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review of the rate of return guidelines

APA submission responding to discussion papers and expert evidence

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APA's key messages

Financial performance measures

Information on profitability and asset sales, and other financial information, are largely irrelevant to determining or assessing allowed rates of return. This information has no role in the making of a new rate of return guideline.

Compensation for risk and use of data where judgement is required

When using its judgement in determining rates of return, the AER should:

- *explain the alternatives it has considered*
- *provide reasons for finding that among the alternatives, the one chosen is most likely to contribute to the achievement of the national electricity objective, or the national gas objective, whichever is appropriate.*

Both service providers and consumers should be able to make a case to the AER that there has been a material change in circumstances, and that the rate of return instrument should be reopened. The AER should be able to consult freely, and draw on any expertise relevant to the change in circumstances, in making a decision to reopen. If the AER decides that the case for a material change has been made, the process of changing the instrument can then follow the process for revision now being proposed for the National Electricity Law and the National Gas Law.

Value of imputation credits

The value of imputation credits should be estimated in two steps:

- *first, to provide an estimate of gamma for the economy as a whole, the ratio of – properly adjusted – ATO credits redeemed to total credits created, should be calculated*
- *second, this ratio should be adjusted for any difference between the rate at which the representative company distributes credits, and the rate at which a benchmark entity distributes credits.*

Equity beta

There are no strong theoretical reasons for believing that the asset βs of regulated electricity and gas businesses should be the same, or that βs are the same across transmission and distribution.

βs should be estimated from stock market data, but that will not be without its challenges.

The use of international data may increase statistical precision, but at the cost of biased estimates of β.

There is no simple mathematical adjustment which might be applied to those international data to make them comparable with data from the extant domestic comparators.

An international version of the CAPM might be adopted, but that would raise new conceptual and data issues. It would be the adoption of a new asset pricing model, and would not be in keeping with the AER's incremental approach to rate of return guidelines review.

If the set of comparable businesses is to be expanded, careful consideration should be given to other Australian infrastructure businesses before turning to possible international comparators.

In respect of gearing, the current approach, and an assumed gearing of 60% for the benchmark efficient entity, should be retained.

β estimation should use the Ordinary Least Squares method.

Weight might be given to the data from delisted firms to augment the size of the sample for β estimation. But β variation over time cannot be ignored, and older data become less relevant if estimates are to reflect prevailing financial market conditions.

β estimation using five years of monthly data should allow closer examination of changes, if any, over time.

The issue of low beta bias should be addressed through the use of the empirical evidence for differences between realized returns and estimates made using the CAPM, and not through adjustment based on the theory of the Black CAPM.

Market risk premium

If the MRP is to be estimated from annual excess returns data, then the arithmetic mean of those data is the required estimate. There is no compounding, period by period, and no case for use of a geometric mean.

Historical – or realized – returns, alone, cannot provide satisfactory estimates of forward-looking expected returns and the MRP to be used when applying the CAPM to estimate the return on equity. More explicit recognition should be given to estimates made using dividend growth models, and greater weight should be given to those estimates in estimating the MRP.

Rate of return guidelines review should proceed on the view that survey data currently have nothing to contribute to MRP estimation.

1 This submission

APA Group (APA), an owner and operator of gas transmission pipelines, and of electricity transmission lines, will be affected by the outcomes of the Australian Energy Regulator's rate of return guidelines review. APA appreciates the opportunity, now provided by the AER, to comment on the six discussion papers issued in February, and on the concurrent expert evidence sessions which were held in March and April as part of the guidelines review process.

APA has concerns about the AER's incremental approach to the review.

We see an incremental approach as starting with current models and parameter estimates, and making minor changes only to the extent that current evidence clearly supports those changes.

In APA's view, an incremental approach to rate of return guidelines review risks the acceptance of models, methods and data which should be more closely scrutinised. However, APA recognises that opening to scrutiny all of the models, methods and data currently used in rate of return determination would likely preclude the making of a binding rate of return instrument by the end of the year.

In responding to the AER's discussion papers, and the expert evidence sessions, APA has limited its comments to a number of aspects of the application of the AER's foundation model approach. More thorough scrutiny of that approach should, APA believes, be a focus for the next review of the rates of return to be used in applying the economic regulatory regimes of the National Electricity Rules (NER) and the National Gas Rules (NGR).

In this submission, APA comments on:

- financial performance measures – section 2
- compensation for risk and use of data where judgement is required – section 3
- value of imputation credits – section 4
- equity beta – section 5
- market risk premium – section 6.

Each of these is a matter examined at length in one of the six discussion papers issued by the AER. The sixth discussion paper examines gearing. APA's comments on gearing are largely restricted to issues of gearing as they arise in the estimation of equity βs, and are made in section 5 of this submission.

APA has participated in the preparation of the submission made by the Australian Pipeline and Gas Association (APGA). APA's views in this submission are not substantially different from those advanced by the APGA.

2 Financial performance measures

A role has been proposed for financial performance measures – RAB multiples, financeability and historical profitability measures – in the making of a new rate of return guideline.

Stakeholders, the *Financial Performance Measures* discussion paper advises, have submitted that financial performance measures can be used to evaluate the overall reasonableness of regulatory revenue allowances, and whether, either in history or expectation, those allowances are excessive or insufficient.

Earlier, when responding to the AER's October 2017 *Issues Paper*, APA did not agree.

We were of the view that information on profitability and asset sales, and other financial information, were largely irrelevant to determining or assessing allowed rates of return. Furthermore, historical information in the form of profitability measures, or derived from asset sales information or from the application of financeability criteria, was not appropriate to any assessment of the operation of the schemes of incentive regulation in the NER and the NGR. Those schemes were "forward-looking", incorporating expectations about the future which may not be realised. Even if expectations were realised, disentangling the effects of different expectations and realizations, and of changes in other factors driving profitability (for example, unanticipated increases in labour costs) would, in APA's view, be a major and contentious undertaking, which would contribute little to assessing regulatory revenue allowances.

We now find further support for our views in the *Expert Joint Report*, which advises that most experts agreed:

- a RAB multiple greater than 1 might be the result of an allowed rate of return on equity which was "generous"; but there were many other reasons why RAB multiples greater than 1 might be observed[1]
- historic profitability analysis provides no information on an appropriate rate of return, and ex post review would be fundamentally inconsistent with an incentive based regulation framework.[2]

Although the *Expert Joint Report* is less explicit on the issue, it indicates that the experts saw analysis of financeability as being able to provide information about the

1 Cambridge Economic Policy Associates, *Expert Joint Report*, 21 April 2018, page 35.

2 *Expert Joint Report*, page 35.

adequacy of the cash flows of regulated businesses, but not providing information which might guide the setting of the rate of return.[3]

During the first of the concurrent expert evidence sessions, Associate Professor Graham Partington made a brief reference to the literature on computing rates of return from accounting data. That literature, we find, supports the views of the experts noted above, and supports APA's views. More broadly, it raises questions about the relevance of financial performance measures calculated from conventional accounting data in the context of economic regulatory regimes like those in the NER and the NGR.

