REPORT TO THE AER: DISCUSSION OF THE ALLOWED COST OF DEBT

By Graham Partington and Stephen Satchell

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Author's Credentials

This report has been prepared by Associate Professor Graham Partington and Professor Stephen Satchell. We are senior finance academics who have published several books and many research papers in finance and we have extensive consulting experience, particularly with respect to the cost of capital and valuation. Our *curriculum vitae* can be found in Appendix 2.

We have read "Expert witnesses in proceedings in the Federal Court of Australia" which are attached as Appendix 3. This report has been prepared in accordance with those guidelines. An expert witness compliance declaration can be found following the reference list at the end of our report.

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The context of the report

The AER has approached us with a request for advice in relation to the allowed cost of debt. The full terms of reference are attached as Appendix 1.

The specific questions were as follows:

Part A.

Provide advice on each of the questions with clear explanation on why you hold your view (including any mathematical proofs where you consider these are appropriate). Where the answer is unclear please state so and explain why. Where assumptions need to be made to answer the question, please state these assumptions and explain their relevance.

In relation to the on the day methodology to set the allowed cost of debt:

1. We consider an allowed return on debt that results in zero expected excess returns should reflect the 'efficient cost' of debt in the market. Is this a reasonable assumption consistent with finance theory?
2. Can the current (that is, the 'on the day') YTM on debt (of a given credit rating and maturity) observed in the financial markets be considered a valid measure of the 'efficient cost' of debt financing of this credit rating and maturity?
3. Assuming the credit rating and term are chosen appropriately, will the current YTM be expected to be commensurate with the efficient debt financing costs at the commencement of the regulatory control period for a benchmark efficient entity with a similar degree of risk that which applies to the regulated firm in respect of the provision of fully regulated services?
4. Would setting the current 'on the day' YTM on debt with an appropriate term and credit rating as the allowed return on debt (assuming the rest of the WACC input parameters are set consistently with this), be expected to lead to reasonably efficient investment in and use of regulated infrastructure?
5. Assume the regulator sets an ex ante PAR YTM on the debt proportion of the RAB at the start of the regulatory control period (based on BBB+ credit rating and ten term to maturity) over the five year regulatory control period combined with the expectation of then resetting the YTM to PAR at the start of the next and subsequent regulatory control periods (also based on a BBB+ credit rating and 10 year term to maturity)

   Having regard to: 1) in the past regulated firms may have frequently issued debt with a maturity of approximately 10 years and swapped the base rate to match the regulatory term (typically 5 years), 2) the AER had not explicitly compensated firms for transaction costs associated with hedging instruments, and 3) the past shape of the terms structure of bond yields and swap rates:

   a. Approximately what ex ante return on the debt proportion of the RAB might be expected over the regulatory control period for regulated firms under this approach?

b. Would this ex ante allowed return on debt be expected to be commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period?

c. Would this approach to setting the allowed return on debt be expected to result in a return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over multiple regulatory control periods and/or over the life of the regulatory assets?

6. In relation to losses or gains on financial liabilities from movements in market interest rates:

    a. Are losses or gains on a financial liability from movements in the market YTM substantively incurred when the YTM changes (i.e. as soon as the present value of the expected value of the liability changes)?

    b. Does the fact a firm may realise a fair value loss, or realise a fair value gain, from future cash flows being different to the current cost of debt in the market rates alter that the substantive loss was made when the cost of debt in the market (i.e. discount rate) changed?

    c. Is the concept that losses (or gains) on financial liabilities substantively occur once interest rates move consistent with the principles underlying fair value accounting?

    d. Has any loss or gain on a regulated firms debt portfolio from movements in interest rates in prior regulatory control periods been incurred in those prior regulatory control periods?

    e. Once “mismatch” risk on a regulated firm’s financial liabilities has eventuated from interest rate movements (i.e. a fair value loss or gain has occurred), can it be hedged?

7. Consider where a firm is exposed to and makes a gain or loss on its issued debt due to ‘mismatch’ risk (either in relation to the whole cost of debt or a component such as the risk premium over swap).

    a. Does this impact whether the firm ex ante received a return on debt over the regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

    b. Do losses or gains incurred from mismatch risk affect whether continuing the on the day regime should result in an expected return commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period, or over multiple future regulatory control periods, or over the remaining life of the regulatory assets?

8. Would potential losses or gains from mismatch risk place an incentive on regulated firms to efficiently manage their exposure to interest rate risk?

In relation to the trailing average methodology to set the allowed cost of debt and transition:

9. Would a cost of debt estimated as a 10 year historical trailing average portfolio (i.e. estimated using a trailing average approach) normally be considered an appropriate estimate of 'efficient' debt financing costs today in either finance theory or by market practitioners?
10. Would a trailing average approach produce a regulatory allowance that would normally be expected to result in efficient investment incentives where the current market cost of debt is materially lower or higher than the historical average?
11. On average, would a trailing average approach produce a regulatory allowance that would result in more efficient investment in, or use of, regulated infrastructure relative to the continued use of an on the day approach?
12. Would the regulatory use of a trailing average approach be expected to materially reduce the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services relative to an on the day approach?
13. If expected reductions in efficient financing costs from the use of a trailing average might be material:
    a. would these be expected to result from efficiencies, or
    b. would any reductions in the efficient financing costs likely primarily reflect a transfer of priced risk to consumers
14. Would the immediate implementation of a trailing average (i.e. without transition) effectively remove interest rate risk that regulated firms bore in prior regulatory control periods under the on the day approach to setting the allowed return on debt (to the extent they did not hedge this risk) ex post the risks occurrence?
15. Take as given that a 10 year historical average of the BBB 10 year YTM on debt is around 7.8% and the current BBB 10 year YTM is less than 6.5%. Given this, would an immediate movement to a trailing average (that is, without transition) be expected to result in:
    a. A materially higher expected return on debt allowance in present value terms (over both the upcoming regulatory control period and over the remaining life of the assets) than if the on the day regime continued to be used to set the allowed return on debt?
    b. Expected future cash flows from the return on debt allowance having a materially higher present value than the current value of the debt component of the regulatory asset base to which the allowed return on debt is applied?
    c. An allowed return on debt above the efficient cost of debt over the upcoming regulatory control period and/or over the future life of existing regulatory investments?

d. Providing an allowed return on debt to the regulated firm with a materially higher value than the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

e. An occurrence of material regulatory risk relative to prior investor expectations?

f. Undermining of regulated firms' incentives to manage the interest rate risk they face?

16. If the regulatory debt allowance is set using a trailing average approach, would this allowance (i.e. future expected allowed return on debt cash flows under this approach) be likely to have a different present value to the value of the debt component of the regulatory asset base (RAB) at any given point in time?

17. If the present value of the allowed return on debt cash flows from using a trailing average to set the allowed return on debt would be likely to differ to the value of the debt component of the RAB at any given point in time, does this imply that the regulatory use of a trailing average approach might be expected to:

a. Not result in an allowed return on debt over any given regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

b. Only potentially result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets (i.e. over multiple regulatory control periods)?

c. If implemented without a transition, only be likely to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if the historical average return on debt approximately equals the current return on debt in the market at the commencement of its use?

d. Where the historical average cost of debt in the market materially differs to the current cost of debt in the market, only result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if a transition (or other method such as a transfer payment) is used to effectively adjust the allowed return on debt so it is commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

e. Be likely to require a transition (so the allowed return on debt remained commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the

regulated firm in respect of the provision of fully regulated services over the life of the assets) if the decision was made to change back to an on the day approach to estimating the cost of debt in a subsequent regulatory control period?

18. In a competitive market can firms necessarily expect to recover historically incurred debt financing costs from customers irrespective of current debt financing costs?
19. Is the outcome that the regulated firms seek from immediately implementing a trailing average (without transition):
    a. Consistent with the ex-ante return that firms would expect to receive in a competitive market?
    b. Likely to lead to investment outcomes you would see in a competitive market?
    c. Consistent with a freely entered bargain between consumers and regulated firms you would expect to see in a workably competitive market?
20. Would the transition approach of the AER be expected to result in expected future allowed return on debt cash flows with approximately the same present value as the expected regulated allowed return on debt cash flows that would come from the continuation of the on the day approach to setting the allowed return on debt?
21. If you are of the view that the on the day regime would be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over individual and multiple regulatory control periods going forward, would setting a regulated allowance with a materially higher or lower present value than this be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?
22. Given that the AER's proposed allowed return on debt (with full transition) and the proposed allowed return on debt allowances (from all of regulated firms who have not applied the AER's approach) are updated by 1/10 using the observed cost of debt in the market each year:
    c. Is the mismatch risk from all alternative approaches to estimating the allowed return on debt likely to be similar?
    d. To the extent that a reduction in mismatch risk from moving to a trailing average reduces the regulated firms efficient financing costs, would all approaches be expected to provide similar reductions?

Part B.

Having regard to your answers to the questions in Part A, any background material you consider relevant, and any other matters you consider relevant, please set out an overall view with reasons in your report whether the consultant considers that the AER's approach to transition to a trailing average is appropriate. Please explain

in your report if the consultant considers the AER's transition approach would be expected to:

a) provide the regulated firms with an ex ante return on debt allowance commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to regulated firms in respect of the provision of fully regulated services;

b) contribute to providing the regulated firms with an (overall) ex ante rate or return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firms in respect of the provision fully regulated services;

c) contribute to the promotion of efficient investment in, and operation and use of, regulated infrastructure;

d) provide the regulated firms with a reasonable opportunity to recover their efficiently incurred debt financing costs

e) contribute to providing the regulated firms with a reasonable opportunity to recover their efficiently incurred (overall) financing costs.

Setting the allowed cost of debt

NPV criterion and regulated returns

The national electricity and gas objectives are to achieve efficient investment and efficient operation in the long term interest of consumers, while the revenue and pricing principles allow for the recovery, by the regulated businesses, of efficient costs including a return on capital and having regard for the costs and risks of overinvestment.[1] There is very clear criterion that can be applied to meet these requirements. That criterion is that investment in regulated assets should be a zero NPV activity.

The zero NPV investment criterion has two important properties. First, a zero NPV investment means that the ex-ante expectation is that over the life of the investment the expected cash flow from the investment meets all the operating expenditure and corporate taxes, repays the capital invested and there is just enough cash flow left over to cover investors' required return on the capital invested. Second, by definition a zero NPV investment is expected to generate no economic rents. Thus, ex-ante no economic rents are expected to be extracted as a consequence of market power. The incentive for investment is just right, encouraging neither too much investment, nor too little.

In our opinion, therefore, the allowed rate of return should be the rate of return consistent with regulated assets being a zero NPV investment. The NER rules require that rate of return be determined as a weighted average of debt and equity. The theory of finance (and common practice) is that in computing the weighted average cost of capital for use in NPV calculations it is the *current* required returns on debt and equity[2] that should be used for the WACC. Thus with respect to the cost of debt it is the current cost of debt (as currently required in the market) that should be used in the WACC, not the historic cost of debt.

We note that in order to maintain the zero NPV condition regular updating of the WACC should be undertaken. The regulatory WACC is updated every five years so there can be divergence from the zero NPV condition over the five year regulatory period. Consequently, the incentives for

[1] A more detailed discussion of the NER and NGR rules and reference to the relevant clauses of the NER can be found in Appendix 1, which contains the terms of reference.

[2] These required returns are equal to the equilibrium expected returns on debt and equity given the level of risk of the equity and the debt.

investment may change to underinvestment or over investment, during the regulatory period, but the incentive starts from the right place and soon returns to the right place when the allowed return is reset at the start of the next regulatory period.

It would be comparatively easy to update the WACC annually with respect to the cost of debt, but we anticipate that if the cost of debt went down (up) there would be submissions from the regulated businesses (user groups) expressing concerns about stability in prices and also likely arguing the case for offsetting changes in the cost of equity. The trailing average approach shifts much more gradually than the current cost of debt and so is less likely to be the subject of controversy over changes. It has the disadvantage, however, that it may be substantially different to both the current cost of debt and the actual cost that a firm incurs from following a sensible financing strategy.

Under the NER there is an allowed rate of return objective, which is that the rate of return for the regulated businesses should be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk to the regulated businesses.[3] We interpret these efficient financing costs as being the opportunity cost of capital for the benchmark efficient entity. We make this interpretation because the opportunity cost of capital is the discount rate that determines the market value of the benchmark efficient entity. It is also equal to the plain vanilla WACC measured at the current cost of debt and equity.

The use of the opportunity cost of capital is also consistent with the criterion that investment in regulated assets should ex-ante be a zero NPV activity as discussed above. Since the opportunity cost of capital is a market rate of return for assets with a given level of risk its adoption also has the advantage of rendering redundant discussion about whether we are dealing with efficient financing for a regulated or an unregulated firm.

In particular we recommend against interpreting the efficient financing costs as relating to some assumed financing strategy. For example, the trailing average approach for the cost of debt, or costs of debt actually incurred by regulated businesses. There are several reasons why we recommend against this.

[3] See Appendix 1.

First, by definition, present values and net present values should be calculated using the opportunity cost of capital to give the right incentives with respect to investment. For debt the opportunity cost of capital is the current return on debt in the capital market. Second, as we subsequently explain, it is fundamentally the assets that determine the required rate of return, rather than the portfolio of securities that have been issued by the firm. Third, as we also subsequently explain, what constitutes benchmark efficient financing practices is ambiguous. Fourth, there is likely to be conflict with the stated desirability under the NER of having consistent estimates that are common to the cost of equity and the cost of debt.[4] Fifth, because the WACC is no longer the opportunity cost of capital we lose the property that the plain vanilla WACC is a constant independent of leverage. Lastly, it can easily be demonstrated that taking a specific financing policy and using historic costs as the efficient financing costs can lead to undesirable results.

Let us demonstrate the last point. Suppose that the regulatory period is about to start and we have recently entered a high interest rate regime. The current interest rate for BBB+ debt is 11%. We emphasise that this is not an abnormally high interest rate relative to rates in recent decades. Also suppose that in the previous low interest rate regime some regulated businesses were sufficiently prescient to lock in low rates by issuing fixed rate debt with long maturities, at close to the minimum rate over the low interest regime. Other businesses that did not lock in the low rates with long maturities have substantial refinancing to undertake over the next five years.

The result for those businesses that locked in the low rates is that they now have debt with a 5% YTM, an average term to maturity of 11 years, and very little debt maturing in the next five years. If the objective is to maximise the value of equity, then locking in the low rates has turned out to be a very efficient financing practice. Therefore, let us take this to be the financing practice of the benchmark efficient entity. Thus 5% becomes the allowed cost of debt in computing the regulatory WACC.

Suppose that the current cost of equity is 15%, with the cost of debt at 5% and the regulatory weight of 60% debt this gives a regulatory WACC of 9.0%. The current WACC at market rates (the opportunity cost of capital) is 12.6%. If you invest to earn a return of 9%, when the market requires 12.6% the value of your business is going to fall. Thus, there is a substantial incentive for under-

[4] See Appendix 1

investment in regulatory assets. We doubt that any of the regulated businesses would express satisfaction with this regulatory outcome and it could be quite problematic for those businesses that have to undertake substantial refinancing during the regulatory period. Borrowing at 11% while only being allowed a cost of debt of 5% could lead to financial distress and is likely to give rise to calls for regulatory relief.

The problem with the trailing average approach is that it is substantially disconnected from current market required returns. It looks backwards rather that forwards, other than for the one tenth of the trailing average cost of debt that gets updated to the current cost of debt each year. However, since the trailing average approach resets one tenth of the cost of debt to the market rate each year, the compensation is correctly set for one tenth of the debt each year. If it is assumed that the regulated businesses refinance one tenth of their debt each year, the trailing average will offer them a fair ex-ante return on the debt financed component of the RAB in the sense that at the time of debt issue the allowed return matched the cost of debt.

A potential problem is that firms are being compensated on the basis of a financing practice, that they may not follow, having given rise to an allowed cost of debt, which may differ from that which they have incurred. This would not be such a problem if we could be sure that the chosen "efficient" compensation was the appropriate compensation. The evidence, according to Chart 1 in Chairmont (2015b), is that the AER Guideline Allowance would substantially overcompensate five of six possible alternative financing strategies for most of the period studied and for some strategies overcompensate for all of the period studied. This seems undesirable, but it would not be appropriate to generalise from this result. It may be specific to the relatively short period studied. A major problem with back-testing "efficient" financing strategies is that there is not enough data available on BBB debt to provide a long time series of results.

Value financing and hedging

By definition, a stream of expected cash flows that allows the current required return on the book value of capital invested, recovers the capital invested and covers other costs, will have a discounted present value that ex-ante is equal to the book value of the investment. Allowing this cash flow for a regulated business, the book value of the RAB will be equal to the market value of the RAB. To put it another way this cash flow gives rise to a zero NPV investment.

Consistent with our arguments, Lally (2015) demonstrates analytically and numerically that using the current required rate of return (current WACC) as the regulated return delivers cash flows that match the required return on the *book value* of investment over the regulatory period. He shows that this is true even when the life of the asset exceeds the regulatory period and even if the interest rates beyond the regulatory period, differ from the current interest rate.

Lally (2015) also explains that it is possible, depending on the debt financing practices that the regulated business adopts, that the allowed cost of debt may not match the actual cost of debt incurred by the regulated business. This is a consequence of the financing choices that the regulated business has made.

The problem of making appropriate financing decisions is common to both regulated and unregulated businesses, as is the problem that the actual cost of their debt may differ from the current cost of debt. The distinction, relative to other firms, is that regulated businesses have the choice that they can structure their debt financing so that their cost of debt matches the cost of debt used in the determination of the regulated cash flow.[5] While the regulated businesses have, in principle, the opportunity to match their actual cost of debt to that which is allowed in the regulated return, Lally (2015) points out that in practice there may be good reasons why they may choose not to do so.

Where regulated businesses choose not to exactly match their actual cost of debt to that which is allowed, they can expect to earn the regulated cash flow, on the book value of the RAB, but they are exposed to changes in the market value of equity. They can manage the extent to which they are exposed to market value changes in equity by partially hedging interest rate risk, just like any business. Hedging is a choice, but not necessarily the best choice, so not all firms will choose to fully hedge and possibly some may choose not to hedge at all.

Viewing the RAB as two investment funds

To help explain the effect of changes in interest rates and in order to clarify the meaning of statements like 'the allowed return on the debt financed component of the RAB', we will divide the regulated assets into two funds. We make an initial investment in assets and we call the sum

[5] If matching is not undertaken, the problem for regulated businesses is that their cost of debt may differ from the interest component of allowed revenue. Banks face a similar problem with respect to actual revenue.

invested the book value of the RAB. We now create the two funds. The first fund contains 60% of the initial investment in assets and we call this fund the debt financed proportion of the RAB, or debt fund for short. The second fund contains the balance of the assets and we call this the equity financed proportion of the RAB, or equity fund for short.

On the debt fund we promise to pay a rate of return that is equal to the rate we have promised to pay on the portfolio of debt securities that the regulated business has issued. We call this the actual cost of debt. If the return on the regulated assets exceeds the actual cost of debt, the surplus earned on assets in the debt fund gets transferred to the equity fund. If the return on assets is less than the actual cost of debt, then a transfer is made from the equity fund to the debt fund in order to cover the promised payment on the debt fund. Thus payoffs from the debt fund mimic payments to the debt-holders and payoffs from the equity fund mimic payoffs to the equity-holders. Consequently the value of these funds of assets (but not the value of the assets in the fund) tracks the value of debt and equity securities issued by the firm.

By definition, the combined market value of the two funds must be equal to the total market value of the assets. If the expected cash flows from the assets match the current required return in the market then the market value of the RAB will be equal to the book value of the RAB (initial investment). If the allowed cost of debt matches the market cost of debt, which in turn equals the actual cost of debt, then the book and market value of the debt fund will be equal. The debt will be equal to 60% of the assets. Also, the earnings on the assets in the equity fund plus the surplus transferred from the debt fund will exactly match the market return required on the equity fund. Thus the market and book value of the equity fund will be equal and will be 40% of the assets.

Let us suppose that the regulatory period starts in the above equilibrium. Now suppose that over the regulatory control period the cost of debt changes leading to a change in the overall required return in the market. The value of the assets then varies inversely with the cost of debt. For example, if the interest rate falls, the expected cash flows from the assets is now higher than the required return in the market, so the market value of the RAB goes up and is greater than its book value.

How the change in market value is apportioned between the debt holders and equity holders depends on the debt financing practices of the firm. If those financing practices hold the market value of the debt fund equal to its book value irrespective of the market value of the assets that

the fund contains, then all gains and losses in the market value of the assets accrue to the shareholders. If however, the financing practices are such that the market value of the debt fund can diverge from book value and change in the same direction as changes in asset value, this reduces the equity holders' share of gains and losses in asset value. Consequently the variance in the market value of equity is reduced and so is the variance in equity rates of return.

Now assume that we have reached the start of the next regulatory control period. Also assume that the current market cost of debt is lower than the cost of debt allowed in the preceding regulatory control period.

Using the on the day approach, the allowed rate of return gets reset to the current market required return, which is lower than previously allowed. Thus, the expected cash flows on the book value of the RAB are lower and match the lower market required return. Consequently, the market value of the RAB is now equal to the book value of the RAB. If the regulated business has matched its actual cost of debt to the current cost of debt (equals allowed cost of debt) at the start of the regulatory control period, then the market values of the debt and equity funds once again match book value. The expected surplus cash flow (return on assets less cost of debt) from the assets in the debt fund is just sufficient to compensate the equity holders for the increased risk created by leverage.

If the regulated business has not matched its actual cost of debt to the current cost of debt and the actual cost is higher, then the market value of the debt fund will exceed its book value. The ratio of the market value of the debt fund to the market value of the assets will be greater than 60%. Thus the market value leverage ratio of issued securities is above 60% and there has been a transfer of wealth from shareholders to debtholders. [6]

Under the trailing average approach it will only be by chance that the trailing average cost of debt matches the current cost of debt. As long as such a mismatch persists the market value of the RAB will not equal the book value of the RAB, since the expected regulatory cash flow will not equal the return required in the market. Under these conditions, if the regulated business adopts the

[6] The regulated business also gets a higher actual interest tax shield than is implied by a 60% leverage ratio at the current cost of debt. This is driven by the difference in the costs of debt incurred and assumed.

trailing average financing strategy then the market value of debt will not equal the book value of debt and the market value of equity will not equal the book value of equity.

We can further analyse the effect of the trailing average approach by splitting the debt fund into ten separate funds. On the first fund we promise to pay the current rate of interest and the fund has ten years to run before the rate is reset, on the second fund we have promised to pay the rate of interest observed last year and the fund has nine years to run before the rate is reset, on the third fund we promise to pay the rate of interest observed two years ago and the fund has eight years to run before the interest rate is reset, and so on. The first fund will have a market value equal to the book value, but other than by chance this will not be the case for the remaining funds.

If the regulated business has followed a trailing average financing strategy then its actual cost of debt will match the cost of debt allowed. However, because the book values of each fund are likely to differ from their market values the market value of the debt funds in aggregate is likely to differ from their book value in aggregate. Consequently, the market value leverage ratio of the regulated business is most likely to differ from 60% and so the cost of equity will diverge from that assumed at a 60% leverage level.

Choice of Financing Practices

Unlike the principle that investment ex-ante should have a zero NPV, the concept of efficient financing practices is not so easy to pin down. The discussion of financing practices and regulatory returns, risks falling into the trap of presuming that it is the nature of financing, rather than the nature of the investment that determines required returns. As explained below what fundamentally causes the returns that are required on the firm's portfolio of issued securities is the nature of the firm's investment in assets.

The finance literature is quite clear that the firm's financing choices (historic or current) do not determine the required return on debt to be used in determining the NPV of investments. Indeed the fundamental principle is that what drives the required return on the investment is the risk of the assets and this determines current opportunity cost of capital. The portfolio of securities issued by the firm inherits the risk characteristics and expected net cash flow from the assets. This is because it is the assets that generate the cash flow that goes to the security holders. However,

there is considerable confusion on the point that it is the assets, not financing, that drive the required return.

