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ENERGY REGULATOR OFFICE

Before: Ms Cristina Cifuentes, Presiding member, AER Board

Ms Paula Conboy, Chair, AER Board

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REVIEW OF RATE OF RETURN GUIDELINES
CONCURRENT EXPERT EVIDENCE SESSION 2

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Dr Jonathan Mirrlees-Black, Facilitator, Cambridge Economic Policy Associates

Assoc Prof Graham Partington, University of Sydney

Professor Stephen Satchell, University of Sydney and Fellow, Trinity College, Cambridge

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Mr Jim Hancock, South Australian Centre for Economic Studies

Prof. Stephen Gray, Frontier Economics

Dr Simon Wheatley, Houston Kemp

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MS CIFUENTES: Thank you all. We are going to make a start and try and keep to time today. In fact we are going to try to finish a little early. A couple of us have some urgent meetings just after 4.30, so we will try to finish a little bit early.

Good morning and thank you for joining us today. I'm Cristina Cifuentes. I'm a member of the AER Board. I'm joined by my fellow board member and chair of the AER, Paula Conboy, and also by Esmond Smith, who is the senior financial adviser to the AER. I would like to begin by acknowledging the Gadigal people of the Eora Nation, the traditional custodians of the land on which we meet today and to pay our respects to their elders, past, present and emerging.

This is the second of our concurrent evidence sessions and this is part of our rate of return guideline review process. The purpose of these concurrent sessions is to assist the AER Board in making a rate of return guideline that will best achieve the national gas and electricity objectives. We will be hearing from a range of experts and hearing you discuss each other's ideas and to clarify your assumptions and conclusions and see how they differ relative to the other experts.

As in the first session, we would encourage all the experts to focus on assisting the AER rather than advocating for the positions of their sponsors. Even though we have seen much of this information before, we nonetheless encourage innovative thinking and exploration of the ideas and discussion about how these new ideas might be implemented. I would, however, emphasise the need for options to be granted in robust evidence that can be assessed and tested by all participants.

It's also important to note that these concurrent sessions are only one part of the overall stakeholder engagement that we are undertaking before we make our decision and most of you present here have been part of a very comprehensive engagement process and I thank you again for your assistance in that and we do appreciate the efforts that you have made in coming to the forums and working with Jonathan Mirrlees-Black, the independent facilitator, and the AER staff to add as much value as you can to these forums.

So, before we get started I will just quickly spend a minute running through the structure and the agenda for today. We haven't actually made many changes from the last format which I think actually worked quite well. So while I will be chairing today's session, Jonathan will actually be facilitating and guiding the discussion to ensure that it does remain balanced and focused on today's objectives. Jonathan won't be advocating for any particular positions, but he will be asking questions and clarification or invite alternative viewpoints.

The role of the AER Board today is to essentially listen to the discussion, the debate and comprehending the views of various experts. While the discussion will be largely shaped by the participating experts, the board may actually ask questions. But, as was the case in the first forum, we won't be taking questions from the floor. So, today's discussion will be focusing on three topics. The first one is the equity beta, followed by market risk premium and then the value of the imputation credits.

On 15 March we published discussion papers on the above topics and they included questions we thought would cover the most important issues for discussion. Jonathan has been speaking with you, the experts, in advance of this session to get an idea of the areas that we would like to focus on and that has actually shaped the structure. I gather all of you have received the agenda and the issues papers developed by Jonathan to facilitate today's discussions.

Now I will hand over to Jonathan who will go through the structure and the running order today. But before I do, if you could introduce yourselves for the purposes of the transcript.

MS CONBOY: Paula Conboy, and I'm the chair of the Australian Energy Regulator.

DR MIRRLEES-BLACK: Jonathan Mirrlees-Black, Cambridge Economic Policy Associates, independent facilitator.

MR HANCOCK: Jim Hancock from the South Australian Centre for Economic Studies, and I'm appearing for the Energy Consumers Australia.

MR SADEH: Ilan Sadeh from Hastings Funds Management.

DR WHEATLEY: Simon Wheatley from Houston Kemp representing the APGA.

PROF JOHNSTONE: I'm David Johnstone, I'm professor of accounting at Wollongong Uni and honorary professor of finance at Sydney University.

PROF GRAY: Stephen Gray from the University of Queensland and Frontier Economics.

ASSOC PROF PARTINGTON: Graham Partington from the University of Sydney advising the AER.

MR SMITH: I'm Esmond Smith. I'm a financial adviser to the Australian Energy Regulator.

MS CIFUENTES: Sorry, just before we do hand over, can I just again emphasise that the experts here are experts in their own right rather than representing any organisation. So, while you may have been appointed by particular organisations, you are actually here to advise the board and not to present the views or advocate the positions of your respective sponsors. Thank you.

DR MIRRLEES-BLACK: Thank you very much, Chair. Just to reiterate that all of the experts have been provided with the Federal Court's guidelinesfor experts and have agreed that they will be acting as experts and not for the organisations have nominated them. It is also worth highlighting, that compared to the last session we have new experts. So, Simon Wheatley takes the place of Greg Houston. Jim Hancock has stepped in and been appointed. Also Stephen Satchell, who is not at the table now, will be taking place shortly with Graham Partington for part of this session and also for a small part of the session on the market risk premium.

In running the meeting you've all got the agenda. There's also an issues paper which has been provided to you all and which you all contributed to and that provides the detailed agenda items of the areas which we want to probe. Our objective is to identify areas of agreement and areas of disagreement and, because we've had some time to go through the issues in advance, we've highlighted the areas there where there's disagreement and it is more useful for us to spend time on those areas where there is disagreement, although if there's an area of

agreement subsequently, occasionally an expert may wish to make a short statement on that if it is helpful to the discussion. On this occasion we won't be having opening statements. We will go straight into the discussion on each agenda item.

In terms of timing, they are set out in the Agenda. I will be making sure we finish by 4.30, as Cristina has suggested. It may well be that we need slightly more time on equity beta and more on risk premium and if the discussion warrants it, then I may allow us to run over a little bit and eat into lunch by a short amount. I'm sure we will have adequate time, but we will be running the session in time to finish the day by 4.30.

As Cristina said, my role is not to have views, it is to help the discussion. I can ask questions, I can clarify and invite contributions from people to ensure that the discussion remains focused and we achieve the outcome that we are aiming for. But it is not my role to have views.

After this we will be producing a joint report which will highlight areas of discussion and may elaborate on issues where we haven't had a chance to fully discuss it in the session. That's the best approach for time and discuss the joint report in more detail at the end, if that's useful.

So that finishes my opening comments on running the session. We now move straight into equity beta and consideration of the issues related to it and be rather directed in terms of going through the issues that have been highlighted in the document and we will be going through them as a list.

One of the first issues that we have identified is that there's an approach that the AER has of looking at estimates of equity beta and then adjusting them for the leverage of the companies which you are observing and then re-leveraging back up to 60 per cent, which is the market gearing. I think there's agreement among a number of the participants that that is the appropriate approach, but it's not universal and I think some experts have concerns about this. So I will invite Graham Partington, who has some concerns about this in particular, to comment on the de-leveraging and re-leveraging approach adopted by the AER

before others contribute.

ASSOC PROF PARTINGTON: Okay. So, I totally agree that leverage affects the risk of equity and affects the equity beta. I suspect the effect may be considerably less severe in regulated utilities because of the low volatility of the cash flows, and particularly the revenue streams.

Now, why am I concerned about the leveraging, re-leveraging? Well, let's start with the leverage ratio, measurement of the leverage ratio. The theory is that we should be using the market leverage ratio but we don't. We use the market value of equity and we use the book value of debt. For some firms that will be a reasonable approximation. For other firms it will be a poor approximation. It is a common practice.

Now, let's think about the measurement of debt. There are measurement issues with the measurement of book debt. You would hope it would be a relatively simple task, but it's not. Recently there were two submissions from the network businesses about beta. Those two submissions use almost identical data. They got different results. Why? Because they used different leverage ratios because they measured debt differently. The AER had two goes at estimating betas. Why? Because they decided they needed to revise their measurement of the level of debt.

Then there are the issues of what should we do about look-throughs, what should we do about hybrids, what should we do about stapled securities, and next year there will be an additional issue which is what should we do about capitalised operating leases. Then there's the question of which year's leverage are we going to use? Beta is observed through a set of time series data and the suggestion is we should be using five years, possibly ten. Over that time, the leverage of the firms that you are using for your estimation process changes. Which leverage ratio should you use? Well, some people use the latest leverage ratio, some people use an average taken over the data series. It's not clear that either of those is strictly correct.

Then we come to the choice of the re-leveraging formula. There are a number of formulas out there, somewhere between eight and 10, and the different view and largely depends upon what you assume about the risk of the tax shield, and

that in turn is largely seen to depend upon what you assume about the firm's capital structure policies. Is the level of debt is fixed? Is it growing in some way? Is there some target leverage? If you have target leverage, how frequently do you rebalance your target? Is your target a market value target or is it a leverage target or is it a book value leverage target?

Now, if we use the Miles and Ezzell formula, for example, the assumption is that we have a fixed target and we rebalance that target once a year, and that target is a market value leverage ratio target. If you use the Hamada formula, which is a formula that's popular in practice, that essentially is fixed debt. Now, it's been said that the AER uses the Miles and Ezzell formula. I don't believe that's correct, because there are terms in the Miles and Ezzell formula that don't turn up in the AER formula. The AER themselves in their discussion document say they use the Brealey & Myers formula, and that is correct in the sense that the formula they use is consistent with the formula given in Brealey & Myers. That formula appears in several places in the literature, so it is not just Brealey & Myers, it is a well established formula derived in a number of different ways.

That formula assumes that you have a target leverage ratio and you continuously rebalance so you never deviate from your target, which is clearly not a realistic assumption, but it does greatly simplify the analysis and the reality is that the impact of that is not very much different from using the Miles-Ezzell formula.

So, and here I have a question, is that what the AER is assuming as appropriate for the BEE that they have a fixed target that they continuously rebalance to, or as a close approximation rebalance to annually and, if the latter, you might think about using the Miles-Ezzell formula, but it has some complications and you need to have a debt rate, you need to have the tax rate as well, and it doesn't really make a difference. So, if you're going to go down this route I recommend you stick with the Brealey & Myers formula.

Then, since you are taking the comparators and re-levering their betas, you have to make an assumption about what is the debt policy of the comparators. Does anybody know? Is the assumption of a target leverage ratio

which is rebalanced at some frequency appropriate for those comparator firms? Don't know. What I can say is that in quantitative research looking at the issue of whether or not firms have target leverage ratios, it's been rather difficult to establish that in fact they do. In survey research there is some survey evidence that suggests firms have targets, not all of them, but a substantial subset, but many of those targets are rather loose; in other words, they drifted about a lot. You are not constantly rebalancing or even rebalancing with any particular frequency. You just have a target in mind, which I suspect in some cases is not driven by a particular policy, it's just driven by a firm's debt covenant that they know, that they need to be a certain distance below their debt covenant so they don't breach the covenant.

So, there are some significant issues in the re-levering approach. It's even more significant if we are going to use overseas comparators. As implemented, the assumption is that the debt beta is zero. If indeed that is true, then the allowed rate of return for debt for regulated networks should be the risk-free rate, and that's a natural consequence of debt beta at zero. You might allow a little bit extra for an illiquidity premium; you wouldn't be allowing them the default premium as well.

Now, the thing about the debt beta is it increases with lower credit ratings and maturity of the debt. So what is the debt beta? Well, there are varying estimates that I've found. Some suggest, for the sort of debt we're talking about, a debt beta of 0.1, some say 0.16, some say 0.3, some are as high as 0.5. I think that's probably rather too high. If it were me, I would probably say 0.2, but that's just my sense from reading in this area. So I think that requires some more investigation.

