AER RATE OF RETURN GUIDELINE REVIEW
FACILITATION OF CONCURRENT EXPERT EVIDENCE

4 APRIL 2018

SESSION 2 ISSUES PAPER

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CONTENTS

GLOSSARY

AER	Australian Energy Regulator
ARORO	Allowed Rate of Return Objective
BEE	Benchmark Efficient Entity
Beta (β)	Measure of risk in CAPM
CAPM	Capital Asset Pricing Model
COAG	Council of Australian Governments
ERA	Economic Regulation Authority
EV	Enterprise Value, the sum of the market value of equity, debt and other liabilities
Gamma (γ)	Value of imputation credits
LMR	Limited Merits Review
MRP	Equity Market Risk Premium
NEO	National Electricity Objective
NGO	National Gas Objective
ROE	Return on equity
ROR	Rate of return
RORG	Rate of Return Guideline
Theta (θ)	Measure of utilisation of tax credits
TMR	Total Market Return
WACC	Weighted Average Cost of Capital

AGENDA FOR CONCURRENT EXPERT EVIDENCE SESSION, 5 APRIL 2018

No	Item	Points to consider
1	Introduction	• Recap • Introduction to participants • Agenda overview
2	Equity β	• The approach of the AER to re-leverage • Which comparators are appropriate to measure β, associated adjustments to parameters and revisions to methodology • Use of data from de-listed firms • Data frequency for estimation of β • How to determine a point estimate of β • Has β changed for the BEE? • How to respond to the phenomenon that low β stocks have had a higher return than suggested by CAPM
3	Equity market risk premium	• Approach to averaging historic estimates • Estimation of parameters in the DGM • Whether MRP constant, expected returns constant (real or nominal), or something between the two. • Construction of MRP formula in the guideline (binding).
4	Value of imputation credits	• Underlying assumptions for approach • Use of ATO derived tax statistics • Use of equity ownership statistics • Lally approach to measurement of γ • Parameter estimates and ranges
5	Conclusion	• Other issues to be considered • Assessing whether the NEG / NGO / ARORA has been met • Next steps

1. INTRODUCTION

The AER is undertaking a review of its 2013 Rate of Return Guideline (RORG) to be completed by December 2018. One element of the review process is the provision of evidence by experts in economics and finance through concurrent expert evidence sessions, also known as "hot-tubbing". The AER scheduled two evidence sessions: Session 1 took place on 15 March 2018 and Session 2 is scheduled for 5 April 2018.

The purpose of the concurrent expert evidence sessions is to support the AER in the review process by defining the issues of agreement and disagreement on the issues considered by the sessions. The experts are supported in this by an independent facilitator. The facilitator has been asked to provide a draft paper setting out areas of agreement and disagreement in advance of each session. After the sessions have taken place this a joint paper to be agreed between the experts will be prepared and available for publication.

Within the time constraints of the process, it has not been possible to produce a comprehensive statement of agreed positions. The experts have provided initial views on issues to the facilitator, and a summary of these have been set out in the tables in the remainder of this note. It is important to note that they are not comprehensive and are subject to refinement. The purpose of setting them out is to aid discussion at the expert session on Thursday 5 April and to facilitate a move towards agreed positions and positions where there is no common ground.

1.1. Participants in the concurrent expert evidence sessions

Experts:

- Stephen Gray (SG)
- Jim Hancock (JH)
- Greg Houston (GH) (session 1) / Simon Wheatley (SW) (session 2)
- David Johnstone (DJ)
- Martin Lally (ML) (gearing, imputation tax) / Graham Partington (GP) and Stephen Satchell (SS) (other issues)
- Ilan Sadeh (IS)

Facilitator:

- Jonathan Mirrlees-Black (JMB)

A transcript will be made of each concurrent session and circulated to the experts for checking, before being made available for publication.

1.1.1. Session 1 issues

- The allowed rate of return, compensation for risk, and the use of data when judgment is required.

- Gearing.

- Financial performance measures (RAB multiples, profitability analysis, and financeability analysis)

1.1.2. Session 2 issues

- Method of mechanistically applying return on equity.

- Estimating market risk premium.

- Estimating equity beta.

- Value of imputation credits.

1.2. Structure of this document

The remainder of this document is an annotated version of the agenda with views expressed by experts to the facilitator verbally or in writing. Experts have not approved or endorsed the views expressed in the document.

Statements of individual experts are set out in different colours to aid identification. In addition, additional rows have been included in the table identifying issues where there is agreement and discussion at Session 2 is unlikely to be needed (coloured green), and issues where discussion will be required (coloured red).

1.3. Appendices

Two experts (Stephen Gray and Martin Lally) have provided additional evidence for consideration by the panel and the AER. This is included as Appendices to this document. SG's contributions are an analysis of debt beta on gearing estimation, AER estimates of beta and DGM related estimates, and a short note on leveraging beta. Martin Lally's paper provides some recent analysis of gearing and gamma. These have been included here to support the discussion in the session on Thursday 5 April.

2. EQUITY BETA

No	Item	Questions	Views expressed / issues

2	Equity beta	• Is overall framework appropriate? E.g. should asset β be used directly?	GP
			
			• The overall framework is a reasonable approach.
			
			• The asset beta approach has theoretical merit, but the estimation of asset betas is problematic.
			
			SG
			
			• Current framework of re-levering to 60% should be maintained.
			
			• No difference between un-levering all estimates, taking average, and then re-levering to 60% vs. re-levering all estimates to 60% and then taking the average. Mathematically identical.
			
			• Definitely wrong to compare equity betas with different degrees of leverage as like with like.
			
			IS
			
			   • General approach to estimating beta remains sound and there is no strong justification for a departure from the current approach given:
			
			     - No material change in investment practices (or financial theory),
			
			     - Per session 1, adjustments should only be made where they product a significantly more robust result - high bar for change
			
			   • If equity beta was to change, it should be increased because:
			
			     - Nearly 60% of the AER's updated estimates at the portfolio level from the most recent 5 years (to April 2017) are above 0.7
			
			Emerging systematic risks are likely not to have been fully captured in listed stock / beta observations (anecdotally, listed equities markets have not yet fully priced in recent heightened political risk, proposed removal of LMR, industry/ecβonomy

No	Item	Questions	Views expressed / issues
			wide issues such as heightened technology risk and climate change, cyber security, inflation forecast risk etc.) JH • Systematic risk expressed in β will reflect consumption risk at consumer level. Estimates of asset β close to this concept. • While its valid to use an equity beta, important that comparisons are valid i.e. that correct adjustments are made for gearing. SW • Higher rather than lower frequency data should be used to estimate the equity beta of a benchmark entity with adjustments for infrequent trading where necessary. The use of higher frequency data will lead to more precise estimates and the early detection of shifts in the level of risk. • Procedures should be adopted to allow the data to signal when the asset beta of a regulated energy utility has changed. • Asset betas should be re-levered to 60 per cent. • Adjustments for the tendency of the SL CAPM to underestimate the returns required on low-beta assets should be made and should be linked directly to the evidence on this tendency.
2a	Releverage	AER should only make comparisons of equity β that have been relevered to 60%. It may be possible to get agreement about a refinement to this proposition.	There is agreement that increasing equity β increases the required cost of equity. However, GP has reservations about the deleveraging / releveraging calculation.
	Releverage formula	Miles-Ezzell formula is the only appropriate formula for the releverage calculation	This has been raised a few times in discussion but agreement to this has not yet been confirmed.

No	Item	Questions	Views expressed / issues
	Debt β	Should not be used as it is not significant	Not full agreement on this. SG has produced a table showing the impact of including a debt beta on leverage / deleverage. Included in this document as an annex.
		• DJ has argued that β is endogenous – i.e. the observed β depends on the rate of return that is set. How should this observation influence the approach to setting β?	GP • There is some merit to DJ's argument, but how to accommodate it is a conundrum. • This is less likely to be a problem if the rate the AER selects truly gives a result that investments are zero NPV. Unfortunately a trailing average cost of debt make this latter unlikely. SG • This is another argument (in addition to the inadequacy of the AER's current sample) for expanding the set to include companies that are not regulated by the AER – other domestic infrastructure companies and international NSPs. SW • Theory suggests that the regulatory regime can affect the risk of a regulated asset but the evidence to support the theory is weak. • If a significant change in the way in which companies are regulated were to be made, then some weight might be placed on a theoretical analysis of how the change might be expected to affect the risk of the companies.
2b		AER should be mindful that its decisions on rate of return may in themselves influence β.	There may be follow on consequences of this observation for the guideline. Suggest best to cover in discussions after the formal session.
		• If it can be shown that a market estimate of β combined with other parameters leads to an estimate of the return on equity that is higher or lower	GP • This depends on the quality of the evidence and unambiguous demonstration of the positive consequences with respect to the NEO/NGO.

No	Item	Questions	Views expressed / issues
		than the range of other market evidence, should it be adjusted to ensure that the ROR better achieves the NEO/NGO or Allowed ROR Objective?	• ROR could be adjusted for ''low beta bias'' in two ways we can reduce the alpha, or increase the beta; we suspect that different stakeholders might prefer different adjustments SG • Should not assess relevant evidence in stages or layers. *All* evidence that is relevant to beta should be set out. The strengths and weaknesses of each piece should be considered and then judgment/weight assigned accordingly. • Using a subset of evidence to determine an initial range, then a different subset to select a point estimate from within that range, and then a third subset of relevant evidence to check (and possibly revise) the point estimate has no reasonable basis and is likely to lead to error. IS • Only if the data is fundamentally incorrect or there is a demonstrated sustained shift over time. As discussed in session 1 as the data is not perfect it is dangerous to mechanically apply averages over short/medium term periods. There should be a bias against change against the rationale can be fully explained. SW • Adjustments for the tendency of the SL CAPM to underestimate the returns required on low-beta assets should be made and should be linked directly to the evidence on this tendency.
2c	Cross check Low β	Two issues here. One is cross check (highlighted in session 1), one is low-β stocks, see below.	

No	Item	Questions	Views expressed / issues
		• What criteria should be used to assess whether β estimates are appropriate?	GP • Conceptual analysis of the determinants of beta • The evidence of empirical estimates SG • No value in setting out (vaguely-worded) criteria. The simpler and better approach is to set out all relevant evidence and explain the reasons for assigning judgment/weight to each. SW • More precise rather than less precise estimates are to be preferred. So higher rather than lower frequency data should be used to estimate the equity beta of a benchmark entity with adjustments for infrequent trading where necessary. • Procedures should be adopted to allow the data to signal when the asset beta of a regulated energy utility has changed. • Adjustments for the tendency of the SL CAPM to underestimate the returns required on low-beta assets should be made and should be linked directly to the evidence on this tendency.
2d	Criteria for β	Agreement that β should be assessed from empirical evidence.	
	AER Approach used so far		
		• Does the approach used so far remain appropriate for estimating equity beta including the roles allocated to relevant materials? • What does the current evidence indicate?	GP • The current approach is reasonable, but the judgemental adjustments have been a source of concern with respect to transparency. It is also debateable whether the judgemental adjustments with respect to the Black CAPM and so called low beta bias are necessary. If they were dispensed with it is not at all clear that the results would be any less accurate.

No	Item	Questions	Views expressed / issues
			• A lower beta, probably of about 0.5 or 0.6, is appropriate
			SG
			• Two-stage approach of using one subset of the relevant evidence (domestic NSPs) to construct an immutable range, and then using all other relevant evidence to select a point estimate from within that range is flawed. Better approach is to consider all relevant evidence together, having regard to the strengths and weaknesses of each piece of evidence.
			• Estimates have materially increased since 2013 for the three remaining companies.
			• Estimates for international comparators are higher than the AER's current 0.7 allowance.
			• Estimates for other domestic infrastructure firms are higher than the AER's current 0.7 allowance.
			IS
			• I believe beta should be higher now than in the recent past as there have been structural shifts in systematic risks borne by networks as a whole (see previous comments).
			SW
			• The current approach appears to be to construct as many estimates of beta as possible leading to as wide a range of estimates as possible. Judgement, that is less than transparent, is then used to select an estimate from this range. Faced with a set of data, it is unlikely that an independent expert could identify the equity beta of a benchmark entity that the regulator would choose using the same set of data.
			• The current evidence indicates that there is little relation across portfolios of stocks between estimates of their betas and the returns that the portfolios subsequently realise. This evidence indicates that, in setting the equity beta of a benchmark entity to be 0.7, the regulator is running the risk of underestimating the cost of capital for the benchmark.