The confusion arises because the required return on the assets is conveniently measured as the required return on the firm's portfolio of issued securities. Because the required return is measured from the portfolio of securities there is a tendency to mistakenly believe that causality flows from financing to assets, rather than the other way round. The reality is that if the assets are high risk the required return on the firms' portfolio of issued securities will be correspondingly high and vice versa if the assets are low risk. The fundamental principle, therefore, is that it is the nature of the assets that determines the return that should be earned on the assets, not the way those assets are financed.

Financing choices do have some impact on asset values because of market imperfections and frictions, most notably because of tax effects, but these are usually considered to be second order effects. The most important driver of cash flows, value, risk and required returns is the nature of the investments that the firm makes.

Efficient financing practices

In a world of perfect financial markets with no taxes, no transactions costs and full information, financing practices are a matter of no consequence since they do not affect the value of the firm, and the WACC is a constant independent of financing. This is the famous Miller Modigliani capital structure theory. Neither the level of the debt, nor the maturity structure of the debt matter. In this world of perfect markets all financial practices are equally efficient.

In the real world we don't have perfect markets we have imperfections. These include taxes, transactions costs, costs of financial distress and information asymmetry. The latter means that conflicts of interest are not readily resolved and this gives rise to agency costs. Because of these factors debt financing practices do matter, but despite over 50 years of extensive debate in the finance literature, what constitutes the optimal debt financing practice is still unresolved.

There is another important point to make. The importance and magnitude of taxes, transactions costs, costs of financial distress, information asymmetry and conflicts of interest differ across firms. Thus a set of financing practices that are efficient for one firm will not be efficient for all firms. Efficient financing practices, whatever they are, will differ across firms. It may be possible

to list which imperfections will be important for the benchmark efficient entity, but not how trade-offs will be made between the imperfections in formulating the efficient financing practice.

In the light of the foregoing discussion, we argue that it is impossible to define what constitutes an unambiguously efficient choice. However, it is possible to specify financing practices that can be sensible for a regulated business to adopt. For example, in Chairmont's (2015a, p19) alternative financing strategy comparisons they use the AER's definition of efficient financing practices (EFP) as follows:

"a) EFP 'on-the-day' are:

i. borrow long term (10 years) and stagger the borrowing so that only a small proportion (around 10 per cent) of the debt matures each year;

ii. borrow using floating rate debt (or to borrow fixed rate debt and convert this to floating rate debt using fixed-to-floating interest rate swaps at the time of issuing the debt and which extended for the term of the debt, being 10 years);

iii. enter into floating-to-fixed interest rate swaps at, or around, the time of the service provider's averaging period and which extended for the term of the regulatory control period (being typically 5 years); and

iv. the averaging period flexibility is 5 to 40 business days ending no later than 20 March 2009. The exact dates were nominated by the service provider.

b) EFP for the 'trailing average' is to have a staggered portfolio of 10 year fixed rate debt.

i. The averaging period flexibility8 is to be 10 business days to 12 months. The exact dates are to be nominated by the service provider.

c) EFP for the transition is, in respect of:

i. new debt, to borrow long term (10 year) and stagger the borrowing so that only a small proportion (around 10 per cent) of the debt matured each year; and

ii. existing debt, to engage in hedging its exposure to interest rate (mismatch) risk by swapping each of its prevailing floating rate debts into fixed rate debt for the remaining term to maturity. For example, existing debt with two year to maturity would be swapped into two year fixed rate debt; existing debt with three year to maturity would be swapped into three year fixed rate; and so on.

d) The averaging period flexibility is for:

i. year 1 (2014–15) of the 2014–19 regulatory period, 10 business days to six months ending no later than 30 June 2014; and

ii. years 2 to 4 of the 2014–19 regulatory period, 10 business days to 12 months.

The exact dates are to be nominated by the service provider for both (i) and (ii)."

These alternative practices seem to be sensible choices under the three different regulatory scenarios, if the objective is matching the actual cost of debt to the allowed rate of return on debt. They also provide for some management of refinancing risk. However, whether these practices are the optimal efficient practices depends on the objectives to be achieved by the benchmark

efficient entity and how trade-offs are to be achieved between different objectives.[7] Efficient financing practices consist of more than hedging the regulatory rate of return and maturity matching. In hedging, there is also a decision to be made about whether to minimise the variance of an asset's value, or to manage tail risk.

Financing practices objectives and trade-offs

An efficient debt financing practice needs to be defined relative to an objective. For example to maximise the value of equity. Unfortunately, there is no agreed prescription of which debt financing practices would achieve this objective.

It is clear from the statements of treasury officers from the regulated businesses, and from the observably staggered nature of their debt financing, that the regulated businesses consider controlling refinancing risk to be particularly important. This is consistent with increasing firm value by reducing the present value of expected bankruptcy costs.[8]

Refinancing risks could be eliminated by matching the maturity of assets and the maturity of debt and some of the treasury officers from the regulated businesses have mentioned the desirability of doing this. However, they have also explained that one reason for not doing so is cost.[9] Long term debt is typically more expensive and is considered too costly. This in turn implies a view on interest rates, which is that they embed a liquidity premium increasing with maturity and that consequently rolling over shorter term debt is expected to be cheaper than borrowing long. So financing practices in this case depend on more than one objective and also on an implicit interest rate forecast.

We now have two objectives to achieve, minimising refinancing risk and minimising the cost of debt. As a consequence of more than one objective, there is a trade-off being made. What is the efficient trade-off? This depends on the overarching objective, which we take to be value maximisation. In principle then, the efficient trade-off is where the value gains from the reduction in the present value of expected financial distress costs from extending the debt maturity is equal

[7] As it turns out they would have been a poor choice for maximising the value of equity over the period that Chairmont studied.
[8] The expected bankruptcy costs are lower because of a lessening of the probability of financial distress.
[9] Another reason is the lack of liquid debt markets to supply debt with the very long maturities involved in electricity transmission networks and gas pipelines.

to the present value of the extra liquidity premium costs of the longer maturity debt. Unfortunately, measurement problems render this unlikely to be useful as a regulatory rule for identifying efficient financing. Additionally, there is the alternative of reducing refinancing risk by staggering the maturity of debt so that only a small fraction falls due in a given year, there is also the possibility of employing standby lines of credit. Thus, the trade-off becomes increasingly complicated and harder to specify.

Further complexity is added by the desirability of diversifying sources of debt across different markets, decisions about the extent to which interest rate and currency risk should be hedged, the difficulties in hedging the debt risk premium, reducing this premium through credit enhancement such as credit wraps, the trade-off between covenant restrictions and the debt risk premium, and so on. Ideally, all the trade-offs would be written down mathematically as an optimising problem and the optimal solution obtained. In practice, however, this is not feasible and that means the chosen financing practice is a matter of judgement. Unfortunately, the judgement of different experts may well result in different recommendations for a given firm and the practices judged appropriate are also likely to vary across firms.

Financing practices and forecasting

The choice of a financing practice involves implicit or explicit interest rate forecasts. Depending on our forecast of future interest rates we might consider different sets of financing practices to be efficient. For example, the treasury officers' statements that lengthening debt maturities to better match asset maturities was too costly, are based on a particular view of the term structure of interest rates and an implicit forecast of future short term interest rates.

The question about what stochastic process (SP) one believes is the true model for interest rates is an important issue within this context. The nature of the stochastic process also helps determine whether the current (on the day) rate will provide a better forecast of rates over the next five years than the ten year average. Consider first a conventional SP such as an ARMA (autoregressive moving average) process, then we would want as much data as possible to estimate the five year ahead forecast and so the past 10 year average would be a more suitable forecast than the on the day rate.

Now suppose we have a regime-switching model where for simplicity we consider the case of two regimes, one regime being high rates and the other being low rates. Suppose we are currently in the low rate regime and the transition probability of moving into the high regime over the next 60 months is known to be very low based on information on current economic policy. Suppose also that over the last 10 years virtually all the time was spent in the high regime. Then in this case, the 10 year average will provide a very poor forecast of the next 5 year's average rate and the current rate would provide a better forecast.

We should also mention that there are several models of the term structure of interest rates, many of which are based on a model of the current (spot) rate and also have the property of being Markovian. This means that the only conditioning information is the most recent spot rate. However, the well-known Heath Jarrow Morton model is non-Markovian, which means that the interest rate process is path dependent.

We could go on, but we think the point is made. Considering the alternatives for interest rate forecasts increases the ambiguity in defining what constitute efficient financing practices.

The financing choices of regulated businesses

We expect that the financing practices that regulated businesses actually chose are those that they believe to be ex-ante efficient.[10] This is expected, because regulated businesses have no significant market power with respect to financial markets and efficient (value maximising) financing practices are in their own self-interest.[11] The diversity of financing practices observed for regulated businesses suggests that either, there is no well-defined overall optimal practice, or as expected the optimal practice is firm specific.[12]

Matching of the actual cost of debt to the regulatory allowance has been a substantial discussion point in the submissions and reports to the AER. In our opinion, where firms choose not to adopt financing practices that ensure matching of their actual costs of debt with the cost of debt used

[10] Whether they actually are ex-ante efficient depends on the objective and how good regulated businesses' judgements are.

[11] We take this self-interest to be value maximisation, but we recognise that hedging can give rise to agency costs because it can be more in the interests of mangers than owners.

[12] Optimal financing practices may differ across firms, but nonetheless may still be difficult to precisely define for each firm.

in regulation, they do so because they believe that the benefit of not matching, relative to matching, is positive. Just as any unregulated firm that choses to fully, or partially hedge, their currency or interest rate risk rationally does so if they believe that the value benefit from hedging outweighs the costs of hedging. This suggests that the costs are covered by the value enhancement that results. This weakens any argument for additional compensation via regulatory allowances.

In the context of efficient financing choices and a discussion of the principles of the national electricity laws and rules, Chairmont (2015a, p14) state: "These principles are important in the current considerations because they highlight the need for regulations to allow flexibility of behaviour by individual NSPs, and for the impact of those individual decisions to be borne by the NSP. If their flexibility leads them to profit beyond the benchmark they should not be penalised and if it leads to loss they should not be compensated." In our opinion this puts the position well.

Specific questions posed by the AER

PART A

1. We consider an allowed return on debt that results in zero expected excess returns should reflect the 'efficient cost' of debt in the market. Is this a reasonable assumption consistent with finance theory?

In answering this question we take it that zero expected excess returns is intended to be interpreted as zero expected abnormal returns. We make this interpretation because of the context. In finance the term excess returns usually means the difference between the return on an asset and the risk free rate. When prices are in equilibrium this difference is compensation for risk. Thus, risky debt is expected to earn a risk premium, but in equilibrium it not expected to earn an abnormal return, that is a return greater than that required to compensate for the level of risk.

Consistent with finance theory, zero expected abnormal returns means an ex-ante zero NPV investment and we take the 'efficient cost' of debt to be the current required market return on debt. Under these circumstances the answer to question 1 is clearly yes.

Alternatively, we could interpret the question as asking, what is the cost of debt that gives an efficient price to the debt? In finance theory an efficient price is a price that makes purchasing the debt a zero NPV investment, thus giving zero abnormal returns. Setting the allowed return on debt equal to the current required return in the market makes purchasing the debt a zero NPV investment. So the answer to question 1 is again yes and the efficient cost of debt is the current required market return on debt.

2. Can the current (that is, the 'on the day') YTM on debt (of a given credit rating and maturity) observed in the financial markets be considered a valid measure of the 'efficient cost' of debt financing of this credit rating and maturity?

Based on our answer to 1 above and our earlier discussion, particularly in the section on the NPV criterion and regulated returns it is clear that the current ('on the day') cost of debt is a valid and widely used measure of the 'efficient cost' of debt financing for a given credit rating and maturity. The current cost of debt is generally measured by the yield to maturity, preferably in an active and liquid market. However, there is a caveat on the use of the YTM for this purpose.

The YTM overstates the required return on risky debt, since it is higher than the equilibrium expected return. This is because the YTM is calculated as the discount rate that equates the present value of the promised cash flows to maturity to the current price. Thus, the YTM is based on the promised return, as opposed to the expected return. The promised return exceeds the expected return for risky debt because of default risk. Thus, the promised return has to be higher than the expected return in order to ensure that after allowing the expected loss due to default the investor earns their expected return.[13]

The cost of debt as measured by the YTM is thus upward biased. However, this effect is commonly ignored. It is often assumed to be small and in the context of other potential sources of inaccuracy in estimating the WACC may not be a major concern. However, this is not always the case, particularly for less well rated debt. If this built in over-allowance was to be addressed as part of the regulatory process it would likely be a difficult and contentious issue to resolve.[14] We also

[13] This can also be thought of as the price that the shareholders have to pay for the option to default.
[14] Conceptually we require the discount rate that equates the expected cash flow on the debt to the current price. This requires an estimate of expected cash flows on the debt. Alternatively we might try and decompose the excess return (credit spread) on the debt in order to extract the component for default risk. We might also try and price the option to default.

note that Moody's (2007) evidence is that the recoveries in defaults by regulated utilities average 90% or so. In which case the expected return is not much below the promised return.[15]

3. Assuming the credit rating and term are chosen appropriately, will the current YTM be expected to be commensurate with the efficient debt financing costs at the commencement of the regulatory control period for a benchmark efficient entity with a similar degree of risk that which applies to the regulated firm in respect of the provision of fully regulated services?

At the commencement of the regulatory control period the efficient cost of debt for any firm, including the regulated firm, is the required current market return on debt with a similar degree of risk. It is the opportunity cost of debt capital.

As explained above the YTM tends to overestimate the cost of debt r_d, but is generally considered to be a satisfactory approximation to r_d. Subject to this qualification our answer to question 3 is yes.

4. Would setting the current 'on the day' YTM on debt with an appropriate term and credit rating as the allowed return on debt (assuming the rest of the WACC input parameters are set consistently with this), be expected to lead to reasonably efficient investment in and use of regulated infrastructure?

Yes, subject to our earlier caveat on YTM. For new investments, setting the current 'on the day' YTM on debt with an appropriate term and credit rating as the allowed return on debt (assuming the rest of the WACC input parameters are set consistently with this), will give rise to an ex-ante expected return equal to the required return in the market.

Given that, at the start of the regulatory control period, the current required rate of return on debt is r_d and the current required return on equity is r_e then the firm must earn the WACC on the RAB in order to make investments zero NPV. Note that for the purpose of computing NPVs the WACC must be calculated using the current costs of debt and equity.

[15] Moody's point out this high recovery is probably because defaults were strategic in order to obtain regulatory relief.

Earning the WACC on the RAB will enable the regulated entity to support a return of r_d on the debt financed component of the RAB and r_e on the equity financed component of the RAB. This will maintain the current market value of the RAB unchanged and equal to book value.

To put it another way investments will earn their opportunity cost of capital. That is they will earn the same return as equivalent risk investments in financial markets. New investments will have an NPV of zero and there will be no ex-ante economic rents on new investment. As explained earlier the incentive for investment is just right, encouraging neither too much investment, nor too little.

5. Assume the regulator sets an ex ante PAR YTM on the debt proportion of the RAB at the start of the regulatory control period (based on BBB+ credit rating and ten term to maturity) over the five year regulatory control period combined with the expectation of then resetting the YTM to PAR at the start of the next and subsequent regulatory control periods (also based on a BBB+ credit rating and 10 year term to maturity)

Having regard to: 1) in the past regulated firms may have frequently issued debt with a maturity of approximately 10 years and swapped the base rate to match the regulatory term (typically 5 years), 2) the AER had not explicitly compensated firms for transaction costs associated with hedging instruments, and 3) the past shape of the terms structure of bond yields and swap rates:

a. Approximately what ex ante return on the debt proportion of the RAB might be expected over the regulatory control period for regulated firms under this approach?

In order to answer this question we must assume that we separate the assets in the RAB into two funds, one for the debt holders and one for the shareholders in the proportion of debt and equity financing. These funds represent the debt financed proportion of the RAB and the equity financed proportion of the RAB, respectively. By the definition of the WACC, we can promise an ex-ante return on the debt fund over the control period equal to the par YTM of a 10 year BBB+ debt, and we can offer an expected return on the equity fund equal to the allowed cost of equity.

As we have noted before, the YTM being a promised yield is technically higher than the expected return, but even when utilities default the evidence is that recovery rates are high, so the

difference between the promised and expected return for utilities is probably small. Thus, the expected return on the debt financed component of the RAB is approximately the current yield on BBB+ bonds with 10 years to maturity.

We used the device of two funds above because it is usual to take a pool of funds approach and if the expected return on assets is 10% then each dollar of assets is expected to earn a 10% return. In terms of distributions of this 10% return to security holders, debt service gets paid first and then what is left over goes to equity.

b. Would this ex ante allowed return on debt be expected to be commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period?

We have defined efficient debt financing costs to be the opportunity cost of capital for the investment. The BBB+ credit rating and ten year term to maturity, measured at the start of the regulatory control period, provides a measurement of the opportunity cost of capital for debt that is appropriate for use in computing the opportunity cost of capital for the investment. So our answer to this question is yes.[16] We note that for the reasons we discussed earlier about hedging being a choice and that it is rational to hedge when the benefits outweigh the costs we would not consider the transactions costs of hedging to be part of efficient financing costs that should be compensated by a regulatory allowance.

Allowing this cost of debt on the RAB will provide an expected return commensurate with the opportunity cost of capital, which is efficient. Combined with an appropriate allowed cost of equity we expect the book and market value of the RAB to be equal and we expect the book value and market value of the debt financed component of the RAB to also be equal.

[16] Chairmont (2015b) argue that following the financing strategy described in question 5, there is a small gain for the equity holders as with an upward sloping term structure, the actual cost of debt over the five years will be lower than the allowed cost of debt which is based on a ten year maturity.

c. Would this approach to setting the allowed return on debt be expected to result in a return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over multiple regulatory control periods and/or over the life of the regulatory assets?

The answer to this question is yes. Matching of the opportunity cost of capital to the allowed return is achieved at each reset of the regulated return. Thus the logic that applies in question b above is repeated in each regulatory period.[17] In this case investors expect to earn the market required return on book value. That return will be expected to cover the required returns on debt and equity and the market values and book values of the RAB will be equal. Lally (2015) provides an analytical and numerical illustration of this result over several regulatory periods.

6. In relation to losses or gains on financial liabilities from movements in market interest rates:

a. Are losses or gains on a financial liability from movements in the market YTM substantively incurred when the YTM changes (i.e. as soon as the present value of the expected value of the liability changes)?

The short answer is yes. The prices in financial markets are forward looking and anticipate the future cash flows. The price today is equal to the present value of expected future cash flows. Thus, if either the expected future cash flows change or the discount rate changes today, then the value changes today.

Consequently, when the market's required YTM changes the value of the debt changes at the time of the YTM change. The substantive gain or loss in the resulting value change of the debt arises at the time of the change in the YTM.

The change in the market value of the debt affects the value of equity via the accounting identity expressed in market values.

Market value of assets = Market value of debt + Market value of equity.

[17] We note that our comment at part b about hedging being a choice and that the costs should not be compensated by a regulatory allowance also applies over multiple regulators periods.

Thus for a given market value of assets, if the market value of debt goes down, the market value of equity increases by a corresponding amount and the market value leverage ratio declines reflecting the relatively greater share of the value of assets now accruing to the equity holders. However, changes in the market value of debt induced by changes in interest rates also affect the market value of assets. In this case the gains and losses on the value of assets are shared by debtholders and equity holders depending on the firms' debt financing practices. This sharing of gains and losses does not affect the timing of the change, the gains or losses occur at the time the YTM changes.

An intuitive explanation for the effect on shareholder wealth is as follows. Suppose the firm has issued fixed interest debt which traded at par value and then interest rates rise. The market value of the debt falls. The shareholders could now buy the debt back in the market at below par value. Alternatively, they can keep the debt on issue and pay lower interest than the prevailing market rate. Either way the shareholders gain at the expense of the debt holders.

b. Does the fact a firm may realise a fair value loss, or realise a fair value gain, from future cash flows being different to the current cost of debt in the market rates alter that the substantive loss was made when the cost of debt in the market (i.e. discount rate) changed?

The short answer is no. In a mark to market system with daily marking to market, such as in futures markets, the fair value loss or gain will be recognised on the day it occurs, which is when the discount rate changed.

c Is the concept that losses (or gains) on financial liabilities substantively occur once interest rates move consistent with the principles underlying fair value accounting?

According to the accounting standard AASB13 fair value accounting is defined as follows:
"This Standard defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date." AASB (2011, p10).

Thus fair value accounting is based on making measurements at market value, rather than the value to a specific entity. The losses (or gains) on financial liabilities are captured in market values and occur substantively at the time interest rates move. However, what is specific to the entity is

the measurement date. Hence fair value accounting may not be timely, since the measurement is not made when value changes occur, but at the measurement date.

With daily marking to market as in futures markets timeliness is not a substantive issue. However, with accounting reports only appearing periodically fair value changes will be reported with a lag and only the net effect of market value changes over the accounting period will be reported. Thus, if there have been no further changes in expected cash flows or required returns since the date of the original value change, then the loss or gain recognised in the accounts will be of the same magnitude as the value change that originally occurred. If there are multiple changes in market value over the reporting period, the end of period fair value accounts will reflect the cumulative net effect of the market value changes. Since the changes in value are not reported when they occur this is consistent with the old adage that accounting numbers are value relevant, but not timely.

d. Has any loss or gain on a regulated firms debt portfolio from movements in interest rates in prior regulatory control periods been incurred in those prior regulatory control periods?

Yes, as in the answers questions above, changes in the value of a regulated firm's debt portfolio value occur when the market interest rates change. These changes lead to increases or decreases in the market value debt, which in turn affect the market value of the equity of the regulated firm at the same time as the market value of the debt changes.

e. Once "mismatch" risk on a regulated firm's financial liabilities has eventuated from interest rate movements (i.e. a fair value loss or gain has occurred), can it be hedged?

Once the change in value has occurred the original event cannot be hedged. We cannot change the past. Hedges have to be put in place before the events to be hedged have occurred.

7. Consider where a firm is exposed to and makes a gain or loss on its issued debt due to 'mismatch' risk (either in relation to the whole cost of debt or a component such as the risk premium over swap).

   a. Does this impact whether the firm ex ante received a return on debt over the regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

Under the on the day approach firms have the ex-ante opportunity to earn the benchmark efficient return on the assets. That benchmark efficient return is consistent with being allowed to earn the opportunity cost of debt on the debt financed portion of the RAB and the opportunity to earn the cost of equity on the equity financed proportion of the RAB. This is not affected by whether or not the firm has a 'mismatch' risk.

What is affected by mismatching is whether the actual cost of debt resulting from the firm's financing choices matches the allowed cost of debt. Financing choices that turn out well ex-post will give the firm a cost of debt lower than the allowed cost and vice versa. In turn this will increase, or decrease, the return to equity and also the market value of equity. All this however is a consequence of the firm's financing choices, not the return it was allowed to earn. However, ex-ante, in an efficient market financing choices are expected to be a zero NPV activity. Beating the market is not expected and therefore setting an allowed cost of debt equal to the current cost of debt will ex-ante offer a return on debt over the regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services

b. Do losses or gains incurred from mismatch risk affect whether continuing the on the day regime should result in an expected return commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period, or over multiple future regulatory control periods, or over the remaining life of the regulatory assets?

In the light of prior answers and the introductory analysis in this report the answer to this question is no. Over multiple regulatory periods, the regulated business can earn the opportunity cost of capital on the assets, including the opportunity cost of debt. However, there is no guarantee that allowed return on debt matches their specific choices about debt financing. Consequently the specific financing choices made by the regulated businesses can give rise to mismatch risk that results in gains or losses.

The financing choices that the regulated businesses make do not affect whether continuing the on the day regime should result in an expected return commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period, or over multiple future regulatory control periods, or over the remaining life of the regulatory assets. Continuing the on the day regime allows a cost of debt that matches the opportunity cost of capital, which is consistent with earning an expected return commensurate with the efficient debt financing costs of a benchmark efficient entity.

c. Would potential losses or gains from mismatch risk place an incentive on regulated firms to efficiently manage their exposure to interest rate risk?

The answer to this question depends on the definition of efficiently managing exposure to interest rate risk. Hedging reduces the downside, but also reduces the upside. Hedging can be directed to minimising variance in value, but it can instead be directed to avoiding extreme outcomes (tail risk). If hedging is considered desirable it can be undertaken by the firm, but it can also be undertaken by the equity holders.