Steve's spreadsheet suggests that the assumption that debt beta is zero is not particularly material in these cases, and that's because, on the one hand, that you get a bias in un-levering and then you get the opposite bias in re-levering. And Steve's spreadsheet only covers debt betas of 0.1 and only covers leverage ratios down to 0.45. I seem to recall that some comparators possibly recently or in the past have had debt ratios below 0.45. Certainly there will be, if we start going overseas, there will be comparators with much lower debt ratios than the debt ratios that utilities have in Australia. So, I would like

to do a little bit more investigation with a spreadsheet of my own. Steve's spreadsheet's available so I can take that.

We also heard in our last meeting that the weighted average cost of capital according to the AER's formula was not flat. Greg was suggesting it was upward sloping and the reason for that was the assumption that the debt beta was zero and he suggested we all read some judgment of the New Zealand High Court which explains that very clearly.

Also, interestingly, Damadoran, who is a big authority in this area, who himself often assumes a debt beta of zero, points out that estimated betas, and I'm more or less quoting him word for word, estimated betas of highly levered stocks tend to be much lower than the estimates derived from the levered beta formula that he uses. In other words, you re-lever the betas, you get a higher number; you estimate them, you get a much lower number. He gives a few reasons for that, but one is the assumption that the debt betas are zero.

So, lots of problems. I have laid out the problems.What might be a solution? Well, we heard last week we looked at leverage ratios which did vary around about the assumed 60 per cent and essentially the argument boiled down to, "Well, they do differ from 60 per cent but really when you take it overall the difference is not material, and so we can run with 60 per cent." Now with respect to re-levering the argument is, "Well, actually these differences are material and therefore we need to adjust the betas.

So, my first line of argument is if in fact the differences are considered not material, then don't bother making the adjustment. My second line of argument is if the differences are material, then reconsider the level of leverage you are assuming for the bench mark efficient entity, if you assume that the sample you've got is representative.

Alternatively, you could use the property of the plain vanilla WACC that it represents the opportunity cost of capital and that is a constant invariant to leverage because it reflects the risk of the assets and once you've worked out the WACC at one level of leverage, you have the WACC for all levels of leverage, and you could stop at that

point and say, "Well, we have an estimate of WACC," or you could say, "Well, we have an assumed level of leverage and we have a known level of leverage for this WACC," so we have an assumed level of leverage, we know what the WACC is, and work out the cost of debt and then you can back out the costs of equity at your assumed level of leverage.

You can go a step further. You can say, "Okay, now I've got the cost of equity at my assumed level of 60 per cent, I could back out the beta from the CAPM." Interestingly enough, the results of that could in some cases be quite similar to the re-levering process, but you get around quite a few problems.

DR MIRRLEES-BLACK: Thanks very much, Graham. I think we can unpack a few issues that come in there. Some of them are related to later questions. The first of these is what's the formula you should use to do de-levering and re-levering, and, secondly, should the debt beta be zero. Perhaps if we address those issues and we might come back to what the overall approach would be in terms of de-leveraging and re-leveraging. So perhaps we can address first of all what's the formula that should be used. Steve, do you want to --

PROF GRAY: Yes. Maybe if I can have a go at summarising the view of everyone else. So, just unpacking what Graham said, I think there's a few different things. So the first one was Graham raised a whole lot of issues around how you would go about best estimating leverage or gearing. So, the AER will have to take all of those things into account, but ultimately it has to adopt a number for gearing. That's one of the WACC parameters that has to be written down.

So, I know the AER has an open mind about all of these things, but for the sake of the example let's suppose that the AER considers all of those things and adopts a 60 per cent number for gearing. I think it's just unquestionable that if a 60 per cent number for gearing has been adopted, then all of the betas have to be expressed in terms of 60 per cent gearing. Otherwise you have a very obvious internal inconsistency. So, in my mind the only question then is how do we go about regearing to the 60 per cent leverage that's been adopted in the regulatory determination.

So, there are two issues that Jonathan just outlined: which formula should be used and what debt beta should be used in that formula. I think the answers to those questions are also both very easy. The Miles-Ezzell formula is on the basis of a constant proportion of debt finance, which is exactly what the AER assumes throughout its analysis. It's built in to the PTRM in fact. And then in terms of the debt beta, for any reasonable level of debt beta, so textbooks, for example, will set out debt betas up to about 0.1. So, for example, Berk & DeMarzo, which is probably the leading textbook, has a table that cites work from Schaefer and Strebulaev that sets out debt betas for flat BBB I think up to 0.1.

ASSOC PROF PARTINGTON: 0.16 or 0.17.

PROF GRAY: The table in Berk and --

ASSOC PROF PARTINGTON: Yes, 0.16 is the actual number in that book.

PROF GRAY: We can go to documents later. So BBB is 0.1 and BBB plus would be slightly below that. So, those sorts of levels of debt beta, whether you assume zero in the un-levering and re-levering process or whether you assume even up to 0.1, even a little higher than 0.1, as long as you work consistently in the un-levering and re-levering step, it makes hardly any difference to that final equity beta estimate. Certainly the difference that you get in relation to the different levels of debt beta is tiny relative to the standard errors of the beta estimate that you're starting with.

So, in my mind it's very simple. So the AER needs to write down a gearing number. It must be the case - I can't see any argument for adopting a gearing of 60 per cent and then looking at betas that are geared to something different from 60 per cent. So, the only questions are: what formula do you use? And that's got to be Miles-Ezzell. And what debt beta do you use? It doesn't matter.

DR MIRRLEES-BLACK: Does anyone else have a view that they are able to contribute? Simon?

DR WHEATLEY: I would concur almost completely with what Stephen had to say.

MR SADEH: I agree with Stephen as well, just from an industry perspective, the questions about how do firms look at leveraging and what do they practically do. There's a bit of a difference when you look at listed companies, infrastructure or a network owner versus a traditional corporate or industrial. A traditional corporate or industrial effectively will often target a dividend payout ratio and the leverage is kind of an output, depending what I have to do to get to my leverage ratio. Do I draw down debt or do I repay debt?

Infrastructure assets are very different because they are functions of much more defined leverage covenants. For networks it is almost uniform in Australia that the privately owned networks have covenants, two key ones being a collateral measures and a debt to RAB measure which is, for all intents, let's just call it a book ratio for a second. Firms are efficiently levered, which for networks which also have reasonably consistent amounts of capex coming through, they do in effect practically maintain a consistent level of leverage on that basis by fixing the amount of capex that they debt fund. So I do see it in practice being consistent that a constant level of gearing is the appropriate thing to do.

MR HANCOCK: It's really a question, and I think we're going to come to talk about the issue of low beta bias, but if we are making adjustments for low beta bias, then we are effectively adopting a quite high rate of return on a sort of zero risk asset and does that tell us something about the sort of debt beta that is embedded in the model and particularly if we are going to have estimates that are significantly higher than the risk free rate, do we have to rationalise that with higher debt betas?

MR SADEH: Can I just revert on the debt beta point as well. Again, from what I see as an investor, I literally never see debt betas used by the market or independent valuers, and I actually think it is inconsistent to look at a starting point of an equity beta from market based evidence unless, as Stephen correctly points out, you adjust it for leverage consistent with the allowed gearing way you want. If you are doing everything based on market data, I don't understand how you can then say "I'm going to have a random override with a subjective number of debt beta that nobody knows where it comes from." I must say I have quite an intellectual problem with it.

PROF GRAY: Yes, I think it's more useful if we take it sort of issue by issue, so we will certainly come to low beta bias in a moment. But I think it would be useful if we get everyone's views on the proposition that suppose that the AER has determined that a 60 per cent gearing is the number they are going to write into their WACC formula, do we all agree with the proposition that the betas the AER must use are betas which are re-geared to 60 per cent for internal consistency?

PROF JOHNSTONE: Fair question. The subjectivity that Ilan is talking about, which no one likes, I think, is just inevitable given the exposition that we heard from Graham of just the insolubility of this issue. There's just so many inputs into the calculation and theoretical arguments one way or another and I do like tidy solutions, and Stephen's got quite a few of those, and it is nice for certainty for something to be axiomatic like 60 per cent, but we can't masquerade as if this is sort of physics.

So, in the end for me, if I was a regulator, I would be wanting to know what the end result is and working out whether that makes pragmatic sense or not. So the sensitivity analysis that Stephen did in his table, that would be the kind of thing that I think would be the way to come to a solution, a regulatory solution, and it's the only way that's not in danger of doing something ridiculous. We can get lost in theoretical arguments and hide the wood behind the trees, and end up with a theoretical proposition that when you work through the numbers you come to a result which is just outlandish. Then you think, "Oh, okay," and so you go back then and you come up with a new theory and go through until you get a result that, "Actually, that's plausible." So this is the kind of masquerade that I feel we can get involved in.

I know we need to get into the ballpark and you need some kind of framework to get there, but in the end I think rather than just relying per se on a theoretical tidy solution, we should be looking at the possibilities, the range of possibilities, and that leads me back to the subjectivity. I think it's just inevitable that the regulators are going to have to work within a range of possible outcomes and it's the bottom line that counts, not whether the theory is right or wrong, because the theory is definitely wrong. All theory in this area is all wrong.

It's not like there's theory which has got kind of empirical validity where it predicts and explains reality like a mission to the moon. I make a living from teaching this stuff, but I wouldn't claim that it's going to actually help me invent an engine for a car or something like that. It's so far off objectivity in terms of theoretical validity of that nature that we shouldn't pretend that we've got that. So, to get lost in theoretical arguments is in a way to delude ourselves and I think the theoretical arguments are great, you can actually go to and fro to get the range, but then in the end we actually need to look at what the end result is, not whether the argument is theoretically --

DR MIRRLEES-BLACK: I think in our last session we discussed we should be using a range of models. There was a discussion about the framework and using the Sharpe-Lintner CAPM as the foundation model and the other models as having various elements of weight and then I think what you are referring to is that perhaps there's a role for a cross-check at the end and that's something which we can address in the last session of today, how do we test whether the AER through its decision is meeting the NGO and the NEO and that would be, if there is a role for cross-check, to assess whether the various models used are appropriate and give you an answer which is plausible. I think that can come through the cross-check.

But at the moment I think we are addressing ourselves to if we are using it within the AER framework, the foundation model, how do we implement that to come up with the best answers. So cross-checks may come later. For the moment we are looking at the framework model, and within that I think it's worth addressing ourselves to Stephen's question, which is firstly do we de-lever and re-lever given the 60 per cent, if that's what the AER is doing as a benchmark for estimating equity beta and, secondly, what's the formula and, thirdly, what's the debt beta. I think if we answer those three questions, then maybe we can come to a conclusion.

MS CONBOY: Yes, and I think if I understood correctly on that third question that Stephen was positing was that that may not matter, what the debt beta is. I don't know. Is that because it is formula specific to the Miles-Ezzell that you're talking about or is it regardless of? So, the

three questions in terms of the 60 or whatever it is, does that mean the comparator firms have to be de-levered, re-levered and then, regardless of what methodology you use, the debt beta, and I know Graham doesn't agree with the debt beta issue, is not as relevant. Do I understand that correctly?

PROF GRAY: Yes, yes. So I would say the answer to the three questions: Do we have to re-gear? Yes. Should we use the Miles-Ezzell formula for that? Yes. And does the debt beta matter? No. So I would say the answer to question number 2 is you have to use the Miles-Ezzell formula because that's the one that's consistent with the whole AER process. Within that formula certainly the debt beta is insignificant, so long as it is used consistently when you un-lever and re-lever it.