No	Item	Questions	Views expressed / issues
2e	Approach to β	Issues covered below	
		- How should AER consider technological changes as part of its conceptual analysis? - Are technological changes systematic risk that should be compensated through the equity beta of are they risks that can be diversified away?	- Question included in the AER consultation paper, but has been addressed in Session 1 discussions. SG - NSPs to provide evidence describing these risks and proposing how they should be addressed. - No real value in discussing a generic 'technology risk' and seeking to classify it as either purely systematic or purely diversifiable. - Some of the emerging risks may have a systematic element. For example, political risk may be more likely to arise during economic downturns. But no ability to quantify these effects ex ante – need to measure effect in observable data over time. IS - Technology risk is not diversifiable away – there are general trends and new risks impacting all businesses. Risks are not fully understood (and hence valued) as it is emerging quickly and the policy response is also evolving # JH - Not easy to unbundle different risks and assess impact on estimation based on incomplete data. - More sensible to assess overall risk assessed in β and check for reasonableness. SW - Some technological changes may give rise to changes in systematic risk while others may give rise to changes in risk that are not systematic. - Measuring the impact of technological change on systematic risk is best done through empirical analysis.

No	Item	Questions	Views expressed / issues
2f	Technological risk	Technological risk does not need to be considered separately in assessing β.	Addressed in Session 1.
	Comparator firms	• Does the current Australian empirical data used by the AER remain sufficient for informing the equity beta of a benchmark efficient entity with a similar degree of risk as that which supplies regulated energy network services?	GP • If they are not representative of the industry, the shrinking sample of listed companies is a problem • The shrinking sample is a problem with respect to measurement/estimation error. • Given the relative stability of the beta of regulated networks, historic data is not so outdated as to be irrelevant. • The gearing adjustment is problematic and this problem is avoidable. SG • Certainly the three domestic NSPs are relevant evidence that should receive material weight. But they are insufficient to rely on entirely or to use as the basis for constructing a 'stage 1' immutable range. IS • Although the existing comparator set has narrowed since the 2013 RoR Guideline, the reduction in the sample size is not, in and of itself, a sufficient rationale to include additional comparators (unless they are appropriate and relevant). • Unless there is a demonstrably superior method or data set or a material change observed in the estimates using the existing method and data, a change in equity beta is likely to introduce uncertainty and therefore cost and risk. • De-listed firms are not appropriate as they do not reflect prevailing market conditions (and emerging risks).

No	Item	Questions	Views expressed / issues
			• International firms should not be used without caution and scrutiny given materially different regulatory and political environments JH • Concerned that comparator list is too narrow. • Also concerned that additional companies would not be sufficiently comparable. • With limited number of comparators, AER needs to be prudent and ensure that it will be able to continue to make beta assessments. SW • There are now only three firms in the regulator's sample that are still listed and so the current sample size can now be described as barely large enough.
2g	Comparator firms	The range of comparators should be extended.	There is not agreement about this, there are a range of views for discussion including adjustments that would need to be made to reflect evidence from international companies. Further commentary on comparator groups below under AER questions (a) to (f), all issues to be covered in discussion.
		• What weight should be given to data from de-listed firms when estimating equity beta?	GP • Given the relative stability in beta estimates over time the evidence of delisted firms remains relevant. SG • Predominant weight should be applied to firms that still exist because beta estimates vary materially over time and the estimate for a delisted firm will be forever frozen in time at the point it happened to delist. • Since the current set of live firms is inadequate we will have to expand the set to include less ideal comparators. This will include delisted firms, with weight declining in line with the length of time since delisting. IS

No	Item	Questions	Views expressed / issues
			• Bananas unless they are recently delisted SW • Whether weight should be placed on delisted firms is an empirical question. If the data point to a recent shift in the equity beta of a benchmark entity, then little weight should be placed on de-listed firms. If, on the other hand, the data point to little change in the equity beta of a benchmark entity, then some weight should be placed on de-listed firms.
2h	De-listed firms	De-listed firms should be included in the comparator set, but the weight to place on the estimates should decline in line with the length of time since delisting.	There are different views on this, but the form of words on the left may be acceptable.
		• If available Australian data is not considered sufficient, what might be done to augment this (use of international data, theory, etc.)? Will this augmentation improve the estimation?	GP • Other listed domestic regulated utilities could be analysed to determine if they are suitable as comparators. • If international data is to be used then this raises many problems and requires very careful thought. • The use of international data creates substantial opportunities for gaming and debate. For example, Burke and Demarzo (well known textbook) report US utility asset betas of 0.2. This would probably be attractive to consumers, but probably not so attractive to regulated networks. • If the choice is made to go international, consideration should be given to adopting an international CAPM for the estimation of beta. SG • Also include international NSPs. • Also include other domestic infrastructure firms. • Also include beta allowances of other regulators (re-levered to 60%) – this indicates how other regulators have dealt with the scarcity of relevant data

No	Item	Questions	Views expressed / issues
		• (a) What are the strengths and weaknesses of broadening comparator firms?	GP • There is only benefit in broadening the sample of comparator firms if they are representative of the industry. A bigger sample of itself is of no value. SG • Strength is that it improves statistical reliability. • Weakness is that the expanded set of firms are less comparable to the BEE. • But there is a trade-off to be made and the 'other' evidence will naturally receive relatively more weight as the set of domestic NSPs continues to shrink. • Note that the inclusion of even a slightly biased estimate can improve the final estimate in a mean squared error sense. IS • See comments above SW • In using foreign data there will be a trade-off between bias and precision. Using foreign data will likely lead to more precise estimates but the estimates may be biased. The case for using foreign data will be stronger the smaller the number of domestic comparator firms. If there were no domestic comparator firms, then it would be difficult to argue against using foreign data. • There is a substantial amount of evidence against a domestic version of the SL CAPM. While the use of an international asset pricing model is, in principle, an appealing alternative to the use of a domestic model, there is also evidence against an international version of the SL CAPM. Any evidence against a version of the SL CAPM should be taken into account in using that version to produce an estimate of the return required on the equity of a benchmark entity.

No	Item	Questions	Views expressed / issues
		• (b) Should the AER's broaden its comparator firms to include international energy firms and/or other Australian infrastructure firm? Please explain the additional firms' comparability with the benchmark efficient entity with a similar degree of risk as that which applies to a service provider in respect of the provision of regulated energy network services.	**GP** • Noted in session 1 that if international data used, consideration would need to be given to the index used for measurement of β. • An alternative to using an international index is to convert the international firm returns to returns in Australian dollars and regress them against the Australian index to compute their beta. The question being addressed is if this network firm were an Australian entity, what would be the Australian market risk associated with it? **SG** • Noted in session 1 that if international data used, consideration would need to be given to the index used for measurement of β. • Would need to regress vs. local market index, or construct local market index to have same weights as 20 GICS sectors in the Australian market. SW • Rightly or wrongly, the AER uses a domestic version of the SL CAPM to estimate the return required on the equity of a benchmark entity. So the task is to use foreign data to assist the regulator in determining what should be the equity beta of a benchmark entity relative to an Australian index. • This can be done, if certain conditions are satisfied, by regressing the foreign currency return to a foreign portfolio of comparators on the foreign currency return to the corresponding foreign index. • The makeup of the Australian equity market differs from the makeup of other international equity markets and so it makes sense that some adjustment be made for this difference. The most sensible approach would be to construct local market indices that have the same industry weights as the Australian index.

No	Item	Questions	Views expressed / issues
		• (c) What adjustments would be required to international energy firms and/or other Australian infrastructure firms to make them suitable comparators if we chose to consider their estimated betas?	**GP** • It is not at all clear that such adjustments can be made and the gearing adjustment is again problematic and also unnecessary. **SG** • No simple mathematical adjustment exists. The fact that these firms come from a different market is simply one of the considerations when determining the relative weight to be applied. That is, the fact that these estimates come from a different market is a weakness to be weighed against the strength of the fact that there is a large set available to produce statistically reliable estimates. **IS** • This is a complicated exercise **SW** • There are trade-offs that the AER has chosen to make in using a domestic version of the SL CAPM. A benefit from using the model is that it is a simple one. Two of the costs in using the model are that Australian capital markets are largely integrated with international capital markets – and the model presumes this to be untrue – and that there is strong evidence against the model. • While no mechanical formulae exist for adjusting estimates of the betas of international comparators, in using international comparators to estimate the equity beta of a benchmark entity, trade-offs must also be made. Using international comparators will increase the precision of estimates but may entail some bias.
		• (d) Should Australian industry/sectors betas be considered to determine the equity beta?	**GP** • The utility sector beta could be relevant.

No	Item	Questions	Views expressed / issues
			SG
			• Better to select individual firms considered to be the most appropriate comparators. Industry and sector indexes are likely to be too broad.
			IS
			• No other sectors should be used. E.g. I do not agree with comment above about broader utility sector – there are a wide variety of different risks between a regulated network, E&P, generator, retailer etc
		• (e) If we include Australian industry/sectors betas, then how should they be considered to derive a point estimate?	GP
			• They would be appropriately used as a cross check on the reasonableness of the AER's choice of beta.
			SG
			• See above.
		• (f) Could the AER use regulated cash flows as opposed to market returns to estimate beta for networks businesses?	GP
			• Conceptually the CAPM can be implemented it terms of the covariance of cash flows and this is consistent with DJ's approach.
			• Practically, it is unlikely that the business cash flow can be measured at sufficient frequency to allow sensible measurement of the covariance.
			SG
			• No. By definition, beta is a measure of correlation between stock and market returns. It is hard enough to estimate directly from returns. Trying to model how cash flows might affect returns adds yet more noise to the process.
			IS
			• I don't understand how this would practically work without creating more subjectivity. For example the discussion in Session 1 around unregulated cashflows, some listed stocks having non-network assets, etc
			JH

No	Item	Questions	Views expressed / issues
			• Can't see how this would work. Observations not sufficiently frequent, there is potential for companies to manipulate to influence β SW • There are a number of multi-period models in which cash-flow betas play a role and there are submissions to UK regulators that have used these models. Using these models would represent a surprising departure by the AER from its use of the SL CAPM but could hold out hope of producing better estimates of the return required on the equity of a benchmark entity. I would be surprised, however, if there were long enough time series of cash flows to reliably estimate cash-flow betas.
2i	Cash flow analysis	Business cash flow analysis should not be used as evidence for β.	Most experts agree with this statement. DJ dissents from this. Given that changes of view are unlikely this won't be covered in session 2.
		• Is there a rationale for using different β statistics for T/D and Gas / Electricity? • Can enough evidence be brought to justify this (note regulators in other countries do this without relying on evidence from local listed entities)	GP • This is an empirical question, but there does not seem to be any data to estimate the different betas. Since there appears to be no objective way to make such estimates, presumably the different betas would be based on the AER's judgement of the arguments presented. It is not clear that this would give the transparency often called for and could lead to concerns about uncertainty associated with the exercise of discretion. • Regulators in other countries may use different betas, but some place all the utilities in one risk class. So if guidance is to be sought from overseas practice, what is the criteria for best practice? SG • Difficult to identify unless large sets of comparator firms are available. Impossible to identify under AER's current approach. • Should be open to any stakeholder to provide evidence that the systematic risk for a particular firm (or type of firm) is different from the AER's

No	Item	Questions	Views expressed / issues
			interpretation of the BEE. It would be open to the AER to reflect such differences in the Guideline (as the NZCC does).
			• Once the Guideline is set, there will be no further opportunity to change the beta allowance, so any risk differences (e.g., higher stranding risk) would have to be accommodated through accelerated depreciation or some other cash flow allowance.
			JH
			• No a priori reason why β for electricity and gas wouldn't be different. There has been discussion around different values for gas vs electricity because of different regulatory approaches (revenue capping vs price capping).
			• However, it will be hard to deliver convincing evidence of this.
			SW
			• There are no strong theoretical reasons to believe that the asset betas of regulated electricity and gas businesses should be the same. Stakeholders should be permitted to submit theoretical arguments and empirical evidence to support the case that there is a difference or, alternatively, to support the case that there is no difference between the asset betas of regulated electricity and gas businesses.
2j	Differential beta	Differential beta for transmission / distribution and gas / electricity	Agreed that conceptually different sectors may have different β statistics. The difficulty is with estimation, and discussion of the relevant issues is considered elsewhere.
	Empirical methodology	• What length data should be used to estimate beta given the current regulatory regime and application, empirical evidence, and finance theory?	GP • Beta estimates do vary depending on the period of measurement for individual observations and the length of the time series used. This provides the opportunity for gaming. The advantage of the AER making the choice with respect to measurement is that the opportunity for gaming is removed.