Assuming the firms comparative advantage is in its operations as an NSP rather than in financial markets and that any hedging is to be undertaken by the firm rather than the equity holders, then

the potential for losses or gains from mismatch risk is likely to focus firm's attention on efficiently hedging this risk.

In relation to the trailing average methodology to set the allowed cost of debt and transition:

9. Would a cost of debt estimated as a 10 year historical trailing average portfolio (i.e. estimated using a trailing average approach) normally be considered an appropriate estimate of 'efficient' debt financing costs today in either finance theory or by market practitioners?

A historical trailing average is just that, a record of history. Finance is forward looking, what is relevant for practitioners valuing assets and securities and making investment decisions are the spot and forward interest rates in the market. Our conclusion with respect to both finance theory and practice is that a ten year historical trailing average is largely irrelevant, except perhaps in some interest rate forecasting models. We would not consider it to be an efficient debt financing cost today.

10. Would a trailing average approach produce a regulatory allowance that would normally be expected to result in efficient investment incentives where the current market cost of debt is materially lower or higher than the historical average?

As explained in our introductory comments to this report efficient investment incentives come from using the current cost of debt as input to the WACC. Where the current market cost of debt is materially higher (or lower) than the historical trailing average there is an incentive for underinvestment (or overinvestment). This may lead to an incentive for game playing to exploit this situation.

11. On average, would a trailing average approach produce a regulatory allowance that would result in more efficient investment in, or use of, regulated infrastructure relative to the continued use of an on the day approach?

In the light of the answers to previous questions and our introductory discussion it is very likely that that there will be a worse outcome with respect to efficient investment in, or use of, regulated infrastructure using a trailing average approach relative to an on the day approach. In

short, the use of a trailing average approach is likely to distort investment incentives, making investment less efficient

12. Would the regulatory use of a trailing average approach be expected to materially reduce the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services relative to an on the day approach?

In terms of financing, the trailing average approach will change the financing behaviour of those firms who seek to match their cost of debt to the regulatory allowance and it may change the financing behaviour of other firms by creating as yet unrecognised opportunities for regulatory arbitrage. It is clear that there will be strong incentives for the regulated businesses to argue for the trailing average when, as now, the trailing average cost of debt is materially above the current cost of debt. Equally we would expect arguments will be advanced against the trailing average when it is materially below the current cost of debt.

It is difficult to see how the use of the trailing average will materially reduce the financing costs of firms since such costs are primarily driven by the assets the firms invest in, as explained earlier. Financing can have second order effects and the change to a trailing average might allow some minor reductions in transactions costs associated with hedging. However, we see no obvious mechanism for the trailing average regime to materially reduce financing costs.

13. If expected reductions in efficient financing costs from the use of a trailing average might be material:

a. would these be expected to result from efficiencies, or
b. would any reductions in the efficient financing costs likely primarily reflect a transfer of priced risk to consumers

As discussed at question 12, we would not expect the use of a trailing average cost of debt to result in material reductions of the cost of financing relative to the on-the day approach. We would expect the immediate implementation of the trailing average approach in the current environment to represent a large wealth transfer from energy consumers to the owners of the regulated businesses.

14. Would the immediate implementation of a trailing average (i.e. without transition) effectively remove interest rate risk that regulated firms bore in prior regulatory control periods under the on the day approach to setting the allowed return on debt (to the extent they did not hedge this risk) ex post the risks occurrence?

Under the prior regime the interest risk that firms bore if they did not hedge the risk was that the regulated return they were allowed on debt and their actual cost of debt would diverge. If the regulated allowance was higher this would be good news for equity, but if lower that would be bad news. Thus firms may have made gains and/or losses in prior regulatory control periods depending on the particular financing decisions that they made historically.

The 10 years previous to the current regulatory control period have been a relatively high interest rate regime. The current regulatory control period is a relatively low interest rate regime. Thus the use of the 10 year trailing average rate without transition will deliver a windfall gain to the regulated firms since the cost of debt allowed will be above the current market cost and the allowed WACC will be above the opportunity cost of capital. Under this arrangement gains from bearing the previous period's interest risk are still there as are losses, but there is now a windfall gain from the immediate switch to the trailing average.

In our opinion, it is a concern that firms will get windfall gains potentially reflecting an assumed set of financing practices that they did not follow and based on an assumed set of costs which differ from the costs they actually incurred. However, the past bearing of interest rate risk and the regulatory change are not events that have a direct causal link.

While the past bearing of interest rate risk and the regulatory change do not have a direct causal link, the regulatory change clearly presents incentives to regulated businesses to maximise the benefit from the change. Had the previous regime continued the mismatch risk that the regulated business incurred would have depended on the financing choices they had previously made as would any resulting gains or losses. There would have been no prospect of reversal from a switch in regulation. Now, however, there is an incentive to argue for immediate implementation of the trailing average and thereby offset prior mismatch losses, or extend prior mismatch gains.

15. Take as given that a 10 year historical average of the BBB 10 year YTM on debt is around 7.8% and the current BBB 10 year YTM is less than 6.5%. Given this, would an immediate movement to a trailing average (that is, without transition) be expected to result in:

a. A materially higher expected return on debt allowance in present value terms (over both the upcoming regulatory control period and over the remaining life of the assets) than if the on the day regime continued to be used to set the allowed return on debt?

This situation would lead to substantially higher expected return on debt allowance in the upcoming control period relative to the on the day regime. On the figures given, for one billion dollars of debt the allowed return for the first year will be $78 million per year and the required cash flow for debt service at current interest rates would be $65 million. How this evolves over the regulatory control period and beyond will depend upon how interest rates evolve, but the difference between the allowed and current interest rates is expected to remain substantial and positive for some time. If for example the current difference were sustained for the regulatory control period that would be a present value of $54 million per billion dollars of debt.

The term structure of interest rates on government bonds is relatively flat. While for BBB bonds it is even flatter, according to the yields for March 2016 published by the RBA. BBB bonds with a 3 year tenor have a yield of 5.11%, while 7 and 10 year tenors both have a yield of 5.37%. The current expectation, therefore, is for future interest to remain low. Consequently, the trailing average return is expected to decline as the higher interest rates from previous regulatory periods are replaced by the expected low rates in the current and subsequent period. However, it will probably be well into the second regulatory period before the trailing average and the current rate are expected to get close in magnitude.

The assets held by the regulated company include assets with potential maturities of 30 years or more. Thus the result over the life of regulated assets depends upon the term structure going forward over very long horizons relative to a 10 year moving average at any point in time. It seems unlikely that we could obtain reliable data for forward interest rates on BBB debt much beyond the current ten years so any forecasts of the relation between the trailing average and future interest rate would be speculative. It would be possible to examine historical data to compare these two quantities but unfortunately this exercise would not inform us as to what will happen

in the future within any degree of certainty. Therefore, a neutral forecast of zero net gains and losses beyond 10 years seems to be the best that we can do.

Whatever subsequent interest rates turn out to be, it can be said beyond reasonable doubt that there is a substantial present gain in wealth for equity holders in the regulated businesses, that would arise from an immediate switch from the on the day approach to the trailing average approach. There is a clear expectation of a significant cash flow benefit for some years into the future, which when discounted at the current interest rate would have a substantial present value. Across the regulated assets of the Victorian NSPs this would be likely to be a current wealth transfer of several hundred million dollars from consumers to the equity holders in the regulated businesses. The use of the higher historical rate of return effectively results in an allowed rate of return above the efficient costs and this is inconsistent with achieving the ARORO. In particular the substantial wealth transfer hardly seems consistent with the long term interests of consumers.

b. Expected future cash flows from the return on debt allowance having a materially higher present value than the current value of the debt component of the regulatory asset base to which the allowed return on debt is applied?

The expected cash flows will increase since the regulated return is higher, while the market discount rate has gone down. The result is that the allowed cash flows on the debt financed component of the RAB will have a present value that is materially higher than the current book value of the debt financed component of the regulatory asset base to which the allowed return on debt is applied

c. An allowed return on debt above the efficient cost of debt over the upcoming regulatory control period and/or over the future life of existing regulatory investments?

Taking the efficient cost of debt to be the current cost of debt, then clearly the allowed return on debt over the upcoming regulatory period is expected to be higher than current cost of debt. The result is therefore overcompensation in the regulatory allowed return for the upcoming regulatory period. As discussed under point 15 a, this situation is expected to persist into the next regulatory control period. Beyond that it is difficult to say with any certainty. However, it can be

said that since the trailing average and current cost of debt will only coincide by chance there are likely to be ongoing mismatches in the allowed cost of debt and the opportunity cost of funds.

d. Providing an allowed return on debt to the regulated firm with a materially higher value than the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

The answer to this question is very similar to the point above (15c). Our recommendation is to set the benchmark efficient financing costs for debt to be the current market cost of debt at the regulatory reset date. In this case the allowed rate of return based on implementation of the trailing average with no transition will be materially higher than the efficient debt financing costs of the benchmark efficient entity. This is inconsistent with the ARORO and seems unlikely to be in the long term interests of consumers.

e. An occurrence of material regulatory risk relative to prior investor expectations?

It is very unlikely that the switch in regulatory practice to a ten year trailing average would have been anticipated ten years in advance of the change. Indeed, until the process of revisions to the regulatory guidelines was commenced it is probable that there was little or no anticipation of a change in determining the allowed cost of debt. Such a switch, therefore, represents a shock to investors' prior expectations of future cash flows. A change of 1.3% in expected cash flow on 60% of the assets is a material effect and would have a substantial impact on asset values. It can therefore be regarded as a material regulatory risk. In this case the effect on asset values is positive. Had the effect been reversed we anticipate that there would have been substantial objections to the change from the regulated businesses.

f. Undermining of regulated firms' incentives to manage the interest rate risk they face?

As we argued earlier (see the section with the heading "Value financing and hedging") we expect firms to pursue efficient debt financing practices as this is in their self-interest. The regulated businesses invested in the past on the basis of rates being reset to current market returns under the on the day approach and they could be expected to bear the consequences of the risks they took in their financing decisions. Thus if they adopted policies that led to an ongoing commitment

to service loans at the previous higher interest rate, that was a risk and resulting loss that the regulated business bore. An immediate switch to the trailing average regime would reverse that result as the cost of the prior high interest rates would now be borne for a second time by consumers. Since the adverse consequences of prior risk to regulated business would be mitigated this might induce less concern about the management of interest rate risk.

Going forward, under the trailing average approach the regulated interest rates change more slowly than actual interest rates. Only one tenth of the current interest rate gets factored into the trailing average rate for the current period. As a consequence of the small changes period by period in the trailing average rate, regulated businesses may be more relaxed about exactly matching their actual interest rate to the regulated rate.

16. If the regulatory debt allowance is set using a trailing average approach, would this allowance (i.e. future expected allowed return on debt cash flows under this approach) be likely to have a different present value to the value of the debt component of the regulatory asset base (RAB) at any given point in time?

It will generally be true that the market value of the debt financed proportion of the RAB will differ from the book value as previously discussed due to the likely difference between the trailing average rate and the current rate of interest.

17. If the present value of the allowed return on debt cash flows from using a Trailing Average to set the allowed return on debt would be likely to differ to the value of the debt component of the RAB at any given point in time, does this imply that the regulatory use of a Trailing Average approach might be expected to:

a. Not result in an allowed return on debt over any given regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

We have defined efficient debt costs to be the current spot rate, since this is consistent with zero NPV investments and as we have argued any other definition of efficient financing costs is ambiguous. Furthermore discounting at the spot rate will ensure that the present value of the cash flow to the debt financed component of the RAB will equal the book value of the RAB.

The question therefore is whether over the regulatory control period the trailing average matches the spot rate. This is unlikely. It is clear in the current situation that the trailing average will very likely not match the spot rate at any point during the regulatory control period, and we expect this will be a relatively common occurrence. Thus, the regulatory use of a trailing average is likely not to result in an allowed return on debt over any given regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services.

b. Only potentially result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets (i.e. over multiple regulatory control periods)?

The result over the life of regulated assets depends upon the term structure going forward over very long horizons relative to a 10 year moving average at any point in time. The discussion above which looked at a single regulatory control period would also apply to multiple regulatory control periods. The question then is whether overvaluations and undervaluations offset so that on average over the life of the asset the market and book value of the RAB are equal. This might happen, but then again it might not. It is clear that for any given regulatory control period the trailing average approach will not necessarily result in an ex-ante efficient return since the trailing average may not match the efficient return which is the current spot rate. Such a mismatch would probably be a regular event. For example, suppose that the trailing average approach had been introduced ten years ago it would likely have been a poor match for the spot rates over the last ten years and the ex-ante rate being set for the current five year regulatory period would be substantially above the current spot rate.

c. If implemented without a transition, only be likely to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if the historical average return on debt approximately equals the current return on debt in the market at the commencement of its use?

One of the features of an NPV calculation is that if all future cash flows are positive, then there is a unique solution for the rate of return that sets the NPV to zero. The current cost of debt is a solution for the discount rate that equates the present value of future cash flows to the sum invested. If we assume future net cash flows are all positive, the current cost of debt is the only possible solution. Thus, with no transition, equating the trailing average to the current cost of debt is required to achieve the efficient outcome.

d. Where the historical average cost of debt in the market materially differs to the current cost of debt in the market, only result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if a transition (or other method such as a transfer payment) is used to effectively adjust the allowed return on debt so it is commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

It should be clear from our prior discussion that if the trailing average return is not equal to the current cost of debt there will most likely be overcompensation or under compensation in specific regulatory periods and whether it balances out over the life of assets is a matter of chance. To ensure that overcompensation or under compensation does balance out would require either transfer payments or transitional periods at the beginning of the averaging process and at the end of asset life. Where the process starts is particularly important as early under or over compensation gets more heavily weighted in present value terms. Therefore it is appropriate in the present case, of significant divergence between the trailing average and the current cost of debt, that a transition should be made to the trailing average rather than immediately moving to

full implementation. A transfer payment to offset the gain might be an alternative to a transition and an approximate value might be computed from the differential allowed return between the transitional approach and the full implementation of the trailing average approach.

e. Be likely to require a transition (so the allowed return on debt remained commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets) if the decision was made to change back to an on the day approach to estimating the cost of debt in a subsequent regulatory control period?

If the decision was made to change back to the on the day approach the starting equilibrium would be immediate equalisation of the book value of the RAB and the market value of the RAB. So going forward firms could expect to earn the market required rate of return on their investment, which we consider to be efficient. However, from a change without transition there would very likely be greater adjustment costs for the regulated businesses. The change in regulation might result in significant wealth effects for consumers and the regulated businesses, so a transition or transfer payment would likely be required. If a change back to the on the day approach is a significant possibility this reinforces the desirability of a transition into the trailing average approach, as the divergence from the on the day approach will be gradual and the effects of reversion will therefore be lessened.

18. In a competitive market can firms necessarily expect to recover historically incurred debt financing costs from customers irrespective of current debt financing costs?

In a competitive market firms cannot necessarily expect to recover historically incurred debt financing costs from customers irrespective of current debt financing costs. The equilibrium in a competitive market is that investments in assets are zero NPV. This implies that firms can expect to recover the current cost of capital, which in the form of the WACC includes the current cost of debt.

In a competitive market, equilibrium prices for customers are set to cover expected costs, including the current cost of debt. This is a necessary consequence of the zero NPV condition. The zero NPV condition is in turn a natural outcome in competitive markets. A positive NPV either encourages expansion by existing firms in the market, or attracts new competitors into the

market. Either way supply expands and prices fall until a zero NPV equilibrium is reached. A decision to allow firms ex post, to recover actual costs can only be disastrous as it is very likely to encourage inefficient behaviour from regulated firms. Even allowing the recovery of ex-post "efficient benchmark" costs is problematic when such "efficient benchmarks" cannot be unambiguously defined.

19. Is the outcome that the regulated firms seek from immediately implementing a trailing average (without transition):

a. Consistent with the ex-ante return that firms would expect to receive in a competitive market?

To award regulated firms an immediate implementation of the trailing average rate without transition is, generically, inconsistent with the ex-ante return that firms would expect to receive in a competitive market. Taking the data from question 15, the regulated firms are arguing that they should receive 7.8% rather than 6.5% which would allow for a 20% increase in the return on the debt financed component of RAB. Allowing 7.9% instead of 6.5% is simply rewarding the regulated firms by transferring wealth from consumers.

b. Likely to lead to investment outcomes you would see in a competitive market?

The investment outcome in a competitive market is zero NPV investments. Here the investment outcome is positive NPV investments and an incentive to overinvest.

c. Consistent with a freely entered bargain between consumers and regulated firms you would expect to see in a workably competitive market?

Consumers face monopolistic provision of energy transmission. It is hard to assess whether the increase in price to support the uplift in the cost of debt would be consistent with a freely entered bargain, since the degrees of freedom of the consumer seem seriously curtailed. However, it is likely, in a hypothetical market where consumers can costlessly switch to competitively priced alternative transmission modes, that the result would be a lower price consistent with the current cost of debt.

20. Would the transition approach of the AER be expected to result in expected future allowed return on debt cash flows with approximately the same present value as the expected regulated allowed return on debt cash flows that would come from the continuation of the on the day approach to setting the allowed return on debt?

The transitional approach is likely to provide cash flows that more closely approximate the present values from continuation of the on the day approach than an immediate switch to the trailing average approach. This is because the transition only gradually moves away from the on the day approach. However the transition approach seems unlikely to exactly match the present value that would come from continuation of the on the day approach unless the two approaches (on the day and transitional 10 year moving average) to sampling the stochastic process governing interest rates were to coincide. This is mathematically possible but unlikely.

After the time when the transitional approach becomes the full 10 year trailing approach, it is mathematically possible that the 10 year approach and the on the day approach might coincide but this seems extremely unlikely given the way in which interest rates are formed. Essentially this is because the 10 year trailing approach is backward looking by its construction whilst the on the day approach is forward looking by construction.

21. If you are of the view that the on the day regime would be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over individual and multiple regulatory control periods going forward, would setting a regulated allowance with a materially higher or lower present value than this be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

We are of the view that that the on the day regime would be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over individual and multiple regulatory control periods going

forward. So clearly a higher or lower allowance would not allow a return commensurate with the efficient costs of a benchmark efficient entity if the benchmark entity is a regulated firm.

If the benchmark entity is considered to be an unregulated firm then the unregulated and efficient nature of the firm implies a competitive rather than monopolistic firm. It is thus somewhat unclear what equivalent risk means since a service provider in a competitive market faces higher revenue risk and hence a higher asset beta to a regulated firm. Given the same leverage as the regulated firm this will result in a higher equity beta. If similar risk means the same asset beta, the same equity beta, the same leverage and the same default risk (since YTM is used as the cost of debt) the result will be exactly the same as the WACC from the on the day approach. This is a fundamental point about the opportunity cost of capital, for firms which really do have the same risk, the opportunity cost of capital will be the same irrespective of whether the firm is regulated or not. Thus, whether the benchmark firm is regulated or otherwise, should not change the allowed rate of return.

Alternatively, if the benchmark entity is an unregulated firm which has monopoly power, then it will be extracting economic rents. Consequently it is not an appropriate benchmark.

22. Given that the AER's proposed allowed return on debt (with full transition) and the proposed allowed return on debt allowances (from all of regulated firms who have not applied the AER's approach) are updated by 1/10 using the observed cost of debt in the market each year:

a. Is the mismatch risk from all alternative approaches to estimating the allowed return on debt likely to be similar?

We take mismatch risk here to be the difference between the cost of debt that the firm incurs and the allowed cost of debt. The actual extent of mismatch risk will depend upon how the treasurer of a firm is influenced in his debt portfolio decisions by the alternative approaches to estimating the allowed return on debt. It is clear that different firms have responded to the on the day approach in different ways so it is difficult to predict how they will respond to new alternative regimes.

The process for matching to the on the day approach, which involves swapping from floating rates to a fixed five year rate, can be accomplished relatively quickly. Those treasurers who want to

follow a policy of matching the on the day interest rate are likely to be already set up to do so. Thus, mismatch risk is relatively low for those treasurers who wish to match.

For the immediate switch to the on the day approach matching requires a staggered debt portfolio which has an equally weighted average of historically observed costs of debt over the last ten years. Unless firms have coincidentally set up their bond portfolios in this fashion, which seems unlikely, their interest costs are not likely match the allowed cost of debt. Not least because this would currently involve the firm in setting up transactions where they pay a higher rate of interest than the current market rate. For the time being they will wish to maximise the mismatch. Thus, for the foreseeable future a mismatch would be a high probability.

For the transition approach, it begins by looking very like the on the day approach and gradually moves to be like the full trailing average. Thus treasurers who want to hedge the mismatch risk are currently set up to match the on the day approach and have the opportunity to transition to the trailing average approach. Thus, mismatch risk is relatively low for those treasurers who wish to match their cost of debt to the allowed rate.

b To the extent that a reduction in mismatch risk from moving to a trailing average reduces the regulated firms efficient financing costs, would all approaches be expected to provide similar reductions?

It is not clear to us that a trailing average approach reduces the mismatch risk, as it depends on how treasurers respond to the changed incentives. Neither is it clear to us that moving to a trailing average, even if it succeeds in reducing mismatch risk, reduces efficient financing cost. Indeed it is not clear to us that moving to a trailing average even promotes efficient financing practices.

Part B.

Having regard to your answers to the questions in Part A, any background material you consider relevant, and any other matters you consider relevant, please set out an overall view with reasons in your report whether the consultant considers that the AER's approach to transition to a trailing average is appropriate. Please explain in your report if the consultant considers the AER's transition approach would be expected to:

a. provide the regulated firms with an ex ante return on debt allowance commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to regulated firms in respect of the provision of fully regulated services;
b. contribute to providing the regulated firms with an (overall) ex ante rate or return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firms in respect of the provision fully regulated services;
c. contribute to the promotion of efficient investment in, and operation and use of, regulated infrastructure;
d. provide the regulated firms with a reasonable opportunity to recover their efficiently incurred debt financing costs
e. contribute to providing the regulated firms with a reasonable opportunity to recover their efficiently incurred (overall) financing costs.

As will be apparent from our discussion and answers to questions in Part A we do not support the move to a trailing average, with or without transition, because we do not think it consistent with promoting efficient investment. Neither do we consider it consistent with promoting efficient financing or measuring the efficient cost of debt. We doubt that an equally weighted ten year trailing average is likely to represent the efficient financing practice, indeed as we have argued it is very doubtful that the efficient financing practice can be unambiguously defined. We are not alone in this view. To quote Chairmont (2015b, p 17) in its advice to the AER:

'The industry submits that there is not one unique EFP and this proposition is supported by Chairmont and other expert reports. Importantly, the AER also acknowledges that it "does not necessarily consider all efficient service providers would have adopted precisely this strategy."'

Based on Part A and our comments immediately above, our answers to all the specific questions above, with respect to full implementation of the trailing average, is no. The transition improves things as it stays closer to the on the day approach for longer. Thus, our negative answers to the

above questions are softened, particularly with respect to the initial regulatory period and also with respect to questions d. Since we have argued in Part A that the on the day cost of debt is the efficient cost and the transitional regime stays closer to the on the day cost of debt, the conditions in a to d above are more likely to be approximately satisfied by the transitional regime.

Given that the AER is introducing the trailing average, we are of the view that a transition is preferable to immediate or hybrid implementation of the trailing average approach. There are several reasons for this, in addition to staying closer to the on the day approach for longer and more closely matching the conditions a to d. One reason is that we recommend that the AER switch back to the on the day approach in the next regulatory period. In which case a transitional approach to implementation of the trailing average will diminish the impact of a return to the on the day approach.

It is also clear that the change to a trailing average if fully implemented immediately has substantial wealth effects. Substantial wealth transfers, whether to or from the regulated businesses, simply as a consequence of a relatively sudden regulatory change is undesirable. Undesirable from the regulated businesses' point of view if the wealth transfer is from the businesses to the consumers and undesirable from the consumer's point of view when the wealth transfer is to the businesses. In this case the wealth transfer is to the regulated businesses and the consumers might validly complain about paying the high interest rates twice. Paying once for high interest rates under the on the day approach and again paying for those same high interest rates under the trailing average approach. The transition to the full trailing average mitigates such effects. It also gives time and flexibility to the regulated businesses in adjusting their financing practices to the new regime, should they wish to do so.