If you are using a different formula that was based incorrectly on the firm having a constant dollar amount of debt instead of a constant proportion of debt, then the same would apply. For reasonable estimates of debt beta, as long as you are using it consistently in the un-levering and re-levering set, it would drop out. It's tiny. The effect is tiny compared to the range of estimation uncertainty that we have with debt beta estimates that we have available.

MS CONBOY: Thank you.

ASSOC PROF PARTINGTON: Just on that, would the re-levered beta lie outside the 95 per cent confidence interval for your original estimated beta? I suspect not.

PROF JOHNSTONE: Hoping 95 per cent would be wide.

PROF GRAY: The way the AER currently does things is it places almost entire reliance on the domestic comparator firms. For those firms, the effect of debt beta assumption does not even show up I think in a third decimal place because those firms are the same firms that are used to derive the 60 per cent gearing. So when you are un-gearing and re-levering, you are going a tiny amount one way and then a tiny amount back up to almost the same place. So that set of firms, and given the predominant reliance on those domestic firms, the debt beta issue is particularly trivial.

ASSOC PROF PARTINGTON: That wasn't my point. My point was when we re-lever do we actually get a revised estimate of beta that lies outside the confidence interval for your original estimate?

PROF GRAY: Yes, so for those three firms the confidence intervals are best and the effect of the debt beta is --

ASSOC PROF PARTINGTON: No, I'm not talking about the debt beta. I'm talking about the raw estimate. You have a raw estimate of beta which has a confidence interval about it. You re-lever that beta. Does the result lie outside the confidence interval?

PROF GRAY: For the comparators, no. But, yes, if it did, what would --

ASSOC PROF PARTINGTON: So what we're saying is we go through this re-levering process to shift the number up but it still lies within the --

PROF GRAY: Or down.

ASSOC PROF PARTINGTON: It will be down, it's above 60 per cent, and then we end up with a number that's still within the range of estimation.

MR SADEH: But I don't understand. I'll give you a simple example. Imagine you had a perfect example of a comparable listed company in the Australian market, and you said, "Here's it's beta, but I'm going to adjust it for a debt beta and I'm going to do it inconsistently with this leverage," and all of a sudden you're saying it's a revised number, being a beta different to what the market has actually priced. How can that be right?

ASSOC PROF PARTINGTON: I don't understand what you just said.

PROF GRAY: We seem to not want to answer the three questions that Jonathan has summarised. I think it would be useful --

DR MIRRLEES-BLACK: We could start backwards. So we could say if you are doing the de-leveraging and re-leveraging, is it appropriate to assume a debt beta of zero. We could say who agrees with that proposition? Who agrees that we

should assume the debt beta is zero for the de-leveraging and re-leveraging process?

PROF JOHNSTONE: I think there are some questions over it that –

Prof Johnstone: I think there would be too, because just thinking about what a beta is. Now it's about the covariance of returns for the debt holder with the market and there are some issues about all sorts of things that could affect the amount and the reliability of those returns.

MS CONBOY: Sorry, do I understand correctly Simon is saying yes for a zero, a zero debt beta as well. Jim is saying it depends, we need to ask more questions. Graham is saying you shouldn't assume it's zero, and I thought I heard Stephen saying at the outset it does not matter, it's not a relevant - it may be zero or it may not be zero, but the fact is it doesn't have a material impact.

PROF JOHNSTONE: Is that dependent on the model approach, though? Is it immaterial on the other assumptions?

DR MIRRLEES-BLACK: I think you could run through formula, but I think, if it's helpful, I don't think we need to address it here, but if you run through different de-leveraging formula I think it probably wouldn't make a large difference to the result

PROF JOHNSTONE: That's got to be the way to go, to almost be considering what the difference is. Does it make a difference?

DR MIRRLEES-BLACK: I'm not sure we are going to resolve the difference now, but we have identified who agrees with that and we have identified who disagrees with it. I know we are going backwards on the questions. The second question was the Miles-Ezzell formula and it's not the Miles-Ezzell formula for a classic tax system; it's a Miles-Ezzell formula - this is a formula effectively the AER already uses. So who agrees that that's the formula that should be used for de-leveraging and re-leveraging?

ASSOC PROF PARTINGTON: Sorry, did you say the Miles-Ezzell formula is the formula the AER already uses?

DR MIRRLEES-BLACK: There is a Miles-Ezzell formula --

ASSOC PROF PARTINGTON: It's not the formula the AER uses.

DR MIRRLEES-BLACK: With a classic tax system. But there's a question of what's the appropriate formula for when you are making the assumption of constant leverage and you've got imputation taxes. I think that's the formula that --

ASSOC PROF PARTINGTON: And also how frequently you assume the rebalancing takes place because the frequency of rebalancing changes the formula.

PROF GRAY: This, I would think, is a highly controversial proposition. If you have a constant level of gearing which the AER assumes and is embedded into the PTRM, then the formula that the AER uses for un-levering and re-levering is the correct one.

DR MIRRLEES-BLACK: Who agrees with Stephen's statement?

ASSOC PROF PARTINGTON: We need to be clear about what the formula is. The formula is not what the AER uses. It's not the Miles-Ezzell formula.

DR WHEATLEY: (Indistinct).

MS CIFUENTES: Sorry, can we just hear each of you separately rather than together?

DR WHEATLEY: So the differences that Graham is talking about entail a lot of additional algebra but no appreciable difference in numbers. So the AER's formula is reasonable.

MS CIFUENTES: I think you acknowledged that in your opening statement.

ASSOC PROF PARTINGTON: What, that the AER's formula would be appropriate if we assume constant leverage with continuous rebalancing. The Miles-Ezzell formula would be appropriate if we assumed constant leverage with annual rebalancing. But if you want to use the Miles-Ezzell formula you've got to drag in another term which is to do with the fact that the first year’s tax shield is known with certainty.

DR WHEATLEY: And without making any appreciable difference.

ASSOC PROF PARTINGTON: It doesn't make a big difference. So, if you forget about that, you go back to the formula that the AER uses which is originally I think it was Harris & Pringle 1985 or Brealey & Myers if you like.

MR SADEH: Unfortunately I can't add to the formula. I'm not qualified to comment on the formulas. But I think the practice of a constant re-leveraging, whether it's annual or effectively constant is appropriate.

MR HANCOCK: I can't add to the formula debate either, but I would agree that you want to have comparability across the leverage of the betas that you're using to observe or, sorry, the observations you're using to observe beta, you want to have them comparable. But I think Graham has raised some important questions about how you actually do measure leverage and that it's not necessarily straightforward.

PROF GRAY: Those things definitely have to be taken into account to be dealt with in that first section. Maybe a way of asking the first of the three questions is this: Most of us teach graduate finance students. If you had a question on a finance exam that you set where a student had plugged in 60 per cent gearing into the WACC formula and then had re-geared betas to 40 per cent, would the student pass that question or not? Mine would fail.

PROF JOHNSTONE: These days a lot of students get (indistinct). Part of that is that finance has got a lot that's not black and white about it. I just think if any position is taken as to a tidy position here, it really should be put forward with the end result attached to it and that's what then is the full story. I saw a document that IPART put out in 2011 on gamma and it actually worked through to notional cash flows to the entities based on the different arguments, and I think that's the full picture then because then we don't get in this bubble where we argue to and fro about different formula, to which I don't think there is ever any one and only one answer. I know Jonathan doesn't like that because he wants to get some answers --

DR MIRRLEES-BLACK: The aim of this session is not to get agreement. The aim is to identify where there is agreement and where there is disagreement. So what you have said is

areas of disagreement which will be noted and reflected in the joint report, that you have a different view from some (indistinct).

PROF GRAY: Jim, would your student pass?

MR HANCOCK: No, I wouldn't think so.

ASSOC PROF PARTINGTON: I would hope what my students would say is, what they are taught is, there is a great deal of uncertainty about how one should do this and that therefore one shouldn't place a great deal of confidence in the re-levered number.

DR MIRRLEES-BLACK: I think we have probably reached a conclusion on this particular issue, and there are different opinions.

PROF GRAY: But, just to summarise, the difference in the opinions, I think I have laid out a process that I believe to be uncontroversial and quite concrete, and it is effectively the process that the AER goes through right now, and a number of people have agreed with that process or at least aspects of it. The alternative is not a different process that people are suggesting the AER should go through, but I'm not sure whether the AER has got its answer that there has been any alternative suggested or just that it's a very hard thing and you have to think about it very carefully.

PROF JOHNSTONE: Yes, I'm just thinking it's actually looking through to the bottom line and that's where we keep on saying we will do this later.

DR MIRRLEES-BLACK: Well, I might suggest that what Graham has suggested is that rather than going through the de-leveraging and re-leveraging process and estimating re-levered beta and estimating the cost of capital for a commercial entity (indistinct) with that gearing, that Graham's suggestion is to estimate the WACC for a range of firms with a range of different gearing and then the AER would form a judgment from --

ASSOC PROF PARTINGTON: That's one thing one could do, or you could go all the way through to getting an adjusted beta, but backing it out from the WACC.

DR MIRRLEES-BLACK: And I think Stephen has argued --.

ASSOC PROF PARTINGTON: I could write a process to do that.

DR MIRRLEES-BLACK: You wouldn't get necessarily a hugely different result going through that process.

PROF GRAY: If everything is done internally consistently. But then the approach that Graham seems to be suggesting would be a very big change from what's been done over the history of the AER and would be quite inconsistent with the rules. Whether they are relevant or not I'm not sure, but the rules require you to write down a WACC formula and to plug numbers into the WACC formula for the various parameters and to that extent --

ASSOC PROF PARTINGTON: You could do that on the (indistinct). It would be feasible to do.

DR MIRRLEES-BLACK: But there is also a requirement to calculate the rate of return for the benchmark (indistinct).

ASSOC PROF PARTINGTON: Yes, you could do that as well.

MR SADEH: Can I raise two comments that I have. Firstly, the point just before, I don't think you can have a fixed WACC and the reason for that is at the end of the day the whole framework is trying to provide a benchmark efficient, you know, cost for a firm to go and practically replicate in the market. There is no network of scale that will actually go and take a fixed rate of return, determine a fixed WACC at the start of each guideline period, so not even at the start of its own regulatory determination because you don't completely flip over your capital structure every five years. That's why I think the AER's overall approach at the moment is good because it does reflect the reality of companies using trailing cost of debt, portions from the cost of equity that reflect its actual capital positioning. So I think to move to a fixed immediate total refresh of a capital structure approach I don't think would reflect reality.

ASSOC PROF PARTINGTON: The trailing cost of debt. Now, Steve just asked a question about what would you do, how would you mark a paper. So the question I would put is if you gave your students a valuation exercise and they did

their discounting using the historic cost of debt, would you give them a passing grade?

PROF GRAY: So there are two purposes for cost of capital. One is to evaluate new projects going forward. So there you would need forward looking estimates tied in. The second use of a cost of capital formula is the use for the AER which is to provide a fair return for investors and the benchmark efficient entity. So, to the extent that efficient form of debt financing is a staggered maturity trailing average approach, the allowed returns would have to be consistent with that.

ASSOC PROF PARTINGTON: I don't think you answered the question, but I suspect most people if they're honest would say the student would fail.

PROF GRAY: You are not suggesting that was a dishonest answer.

ASSOC PROF PARTINGTON: No, I'm saying it was an evasive answer.

DR MIRRLEES-BLACK: I think in the interests of achieving our objectives of the day, I think we need to accept that there are differences of opinion on this precise approach and I think in the joint report we need to reflect there's agreement among some of the experts for what Stephen laid out in terms of the process and the consistency with what the AER does and we need to reflect the other views as well.