No	Item	Questions	Views expressed / issues
		• Do the AER's estimation periods remain appropriate?	• The AER's estimation periods are consistent with well accepted practice and there seems to be no compelling evidence to change them.
			SG
			• Prefer long period of data (e.g., 10 years) for the reason that more data is likely to provide more statistically reliable results.
			• Should also consider rolling 5-year average estimates for two reasons:
			a. Illustrates variation in beta estimates over time, which is relevant to reliability (e.g., if *estimates* vary materially when the regulator considers that true systematic risk is more stable); and
			b. Submissions may suggest that there has been a recent change in true systematic risk, so the regulator would want to know whether there is any evidence of such a change since the last review.
			IS
			• 10 years, consistent with the AER's approach to gearing, and other metrics.
			• If beta is to change regularly, then that change should be consistent with more recent data from a consistent approach adopted over time, not reflect a change in methodology or time series.
			JH
			• Long estimation periods are most appropriate unless there are breaks in series. Ideally consistency in time period of estimation across parameters (but may not be possible).
			SW
			• As much data as is available should be used to determine the time series properties of the equity beta of a benchmark entity. If the data suggest that the equity beta has been relatively constant, then some weight will be placed on the older data. If the data suggest that the

No	Item	Questions	Views expressed / issues
			equity beta has undergone a recent change, then more weight will be placed on recent data. • In the same way, one would use a long time series to estimate the mean of a variable that fluctuates around a constant mean but only the most recent observation to forecast a random walk.
2k	Estimation period	Estimation period for β and the time period over which β is observed	Longer periods of 10 years considered appropriate. Reliable estimates of systematic risk as expressed in β should be relatively stable. Need to address precise views on these issues.
		• When estimating gearing for firms with minority stakes in regulated energy networks, how should the AER arrive at an estimate that appropriately reflects the debt carried by the firm and its share of asset-level debt? Is the AER's look-through method appropriate for this adjustment? • Does it remain appropriate to use the look through method to adjust SKI's gearing estimate? Should the AER use 'borrowings' or 'liabilities' to make this adjustment?	GP • The AER's look through method is appropriate. • The application of the consistency principle dictates the use of borrowings. SG • Look-through method is appropriate. • Approach to SKI is appropriate. 'Borrowings' or 'interest-bearing liabilities' should be used rather than general liabilities. Trying to quantify debt, but many liabilities are not debt. IS • Agree with GP and SG - I thought was agreed in Session 1
2l	Gearing with minority stakes	Estimating gearing for firms with minority stakes	The AER approach is considered appropriate.

No	Item	Questions	Views expressed / issues
		• What data frequency is appropriate? (daily or more frequent / weekly / four weekly). • What criteria should be used to decide? • How is this affected by liquidity?	GP • Weekly or monthly data frequency is preferred. This enables the signal to be more clearly distinguished from the noise. Daily betas can give very silly results, such as negative betas, which are generally implausible for equity. • Longer observation periods are likely to reduce the thin trading problems caused by illiquidity SG • Weekly and monthly data should be considered. Theory provides no guidance on the appropriate frequency, so judgment is required. Daily estimates tend to be more variable and more susceptible to statistical problems (illiquidity/non-trading). • Highly illiquid firms (e.g., closely held firms that rarely trade) should not be used. Can filter out objectively using Amihud measure or other statistical measures. JH • Weekly / monthly makes sense provided results reasonable. . SW • Daily and weekly data should be used with adjustments for infrequent trading where necessary or filters to remove illiquid firms. The use of daily and weekly data will provide more precise estimates and provide an early warning of changes in risk.
2m	Data frequency	Data frequency for beta estimation	Experts who have commented here considered weekly or monthly data more reflective of systematic risk. However, SW on call commented that shorter periods give more reliable estimates. This is worthy of further discussion.

No	Item	Questions	Views expressed / issues
	Range and selection of point estimates	• Does theory support relatively stable regulated network equity beta estimates (at a given gearing) through time and over what time periods?	**GP** • Theory suggests a relatively stable cash flow from regulated networks. This is turn suggests a consistently low covariance with the market, which in turn suggests a consistently low beta. **SG** • True systematic risk is likely to be quite stable over time. • Same for low-beta bias. **IS** • It is rationale to expect beta to be stable over time, and this is how the parameter is assessed in unlisted markets. • Any change should reflect a demonstrably superior method or approach. **JH** • Agree with GP comment, one would expect underlying β to be low. **SW** • Beta is a relative measure of risk. So the equity beta of a benchmark entity can change through time even with no change in the behaviour of the returns to the benchmark. The equity beta can change, for example, if the makeup of the market changes. There have been large changes in the makeup of the market over the last 10 years and this may or may not have contributed to a change in the equity beta of a benchmark entity.
2n	Stability of β	Equity / asset β is relatively stable. It is acceptable to fix β estimates for the duration of the guideline.	

No	Item	Questions	Views expressed / issues
		• How do you pick a range and a point estimate? Do empirical studies around 'low beta bias' support an adjustment to beta estimates or imply judgement should be exercised differently? • Does the AER's current practice of selecting a point estimate from an empirical range remain appropriate?	• Whether an adjustment for low beta bias is required depends upon the quality of the evidence and how you interpret its meaning. We incline to the view that no adjustment is required. • It is not possible to get a definitive point estimate of beta, so the exercise of judgement by the AER is inevitable, as is the choice of selecting a point estimate from an empirical range. SG • Using a subset of evidence to determine an initial range, then a different subset to select a point estimate from within that range, and then a third subset of relevant evidence to check (and possibly revise) the point estimate has no reasonable basis and is likely to lead to error. • The simpler and better approach is to set out all relevant evidence and explain the reasons for assigning judgment/weight to each. SW • The current approach appears to be to construct as many estimates of beta as possible leading to as wide a range of estimates as possible. Judgement, that is less than transparent, is then used to select an estimate from this range. Faced with a set of data, it is unlikely that an independent expert could identify the equity beta of a benchmark entity that the regulator would choose using the same set of data. • The current evidence indicates that there is little relation across portfolios of stocks between estimates of their betas and the returns that the portfolios subsequently realise. This evidence indicates that, in setting the equity beta of a benchmark entity to be 0.7, the regulator is running the risk of underestimating the cost of capital for the benchmark. • A useful way of proceeding is to ascertain whether any strategy that the AER proposes to use in setting the return required on the equity of a benchmark entity would have produced forecasts of returns that are not significantly biased in historical data.

No	Item	Questions	Views expressed / issues
2o	Point estimates	AER should clearly set out how it has exercised its judgement in determining its point estimate of β.	
2p	Point estimates	How should AER determine point estimate of β?	
		• Do empirical estimates of equity beta provide sufficient support to warrant departure from the current empirical range of 0.4–0.7?	GP • There is no substantive evidence for change. SG • The estimates for the three live firms are materially higher over the period since the last guideline. • The international evidence (including from other regulators) and the evidence from other domestic infrastructure firms indicates a beta above 0.7. SW • This is an empirical question and to answer it I will need to examine the data.
3q	Change in β estimates	Has β changed? Potential agreement, based on evidence to be supplied, that β estimates have all increased since 2013.	
		• Should the AER continue to have regard to the theory of the Black CAPM and the international beta estimates when estimating equity	GP • No. This should be disregarded as too subjective in its application.

No	Item	Questions	Views expressed / issues
		beta? How should the AER have regard to these materials?	• Empirical estimates of zero beta returns submitted by the regulated networks have been inconsistent and in many cases implausibly large and highly variable.
			SG
			• Estimates from international comparators and other domestic infrastructure firms should be considered alongside estimates from the three domestic comparators. Judgment/weight should be applied after considering the strengths and weaknesses of each set of evidence.
			• The extent to which the SL-CAPM produces downwardly-biased estimates of the required return on equity is a different issue that, within the AER's foundation model approach, requires an adjustment to the best estimate of beta for the BEE. The adjustment must be sufficient to offset the downward bias.
			SW
			• The AER should adjust the equity beta of a benchmark entity for the low-beta bias but it should rely on the empirical evidence and not the theory behind the Black CAPM to do so. The Black CAPM relaxes the assumption underlying the SL CAPM that investors can borrow freely at a single risk-free rate. Other more recent models, however, relax other assumptions that the SL CAPM makes. Relaxing the assumption that investors share the same beliefs can lead to more dramatic departures from the SL CAPM than the Black CAPM provides.
2r	Low β	There is sound evidence that low β stocks have exhibited higher returns than the S-L CAPM predicts.	
2s	Low β implications	How should AER respond to the finding above?	No agreement on this, needs discussion.

No	Item	Questions	Views expressed / issues
		• What regard should be given to stakeholders' desire for certainty and stability?	**GP** • Certainty and stability imply a reduction in the risk of investment and greater stability of cash flow. This in turn implies a wealth gain for investors. This is not a free lunch, someone has to pay. The question is how much wealth consumers want to surrender for stability. **SG** • An important consideration that should be given material weight. **IS** • The AER should have a high regard for certainty and stability - all stakeholders benefit as it keeps the cost of capital low and incentivises efficient and sustainable investment; and innovation • Uncertainty/instability in markets should be seen as a real cost which adds to long-term costs of customers for the above reasons • There should therefore be a high bar to change – not just prevailing theory of the day, nor objective approach + subjective "vibe" **JH** • Stability important. • Move to binding guideline likely to reduce risk • However, reduced exposure to risk appears to benefit investors rather than consumers • Consider how this risk reduction can benefit consumers. What adjustments to these parameters do we make to make allowance for reduced investor risks?

No	Item	Questions	Views expressed / issues
			SW
			• There can be benefits to both consumers and investors if the regulator acts in a predictable and transparent manner.
2t	Stability	There is value in stability in the approach to estimation of the required return, and this consideration should inhibit change in estimation approaches or parameters.	Proposed wording for agreement, reflecting a "high bar" to change.

3. EQUITY MARKET RISK PREMIUM (MRP)

No	Item	Questions	Views expressed / issues
	MRP general	• What are the determinants of market returns?	GP • There are many variables that feed into expected and realised returns. Realised returns are highly volatile, but the evidence tends to suggest that the MRP is going down. SG • MRP changes over time as the market reassesses the amount of risk and the price of risk. JH • Range of factors affect observed returns including all sorts of stochastic factors. These may not impact expected returns. • Foundation is consumer attitudes to risk, and smoothing of consumption flows. • At a macro level hard to reconcile MRP observed in markets with plausible consumer risk aversion SW • The MRP will depend on the risk of the market and the price of risk and both these can change through time.
3a	MRP determinants	Although not debated extensively, it is likely that a statement on this can be agreed between the experts.	Limited value to debating in the session?
		• How can required market returns be estimated and what information is	GP

No	Item	Questions	Views expressed / issues
		available and likely to be useful for this task? Does this indicate change?	• Three techniques are in common use: Historic performance (including build-up methods) surveys and implied cost of capital methods.
			SG
			• MRP estimates have either increased or remained constant since 2013.
			• Survey, Wright, DGM and other regulatory estimates have increased materially since 2013.
			• HER estimates are essentially constant by nature.
			• Conditioning variables have remained relatively constant.
			JH
			• Current figures likely to be too high, but hard for there to be statistical significance to measured changes in HER.
			SW
			• Long time series of returns are useful for estimating the unconditional or long-run MRP and the long-run mean real return to the market.
			• Regressions of returns on predictors and the dividend growth model are useful for estimating the conditional or short-run MRP and the short-run mean real return to the market.
			• Estimates of the short-run MRP can also be extracted from option prices and research using estimates like these suggests that the short-run MRP was high during the global financial crisis.
			• Recent evidence indicates that measures of the short-run MRP extracted from surveys are unreliable – survey forecasts of the return to the market do not appear to make intelligent use of available information.
			• Estimates of the long-run MRP that use the geometric mean of a time series of returns should be given no weight.