Comments on the Tribunal decision

In the terms of reference it was suggested that we might need to engage with the Australian Competition Tribunal's recent decision on the allowed return on debt and also explain any actual or perceived inconsistency between our advice and the Tribunal's decision. Our analysis is as follows.

The Tribunal decision reflects our earlier observations that efficient financing practices were likely to vary from firm to firm. Combining this observation, with our observation that efficient financing

practices cannot be unambiguously defined creates the potential for a difficult situation for the AER. The difficulty arises because the view of the Tribunal is that the AER should consider the efficient financing practice for individual regulated firms. Without an unambiguous criterion the AER is exposed to disputation by firms about what practice was/is appropriate for that firm's case and the nature of transition arrangements, if any, appropriate to the firm. Given the sums involved there is ample incentive for each firm to challenge the AER's decision unless it is in favour of the firm being considered. Defending against such challenges, without unambiguously correct criteria for efficient financing, is problematic.

In paragraph 901 the Tribunal states: "As already noted, it is clear that, in the course of that process, significant transitional issues including the potential for windfall gains or losses by reason of the transition process from one methodology to another were addressed. One context was the avoidance of a DNSP "gaming" by selecting its preferred methodology, or its preferred transitional process to a new methodology. The 2012 Rule Amendments do not permit that. The decision is made by the AER."

Nonetheless, the current situation seems open to gaming. While the AER is the decision maker, the risk is that the extent of the AER's freedom of action may be constrained such that the regulated businesses' might have the opportunity to substantially engineer what their allowed cost of debt is to be.

We have put the case for the on the day approach in our earlier analysis and here we emphasise the point that the attention being devoted to financing is an unnecessary distraction from the main objective, which is efficient investment. As we have previously observed financing effects are of second order consequence relative to investment. There is a clear and unambiguous criterion for efficient investment zero NPV (no economic rents) and this is achieved by the use of a WACC which includes the on the day cost of debt. The immediate transition to a trailing average cost of debt is clearly inconsistent with this. The transition to a trailing average over ten years is a better option as the divergence from the on the day approach is gradual and therefore there is less divergence from the efficient regulated rate of return.

The efficient cost of debt is given by the current spot rate. In contrast, there is no clear and unambiguous definition of what the historic cost of debt should be (hence the current imbroglio) and even if there were, in our opinion historic costs should not be used. There is a clear principle on the cost of debt to be used in the WACC when evaluating investments, that cost should be the

current cost of debt. Substituting a different principle based on historic financing costs just adds confusion and may make efficient investment a matter of chance.

One distraction in relation to financing is whether the BEE for the purpose of efficient financing should be a regulated or unregulated firm. In the case of the opportunity cost of capital this is not a substantial problem, firms which have the same risk will have the same opportunity cost of capital whether regulated or unregulated. This is because the opportunity cost of capital is determined by reference to the capital market and is the same return for all firm's that have the same level of risk. Here again the on the day approach provides a simple and satisfactory outcome, because it gives the opportunity cost of debt capital.

It is understandable that the Tribunal should take the BEE as a "….hypothetical efficient competitor in a competitive market for those services." (paragraph 914) and that therefore they consider that benchmark efficient financing practices should be set with reference to such an entity. The notion of a "hypothetical competitor in a competitive market" is useful with respect to defining efficient investment and the opportunity cost of capital. However, the notion is not useful with respect to the concept of efficient financing if the cost of that financing is to be anything other than the opportunity cost. Since the cost of debt contested in the Tribunal was not the opportunity cost but rather the historic cost, reference to a "hypothetical competitor in a competitive market" is unhelpful.

There is no objective criteria to define what ex-ante efficient financing practices would be with respect to the historic cost of debt. Even if such practices could be defined, it is entirely unclear that they would be a relevant benchmark for a regulated business. A major distinguishing feature of an unregulated business with regard to debt financing would be a very different sensitivity of the revenue stream to the cost of debt relative to a regulated business. For an unregulated business the sensitivity, if any, would be indirect via interest rate effects on demand. Thus there might be no consideration of hedging of interest rate risk with respect to demand, although some interest rate hedging might be undertaken for other reasons. Beyond that point it is difficult to specify what the financing practices of a "hypothetical efficient competitor in a competitive market" would be. This takes us back to the problem that we have no unambiguous criteria for exactly what an efficient financing practice should be.

In contrast to a firm in a competitive market, the regulated businesses' revenues depend directly on the allowed cost of debt and therefore interest rate hedging is considered important, or even critical, by some regulated businesses. This is a consequence of a rational response to regulation rather than any exercise of market power by the regulated businesses. It is not an undesirable outcome relative to the competitive outcome as long as this does not increase costs to consumers. In this respect it has been the AER's practice that the costs of hedging are not compensated in the revenue allowance.

The regulated businesses have no market power with respect to financial markets, but rather are price takers. Thus, we suggest using the on the day approach as the basis of allowed revenue and letting the firms sort out their financing practices as they see fit, bearing any costs, or accruing any benefits that might arise

The AER is not bound by the Rate of Return Guidelines, but might understandably be reluctant to diverge from them. We note however, at paragraph 893, the Tribunal has opened the door to such divergence where it states "…that neither the AER nor the regulated service providers generally were bound to comply with the ROR Guideline." and that on this basis that Networks NSW and ActewAGL could depart from them. Given the clear path set by the Tribunal, we suggest that the AER consider diverging from the guidelines and returning to the on the day approach. We realise that this would be a challenging step to take and would likely raise a storm of protest from the regulated businesses, however it seems that continuing with the trailing average approach will be an ongoing entanglement.

The Tribunal makes the observation at paragraph 917, about the allowed return on debt being the return required by debt investors likely in a competitive market. While at paragraph 918, there is reference to the need for similar measurement and similar conceptual yardsticks for the returns on debt and equity and that the return on equity is "…measured by the prevailing conditions in the market for equity funds. It would follow that market conditions for the BEE should be used to measure the return on debt, rather than some undefined regulated conditions." The foregoing requirements could readily be met by the on the day approach, but it is not clear to us how they are to be met otherwise.

References

AASB (2011) *AASB13 Fair Value Measurement*, Australian Accounting Standards Board, September 2011.

Chairmont (2015a) *Cost of debt: Transitional analysis*, April 2015.

Chairmont (2015b) *Financing practices under regulation*, October 2015.

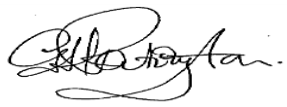
Lally (2015) *Review of submissions on the cost of debt*, April 2015

Moodys (2007) *Special Comment: Moody's Ultimate Recovery Database,* April 2007.

Expert Witness Compliance Declaration

We have read "Expert witnesses in proceedings in the Federal Court of Australia" which are attached as Appendix 3. This report has been prepared in accordance with those guidelines. As required by the guidelines, 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.

Signed



Graham. H. Partington

Steven. E. Satchell

Appendix 1

APPROACH TO MARKET (ATM) – ATTACHMENT A

REFERENCE NO: WACC.2016.02

Terms of Reference

Introduction

The Australian Competition and Consumer Commission (ACCC) / Australian Energy Regulator (AER) seeks an expert in corporate finance, specifically, the cost of capital. This is to provide an assessment of the return on debt for regulatory determinations and access arrangements occurring in April and June 2016.

The AER is responsible for the economic regulation of electricity networks and gas pipelines in Australia.[18] In undertaking this role the AER sets the allowed revenues or prices for these monopoly service providers over a fixed period determined in advance (usually 5 years), in accordance with the relevant legislation.[19] This fixed period is known in an electricity context as a regulatory control period or in a gas context as an access arrangement period (henceforth referred to as a regulatory control period). As part of determining the total revenues or prices that a service provider may earn, the AER applies a 'building block' framework that includes a return on capital building block, which is derived from a regulated rate of return.[20]

Better regulation rate of return guideline

18 Excludes Western Australia.

19 For electricity networks, this means the National Electricity Law (NEL) and National Electricity Rules (NER). For gas networks, this means the National Gas Law (NGL) and National Gas Rules (NGR).

20 That is, the rate of return on capital is multiplied by the regulated asset base (for electricity networks) or the capital base (gas networks) to derive the return on capital building block for a given year.

In November 2012, the Australian Energy Market Commission (AEMC) published changes to the National Electricity and Gas Rules (NER, NGR). The AER's Better Regulation program was initiated to update and improve its processes under these new rules, with the aim of delivering an improved regulatory framework focused on the long term interests of electricity and gas consumers.

The Better Regulation program involved the publication of several guidelines. The Rate of Return Guideline (the Guideline) was developed through extensive consultation with service providers, consumer representatives and other stakeholders and sets out the AER's proposed approach to determining the allowed rate of return in accordance with the relevant legislation.[21] An explanatory statement (including appendices to the explanatory statement) accompanies the Guideline, and sets out the AER's reasons for the positions it reached in the Guideline.[22]

The Guideline and explanatory statement apply to both electricity and gas distribution and transmission service providers.

The Guideline sets out the approach the AER proposes to use to estimate the returns on equity and debt for a benchmark efficient entity.[23] The Guideline also sets out the approach the AER proposes to use to estimate the value of imputation credits under the Australian tax system. The value of imputation credits mostly impacts on the separate corporate income tax building block. However, the rate of return must be set on a nominal vanilla basis consistent with the estimate of the value of imputation credits.

21 AER, *Rate of return guideline*, December 2013.

22 AER, *Explanatory statement—Rate of return guideline*, December 2013; AER, *Explanatory statement—Rate of return guideline—Appendices*, December 2013.

23 The Guideline defines the benchmark efficient business as a pure play, regulated energy network business operating within Australia.

The Guideline does not consider the AER's position on forecast inflation or transaction costs (equity and debt raising costs), though the AER has adopted positions on these matters in previous regulatory determinations.

The Guideline is not legally binding on the AER or service providers. However, if the AER or a service provider chooses to depart from the Guideline, it must state its reasons for doing so in the relevant regulatory determination.

AER regulatory determinations recently finalised

In April and June 2015, the AER finalised regulatory determinations / access arrangements for the following service providers:

- TransGrid
- TasNetworks (formerly Transend)
- Directlink
- Ausgrid, Endeavour Energy, Essential Energy*[24]
- ActewAGL*

[24] *These service providers have appealed the AER's return on equity decision and the matters are currently before the Australian Competition Tribunal.

- Jemena Gas Networks (JGN).*

In October 2015, the AER finalised regulatory determinations for the following service providers:

- SA Power Networks (SAPN)*
- Energex and Ergon (QLD Electricity distribution network service providers [DNSPs]).

A number of service providers (those with a * next to their name) have appealed the AER's final decision on the rate of return (including the return on debt) to the Australian Competition Tribunal (Tribunal). The hearing for all processes except SAPN concluded on 9 October 2015. The SAPN appeal is expected to be heard after the decision of the earlier processes is handed down. However, the Tribunal is yet to release its final decision on the appeals that concluded on 9 October 2015. The final decision is scheduled to be handed down on 26 February 2016..

In developing the AER's decision on the allowed return on debt for these decisions, the AER commissioned the following expert reports:

- Dr Martin Lally—*Transitional arrangements for the cost of debt*, November 2014
- Dr Martin Lally—*Implementation issues for the cost of debt*, November 2014
- ACCC Regulatory Economics Unit—*Return on debt estimation: A review of the alternative third party data series*, August 2014
- Dr Martin Lally—*Review of submissions on the cost of debt*, April 2015

- Chairmont—*Cost of debt transitional analysis, April 2015*
- Dr Martin Lally—*Review of submission on transition issues for the cost of debt,* October 2015
- Dr Martin Lally—*Review of submission on implementation issues for the cost of debt,* October 2015

- Chairmont—*Financing practices under regulation, October 2015.*

AER regulatory determinations under consideration

Between April and August 2015, the AER received regulatory / access arrangement proposals[25] from the following service providers:

- AusNet Services—VIC electricity distribution network

- Citipower —VIC electricity distribution network
- Powercor—VIC electricity distribution network
- Jemena—VIC electricity distribution business.

- United Energy—VIC electricity distribution network[26]

- ActewAGL—ACT gas distribution network

25 Electricity transmission network service providers submit a revenue proposal, electricity distribution network service providers submit a regulatory proposal and gas pipeline service providers submit a access arrangement proposal.

26 Together, these service providers are the VIC DNSPs. They submitted their regulatory proposals to the AER on 30 April 2015.

- Australian Gas Networks (AGN)—SA gas distribution network[27]
- APTNT— Amadeus gas pipeline in NT.[28]

In October and November 2015, the AER published preliminary determinations and draft access arrangements for these service providers. In January 2015, these service providers submitted revised proposals, which have been published on the AER's website. Additionally, on 31 October 2015, the AER received a revenue proposal from AusNet Services—VIC electricity transmission network. [29]

The abovementioned service providers have proposed (and continue to propose) a departure from the approach to estimating the return on debt proposed in the Guideline on many aspects.

Finally, on 31 January 2015, the AER received revenue/regulatory proposals from:[30]

- Powerlink—QLD electricity transmission network
- TasNetworks—TAS electricity distribution network.

These service providers have adopted the proposed approach in the Guideline in their proposals with respect to debt, subject to the outcome of the current appeal of a number of the AER's final decisions to the Tribunal.

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27 These service providers submitted their access arrangement proposals to the AER on 30 June 2015 or 1 July 2015.

28 This service provider submitted its access arrangement proposal to the AER on 4 August 2015.

29 See this link for the current Victorian electricity network processes and this link for the current gas network processes.

30 See this link for the current QLD and TAS electricity processes.

Table 1 sets out the key dates for the current determination processes:

Table 1: Key dates for current regulatory determination processes

Service provider	Regulatory control period	Regulatory process					
		Proposal	Submissions on proposal*	Draft decision	Revised proposal*	Submissions draft/revised proposal*	Final decision
VIC DNSPs	1 Jan 2016 – 31 Dec 2020	30 Apr 2015	13 Jul 2015	31 Oct 2015	6 Jan 2016	4 Feb 2016	30 Apr 2016
ActewAGL	1 Jul 2016 – 30 Jun 2021	30 Jun 2015	31 Jul 2015	30 Nov 2015	6 Jan 2016	4 Feb 2016	30 Apr 2016
AGN	1 Jul 2016 – 30 Jun 2021	1 Jul 2015	10 Aug 2015	30 Nov 2015	6 Jan 2016	4 Feb 2016	30 Apr 2016
APTNT	1 Jul 2016 – 30 Jun 2021	4 Aug 2015	11 Sep 2015	30 Nov 2015	6 Jan 2016	4 Feb 2016	30 Apr 2016
AusNet (TNSP)	1 Apr 2017 – 31 Mar 2022	31 Oct 2015	Feb 2016	30 Jun 2016	Sep 2016	Oct 2016	31 Jan 2017
Powerlink	1 Jul 2017 – 30 Jun 2022	31 Jan 2016	May 2016	30 Sep 2016	Dec 2016	Jan 2017	30 Apr 2017
TasNetworks (DNSP)	1 Jul 2017 – 30 Jun 2022	31 Jan 2016	May 2016	30 Sep 2016	Dec 2016	Jan 2017	30 Apr 2017

* Indicative dates only.

Legal requirements for the allowed rate of return

In determining the rate of return, the AER is guided by requirements in:

- the national electricity law (NEL) and national gas law (NGL)

- the national electricity rules (NER) and national gas rules (NGR).

The expert advice is required in the context of these requirements.

Requirements of the law

Under the NEL and the NGL, the AER must determine the rate of return in a manner that will or is likely to contribute to the achievement of the national electricity objective (NEO) and the national gas objective (NGO).

The **national electricity objective (and NGO)** is to promote efficient investment in, and efficient operation and use of, electricity (gas) services for the long term interests of consumers of electricity (gas) with respect to:

- price, quality, safety, reliability and security of supply of electricity (gas), and
- the reliability, safety and security of the national electricity system.

Where multiple decisions will or are likely to contribute to the achievement of the national electricity objective (NGO), the AER must be satisfied that its decision will or is likely to contribute to the achievement of the national electricity objective (NGO) to the greatest degree.

The AER must also take into account the revenue and pricing principles when determining the rate of return.

Of relevance to the rate of return are the following **revenue and pricing principles**:

- A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in:
    - providing regulated network services, and
    - complying with a regulatory obligation or requirement or making a regulatory payment.
- A regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to regulated network services the operator provides. The economic efficiency that should be promoted includes:
    - efficient investment in a distribution system or transmission system with which the operator provides regulated network services; and
    - the efficient provision of electricity network services; and
    - the efficient use of the distribution system or transmission system with which the operator provides regulated network services.
- A price or charge for the provision of a regulated network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the regulated control network service to which that price or charge relates.
- Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides regulated network services.
- Regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides regulated network services.

Equivalent provisions apply under the NGL.

The NEO and revenue and pricing principles have been in place for some time, and previous AER decisions were also conducted under this framework. However, the requirement to adopt the decision that would contribute to the achievement of the NEO 'to the greatest degree' if two or more decisions are possible is new.

Requirements of the rules

Under the NER, the allowed rate of return is to be determined such that it achieves the allowed rate of return objective.[31]

> 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 regulated network services.

The NER require that the allowed rate of return for a regulatory year must be:[32]

31 NER, clauses 6.5.2(b) and 6A.6.2(b).

32 NER, clauses 6.5.2(d) and 6A.6.2(d). The value of imputation credits is referred to in clause 6.5.3 and 6A.6.4 of the NER and rule 87A of the NGR.

- a weighted average of the return on equity for the regulatory control period in which that regulatory year occurs and the return on debt for that regulatory year

- determined on a nominal vanilla basis that is consistent with the estimate of the value of imputation credits.

In determining the allowed rate of return, the NER also require that regard must be had to:[33]

- relevant estimation methods, financial models, market data and other evidence

- 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

- any interrelationships between estimates of financial parameters that are relevant.

There are also provisions in the NER that refer specifically to the return on equity, the return on debt and the value of imputation credits.[34]

Equivalent provisions apply under the NGR.[35]

The NER and NGR concerning the determination of the rate of return were revised in 2012 by the AEMC. The AER's recent Guideline was made under this framework.

33 NER, clauses 6.5.2(e) and 6A.6.2(e).

34 See NER, clause 6A.6.2 and clause 6.5.2.

35 See NGR, rule 87.

However, these rules differ from the framework under which the AER made regulated determinations in the past.[36] The current regulatory determinations are the first ones to be conducted under this new rules framework.

Of particular importance under the new rules framework is the introduction of the allowed rate of return objective, and the primacy given to this objective over other rule requirements.

Context for the determination of the allowed rate of return

The expert advice is required in the following context and framework:

1. The overarching requirement is that the rate of return on capital must be consistent with relevant legislation in the NEL, NGL, NER and NGR (see above 'Legal requirements for the allowed rate of return').

Specific to the return on debt, the NER and NGR require:

   a. The return on debt for a regulatory year must be estimated such that it contributes to the achievement of the allowed rate of return objective.[37]

[36] The rules were amended in AEMC, Rule determination: National electricity amendment (Economic Regulation of Network Service Providers) and National Gas Amendment (Price and Revenue Regulation of Gas Services), 29 November 2012. See version 52 and 13 of the NER and NGR respectively for the previous rules.

[37] NER, clauses 6.5.2(h) and 6A.6.2(h). NGR, rule 87(8). 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 its regulated services.

b. The return on debt may be estimated using a methodology which results in either:[38]

    i. the return on debt for each regulatory year in the regulatory control period being the same; or

    ii. the return on debt (and consequently the allowed rate of return) being, or potentially being, different for different regulatory years in the regulatory control period.

c. Subject to paragraph (h), the methodology adopted to estimate the return on debt may, without limitation, be designed to result in the return on debt reflecting:[39]

    i. the return that would be required by debt investors in a benchmark efficient entity if it raised debt at the time or shortly before the making of the determination / access arrangement for the regulatory control period;

    ii. the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period; or

    iii. some combination of the returns referred to in subparagraphs (1) and (2).

d. In estimating the return on debt under paragraph (h), regard must be had to the following factors:[40]

    i. the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective;

    ii. the interrelationship between the return on equity and the return on debt;

    iii. the incentives that the return on debt may provide in relation to capital expenditure over the regulatory control period, including as to the timing of any capital expenditure; and

    iv. any impacts (including in relation to the costs of servicing debt across regulatory control periods) on a benchmark efficient entity referred to in the allowed rate of return objective that could arise as

[38] NER, clauses 6.5.2(i) and 6A.6.2(i). NGR, rule 87(9).

[39] NER, clauses 6.5.2(j) and 6A.6.2(j). NGR, rule 87(10).

[40] NER, clauses 6.5.2(k) and 6A.6.2(k). NGR, rule 87(11).

a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next.

e. If the return on debt is to be estimated using a methodology of the type referred to in paragraph (i)(2) then a resulting change to the service provider's annual revenue requirement / total revenue must be effected through the automatic application of a formula that is specified in the determination / access arrangement.[41]

It is worth noting that the allowed rate of return objective must be applied in a manner consistent with the objectives and pricing principles in the NEL and NGL. It is also worth noting that the factors we must have regard to are sub-ordinate to the allowed rate of return objective.

2. The Guideline sets out the AER's proposed approach to determining the allowed rate of return in accordance with the relevant legislation. The expert advice should have regard to the Guideline approach when identifying issues put forward by the relevant service providers in their proposals. In the Guideline, the AER proposes to estimate:

   a. the returns on equity and debt for a benchmark efficient entity[42]

   b. the WACC (post corporate tax, pre personal tax) using a the nominal vanilla formula $WACC_{vanilla} = E(k_e)\frac{E}{V} + E(k_d)\frac{D}{V}$

      where:

      i. $E(k_e)$ is the expected required return on equity

      ii. $E(k_d)$ is the expected required return on debt

      iii. E/V is the proportion of equity in total financing (comprising equity and debt)

      iv. D/V is the proportion of debt in total financing, and is equal to the AER's proposed benchmark efficient entity gearing ratio of 0.6

      v. $WACC_{vanilla}$ is updated annually as a result of the estimated return on debt being updated annually.[43]

41 NER, clauses 6.5.2(l) and 6A.6.2(l). NGR, rule 87(12).

42 The Guideline defines the benchmark efficient entity as a pure play, regulated energy network business operating within Australia.

43 AER, *Better regulation rate of return guideline*, December 2013, pp. 7–9.

Return on debt approach and implementation

In the Guideline, the AER proposed the following positions on the benchmark efficient entity:

- to adopt a single benchmark across electricity transmission, electricity distribution, gas transmission and gas distribution, and

- to adopt a conceptual definition of the benchmark efficient entity that is 'a pure play, regulated energy network business operating within Australia', and

- to apply this single benchmark efficient entity definition in estimating the return on equity and the return on debt.[44]

In the Guideline, the AER proposed the following positions on the return on debt approach:[45]

- to use a 'trailing average portfolio approach'—that is, to estimate the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period

- to update the return on debt estimate annually (that is, for each regulatory year).

[44] AER, *Rate of return guideline*, December 2013, p.7; AER, *Explanatory statement—Rate of return guideline*, December 2013, p.32.

[45] AER, *Rate of return guideline*, December 2013, pp. 18-20

- to apply equal weights to all the elements of the trailing average, and

- to implement transitional arrangements—in moving from the current 'on the day' approach to the new 'trailing averaging portfolio' approach—consistent with the 'QTC method' (an annual re-pricing of a portion of the notional debt portfolio) and a benchmark term of 10 years.[46]

In the Guideline, the AER proposed the following positions on implementation of the return on debt approach:[47]

- to use a benchmark credit rating of BBB+ or its equivalent

- to use a benchmark term of debt of 10 years

- to use an independent third party data service provider to estimate the return on debt, and

- to use an averaging period for each regulatory year of 10 or more consecutive business days up to a maximum of 12 months (nominated by the service provider). The averaging period should be as close as practical to the commencement of each regulatory year.[48]

46 AER, *Rate of return guideline*, December 2013, pp. 18-20; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 98.

47 AER, *Rate of return guideline*, December 2013, pp. 21-22

48 AER, *Rate of return guideline*, December 2013, pp. 21-22; AER, *Explanatory statement—Rate of return guideline*, December 2013, p. 126.