But I think we need to move on now to the other issues, and to comparators in particular. There are a number of questions in the issues paper which relate to the appropriate comparators for estimation of beta and we have three comparator firms in the Australian market which is considered the benchmark efficient entity. But there's questions as to whether these are sufficiently representative or whether, in the interests of getting the best evidence of the benchmark efficiency entity, the AER needs to look more broadly at other companies for the process.

So, in the contributions so far we've had a range of views. Would someone like to start off by suggesting – who would think we should expand the comparators to either

international or outside the (indistinct).

Just for the record, Stephen Satchell has now joined the team and replaced Graham Partington. Welcome, Steve.

DR SATCHELL: Thank you, but I don't want to kick off.

PROF GRAY: Did you want to talk about how the beta estimates for the domestic comparator firms have changed in recent times as part of this discussion or is that a separate --

DR MIRRLEES-BLACK: Formally it comes later. But it is relevant.

PROF GRAY: If we constrain it to just what can we learn from the three domestic comparators that remain and if we were to expand the set, where would we look, I think maybe is what we can deal with now and talk about updated evidence in a moment. So we are at the point where the sample has dwindled over time, the sample of domestic comparators has dwindled over time. So, in 2013 the AER had a sample of nine companies that it examined, five of which were delisted or recently delisted at that time. Since that time there have been more companies that have been delisted, so we are left with a sample of three now. Some of the sample that had already been delisted in 2013 have now, by the end of the currency of this guideline, will have been delisted for I think 12 or 13 years. So at some stage the dead firms have to drop out, I would think.

So, we are down to a very small set and so the question is: is that set reliable enough to place 100 per cent or almost 100 per cent weight on. So I think not, I think you need to balance comparability (Certainly these are the most comparable firms that we have, and that's very important) but with statistical reliability. And as the domestic comparator sample becomes less statistically reliable just because there are fewer data points over time, that balance needs to change and you need to look elsewhere. Where else might you logically look? Overseas network companies and other Australian infrastructure companies are the obviously places to look.

Are they perfect comparators? No, they are not perfect comparators with a benchmark efficient entity and we need to take account of that. But we also need to take

account of the fact that we are down to three. Can we really sort of put our hand on our heart and say that those three data points will be sufficient to have 100 per cent or predominant weight on.

DR WHEATLEY: Well, I think if you were down to no domestic comparators, then you would have to look elsewhere and you would have to make all sorts of assumptions to do so. So it's not a perfect solution, but it's difficult to think what the alternatives are. So I think you'd be forced to look at international comparators and potentially unregulated companies.

MR HANCOCK: We shouldn't quickly dismiss the old delisted firms. To the extent the betas changed, they are probably cycling, they are probably not sort of trending --.

DR WHEATLEY: The data will reveal whether or not they have changed.

MR HANCOCK: The difficulty of course is that we don't have data and that's what we are talking about. We are having to make leaps of faith --

DR WHEATLEY: But we do have time series of returns and in fact if you use relatively frequently measured returns you can get fairly precise estimates of betas, so you should be able to determine whether or not betas have changed.

PROF GRAY: And suppose there is some sort of cyclical effect on beta estimates for whatever reason, and we will come to this in a moment when we look at the updated estimates, so the estimates at the time of 2013 were quite low, the low point in the cycle. Now they are materially higher. So we have had this cyclical effect observed and that's one of the things that the AER will have to deal with in this process. But the point is that the firms that were delisted at 2013, their beta estimates are frozen in time at that point.

So if you see that, look, the majority of the firms have their beta estimates frozen in time because they are delisted and happen to be, say, at a low point in the cycle you are talking about and all of the evidence of the remaining firms suggests a material increase in more recent times, then if you were taking just a simple average of the currently available now higher estimates with these

delisted firms that have been frozen in time a number of years ago, then you will be likely misled.

MR HANCOCK: I mean, I accept that you do need to think through those issues, but the evidence that we've got, as I understand it, is three firms and our concern is that's too thin. So we can't sort of put everything on that evidence either. If we look at those historical – the delisted firms, maybe we can infer something from those price periods about whether they were atypically sort of low and then the time that they were used in 2013.

PROF GRAY: I agree with that. That's relevant.

DR MIRRLEES-BLACK: There is a statement here which maybe could be relied on. "A delisted firm should be included in the comparator set but the weight to be placed on the estimates should decline in line with the length of time since delisting." Is that something we could say?

MR HANCOCK: I feel hesitant about it. Basically to decrease weight on the delisted firms, we have to be putting increasing weight on something else, and what is it? What is it that's better than those delisted firms? If it were the case that we thought betas were something that was trending and therefore becoming more and more wrong, then you might say that the weight put on them should be decreased. But if you think that there's something that just sort of cycles up and down through time, then perhaps that historical data still gives a reasonable estimate of the long run average even if it is not picking up the short-term fluctuations in it.

DR SATCHELL: Can I support that remark. It seems to me we have very imperfect data. We all agree there's a serious problem here, and that to throw away the one bit of information that at least is historically reliable could only be justified if we could find something better. Looking at what was discussed earlier such as international comparators, that does not seem the way to go. I mean, it's a different market portfolio you are measuring them against.

Also, if we are going to use statistical testing, and I hear across the table that that seems like a good idea, you want to use the most reliable data possible, and that's basically a beta that's only calculated on the returns which are observable in the market and the returns on the

index which is observable in the market. So you don't want to do any calculations of testing that involve gearing calculations embedded in it, pure returns, because that at least has some statistical structure to it.

MS CIFUENTES: Can I just tease out a little bit your notion that we can't look at overseas comparators because it involves a completely different market portfolio.

DR SATCHELL: Absolutely. So it's not clear to me that there is any - and I know we can't talk too much theory here or we will be guided by it all the time - but the notion that, if you like, a cross-section of betas in one market is directly comparable with a cross-section of betas in another market, I don't think there is any evidence for it. The way one could deal with that is if you want to do comparisons between Australian companies and US companies is to embed them both in a global market. So you could do a global CAPM, if I may call it that, and then there's a valid point of comparison. Otherwise it seems to me it's just an ad hoc calculation. Then you get to the issue do you actually benefit yourself by using dubious statistical methods just so you get the illusion of more data? It's not clear to me that you do.

MS CONBOY: You are talking about using the three that we have and holding the historical ones constant versus the overseas energy companies. Given the fact that we are talking about systematic risks, what about the fact that you would look at other Australian infrastructure companies?

DR SATCHELL: It depends whether these companies are fundamentally similar. I do not claim to have expertise to fully answer that question, but if I was to address the question I would want to have a rather detailed look at these infrastructure companies and see whether they actually do have the same sort of, if you like, economic composition as the networks, and I don't know. So that's a research question to me.

DR MIRRLEES-BLACK: The question, and that is to say investors are making decisions every day, where they are looking at one set of companies which may well be Australian energy networks and then they may decide to switch their portfolios to something else which is an investment substitute. Thousands and thousands of investors through

the world are looking at "Here's one set of companies and there are another set of companies" which are relevant comparators for the purposes of investors. They are making those sorts of comparisons. Is it possible that - are you saying that the AER won't be able to make those comparisons and find those types of comparators? In the end, the AER has to make the decision what is the opportunity cost of capital for those who might invest in Australian energy networks but aren't doing so or are choosing to do so.

DR SATCHELL: This is like a global asset allocation. If you are thinking of building a global portfolio and comparing investment here with investment there, it's not clear to me that you would use the domestic betas as the fundamental decision point.

DR WHEATLEY: So which model would you use?

DR SATCHELL: That's a hard question and it's a commercial question too. I don't know.

DR WHEATLEY: It is a very hard question and --

DR SATCHELL: I'm sorry?

DR WHEATLEY: I think the thing is it is a very hard question. There is less than uniform agreement on which domestic pricing model to use and there is even less agreement on which international model to use.

DR SATCHELL: I entirely agree with that.

MR SADEH: The relative systematic risk to the overall market I think we discussed in the first session should be reasonably stable. So, intuition would tell me that beta shouldn't go up and down on day-to-day statistics. So I thought we talked about there should be a relatively high bar to change things and you don't just mechanically look at a set of data and therefore, "Here's a new beta this month, here's a new beta next year." There needs to be a demonstrable change in trend before you look at it using the data to change something, I think the role of data is very important and I think it would certainly provide a greater quality of decision to have an expanded dataset.

To the question of, you know, if I were making an

investment decision looking at betas and saying how should I apply that for a company, unfortunately the world isn't binary where I say that, "Here is a quality observation, therefore I'm going to place weight on it and here is something I will place no weight on it." There are a lot of things in the middle. My own view would be of course the domestic betas that are of currently listed firms are the most relevant, but then there is some relevance in my mind, in declining order, of number 1 recently delisted Australian firms, number 2 overseas networks where you do need to start looking at these in terms of what adjustment should I make or I'm using them more as a cross-check so I wouldn't apply an absolute arithmetic mean to them all, and then lastly, and probably lastly if at all, the other Australian infrastructure because of toll roads, airports, retail, that is quite uncorrelated to networks.

DR MIRRLEES-BLACK: That sounds like a practical investor, and that's the process that you would adopt in assessing betas if you were looking at an investment.

MR SADEH: If I was looking at an independent valuer's Report where they will provide you with "here is my beta" and then naturally it isn't a simple formula, there are a number of let's say artistic ways they get to it, and at the end they will provide you with tables of data of what they have used to have regard to the beta. Now, they will show you means and medians of different samples and they will show you overseas firms, et cetera. You will find that the global average isn't what they use. They just have regard to it as a cross-check because it's a useful thing - because there are a number of reasons why the overseas firms would be less comparable than the domestic firms.

When you have three domestic firms, it is also potentially misleading to say "Therefore the average of those is what I must use." You take greater weight for that average but you use a cross-check for the second best data set and then an additional cross-check with less weight for the broader data set. But I think there's value in it, but you just need to temper it. Unfortunately I can't say I would apply weighting 50 per cent, 20 per cent, 10 per cent to each of them, but one I would use reasonably mathematically and the other ones I would not have regard to an absolute mean.

DR SATCHELL: Thank you for that. I thought it was interesting. But I think if you're looking at it from the point of view of an Australian investor, which is what you've been saying to me, you then perhaps want to think of it in terms of there's an overseas regulated company and I'm going to regard that as, if you like, a domestic investment in the sense that I want to measure it against the Australian market and I want to convert US dollars into Australian dollars, that I think is an interesting exercise to do, but that's a different beta you get out of it than the beta we get from observing it against the US market.

MR SADEH: Absolutely, and a different level of systematic risk compared to the Australian networks by virtue of how those regulatory jurisdictions work.

DR SATCHELL: I see that as an interesting research question that's worth pursuing.

DR MIRRLEES-BLACK: Maybe we should use comparators. But the second question would follow, which is if you are going to use comparators, what adjustments do you need to make in order to make them comparable so you can give them due regard. I think that's what you --

DR SATCHELL: I don't say you shouldn't use any comparators or disregard all international information. I'm just saying you should use it rather carefully and I think it's at the research level rather than at the conclusion level, if you see what I mean.

PROF JOHNSTONE: So we are craving data; I think everyone is saying the same thing about that. I totally agree with Stephen. If you are doing this exercise realistically, you would be running different sets of data and just seeing what the answers are, so you would be using delisted firms. But you would probably also be thinking of American utilities and I think I have seen somewhere from Graham Partington that in that book by Berk, US utilities are quoted as having betas of 0.2.

PROF GRAY: I will come to that. That's not right.

PROF JOHNSTONE: I thought you would.

PROF GRAY: That's not right, but go on.

PROF JOHNSTONE: So the thing with the local data too is I understand the three firms are not all regulated income. So their market betas are a reaction to all their activities, not just their regulated income. Their regulated income would have to be seen at the low end of their - if you have the businesses, two businesses regulated and unregulated, the unregulated business is going to be more responsive to the general market and the regulated is more anchored on the regulator's decisions, so I would have thought the regulated part of the income has a lower beta than the overall beta observed in the marketplace, surely.