In an early contribution to the literature referred to by Associate Professor Partington, eminent Australian economist, Geoffrey Harcourt, concluded that accounting measures of the rate of return are influenced by the pattern of net earnings on individual items of plant and equipment (in Harcourt's terminology, the pattern of quasi-rents associated with individual machines in the stock of capital), the method of depreciation, whether or not the stock of plant and equipment was growing, and what assets were included in that stock.[4] Harcourt found that, even under his assumed ideal conditions (the "Golden Age" of the title of his paper), accounting measures of the rate of return were extremely misleading.

American economist and MIT Professor Franklin Fisher, and co-author John McGowan, have similarly concluded that accounting rates of return, even when properly and consistently measured, provide almost no information about economic rates of return.[5]

But UK economists Professors John Kay and Colin Mayer have contended: "Were these statements [by Fisher and McGowan] to be true they would undermine a substantial portion of empirical industrial studies and much of the macroeconomic literature which requires aggregate measures of profitability. They are not true."[6] However, Kay and Mayer were not primarily concerned with the question of whether conventional accounting concepts, applied using historical information, provided estimates of economic rates of return. The focus of their work was the changes to those conventional accounting concepts which would be required to ensure that

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3 *Expert Joint Report*, pages 36-37.

4 Harcourt, G C (1965), "The Accountant in a Golden Age", Oxford Economic Papers, New Series, 17(1): pages 66-80.

5 Fisher, Franklin M, and John J McGowan (1983), "On the Misuse of Accounting Rates of Return to Infer Monopoly Profits", American Economic Review, 73(1): pages 82-97.

6 Kay, J, and C P Mayer (1986), "On the Application of Accounting Rates of Return", Economic Journal, 96(381): pages 199-207.

accounting methods could provide the precise measures that were required for economic analysis.

Stakeholders may have submitted that financial performance measures can be used to inform rate of return determination. But the experts convened by the AER do not concur with their submission. Nor is their submission supported by the technical literature on computing rates of return from accounting data.

Information on profitability and asset sales, and other financial information, are largely irrelevant to determining or assessing allowed rates of return. This information has no role in the making of a new rate of return guideline.

3 Compensation for risk and use of data where judgement is required

The AER's discussion paper, *The allowed rate of return, compensation for risk and the use of data when judgement is required*, sets out a range of broad issues about the way in which the regulatory regimes of the NER and the NGR are to be applied.

In this section of this submission APA comments only on the issues of the use of judgement, and the reopening of the rate of return instrument. Our comments on compensation for risk are primarily in relation to the use of the Capital Asset Pricing Model (CAPM), and to the components of risk in that model, as they are represented by the parameter β and the market risk premium (MRP). These comments are made in section 5 of the submission (Equity beta), and in section 6 (Market risk premium).

3.1 Use of judgement

The use of judgement in rate of return determination was an issue raised in submissions responding to the AER's initiation of the guidelines review, and in the discussion papers. It was an issue which arose early in the first of the concurrent expert evidence sessions.

Some aspects of rate of return determination may be progressed through the application of rules which have been clearly specified and set down in the NER and the NGR. But rate of return determination is both complex and subtle.[7] It might be comprehensively codified, but only by over-simplication. Over-simplication is unlikely to deliver rates of return which can contribute to achievement of the national energy objectives. If over-simplication is to be avoided, the regulator will need to have discretion to make decisions on those aspects of rate of return determination which cannot be easily codified.

This seemed to be the view of the experts in the first concurrent evidence session. There was, they contended, no escape from the need to exercise judgement. What is important in the regulatory context is that the exercise of judgement be explained.[8]

APA concurs.

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7 During the first of the concurrent evidence sessions, experts agreed that simplicity was to be preferred to complexity but, if a complex approach were required to produce the best estimate of the rate of return, then that approach was to be preferred to a simpler, but inferior, approach. See *Expert Joint Report*, page 22.

8 *Expert Joint Report*, pages 20-21.

The introduction of a binding rate of return instrument will curtail any opportunity for debate about rate of return issues in regulatory approval processes. APA is of the view that, in these circumstances, the AER should carefully explain why it believes that a particular exercise of judgement is thought to lead to a rate of return outcome which better achieves the national electricity objective or the national gas objective.

When using its judgement in determining rates of return, the AER should:

- ***explain the alternatives it has considered***
- ***provide reasons for finding that among the alternatives, the one chosen is most likely to contribute to the achievement of the national electricity objective, or the national gas objective, whichever is appropriate.***

3.2 Reopening the rate of return instrument

The AER's rate of return guidelines are expected to become the rate of return instrument which the Energy Council Secretariat is intending to impose through amendments to the National Electricity Law and the National Gas Law. The discussion paper, *The allowed rate of return, compensation for risk and the use of data when judgement is required*, raises the question of the circumstances in which the instrument should be reopened, but does not elaborate on the matter.

The question of reopening the rate of return instrument was addressed to the experts attending the first concurrent evidence session. Most experts were supportive of a mechanism to reopen if there were a material change in market conditions.[9] The Global Financial Crisis of 2008 (GFC) was given as an example of a change in conditions which should be regarded as material. Experts advised that conditions would need to be spelled out in advance, and to be limited to serious and low probability events. Some possible criteria were noted, and the experts observed that conditions for reopening could be qualitative as well as quantitative.

APA strongly supports a mechanism for reopening the rate of return instrument. A rate of return instrument which is far from market reality will work to disadvantage either electricity network and gas pipeline service providers, or the users of the services they provide. An instrument which sets a rate of return which is far from market reality will not contribute to achievement of the national electricity objective, or to achievement of the national gas objective.

The problem, as the expert discussion makes clear, is specification of a mechanism for reopening the rate of return instrument. APA doubts the feasibility of specifying, in advance, serious and low probability events which could trigger reopening of the

[9] *Expert Joint Report*, pages 15-16.

instrument. The next financial crisis will not be the same as the GFC, just as the GFC was different from the crises which preceded it. Policy responses will be different, just as policy responses to the GFC were very different from the responses to the financial crisis which preceded the Great Depression. Policymakers learn from these serious and low probability events.

Both service providers and consumers should be able to make a case to the AER that there has been a material change in circumstances, and that the rate of return instrument should be reopened. The AER should be able to consult freely, and draw on any expertise relevant to the change in circumstances, in making a decision to reopen. If the AER decides that the case for a material change has been made, the process of changing the instrument can then follow the process for revision now being proposed for the National Electricity Law and the National Gas Law.