No	Item	Questions	Views expressed / issues
3b	Approaches to MRP	Possible approaches to determining required returns are backward looking (HER), forward looking (DGM) and surveys.	
		• How should we use the available evidence to select an MRP point estimate?	**GP** • The status quo in practice has been 6%, but this seems likely to move down. **SG** • Set out all evidence that is relevant to informing the MRP estimate. • Analyse the strengths and weaknesses of each piece of evidence, and weight each item accordingly. • In relation to historical returns, weight should be given to the HER and Wright approaches – as the truth likely lies between these two end points. • DGM should receive significant weight as the only truly forward-looking estimate. • Other evidence should receive relatively less weight. **SW** • Some weight should be placed on estimates of the long-run MRP that use long time series of returns. The Wright assumption is that the mean real return to the market is constant through time. An alternative assumption is that the MRP is constant through time. Neither assumption is likely to be true – the truth is likely to lie somewhere in between. • The dividend growth model is widely used in estimating required returns and should be given a significant weight. • Some weight should also be placed on predictors known to track variation in the short-run MRP through time. • No weight should be placed on survey evidence or on estimates of the long-run MRP that use geometric means.

No	Item	Questions	Views expressed / issues
	Historic Excess Returns (HER)	• Should the return considered be the arithmetic average, the geometric average, or should weight be given to both?	**GP** • Both are used in practice and it is likely that the MRP lies somewhere between the two. **SG** • Arithmetic average is consistent with expected returns. • Geometric average is not relevant and should not be used. • There is even a HBS case study to explain this point! • It is amazing that this is still an issue… **JH** • Arithmetic is the appropriate estimator in a pure statistical sense so long as excess return observations are independent of each other. • There are grounds to believe that there is some negative autocorrelation in excess returns—of uncertain extent—in which case the arithmetic average may be misleading in application to multi-period predictions. **SW** • When compounded over many periods, an estimate of the WACC that uses the arithmetic mean can be biased upwards. • Unless compounded over many periods an estimate of the WACC that uses the geometric mean will be biased downwards. • To all intents and purposes the regulatory process that the AER employs never compounds an estimate of the WACC. • So no weight should be placed on an estimate of the MRP that uses the geometric mean.

No	Item	Questions	Views expressed / issues
			• The assertion that the use of the geometric mean, rather than the arithmetic mean, can lead to a better estimate of the MRP over a single period – that is, one year – is untrue.
3c	Arithmetic vs geometric mean	In considering HER, only the arithmetic average should be used.	Not full agreement but view of most who have expressed a view.
		• Should HERs be the main method of estimation for the MRP?	GP • The historic excess return provides a starting point, but has been highly variable and the true MRP could easily differ from the HER by one percent and possibly more. SG • No. This is one piece of relevant evidence that should receive material weight, but not determinative weight above all other evidence. • The reason for this is best illustrated in the context of the GFC – the HER approach suggested that the cost of equity capital *fell* dramatically during the peak of the GFC. Clearly, such an approach should not be the determinative method for setting the allowed return on equity. SW • No, but an estimate of the long-run MRP that uses a long time series of returns should be given some weight.
3d	HER	The HER is one piece of evidence on the MRP. It should not be considered preeminent, but rather considered alongside other evidence.	
		Data used for estimation of HER should be the data based on Dimson, Marsh & Staunton with the "NERA" adjustments.	These are instead of the Brailsford et al data sources (references to be confirmed).

No	Item	Questions	Views expressed / issues
		Data used for HER should only use periods of 50 years or more.	Comments on HER by AER of shorter time periods are considered to be of insufficient length to provide useful evidence of HER.
	Dividend Growth Models (DGM)	• Is the DGM a useful model when directly estimating a forward looking MRP? What are its strengths and weaknesses?	GP • Plenty of weaknesses, but used in practice. • Future cash flows/earnings are imprecisely estimated as is their pattern of growth or decay and as is also the future funding required to support future cash flow. • A key issue is the range of possible estimates of the long term growth rate. SG • DGM should receive material weight. The only method that estimates a forward-looking return that is commensurate with the prevailing conditions in financial markets. • Note that FERC (US regulator) only allows the CAPM to be used if a DGM estimate of the MRP is used. HER estimates are not allowed at all. • Relevant to consider the weight that other regulators place on DGM estimates of the MRP. • Estimates of the required return on equity are entirely plausible and relatively stable over time. • Long-run growth assumption is required. AER already considers a range of conservative estimates. SW • The evidence indicates that estimates of the MRP that use the dividend growth model can track variation in the short-run MRP through time. • Its primary weakness is that it requires an estimate of long-run dividend growth and forecasting long-run dividend growth is difficult. Other methods of estimating the short-run MRP, however, also have their weaknesses.

No	Item	Questions	Views expressed / issues
3e	DGM	The DGM provides a useful source of evidence on the expected equity market risk premium that should be considered alongside other sources of evidence.	The experts considered DGM to be useful, but have different views about estimation.
		• To what extent are investor's return expectations likely to be relatively constant (in real or nominal terms)? Has there been a change in evidence regarding the potential negative correlation between the risk free rate and the MRP? • Should the AER be considering alternative specifications of the DGM?	**GP** • There is need to distinguish between equilibrium return expectations and returns expected. We are interested in equilibrium return expectations and they may change somewhat, particularly in nominal terms. The problem is reliable measurement. • There is no compelling case for a negative correlation between the risk free rate and the MRP. • Yes alternative specifications should be considered in particular the Gordon and Gordon Model. **SG** • Required returns (real and nominal) are likely to be considerably more stable than the AER's current fixed MRP would suggest. • DGM produces much more stable estimates of the required return on equity. Suggests changes in govt. bond yields generally flow through to the required return on equity, but not 1:1. • Previous consideration of the relationship between risk-free rate and MRP has been binary – either no correlation (HER) or full correlation (Wright). But the truth is likely in between, so both are relevant. • Current specification is well known and has produced plausible results since 2006. No need to consider alternative formulations. **SW**

No	Item	Questions	Views expressed / issues
			• Neither the MRP nor the mean (nominal or real) return to the market are likely to be constant through time.
			• The current two-stage and three-stage specifications of the dividend growth model that the AER employs are adequate for the task of estimating the short-run MRP.
3f	Fixed MRP or fixed TMR?	Experts believe neither (a) expected market returns comprise the sum of a fixed expected MRP plus risk free rates; nor (b) expected market returns are stable, implying that changes in the risk free precisely offset changes in the MRP.	While there may be agreement about this issue, it is worth of discussion in particular for the implications that it would have for the construction of the binding return target.
		• Should the DGM, and in particular the growth rate, be adjusted from its current construction/estimates in the upcoming guideline review? More generally, how should the growth rate (or rates) be estimated?	GP • There is no optimal way to estimate growth rates, if there were the DGM would be much more useful. • The appropriate course of action is to consider the impact of alternative growth estimates. SG • Long-run GDP growth rate should be the starting point. Any adjustment should be made on the basis of evidence, not assertion. For example, if it is argued that a downward adjustment should be made to reflect the extent to which corporate earnings grow at a slower rate than GDP, that adjustment should be demonstrated with evidence. SW • The current estimate of two per cent real dividend growth is conservative and lies below estimates of mean real dividend growth computed using historical data. Adding between 50 and 100 basis points to the estimate

No	Item	Questions	Views expressed / issues
			would bring it closer into line with the mean of historical real dividend growth rates.
			• The best way of estimating real dividend growth – that is, forecasting real dividend growth – would be to examine the relation between real dividend growth and other variables that are likely to be linked to real dividend growth – for example, real GDP growth – for which we may have forecasts.
3g	DGM estimation	Parameter estimation for the DGM.	
	MRP – Other estimation methods	• What role should other information (e.g. the Wright [Total Market Return] approach, survey evidence) play in estimating the MRP?	GP • Survey evidence provides a basis for cross checking the MRP chosen. • The Wright approach has little to recommend it. SG • Wright approach is a valid method for estimating MRP (or total market return). Should be paired with HER approach as two end point approaches for processing the historical data. These two approaches should receive equal prominence. • Surveys should not be used. Unreliable. If they are to be used, they should be used in full (e.g., many surveys indicate that the respondents pair their MRP figure with a risk-free rate that is materially above the prevailing government bond yield). JH • Have concerns about use of surveys. Not sure about the thought process of those that participate and this can contaminate the results. SW • Some weight should be placed on estimates of the long-run MRP that use long time series of returns. The Wright assumption is that the mean real return to the market is constant through time. An alternative assumption is

No	Item	Questions	Views expressed / issues
			that the MRP is constant through time. Neither assumption is likely to be true – the truth is likely to lie somewhere in between.
			• No weight should be placed on estimates of the MRP based on surveys because the evidence indicates that survey assessments of the MRP do not use available information in an intelligent way – they are not rational.
3h	Surveys	Surveys of market participants are unreliable as a source of evidence and very little weight should be placed on them in estimating MRP.	
3i	TMR approach	The approach of estimating the total market return (TMR) rather than the MRP has merit.	There is not universal agreement about this, or how much weight to place on this evidence.
		• Should any of the 'other' MRP estimation methods listed above play a significant role in the estimation of a potentially fixed MRP under the proposed binding rate of return instrument?	GP • See above. SG • Independent expert reports provide relevant evidence. Should be used in full. Not balanced to use MRP figure, but ignore the fact that it has been paired with a risk-free rate that is materially above the prevailing government bond yield, or that a premium has been added to correct for 'the inadequacies of the CAPM in the current market conditions.' • A fixed MRP allowance cannot possibly remain commensurate with the prevailing conditions in the market for the duration of the guideline period…. SW • It is unlikely that the MRP will remain constant through the length of the guideline period.

No	Item	Questions	Views expressed / issues
	Risk free rate averaging period	• Is our proposed option for the RoE averaging periods supported [use between 20 and 60 business days, with the period nominated by the business subject to 2 criteria being satisfied]	GP • This is a reasonable proposition SG • No objections to this approach. SW • Some stakeholders would prefer to see an averaging period of between 20 and 90 business days with businesses having the option to select the exact length in their regulatory proposals. I have no objection to this alternative proposal.
3j	MRP estimation in ROE	The AER proposed approach for the risk free rate to be used in estimating the ROE is reasonable.	
	Automatic application of the guideline	• Is the approach to date for estimating the cost of debt and the value for gamma amenable to automatic application?	GP • The trailing average cost of debt is not appropriate at all. However, it does automatically update. Over the regulatory period, time variation in gamma, in terms of value in use is unlikely to be a major problem, except if tax law changes. The proposal to eliminate cash refunds is an issue in this regard. SG • Approach to allowed return on debt is automatic – can be reduced to a formula so that any stakeholder could derive the same figure from the independent third-party data. • Gamma should be fixed at a single figure for the duration of the guideline. SW • The approach to estimating the cost of debt is amenable to automatic application.

No	Item	Questions	Views expressed / issues
			• It is difficult to see that there will be a significant variation in an estimate of the 'utilisation' gamma over the guideline period unless there are tax law changes.
3k	Automatic application of parameters	Automatic application of the guideline: agreement about γ, β. Issues around MRP and cost of debt expressed elsewhere.	
		• What are the pros and cons of the 3 options proposed in this paper for the automatic application of the return on equity? (set 1 rate of return for guideline, set 1 MRP for guideline, set a formula that allows more elements to be determined through the guideline).	GP • Option 1 has the advantages of simplicity. Certainty for the duration of the regulatory period may be preferred by some stakeholders. The disadvantage is that it does not reflect changes in the price of time. • Option 2 does reflect changes in the price of time and approximates the process that the AER has tended to follow under the current Guidelines. SG • Fixed MRP results in allowed return on equity varying one-for-one with changes in government bond yields. Produces nonsensical results in times of crisis and high volatility. • Fixed allowed return on equity is independent of any change in base risk-free rate. • Reality likely lies somewhere in between – with required return on equity having some relation to the base risk-free rate, but not 1:1 as is the current approach. SW • It is unlikely that the mean real return to the market is constant through time and it is unlikely that the MRP is constant through time and so setting either to a constant is unlikely to lead to the right result. The truth is likely to lie somewhere in between.