That leads me to thinking about something I saw in Ilan's work and that is that this makes a lot of sense to me. If you are trying to work out what the beta is and you are really trying to think of fundamental risks of the organisation, breaking it down between idiosyncratic and systematic risk, and Ilan is talking about things like this and I think this is getting down to concrete, he's talking about risk like political risk. For example, I would have thought political risk is actually the risk that it might be seen that these entities have been doing too well for too long and we've got to tighten up, that's part of it, but other risk that would actually be genuine risk to these entities like risk of reaction to climate change, technology changes, cyber security, those sort of fundamentals.

Now, how we can talk about the risk of the entity in this gobbledygook of beta when we really should be thinking deep down of things like that, I think that would make a lot more sense, and then you could start to think about whether these are actually systematic or unsystematic risks. That's getting down to tin-tacks. Then largely why are there only three firms listed? When these firms are delisting, are they saying they can get their capital cheaper somewhere else or are they saying, in other words, is the true opportunity cost of capital is lower than the market would demand of them? Or are they saying that they want to get in on the economic rents that the regulator is providing to these entities? You know, "We want to monopolise these for ourselves rather than let any old shareholder have some of this."

So, I think the fact that there's only three listed entities now is something really worth considering because

that's a genuine economic decision that's been made by these entities to delist and why are they doing that? What are the motives behind that? All we are concentrating on is the fact there are only three and it's a shrinking number but with short data series.

The last thing I want to also say is that comparative entities really are not going to exist because unless they are regulated, they are subject to completely different market conditions. If they are in different countries and different market indices and so on, it's going to be very hard, apart from just cross-checking and getting a bit of a ballpark idea of using any comparative entity. I would think a natural comparator that the man in the street would think of is an American utility. What happens in the United States? How are their incomes regulated? What sort of (indistinct) are attached to them, which leads to the point too.

PROF GRAY: Just to correct the record on that, so Berk & DeMarzo, page 457 of the global fourth edition, report a utilities asset beta of 0.22 to 0.36, which corresponds to an equity beta of 0.55 to 0.9, but I'm not sure that's relevant in any event. I think if you are going to use international evidence rather than use some sort of broad utilities portfolio, we should look at network businesses as the better set of comparators.

PROF JOHNSTONE: It sounds pretty relevant to me, and the other thing is that 0.2 for an asset beta, that means that the WACC should be based on 0.2 --

PROF GRAY: If that were the right number, but it's not.

PROF JOHNSTONE: That's not equity. It's the overall --

PROF GRAY: That's not the number they report.

PROF JOHNSTONE: But you are saying the asset beta they report is 0.2.

PROF GRAY: No, it's a range of 0.22 to 0.36.

PROF JOHNSTONE: All right. Fair enough. So you take that. That wouldn't be the number that you would plug into a WACC formula because that's covering the overall average cost of capital to the assets. So it's a much lower number

than the numbers we talk in Australia.

PROF GRAY: Well, we are back to the original point of what's the AER's process. They are going to write down a gearing number and it would be - well, my students would fail if they had a beta that was geared to, say, 0.5 and plugged it into a WACC formula that had a gearing of 0.6.

PROF JOHNSTONE: Are you saying the American entities have a lower amount of debt?

PROF GRAY: Well, if they have a different level of gearing it has to be corrected, so we have it internally consistent.

PROF JOHNSTONE: Sure. That would be worth doing. But on the face of it, it looks like the betas coming out of the United States utilities are going to be on the low side relative to ours.

PROF GRAY: No --

MR SADEH: Are they just networks, or does it include contracted power?

PROF GRAY: That's right.

MR SADEH: So power generation. Is it merchant power generation? Might as well be a man on the moon compared to a regulated framework.

PROF GRAY: Utility is broadly defined, so maybe we should not spend a lot of time because I don't think that's relevant.

DR MIRRLEES-BLACK: I think there's more of a question which is should we be using any of this data? We picked on one market and there are other markets, other companies in question. Is any of this evidence in any of these companies anywhere in the world relevant to the question which the AER is prepared to invest themselves in. That's the question.

PROF GRAY: Maybe it's a bit of a consensus formula. All of this is relevant evidence, so the three companies that we've got, that's certainly relevant evidence. Delisted companies, there's some relevance in that. Other Australian infrastructure firms, that's relevant evidence, and other overseas network firms is relevant evidence. So

this is an area where inevitably some level of judgment is going to be required and I guess my view is that it would be wrong to say I'm only going to look at the three firms and that I'm going to be blinkered to all of this other relevant evidence. I think all of this is relevant evidence and we should have regard to all of it.

MS CIFUENTES: Ilan, that wasn't quite what I heard from you. I think you were questioning the value of other Australian infrastructure in terms of comparing energy networks with, say, roads, retail.

MR SADEH: Yes.

MS CIFUENTES: Even at its most generous, telecommunications. I think you were questioning the value of that and also the notion of using some of the overseas just because the jurisdictional differences are so great, and that's something that I think both Paula and I observed at the World Forum of Economic Regulators just last week, that in fact the ability to compare one regulatory framework overseas, pick any of them, with Australia was just about impossible.

MR SADEH: I agree, and I think there's a sliding scale of weight that I would put on the different sorts of data. As I said, I would put the greatest weight on the existing currently listed domestic, less weight but more than the rest on the delisted Australian networks, and then you go into territory of more qualitative assessment for cross-checking rather than mathematical, as you said. The next most reliable to me is foreign, but you have issues with them. The US utilities, let's take out the non-network utilities, each state in the US has different regulators and a different approach. There are a number of US states where you don't have a regulatory determination until you ask for one. So, by definition it's going to be lower risk because things are changing less frequently. Then, lastly, a set of Australian infrastructure stocks I think have the most danger of looking at them. But the more you go down the spectrum of things further away from a natural comparable, the more the onus needs to be unpicking what's inside.

DR MIRRLEES-BLACK: Can I just unpick that a little bit more. I think that when you look at other regulators, and it's interesting you refer to other regulators, some of

them will make determinations of beta for a range of different sectors and we would like to make sure that the beta estimates, the determinations that they make are sensible relative to each other so they are not internally inconsistent so that those sectors which are perhaps more linked to GDP in terms of their volume pricing have a greater beta. And so the question then is for you, if you are looking at sectors which are not directly related, they might form an upper bound or a lower bound for estimates that you make for the energy networks.

MR SADEH: I agree. I kind of termed it as a semi-check or a cross-check. It's telling you is something too high, is something too low. As you said, you think this is correctly reflecting that one has volume risk or one doesn't, other major difference between jurisdictions.

MS CIFUENTES: But not used to set a range, which I think Jonathan --

MR SADEH: Indeed.

MS CIFUENTES: The sense I get is from a practical investment perspective you would use that just to make sure that it is within the ballpark and it's a qualitative assessment at that level, at that third step.

MR SADEH: Yes, that's right.

DR SATCHELL: I think I entirely agree that all of this is relevant information, but the term "relevant information" needs to be understood as, if you like, potential candidates to inform us. It does not mean that at the end of the day they won't have a weight of zero attached to them. I think that's where I would be. So, yes, we should think about all of these things because this is a problem that's unresolved. But it doesn't necessarily we are going to hopefully end up putting 80 per cent on US networks.

DR MIRRLEES-BLACK: Again, Simon has made comments in papers on some of this. Do you have anything further you would like to add?

DR WHEATLEY: Again, if we ended up with no listed energy networks here, we are going to have to --

MS CIFUENTES: Simon, would you kindly just speak up a little

bit. I'm still suffering from a head cold so I can't hear.

DR WHEATLEY: If we ended up with no listed energy networks in Australia, then you would be forced to look at foreign comparators.

MS CIFUENTES: You could, or you could take up I think Jim's suggestion that you still look at the delisted and have a look at the volatility.

DR WHEATLEY: Even if the data were 40 or 50 years old?

MS CIFUENTES: Again, if I understood, Jim was suggesting that you actually have a look at the period of time when they were actually frozen and then have a look to see whether it was at a cyclical low or a cyclical high. That in itself I think has some challenges because again how do you know whether it was at a cyclical high or low for the entire industry or there were specific factors. So I'm interested in that as a technique, but I do think that there's still going to be a lot of qualitative judgment there.

MS CONBOY: I think what I heard Jim say was that you had the delisted ones and to figure out whether they were in a high or low cyclical period you did need to have those extra three as a cross-check in terms of where they were going. Is that --

MS CIFUENTES: You need to use all of them, I would think.

MS CONBOY: Yes, but that's going out as a straight line, the delisted ones. So you have to look at the other ones as to where they are in the cycle. Is that --

PROF GRAY: Yes, that's right. That's what I was saying. The ones that are still alive, if you can observe that, say, since 2013 the ones that are still alive, their beta estimates have increased uniformly, then that would be fairly persuasive information, I think, that the ones that are frozen in time were frozen at a lower level, not in a cycle of betas, but in a cycle of beta estimates.

DR SATCHELL: May I ask a question? I'm completely ignorant on this. The ones that have been delisted are now privately owned, whatever, but they presumably have annual accounts. Is there any information in those that's

relevant to us or is it just --

MR SADEH: Not that you would estimate a beta from accounting information. Even if they did, the way the accounting book value is recorded is too unreliable.

DR SATCHELL: Thank you.

MR HANCOCK: Using the overseas comparators or indeed any comparison, presumably you would put more weight on them as you became more confident that they are representative of the firms you are trying to regulate. So I think about how you would become more confident. One way that that might happen might be going back to the period when you had better data for the Australian entities and trying to establish a robust connection between the estimates you are getting overseas and what you are getting in Australia, and you find that different people approach that question in different ways and if they are converging on similar answers, then you become more confident about that overseas comparison. But, on the other hand, if they are using those overseas comparators and getting very disparate results, then you can't be very confident about what you take from them.

MS CIFUENTES: One observation I made while I was at the world forum just in the European zone, that the impact of EU regulations and the need for all of the network businesses to start complying and the regulators, but they were at completely different points in time along that path of compliance and within that, so regulatory structures change in short periods of time as well. So that is a particular problem in Europe in using any of the European comparators, as well as the problem of the US where you do have very, very different regulatory structures.

So, in some ways I think someone - Stephen, I think you might have said if you are going to do that, then use a global CAPM, and that's almost the answer, but I am not sure that is really going to be that informative either.

DR SATCHELL: I'm only saying in a sense theoretically how one should approach it. I'm not recommending it as a strategy. The other way one might want to think about it, again as a research question and not as an immediate practical application, is the impact of regulation, because

if one could, if you like, intellectually regulate and deregulate and then re-regulate, you can do the same thing you are doing with gearing, you can take a company that's not regulated, is not a network and then, if you like, infer information from that. That doesn't help us today at all, and I'm not saying that it's not mentally inconceivable.

MS CIFUENTES: There were a few pipelines that fell into that space, but they've since been gathered up into the regulatory net.

PROF JOHNSTONE: Has any work been done on the effect of the fact that the figures we are observing in the Australian market are actually related to income other than the regulated income and how big an issue is that? Because to me clearly, as I said before, the beta of the regulated income has to be lower than the beta of the company, if the company has any large operation outside its regulated stream of activities.

MR SADEH: Not necessarily. I mean, from what I've looked at it's incredibly hard to separate the unregulated cash flows from regulated cash flows, unfortunately. I wouldn't necessarily say that unregulated cash flows were of themselves riskier than regulated cash flows. It depends what their business is, for example, and because in the valuation of a company it has both your existing unregulated value as well as your view on future unregulated value. Now, your existing unregulated contracts in the transmission network in my view are lower risk than a regulated asset because they are effectively 20-year leases, something like that. So, that's one point

The second point is, you know, arguably you also have lower beta bias when you've got some of these listed firms that have multiple networks. So to have two or three networks in different locations with different regulatory decision timelines is arguably diversification benefit which lowers - I mean, you can kind of go around and around qualitatively. I think quantitatively it is extremely hard to separate.