4 Value of imputation credits

In its current approach to estimating the value to be assigned to imputation credits, the AER:

- estimates the value of the credits as the product of a distribution (or payout) rate and a utilisation rate
- relies mainly on imputation credit payout data from the Australian Taxation Office (ATO) for estimation of the distribution rate, but also has some regard to Martin Lally's estimate of the rate for listed equity made using information from the financial reports of the 20 largest ASX-listed companies
- relies mainly on ABS National Accounts data for the proportion of domestic investors in the Australian equity market (equity ownership statistics), and the assumption that those investors fully utilise the credits to which they are entitled, for estimation of the utilisation rate, but also has some regard to ATO statistics recording amounts which investors redeem to reduce their tax liabilities.

Recent decisions by the Australian Competition Tribunal and the Full Federal Court have affirmed this approach.

Experts present at the second of the concurrent evidence sessions did not contest the Tribunal and Federal Court decisions.

4.1 Estimating the distribution (or payout) rate

The distribution rate is a firm-specific parameter, and most experts agreed that it should be estimated by first defining the relevant benchmark efficient entity, and then estimating the parameter from data for firms which approximately accord with that definition.[10] Most experts also agreed that the benchmark entity should be a corporation with operations entirely within Australia, with a level of capital expenditure comparable to regulated electricity network or gas pipeline businesses, and which pays tax at the corporate rate.[11]

There was agreement, again among most of the experts, that it would be difficult to construct, for firms which approximately accord with the benchmark definition, a data set suitable for distribution rate estimation.[12] ATO data were available, but only for all companies, listed and unlisted. This was a problem for distribution rate estimation if the benchmark entity differed from the average firm. There were also

[10] *Expert Joint Report*, page 71.

[11] *Expert Joint Report*, page 72.

[12] *Expert Joint Report*, page 72.

issues about the quality of the data. Some non-resident companies pay corporate tax in Australia which does not generate franking credits, but the extent of this does not seem to be quantified.

Martin Lally was of the view that the problems with the ATO data were too great to warrant placing much reliance on it for distribution rate estimation.[13] Dr Lally continued to propose that the distribution rate be estimated for a sample comprising the 20 largest listed firms (the benchmark entity was expected to be listed), after firms with substantial foreign income had been deleted from the sample. The data could be drawn from the published financial reports of those listed firms. Professor Stephen Gray was concerned that most of the 20 largest listed firms would have material foreign income, and did not accord with the definition of the benchmark.[14]

4.2 Estimating the utilisation rate

Experts also questioned whether the equity ownership statistics available from the ABS were relevant to estimation of the utilisation rate.

Some experts were concerned that estimation from equity ownership data meant that estimates of the utilisation rate took into account foreign investors in the Australian market. This was inconsistent with the AER's general approach that financial assets be priced relative to the domestic market.[15]

Concerns were also expressed about the quality of the equity ownership statistics. They were seen as providing an upper bound for the rate at which franking credits were redeemed because they omit the effects of the 45 day rule, and no account is taken of a number of other reasons why domestic investors choose not to redeem the credits. Furthermore, the equity ownership statistics were compiled from survey data in a process which involved significant aggregation and the application of various "filters and refinements".[16]

ATO data were not necessarily an alternative for utilisation rate estimation. A number of adjustments to those data were likely to be required if they were to provide an estimate of the rate at which credits created are redeemed. Two of these adjustments have been noted by the ATO in its recent response to an inquiry by the AER on imputation credit redemption.[17]

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13 *Expert Joint Report*, page 73.

14 Expert Joint Report, page 76.

15 *Expert Joint Report*, pages 69-70.

16 *Expert Joint Report*, page 75.

17 AER, Note on ATO staff response to AER staff inquiries about Hathaway's 2013 report on imputation credit redemption, March 2018.

The first involves recognition of the fact that net tax does not represent tax payable. The ATO has advised that these two quantities differ.[18]

The second adjustment involves accounting for the payment of company tax by non-resident companies which do not generate franking credits. In the response to the AER noted above, the ATO advised that this second adjustment 'may appear to be small at first glance', and Company Table 1A of the Taxation Statistics 2014-15 supports this preliminary assessment. In the tax year 2014-15, 911,321 resident companies filed, 1,640 non-resident companies with no permanent establishment filed, and 989 non-resident companies with permanent establishments filed.

4.3 A way forward

Limitations in the data available seem almost to preclude any reliable estimation of the value of imputation credits for the purpose of applying the regulatory regimes of the NER and the NGR.

However, during the second concurrent evidence session, Simon Wheatley proposed estimation of the value of the credits in two steps:

- first, to provide an estimate of gamma for the economy as a whole, the ratio of – properly adjusted – ATO credits redeemed to total credits created should be calculated
- second, this ratio should be adjusted for any difference between the rate at which the representative company distributes credits, and the rate at which a benchmark entity distribute credits.[19]

Dr Wheatley's proposal is simple, and relies on what should be the key source of data for estimation of the value of imputation credits, the ATO's statistics. Implementation of the proposal would, however, require that AER engage the with ATO to establish the correct way of making the necessary adjustments to the published tax statistics.

Simon Wheatley has subsequently expanded on the second step of his approach in advice provided to the Australian Pipeline and Gas Association. In that advice, he notes that Neville Hathaway, of Capital Research, has provided the Energy Networks Association with two estimates of the rate at which a representative company

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[18] In reports on estimation of the value if franking credits, in 2015 and 2016, respectively, both NERA and Frontier Economics made the necessary adjustments to net tax. See NERA, *Estimating distribution and redemption rates from taxation statistics*, March 2015; and Frontier Economics, *The appropriate use of tax statistics when estimating gamma*, January 2016.

[19] *Expert Joint Report*, pages 74-75.

distributes credits.[20] Estimation used franking account balances, and credits distributed and received. Hathaway noted that these data were created from company reports to the ATO, and not from data on the flow of funds from or to the ATO. For this reason, they were likely to be less reliable than data on credits created and credits redeemed obtained from ATO funds flow from data.

Using data on franking account balances, Hathaway estimated the cumulative distribution rate from 2004 to 2011 for the economy as a whole to be 0.69. Using franked dividend data, he estimated the rate to be 0.49. Hathaway stated that he had trouble deciding between these two estimates. Dr Wheatley proposed that, absent other information, an average of Hathaway's two estimates, 0.59, be taken as an estimate of the distribution rate for the economy as a whole.

The AER typically estimates the gearing and risk of a benchmark entity using a set of comparable businesses. The place to look for an estimate of the rate at which a benchmark entity will distribute credits is, then, the information for these comparators. However, the task is complicated by the actual tax positions of the relevant entities. Dr Wheatley proposes that the benchmark entity be assumed to pay tax at the statutory rate. The benchmark entity distribution rate would then match its payout rate. The payout rates of the AER's comparators are currently around 70 per cent.

