discounted at the risk-free rate.

Litigation support

Insolvency proceedings relating to the collapse of Octaviar (Public Trustee of Queensland 2008-9)
Valuation of resource assets (Compass Resources 2007-8, Westpac Banking Corporation 2007)
Appeals against regulatory determinations (Envestra 2007-8, Telstra 2008)
Advice on whether loan repayments correspond to contract terms (Qld Dept. of Fair Trading 2005)
Advice on whether port and channel assets were contributed and hence not part of regulated assets (Comalco 2004-5)

Valuation

Management performance securities (Collins Foods Group 2006-11, GroundProbe 2008-9)
Ordinary shares in the context of an equity raising (Auscript 2007-8)
Intangible assets (Inbartec 2007)
Resources assets (Senex Energy 2012, Chalco 2007, Bank of Queensland 2007)

Cost of capital estimation, advice and regulatory submissions

Transport (Qantas 2008, QR National 2005 & 2012)
Water (Essential Services Commission of South Australia 2012, ActewAGL 2012, IPART 2011, Metropolitan utilities in Victoria 2004 & 2006-7, QCA 2002-3)
Energy networks (Economic Regulation Authority in Western Australia 2009, Hong Kong Electric 2007, Envestra 2006-7 & 2012, Powercor 2005, AGL 2004, Energex 2003-4, Ergon Energy 2003-4)
Local government networks (Queensland Competition Authority 2009)
Electricity generation (National Generators Forum 2008)
Environmental consulting (Ecowise 2007)
Listed vs unlisted infrastructure funds across alternative European equity markets (ABN AMRO Rothschild 2007)
Forestry assets (Queensland Department of Natural Resources 2004)

Portfolio performance measurement

Performance evaluation and benchmark derivation (Friday Investments 2010-12, Zupp Property Group 2011-12)

Corporate finance

Economic impact assessment of a proposed development of a retail shopping complex (Lend Lease 2006)
Impact of an acquisition on dividend growth, earnings per share and share price (AGL 2003-4)
Estimation of the optimal capital structure for electricity generation and distribution (NSW Treasury 2001-2)
Review of the debt valuation model used by the Snowy Hydroelectric Authority (NSW Treasury 2002)
Estimation of the optimal contract terms for coal sales to an electricity generator (NSW Treasury 2001-2)

Econometrics

Scoping study into the determinants of changes in tax debt in Australia (Australian Taxation Office 2007)

Interests

I am interested in sport as a participant and spectator. I finished 3rd on three occasions in the Brisbane Half Marathon (2005 & 2009-10), 8th in the Toronto Half Marathon (2002) and 3rd in the Australian Universities Marathon Championships (2003). I have finished 21 marathons, recording a best time of 2:47:54 in the Chicago Marathon 2011. From 1994-96 I was a member of The University of Queensland tennis team, which placed 1st at the Australian University Games in 1994.