PROF JOHNSTONE: That all makes sense and underlines how difficult this task is. The other thing I would just like to bring back to life, what you mentioned in the last forum was that remember that these betas we are observing, they

are the market observing the cash flows coming from the entities, knowing that behind the scene the regulator is governing those cash flows. So the market is observing those and its pricing is actually producing these betas and now we are looking at these betas as if they are exogenous when in fact they are a product of our previous decisions. So that's circularity, you know, it just can't be assumed away.

DR MIRRLEES-BLACK: I think we've got some measure of agreement.. Stephen Gray summarised it by saying this is all relevant data, all relevant information. I think the important question for the AER is, well, it may be relevant information. How should it use it? How does that relevant information then gets translated into the decision it will have to make on what is the beta statistic that it should use in the rate of return framework? I don't think we've had a firm proposal on how that comparator data, which is relevant information, can be translated into a beta estimate. Has anyone got a starter for ten in terms of how that should be used??

MR SADEH: I will have an attempt at it. I think there should overall be a high bar to change based on applying the observed data, that intuitively beta should be something that is relatively stable. So if your application of data in ascending order of its quality being domestic firms first suggests that your current estimate is materially out of line, you would then go to the next tier and look at that set of data qualitatively to see if there's been a demonstrable change in systematic risk in various areas, because three firms is quite dangerous to do that, but, as I said, I think after that it should be higher before you change the estimate.

DR MIRRLEES-BLACK: So you would look at the comparators before in terms of the relevant information and then use that to apply judgment as the current estimate change material --

MR SADEH: I would look at the three existing firms first, look at their data, and say has there been a material change, because if there hasn't been, just the mechanical, you know, it's not something that should be intuitive and happening, does that trigger an assessment into the next level of data to see if there is a discernible pattern of systemic risk change.

DR MIRRLEES-BLACK: Do others concur with the last suggestion?

PROF GRAY: Yes, I do. I think that there's no mechanistic formula that you can write down that says "This is what you should do." So there inevitably will be a level of judgment required, and I agree with Ilan that with all the regulatory parameters, there is a high bar for change, that all stakeholders benefit as we discussed last time from some predictability and stability. So, my approach would be to set out, as Steve said, all of the relevant evidence, so use all of the relevant evidence, and then I would start with where we got to last time. So, the peg in the sand from last time is 0.7, and then what does the relevant evidence tell us relative to that how has the evidence changed since we looked at it last time and came up with 0.7? Is the evidence suggesting since that time an upward move or a downward move or is it inconsistent? And then if all of the evidence or the predominance of evidence is in one direction and if the AER determines that it is material enough, then a change will be made.

But it may be that the evidence is predominantly in one direction, but the AER determines that it's not material enough to make a change. But then that then sets a precedent for how other parameters would be judged. So if the evidence in relation to beta is not deemed to be significant enough to warrant a change, then that kind of threshold, that same threshold of materiality should be applied to the other parameters and symmetrically.

MS CIFUENTES: I will weigh in here and thank you both for those suggestions. They make perfect logical sense. The difficulty I at least have is in the step "let's gather all relevant evidence" and we know from years of rate of return determinations that that actually is a very, very difficult question. How do you decide what information is relevant or not? Some of it is quite obvious, so the three firms, the historical data of the firms that are delisted, that's pretty straightforward. I think it might even be straightforward to have a look at some of the other Australian infrastructure and bring that into the pool as relevant information.

I do, though, have a real difficulty with how we narrow down the international data. I still haven't got a

real sense from the experts on how we do that other than as a research exercise and I'm not sure that that's necessarily going to be easy or satisfactory, because of course the research exercise would depend on what we specify, which means we are almost predetermining what you are going to be looking at.

So, if you can turn your collective minds to how we would decide in that very broad category, remembering that it would be used as almost a final cross-check, a sanity check.

PROF GRAY: I've got a couple of suggestions. So, one is in the evidence that we submitted last time around we went through an exercise with CEG that developed a set of comparator businesses that had more than 50 per cent of their revenues from network operations. So, that's one approach.

The second thing that you might look at is the AER's not the only regulator to have struggled with this issue. So, New Zealand have two comparators. The UK have two comparators. So you look at the way that other regulators have struggled with the same issue. So the New Zealand approach is to take a very large set of overseas comparators, throw them all in, on the basis that some will be wrong, too low, some will be wrong, too high, they will cancel out in a very large set. The UK approach is a little bit different where the regulator there applies judgment and puts a premium on stability. So they would be suggestions for how one might look at the overseas evidence.

PROF JOHNSTONE: I can see the premium on stability. There's no doubt stability is a good thing. But when you boil the whole exercise down and if you were to start this exercise off and just think, "Okay, beta's a number we are going to plug into a formula, it's going to produce an important result," and you know your responsibility is to provide fair return to the set owner so they maintain their assets, they invest as they should, not too much, not too little, things like that, then at the same time you would probably be trying to reduce beta as much as you could whilst achieving those purposes.

I think that's what's happened in time in Australia, that the beta estimates used have actually been brought

back and back and back and I suspect there's probably room to bring them back a bit further whilst not discouraging investment or maintenance of assets or the continued wish to hold these assets. So the companies that hold these assets are not getting out, they are not selling to other companies. So, these are the kind of considerations behind the scenes and in the end we've just got to think that beta is a number that we're not going to come up with a right answer, we've heard that over and over again, we know we have to plug it in, it's going to be important, and where in practical terms can it actually be reduced to, I would suggest, whilst at the same time not doing the entities in the eye.

MR SADEH: You wanted to identify at an early level what are the kind of overseas firms that you want to investigate further, kind of look towards high level criteria, you know, are these similar to the AER networks. So, for example, are you in a jurisdiction that uses a RAB based approach versus a DORC or book value. If you are not, I wouldn't include them. Are you a jurisdiction that has volume risk or not. If not, that might be too high a level of things to exclude. The length of determination period, one year, five years, 10 years. There's a couple of simple criteria like that that you can use to screen.

DR SATCHELL: Can I support that. Good point.

MS CIFUENTES: That's very useful.

MR HANCOCK: So that's sort of looking at particular characteristics to sort of reinforce your views about comparability. I also think the other thing is that if you are going to adopt particular overseas comparators and believe that they tell you something about what's happening in Australia today, then you should actually be able to establish links with the historical data and find that they explain something in the historical data, and if they can't explain anything in the historical data, then how can you be confident that they explain anything now?

DR MIRRLEES-BLACK: I think we have a measure of agreement on this issue. The devil is in the detail when you actually write it down, but I think there is some agreement on how we would use the comparators.

Just in terms of translating the beta, though, all of the experts have expressed concern over a lack of transparency in the way that the AER exercises judgment obtaining the evidence on beta and then converting that into the final estimate, and I think I said the experts have agreed that they regard that as difficult and they would say they would like to be clear about how you would express that application of judgment. I don't think there's agreement here, though, about what's the process that should be adopted. So, take the beta, how it should be translated, how it should be applied. Does anyone have a view as to how that judgment should be applied, what's the process for applying it?

PROF GRAY: Just to comment on how not to apply it. The AER's current approach has been to set the primary preliminary range based on the three comparators, and then use all of the other evidence to select the point within that range. That doesn't make any sense to me, for the reason that that range is set to reflect the statistical imprecision of the estimates of the three parameters, and there's just no reason that that should bound the information that you get from the other relevant sources.

MS CIFUENTES: So, Stephen, can you just go through that again?

PROF GRAY: So the primary range is based on just the domestic comparators, and the reason that there's a range is that we can't precisely estimate beta. We can only narrow it down. So we are saying that the information that we have from the domestic comparators enables us to narrow down a beta estimate from that information to within this range. So that's a range that sort of reflects the statistical imprecision of the beta estimates from that subset of the data, and that may well be unreliable because we've only got three firms left. Then we've got all these other bits of evidence that we say are relevant evidence.

It may well be that in some circumstances all of that other evidence is telling you that the number should be way above that statistical range or way below that statistical range. So, having a primary range only reflecting the statistical imprecision of the one very small subset of the relevant data is not a sensible way of constraining things, in my mind. So what do you do instead is I think what we

are agreeing on.

If I were the regulator doing this, what would I do? I would have a table that sets out the evidence from the domestic comparators and look at what other regulators do, look at the other domestic infrastructure and so on, so a table for all the bits of relevant evidence and then a discussion about how have things changed since the 0.7 was derived last time, the stability and the high bar and predictability and all of that sort of thing, and then set out the application of judgment. What considerations did I have in either leaving the number at 0.7 or increasing it or decreasing it? What pieces of the relevant evidence did I find particularly persuasive that led me to stay the same or increase or decrease?

MS CIFUENTES: Sorry, just a question. Would that involve some mental weighting rather than let's assign a specific number along the lines of in our suggestion. So, if you do set that out in a table and don't necessarily set out a range, would you still use the priority listing that Ilan suggested? So, you give primary weight to the observations of the three. Then if something has materially changed, you would then start to take into account the second column of your table and then the third?

PROF GRAY: Yes, I think that's fine. I know a number of other regulators have started assigning specific weights to different pieces of evidence. The QCA has done that recently in relation to market risk premium, for example. That would be a big step I know for the AER. I think what people are calling for is some better expression qualitatively of the considerations. So, without going through the kind of step by step approach, "We looked at this first and then bounded it to this region and then only after doing that did we factor in this other piece of evidence"; I think rather than that, setting out, "Here's all of the evidence," and then explaining why you gave much more weight, much more regard in a qualitative sense, "so more weight or more regard to this piece of evidence and here's the reasons why, and we gave less weight to this evidence and here's the reasons why."

PROF JOHNSTONE: It's essentially the same thing, though, isn't it? You still probably in the end argue for more relevance for the local observed betas, so you are at the same place.

MS CIFUENTES: I think that's right.

MS CONBOY: I think that helps you start --

PROF GRAY: But it's very different from constraining based on the statistical imprecision of that subset of the data as a first sort of immutable range.

MS CONBOY: And does that help you then with the logic of starting with the 0.7, because you initially said you've used your point estimates to define the upper and lower range, and then conceptual analysis to find a point within that range, and you are saying that that first step was in your view incorrect, but that's what gave us the 0.7, but then you're saying let's start with the 0.7 and use that cascading approach that Ilan has mentioned, which I think would then say you're okay with starting at that 0.7 as your high bar.

PROF GRAY: Yes, I agree with that. I think stability and predictability is very important. What I think scares all stakeholders is where a regulator could assess the same piece of evidence or essentially the same evidence and come up with a different decision than what it had come up with last time or, even worse, where the evidence has moved pretty much uniformly in one direction and the regulatory estimate goes in the other direction. I think that's what really spooks stakeholders. So I would start with the 0.7 and then explain why it is that you moved or didn't move from there.

MS CONBOY: Okay.

DR SATCHELL: I think there's two sides of this. There's the new evidence and the impact it might have on where we are today and there's the, if you like, historic situation that where we are today is in relation to all the accumulated evidence in the past, and the value of the confidence interval, which I agree from a purely statistical sense is pretty weak as a bit of statistics, nevertheless by putting it at 0.7, which I understand is up one end of the confidence interval, is saying that taking into account all the previous uncertainty and based on evidence you have, you are thinking it's larger rather than smaller. I think that's valuable. To throw that away and just replace it by the number 0.7 could in many people's

minds be the centre of some other confidence interval between 0.9 and point something else. So I think there is value in it. I would not agree with throwing away the confidence interval as an idea.