A distribution rate of 70 per cent for a benchmark entity lies above the distribution rate of 0.59 for the economy as a whole. This indicates that Hathaway's estimate, computed using data from 2004 to 2011, of the rate, for the economy as a whole, at which credits created are redeemed of 0.30 will lie below the corresponding rate for a benchmark entity. An estimate of the rate at which credits created are redeemed by the benchmark will be:

$$0.30 \times \frac{0.70}{0.59} = 0.36$$

This is the required estimate of gamma. A different distribution rate for the benchmark entity would, of course, lead to a different estimate.

We note Martin Lally's comment, when Dr Wheatley advanced his proposal during the second of the concurrent expert evidence session: it is possible that both of Hathaway's estimates for the distribution rate from ATO data are wrong, in which case this approach is not viable.[21] We disagree. Hathaway's estimates may be wrong because there were deficiencies in the ATO data which he used. But there are deficiencies in all of the data which might be used for gamma estimation. As

[20] Capital Research, Letter to Garth Crawford of the ENA, December 2017.

[21] *Expert Joint Report*, page 78.

we noted above, the ATO should be the key source of that data. If Hathaway's estimates are wrong – and no reason has been given for why that might be the case – then they should be corrected. Dr Wheatley's proposal remains viable.

In summary, the value of imputation credits should be estimated in two steps:

- ***first, to provide an estimate of gamma for the economy as a whole, the ratio of – properly adjusted – ATO credits redeemed to total credits created should be calculated***
- ***second, this ratio should be adjusted for any difference between the rate at which the representative company distributes credits, and the rate at which a benchmark entity distribute credits.***

5 Equity beta

The NER and the NGR currently require a rate of return which is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to a regulated service provider in respect of the provision of regulated services.

The risks of a regulated service provider in respect of the provision of regulated services have been broadly classified as systematic risks and non-systematic risks.

In the concurrent evidence sessions, most experts agreed:

- any allowance for non-systematic risk should be in the expected cash flows used in the building block method of total cost (total revenue) calculation[22]
- only systematic risk was relevant to efficient financing costs; in particular, it was relevant to the allowed rate of return on equity[23]
- in the CAPM, the parameter β, properly estimated, is the appropriate measure of systematic risk[24]
- βs should be estimated from stock market data; no consideration should be given to qualitative evidence on risk[25]
- the AER's current approach to choice of a β estimate was problematic; the application of the current Rate of Return Guideline has not been transparent.[26]

The experts may have been in agreement on these issues, but other issues pertaining to β and its estimation remained contentious.

In this section of this submission, APA sets out its views on:

- conceptual issues arising in β estimation for application of the economic regulatory regimes of the NER and the NGR
- expanding the set of comparable businesses
- gearing

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22 *Expert Joint Report*, page 23.

23 *Expert Joint Report*, pages 22-23.

24 *Expert Joint Report*, page 22.

25 *Expert Joint Report*, page 42.

26 *Expert Joint Report*, page 42.

- method of estimation – OLS or LAD?
- the estimates themselves
- low beta bias.

5.1 Conceptual issues

APA concurs with the expert view that βs should be estimated from stock market data.

β estimation from stock market data will not be without its challenges. As APA and others noted in earlier submissions, the number of corporations which might be suitable comparators for an entity for which β is to be estimated when applying the regime of the NER or the NGR has dropped since βs were estimated for the current Rate of Return Guideline in 2013.

β estimation for the current Guideline drew on data for nine corporations traded on the Australian Stock Exchange. These were: Alinta, AGL Energy Limited, APA Group, DUET Group, Envestra Limited, GasNet, Hastings Diversified Utilities Fund, Spark Infrastructure and SP AusNet. At the time, there were doubts about the data for a number of these businesses. Alinta had ceased trading in 2007. AGL had focused on transforming itself into an energy retailer. GasNet had been acquired by APA in 2006, and APA had acquired the gas pipeline assets of Hastings Diversified Utilities Fund in 2012. There were risks that the data for these five businesses were no longer current, and may have been distorted by acquisition activity which subsequently led to takeover and absorption within other entities.

By 2018, further acquisition activity had resulted in only three businesses with traded shares remaining in the set of comparators. These are: APA Group, Spark Infrastructure and SP AusNet.

The smaller sample size implies reduced statistical precision for β estimates made for portfolios of electricity network and gas pipeline service providers.

In the second concurrent evidence session, experts explicitly advised against giving consideration to qualitative evidence on risk when estimating β.

Qualitative analysis, previously undertaken for the AER, proceeded at a high level of generality about the nature of risks to which the relevant benchmark efficient entity might be exposed. It focused on a very high level view of the business risks of regulated entities, and concluded that those risks were low. This contributed to low systematic risks and, therefore, to low βs. The reasons given for this were:

- electricity networks and gas pipelines were natural monopolies, and provide essential services with low price elasticities of demand

- the structure of the regulatory regimes of the NER and the NGR – revenue caps, tariff variation mechanisms, cost pass through mechanisms, fixed charges, and protection against asset write-down – insulates service providers from systematic risk.

Conceptual analysis, then, led to a view that appropriate estimates of β for electricity network and gas pipeline service providers were less than one.

APA is unsure about the validity of this conclusion. But, even if it is sound, it provides a very loose bound on estimates of β. Electricity networks and gas pipelines may, in general, have the characteristics of natural monopoly, and provide essential services with low price elasticities of demand, but much more careful analysis is required before these factors can be shown to operate, in the circumstances of a specific network or pipeline, to deliver a low β. Similarly, the structure of regulation may appear to be conducive to low systematic risk. But Australia's economic regulatory regimes, for electricity networks and gas pipelines, have not been particularly stable since they were first introduced in the late 1990s. There have been major regime changes at intervals of two to three years. Some of the specific features of the regimes may be conducive to low systematic risk and low βs, but their effects are offset frequent regime change. Unfortunately, the same data limitations which create problems for β estimation prevent, at the present time, econometric investigation of the magnitude of the effect of regime change on the βs of regulated businesses.

Limited data and the effects of regime change also make difficult any explicit consideration of the effects of disruptive technologies (particularly solar PV generation, "smart technologies" for network control, and electricity storage technologies) on systematic risk. These disruptive technologies will not only affect electricity network service providers. Through the effects on gas fired power generation, they are also impacting on the transportation of gas.

In the second of the concurrent expert evidence sessions, experts advised that the risks in question were not yet fully understood, and may not have been fully "priced" in financial markets. This was a reason for considering estimates made recently, using a shorter span of data (for example, for 5 years), to signal any change in β.