No	Item	Questions	Views expressed / issues
		• How do you design a method to achieve the approach proposed in option 3?	**GP** • Of inputs into the WACC calculation, only the risk free rate, the cost of debt and possibly the level of leverage can be measured with sufficient precision and objectivity to allow for formulaic updating. However, with respect to leverage, the sample of firms with available market data has to be assumed to be representative of the industry. This takes us back to option 2 **SG** • Would need to be entirely objective and mechanistic. For example, half of any change in the risk-free rate might be passed through to the allowed return on equity. **SW** • One way would be to set the MRP to be the average of a constant MRP and the MRP implied by the Wright approach.
3l	How to set MRP – formula or parameter?	Appropriate methodology for setting parameter / formula for MRP in binding guideline framework.	
		• Other observations?	**GP** • The fundamental problem in all this relates to the theory of the second best. The use of the trailing average approach is unlikely to give a zero NPV outcome for investments. Consequently it is not really clear what the optimal choice is with respect to everything else. **SG** • Experts might consider whether the AER's approach to date (which has been to fix a constant MRP) results in the allowed return on equity being too high when rates are high and too low when rates are low. And if so whether (in an NPV=0 sense) this requires consideration when setting the MRP in the current guideline. The AER had regard to such a consideration when changing its approach to the allowed return on debt – ensuring that its

No	Item	Questions	Views expressed / issues
			change does not crystallise any windfall gains or losses from the previous regulatory period.

4. VALUE OF IMPUTATION CREDITS

No	Item	Questions	Views expressed / issues
4	Value of imputation tax credits	•	•
	Overall approach	• Should the definition of the value of imputation credits be regarded as settled, given the Federal Court decisions? • The Federal Court and ACT found that AER may estimate γ from proportion of credits that can be redeemed (rather than their economic value). • AER uses the Officer framework using the Monkhouse 2004 formula.	GP • From a regulatory perspective this seems to be settled by the Federal Court decision • Value in use is given by credit redemption and this measurement is consistent with a value measured before investor taxes and costs. ML • The definition seems to be settled in legal terms, and that may be conclusive in the present situation. Judging from their submissions, the regulated businesses also hold this view. The definition seems to be settled in legal terms, and that may be conclusive in the present situation. Judging from their submissions, the regulated businesses also hold this view. SG • My view is that gamma should be interpreted as the (market) value of credits, not the proportion that might be redeemed. But I am unaware of any stakeholders who see merit in challenging the AER's current interpretation. So we should proceed on the basis of a 'utilisation' estimate of gamma. IS • I don't think it has been legally settled, the Federal Court found that the AER's approach was not incorrect, not that it was better than other definitions/approaches. The dividend drop off studies and ATO statistics do provide relevant information. • To ML's point - I don't think all regulated networks agree with the AER's approach on gamma at all, they have not been able to show another

No	Item	Questions	Views expressed / issues
			method is "materially preferable" and judicial review is not the forum to evaluate the merit of approaches. That does mean given the opportunity to review the current approach we should not see its limitations and strive for a better outcome more in line with regulatory principles
			• There are two broad issues at play:
			a) Should theta capture potential value (upper bound) or value realised (actual)?
			b) For the given approach, is the data sufficiently "clean"?
			• The market value approach is preferable to redemption or utilisation approaches, as it gives a better estimate of how investors *practically extract* value rather what is *prima facie available* to them (i.e. there is a friction and time value of money element). To assume away friction is unrealistic. Simply ask a person whether than would like $1 of income or a $1 franking credit!
			SW
			• Gamma is the product of the distribution rate and theta, where theta measures the impact on the return required on equity of imputation credits distributed. Theta will typically fall far below the redemption rate and so the redemption rate will in general provide a poor guide as to the value of theta. My understanding is also, however, that stakeholders currently see no merit in challenging the AER's view that theta is the rate at which credits distributed are redeemed or utilised.
4a	Overall approach	For the purposes of the guideline the value of imputation tax credits should be interpreted as the utilisation of credits rather than the market value of those credits, the approach proposed by the AER.	Experts do not agree that this is the correct methodology. However, they are prepared to accept that it is the approach that will be used given the history of the discussion of this issue and the associated litigation.
		• What criteria should be used in assessing the estimate of γ?	GP
			• There are very clean estimates of the market value of dividends and franking credits (mine) which indicate that franking credits distributed are close to

No	Item	Questions	Views expressed / issues
			fully valued. However, with respect to these estimates there is a trade-off between internal validity and generalisability.
			• The AER are using a domestic CAPM and this implies domestic investors. In which case credits distributed should be fully valued. If so the only issue for gamma is the distribution rate.
			ML
			• That the estimation methodology accords with the definition of the parameter.
			• The resulting estimate is unbiased. This criterion covers not merely the usual statistical meaning of the word but the effect of various methodological choices such as how data outliers are treated, the rules for selecting data, etc.
			• The standard error of the estimate low. This criterion covers not merely the usual statistical meaning of the word but the reliability of the data from which the estimate is drawn, the sensitivity of results to various methodological choices, the effect of tax arbitrage, and the effect of anomalous behaviour around dividend ex-dates.
			SG
			• No great value in trying to write down criteria. Better approach is to simply consider the relative merits of each of the proposed estimation approaches.
			IS
			• Agree with SG – if we had to summarise aren't we just trying to accurately reflect the level of franking credits networks are able to utilise? I don't see how the equity ownership method can be the sole or main method for this
			• Q - does the BEE principle imply the approach for gamma should necessarily be redemption over market value? I don't think so, in fact the BEE should take into account all realistic costs. I don't believe the equity ownership model appropriately considers (ii) – (v):

No	Item	Questions	Views expressed / issues
			i. Foreign investors (who cannot use franking credits) – maybe less arguable or incorporated (for debate)
			ii. Ineligible investors (e.g. the 45 day rule)
			iii. People who are entitled to credits but do not use them
			iv. NPV benefit of franking credits is lower than dividends (timing)
			v. Tax rules can and do change from time to time (approach we see taken by independent market valuers for unlisted equity)
			SW
			• Setting aside concerns, already expressed, that the AER is estimating the wrong quantity, an unbiased estimator is to be preferred, all else constant, to a biased estimator and a more precise estimator is to be preferred, all else constant, to a less precise estimator.
4b	Criteria	Given the approach to valuing imputation credits, the estimation of utilisation should be the best available and consistent with the framework.	
		• Approaches to estimation of γ are based on estimates across the whole market / all taxed entities. However, on average companies do not pay the statutory tax rate, or pay out fully franked dividends.	GP
			• The presumption in setting the allowed return is that the regulated businesses are taxed at the statutory rate. To be consistent gamma estimation should give the value of the imputation tax credit for a business taxed at the statutory rate.
		• What impact should this have on γ assumed for the BEE?	• Alternatively, it may be appropriate to recognise that the regulated business may avoid tax and adjust both the imputation credit value and the allowed tax rate downwards according to the effective tax rate observed.
		• What impact should this have on the allowed return framework?	• There is logic in using the companies in the sector to obtain estimates of both the effective tax rate, and the value of gamma in use. Adjusting gamma for the effective tax rate in the sector (partial franking) also implies adjusting the allowed cash flow by the effective tax rate.
		• [Note for comparison of approaches: for gearing, average gearing of companies in the sector is thought an appropriate	

No	Item	Questions	Views expressed / issues
		proxy for gearing for the BEE. Same logic appropriate for γ and its determinants?]	• The sample size of listed firms is probably too small and distributions too infrequent to estimate the market value of the franking credits for the sector.
			ML
			• If companies pay less tax than the regulatory model presumes, this matters at most for the estimate of TAX within the regulatory model rather than to the estimate of gamma.
			• If companies do not pay out fully franked dividends, this reduces the distribution rate for credits, and will be reflected in all methodologies for estimating the distribution rate, and reduce the estimate.
			SG
			• Best approach is to consider the distribution rate for the BEE and the 'utilisation' rate for the economy. Should be able to obtain agreement on this point – I think most of us have agreed to this in the past.
			• Need a BEE assumption for the corporate tax rate and the distribution rate. Statutory rate is the obvious benchmark assumption for the tax rate – how can a company paying the statutory rate be considered to be inefficient? In that case, the BEE credit distribution rate is the same as the dividend payout rate. APA has a stated policy of 60-70% and has achieved this on average. AST and SKI have historically had similar payout rates. This avoids the need for noisy estimates of the distribution rate from comparators that differ materially from the BEE.
			JH
			• Careful consideration of BEE is required, this is an important reference point. Not just operational efficiency, but also should reflect finance costs. If sector achieves lower tax / finance costs this is relevant.
			• If the BEE behaves differently from what we observe in the sector (e.g. distribution rates) than need to understand why.
			SW

No	Item	Questions	Views expressed / issues
			• The distribution rate is a firm-specific parameter while theta has typically been regarded as a single market-wide parameter. This suggests that one should estimate the distribution rate for a benchmark efficient entity and the 'utilisation' rate for the economy as a whole.
			• I think that it is reasonable to presume that a benchmark entity would pay corporate tax at the statutory rate.
			• The ratio of credits redeemed to company tax paid constructed from ATO data will be a reliable measure of the 'utilisation' gamma for the economy as a whole. So unless one suspects that the distribution rate for a benchmark entity will differ from that of an average firm, there will be no need to estimate a distribution rate.
			• Should one suspect that there is a difference, however, a natural place to look for guidance in choosing a value for the distribution rate of a benchmark entity would be those utilities that the AER currently employs in estimating the beta and leverage of a benchmark.
4c		Assumption around statutory tax rate	There was general agreement that estimates of γ should be based on assumption that tax is paid at statutory rate. However, this was not universal and some considered that there might be value on considering actual tax paid and actual utilisation of credits in the sector.
		• How likely is it that Franking Credits Redeemed / Company Taxation Paid from ATO tax statistics would give a reliable estimate of the value of imputation credits for a benchmark firm? • What reliance should we place on tax statistics?	GP • This estimate provides a ballpark figure for the value of franking credits in use. • Implicitly this approach values franking credits retained at zero, which is likely to downward bias the estimate. • There are some problems with tax statistics, so the estimates should be treated with caution. ML

No	Item	Questions	Views expressed / issues
			• This estimate for gamma will be more reliable than that for "credits distributed/TAX" (distribution rate) or "credits redeemed/credits distributed" (utilisation rate) using ATO data, but is still unsatisfactory because the problems in the ATO data undermine the credibility of all data from that source, and this gamma estimate necessarily uses the same set of firms for estimating both the distribution rate and the utilisation rate. Furthermore, in addition to gamma, one requires an estimate for the utilisation rate for estimating the MRP, this estimate will be affected by the problem in the ATO based estimate of the "credits distributed", this undercuts use of ATO data in estimating it, and the need for consistency then undercuts the use of ATO data for estimating gamma.
			• Very low reliance should be placed on ATO data for the reasons just noted.
			• The recently provided note from the ATO on the discrepancy identified by Hathaway aggravates my concerns here.
			• 1. Despite having had years to look at this matter, the ATO still can't say whether the FAB or the dividend based estimate of the distributed credits is correct.
			• 2. The ATO claims in their point 4 that Hathaway has failed to deduct from the company tax figure the tax payments that do not generate franking credits. Thus, even a direct estimate of gamma using only company tax paid and credits redeemed will be too low because the company tax figure is too high.
			• 3. The ATO does not quantify this deduction or anything else in this area.
			• 4. The third para and point 6 in their note appears to be politely telling us to stop using ATO data for regulatory purposes.
			•
			SG
			• No question about the reliability of company tax paid or credits redeemed.