The consultant is required to engage in key documents to the extent it is required to answer the questions set out in the terms of reference. Key documents the consultant needs to consider include:[49]

- The revised proposals and other relevant material (including consultant reports) submitted by the VIC DNSPs, ActewAGL (gas distribution), AGN and APTNT.

- The initial proposals and other relevant material (including consultant reports) submitted by AusNet Services (TNSP), Powerlink and TasNetworks (DNSP).
- The AER's preliminary and draft decisions (including consultant reports attached to the decisions) for the VIC DNSPs, ActewAGL (gas distribution), AGN and APTNT.

- Stakeholder submissions to the AER on the revised proposals of the VIC DNSPs, ActewAGL (gas distribution), AGN and APTNT.
- Stakeholder submissions to the AER on the initial proposals of AusNet Services (TNSP), Powerlink and TasNetworks (DNSP).
- The decision and reasoning of the Australian Competition Tribunal in relation to the NSW/ACT/JGN appeal of our allowed return on debt for the NSW/ACT/JGN decision released in April 2015. In these decisions, the NSW and ACT electricity distributors and JGN appealed our decision to implement a full transition starting from an estimate based on the 'on the day' methodology. This decision is to be handed down on 26 February 2016.

In addition, a number of other background documents the consultant may wish to consider are referred to in footnotes throughout this document.

[49] Proposals, submissions and decisions under open regulatory processes can be found under: https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements?f[0]=field_accc_aer_status%3A6.

It is also expected that the consultant will engage more broadly where required, including relevant academic literature or other research and the consultant may refer to other material that is relevant to the questions.

The background documents are listed in attachment 1, together with hyperlinks to enable easy access. A high level background of the key points is set out below.

Some submissions may specifically discuss or raise issues on the expert reports by Dr Martin Lally and Chairmont to the AER for the recent decisions.[50] If this occurs, then the expert advice may need to engage with the material in these submissions.

The expert advice may also need to engage with the Tribunal's final decision on the current appeal of several of the AER's recent decisions. The advice may need to explain any actual or perceived inconsistency between the consultant's advice and the Tribunal's decision and/or reasoning of the Tribunal.

High level background

- In the prior regulatory control period, all the regulated firms under consideration had their ex ante allowed cost of capital set using the 'on the day' approach to setting the cost of capital (the on the day regime).
- The on the day regime entailed estimating a regulated firm's weighted average cost of capital (WACC) in a forward-looking manner, using an averaging period shortly or

[50] These reports are: Chairmont, *Financing practices under regulation*, October 2015; Lally, *Review of submission on transition issues for the cost of debt*, October 2015; Chairmont, *Cost of debt transitional analysis*, April 2015; Lally, *Review of submissions on the cost of debt*, April 2015; Lally, *Transitional arrangements for the cost of debt*, November 2014.

immediately before the start of the regulatory control period. Effectively, the regulatory WACC was estimated to be in line with the required return on capital of an 'efficient' firm with similar priced risk as the regulated firm providing fully regulated services. The on the day regime could be thought of as akin to a resetting bond where the allowed return on capital cash flows were reset to prevailing rates of return in the market resulting in the value equalling PAR (or the face value of the regulator asset base (RAB)) at the start of the each regulatory control period.

- For the purposes of this advice, where necessary please consider if it appears that the return on equity and gearing ratio will be set consistently with the allowed return on debt such that the allowed WACC will be commensurate[51] with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of standard control, reference, or direct control services [52] (henceforth referred to in this brief as "fully regulated services") if the return on debt is set to be commensurate with the efficient debt financing costs for a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services. This is an important assumption because our overarching legal requirement is to meet the allowed rate of return objective (which concerns the overall regulatory WACC). We note that this brief does not require the consultant to consider if the return on equity is set appropriately which is the subject of separate consulting advice. The consultant only needs to consider briefly if it the return on equity and gearing ratio appear to be set consistently with the approach to setting the allowed return on debt where necessary to answer the questions in Part A and/or Part B of the brief.

- The on the day regime established an ex ante incentive regime where the regulatory WACC allowance was set at the start of a regulatory control period. This allowance would then be revisited at the start of the next regulatory control period. Under this approach if a regulated firm was able to raise capital at a lower cost than its regulatory WACC, then it would keep the difference over the regulatory control period. Likewise, if the regulatory firm raised capital at a higher cost than the regulatory WACC, it would suffer a loss relative to the regulatory WACC over the regulatory control period.

- When estimating the allowed return on debt under the on the day regime at the start of the last regulatory control period, the AER used an estimate of the PAR yield to maturity (YTM) on debt with a maturity of 10 years and a credit rating of BBB. This was because the AER observed that appropriate proxy firms (principally the firms the

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51 We use "commensurate with" throughout this document in a manner consistent with AEMC guidance. The AEMC stated with respect to the use of commensurate with'[f]or the avoidance of doubt, the Commission intents "commensurate with" to mean that the rate of return can only ever be estimated as a reasonable approximation rather than identified with total precision. Whether or not the estimated rate of return meets the allowed rate of return objective will invariably require some level of judgement, but this judgement should be based with reference to all relevant estimation methods, financial models, market data and other evidence that could reasonably be expected to inform a regulator's decision.' AEMC, *Final Rule Determination Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services*, 29 November 2012, pp 66-67.

52 The ARORO for electricity distribution service providers applies to the provision of Standard control services, the ARORO for electricity transmission service providers applies to the provision of Direct control services, while the ARORO for gas distribution and transmission service providers applies to the provision of Reference services.

AER regulated) had an average term at issuance of slightly less than 10 years and a BBB+ median credit rating.[53] One reason the AER used a PAR YTM estimate based on a BBB bond was likely because published BBB+ YTM estimates were not available from the third party YTM curve data providers (such as Bloomberg) it used.[54]

- Generally, regulatory control periods are five years in length.[55] Given this, some stakeholders have previously argued that to provide an allowed return on debt commensurate with a regulated firm's efficient debt financing costs, the AER should have used an estimate of the five year PAR YTM as the allowed return on debt at each regulatory determination.[56] The rationale would be that a 10 year PAR YTM would provide regulated firms a higher allowed return on debt (on average) than the expected costs they would face from issuing debt to match the regulated allowance under the on the day approach (given the term structure of interest rates is normally upward sloping). However, the AER rejected this argument in the past on the basis it might increase refinancing risk for the sector.[57] In this respect we note that the private firms we regulate have typically issued staggered debt with a longer maturity than five years (presumably to manage refinancing risk) and then typically swapped the base rate component to match the five year regulatory control period (to manage base interest rate risk).[58] This has limited the risk facing firms in relation to movements in the base rate. However, it appears to have left firms exposed to movements in the risk premium over the base rate. While the base rate typically has an upward sloping yield curve (that might imply the regulatory compensation was generous given the interest rate swaps commonly undertaken by regulated firms), the AER has never explicitly compensated firms for transaction costs associated with entering hedging arrangements such as interest rate swaps, potentially offsetting this conservatism (to some degree).[59]

- As there was an on the day allowance set by the AER at the start of the last regulatory control period it may be reasonable to assume investors would have expected the on the day regime to continue and that, in general circumstances, the allowed return on debt would be reset to a PAR YTM at the commencement of the next regulatory control period. We note that the on the day approach was mandated by the rules when the AER determined the return on debt allowance at the start of the last regulatory period for the Victorian distribution network service providers and it appears the AER has generally applied this methodology to gas service providers.[60]

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53 AER, *2009 WACC review: Final decision*, May 2009, pp. 168–168, 390–391.

54 AER, *2009 WACC review: Final decision*, May 2009, p. 26, footnote 56. Also see AER, *Final distribution determination: Aurora Energy Pty Ltd 2012–13 to 2016–17*, April 2012, p. 122, footnote 470.

55 This is not always the case - for example, AusNet transmission's previous regulatory control period was for 3 years. However, even in this case the AER used the PAR YTM on a 10 year to maturity BBB bond as the estimate of the YTM on debt for the purposes of estimating the allowed return on debt.

56 AER, *2009 WACC review: Final decision*, May 2009, pp. 147–148.

57 AER, *2009 WACC review: Final decision*, May 2009, pp. xiii, pp. 149–150, 166–168.

58 AER, *2009 WACC review: Final decision*, May 2009, pp. 21, 144, 152–154, 162–163; AER, *Rate of return guideline explanatory statement*, December 2013, pp. 105–107.

59 See AER, *2009 WACC review: Final decision*, May 2009, p. 154. Also see Lally, *Review of submissions on the cost of debt*, 21 April 2015, pp. 9–12 and Lally, *Transitional arrangements for the cost of debt*, 24 November 2014, pp. 25–30 for a discussion of the use and cost of interest rate swaps by regulated firms and on the average term structure in the interest rate swap market.

60 SP AusNet Transmission which has a current three year regulatory control period was completed after the rule change process. We also note that the gas law and rules did not mandate the use of the on the day approach, although it appears to have been consistently applied by the AER in setting the allowed rate of

It may also be reasonable to assume that investors would have expected that if a different estimation methodology was adopted it would not result in significant wealth transfers occurring between regulated firms and their customers as a result of the change. This is potentially because the need for a transition was discussed during the AEMC rules change consultation process and because a transition appears consistent with best practice regulation.[61]

- In the 2012 legislative change to the NER [ccl.6.5.2 (h)–(l), 6A.6.2 (h)–(l)], the AEMC changed the options open to the AER to estimating the allowed return on debt for electricity service providers. The change allows the AER to use a historically based estimate of the cost of debt. The same legislative wording was mirrored in changes to the NGR [NGR 87(8)–(12)].

- The rule change to allow the AER to use a historically based cost of debt has several possible rationales including:[62]

    - It may allow some regulated firms to better match their actual/incurred efficient debt costs to the regulated allowance. For example, regulated firms that might have incurred a mismatch between the allowed return on debt and the regulated allowance if they were unable to fully hedge (or chose not to hedge) the allowance may be able to reduce this risk. Following the rule change, these firms may be able to remove much of this mismatch risk by issuing staggered debt so that their physical debt issuance matches the setting of the regulated allowance.

    - It should reduce price volatility for consumers due to movements in the observed cost of debt as the allowed return on debt will be an average of historical cost of debt observations.

- However, it was acknowledged in advice to the AEMC by SFG consulting that a historically based (trailing) average cost of debt would not reflect the current cost of debt in the market and could distort investment incentives.[63]

- While there appears general agreement on perceived advantages of a move to a trailing average by many regulated firms and consumer representative groups, there is disagreement on how to implement the trailing average.[64]

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return for gas service providers. It is also possible some of the other regulated businesses prior determination were completed after the possibility of moving to a trailing average methodology was public information.

61 See SFG, *Rule change proposals relating to the debt component of the regulated rate of return: Report for AEMC*, 21 August 2012, pp. 19, 45–46; Houston Kemp, *Memo: Appropriate objective to guide the setting of the cost of debt allowance*, 3 March 2015, pp. 5–6.

62 See AEMC, *Rule determination*, 29 November 2012, pp. 75–76, 84–85; and SFG, *Rule change proposals relating to the debt component of the regulated rate of return: Report for AEMC*, 21 August 2012, pp. 5–7 for a more detailed description.

63 SFG, *Preliminary analysis of rule change proposals: Report for AEMC*, 27 February 2012.

64 It is worth noting that not all regulated firms at the time of the development of the Rate of Return Guideline supported a move to a trailing average. For example, Jemena supported a hybrid trailing average where the base rate continued to be based on the "on the day" rate and only the risk premium over swap was based on a historical average. Jemena considered this hybrid approach would lead to lower financing costs for smaller networks such as its electricity and gas networks. See AER, *Rate of return guideline explanatory statement*, December 2013, pp. 111.

- The preferred approach of many of the regulated firms currently under consideration is to use a historical trailing average cost of debt immediately implemented (that is, with no transition).[65] A historical average of the 10 year BBB YTM is materially higher than current 10 year BBB YTM. As such, this approach initially results in a debt allowance that is materially higher than if you used the current YTM to set the allowed cost of debt (noting the allowance will converge after ten years). This also results in an expected long-term allowance with a materially higher present value than what would result from continuing the on the day regime. The arguments for this 'no transition' approach include that it is consistent with the cash flows costs of unregulated businesses (who would have a portfolio of historic debt). As such, the regulated firms consider this to be consistent with the outcomes you would see in a workably competitive market.[66]

- Many of the regulated firms have submitted an alternative fall-back position if their primary position is rejected.[67] Under this fall-back position, regulated firms should be assumed to have hedged one third of their debt. These firms submit that one third would have been the optimal hedging ratio given an inverse relationship between the swap rate and the risk premium over the swap rate.[68] This also results in a starting regulated return on debt allowance that is much higher than current 10 year BBB YTM because two thirds of the estimate would be based on a higher average of historical YTMs. It is worth noting that it appears that in practice significantly more than 1/3 of the base interest rate risk may have been hedged by regulated firms in the past.[69]

- The AER in recent determinations has determined the starting return on debt allowance should be based on the 'on the day' YTM for 10 year BBB bonds. The approach proposed in the AER's Guideline is that the allowed return on debt should be transitioned to a trailing average of 10 year BBB YTM rates over 10 years (a full transition starting from an on the day rate based on the YTM on 10 year BBB+ rated

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65 ActewAGL, *Access arrangement information*, January 2016, p. 24; AGN, *Attachment 10.26 response to draft decision: Rate of return*, January 2016, p. 3; APA Group, *Amadeus Gas Pipeline access arrangement information*, January 2016, p. 24; AusNet Electricity Services, *Revised regulatory proposal*, 6 January 2016, p. 145; CitiPower, *Revised Regulatory Proposal 2016—2020*, 6 January 2016, p. 262; JEN, *Attachment 6-1*, 6 January 2016, p. vi; Powercor, *Revised regulatory proposal 2016–20, 6 January 2016* , January 2016, p. 256; United Energy, *2016 to 2020 revised regulatory proposa*l, 6 January 2016, p. 78.

66 See the report submitted in recent revised proposals: CEG, *Critique of the AER's approach to transition*, January 2016, p. 1. Also see AGN, *Revised proposal: Attachment 10.26—Response to draft decision: Rate of return*, January 2016, pp. 14–20, 23–25. Similar arguments are raised in the other NSPs' revised proposals.

67 See the report submitted with the proposals: CEG, *Efficient use of interest rate swaps to manage interest rate risk: Privileged and confidential*, June 2015, pp. 1–4 (CONFIDENTIAL). Also see: ActewAGL, *Revised proposal: Appendix 5.01—Detailed response to rate of return, gamma and inflation*, January 2016, pp. 34–35; AGN, *Revised proposal: Attachment 10.26 response to draft decision: Rate of return*, January 2016, pp. 6–7, 35–36; AusNet Services, *Revised proposal*, 6 January 2016, pp. 7-32–7-33; CitiPower, *Revised Proposal*, 6 January 2016, pp. 10–11; JEN, *Revised proposal: Attachment 6-1—Rate of return, gamma, forecast inflation, and debt and equity raising costs*, 6 January 2016, p. 28; Powercor, *Revised proposal, 6 January 2016* , January 2016, pp. 10–11; United Energy, *Revised proposal: Attachment 8-2: Response to AER preliminary determination re: rate of return and gamma*, 6 January 2016, p. 33.

68 See the report submitted in recent revised proposals: CEG, *Critique of the AER's approach to transition*, January 2016, pp. 13–52.

69 AER, *2009 WACC review: Final decision*, May 2009, p. 153.

debt). This uses the approach to transition originally proposed by Queensland Treasury Corporation.[70]

- Arguments that potentially support a full transition (that transitions from a current on the day rate) include that it should:
    - Provide an ex ante allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services. Under this approach, it might also be argued the resetting of the allowed return on debt to current market rates at the commencement of the transition:
        - Provides allowed return on debt cash flows with a present value that should (approximately) equal the current value of the debt proportion of the regulatory asset base (RAB);[71]
        - Is consistent with the on the day based allowance set in the prior regulatory control period; and
        - is consistent with past investor expectations;
    - Provide an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services irrespective of prior hedging activities undertaken by regulated firms;
    - Potentially reduce regulatory risk relative to an immediate change to a trailing average absent transition. The present value of future expected cash flows from the return on debt allowance (with the proposed AER transition) should approximately equal the present value of the expected cash flows from the return on debt allowance if the on the day regime continued. Therefore, the change in the regulatory regime should not result in a material occurrence of regulatory risk that might occur from an unexpected change in the wealth of regulated firms and their investors flowing from a regulatory change;
    - Provide an opportunity to reduce the 'mismatch' risk facing regulated firms as one tenth of the debt will be updated each year (noting historic movements in interest rates cannot be hedged). As this is updated, firms can issue new debt if they choose to do so;
    - Result in a return on debt allowance that is commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services (having regard to historical debt/financial liabilities),

[70] We note that the AER is likely to use an estimate from the RBA and that it appears the RBA yield curves are not PAR yield curves. This may result in some slight estimation error.

[71] For SP AusNet Transmission investors would have known there was a possibility that the return on debt would be set using a historical average. However, it is reasonable to expect they would have expected a transition to remove wealth transfers from the methodology change given the discussions of the potential need for transition during the rule change process.

and that will contribute to achieving the ARORO, irrespective of any gains or losses on historically incurred debt due to the eventuation of mismatch risk. This might be argued to be because any gain or loss from interest rate movements on historically incurred debt:

- Is risk that occurred ex post the allowed return on debt being set in prior regulatory control periods and therefore should not be compensated under the ex-ante regime.

- Should not result in ex ante compensation not being commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in the provision of fully regulated services (in either the prior regulatory period, or upcoming regulatory periods). To the extent that there was 'mismatch' risk, or there remains mismatch risk, it should largely be reflected in the equity beta estimate (to the extent it is systematic) and be appropriately compensated for in the allowed return on equity (given the choice of equity beta). [72]

- Was incurred in the prior regulatory control period, or regulatory control periods (when interest rates moved). It therefore should not impact the allowed return on debt over the upcoming regulatory control period commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in the provision of fully regulated services as any gains or losses have effectively and substantively already been incurred (as would be recognised in fair value accounting).

- Provide incentives for efficient investment and use of infrastructure. An allowed return on debt commensurate with the efficient debt financing costs for a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services while also limiting regulatory risk should result in efficient investment by regulated firms and efficient complimentary investment and use by consumers.

- Provide the regulated firms with a reasonable opportunity to recover their efficient costs as they relate to debt financing in an ex ante sense (noting the regime is not intended to remove all risk from the regulated firms as would be the case if ex-post returns (actual) were used).

[72] While not all of the firms we used as proxies to estimate beta were regulated (and therefore faced mismatch risk), the regulated firms had lower betas on average than the overall sample. We also note losses and gains from mismatch risk driven by interest rate movements should have been reflected in observed share price data for the regulated firms that we used as proxies to estimate equity beta

Services required

The AER seeks expert advice to inform its upcoming final (and draft) decisions on the rate of return. The AER seeks a particular focus on the return on debt component for the upcoming final decisions for the VIC DNSPs, ActewAGL, AGN, APTNT and AusNet Services (TNSP).

Dr Martin Lally and Chairmont provided the AER with expert reports in October 2014, April 2015 and October 2015.[73] Since then, the AER has received three initial proposals and five revised proposals from electricity network service providers and three revised access arrangement proposals from gas service providers. The AER must publish its final decisions for the eight relevant service providers by 30 April 2016. The AER must publish its draft decisions for the remaining three by 30 June 2016 (for AusNet Services [TNSP]) and 30 September 2016 (for Powerlink and TasNetworks [DNSP]).

The AER requires expert advice as set out below. The services required specifically relate to the return on debt to be applied in the determinations/access arrangements (final and draft decisions) for the service providers stated above, which contributes to the achievement of the allowed rate of return objective (the ARORO). The consultant is only required to consider the rules and law, including the possible regulatory outcomes under the current and prior versions of the rules, to the extent it is necessary to answer the finance and economic questions set out below.

The material relevant to this consultancy is listed in attachment 1, with links to the AER website to access the documents.

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[73] Chairmont, *Financing practices under regulation*, October 2015; Lally, *Review of submission on transition issues for the cost of debt*, October 2015; Chairmont, *Cost of debt transitional analysis*, April 2015; Lally, *Review of submissions on the cost of debt*, April 2015; Lally, *Transitional arrangements for the cost of debt*, November 2014.

The consultant is required to provide a single report that covers the questions in both Parts A and Part B below. Part A of the work has two intended purposes: to provide advice to the regulator on specific points; and to also inform the consultants overall advice in relation to answering the questions in Part B of the report.

Please note the consultant should express:

- their independent expert opinion on the specific Part A and Part B questions asked below regardless of any background set out above; and
- Any further comments that the consultant considers appropriate for the AER to have regard to in assessing the regulated firms proposals in relation to the allowed return on debt

In answering the question in part A and part B, the consultant should not simply rely on material in the high level background above provide as guidance without consideration of whether any statements are reasonable. For example, in answering question 12(e) in Part A the consultant should independently consider what prior investor expectations are reasonable.

The consultant is also required to provide to the AER any spreadsheets used in their analysis.

This request is for a capped-price contract.

Part A.

Provide advice on each of the questions with clear explanation on why you hold your view (including any mathematical proofs where you consider these are appropriate). Where the

answer is unclear please state so and explain why. Where assumptions need to be made to answer the question, please state these assumptions and explain their relevance.

In relation to the on the day methodology to set the allowed cost of debt:

23. We consider an allowed return on debt that results in zero expected excess returns should reflect the 'efficient cost' of debt in the market. Is this a reasonable assumption consistent with finance theory?
24. Can the current (that is, the 'on the day') YTM on debt (of a given credit rating and maturity) observed in the financial markets be considered a valid measure of the 'efficient cost' of debt financing of this credit rating and maturity?
25. Assuming the credit rating and term are chosen appropriately, will the current YTM be expected to be commensurate with the efficient debt financing costs at the commencement of the regulatory control period for a benchmark efficient entity with a similar degree of risk that which applies to the regulated firm in respect of the provision of fully regulated services?
26. Would setting the current 'on the day' YTM on debt with an appropriate term and credit rating as the allowed return on debt (assuming the rest of the WACC input parameters are set consistently with this), be expected to lead to reasonably efficient investment in and use of regulated infrastructure?
27. Assume the regulator sets an ex ante PAR YTM on the debt proportion of the RAB at the start of the regulatory control period (based on BBB+ credit rating and ten term to maturity) over the five year regulatory control period combined with the expectation of then resetting the YTM to PAR at the start of the next and subsequent regulatory control periods (also based on a BBB+ credit rating and 10 year term to maturity)

    Having regard to: 1) in the past regulated firms may have frequently issued debt with a maturity of approximately 10 years and swapped the base rate to match the regulatory term (typically 5 years), 2) the AER had not explicitly compensated firms for transaction costs associated with hedging instruments, and 3) the past shape of the terms structure of bond yields and swap rates:

    a. Approximately what ex ante return on the debt proportion of the RAB might be expected over the regulatory control period for regulated firms under this approach?
    b. Would this ex ante allowed return on debt be expected to be commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period?
    c. Would this approach to setting the allowed return on debt be expected to result in a return on debt commensurate with the efficient debt

financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over multiple regulatory control periods and/or over the life of the regulatory assets?

28. In relation to losses or gains on financial liabilities from movements in market interest rates:
    a. Are losses or gains on a financial liability from movements in the market YTM substantively incurred when the YTM changes (i.e. as soon as the present value of the expected value of the liability changes)?
    b. Does the fact a firm may realise a fair value loss, or realise a fair value gain, from future cash flows being different to the current cost of debt in the market rates alter that the substantive loss was made when the cost of debt in the market (i.e. discount rate) changed?
    c. Is the concept that losses (or gains) on financial liabilities substantively occur once interest rates move consistent with the principles underlying fair value accounting?
    d. Has any loss or gain on a regulated firms debt portfolio from movements in interest rates in prior regulatory control periods been incurred in those prior regulatory control periods?
    e. Once “mismatch” risk on a regulated firm’s financial liabilities has eventuated from interest rate movements (i.e. a fair value loss or gain has occurred), can it be hedged?
29. Consider where a firm is exposed to and makes a gain or loss on its issued debt due to ‘mismatch’ risk (either in relation to the whole cost of debt or a component such as the risk premium over swap).
    a. Does this impact whether the firm ex ante received a return on debt over the regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?
    b. Do losses or gains incurred from mismatch risk affect whether continuing the on the day regime should result in an expected return commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the upcoming regulatory control period, or over multiple future regulatory control periods, or over the remaining life of the regulatory assets?
30. Would potential losses or gains from mismatch risk place an incentive on regulated firms to efficiently manage their exposure to interest rate risk?