None of this precludes the estimate of β for the benchmark entity with a similar degree of risk as that which applies to a particular regulated service provider in respect of the provision of regulated services from being above one. Nor does it preclude differences in the β estimates for regulated entities in different market conditions. It does not preclude different βs for electricity network service providers and for gas pipelines, and it does not preclude different βs for transmission and distribution in both electricity and gas.

Neither the NER nor the NGR requires the same β's across all electricity networks and gas pipelines or, within electricity and gas, across transmission and distribution. The rate of return is to be the efficient financing cost of the benchmark efficient entity. That entity is to have the same risk as the service provider in the provision of regulated services.

When applying the regime of the NER, or of the NGR, the risk of the service provider in the provision of regulated services must first be established. The benchmark, for which the efficient financing cost is to be determined, must have that risk. There is no a priori reason for expecting that all service providers will have the same risk in the provision of regulated services. There is no reason for assuming that β is the same across all electricity networks and gas pipelines or, within electricity and gas, across transmission and distribution.

APA notes that, during the second concurrent evidence session, most experts agreed that there were no strong theoretical reasons for believing that the asset βs of regulated electricity and gas businesses should be the same.[27]

APA is particularly concerned about gas transmission. Unlike gas distribution pipeline systems, transmission pipelines are often constructed for one or a small number of users. Those users may be gas fired power generators, large industrial users of gas, or mining and minerals processing operations. Through their contracts with these users, pipeline owners are exposed to volatility in downstream markets – the national electricity market, domestic and international product markets, and commodity markets. Pipeline owners face the risks associated with volatile electricity prices, or with product and commodity price downturns, which have the effect of significantly reducing requirements for gas. They face the very real prospect of the closure of downstream operations in adverse market conditions.

Although they face the risks of reduced gas requirements and downstream plant closure, transmission pipeline owners have few opportunities to mitigate these risks by diversifying their user bases. Furthermore, these risks are not reduced by regulation which, in the event of prolonged downturn or plant closure, allows pipeline costs to be recovered through higher tariffs for remaining users. Regulatory regimes which increase the tariffs payable by remaining users simply increase the risk of further closures.

The risks of service provision vary across transmission pipelines with differences in the composition of user bases and different contractual arrangement with users. The risks of service provision using transmission pipelines are different from those of distribution pipelines with their extensive, and usually diversified, end-user populations. The costs of financing pipeline investment are therefore different across

[27] *Expert Joint Report*, page 49.

transmission pipelines, and between transmission pipelines and gas distribution pipeline systems.

There are no strong theoretical reasons for believing that the asset βs of regulated electricity and gas businesses should be the same, or that βs are the same across transmission and distribution. Those βs should be estimated from stock market data, but that will not be without its challenges.

5.2 Expanding the set of comparable businesses

In the second concurrent evidence session, experts considered the possibility of expanding the small set of comparable businesses by including data for international electricity network and gas pipeline service providers, and for other domestic infrastructure firms.[28] There was, they argued, benefit in adding to the sample (statistical precision would be improved), but only if the additions were representative of the industry.

Extending the sample for β estimation by including international electricity network and gas pipeline service providers may improve statistical provision, but at the cost of biasing the estimates obtained.[29] International firms, some experts argued, should not be used without caution and scrutiny given materially different regulatory and political environments. On the question of whether data from these international firms could be adjusted to make them comparable with the data from domestic firms, experts were agreed that no simple mathematical adjustment was possible.[30]

Adjustment would not be needed if an international version of the CAPM were to be used to estimate equity returns but, as the experts pointed out, this has been precluded by the AER's preference for using a domestic version of the CAPM even though Australian capital markets are largely integrated into international markets. Simon Wheatley advised that although there was evidence against a domestic version of the CAPM, there was also substantial evidence against an international version of the model.

Adding other domestic infrastructure firms would increase the sample size, and could potentially increase statistical precision in β estimation. However, it could also bias the results. In the second concurrent evidence session, Ilan Sadeh advised that toll roads, airports and sea ports were all inherently different from electricity networks and gas pipelines, and could be expected to have different risks.[31]

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28 *Expert Joint Report*, page 43.

29 *Expert Joint Report*, page 44.

30 *Expert Joint Report*, page 46.

31 *Expert Joint Report*, page 49.

There are clearly differences between Australian electricity transmission systems, gas pipelines and other domestic infrastructure businesses. But there are also important similarities:

- services are provided using long-lived, tangible assets
- very large investments are made in those assets, which are largely sunk costs
- service provision to users provides relatively stable cash flows
- operation is within the same broad legal framework (though, of course, with very different schemes of industry-specific regulation)
- issues of wide of user bases and scales of operation become reasons for public policy intervention.

The other domestic infrastructure businesses – particularly toll roads and airports – are APA's direct competitors in financial markets.

If the set of comparable businesses is to be expanded, then careful consideration should be given to these other infrastructure businesses before turning to possible international comparators.

In summary:

- ***the use of international data may increase statistical precision, but at the cost of biased estimates of β***
- ***there is no simple mathematical adjustment which might be applied to those international data to make them comparable with data from the extant domestic comparators***
- ***an international version of the CAPM might be adopted, but that would raise new conceptual and data issues; it would be the adoption of a new asset pricing model, and would not be in keeping with the AER's incremental approach to rate of return guidelines review***
- ***if the set of comparable businesses is to be expanded, then careful consideration should be given to other Australian infrastructure businesses before turning to possible international comparators.***

5.3 Gearing

The estimation of β for establishing a return on equity for use when applying the regulatory regimes of the NER and the NGR has previously proceeded through:

- delevering the β estimates obtained for a number of comparable businesses and for a number of portfolios of these comparable businesses
- relevering the results to a "standard" gearing, the gearing of the benchmark efficient entity, which has been set at 60%.

Delevering and relevering have used a simplified version of the Miles-Ezzell formula, the derivation of which assumes constant leverage. Constant leverage is built in to the AER's PRTM.

Simon Wheatley explains, in the *Expert Joint Report*, that the Miles-Ezzell formula is:[32]

$$\beta_e = \beta_a \left(1 + \frac{D}{E}\right)\left(\frac{1 + r_d\left(1 - T_c \frac{D}{V}\right)}{1 + r_d}\right)$$

The second term in parentheses on the right hand side is approximately equal to one, allowing the simplification used by the AER and others:

$$\beta_e = \beta_a \left(1 + \frac{D}{E}\right)$$

During the second concurrent evidence session, most experts agreed that the AER's approach to gearing in β estimation was appropriate, and that the measures of gearing required for delevering and relevering should be obtained from the market values of debt and equity of relevant comparable businesses.[33]

Estimating the market value of the debt of the comparable businesses is, however, difficult. That debt is often not widely traded. In practice, then, book values of debt are often used as approximations for market values.

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32 *Expert Joint Report*, page 40.

33 *Expert Joint Report*, page 39.