PROF JOHNSTONE: The only way to fully express the local data is in a confidence interval, it is not in a point.

DR WHEATLEY: As long as it is borne in mind that other adjustments can take you outside that confidence interval.

DR SATCHELL: Absolutely, because there's always that 5 per cent anyway.

DR WHEATLEY: We will discuss later the low-beta bias.

DR MIRRLEES-BLACK: I think we have reached a measure of agreement here. We will have the coffee break, but we might be able to finish off beta if possible in just 10 minutes by doing two things: first of all, simply avoiding some of the detailed measurement questions which I think can be dealt with in later discussions that are not particularly pressing for today, but maybe the low beta bias question is one which is important to address. So if we might spend a few minutes on that before we break for coffee. I will say that there's a measure of agreement that empirically there is a low beta bias in the returns from stocks where the low beta is a bit higher than the CAPM would suggest. So there's agreement about that issue. The question is what should the AER do about it.

DR SATCHELL: I want to raise a question on this which may shatter this sense of agreement. When we say "low beta bias", and I'm now putting a statistical hat, do we mean that we believe the true beta is larger, because that's what bias usually means, or do we mean that actually the CAPM doesn't hold and then in this particular world stocks that have low betas typically also have some alpha.

DR WHEATLEY: John Handley, a former adviser to the AER, coined the phrase "low-beta bias" and it refers to the second of the possibilities.

DR SATCHELL: Yes. It's not a helpful phrase because --

DR WHEATLEY: You will have to blame the adviser, John Handley, and the AER for using the phrase.

PROF JOHNSTONE: I'm just thinking that the possibility there was the one Steve said the CAPM didn't hold. Is that what you meant?

DR WHEATLEY: The "low-beta bias" refers to the idea that the CAPM underestimates the returns to low-beta stocks.

PROF JOHNSTONE: That's wrong.

DR WHEATLEY: ((Indistinct).

DR SATCHELL: I actually worked in this area in an academic sense. You can explain a lot of the low beta bias by historical interest rate movements. So, as interest rates have fallen historically from 1980, low beta stocks have typically exhibited this pattern, historically correct, and as interest rates are likely to go up in the future, we might anticipate they may go the other way. So, this is really a change in the structure of the CAPM rather than a flaw in the CAPM, if we are measuring something that's exogenous to the model. So I query whether there is a problem here or whether we need some adjustment.

MR SADEH: I think I agree with you and the reason I say that is I thought the weight of the regulatory framework works by having the benchmark efficient entity by nature bifurcates systematic versus non-systematic risk and therefore as an investor, if I'm looking at my required rate of return, I would naturally think what do I require as a return on all my cash flows. The rate of return from the regulator is on the RAB, so by definition I will want an alpha for the extra risks that I'm taking, but that is reflected in things like the opex allowance. So I actually don't see there being a disconnect there between it. As I said, over time you should absolutely expect that networks should earn a greater return higher than the pure AER return on RAB because they should be outperforming on opex, at least if your data sample is from networks that are statistically the top performers, which they are.

PROF GRAY: But I think what we are talking about is there's like 60 or 70 years of empirical evidence. Every time someone looks at this question they come up with an empirical relationship that has a flatter slope than the CAPM would suggest. So, whether we call that low beta bias or we call it something else, it's a pervasive empirical

result that has applied for 70 years. The academics that are published in this area are basically a finance hall of fame: Black, Jensen, Scholes, Fama, Macbeth and so on. Multiple Nobel Prize winners have published in this area and they all find the same thing, that the returns empirically on low beta stocks are consistently higher than what the CAPM would suggest. That's like 70 years.

So Graham's textbook, like all of the finance textbooks, sets out a picture of low beta bias or whatever you want to call it. In fact, Graham's textbook has two pictures, one that shows the effect over 70 years and then a second picture that shows the effect has become more pronounced in more recent times. So, the fact that there's this empirical evidence that low beta stocks outperform what the CAPM suggests I think is not subject to any question.

So then the issue is what are the possible explanations. So in the expert conference that we had last week, I think Graham quite usefully set out three possible explanations. So, one is that it's a real effect, that investors do actually price assets, low beta assets, to earn a return higher than what the CAPM would suggest and that's borne out in the data. That's one possibility. A second possibility is that there are just poor statistical tests that we can't trust for empirics. That seems quite unlikely given the widespread acceptance that's in all of the textbooks and so on and, as I said, the hall of fame of empirical researchers that have worked on this.

Then the third explanation is that there has been 60 or 70 years of good luck, that investors in low beta stocks have priced those stocks hoping to return what the CAPM suggests, but just year after year in every developed market for 60 years they've had this extraordinary run of good fortune and just random good luck has meant they have outperformed.

So, I think the weight of evidence has to be on the effects being real, given how pervasive it is, how well accepted it is, it is in all of the textbooks, it's in every developed market, it's across 60 or 70 years, and so it is not something to be ignored on the basis of, well, things might be different in the future.

DR SATCHELL: I absolutely agree with the historical

record, that there's almost unanimity on this, but I actually query it to some extent. The effects may not be quite as big as has been found in the literature. One of the reasons why, and I don't want to go into a long statistical rant and this is something I'm quite happy to write up later, but just intuitively the slope and the intercept are negatively correlated. So if you pick stocks with a small beta, even if the true alpha is nought, you will find typically higher alphas. There's a negative correlation between them. Many of the methods --

DR WHEATLEY: The size of the relation is minute.

DR SATCHELL: I'm sorry, I can't hear you.

DR WHEATLEY: The size of the relation is minute.

DR SATCHELL: It may be minute. Is it minute in every single case? Probably not.

DR WHEATLEY: In the report that you provided it was minute.

DR SATCHELL: I mean, the present - it is undoubtedly there and I'm giving the simplest example. I can give more complex examples why you might find this phenomenon too. In any case, I mean, even if we were to accept that this is something that's present, what do we do about it? One thing we could do about it is we could subtract alpha from all the network companies. When you are coming to compute what the required return should be, is it that we put alpha in, do we take it out? You could either increase returns or decrease returns.

DR WHEATLEY: Your suggestion is to ignore the evidence and use the model anyway. That's what subtracting alpha amounts to.

DR SATCHELL: There's two things here. One thing is that I'm not entirely convinced by the evidence and secondly it's not clear to me precisely, even if you accept the evidence, what you're going to do next.

PROF GRAY: So we need to apply the same threshold for evidence consistently across a regulatory framework. So if empirical work from Black, Jensen, Scholes, Fama, Macbeth, all of the textbooks, 70 years, every developed market is not sufficient to have regard to a piece of evidence, that has to be applied to all parameters.

MR HANCOCK: If for argument's sake, sort of accepting that evidence, in its absence we assume that cost of capital is given an independent gearing. In wanting to accept this proposition, what it's saying to me is that if I'm a low beta I should gear up to be a beta of one, and I won't really be penalised for that and what I will actually do is reduce my WACC. So, if that's the case, then is an entity financing itself efficiently if it runs at a low beta knowing that it doesn't have its WACC adjusted appropriately for it when it could move to a higher beta? So with this model it seems to me that the WACC actually becomes dependent on the gearing position and at that point we have to start saying, "What is an efficient gearing position?"

PROF GRAY: The AER will have to make that call. That's what the AER will decide is what we think is the gearing number and then it will need to, I think, estimate, same as my students, estimate an equity beta to be consistent with that gearing number and that equity beta re-geared to 60 per cent I think will inevitably be less than 1. So that's what the AER will do and that's the number that it will come up with.

Then the question is, given that it has come up with an equity beta less than 1, do we take into account this 70 years of consistent evidence or ignore it? I think that's the question. Whether there might be some incentive in some sort of theoretical context of whether a firm might want to gear up higher or lower, I'm not sure that that's relevant. I think the AER will decide, "Here's the equity beta, here's the level of gearing that we are going to adopt for the benchmark efficient entity," and then the question is do we believe that the CAPM number is the right one or do we have some regard for the 70 years of empirical evidence?

DR SATCHELL: How do we take it into account?

PROF GRAY: Good question. By way of example, the AER currently uses the CAPM slope of 6.5 per cent. If you were to adopt a true slope, an empirical slope, of 4 per cent just for the sake of some numbers, so the CAPM has a theoretical, 6.5 per cent slope. If the 4 per cent slope were used based on empirical evidence, then a raw beta of 0.5 would go up to 0.7, because the way the AER will take

that into account is to compute what adjusted beta would we have to use to produce an outcome that's consistent with the empirical evidence. A raw beta of 0.6 would be adjusted up to 0.75, and a raw beta of 0.65 would be adjusted up to 0.8.

So, I agree with David that you would have to look at a range of slope adjustments based on the observable evidence. My example there was going from 6.5 to 4. So there was a slope adjustment of 2.5 per cent, which is within the range that the AER itself looked at. I think the AER looked at ranges of 1 to 3 per cent slope adjustments in the 2013 guideline.

DR SATCHELL: Stephen, if I'm understanding your example correctly, you are actually now talking about the beta bias?

PROF GRAY: No, no.

DR SATCHELL: So the (indistinct) and 6.5.

PROF GRAY: So the way the AER has regard to it is rather than use the empirical function, it's still going to use the CAPM but it's going to adjust the beta and ask the question, "What beta when plugged into the Sharpe-Lintner CAPM would produce an outcome, return on equity, that is consistent with the empirical evidence?"

DR SATCHELL: Isn't that conceptually similar to saying that the beta is wrong and therefore needs to be moved?

MS CIFUENTES: Yes.

PROF GRAY: No, it's not correcting misestimation in the beta, which is the way you normally understand a bias. It's a correction for the shortcomings of the model itself.

MS CIFUENTES: But the net effect I think is what Stephen says, given his original --

PROF JOHNSTONE: I'm a bit confused by the beta bias relevance in the context because, as I see it, the argument goes that the regulator's estimating beta appropriately, let's assume that, the regulator plugs it into the WACC formula and (indistinct) WACC, but the asset owners are not happy with that WACC because in the real world, in the real

market they would earn a higher rate of return on that beta than this WACC. So therefore it sounds very tendentious to me that we actually now want to actually use this apparent 70 years of data to justify a result number greater than the one that the MPV zero formula suggests, after all the argument about how to measure that beta in the first place.

PROF GRAY: That's a religious argument, isn't it, that you are going to have faith in the CAPM to the exclusion of 70 years of consistent evidence?

PROF JOHNSTONE: That's probably my fault. This has all been religion. There's a lot of religion.

PROF GRAY: With the 70 years of data.

PROF JOHNSTONE: Okay, again getting back to my point, though, it's a convenient argument because it's basically saying that when the devotion to the WACC doesn't give us the answer we want, we find the reason why we should actually earn more.

DR WHEATLEY: (Indistinct).

PROF JOHNSTONE: If the asset owners were earning half that, you're selling up.

DR WHEATLEY: The problem is not with the WACC. It's with the CAPM.

PROF JOHNSTONE: It's the whole thing, the framework. Forget about the religion. If the real world would provide asset owners a greater return on what they are doing than the regulator is, then the asset owners would be walking away to that real world.

DR MIRRLEES-BLACK: I think this is an issue we still need to return to. We need to have morning tea, so we will break now for morning tea and reconvene in 15 minutes. Thank you very much.

SHORT ADJOURNMENT

DR MIRRLEES-BLACK: We'll make a start. I have a note that applies to many of us that can we speak up when we are making a contribution, to make life easier for the transcriber, and to speak clearly and loudly. Thank you.