No	Item	Questions	Views expressed / issues
			• Provides a direct estimate of the 'utilisation' gamma across the economy.
			• Much more reliable evidence than the equity ownership approach.
			• Not clear why any other approach would be preferred to this direct estimate.
			IS
			• Agree with SG
			JH
			• While accepting that ATO statistics may be valid in that they reflect collection data, issue is whether that the data reflects the BEE.
			SW
			• The ratio of credits redeemed to company tax paid constructed from ATO data will be a reliable measure of the 'utilisation' gamma for the economy as a whole. The ATO should know what credits have been redeemed in any year and what corporate taxes have been paid.
			• So unless one suspects that the distribution rate for a benchmark entity will differ from that of an average firm, there will be no need to estimate a distribution rate.
			• Even if the distribution rate were to differ from that of an average firm, however, the ATO data will be of use. Suppose that one were able to show that the distribution rate for a benchmark entity is 10 per cent lower than that for an average firm. Then the ATO data would indicate that the 'utilisation' gamma should be set to a value of 0.90 times the ratio of credits redeemed to company tax paid constructed from ATO data.
4d		Use of tax statistics	Disagreement on reliability of tax statistics
		• What role should the updated equity ownership data from the ABS have in informing the estimate of the utilisation	GP
			• This is an approach that will provide a ballpark estimate for utilisation.

No	Item	Questions	Views expressed / issues
		rate used for estimating the value of imputation credits?	• Implicitly this approach assumes the value of imputation credits to overseas investors is zero, which is likely to downward bias the estimate. Exemption from withholding tax has some value in use. Indirect trading of franking credits has some value in exchange.
			• An upward bias in this estimate will be created if the availability of cash refunds is withdrawn.
			• It would be useful to have advice from the ABS on the precision of their ownership estimates.
			ML
			• Since the Officer model used by the AER assumes that national equity markets are closed to foreign investors and all local investors can use the credits, the appropriate estimate for the utilisation rate is 1, and there is accordingly no need for the ABS data. However, if one considers that the presence of foreign investors must be reflected in the estimate of the utilisation rate, then equity ownership data provides the best estimate of the utilisation rate in accordance with the criteria noted above, and the ABS data seems to be the best equity ownership data.
			SG
			• Not clear why this indirect evidence is used, when we have direct evidence on redemptions from the ATO. Should weight up the relative merits of the ATO tax statistics data against the equity ownership approach (and the assumptions that are required in relation to that approach).
			• Relies on the assumption that all credits distributed to resident investors are immediately redeemed. That assumption is violated by the 45-day rule, the fact that many credits that are distributed to other companies or trusts rather than investors who can redeem them, and it would be clearly violated if investors were unable to redeem excess credits.
			• • Can be used as a upper bound at best because not all credits distributed to resident investors are redeemed.

No	Item	Questions	Views expressed / issues
			IS
			• Equity ownership data is useful but should be seen as an upper bound because it does not consider the effects of the 45 day rule on franking usage
			Again, where data has inherent limitations it should not be mechanically updated periodically – there should be a sustained and significant shift to justify moving away from previous parameter settings
			JH
			• Sympathetic to GP argument here.
			SW
			• It is not obvious that the use of ownership data rather than the ATO data will lead to a better estimate of the 'utilisation' gamma. Since not all credits received by domestic investors are redeemed or have been redeemed in past years, adjustments would have to be made to estimates of the redemption rate produced from ownership data.
			• Estimates of theta are used by the AER in a number of ways. One way in which they are used is in computing estimates of the MRP. Using estimates of theta in this way requires a time series of theta estimates because adjustments have to be made from 1987 onwards. Producing a time series of 'utilisation' theta estimates from equity ownership data will require adjustments be made not just for the 45-day rule but for the fact that prior to 2000 credits redeemed could not exceed an investor's tax liability.
4e	Use of equity ownership statistics		There is not strong support for use of these statistics, but there are nuances in expert views.
		• What regard should be given to Lally's preferred approach of using annual financial report data for a subset of large ASX listed firms (of which his estimate from the top 20 ASX firms is one such	GP
			• A large random sample of dividend paying firm's would be a highly informative source of information on distribution rates for the market.
			• Analysis of the full population of dividend paying firms would give a definitive result on historic distribution rates for the market. However, this

| | | estimate) to inform the distribution rate of the BEE? | involves a large hand collection of data task. This has been an impediment that explains why researchers have not followed this path in the past. |

- The appropriate distribution rate for a BEE would be the rate for a large firm with a strong and stable positive cash flow. The Lintner model suggests that the distribution rate for such a firm would be higher than average.

ML

- The data for estimating the distribution rate should be from listed firms (because regulated businesses are listed or subsidiaries of listed firms, and unlisted firms in general have lower distribution rates), with good sample coverage of the population by value, and reliable. This leaves only financial statement data, as the ATO data is unreliable.

SG

- None. These 20 firms are clearly inappropriate comparators in relation to imputation credits. Most of these firms have material foreign income that they can use to distribute credits. The BEE has no such foreign income, by definition.

- Also, there are many technical problems with the 20-firms approach. Take BHP as one example. Over the last two years alone, BHP Ltd has distributed over $1 billion of credits to UK shareholders in BHP Plc as part of its 'dividend equilisation scheme.' These credits are clearly wasted (and therefore the subject of activist shareholder revolt). But the 20-firms approach assumes that such credits are available for residents to redeem.

- At best, the 20 firms approach should not be relied upon until it can be properly assessed. (Such assessment has not occurred to date, because the debate has focused on whether gamma should be interpreted as an economic value or a redemption proportion.)

IS

- The top 20 ASX companies are largely financial firms, which does not accurately reflect BEE

No	Item	Questions	Views expressed / issues
			• For example, electricity networks are capital intensive businesses requiring large retention of operating cashflow to be reinvested in capex JH • Issue with analysis of listed data is whether these companies sufficiently reflect the BEE. SW • It is not clear that the benchmark entity will resemble a top-20 listed firm. The AER stated in its 2009 WACC review that 'the AER does not agree that a benchmark efficient NSP be defined as a large stock market listed NSP' and so it would appear that at that time the AER shared this view.
4f		Lally approach to measurement	There is disagreement, for discussion
		• What is a reasonable range for an estimate of the value of imputation credits given currently available empirical evidence (including the updated ABS data and Lally's estimate of the distribution rate based on data from the financial statements of the top 20 ASX listed firms)? • What relative weights should be attached to the different data sources?	GP • A reasonable range is 0.4 to 0.8, (including market value studies, allowing that credits retained have some value and that franking credits have some value to overseas investors.) ML • The distribution rate for listed firms without foreign operations is at least 0.83, from the Lally analysis. The utilisation rate should be 1, consistent with the Officer model assuming that national equity markets are closed to foreign investors. This implies an estimate for gamma of at least 0.83. However, if one considers that the presence of foreign investors must be reflected in the estimate of the utilisation rate, the best estimate is 0.61 to 0.70, as per the AER's analysis of ABS data on local ownership of all equity (Table 2 of the AER's "Discussion Paper: Value of Imputation Credits"). This implies a range for gamma of 0.51 to 0.70. • Relative Weights: In respect of the distribution rate, all weight should be given to data from financial statements due to the unreliability of the ATO data. In respect of the utilisation rate, if one considers that the presence of foreign investors must be reflected in the estimate of the utilisation rate,

No	Item	Questions	Views expressed / issues
			most weight should be given to the ABS data because it accords with the definition of the parameter, it seems to be unbiased, and the standard error seems moderate. Minimal weight should be given to ATO data (because it does not accord with the definition of the parameter and the data is unreliable), and to market based estimates (because they do not accord with the definition of the parameter and are subject to a range of concerns relating to bias and standard error).
			SG
			• Best 'utilisation' estimate of gamma would be 0.34. Direct estimate from ATO data.
			• •No weight should be given to the 20-firms distribution rate or the equity ownership estimate. No need to use imperfect indirect estimates, when a reliable direct estimate is already available.
			IS
			• Agree with SG. ATO statistics must be more reliable than ASX 20 or ASX whatever, it is dirty and skewed by a number of factors.
			SW
			• Recent economy-wide estimates of the 'utilisation' gamma from ATO data lie between 0.30 and 0.35 and in the absence of convincing evidence that the distribution rate of a benchmark efficient entity differs from that of an average firm, I would adopt this range for the 'utilisation' gamma.
		• What point estimate of the value of imputation credits is appropriate given currently available empirical evidence (including the updated ABS data and Lally's estimate of the distribution rate based on data from the financial	GP
			• 0.5, possibly 0.6.
			ML
			• Consistent with the Officer model assuming that national equity markets are closed to foreign investors, the best point estimate of the utilisation rate is 1 and the best point estimate for the distribution rate is 0.83 (the lower

No	Item	Questions	Views expressed / issues
		statements of the top 20 ASX listed firms)?	bound of the range described above), implying a point estimate for gamma of 0.83 . However, if one considers that the presence of foreign investors must be reflected in the estimate of the utilisation rate, the best point estimate of the utilisation rate is 0.65 (the mid-point of the range of estimates of 0.61 to 0.70 as above) whilst the best point estimate of the distribution rate is 0.83 as above, implying a point estimate for gamma of 0.55. SG • See above. SW • The most recent estimate of the 'utilisation' gamma produced by the AER from ATO data is 0.34 and in the absence of convincing evidence that the distribution rate of a benchmark efficient entity differs from that of an average firm, I would adopt this value for the 'utilisation' gamma. • A value of 0.60 for the 'utilisation' gamma together with an estimate of the 'utilisation' gamma produced by the AER from ATO data of 0.34 would imply that the distribution rate for a benchmark entity is almost twice that of an average firm. For a variety of reasons – one of which is that the distribution rate cannot exceed one – this appears unlikely to be true.
4g		Parameter estimates and ranges	For discussion
		• Other observations?	

5. OTHER ISSUES

No	Item	Questions	Views expressed / issues
	Cost of debt	• Is the current approach of the AER appropriate? • Alternatives recommended?	**GP** • No. • Go back to the on the day approach for the cost of debt. **SG** • Not clear that it is necessary to re-open this? • Trailing average approach provides a regulatory allowance that is consistent with the efficient financing cost of the benchmark efficient entity, so should be maintained. • Would be seen as a dramatic increase in regulatory risk if, after moving to the TA approach (and several rounds of litigation to sort out the way that change should be implemented), and with all businesses part-way through a transition to the TA approach (being in the process of restructuring their debt portfolios accordingly), the AER were to revert back to the rate-on-the day approach at the first opportunity under its new legislative powers. • Hopefully we can demonstrate that the AER has had an open mind on this issue and then move quickly on. **SW** • Re-examining this issue so soon after a mechanism has been put in place to transition to a trailing average approach would reduce the attraction, all else constant, for current and prospective investors, of investing in regulated energy utilities.
5a	Cost of debt	Approach to cost of debt	Most experts support the continued use of the AER's trailing average approach to the cost of debt.

No	Item	Questions	Views expressed / issues
			GP is a dissenting view. This has been clearly stated in Session 1 and it seems unlikely that it will be resolved through further discussion. The joint paper can articulate the different views and the reasons for them.
		Process for proposing / accepting change	DJ There is too much bother and distraction over nitty gritty points around the overall post-tax CAPM theme. These "technical" inputs are supposedly being solved on theoretically/methodologically sound axioms, but the many disagreements themselves prove the illusory nature of true answers. The obvious practical approach is a sensitivity analysis, showing what actual outcomes to owners would result from the different possibilities (i.e. get real). Then the regulator can make a call on practical/equitable grounds rather than on an act of faith in the supposed theory and empirical estimates. Preferred theoretical positions coincide too much with a preferred end result. The regulator's response should be to look at the motivations and effects of the arguments, to do calculations that ensue and hence better understand not so much the mumbo jumbo but its implicit end-effects. Main point is that when a suggested technical method is put, it is incumbent on the proponent to detail its end effects (which of course someone has already often calculated). It should not be left to the regulator to have to uncover these from scratch. The regulator can of course re-do the calculations and check that the submission is correct and true. That would change the culture of the argument and make it a lot more transparent.