Furthermore, as Associate Professor Partington advised:

- there were alternatives to the simplified Miles-Ezzell formula, which may be appropriate depending on the financing arrangements of individual firms[34]
- some of these alternatives incorporated βs for risky debt, and there was some evidence that estimates of those βs were not so small that they could be ignored.[35]

Associate Professor Partington also drew attention to a number of practical issues arising in the deleveraging of the equity β estimates made for comparable businesses. These concerned the way in which specific financing arrangements (for example, hybrid securities and leases) should be dealt with in arriving at values of debt and equity, and the assumption of constant leverage for those comparators.[36]

In APA's view, the issues raised by Associate Professor Partington are all valid. How they might be addressed – if, indeed, they need to be – is less clear. The list of alternative models for delevering and relevering is long, the evidence on debt βs is much less extensive and less robust than the evidence on equity βs, and abandoning the assumption of constant leverage raises difficult questions about what should be assumed.

This may be an area in which the AER's judgement is called for, guided by the broad view of the experts that the current framework, including the estimation of equity βs from market data, delevering to estimate asset βs, and relevering to an assumed gearing of 60% for a benchmark entity is appropriate.

In respect of gearing, the current approach, and an assumed gearing of 60% for the benchmark efficient entity, should be retained.

5.4 Method of estimation: OLS or LAD?

Empirical estimates of β are made using the "market model":

$r_i = a_i + b_i r_M + \varepsilon_i$

The *Equity Beta* discussion paper notes that a number of econometric methods can be used to estimate β_i from the market model. In his work for the AER, in 2013, Professor Henry had used both the ordinary least squares (OLS) method of estimation and estimation using least absolute deviations (LAD). The AER advised that:

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34 *Expert Joint Report*, page 40.

35 *Expert Joint Report*, page 41.

36 *Expert Joint Report*, pages 39-40.

- for the current rate of return guideline it had relied more on the OLS estimators because they were commonly used
- recent expert reports which the regulator had received had used only the OLS method of estimation.

APA would encourage the AER to reconsider the relevance of LAD estimation. We think β estimation is more than just statistical estimation of the parameter b_i in the market model (which, we agree, could be carried out in a number of ways). If the market model applies, the OLS estimator of the slope parameter of that model is:

$$b_i = \frac{\sum_{t=1}^{T} (r_{it} - \bar{r}_i)(r_{Mt} - \bar{r}_M)}{\sum_{t=1}^{T} (r_{Mt} - \bar{r}_M)^2}$$

where $\bar{r}_i$ and $\bar{r}_M$ are the sample means of the return on financial asset i and the return on the market, respectively.

The OLS estimator of b_i is the sample estimate of $\beta_i = \text{cov}(r_i, r_M)/\text{var}(r_M)$. The LAD estimator does not have this correspondence with the economic meaning of the parameter being estimated. The LAD estimator does not provide an estimate of β.

β estimation should use the Ordinary Least Squares method.

5.5 Beta estimates

The AER's β estimates are summarised in the following table.

Table 1: AER beta estimates – 2014, 2017 and 2018

AAN	AGL	APA	DUE	ENV	GAS	HDF	SKI	SPN/AST
Henry, 2014								
Longest available series, weekly data								
0.88	**0.69**	**0.60**	**0.29**	**0.31**	**0.31**	**1.03**	**0.33**	**0.29**
Last 5 years (to April 2017), weekly data								
		0.54	**0.24**	**0.38**		**1.11**	**0.30**	**0.27**
AER, June 2017								
Longest available series, weekly data								
		0.61	**0.47**				**0.43**	**0.39**
Last 5 years (to April 2017), weekly data								
		0.67	**0.31**				**0.48**	**0.77**
AER, June 2018								
Longest available series, weekly data								
		0.63					**0.44**	**0.41**
2008-2018, monthly data								
		0.76					**0.29**	**0.40**

The estimates in Table 1 indicate a difference between the β for the one (predominantly) pipeline service provider, APA Group, and (predominantly) electricity network service providers Spark Infrastructure and AusNet Services. This apparent difference is a caution against the use of β estimates of portfolios of extant businesses for estimation of either the return on equity of electricity network service providers or pipeline service providers.

The estimates for APA group indicate an increase in β.

Table 1 also indicates the difficulties inherent in estimating βs with only small numbers of comparable businesses.

In the second concurrent evidence session, experts agreed that, with only small numbers of comparable businesses, weight should be given to the β estimates of delisted firms, possibly with weights declining with the length of time since delisting.[37]

[37] *Expert Joint Report*, page 47.

Associate Professor Partington was of the view that, given the relative stability in β estimates over time, the evidence from the delisted firms remained relevant.[38] This is a view we are not inclined to accept. The estimates for the extant firms indicate – although not conclusively – that the estimates of β are changing through time.

The changes in β appear, to APA, to be dampened by the use of the longest available data series for estimation. The experts were agreed that long data series provide more precise estimates but, if beta were changing, the use of shorter series for estimation might be appropriate.[39]

Campbell, Lo and MacKinlay note, in their well-known textbook on financial econometrics, that β is most commonly estimated (from the market model noted in section 5.4) using five years of monthly data.[40]

Weight might be given to the data from delisted firms to augment the size of the sample for β estimation. But β variation over time cannot be ignored, and older data become less relevant if estimates are to reflect prevailing financial market conditions. β estimation using five years of monthly data should allow closer examination of changes, if any, over time.

5.6 Low beta bias

Since the early 1970s, financial economists have reported that, for stocks with β estimates less than (greater than) one, equity returns estimated using the CAPM are lower (higher) than observed returns.

This observation has been referred by as "low beta bias" in the CAPM, although estimates of β are not, themselves, biased.

Estimated βs for regulated energy network service providers have generally been less than one, with the implication that estimates of the expected return on equity obtained by applying the CAPM understate the returns expected by equity investors.

The *Expert Joint Report* advises that most experts agreed that there was sound evidence that low β stocks have exhibited higher returns than is predicted by the CAPM.[41]

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38 *Expert Joint Report*, page 47.

39 *Expert Joint Report*, page 50.

40 John Y Campbell, Andrew W Lo and A Craig MacKinlay (1997), *The Econometrics of Financial Markets*, Princeton: page 182.

41 *Expert Joint Report*, page 52.

When developing the current Rate of Return Guideline, the AER sought to "correct" this low β bias by appeal to the theory of the Black CAPM.

The relatively simple theoretical result which is the Sharpe-Lintner CAPM is derived from a view in which, in addition to a number of risky assets, a risk free asset is available to investors. Furthermore, those investors are assumed to be able to borrow and lend freely at the rate of return on the risk free asset.

However, this may not be the case. If a bond – usually a low risk government bond – is identified as reasonable proxy for the risk free asset, then it is unlikely that all investors will be able to borrow or lend freely at the rate of return on that bond.