In relation to the trailing average methodology to set the allowed cost of debt and transition:

31. Would a cost of debt estimated as a 10 year historical trailing average portfolio (i.e. estimated using a trailing average approach) normally be considered an appropriate estimate of 'efficient' debt financing costs today in either finance theory or by market practitioners?
32. Would a trailing average approach produce a regulatory allowance that would normally be expected to result in efficient investment incentives where the current market cost of debt is materially lower or higher than the historical average?
33. On average, would a trailing average approach produce a regulatory allowance that would result in more efficient investment in, or use of, regulated infrastructure relative to the continued use of an on the day approach?
34. Would the regulatory use of a trailing average approach be expected to materially reduce the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services relative to an on the day approach?
35. If expected reductions in efficient financing costs from the use of a trailing average might be material:
    e. would these be expected to result from efficiencies, or
    f. would any reductions in the efficient financing costs likely primarily reflect a transfer of priced risk to consumers
36. Would the immediate implementation of a trailing average (i.e. without transition) effectively remove interest rate risk that regulated firms bore in prior regulatory control periods under the on the day approach to setting the allowed return on debt (to the extent they did not hedge this risk) ex post the risks occurrence?
37. Take as given that a 10 year historical average of the BBB 10 year YTM on debt is around 7.8% and the current BBB 10 year YTM is less than 6.5%. Given this, would an immediate movement to a trailing average (that is, without transition) be expected to result in:
    g. A materially higher expected return on debt allowance in present value terms (over both the upcoming regulatory control period and over the remaining life of the assets) than if the on the day regime continued to be used to set the allowed return on debt?
    h. Expected future cash flows from the return on debt allowance having a materially higher present value than the current value of the debt component of the regulatory asset base to which the allowed return on debt is applied?
    i. An allowed return on debt above the efficient cost of debt over the upcoming regulatory control period and/or over the future life of existing regulatory investments?
    j. Providing an allowed return on debt to the regulated firm with a materially higher value than the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

k. An occurrence of material regulatory risk relative to prior investor expectations?

l. Undermining of regulated firms' incentives to manage the interest rate risk they face?

38. If the regulatory debt allowance is set using a trailing average approach, would this allowance (i.e. future expected allowed return on debt cash flows under this approach) be likely to have a different present value to the value of the debt component of the regulatory asset base (RAB) at any given point in time?

39. If the present value of the allowed return on debt cash flows from using a trailing average to set the allowed return on debt would be likely to differ to the value of the debt component of the RAB at any given point in time, does this imply that the regulatory use of a trailing average approach might be expected to:

f. Not result in an allowed return on debt over any given regulatory control period commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services ?

g. Only potentially result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets (i.e. over multiple regulatory control periods)?

h. If implemented without a transition, only be likely to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if the historical average return on debt approximately equals the current return on debt in the market at the commencement of its use?

i. Where the historical average cost of debt in the market materially differs to the current cost of debt in the market, only result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets if a transition (or other method such as a transfer payment) is used to effectively adjust the allowed return on debt so it is commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?

j. Be likely to require a transition (so the allowed return on debt remained commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over the life of the assets) if the decision was made to change back to an on the day approach to estimating the cost of debt in a subsequent regulatory control period?

40. In a competitive market can firms necessarily expect to recover historically incurred debt financing costs from customers irrespective of current debt financing costs?
41. Is the outcome that the regulated firms seek from immediately implementing a trailing average (without transition):
    d. Consistent with the ex-ante return that firms would expect to receive in a competitive market?
    e. Likely to lead to investment outcomes you would see in a competitive market?
    f. Consistent with a freely entered bargain between consumers and regulated firms you would expect to see in a workably competitive market?
42. Would the transition approach of the AER be expected to result in expected future allowed return on debt cash flows with approximately the same present value as the expected regulated allowed return on debt cash flows that would come from the continuation of the on the day approach to setting the allowed return on debt?
43. If you are of the view that the on the day regime would be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services over individual and multiple regulatory control periods going forward, would setting a regulated allowance with a materially higher or lower present value than this be expected to result in an allowed return on debt commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firm in respect of the provision of fully regulated services?
44. Given that the AER's proposed allowed return on debt (with full transition) and the proposed allowed return on debt allowances (from all of regulated firms who have not applied the AER's approach) are updated by 1/10 using the observed cost of debt in the market each year:
    g. Is the mismatch risk from all alternative approaches to estimating the allowed return on debt likely to be similar?
    h. To the extent that a reduction in mismatch risk from moving to a trailing average reduces the regulated firms efficient financing costs, would all approaches be expected to provide similar reductions?

Part B.

Having regard to your answers to the questions in Part A, any background material you consider relevant, and any other matters you consider relevant, please set out an overall view with reasons in your report whether the consultant considers that the AER's approach to transition to a trailing average is appropriate. Please explain

in your report if the consultant considers the AER's transition approach would be expected to:

f) provide the regulated firms with an ex ante return on debt allowance commensurate with the efficient debt financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to regulated firms in respect of the provision of fully regulated services;

g) contribute to providing the regulated firms with an (overall) ex ante rate or return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the regulated firms in respect of the provision fully regulated services;

h) contribute to the promotion of efficient investment in, and operation and use of, regulated infrastructure;

i) provide the regulated firms with a reasonable opportunity to recover their efficiently incurred debt financing costs

j) contribute to providing the regulated firms with a reasonable opportunity to recover their efficiently incurred (overall) financing costs.

Project Deliverables

The key deliverable is a written report addressing the advice sought as per the services required. Prior to finalisation, the consultant will provide a draft of the report for review by AER staff.

Timeline[74]

Contract signed (X)	Work commences (2 March)
X + 2 days	Commencement discussion with AER staff
X + 5 business days	Oral update to AER staff (9 March)
X + 20 business days	Draft report to AER staff (30 March)
X + 23 business days	AER staff comments on draft (4 April)
X + 28 business days	Final report to AER (11 April)

Merits and judicial review

The regulatory determinations made by the AER under the NER and NGR are subject to merits review by the Australian Competition Tribunal and judicial review in the Federal Court of Australia. Accordingly, the consultant's services and the consultant's final report must be performed to a professional standard which is robust, transparent, well-reasoned and defendable.

Any work required of the consultant as a result of a merits review would be the subject of a separate contract. The consultant may be requested to provide services in support of the final decision of the AER and the consultant must not unreasonably decline a request for assistance.

[74] Dates within brackets are indicative assuming that work commencement date is 2 March 2016.

Attachment 1

Background documents

Table 1 Previous expert advice provided to the AER

Lally (2014)	Lally, *Transitional arrangements for the cost of debt*, 20 November 2014.
Lally (2015)	Lally, *Review of submissions on the cost of debt*, April 2015,
Chairmont (2015b)	Chairmont, *Cost of debt: Transitional analysis*, April 2015.
Lally (2015b)	Dr Martin Lally—Review of submission on transition issues for the cost of debt, October 2015
Lally (2015c)	Dr Martin Lally—Review of submission on implementation issues for the cost of debt, October 2015
Chairmont (2015b)	Chairmont—Financing practices under regulation, October 2015.

Table 1 AER rate of return guideline

AER's current rate of return guideline
AER's current rate of return guideline explanatory statement
AER's current rate of return guideline explanatory statement (appendices)

Key proposal documents

Table 2 Current regulatory proposals, revenue proposals, access arrangement proposals

Initial proposal from AusNet Services (TNSP) – chapter 10
Revised proposal from ActewAGL (gas distribution network)
Revised proposal from Australian Gas Networks (AGN)
Revised proposal from APTNT (Amadeus gas pipeline) revised submission + revised AAI
Revised proposal from AusNet Services (DNSP) – chapter 7
Revised proposal from United Energy
Revised proposal from CitiPower and Powercor – chapter 10 (these are basically identical)
Revised proposal from Jemena Electricity Networks

Table 3 Previous regulatory proposals, revenue proposals, access arrangement proposals

Initial proposal from ActewAGL
Initial proposal from Australian Gas Networks (AGN)
Initial proposal submission from APTNT (Amadeus gas pipeline) + AAI
Initial proposals from AusNet, United Energy, Citipower, Powercor, and Jemena

Key consultant reports attached to revenue proposals / regulatory proposals / access arrangement proposals are shown in Table and **Error! Reference source not found.** below.

Table 4 New expert reports

Author and/or document link	Document	Submitted or referenced by
CEG	CEG - Critique of the AER's Approach to Transition - January 2016	AusNet JEN CitiPower Powercor UED ActewAGL AGN
CEG (attached)	CEG – Debt and inflation forecast estimates Revised 2016-21 access arrangement proposal Response to the AER's draft decision – January 2016	ActewAGL

Table 5 Previously submitted expert reports

Author or document link	Document	Submitted or referenced by
CEG (attached)	CEG, Application of AER criteria to methods for estimating efficient debt finance costs, June 2015.	ActewAGL
CEG (attached)	CEG, *Efficiency of staggered debt issuance*, February 2013.	AusNet JEN
CEG	CEG, *Efficient use of interest rate swaps to manage interest rate risk,* June 2015.	AGN UED
CEG	CEG, *Critique of the AER's JGN draft decision on the cost of debt*, April 2015.	ActewAGL AusNet CitiPower JEN UED Energex Ergon Energy SAPN
CEG (attached)	CEG, *The hybrid method for the transition to the trailing average rate of return on debt—Assessment and calculations for United Energy*, April 2015.	UED
CEG	CEG, *The hybrid method for the transition to the trailing average rate of return on debt—Assessment and calculations for AGN*, June 2015	AGN
CEG	CEG, *The hybrid method for the transition to the trailing average rate of return on debt—Assessment and calculations for SAPN*, June 2015	SAPN
Frontier	Frontier Economics, Cost of debt transition: Report prepared for Energex, June 2015.	Energex.

Frontier	Frontier Economics, TransGrid cost of debt transition, January 2015.	
Frontier	Frontier Economics, Cost of debt transition for NSW distribution networks, January 2015.	
QTC	QTC, *Return on debt transition analysis, A Joint Report for Energex and Ergon Energy*, July 2015.	Energex Ergon Energy
QTC, from page 114	Queensland Treasury Corporation, Return on debt transition analysis for Powerlink, December 2015.	Powerlink
Schlögl	Schlogl, *The AER's JGN draft decision on the cost of debt—A review of the critique by the CEG*, 23 April 2015.	UED Ergon Energy
SFG	SFG, *Return on debt transition arrangements under the NGR and NER*, February 2015	CitiPower JEN SAPN
UBS	UBS, Response to the TransGrid request for interest rate risk analysis following the AER Draft Decision of November 2014, January 2015.	
UBS (attached)	UBS, *Transaction costs and the AER return on debt draft determination*, March 2015.	CitiPower JEN

Table 6 Statements by corporate treasurers during the 2009 WACC review on their financing practices

Author and document link	Document	Submitted or referenced by
Buck Khim	Buck Khim, *Witness statement of Sim Buck Khim*, Jemena, undated.	JEN UED
Meredith	Meredith, *Witness statement of Gregory Damien Meredith*, Envestra, 31 January 2009	JEN UED
Noble	Noble, *Witness statement of Andrew Noble*, CitiPower and Powercor, undated.	JEN UED
Watson	Watson, *Witness statement of Alistair Watson*, SP AusNet, 30 January 2009.	JEN UED

Table 6 Key AEMC documents

AEMC Final Rule Determination	AEMC final rule determination
SFG (2012b) and SFG (2012a)	SFG reports to the AEMC for the rule development process

Table 7 Key submissions

Origin Energy	Origin Energy, Submission on ActewAGL's revised access arrangement for 2016–21, 4 February 2016
Origin Energy	Origin Energy, Submission on AGN's revised access arrangement for 2016–21, February 2016
Origin Energy	Origin Energy, Submission on the Victorian networks' revised proposals (for 2016–21), 4 February 2016

Victorian Minister for Industry, Energy and Resources	Minister for Industry, Energy and Resources Victorian Government, Submission to Victorian distribution businesses revised regulatory proposals (2016–20), 29 January 2016
Victorian Government	Victorian Government, Submission on the Victorian electricity distribution network service providers' revised regulatory proposals for 2016–20, 12 February 2016
EUCV	EUCV, A response to AusNet revenue reset proposal for the 2017–2022 period, 9 February 2016
CCP (panel 5)	CCP (panel 5), Transmission for the generations: Response to proposal by AusNet Services transmission group pty ltd and AER issues paper for AusNet Services transmission revenue review 2017–22, February 2016
VECUA	VECUA, Submission on the AER: AER preliminary 2016–20 revenue determinations for the Victorian DNSPs, 6 January 2016
Origin Energy	Origin Energy, Submission on the AER's preliminary decisions on the Victorian distribution network service providers for 2016–20, 6 January 2016
CCP sub panel 3	Consumer Challenge Panel, *Sub panel 3—Response to proposals from Victorian electricity distribution network service providers for a revenue reset for the 2016–2020 regulatory period*, 5 August 2015, pp.63–75, and attachment 1

Any reports referenced in these documents can be provided upon request.

Appendix 2

CURRICULUM VITAE GRAHAM PARTINGTON

PERSONAL

Name:	Graham Harold Partington
Address:	Economics and Business Building (H69),
	Finance Discipline, School of Business,
	University of Sydney
	NSW 2006
	Australia
Telephone:	+61 (0)2 9036-9429
Email:	Graham.Partington@sydney.edu.au

HIGHER EDUCATION AND EMPLOYMENT

Academic Qualifications:	B.Sc. (Hons) Economics/Forestry, University of Wales, 1971
	MEc. (Hons) by thesis, Macquarie University, 1983.

My current position is Associate Professor of Finance in the Finance Discipline at the University of Sydney. I have been chair of the Finance Discipline and was also head of the postgraduate research program in finance. Concurrent with my position at the University of Sydney I was also the Education Director for the Capital Markets Co-operative Research Centre PhD

program. In a career stretching back more than thirty years I have held Associate Professorships in finance at The University of Technology Sydney and The University of British Columbia. I have also held academic positions at Macquarie University and the University of Bangor I have had extensive teaching and research responsibilities in finance and accounting as well as being head, or deputy head, of University Departments and Schools. I have been very influential in the design of several undergraduate and masters degrees in finance and also PhD programs.

I have written in excess of thirty consulting and expert witness reports covering topics such as valuation, the cost of capital, the value of imputation tax credits, and the market risk premium.

Awards and Major Research Grants

Awards

2013 Best paper prize for accounting, banking economics and finance, Global Business Research Conference.

2012 Bangor University: Honorary Visiting Senior Research Fellow title extended for the period 2013-2016.

2010 The GARP (Global Association of Risk Professionals) Prize for Quantitative Finance/Risk Management/Derivative Instruments, Finance and Corporate Governance Conference.

2009 The CFA (Chartered Financial Analyst) Prize Asian Investments, Asian Finance Association Conference

2009 Bangor University: Honorary Visiting Senior Research Fellow for the period 2009-2012.

2008: PhD students name their rock group after me “The Partingtons”

2001: Manuscript award for the best paper: Education Notes, *Accounting Research Journal,* 2000.

2000: Peter Brownell Manuscript Award. Awarded by the Accounting Association of Australia and New Zealand for the best paper in *Accounting and Finance*, 1999

1985: Butterworths Travelling Fellowship

Major Research Grants

2014-2016 Centre for International Financial Regulation (CIFR), *Measuring Market Quality: Current Limitations and New Metrics*, $170,000.

2007-2014: National Co-operative Research Centre Scheme, grant for the Capital Markets Cooperative Research Centre (CMCRC) $98 million ($49 million in cash and matching in kind contributions.) About $21 million cash over the term of the grant was under my management to run the scholarship and education program.

2000-2003: Australian Research Council, industry linked grant, *Intangibles, Valuation and Dividend Imputation* ($667,000).

1985-1988: Australian Research Grants Scheme, *The Determinants and Consequences of Dividend Policy* ($30,000).

PUBLICATIONS

Books

R. Brealey, S. Myers, G. Partington and D. Robinson, 2000, *Principles of Corporate Finance*, Australian Edition, McGraw-Hill (1st printing 2000, 2nd printing 2000.)

C.A. Martin, J. McKinnon, R. Hines, G. Harrison and G. Partington, 1983, *An Introduction to Accounting*, McGraw-Hill (1st edition, 1983, 2nd edition, 1988, 3rd edition 1990.)

Contributions and Chapters in Books

G. Partington, 2011, Valuation and Project Selection when the Market and Face Value of Dividends Differ, Reprinted in *Asset Management Tools and Strategies,* Bloomsbury Press.

G. Partington, 2009, Valuation and Project Selection when the Market and Face Value of Dividends Differ, in *Qfinance the Ultimate Resource*, Bloomsbury Press.

G. Partington, 2007, Dividend Imputation Credits and Valuation, in *Business Tax Reform*, Australian Tax Research Foundation.

R. J. Coombes, M. Craig-Lees, M. McGrath, P. O'Sullivan, G. Partington and J. M. Wood, 1991, *Business Studies Book Two*, Social Science Press.

R. J. Coombes, M. Craig-Lees, M. McGrath, P. O'Sullivan, G. Partington and J. M. Wood, 1990, *Business Studies Book One,* Social Science Press.

E. Carew, 1985, *The Language of Money,* George Allen and Unwin.

Refereed Journals

PUBLISHED

M. Kim and G. Partington, 2015, The Dynamic Prediction of Financial Distress of Australian Firms, Australian Journal of Management, 40:1, pp.135-60.

A. Ainsworth, K. Fong, D. Gallagher, and G. Partington, 2015, Institutional Trading Around the Ex-Dividend Day*, Australian Journal of Management,* published on-line January, 2015.

A. Jun and G. Partington, 2014, Taxes, International Clienteles and the Value of ADR Dividends, *Journal of Business Finance & Accounting*, vol.41:9 & 10, pp. 1337–1360.

H. Dang and G. Partington, 2014, Rating Migrations: The Effect of History and Time, *Abacus*, vol.50:2, pp. 174-202

Hodgkinson L and G. Partington, 2013, Capital Gains Tax Managed Funds and the Value of Dividends: the Case of New Zealand, *British Accounting Review*, **45:4**, pp.271-283.

Partington G., 2013, Death Where is Thy Sting? A Response to Dempsey's Despatching of the CAPM, Abacus, **49:S1**, pp. 69-72

Yao J., G. Partington and M. Stevenson, 2013, Predicting the Directional Change in Consumer Sentiment, Australian Journal of Management, **38:1**, pp. 67-80

A. Jun, D. Gallagher and G. Partington, 2011, An Examination of Institutional Dividend Clienteles: Evidence from Australian Institutional Portfolio Holdings, *Journal of Business Finance and Accounting,* **38:1-2,** pp. 198–224.

M. Dempsey, M. McKenzie and G. Partington, 2010, The Problem of Pre-Tax Valuations: A Note, *Journal of Applied Research in Accounting and Finance*, **5:2**, pp. 10-13.

G. Partington, Discussion of an International Analysis of Dividend Payment Behaviour, 2009, *Journal of Business Finance and Accounting,* **36:3-4**, pp. 523-529.

G. Truong, G. Partington and M. Peat, 2008, Cost of Capital Estimation and Capital Budgeting Practice in Australia, *Australian Journal of Management,* **33:1,** pp. 95- 122.

M. Dempsey and G. Partington, 2008, The Cost of Capital Equations under the Australian Imputation Tax System, *Accounting and Finance,* **48:3**, pp. 439-460.

H. Chu and G. Partington, 2008, The Market Valuation of Cash Dividends: The Case of the CRA Bonus Issue, *International Review of Finance,* **8:1-2**, pp. 1-20.

L. Hodgkinson and G. Partington, 2008, The Motivation for Takeovers in the UK, *Journal of Business Finance and Accounting*, **35:1-2**, pp. 102-126

Jun, V. Alaganar, G. Partington and M. Stevenson, 2008, Price and Volume Behaviour around the Ex-dividend Day: Evidence on the Value of Dividends from ADRs and their Underlying Australian Stocks*, International Review of Finance*, **8:1-2**, pp. 21-55.

Truong and G. Partington, 2008, The Relation between Franking Credits and the Market Risk Premium: A Comment, *Accounting and Finance*, **48:1**, pp. 153-158.

B. Wong, G. Partington, M. Stevenson and V. Torbey, 2007, Surviving Chapter 11 Bankruptcies: Duration and Payoff? *Abacus*, **43:1**, pp.363-387.

G. Partington, 2006, Discussion of Dargenidou, Mcleay and Raonic (Expected Earnings Growth and the Cost of Capital: An Analysis of Accounting Regime Change in the European Financial Market) *Abacus* **42:3-4,** pp. 415-425.

S. Armitage, L. Hodgkinson and G. Partington, 2006, The Market Value of UK Dividends from Shares with Differing Entitlements, *Journal of Business Finance and Accounting*, **33:1**, pp 150-174.

G. Partington, M Stevenson and J. Yao, 2005, Run length and the Predictability of Stock Price Reversals. *Accounting and Finance*, **45:4**, pp. 653-671.

G. Partington, P Russell, M. Stevenson and V. Torbey, 2001, Predicting Return Outcomes for the Shareholders of Companies Entering Chapter 11 Bankruptcy, *Managerial Finance,* **27:4,** pp.78-96.

G. Partington and M. Stevenson, 2001, The Probability and Timing of Price Reversals in the Property Market, *Managerial and Decision Economics,* **22:7,** pp.389-398.

H. Chu and G. Partington, 2001, Dangers in Data Adjustment: The Case of Rights Issues and Returns, *Accounting and Finance,* **41:2,** pp.143-168.

G. Partington and S. Walker, 2001, A Note on Transactions Costs and the Interpretation of Dividend Drop-off Ratios, *Accounting and Finance,* **41:2**, pp. 229-241.

S. Walker and G. Partington, 2000, A Market Valuation for Optus Pre-listing: A Case Note, *Accounting Research Journal*, **13:2,** pp. 90-94. (This paper won the award for Best Paper: Education Notes.)

S. Walker and G. Partington, 1999, The Value of Dividends: Evidence from Cum-dividend Trading in the Ex-dividend Period, *Accounting and Finance*, **39:3,** pp. 275-296. (This paper won the Peter Brownell Manuscript Award).

G. Hobbes, G. Partington and M. Stevenson, 1996, Earnings Dividends and Returns: A Theoretical Model, *Research in Finance,* Supplement 2, pp. 221-244.

G. Partington, 1989, Variables Influencing Dividend Policy in Australia: Survey Results, *Journal of Business Finance and Accounting* **16:2,** pp.165-182.

C.A. Martin, J. L. McKinnon and G. Partington, 1986, Funds Statements and the Two Entity Test: A Response, *Abacus*, **22:1**, pp. 39-44.

G. Partington, 1985, Dividend Policy and its Relationship to Investment and Financing Policies: Empirical Evidence, *Journal of Business Finance and Accounting,* **12:4**, pp. 531-542.

G. Partington, 1984, Dividend Policy and Target Payout Ratios, *Accounting and Finance*, **24:2**, pp. 63-74.

G. Partington, 1984, Teaching Process Costing, *Issues in Accounting Education,* **2:1**, pp. 75-90.

C.A. Martin, J. L. McKinnon and G. Partington, 1983, Clarifying Funds Statements: The Two Entity Test *Accounting and Finance,* **23:1**, pp. 79-87.

R. H. Chenhall and G. Partington, 1983, Dividends Distortion and Double Taxation, *Abacus*, **19:1**, pp. 3-13.

G. Partington, 1981, Financial Decisions the Cost(s) of Capital and the Capital Asset Pricing Model, *Journal of Business Finance and Accounting,* **8:1**, pp. 97-112.

G. Partington, 1979, Process Costing: A Comment, **15:1**, *Abacus,* June pp.60-66.

G. Partington, 1979, The Tax Deductibility of Interest Payments and the Weighted Average Cost of Capital: A Comment, *Journal of Business Finance and Accounting*, **6:1**, pp.95-100.