No	Item	Questions	Views expressed / issues
			•
		Assessing the NEO and NGO	• Views?
5b	Achievement of objectives	How to assess whether NGO and NEG have been achieved in respect of the ARORO or its replacement	This has not been sufficiently addressed in discussion or papers yet. Some suggestions appear in stakeholder submissions.

ANNEX A   DEBT BETA IMPACTS, DATA PROVIDED BY STEPHEN GRAY

The following table sets out the impact on equity beta estimates of assuming a zero debt beta compared to the true debt beta for a range of debt beta statistics and gearing estimates. The effect is larger for a larger difference between comparator gearing and that of the BEE, and the larger the true debt beta.

Impact of debt beta assumption on equity beta estimate at different levels of comparator gearing

		True debt beta				
		0.000	**0.025**	**0.050**	**0.075**	**0.100**
Comparator gearing	**45%**	0.00	0.01	0.02	0.03	0.04
	50%	0.00	0.01	0.01	0.02	0.03
	55%	0.00	0.00	0.01	0.01	0.01
	60%	0.00	0.00	0.00	0.00	0.00
	65%	0.00	0.00	-0.01	-0.01	-0.01
	70%	0.00	-0.01	-0.01	-0.02	-0.03
	75%	0.00	-0.01	-0.02	-0.03	-0.04

Source: Stephen Gray. Underlying spreadsheet has been provided

ANNEX B   AER UPDATED DATA, SUPPLIED BY STEPHEN GRAY

B.1.   Equity beta estimates

This figure compares the OLS equity beta estimates for individual firms from Henry (2014) with the corresponding estimates from AER (2017). Firms that were already delisted in 2014 are excluded because their estimates are frozen in time. Points above the 45-degree line indicate that the more recent evidence indicates an increase in beta.

Movement in firm equity beta estimates since 2013 Guideline
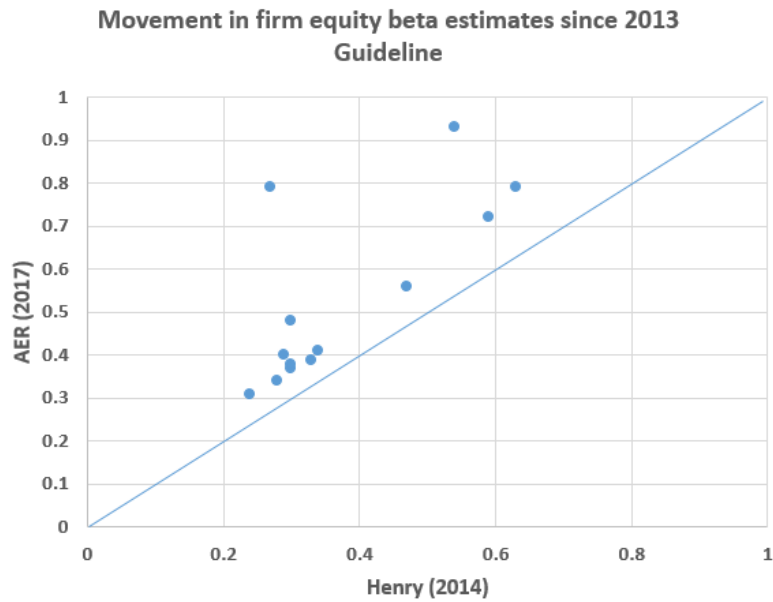
Source: Stephen Gray, from AER

B.2. AER DGM estimates

This figure shows the AER DGM mid-point estimates of the total market return over time. The shaded areas represent the GFC and the period since the 2013 Guideline. The figure also shows an estimate obtained by adding 6.5% to the prevailing government bond yield.

Cost of Equity
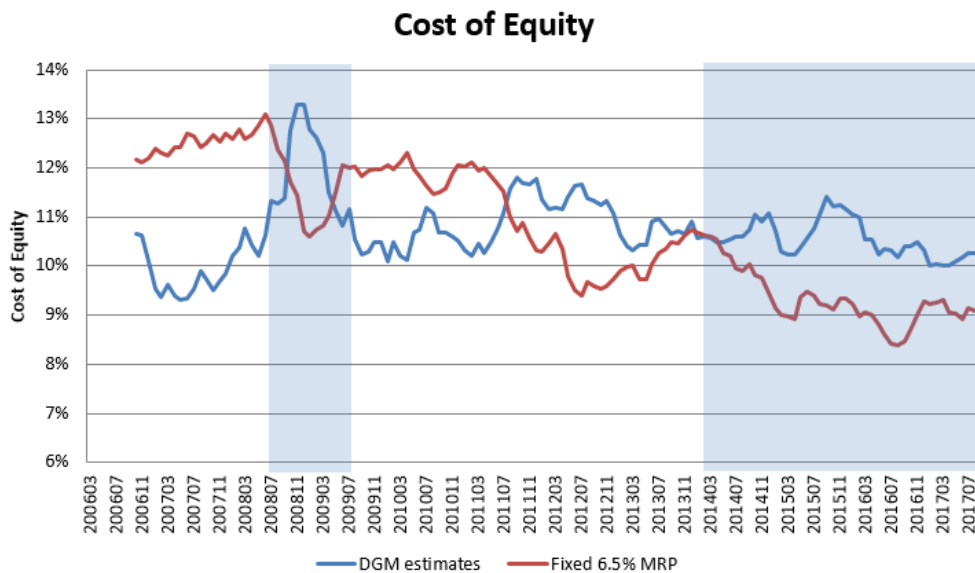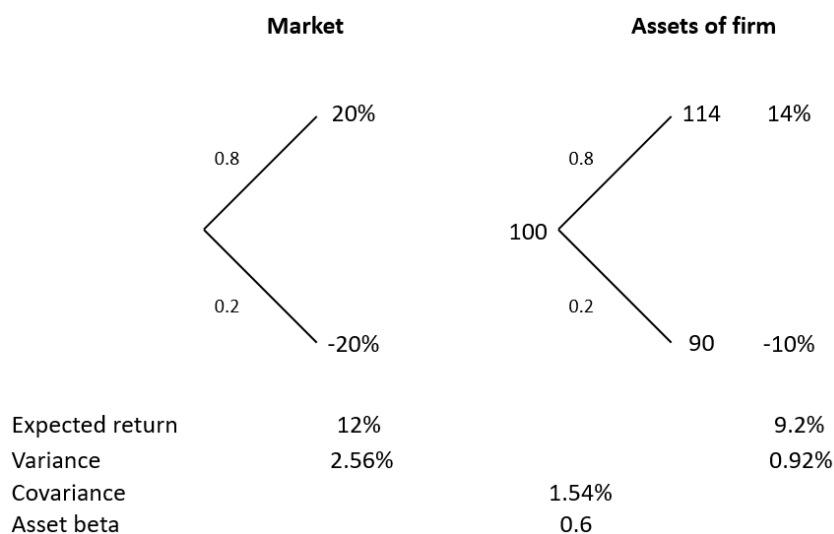

Source: Stephen Gray, from AER

ANNEX C   EXAMPLE OF HOW LEVERAGE INCREASES EQUITY BETAS, STEPHEN GRAY

In this example, there are two states of the world:

   a. A 'good' state, that occurs with 80% probability, in which the market and the firm in question both generate positive returns.

   b. A 'bad' state, that occurs with 20% probability, in which the market and the firm in question both generate negative returns.

This is illustrated in Figure 1 below.

Figure 1: Market and asset values in different states of the world

	Market		Assets of firm
Expected return	12%		9.2%
Variance	2.56%		0.92%
Covariance		1.54%	
Asset beta		0.6	

Source: Frontier Economics calculations

Relevant statistics for the market are as follows:

   a. The expected return is 12%;[1]

   b. The variance of asset returns is 2.56%;[2]

Relevant statistics for the firm's assets are as follows:

   a. The expected return of the firm's assets is 9.2%;[3]

   b. The variance of asset returns is 0.92%;[4]

   c. The covariance between asset returns and market returns is 1.54%;[5] and

   d. The asset beta is 0.6.[6]

Now suppose that the risk-free rate of interest is 5%, so that the market risk premium is 7%:

$$MRP = E[r_m] - r_f = 12\% - 5\% = 7\%.$$

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[1] $0.8 \times 20\% + 0.2 \times -20\% = 12\%$.

[2] $0.8 \times (20\% - 12\%)^2 + 0.2 \times (-20\% - 12\%)^2 = 2.56\%$.

[3] $0.8 \times 14\% + 0.2 \times -10\% = 9.2\%$.

[4] $0.8 \times (14\% - 9.2\%)^2 + 0.2 \times (-10 - 9.2\%)^2 = 0.92\%$.

[5] $0.8 \times (20\% - 12\%)(14\% - 9.2\%) + 0.2 \times (-20\% - 12\%)(-10\% - 9.2\%) = 1.54\%$.

[6] $\beta_a = \frac{Cov(r_a, r_m)}{Var(r_m)} = \frac{1.54\%}{2.56\%} = 0.6$.

Note that the expected return on the firm's assets is consistent with the Sharpe-Lintner CAPM in this setting:

$$E[r_a] = r_f + \beta_a \times MRP$$
$$= 5\% + 0.6 \times 7\% = 9.2\%.$$

Now suppose that the firm issues $40 of risk-free debt. In this case, the value of equity will be $60 ($100-$40) and the firm will be required to pay $42 to the debtholders at the end of the period ($40×1.05).

The payoffs (and returns) to the equity holders are set out in Figure 2 below. Note that the equity holders receive the value of the assets less the $42 that must be first paid to the debt holders.

Figure 2: Market and equity values in different states of the world
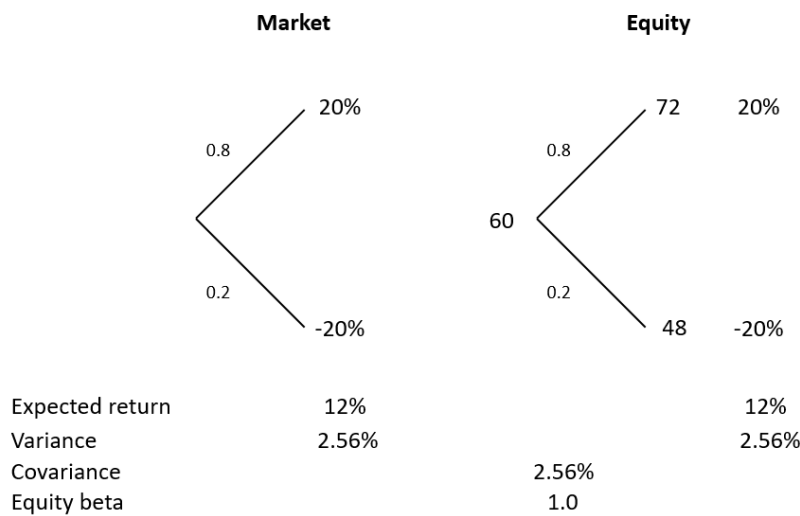
Source: Frontier Economics calculations

Relevant statistics for the firm's equity are as follows:

    a.   The expected return of the firm's equity is 12%;[7]

    b.   The variance of equity returns is 2.56%;[8]

    c.   The covariance between equity returns and market returns is 2.56%;[9] and

    d.   The equity beta is 1.0.[10]

Note that the equity beta is consistent with the AER's approach to re-levering, which assumes a constant proportion of debt financing:

$$\beta_e = \beta_a \left(1 + \frac{D}{E}\right) = 0.6 \left(1 + \frac{40}{60}\right) = 1.0.$$

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[7] $0.8 \times 20\% + 0.2 \times -20\% = 12\%$.
[8] $0.8 \times (20\% - 12\%)^2 + 0.2 \times (-20 - 12\%)^2 = 2.56\%$.
[9] $0.8 \times (20\% - 12\%)(20\% - 12\%) + 0.2 \times (-20\% - 12\%)(-20\% - 12\%) = 2.56\%$.
[10] $\beta_e = \frac{Cov(r_a, r_m)}{Var(r_m)} = \frac{2.56\%}{2.56\%} = 1.0$.

The reason for the increase in the equity beta is that leverage increases the risk to residual equity. Prior to introducing leverage, the returns varied between +14% and -10%. After leverage, the returns vary between +20% and -20%.