The CAPM derived by Fischer Black was one of a number of similar models developed under weaker assumptions than unrestricted borrowing and lending at the risk free rate.[42] This CAPM, the Black CAPM, can be written:

$E(r_i) = E(r_z) + \beta_i \times [E(r_M) - E(r_z)]$

where $E(r_i)$ is the expected return on financial asset i, $E(r_M)$ is the expected return on the market portfolio, and β_i is the ratio of:

- the covariance of the return on asset i and the return on the market portfolio
- the variance of the return on the market portfolio.

$E(r_z)$ is the expected return on a portfolio with returns which are uncorrelated with the returns on the market portfolio. This portfolio with returns uncorrelated with the returns on the market portfolio is a zero-beta portfolio.

Black showed that $r_f < E(r_z) < E(r_M)$, which implies a higher (lower) estimate of the rate of return on a financial asset with β less than (greater than) one than would be obtained using the Sharpe-Lintner CAPM.

If the Black CAPM were thought to be relevant to estimation of the return on equity, that model might be estimated and used rather than the CAPM. But the expected return on the zero-beta portfolio is not directly observable, and must be estimated. There are, however, as the AER has pointed out, considerable difficulties associated with obtaining reliable estimates of the return on the zero-beta portfolio.

[42] Fischer Black (1972), "Capital market Equilibrium with Restricted Borrowing", Journal of Business, 45(3): pages 444-455.

Instead of using the Black CAPM, the AER has opted for a qualitative method of recognising the effect of low beta bias associated with use of the CAPM. Recognising that application of the CAPM may lead to an estimate of the rate of return on equity for an electricity network or gas pipeline services provider which, the theory of the Black CAPM suggests, is too low, the AER has applied the CAPM using the upper limit of the range of its estimates for β to account for the effect of low beta bias.

The AER's approach to recognition of low beta bias is pragmatic, but does not provide a very precise "correction". Choosing a β of 0.7 when the midpoint of the range is 0.5 adds around 130 basis points to the return on equity estimate if, as the AER assumed, the market risk premium was 6.5%. Service providers have advanced evidence that, over an extended period, a portfolio with a β of around 0.5 to 0.6 earned, on average, a return of some 400 to 500 basis points above the CAPM estimates.

In the second of the concurrent expert evidence sessions, Professor Satchell questioned the evidence for low beta bias, arguing that the "bias" was to be expected – the estimates of β and the intercept term (a, which is expected to be zero if the CAPM is true) are negatively correlated. Furthermore, other factors affected low beta stocks. They are likely to have been affected by the long term decline in interest rates since 1980: increases in rates of return which have been observed as interest rates have declined may be reversed as interest rates rise in the future.

This is a puzzling response. First, the estimators for β and a in the standard context of testing the CAPM are negatively correlated. But that is not directly relevant to whether the CAPM produces a return estimate which is below the return actually observed. Second, if there is evidence of other factors – the long term decline in interest rates since 1980 – affecting the returns on low beta stocks, then that draws into question the validity of using the CAPM to estimate equity returns. The CAPM is, in these circumstances, a seriously incomplete model.

If the CAPM is a valid model, the observed low beta bias may be a consequence of the model correctly estimating expected returns which are then being compared against – different – realized returns. But in financial markets in which participants form rational expectations, and adjustments of positions are rapid, we would not expect this to lead to a significant difference between expected and realized returns. Perhaps expectations are not being formed rationally. But then historical excess returns will not provide a reasonable estimate of the MRP.

In the second concurrent expert evidence session Simon Wheatley proposed that the AER adjust the β for the benchmark efficient entity for the higher returns on low β companies. The adjustment should rely on empirical evidence, and not the theory underlying the Black CAPM.[43]

The method of adjustment proposed by Multinet Gas in its last access arrangement revisions proposal (which, we understand, was in part developed by Dr Wheatley) should be reconsidered by the AER.

The issue of low beta bias should be addressed through use of the empirical evidence for differences between realized returns and estimates made using the CAPM, and not through adjustment based on the theory of the Black CAPM.

[43] *Expert Joint Report*, page 53.

6 Market risk premium

In the AER's foundation model, the expected rate of return on equity is estimated using the relationship

$E(r_e) = r_f + \beta \times MRP$

where $E(r_e)$ is the required expected rate of return on equity, r_f is the rate of return on a risk free asset, and MRP is a measure of the market risk premium. β is the ratio of the covariance of the return on equity asset and the return on the market portfolio to the variance of the return on the market portfolio.

6.1 Risk free rate and MRP correlation

The MRP discussion paper advises that there is a debate between experts about whether there could be a correlation between the risk free rate and the MRP. A question of whether the cost of equity is stable underlies this debate.

APA, the discussion paper notes, has submitted an approach which implies a negative correlation between the risk free rate and the MRP. This is not correct.

The MRP discussion paper also notes that APA has put forward a specification of the CAPM which is a version of the Wright CAPM. The *Expert Joint Report* advises that most experts agreed that the "Wright approach" to application of the CAPM makes the assumption that the mean real return to the market is constant through time.[44] This is a strong assumption, and we agree with Associate Professor Partington and Professor Satchell that there is no clear evidence for such an assumption being applicable in the Australian market.

APA has not asserted or implied a negative correlation between the risk free rate of the MRP. APA's submissions have sought to deal with the structure of the Sharpe-Lintner CAPM, which is a static equilibrium model of the expected return on a financial asset – and the implications of this for the way in which the model should be applied. These are, APA believes, important issues in estimating the rate of return on equity which cannot be addressed by pointing to market practice.

They remain, but APA does not pursue them further in this submission. As we noted at the outset, we accept the need for the current review of the AER's rate of return guidelines to be incremental.

The MRP, whether interpreted as a single parameter as the AER and its advisors propose, or as the difference between the expected return on the market and the current risk free rate which, APA argues, follows from the conceptual foundations of

[44] *Expert Joint Report*, page 61.

the Sharpe-Lintner CAPM, embodies a measure of expectations. The way in which these expectations are to be measured, and incorporated into an estimate of the rate of return on equity, remain critical issues.

APA's views on measurement using arithmetic or geometric means, the use of dividend growth models, and on the use of survey data, and noted in the paragraphs which follow.

6.2 Arithmetic or geometric means

If historical excess returns are to be used in estimating the MRP, then a question arises as to how those excess returns are to be summarised into a single measure: should that measure be an arithmetic mean or a geometric mean?

Some experts advised that, in the application of the regulatory regimes of the NER and the NGR, there was no compounding of the rate of return. In these circumstances, the arithmetic mean was the appropriate measure.[45] Others argued that both means were used in practice, and it was likely that the MRP was between the two.