Conference Papers

E. Lai, A. Ainsworth, M. McKenzie, and G. Partington, 2014, *The Value of Dividends: Evidence from Short-Sales*, Proceedings of the European Financial Management Association 2014 Annual Meetings, Rome, June.

G. Partington, and M. Kim, 2014 *The Dynamic Prediction of Company Failure: The Influence of Time Non-linearity and the Economy*, 2014 China Meeting of the Econometric Society, Xiamen, China, 25 - 27 June.

S. Foley, G. Partington, J. Svec and N. Pritcha, 2014 *The Effects of Underwriting Dividend Reinvestment Plans*, CFA-JCF-Schulich Conference on Financial Market Misconduct, Toronto, April.

R. Philip, P. Buchen and G. Partington, 2013, *Returns and Doubling Times,* Global Business Research Conference, Kathmandu. (Best paper prize for accounting, banking economics and finance.)

R. Philip, P. Buchen and G. Partington, 2013, *The transformation of returns to the time domain as doubling times*, 6th MEAFA Workshop, Sydney

M. McKenzie and G. Partington, 2012, *Selectivity and Sample Bias in Dividend Drop-off Studies*, 10th INFINITI Conference on International Finance, Dublin.

L. Hodgkinson and G. Partington, 2011 *Capital Gains Tax Managed Funds and the Value of Dividends*, Accounting and Finance Association of Australia and New ZealandConference, Darwin.

A. Jun and G. Partington 2011, *Taxes International Clienteles and the Value of ADR Dividends*, 9th INFINITI Conference on International Finance, Dublin.

A. Ainsworth, K. Fong, D. Gallagher, and G. Partington, 2010, *Taxes, Price Pressure and Order Imbalance around the Ex-Dividend Day*, Financial Management Association (FMA) Asian Conference, Singapore

H. Dang and G. Partington, 2010, *The Dynamic Estimation of Rating Migration Hazard*, Finance and Corporate Governance Conference, Melbourne, (Awarded the GARP prize in Quantitative finance/Risk Management/Derivatives).

Partington G and Xu Y 2010, *Rights issue announcements motives and price response,* 8th INFINITI Conference on International Finance - International Credit and Financial Market Integration: After the Storm?, Dublin.

A. Ainsworth, K. Fong, D. Gallagher, and G. Partington, 2009, *Institutional Trading Around the Ex-Dividend Day*, Asian Finance Association Conference, Brisbane. Awarded the CFA best paper prize (Asian Investments.)

H. Dang and G. Partington, 2009, *Rating Migrations: The Effect of History and Time*, Financial Management Association (FMA) European Conference, Turin.

H. Dang and G. Partington, 2008, *Rating History and the Rating Dynamics of Fallen Angels, Rising Stars, and Big Rating Jumpers*, Risk Management Conference: Credit and Financial Risk Management 40 Years after the Altman Z-score Model, Florence.

G. Partington, M. Stevenson, and J. Yao, 2008, *Predicting the Directional Change in Consumer Sentiment*, The 28th Annual Symposium on Forecasting, Nice.

M. Kim and G. Partington, 2008, *The Dynamic Prediction of Corporate Failure*, Australasian Finance and Banking Conference.

M. Dempsey and G. Partington, 2007, *Cost of Capital and Valuation Equations that Work for Any Tax System: Their Application under the Australian Imputation Tax System*, Multinational Finance Society Conference, Thessalonica.

H. Dang and G. Partington, 2007, *Modeling Rating Migrations*, Poster Session, CREDIT Conference, Venice

G. Truong and G. Partington, 2007, *Alternative Estimates of the Cost of Equity Capital for Australian Firms*, 20th Australasian Finance and Banking Conference, Sydney,

G. Partington, 2006, *Dividend Imputation Credits and Valuation*, Business Tax Reform Meet the Critics, Australian Tax Research Foundation Conference, Sydney.

G. Truong and G. Partington, 2006, *The Value of Imputation Tax Credits and Their Impact on the Cost of Capital*, Accounting and Finance Association of Australia and New Zealand Conference, Wellington.

A. Jun, D. Gallagher and G. Partington, 2006, *An Examination of Institutional Dividend Clienteles: Evidence from Australian Institutional Portfolio Holdings*, Accounting and Finance Association of Australia and New Zealand Conference, Wellington.

G. Partington and M. Stevenson, 2006, *A Distress Prediction Tool*, New Directions in Employment and Financial Security: Rethinking Employee Entitlements and Employee Buyouts. Workplace Relations Centre and Members Equity Workshop, Sydney.

H. Chu and G. Partington, 2005, *The Market Valuation of Cash Dividends: The Case of the CRA Bonus Issue*, The European Financial Management Association Annual Meeting, Milan.

G. Truong, G. Partington and M. Peat, 2005, *Cost of Capital Estimation and Capital Budgeting Practice in Australia*, Accounting and Finance Association of Australia and New Zealand Conference, Melbourne,.

A. McAdam, and G. Partington, 2005, *Does the Choice of Share Price Matter when Examining Takeovers?* Accounting and Finance Association of Australia and New Zealand Conference, Melbourne.

A. Jun, , V. Alaganar, G. Partington and M. Stevenson, 2004, *Price and Volume Behaviour around the Ex-dividend Day: Evidence on the Value of Dividends from ADRs and their Underlying Australian Stocks*, Accounting and Finance Association of Australia and New Zealand Conference, Alice Springs.

M. Dempsey and G. Partington, 2004, *The Cost of Capital Equations Under the Australian Imputation Tax System*, Accounting Association of Australia and New Zealand Conference, Alice Springs,.

S. Armitage, L. Hodgkinson and G. Partington, 2002, *The Value of Dividends to a Marginal Investor, Evidence using Contemporaneous Trading Data,* British Accounting Association Conference, Jersey.

H. Chu and G. Partington, 2001, *The Value of Dividends: Evidence from a New Method*, Accounting Association of Australia and New Zealand Conference, Auckland.

G. Partington, P Russell, M. Stevenson and V. Torbey, 2001, *Predicting Return Outcomes for the Shareholders of Companies Entering Chapter 11 Bankruptcy*, Accounting Association of Australia and New Zealand Conference, Auckland.

H. Chu, L. Hodgkinson and G. Partington, 2001, *Right's Trade Adjustments: Evidence from the UK,* British Accounting Association Conference, Nottingham

H. Chu and G. Partington, 2001, *The Value of Dividends Implicit in Rights Prices*, Australasian Finance and Banking Conference, Sydney.

L. Hodgkinson and G. Partington, 2000, *The Motivation for Takeovers in the UK*, British Accounting Association Conference, Exeter.

V. Alaganar, G. Partington and M. Stevenson, 2000, *Do Ex-dividend Drop-offs Differ Across Markets? Evidence From Internationally Traded* (*ADR*) *Stocks*, Accounting Association of Australia and New Zealand Conference, Hamilton Island.

G. Partington and S. Walker, 2000, *A Theory of Ex-Dividend Equilibrium Under Imputation and Some Empirical Results*, Accounting Association of Australia and New Zealand Conference, Hamilton Island,.

G Partington and S. Walker, 1999, *The 45-Day Rule: The Pricing of Dividends and the Crackdown on Trading in Imputation Credits*, Accounting Association of Australia and New Zealand Conference, Cairns.

S. Walker and G. Partington, 1999, *Optus: A Market Valuation Pre-listing*, Accounting Association of Australia and New Zealand Conference, Cairns.

H. Chu and G. Partington, 1999, *Dangers in Data Adjustment: The Case of Rights Issues*, Australasian Finance and Banking Conference, Sydney.

G. Hobbes, G. Partington and M. Stevenson, 1997, *A General Model of Earnings Dividends and Returns,* Australasian Finance and Banking Conference, University New South Wales, Sydney.

S. Walker and G. Partington, 1997, *The Ex-Dividend Drop-off: Evidence from Cum-dividend Trading in the Ex-dividend Period*, Accounting Association of Australia and New Zealand Conference, Hobart.

G. Hobbes, G. Partington and M. Stevenson, 1995, *Earnings Dividends and Returns: A Theoretical Model,* Asia-Pacific Finance Association Conference, Hong Kong.

G. Partington and E. Hutson, 1994, *Share Prices, Takeover Outcomes and the Expected Value Hypothesis*, invited paper at the University of Wales Finance & Accounting Colloquium, Gegynog.

G. Partington and E. Hutson, 1994, *Share Prices, Takeover Outcome sand the Volume of Trades*, Australasian Finance and Banking Conference, Sydney.

G. Partington, M. Peat and M. Stevenson, 1992, *The Probability and Timing of Corporate Financial Distress: Preliminary Results for Australia,* Australasian Finance and Banking Conference, Sydney.

G. Partington, M. Peat and M. Stevenson, 1991, *Estimating the Probability and Timing of Financial Distress,* Australian Institute of Bankers Conference, Melbourne.

P. Eddey, G. Partington and M. Stevenson, 1989, *Predicting the Probability and Timing of Takeover Success,* Australasian Finance and Banking Conference, Sydney.

G. Partington and T. Valentine 1984, *Finance for Australian Industry*, Metal Trades Industry Conference, Sydney.

G. Partington, 1983, *Why Firms Use Payout Targets: A Comparative Study of Dividend Policy,* Accounting Association of Australia and New Zealand Conference, Brisbane.

Unpublished Working Papers

H. Chu and G. Partington, 2001, *The Market Valuation of Cash Paid into Australian Companies: Evidence from Ex-Rights Day Share Price Behaviour,*.

G. Partington, 1993, *Miller Modigliani and Ohlson: A Note on Old Models in New Clothes,*.

Submissions to Government Inquiries and the Accounting Research Foundation

A. Ainsworth, A. Lee, G. Partington and T. Walter, 2013, *Analysis of ASX Cum Dividend Trading in the Ex Dividend Period 2003-2013: Submission to the Treasury on "Preventing Dividend Washing",* submission to Treasury Inquiry: Protecting the Corporate Tax base from Erosion and Loopholes - Preventing 'Dividend Washing'

G. Partington, 1991, *Pricing and Capital Adequacy: Are the Banks Getting it Wrong*? a submission to The Australian Banking Inquiry.

G. Partington, 1989, *Accounting in Higher Education*, a submission to The Review of The Accounting Discipline in Higher Education.

J. McKinnon and G. Partington, 1980, *Statement of Sources and Applications of Funds - A Comment on the Exposure Draft,* a submission to the Australian Accounting Research Foundation.

C. Le Gras and G. Partington, 1979, *Commission Rates - Sheep and Cattle Sales,* a submission to the Prices Justification Tribunal.

R. Chenhall and G. Partington, 1979, *Financial Effects of Corporate Taxation,* an invited submission, Australian Financial System Inquiry.

R. Chenhall and G. Partington, 1979, *Submission on Corporate Sector Finance,* a submission to the Australian Financial System Inquiry.

Miscellaneous

G. Partington, 1989, Careers in Finance, *Focus on Careers*; *National Graduate Careers Magazine*. (Updated 1993, at the request of the Department of Education Employment and Training, Careers Reference Centre.)

D. Leece, G. Partington and R. Skellington, 1975, *Not All Over the Audience*, Bangor Arts Festival, Bangor.

D. Leece, G. Partington, D. Power and R. Skellington, 1974, *A Spring Revue,* Bangor Arts Festival, Bangor.

MEMBERSHIPS

Accounting and Finance Association of Australia and New Zealand (Current))

American Finance Association (Current))

American Accounting Association (1978–1992)

European Accounting Association (1984–1987)

Australian Institute of Bankers (1993–1997)

Royal Forestry Society (1978-1984)

CURRICULUM VITAE STEPHEN SATCHELL

NAME Stephen Ellwood SATCHELL

CURRENT POSITION College Teaching Fellow

COLLEGE Trinity College, Cambridge University

DATE OF BIRTH 22nd February 1949

CAREER 1971-73 - School Teacher

1973-74 - Computer Executive

1974-76 - Research Officer

1977-78 - Economic Advisor 10 Downing Street, (part-time)

1978-79 - Lecturer (Statistics Department) at LSE

1979-80 - Lecturer (Economics Department) at LSE

1980-86 - Lecturer, University of Essex

1986-2014 - Fellow(Title C), Trinity College

1986-89 - Assistant Lecturer, University of Cambridge

1989-2000 - University Lecturer at the University of Cambridge

1991-93 - Reader, Birkbeck College

2000-2009 - The Reader of Financial Econometrics, Cambridge University.

2010-2012 - Visiting Professor, Sydney University.

2011 - The Emeritus Reader of Financial Econometrics, Cambridge University.

2012- 2014 -Visiting Lecturer ,RHUL, London University

2013 -Professor, Sydney University

2014 - Fellow(Title E), Trinity College

CURRENT RESEARCH

I am working on a number of topics in the broad areas of econometrics, finance, risk measurement and utility theory. I have an interest in both theoretical and empirical problems. Many of my research problems are motivated by practical investment issues. My current research looks at alternative methods of portfolio construction and risk management, as well as work on non-linear dynamic models. I am active in researching the UK mortgage and housing markets.

I have strong links with Inquire (Institute for Quantitative Investment Research). This is a city-based organization that finances academic research on quantitative investment. I am also on the management committee of LQG (London Quant Group).

JOURNAL AFFILIATIONS

I am the Founding Editor of *Journal of Asset Management* (Palgrave Macmillan publishers) first issue, July 2000

I am the Series Editor of a book series, *Quantitative Finance* (Academic Press/Elsevier publishers).

I am the Editor of *Journal of Derivatives and Hedge Funds* (Palgrave Macmillan publishers). I am on the Editorial Board of *Applied Financial Economics*, *Journal of Financial Services Marketing*, *Journal of Bond Trading and Management. QASS, Journal of Financial Policy* and *European Journal of Finance* and senior associate editor of *Journal of Mathematical Finance.*

I am the Founding Editor of a journal for Incisive-Media Ltd, *Journal of Risk Model Validation.* and was editor for another of their journals, *Journal of Financial Forecasting.*

SUBMITTED PUBLICATIONS

Estimating Consumption Plans for Endowments with Recursive Utility by Maximum Entropy Methods, (with S. Thorp and O. Williams), submitted to *Applied Mathematical Finance*

Aligned with the stars: the Morningstar rating system and the cross-section of risk aversion (with S. Thorp and R. Louth)

"Individual capability and effort in retirement benefit choice" (with H. Bateman, S. Thorp, , J. Louviere, C. Eckert) submitted to *Journal of Risk and Insurance*

("Default and Naive Diversification Heuristics in Annuity Choice",(with H. Bateman, S. Thorp, , J. Louviere, C. Eckert) submitted to *Journal of Behavioural Finance*

Selfish Banks and Central Price Setting :The LIBOR price setting mechanism(with O. Ross and M. Tehranchi) submitted to OR

."Investigating a Fund Return Distribution when the Value of the Fund under Management is Irregularly Observed", with John Knight and Jimmy Hong, submitted to the *Journal of the Royal Statistical Society: Series A*.

Biased estimates of beta in the CAPM(with R.Philip and H. Malloch) submitted to *Applied Economics*

An Equilibrium Modelof Bayesian Learning(with O.Ross and M.Tehranchi) submitted to *Econometrica.*

FORTHCOMING PUBLICATIONS

Time Series Momentum, Trading Strategy and Autocorrelation Amplification", (with J. Hong) in *Quantitative Finance. A*

Theoretical Decomposition of the Cross-Sectional Dispersion of Stock Returns(with A.Grant) forthcoming in *Quantitative Finance. A*

Evaluating the Impact of Inequality Constraints and Parameter Uncertainty on Optimal Portfolio Choice with A.Hall and P. Spence, forthcoming in *Applied Economics*

2015 Publications

On the Difficulty of Measuring Forecasting Skills in Financial Markets, (with O. Williams), in *Journal of Forecasting A* http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291099-131X

2014 Publications

'Modelling Style Rotation: Switching and Re-Switching',(with Golosov, E.) in

Journal of Time Series Econometrics,(A) vol.6, no. 2, pp.103-28. Citation Information: Journal of Time Series Econometrics. Volume 0, Issue 0, Pages 1–26, ISSN (Online) 1941-1928, ISSN (Print) 2194-6507, DOI: 10.1515/jtse-2012-0028, April 2013

Steady State Distributions for Models of Locally Explosive Regimes: Existence and Econometric Implications (with J.Knight and N. Srivastava) in *Economic Modelling.* (A) Volume 41, August 2014, Pages 281-288, ISSN 0264-9993, http://dx.doi.org/10.1016/j.econmod.2014.03.015. (http://www.sciencedirect.com/science/article/pii/S0264999314001114)

A General Theory of Smoothing and Anti-Smoothing (with M.Mackenzie and W.Wongwachara) in *Journal of Empirical Finance, vol 28, pp 215-219.(A)*

Risk Presentation and Portfolio Choice (with H.Bateman, S. Thorp, J. Geweke, J. Louviere, C. Eckert) in *Review of Finance.* ((A+) 12/2010; DOI: 10.2139/ssrn.1776525, Source: OAI

'Financial Competence, Risk Presentation andRetirement Portfolio Preferences', (with - Bateman, H., Eckert, C., Geweke, J., Louviere, J., Satchell, S. and Thorp, S. *) in Journal of Pension Economics and Finance*, vol. 13, no. 1, pp. 27-61

Is Rating associated with better Retail Funds' Performance in Bull or Bear Markets? (with R.Louth and W.Wongwachara)in *Bankers, Markets and Investors*. In Vol 132,sep-oct 2014, 4,25

Testing linear factor models on individual stocks using the average F-test', (with S.Hwang,) in *European Journal of Finance*, vol. 20, no. 5, pp. 463-98. DOI:10.1080/1351847X.2012.717097; Version of record first published: 10 Sep 2012

'The sensitivity of beta to the time horizon when log prices follow an Ornstein-Uhlenbeck process', (with - Hong, K.H.) in *European Journal of Finance*, vol. 20, no. 3, pp. 264-90 DOI:10.1080/1351847X.2012.698992;Version of record first published: 24 Jul 2012

What factors drive the US labour market?(with S.Ahmed and P.Burchardt

Efund research.com 07/10/2014; http://ch.e-fundresearch.com/newscenter/120-lombard-odier/artikel/23090-what-factors-drive-the-us-labour-market

Art as a Luxury Good, with N. Srivastava in"*Risk and Uncertainty in the Art World*", edited by A. Dempster, ;Chapter 9, Bloomsbury Publishing, London; 2014.

Quantitative Approaches to High Net Worth Investment (with A. Rudd,) 2014, (London, Risk Books,2014).

High Net Worth Consumption: The Role of Luxury Goods" (with N. Srivastava,)in *Quantitative Approaches to High Net Worth Investment*, edited by Steve Satchell and Andrew Rudd, 183–212. London: Risk Books,2014.

Modelling Sustainable Spending Plans for Family Offices, Foundations and Trusts (with S. Thorp) in *Quantitative Approaches to High Net Worth Investment*, edited by Steve Satchell and Andrew Rudd, 213–251. London: Risk Books, 2014.

2013 PUBLICATIONS

How Much does an Illegal Insider Trade? (with A. Frino and H. Zheng) in *The International Review of Finance* Article first published online: 4 FEB 2013 | DOI: 10.1111/irfi.12006

Sequential Variable Selection as Bayesian Pragmatism in Linear Factor Models

(with John Knight, Jessica Qi Zhang) in *Journal of Mathematical Finance*

,PP. 230-236, Pub. Date: March 29, 2013

DOI: 10.4236/jmf.2013.31A022

Portfolio Skewness and Kurtosis (with A.D. Hall) in *Journal of Asset Management* 14, 228–235. doi:10.1057/jam.2013.18

2012 PUBLICATIONS

Financial Competence and Expectations Formation: Evidence from Australia, (with H. Bateman, C. Eckert, J. Louviere, and S. Thorp), *Economic Record*, Vol. 88, Issue 280, pp. 39-63, March 2012.

Unsmoothing Real Estate Returns: A Regime-Switching Approach"(with C. Lizieri and W. Wongwachara) in *Real Estate Economics*. 40(4).2012.

Why All Equity Portfolios Still Remain the Exception, (with R. Lewin and M. J. Sardy), in *Academy of Economics and Finance Journal*.3,73-83.

An Assessment of the Social Desirability of High Frequency Trading; in

JASSA; Finsia Journal of Applied Finance,vol 3,7-11.

Retirement investor risk tolerance in tranquil and crisis periods: experimental survey evidence (with H.Bateman, S. Thorp, J. Geweke, J. Louviere, C. Ebling.), in *Journal of Behavioural Finance. Vol 12,No 4.*

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Using a Model of Integrated Risk to Assess U.K. Asset Allocation, (with D. Damant and S. Hwang) (2000), *Applied Mathematical Finance* 7:2, pp. 127-152.

Market Risk and the Concept of Fundamental Volatility: Measuring Volatility across Asset and Derivative Markets and Testing for the Impact of Derivatives Markets on Financial Markets, *Journal of Banking and Finance*, Vol. 24(5), 759-785. (With S. Hwang) 2000.

BOOK CHAPTERS

Finite Sample Properties of Cointegration Estimators with Applications to Testing, (with G. Ellison), 1988, published in R. Bergstrom's Festschrift, published in *Models, Methods and Applications of Econometrics*, edited by P.C.B. Phillips, 1993, 176-200, Blackwell.

On Apprenticeship Qualifications and Labour Mobility (with A. Booth) in refereed book. *The Skills Gap,* edited by A. Booth and D. Snower, 1996, 285-302, CUP.

Daily Stock Returns in European Stock Markets Non-linearity, Predictability, and Transaction Costs (with A. Timmermann), *Non-Linear Dynamics in Economics*, edited by W.A. Barnett, A.P. Kirman and M. Salmon, CUP, 369-392, 1996.

Investor Preference and the Correlation Dimension, (with A. Timmermann), *Chaos and Non-Linear Dynamics in the Financial Markets*, edited by L. Trippi, 1996, Irwin.

Non-Normality of Returns in Emerging Markets: A Comparison of Mean-Variance Versus Mean-Lower Partial Moment Asset Pricing Models, (with B. Eftekhari), in refereed book *Research in International Business and Finance, Supplement 1*, edited by J. Doukas and L. Lang, 1996, 267-277, JAI Press.

Mean Variance Analysis, Trading Rates and Emerging Markets, (with P. Matheussen) in *Advanced Trading Rules*, edited by E. Acar and S.E. Satchell, 1997, 41-50, Butterworth and Heinemann.

The Portfolio Distribution of Directional Strategies (with E. Acar) in *Advanced Trading Rules* edited by E. Acar and S.E. Satchell, 1997, Butterworth and Heinemann.

Regime Switching Models and Forecasting High Frequency FX, (with R. Daccó), in *Nonlinear Modelling of High Frequency Financial Time Series*, edited by C. Dunis and B. Zhou, 1998, 177-201, John Wiley and Sons.

Modelling Intraday Equity Prices and Volatility Using Information Arrivals - A Comparative Study of Different Choices of Informational Proxies, (with S. Lin and J. Knight) edited by P. Lequeux, (forthcoming in Financial *Markets: Tick-by-Tick*, 1998, 27-64, John Wiley & Sons Ltd).

Hashing Garch (with G. Christodoulakis), in *Forecasting Financial Volatility*, edited by J. Knight and S. Satchell, 1998, 168-192, Butterworth and Heinemann.

Implied Volatility Forecasting, (with S. Hwang), in *Forecasting Financial Volatility* edited by J. Knight, S. Satchell, 1998, 193-225, Butterworth and Heinemann.

GARCH Processes, Some Difficulties and a Suggested Remedy, (with J. Knight), *Forecasting Financial Volatility*, edited by J. Knight and S. Satchell, 1998, pp.321-346, Butterworth and Heinemann.

GARCH Predictions and Predictions of Options Prices Proccesses Applied to UK Stocks, (with J. Knight), *Forecasting Financial Volatility*, edited by J. Knight and S. Satchell, 1998, pp.226-244, Butterworth and Heinemann.

Choosing the Right Measure of Risk: A Survey, *The Current State of Economic Science*, (with C. Pedersen), edited by S.B. Dahiya, 1998.