Leverage has the effect of making the good state better and the bad state worse – it widens the range of possible outcomes. That is why it is called 'leverage.' This leverage increases the risk to (residual) equity and consequently the required return.

Note that all of these calculations required only knowledge of the amount of leverage. No information at all was required about the firm's sensitivity to changes in interest rates or inflation, or about any sort of refinancing risk. Leverage increases the risk to residual equity in the manner set out above, regardless.

Note also that the expected return on the firm's equity is internally consistent with the Sharpe-Lintner CAPM in this setting:

$$E[r_e] = r_f + \beta_e \times MRP$$
$$= 5\% + 1.0 \times 7\% = 12\%.$$

ANNEX D   SOME NOTES ON GEARING AND GAMMA, NOTE BY MARTIN LALLY, 4 APRIL 2018

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The question of whether to continue to use the current gearing value of 0.60 depends in part on the maximum error from doing so. As is apparent in the AER's data (Table 3 of their Gearing Paper), use of data from the latest year yields 52%, from the previous three years yields 54%, from the last five years yields 57%, and from the last ten years yields 63%. Thus, if the existing value of 60% were used, it follows that the maximum error would seem to be 60% - 52% = 8%. If the regulatory impact of this were sufficiently small, a strong case for continuing the use the figure of 60% would then arise. Accordingly, it would be desirable to assess the implications of a gearing error of 8%.

To do this, it is necessary to incorporate the full tax effects of the cost of debt into the WACC, yielding the following:

$$WACC = k_e \frac{S}{V} + k_d[1 - T_c(1 - \gamma)]\frac{B}{V}$$

Substituting for k_e using the CAPM, and expressing k_d as the sum of the risk-free rate and the debt risk premium p, yields the following:

$$WACC = [R_f + MRP\beta_e]\frac{S}{V} + (R_f + p)[1 - T_c(1 - \gamma)]\frac{B}{V}$$

Substituting the AER's beta gearing formula then yields the following:

$$WACC = [R_f + MRP\beta_u \frac{V}{S}]\frac{S}{V} + (R_f + p)[1 - T_c(1 - \gamma)]\frac{B}{V}$$

$$= R_f + MRP\beta_u + \frac{B}{V}[p - (R_f + p)T_c(1 - \gamma)] \qquad (1)$$

So the effect of changing gearing by 0.08 depends upon the term [ ] in this equation, and therefore on the values of p, R_f, T_c, and γ. The most recent estimates of these by the AER appear in the Murraylink Draft Decision, of 2.1%, 2.68%, 30% and 0.40. Substitution into the last equation yields [ ] = .012, and therefore changing the allowed B/V by 0.08 changes the

allowed WACC by only 0.1%. This is minor and therefore supports continued use of a gearing estimate of 0.60.[11]

In respect of the distribution rate, this is a firm rather than a market-wide parameter and therefore could be estimated using firm, industry, or sector-wide data according to which was judged to provide the best estimate for this firm-specific parameter. I favour sector wide data leading to an estimate of at least 0.83 but using data from comparable firms would seem to be an alternative. The natural candidates are the five firms examined by the AER (Table 3 of their Gearing Report): APA Group, Ausnet Services, DUET Group, Envestra (now Australian Gas Networks), and Spark Infrastructure. Amongst these firms, I cannot locate recent Annual Reports for Envestra, and both Spark and DUET fail to record the Franking Account balances. This leaves APA Group and Ausnet Services. In both cases, the Franking Account Balances are smaller in 2017 than in 2014, which implies a distribution rate of 1 for all credits created in that most recent three year period.[12] Furthermore, in both cases, it is unclear from the Annual Reports whether there is any foreign income. This very limited evidence supports my earlier conclusion that the appropriate estimate for the distribution rate of the benchmark firm (which has no foreign operations) is at least 0.83.

Graham Partington has argued that the company tax payments made by firms are less than assumed by the AER, and this may affect the estimate of the distribution rate. To examine this point, the distribution rate F calculated from a set of n companies is as follows:

$$F = \frac{\sum_{j=1}^{n} DIST_j}{\sum_{j=1}^{n} TAX_j} = \frac{\sum min \left[TAX_j, \frac{3}{7} DIV_j \right]}{\sum TAX_j}$$

For some firms, the dividend payments are the binding constraint (insufficient to distribute all credits). So, if the tax payments for these firms rise and assuming that their dividends will not rise (but may fall), the distribution rate F will fall. Accordingly, if the AER's model assumes

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[11] This analysis presumes that the debt risk premium p is invariant to leverage, which is not the case. Since *p* is positively related to leverage, the impact on WACC would be larger than estimated above but the effect would still be very small.

[12] For the APA Group, the Franking Account balances at 30 June 2014 and 30 June 2017 are $5.1m and $4.4m respectively. For Ausnet Services, the balances at 31 March 2014 and 31 March 2017 are $59.9m and -$26.4m respectively.

higher tax payments than these firms actually make, a consistent estimate of F will be smaller than that observed. By contrast, for other firms, the dividends are not the binding constraint (the dividends are large enough to distribute all credits). Accordingly, if the AER's model assumes higher tax payments than these firms actually make, a consistent estimate of F will be larger than that observed. The overall impact will depend upon the mix of these firms and the extent to which their actual tax payments are less than those implied by the AER's model.

To illustrate this point, suppose that two firms are used in this analysis: firm 1, with actual tax payments of $100m and dividends of $200m, and firm 2, with actual tax payments of $100m and dividends of $300m. The conventional estimate of F would then be

$$F = \frac{\frac{3}{7}\$200m + \$100m}{\$100m + \$100m} = \frac{\$186m}{\$200m} = 0.93$$

Suppose firm 1 pays the appropriate amount of tax whilst firm2 pays $20m less than implies by the AER's model. So, to obtain an estimate of F that is consistent with the AER's model for tax, the tax payment by firm 2 must be raised by $20m, thereby raising F to 0.94. If additionally firm 1 pays $40m less than that implied by the AER's model, a consistent estimate of F requires raising the tax payment of firm 1 by $40m, thereby lowering F to 0.79 if firm 1's dividend did not fall.

Clearly, there would be considerable difficulties in assessing the extent to which tax payments made by each of the firms used to assess F are less than that assumed by the AER's model, and therefore by how much the observed value for F should be reduced. Furthermore, the possibility remains that any increase in taxes paid would lead to an increase in that firm's dividend in order to ensure that the additional credits thereby created were distributed. In view of these difficulties, it would seem to be impossible to take account of Graham's point.

In respect of the issue of whether foreign investors are included within the Officer CAPM, the AER (section 2.1.2 of their gamma paper) seems to believe that the presence of foreign investors is consistent with the Officer model, and appears to rely upon Handley in support of this view. In particular, Handley (Advice on the Value of Imputation Credits, 2014, page 22) argues that

"The starting point for a CAPM is a given set of n assets and a given set of m investors who hold them. It is then assumed that this set of investors will then trade this set of assets among themselves in order to form their optimal portfolios – with the decision criteria of each investor being to maximize his utility of end-of-period wealth, which in turn is defined over the set of n assets. The CAPM makes no explicit assumption about any other assets or any other investors but if there are other assets or investors then it is implicitly assumed that these do not matter for the purposes of determining the prices of the n assets under consideration (otherwise they should be in the model). This means that other assets held by other investors do not matter. It also means that other assets held by the m investors do not matter. For this purpose, investors in the domestic market consistent of domestic investors to the extent that they hold domestic assets and foreign investors to the extent that they hold domestic assets – this is the set of n assets and the set of m investors who hold these n assets. Foreign assets held by the domestic investors, foreign assets held by these foreign investors and foreign assets held by other foreign investors are outside the model."

These views are not correct. The CAPM was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). None of these authors imposes any restrictions on the assets examined, and it is abundantly clear that the model was intended to apply to all capital assets and all investors. For example, Sharpe (1964, page 429) states that "The model of investor behavior considers the investor as choosing from a set of investment opportunities that one which maximizes his utility….The investor will choose from among all possible plans the one placing him on the indifference curve representing the highest level of utility." Similarly, Lintner (1965, page 15) states that "..each individual investor …can invest any fraction of his capital in any or all of a given finite set of risky securities which are traded in a single purely competitive market…". Similarly, Mossin (1966, pp. 771-772) states that "..we postulate for each individual a preference ordering…over all possible portfolios.". However, in applications of the model, it has been assumed that the assets available to any investor are only local assets, consistent with the low level of international diversification and significant restrictions on the purchase of foreign assets being commonplace at the time the model was developed (the 1960s). Subject to this restriction, each investor then chooses their optimal portfolio amongst local assets. This is called market segmentation. It follows that the n assets are local assets and the m investors are local investors. So, there is no place for foreigners in the model. Thus, contrary to Handley's claims, one cannot define the n assets to be local assets and the m investors to be

those who hold them, because the holders will include foreigners because the implicit assumption of market segmentation is not true.

Furthermore, Handley's beliefs about the model are inconsistent with two fundamental assumptions concerning the model. One of these assumptions is that investors will choose the portfolio that maximizes their utility, in the Markowitz fashion, and therefore will consider all possible portfolios (Sharpe, 1964, page 429) unless the model imposes a restriction, and a restriction would only be imposed if the restriction simplified the model or had some empirical rationale. The restriction that has been imposed is that investors cannot buy foreign assets, consistent with the prevalence of such restrictions during the 1960s, and therefore foreign investors are precluded. By contrast, Handley claims that "…other assets held by the m investors do not matter". This implies that foreign investors in Australian assets can only optimize within their Australian asset holdings whilst their holdings in other countries are fixed. Such a restriction does not exist in the standard or Officer versions of the CAPM, and it would be irrational for such a restriction to be imposed because it would not simplify the model or have any empirical rationale.

A further assumption of the CAPM that clashes with Handley's beliefs about the model is that investors agree on the probability distribution for future returns on each asset (Sharpe, 1964, pp. 433-434), and the same assumption applies to the Officer (1994) model because it differs only in recognizing the existence of imputation credits. So long as all investors are Australians, such an assumption is at least imaginable. However, if some investors are foreigners, such an assumption is not possible unless assumptions are made about foreign exchange rates. Since no such assumptions are made in these models, it follows that foreign investors are precluded.[13]

To illustrate the point that asset returns in general depend upon the currency in which they are determined, suppose the current price of an asset is $1AUD and the current exchange rate between AUD and US dollars is 1:1. Suppose all investors agree that this asset price in AUD (inclusive of any dividends) will rise by 30% or fall by 10% with equal probability. In addition, they all believe that the exchange rate between AUD and USD will change to 0.95:1 or 1:1.05

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[13] Versions of the CAPM that do allow foreign investment necessarily adopt assumptions about foreign exchange rates. For example, Stulz (1995) assumes that investors are concerned with real returns and that foreign exchange rates conform to PPP. This ensures that asset returns are identical regardless of the currency in which they are determined, thereby preserving the assumption that all investors agree on the probability distributions for all asset returns.

(US per AUD) with equal probability, and this exchange rate is uncorrelated with the AUD price of the asset. Accordingly, Australian investors will all agree that the asset will deliver a return of either 30% or -10% with equal probability. By contrast, US investors will all agree that the returns will be 36.5%, 23.5%, -5.5% and -14.5% with equal probability. So, all investors will not agree on the probability distribution for an asset's future rate of return.

Furthermore, Handley's beliefs about the model are inconsistent with a fundamental consequence of the model: that every investor holds a combination of only the risk-free asset and the market portfolio, and this risk-free asset is the same for all investors. Handley's belief that the model allows for foreign investors in the Australian market, who optimize their holdings of Australian assets whilst their holdings elsewhere are fixed, is incompatible with this. Such investors would be holding fundamentally different portfolios to that of Australians, most particularly because they would hold a quite different risk-free asset to that of Australians (the asset that is risk-free to Australians would not be risk-free to these foreigners due to exchange rate risk).

All of this demonstrates that Handley's beliefs about the standard and Officer versions of the CAPM are wrong. However, it does not follow from this that the AER is 'wrong' to include foreign investors in estimating the utilization rate; this might be done to pragmatically incorporate the empirical reality of foreign investors into a model that implicitly precludes them.