Rajnish Mehra and Edward Prescott, in their paper "The Equity Premium in Retrospect", in the *Handbook of The Economics of Finance*, advise that the arithmetic mean is the correct statistic if one is interested in the mean value of excess returns.[46] They note that the best available evidence indicates that equity returns are uncorrelated over time and demonstrate, in Appendix A to the paper, that when returns are period by period independently and identically distributed, the future value of investment computed at the arithmetic mean of returns tends to the expected value of the investment with probability 1 as the number of periods becomes large. Mehra and Prescott used arithmetic means in their seminal paper in 1985.[47] They continue to use arithmetic means in the paper in the *Handbook of the Economics of Finance*.

Jonathan Berk and Peter DeMarzo, in their recent textbook, advise that one way of estimating the MRP is as the historical average of the excess of returns on the market

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45 Expert Joint Report, pages 57-58.

46 Rajnish Mehra and Edward C Prescott (2003), "The Equity Premium in Retrospect". In George M Constantinides, Milton Harris, Rene M Stulz, The *Handbook of Economics and Finance*, Vol. 1B, Financial Markets and Asset Pricing, Elsevier: pages 889-938.

47 Rajnish Mehra and Edward C Prescott (1985), "The Equity Premium: A Puzzle", Journal of Monetary Economics, 15: pages 145-161.

over the risk free rate. However, they caution users: because we are interested in the expected return, the correct average to use is the arithmetic mean.[48]

If the MRP is to be estimated from annual excess returns data, then the arithmetic mean of those data is the required estimate. There is no compounding, period by period, and no case for use of a geometric mean.

6.3 Dividend growth models

Berk and DeMarzo may advise that historical excess returns may be used to estimate the MRP, but they also point out that the use of these data are subject to two limitations. These are:

- despite a relatively long series of excess returns being available (50 years and more) for estimating mean excess return, the standard error of estimate is large[49]
- because historical excess returns data are "backward looking", they may not be representative of the current expectations of returns required for application of the CAPM.[50]

Berk and DeMarzo propose, in these circumstances, an alternative: direct estimation of the MRP using the dividend growth model.

Dividend growth models can be used to make estimates of the return on the market and the MRP which are forwarding looking estimates of the type required for application of the CAPM.

In the second concurrent evidence session, most experts agreed that:

- estimates made using dividend growth models can track variation in the short run MRP through time
- dividend growth models are commonly used in practice, including in regulatory settings

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48 Jonathan Berk and Peter DeMarzo (2014), *Corporate Finance*, 3rd edition, Pearson: page 406.

49 Berk and DeMarzo note that, for US data from 1926, the 95% confidence interval for the mean excess return is ± 4.5%. Brailsford, Handley and Maheswaran report a mean of 6.1% for the excess of market return over the bond rate for 128 years of data from 1883 to 2010. Although not as wide as for the US data, the 95% confidence interval for the Australian data is still large at ± 2.9%. See Tim Brailsford, John C Handley and Krishnan Maheswaran (2012), "The historical equity premium in Australia: post-GFC and 128 years of data", Accounting and Finance, 52(1): page 240.

50 Berk and DeMarzo (2014), page 407.

- dividend growth model estimates of the MRP should receive material weight: they are the only estimates we have of a forward looking return that is commensurate with prevailing conditions in financial markets.
- a view that historical excess returns are a satisfactory estimate of the expectation of returns required by the model
- a view that the model is simply a single factor model of expected return determination in which the single factor is historical excess return.[51]

The primary weakness of dividend growth models, the experts advised, was their requirement for forecasts of dividend growth. However, other methods of estimating a forward looking MRP also have weaknesses.[52]

The experts discussed the question of whether forecasts of long run dividend growth to be used in dividend growth models could be linked to empirical evidence on past dividend growth.

Associate Professor Partington advised that there was no optimal way to these estimate growth rates.[53] The appropriate course of action was to consider the impact of alternative growth rate estimates. Professor Stephen Gray referred to the practice of estimating dividend growth using GDP growth rates adjusted downward, if necessary, to reflect growth in corporate earnings at a lower rate than the rate of growth in GDP. Simon Wheatley advised that the assuming real dividend growth of 2%, as has been recent practice, was conservative and produced a result below estimates of real dividend growth rates computed using historical data. Wheatley recommended forecasting real dividend growth from a well-specified relationship between dividend growth and other variables that are likely to be linked to dividend growth for which forecasts are available. The obvious candidate was real GDP growth.

In 2012, consultant economists, NERA (who employed Simon Wheatley at the time), demonstrated a significant positive relationship between real dividend per share growth and current and lagged values of real GDP growth. In a report for APA and others, which was submitted to the AER, NERA proposed the use of this relationship for estimating dividend growth rates for use when applying dividend growth models

51 *Expert Joint Report*, pages 60-61.

52 *Expert Joint Report*, page 60.

53 *Expert Joint Report*, pages 62-63.

to estimate expected returns on the market and the MRP.[54] The time has come to revisit that report.

Historical – or realized – returns, alone, cannot provide satisfactory estimates of forward-looking expected returns and the MRP to be used when applying the CAPM to estimate the return on equity. More explicit, recognition must be given to estimates made using dividend growth models, and greater weight should be given to those estimates in estimating the MRP.

6.4 Use of survey data in estimating the MRP

In previous submissions APA has expressly rejected the use of survey data for estimation of the MRP. We have nothing to add to this earlier view.

We note that during the second of the concurrent expert evidence sessions, some experts agreed with our view. Others saw survey results as containing potentially useful information, but provided little guidance on how that information could be "extracted" and used in rate of return estimation.

Associate Professor Partington made reference to a recent paper by Harvard economists Robin Greenwood and Andrei Shleifer: the paper, Partington advised, indicated that, if you want to know what rates of return investors are thinking about and acting on, then surveys can provide that information, even though they may not provide good forecasts.[55]

We see the Greenwood and Shliefer paper pointing to current limited understanding of the way in which expectations are incorporated into the prices of financial assets. Greenwood and Shliefer advise that their finding are not consistent with rational expectations representative investor models of returns. The CAPM of Sharpe and Lintner may not be a representative investor model (indeed, this is one of its strengths), but this should caution against placing too much reliance on historical returns as measures of expected return.

The role of information and expectations formation in asset pricing are currently active areas of academic research. To being their exploration would be a major step away from the intended incremental approach to rate of return guidelines review.

Rate of return guidelines review should proceed on the view that survey data currently have nothing to contribute to MRP estimation.

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54 NERA, *Prevailing Conditions and the Market Risk Premium: A report for APA Group, Envestra, Multinet & SP AusNet*, March 2012.

55 Robin Greenwood and Andrei Shliefer (2014), "Expectations of Returns and Expected Returns", Review of Financial Studies, 27(3): pages 714 -746.