An Assessment of the Economic Value of Non-Linear Foreign Exchange Rate Forecasts, with A. Timmermann, published in *Journal of Forecasting*, 14, 1995, 447-497, reprinted in *Economic Forecasting* edited by T.C. Mills, Edward Elgar (1999).

A Data Matrix to Investigate Independence, Over-reaction and/or Shock Persistence in Financial Data, (with R. Daccó), *Decisions Technologies for Computational Finance - Proceedings of the Fifth International Conference, Computational Finance* edited by A.P.N. Refenes. Kluwer Academic Publishers, 1999 pp. 49-60.

BOOKS AND UNPUBLISHED PAPERS

A) BOOKS

Advanced Statistical Methods in Social Sciences, Francis Pinter (with Dr. N. Schofield, M. Chatterjii, and P. Whiteley), 1986.

Advanced Trading Rules, Theory and Practice (edited with E. Acar), 1997, Butterworth and Heinemann.

Forecasting Financial Volatility (edited with J. Knight), 1998, Butterworth and Heinemann.,2nd edition,2004. 3rd edition, Elsevier, 2007

Returns Distributions in Finance (edited with J. Knight), 2001, Butterworth and Heinemann.

Managing Downside Risk (edited with F. Sortino), 2001, Butterworth and Heinemann..

Performance Measurement (edited with J. Knight), 2002, Butterworth and Heinemann.

Advances in Portfolio Construction and Implementation *(edited with A. Scowcroft), 2003. Butterworth and Heinemann*

Linear Factor Models in Finance (edited with J. Knight) (Butterworth Heinemann, 2004).

Forecasting Expected Returns (Elsevier, 2007).

Risk Model Validation (Edited with G. Christodoulakis) (Elsevier, 2007).

Collecting and High Net Worth Investment, (Elsevier, 2009).

Optimizing the Optimizers, (Elsevier, 2009).

B) PAPERS (PAST)

Are Stock Prices Driven by the Volume of Trade? Empirical Analysis of the FT30, FT100 and Certain British Shares over 1988-1990, (with Y. Yoon), 1991.

Variance Bounds Tests Using Options Data, (M. Ncube and P. Seabright), 1992.

The Use of High-Low Volatility Estimators in Option Pricing, (with A. Timmermann), 1992.

Misspecification in Measurement of the Correlation Dimension, (with Y. Yoon), 1992.

Can We Hedge the FT30? (with C. Rogers and Y. Yoon), 1992.

Estimation of Stationary Stochastic Processes via the Empirical Characteristic Function, (with J. Knight), 1993.

Modelling U.K. Mortgage Defaults Using a Hazard Approach Based on American Options, (with M. Ncube), 1994.

Elliptical Distributions and Models of Garch Volatility, 1994.

Estimating the Mean-Generalized - Gini CAPM, 1995.

The Distribution of the Maximum Drawdown for a Continuous Time Random Walk (with E. Acar and J. Knight), 1995.

Analytical Properties of Rebalancing Strategies in TAA Models, (with M. Leigh), 1995.

The Effects of Serial Correlation on Normality Tests, (with Y. Yoon), 1996.

Index Futures Pricing with Stochastic Interest Rates: Empirical Evidence from FT-SE 100 Index Futures, (with Y. Yoon), 1996.

Forecasting the Single and Multiple Hazard. The Use of the Weibull Distribution with Application to Arrears Mortgages Facing Repossession Risk, (with Y. Shin), 1996.

Tactical Style Allocation: Applications of the Markov Switching Model to Value-Growth Investment and Tactical Asset Allocation, (with Y. Yoon), 1997.

Modelling Mortgage Population Dynamics, (with R.L. Kosowski), 1997.

Evolving Systems of Financial Asset Returns: AutoRegressive Conditional Beta , Working Paper. (With G. Christoulakis) 2000

Bayesian Analysis of the Black-Scholes Option Price. DAE Working Paper No. 0102, University of Cambridge. (With T. Darsinos) 2001.

Bayesian Forecasting of Options Prices: A Natural Framework for Pooling Historical and Implied Volatility Information, DAE Working Paper No. 0116, University of Cambridge. (With T. Darsinos) 2001.

The Implied Distribution for Stocks of Companies with Warrants and/or Executive Stock Options, DAE Working Paper No. 0217, University of Cambridge. (With T. Darsinos) 2002.

On the Valuation of Warrants and Executive Stock Options: Pricing Formulae for Firms with Multiple Warrants/Executive Options, DAE Working Paper No. 0218, University of Cambridge. (With T. Darsinos) 2002.

Reconciling Grinblatt and Titman's Positive Period Weighting Performance Measure with Loss Aversion: An application to UK active managers, Mimeo, University of Cambridge. (With N. Farah) 2002.

The Asset Allocation Decision in a Loss Aversion World, Financial Econometric Research Centre working paper WP01-7, Cass Business School. (With S. Hwang) 2001.

Returns to Moving Average Trading Rules: Interpreting Realized Returns as Conventional Rates of Return (with G. Kuo).

On the Use of Revenues to Assess Organizational Risk (with R. Lewin).

Improving the Estimates of the Risk Premia – Application in the UK Financial Market, DAE Working Paper No. 0109, University of Cambridge. (With M. Pitsillis) 2001

Ex-Ante versus Ex-Post Excess Returns, mimeo. (with D. Robertson) 2001.

The Impact of Technical Analysis of Asset Price Dynamics, DAE Working Paper No. 0219, University of Cambridge. (With J-H Yang) 2002.

A Bayesian Confidence Interval for Value-at-Risk. Submitted to theDAE Working Paper Series. (with Contreras, P.). 2003

PAPERS (CURRENT)

"Using the Large Deviation Technique to Estimate Asymmetric Financial Risk", Institute for Financial Research, Birkbeck College, IFR 1/2003 (with Ba Chu and Knight, J.). 2003

A Bayesian Confidence Interval for Value-at-Risk. Submitted to theDAE Working Paper Series. (with Contreras, P.). 2003

The Impact of Background Risks on Expected Utility Maximisation (with V. Merella).

Valuation of Options in a Setting With Happiness-Augmented Preferences (with V. Merella) (QFRC discussion paper, Number 182), (2006).

Information Ratios, Sharpe Ratios and the Trade-off Between Skill And Risk (with P. Spence and A.D. Hall)

The Impacts of Constraints on the Moments of an Active Portfolio (with P. Spence and A.D. Hall)

Exact Properties of Optimal Investment for Institutional Investors (with J. Knight), Birkbeck College WP, 0513, 2005.

Distribution of Constrained Portfolio Weights and Returns, (with J. Knight,).

Improved Testing for the Validity of Asset Pricing Theories in Linear Factor Models, Financial Econometric Research Centre working paper WP99-20, Cass Business School. (With S. Hwang) 2001.

Optimal Portfolio for Skew Symmetric Distributions, (with R. Corn).

Scenario Analysis with Recursive Utility: Dynamic Consumption Paths for Charitable Endowments, (with S. Thorp), working paper, UTS.

Incorporating Gain-Loss and Mean-Variance in a Single Framework, (with S. Cavaglia, and K. Scherer).

'Heuristic Portfolio Optimisation: Bayesian Updating with the Johnson Family of Distributions', Callanish Capital Partners Technical Paper (with R. J. Louth)

'The Impact of Ratings on the Assets Under Management of Retail Funds', S&P Internal Report, (with R. J. Louth).

'The Impact of Ratings on the Performance of Retail Funds', S&P Internal Report (with R. J. Louth)

Are There Bubbles in the Art Market? (with N. Srivastava)

EDUCATION

1965-9 - BA in Economics, Mathematics, Statistics and Politics, University of New South Wales.

1971 - Diploma in Education, Balmain Teachers' College

1972 - Teachers Certificate, Department of Education, NSW

1972-73 - MA in Mathematics, University of Sydney

1974-75 - M. Commerce in Economics, University of New South Wales

1976-80 - Ph.D. in Economics, University of London (The Ph.D. was supervised by Professor J.D. Sargan), examined by P. Phillips and D. Sargan.

1990 - MA (Cambridge).

1995 - Ph.D (Cambridge), examined by P. Robinson and P. Schmidt.

2001 - FIA (Institute of Actuaries) Honorary

SUPERVISION

1987-2007 Have supervised students from all colleges in Paper 12, now Paper 11. Have supervised papers 1, 2, 5, 6 of Prelim and papers 7, 11, and 12 of Part 2 (now 6, 10, and 11).

TEACHING

1973 - Taught for two years in high school, was inspected and received Teacher's Certificate.

1975 - Taught again at NCR, learnt and taught various computing languages.

1976-78 - Taught Introductory Econometrics in a September Mathematics Course to MA in Economics students at the LSE.

1977 - Whilst Lecturer in Statistics, taught:

(i) post-graduate course in Causal Analysis

(ii) post-graduate course in Advanced Time-Series

1978 - Shared courses in Econometric Theory

1979-86 - At Essex: Taught courses in Econometric Theory

(i) Statistics

(ii) Econometrics

(iii) Computing

(iv) Mathematical Economics

(v) Finance

1987-90 - Finance, Econometrics (Cambridge Papers 12, 25, 31)

1990-91 - Taught Advanced Econometrics at Birkbeck.

1991-92 - Taught Introduction to Mathematical Economics.
Advanced Econometrics.

BASE (Birkbeck Advanced Studies in Economics) course on Finance

1992-93 - Taught September course Mathematics, taught Theory of Finance (M.Sc.), Financial Econometrics (M.Sc.), Financial Econometrics (B.Sc.).

1993-2004 - Taught Papers 7, 12, 31 201, 231, 301 and 321 (not all simultaneously).

2005-2007 Taught Papers 7, 11, and 403, also taught Risk Management in Msc, Financial Engineering, Birkbeck , and Corporate Finance, University of Sydney.

CONSULTING EXPERIENCE

My consulting experience is very extensive, particularly in the areas of asset management and investment technology. I have supervised the building and maintenance of portfolio risk models. I have organised conferences for risk managers, investment professionals, and academics. I have carried out risk analysis on investment strategies and investment products. I can provide specific details on any of these areas if requested. I have worked with large numbers of international financial institutions and can provide testimonies as to my value – added if required.

I also work in mortgages, house prices, and real estate generally; recently, I designed with G. Christodoulakis the FT House Price Index for Acadametrics. I have also built mortgage default and loss models for Acadametrics. In conjunction with Acadametrics, I have been involved in the validation of risk models for lending institutions; this has been part of Basle II work in the recent past.

GENERAL CONTRIBUTION

I received colours from the LSE for cross-country running in 1977 and 1978 . I was also Secretary of London University Cross-Country Club 1978. I represented Trinity College at cross-country running 1987-1988, completed the London Marathon on 5 occasions, best 3.04.41 (1987). I was

reserve for Cambridge University Marathon Team (1990). In recent years, I ran 10 km in 44.32, Oct 2000, 44.05 in Mar, 2001; 44.48 in Jan, 2003, 44.52 in March 2005 , 42.53 in Feb, 2006, 44.24 in April 2007. I have won a number of medals in Veteran's road running.

CAMBRIDGE FACULTY ADMINISTRATION

At various stages I have been on:

Management Board for Management Studies Tripos

Statistics Committee (Chair)

Graduate Admissions Committee, was acting Admissions Officer 1989

Organised Seminar Series in Finance

Organising Seminar Series in Econometrics

Future Needs and Lecture List Committee

Faculty Board

Appointments Committee

College Administration

Director of Studies (1987- 2011) and Director of Admissions in Economics (1987-1994)

Trinity College

Finance Committee (1991-2003) ,2008 to 2011 and Treasurer of Trinity in Camberwell (charity) (1989-1992) plus other minor committees. Inspector of Accounts 1994-5 and 1996-97.

Wine Committee from 2005 to 2012.

Birkbeck Administration 1991-92

Department Seminar Organiser

Chairman Finance Examinations

Appointments Committee

Ph.D. Admissions

M.Sc. Finance Admissions

Jointly responsible for the creation of the new M.Sc. Finance (currently 70 students) which has now run successfully for 15 years.

Cambridge Administration 1993 to present

Appointments Committee

M.Sc. Finance Admissions

Chairman Finance Exams

M.Sc. Finance Co-ordinator

1993-94 Coordinator Papers 12, 31, 201, 231.
MSc Finance Admissions

1994-95 Coordinator Papers 12 and 231.

1995-96 Coordinator Papers 12, 201,231. Chairman ETE Exams.

1996-1999 Coordinator Papers 7 and 12.

1999-2000 Acting Graduate Chairman

2000-2001 Coordinator Paper 301.

2002-2006 Coordinator Papers 6 and 11. Head of Part 1 Examiners (2004).

PROFESSIONAL CONTRIBUTIONS

Refereeing

I have refereed articles for the *Journal of Econometrics*, *Econometrica, IER*, *Mathematical Social Sciences*, *Journal of Public Economics*, *Review of Economic Studies*, *Econometric Theory*, and *Journal of Applied Econometrics* plus many other journals.

Visiting and Seminars

I have given seminars at many British and Australian Universities and have been a visitor at Monash University (1985), (1987) and the University of New South Wales (1986) and Australian National University (1986), (1987). I have visited the University at Western Ontario (1988) and been a Visiting Fellow to University College, London. In 1989, I visited Complutense, Madrid. I am currently 4 times a Visiting Professor at Birkbeck College, London (1994 -). I recently visited University of Technology, Sydney (1998-2006). I have been appointed Visiting Professor at CASS/CUBS (2000-2006) and Visiting Professor at Birkbeck College (2000-2006) and Visiting Lecturer in Applied Mathematics at Oxford University (2002-2004). I am currently an Adjunct Professor at UTS (Sydney), and have had an association since 1997.

Supervision and Examination

I have supervised numerous post-graduate students and have successfully supervised the Ph.D.'s of A. Nasim at Essex and of M. Ncube and Y. Yoon, B. Eftekhari and S Hwang, G. Kuo, C. Pedersen, M. Sokalska, S. Bond, L. Middleton(Judge), M. Pitsillis, T. Darsinos, A. Sancetta, S. Yang, R. Lewin(Judge), G. Davies, W. Cheung , R. Corns, O. Williams and P. Contreras ,J.Zhang, R. Louth, Jimmy Hong, Nandini Srivastava, Omri Ross(Maths) at Cambridge, plus other Cambridge students on a joint supervision basis including A. Timmermann and L. Shi. Other successful PhD students supervised at Birkbeck include Y. Hatgioniddes, R. Daccó, M. Karanassou, G. Christodoulakis , B. Chu , Wei Jin, Wei Xia , Riko Miura and John Wylie from Sydney University.

My current students consist of four Cambridge Ph.D. students in Economics and three Birkbeck students. Plus one from Sydney University I have been an Examiner every year that I have taught at University. I have been external examiner at Queen Mary College and London School of Economics (Econometrics), and at London School of Economics (Economics), Imperial College, and Essex University. I have also examined over forrty doctoral dissertations in Econometrics, Finance and Land Economy at universities in Great Britain, Europe, Canada, and Australia.

Awards and Prizes

My research project was awarded a prize (the Inquire Prize for the best presentation at the annual Inquire Conference, Bournemouth, 1991 value £3,000).

Received Econometric Theory Multa Scripsit Award (1997).

My paper The Pricing of Market-to-Market Contingent Claims in a No-Arbitrage Economy was runner-up 1997 E. Yetton Award for the best paper published in AJM (1997).

Received Honorary Membership of the Institute of Actuaries (2001), received F.I.A.

Fund Raising

I have raised well in excess of £1,000,000 since 1991, I give details below:

I raised £105,000 for a financial econometrics project, the research was done at the Department of Applied Economics (Cambridge). This was funded by Inquire and the Newton Trust. The research project brought Professor W. Perraudin to Cambridge and employed Y. Yoon.

I have received £9,000 from the Newton Trust for 1993-94; and have had 2 research grants from ESRC joint with W. Perraudin, total value about £60,000. I have received £17,500 from Inquire for 93-94. I have received a further £20,000 from the Newton Trust (1993).

I started a new research project on the Econometrics of Emerging Markets. I received £30,000 from the Newton Trust (1994) and £10,000 from Inquire (1995) and £30,000 from Kleinwort Benson Investment Management (1995) plus a further £28,000 from Alpha Strategies (1998). This project has employed R. Daccó, and S. Huang.

I received £26,000 from the DSS to work on Pension Funds (joint with C. Pratten). I received £10,000 from Inquire (1996). I received a further £10,000 from Inquire (1997). In 1998, I received £7,500 for research on trading rules from a private donor and a further £25,000 from the Newton Trust. I received £4,500 research donation from Alpha Strategies and £2,500 from General-Re to speak at their annual conference (joint with C. Pratten), plus £6,500 from Inquire (1998) and £9,000 from Inquire (2000), £8,000 from Inquire (2003) and a grant of £6,000 from Acadametrics to employ J. Zhang.

I have received an ESRC grant of £80,000, which employed A. Sancetta for two years (2003-2004).

In 2005 I received with S. Hwang and B. Chu £45,000 from the ESRC to research on risk-management and non-linear correlation.

I have also received two grants of 3000 pounds each from Reading University(2005-2006) to work on real estate finance and a grant of (approx.) 20.000 pounds in 2006,joint with S.Bond and S.Hwang to work on asset allocation issues, the grant being from IRF.

Summary of Discovery Project Proposal for Funding to Commence in 2010

DP1093842 A/Prof HJ Bateman; Prof JJ Louviere; Dr SJ Thorp; Dr C Ebling; A/Prof T Islam; Prof S Satchell; Prof JF Geweke

Approved The paradox of choice: Unravelling complex superannuation decisions

Approximately A$960,0000

CIFR Grant Graham Partington, Steve Satchell, Richard Philip, Amy Kwan Measuring market quality: current limitations and new metrics $140,000 total

CIFR Grant: Identifying Asset Price Bubbles in Australian Listed Securities
$122,000 total

Popular Articles

Making Money Out of Chaos, Investors Chronicle, 10th July 1992. (Interview)

Articles in the *International Broker*, (with Allan Timmermann), (15 pieces), listed next.

Weekly columns on Investment Techniques:

Equity switch programme (Vol. 6, page 7)
Making money out of chaos (Vol. 7, page 6)
Where random walks trips up (Vol. 8, page 7)
Ignorance can be profitable (Vol. 9, page 7)
Making money from market volatility (Vol. 10, page 7)
High-low prices in options trading (Vol. 11, page 7)
Can heavy trading be profitable? (Vol. 12, page 7)
Economic variables show stock returns (Vol. 13, page 7)
No mean return on shares (Vol. 14, page 9)
Do option prices augur a crash? (Vol. 15, page 9)
Puzzles in closed-end fund prices (Vol. 16, page 9)
Capital asset pricing model challenged (Vol. 17, page 9)
How dividends affect share prices (Vol. 18, page 9)
The relationship between price and volume (Vol. 19, page 9)
How persistent are financial market shocks? (Vol. 22, page 9)

Research work written up by International Management (April 1993).

Article in the *Professional Investor* (May 1995), Short-termism (with D.C. Damant), (pages 21-27).

Article in the *Professional Investor* (July 1995), Accounting for Derivatives (with D.C. Damant).

Book Review on Ethnic Minorities and Higher Education in *Higher Education Review*, 1996, 28:2, 96.

Article in the *Professional Investor* (June 1996), Downside Risk (with D.C. Damant).

Contribution to discussion British *Actuarial Journal*, Volume 3, Part I, pages 10-11, 1997

Contribution to discussion British *Actuarial Journal*, 1998.

Article on Lloyd's Syndicate Valuations Methodology, (*ALM News*), 1998.

Research discussed in Observer (26th April 1998, page 11).

Research discussed in Inside Monthly (April 1998, pages 12-14).

Interviewed on Bloomberg TV (27th February 1998)

Pension Scheme Investment Policies, DSS Research Report No. 82 (with C. Pratten), 1998.

Designed the FT Acadametrics House Price Index, 2003. This Index appears monthly in the FT and is

usually discussed by journalists and market pundits.

Contribution to discussion, British *Actuarial Journal,* 2006.

The Impact of Utility on Endowment Strategy, *Professional Investor, April 2007.*

Interviewed on ABC re financial crisis(October 2008)

<u>Research Affiliations (past and present)</u>

Head of Research,Bita-Risk.

Academic Advisor, Alpha Strategies

Advisory Panel, IFC (Subsidiary of the IMF)

Academic Advisor, Kleinwort Benson Asset Management

Academic Advisor Kiln Colesworth Stewart (Member's Agents, Lloyds)

Academic Panel, Panagora Asset Management (1992-1998)

U.K. Representative, Pension Research Institute (State University of California)

Fellow, Pensions Institute (Birkbeck College)

Academic Adviser, Quantec

Academic Panel, State Street Global Advisors

Research Advisor, Thesys Forecasting, currently Acadametrics.

Visiting Professor, Cass Business School, City University,

Visiting Professor University of Technology, Sydney.

Visiting Professor, Birkbeck College.

Honorary Visiting Professor University of Sydney

Academic Advisor, Style Research Associates

Visiting Lecturer, University of Oxford, applied mathematical finance diploma.

Academic Adviser, Northern Trust.

Academic Advisory Board, Old Mutual Asset Management.

Expert Witness between fund Manager and Pension Fund., 2003.

Expert Witness between fund Manager and Pension Fund, 2004-2006.

Expert Witness between Insurance Company and Lettuce Grower.

Adviser in Risk Management to the Governor of the Bank of Greece.

Head of Research, BITA Risk..

Member, Advisory Board, Quantitative Finance Research Centre, UTS.

Member, Steering Committee, CIMF, Cambridge University.

Area Coordinator, Fundamentals of Economic Analysis, Libros de Economia y Empresa, Real Academia de Ciencias Morales Y Politicas.

Consultant, JP Morgan AM,Behavioural Equity Team.

Academic Advisor, Lombard-Odier Asset Management.

Program Committees

European Meeting of the Econometric Society (1997)

Forecasting FX Conference organized by Imperial College and B.N.P. (1996 to 2007)

Inquire UK (2006, 2007)

Program Committee, UK Inquire.

Prize Committee, European Inquire.

Conferences and Seminars

NZ Econometric conference, feb,2011.

Conferences and Seminars (2009)

Presented seminars at:
Sydney University (April 3rd);
Macquarie Bank (April 7th),
CRMC Sydney (April 8th);
Sydney Q group, April 15th.

Conferences (2008)

Finance Conference, London, October, key-note speaker.

Chair, LQ conference (Cambridge, September), presented.

Prize Committee, Inquire Europe(Bordeaux, October).

Conferences (2007)

Finance Conference, Imperial College, March 2007, Discussant.

Finance Conference, Zurich, March 2007. Invited Key Note Speaker.

Alpha Strategies Finance Conference, April 2007, Duke University, chaired conference.

UKSIP Lecture on Endowments, April 2007.

Alpha Strategies Finance Conference, September 2007, Oxford University, chaired conference.

Conferences (2006)

Alpha Strategies Finance Conference, April 2006, Duke University, chaired conference.

Risk Management Conference, June 2006, Bank of Greece, Athens. Gave paper, helped organize programme.

Asset Allocation Summit, July 2006, London, presented paper.

New Zealand Econometrics Conference Dunedin August 2006, chaired session, gave paper, was on prize committee.

Alpha Strategies Finance Conference, September 2006, Cambridge University, chaired conference.

Appendix 3

FEDERAL COURT OF AUSTRALIA

Practice Note CM 7

EXPERT WITNESSES IN PROCEEDINGS IN THE FEDERAL COURT OF AUSTRALIA

Practice Note CM 7 issued on 1 August 2011 is revoked with effect from midnight on 3 June 2013 and the following Practice Note is substituted.

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[75], 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.

[75] 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].

Guidelines

1. General Duty to the Court[76]

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[77]

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

(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

[76] The "*Ikarian Reefer*" (1993) 20 FSR 563 at 565-566.
[77] Rule 23.13.

(ga) contain an acknowledgment that the expert's opinions are based wholly or substantially on the specialised knowledge mentioned in paragraph (c) above[78]; 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[79].

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[80].

[78] See also *Dasreef Pty Limited v Nawaf Hawchar* [2011] HCA 21.
[79] The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565
[80] The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565-566. See also Ormrod *"Scientific Evidence in Court"* [1968] Crim LR 240

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