There are some remaining issues on beta that we could discuss, and they include further issues in terms of adjustments and questions around stability of beta. I think in the interests of making progress through the day we should park those issues and if there are burning issues remaining on beta we can pick those up in the last session, with the board's concurrence. So I think in that regard we will then move on now to discussing equity market risk premium issues and debate those.

Just in terms of this session I think the plan was that, Stephen, you will contribute to a small part of it, and then switch to Graham, is that right? Just for everyone's information. So, turning to market risk premium and preparing yourself for the relevant page of the document that we prepared, the first question is - there's a little question and it relates to what are the possible approaches to determining the required return, so backward looking, so forward looking dividend discount models and survey evidence. But I think we will turn to the individual estimations, those individual parameters in a moment.

But I think there's a question does anyone else have any alternative method of estimating the equity market risk premium that we haven't noted so far that they want to raise or are we down to those three methods that we have identified. So that's historic returns, dividend growth models and survey evidence of either, the sorts of evidence that we should be receiving, is there agreement about that. Stephen, I know you've had little time to contribute to that, but is there a source of evidence?

DR SATCHELL: Again, I won't lead off on this one, I don't think, thank you.

DR MIRRLEES-BLACK: Okay. Is there additional --

DR WHEATLEY: There are alternative methods that have been introduced in the literature over the last two or three years, but I don't know of anyone who's using them in a practical manner.

DR MIRRLEES-BLACK: Okay. So for the purposes of our discussion we can constrain ourselves to the models that have been considered as a result.

The second question, and this is a question in relation to using the historic equity rate of return, there's a question: Should it be only the arithmetic average of historic returns that should be used? So this refers to the historical data on returns. There are normally two measures to assess average returns, the arithmetic return and the geometric return, and the statements by most of the experts here refer to the statistical properties of the arithmetic mean as the unbiased estimator of a one year return.

There are two questions that come up about this. One is: Is the right holding period for investors to assume one year or is it longer than one year? I think we can observe some owners have expectations of holding assets for many years or decades. Then the question is: Then if the holding period isn't one year, what is the appropriate estimate for returns over a holding period that is longer than one year, and what implication might that have for the way that the historic returns are assessed? So would someone like to make a comment on that?

DR WHEATLEY: So, to all intents and purposes, in the regulatory process, an estimate of a WACC is not compounded over more than one year. The problems that arise with arithmetic mean rates of return is when they're compounded. In the regulatory process, an estimate of the WACC is not compounded. So it is my view that the AER should use only the arithmetic mean rate of return.

PROF GRAY: I agree with that. The question is not how long might an investor want to hold the asset for, but how does the AER use the MRP number that it comes up with, and that's a year at a time.

PROF JOHNSTONE: If you look at someone who holds an asset over a period of years, then what they actually physically earn is the geometric return compounded by the number of years. That's what they actually get. That's by definition.

DR WHEATLEY: But that's using parameters, not estimates.

PROF JOHNSTONE: An estimate --

DR WHEATLEY: The issue is does the AER compound an

estimate?

PROF GRAY: And it doesn't.

PROF JOHNSTONE: If the estimate is of the geometric return, then you would compound that, sensibly. The validity of the estimate is another story. But if it is an estimate of a geometric return, you compound that correctly.

DR WHEATLEY: But the issue is does the AER ever compound - can you point to where in the regulatory process the AER compounds an estimate?

PROF JOHNSTONE: I don't know. But all I'm saying to you is if you want to look at what someone earned over a period of time and you express it on a per year basis, you would express it as a geometric.

PROF GRAY: That's not the question, though.

DR MIRRLEES-BLACK: The question is the AER in the current guideline, in the supporting papers for it, it says the best estimate is the historical excess return over a 10 year period is likely to be between the geometric average and the arithmetic average. That's what the AER has said.

PROF JOHNSTONE: It's actually not specifying what it's trying to catch. The best estimate of whatever - to be specific you need to write down the best estimate of the geometric return or the best estimate of the arithmetical return. They are two different things.

DR MIRRLEES-BLACK: Of the experts who submitted to this question here, Graham and the representative of Graham said that both geometric and arithmetic are used in practice and it is likely that the MRP lies somewhere between the two and Graham has looked at the table that Stephen --

DR SATCHELL: I don't want to comment on it, actually.

DR WHEATLEY: The AER does not use a 10-year rate of return. It doesn't compound. Where in the process does the AER compound an estimate?

DR MIRRLEES-BLACK: I guess the experts around this table.

MR HANCOCK: I accept that to estimate a mean of an excess return that you use an arithmetic average of the past, assuming that mean is stable. I don't think that there's anything sacrosanct about a one-year rate of return. If you look at five-year rates of return, I did some rough calculations on some opposite data. If you look at five-year rates of return, then the excess returns are about a percentage point lower than on the one-year returns, and 10-year returns are sort of one and three-quarter percentage points lower. So there's a big difference and we're talking about investments that are long-lived and I'm not convinced that the one period point of view is the appropriate one.

If you look at the dataset that these observations are drawn from, they are very, very volatile. So, although you may have sort of a 6 per cent average over a long run of years, that's made up of some years where it's 20 per cent and some years where it's minus 10 per cent and that volatility affects the end point that you get to and that sort of volatility is not built into the revenues that the AER allows. So, I'm not convinced that that sort of one-year figure without allowance for that volatility is consistent with the investment decisions that are actually being made here and the cost of capital that's required against them.

MR SADEH: I'm not sure I understand the arithmetic or geometric point very much, but if it is simply a function of the return that I would get on a listed stock it can't be a geometric mean because if that's the case why are we talking about imputation credits because it would have to have a distribution rate of zero. Clearly a lot of the return in listed stocks, the networks, are from yield. So it has to be an arithmetic figure.

PROF JOHNSTONE: To me it's just an issue of how you write something and one can be converted into the other back and forward. If you were using data to estimate and you actually have geometric returns as to data, then you are estimating the geometric return. If you have arithmetic returns as the data, then you are estimating the arithmetic return. You can then express one back and forward the other way.

DR MIRRLEES-BLACK: Simon, just to clarify, in your view the fact that investors may intend to hold a stock for

longer than one year is irrelevant for the decision here.

DR WHEATLEY: I know that Martin Lally is not attending this session, but he's written a working paper that basically shows the same thing.

PROF GRAY: It's just a matter of mathematics, I think. You want an expected return for the use of the CAPM and the arithmetic mean gives you the expected return.

DR MIRRLEES-BLACK: I think the question is if your expected holding period was longer than one year, then I think it's a different question.

PROF GRAY: Potentially, but that's an irrelevant question because the AER does it a year at a time. There's no compounding, as Simon says. I think the easier way, rather than sort of getting to the mathematics and sort of explanation as to why that's the case, the easiest way is to think about how do we assess the historical data. Suppose we've got 50 years of historical data. If the way to think about that data is that for next year the market risk premium could be like year one, if there's a one in 50 chance that next year will be like year one in our historical data. There's a one in 50 chance that next year might be like year 2. There's a one in 50 chance that next year might be like year 3 and so on. That's how we should think about the historical data. We've got 50 observations of what that MRP next year could be like, and so if you think about it that way it just becomes abundantly clear you've got to take the arithmetic mean.

DR MIRRLEES-BLACK: An investor may not be considering just a one year return. An investor might be considering what's the return on a five year basis.

PROF GRAY: The AER is, and I think even if you're looking at a longer period, we can put together a little mathematical example to show that even over a two-year period the same applies, or any year period you are going to want an arithmetic mean. There's even a Harvard Business School case that deals with this very issue, the Marriott case. One of the key issues in that is explaining to students why they have to take an arithmetic mean if they are using historical excess return.

MR HANCOCK: Accepting that you take an arithmetic mean,

taking your 50-year example, I could break that into 10, five-year periods and average those 10, five-year periods and that would give me a consistent estimator of the five year returns, of a five year return to be used over a five year regulatory period.

PROF GRAY: And that would be - I'm not sure why that would be different from the mean of the one years.

MR HANCOCK: It is.

DR SATCHELL: Yes, because the data has got some correlation in it, basically. The sort of example of doing one on 50 is implicitly saying every observation is essentially IID, independent identically distributed. It isn't quite, and that's why you will get different answers. I don't have a particularly strong view one way or the other. I'm disinclined to rule out - and this doesn't help the AER - I'm disinclined to rule out one procedure completely.

PROF JOHNSTONE: The CAPM doesn't solve the issue because the CAPM is a one-year model. That's why compounding - it doesn't ever come up in compound, in CAPM. Part of the simplicity of the CAPM is it is a one-year model. So if it was a model of asset pricing over periods, whether they're years or months or whatever, it is a one period model, the CAPM, so it doesn't need to be a year. If there was a model that actually was valid for a longer number of periods, then you would have the issue arise. It doesn't arise in the CAPM. But I can't see it is an issue.

MR HANCOCK: The one period could be a five-year period.

PROF JOHNSTONE: It could be, yes.

PROF GRAY: Not the way the AER does it. It does things a year at a time. There's no compounding.

DR WHEATLEY: The issue is the bias that can arise when you compound estimates. The AER never compounds estimates.

MR HANCOCK: In a sense a one-year estimate is like 12-months when the estimate is compounded, a five-year estimate is five one-year estimates compounded. So to say there's no compounding, I'm not sure I really get the point.

DR WHEATLEY: An estimate of a one-year rate of return is never compounded. The inputs are one-year rates of return.

MR HANCOCK: But that could be five-year rates of return.

DR WHEATLEY: But they're not. They are one-year.

PROF JOHNSTONE: You can take the arithmetic return for a given year and express it as if it was a continuously compounded amount and that would be the geometric return in its pure form. So it's just a matter of expression. That's all it is, one back and forward.

DR MIRRLEES-BLACK: I think there is a question. Obviously after some reflection the AER made this statement. In the current rate of return it said the best estimate is a weighted average. I think you are saying that that's irrelevant and --

DRDR WHEATLEY: That is correct.

DR MIRRLEES-BLACK: And there may be some relevance to that. You are saying it's incorrect.

DRDR WHEATLEY: It's irrelevant because they never use estimates compounded over many years.

DR MIRRLEES-BLACK: I think we need to perhaps firm up these statements in the joint report and it's a question of what precisely the estimation the AER has made should be. But I think there are some different statements that the AER has made in the past and I'm not sure we have finally resolved a position on that between the experts. But I don't think we should spend more time on it now.

PROF JOHNSTONE: Can I just say that I think part of the problem, at least in my case, is I don't fully understand where the question is going. I think I would benefit if the question was refined slightly and then I could perhaps comment more clearly.

DR MIRRLEES-BLACK: I think the question is in considering historic equity return, the statement that you might make is only the arithmetic average should be used. So there should be no weight placed on the geometric average.

DR SATCHELL: In all conceivable contexts? In one specific context?

DR MIRRLEES-BLACK: In the context of determining the average of the historical equity returns on the data that is then used as evidence to construct the market risk premium in the regulatory process in Australia.

DR SATCHELL: If that's what the question is, I would go away and think about it.

PROF JOHNSTONE: The return in the CAPM is the arithmetic return because it's one period. One period can be any amount of time and you could re-express that return as continuously compounded or compounded monthly or whatever you like.

PROF GRAY: In the PTRM the period is a year at a time.

MR SADEH: Which presumably is meant to be consistent with the overall rate of return which includes things that get refreshed annually like the cost of debt. So it would be to me inconsistent to have different periods of time.

PROF GRAY: Everything happens one year at a time.

DR MIRRLEES-BLACK: Okay. Very good. We move on. I will make some statements that have been made and I think there's no contention about this in the paper. So, the historical equity return is one piece of evidence. It's not to be considered pre-eminent, but rather sitting alongside other evidence. There's a further statement, and this might be of importance for the AER. The data used for the estimation of the historic equity return should be based on the Dimson, Marsh and Staunton data and with certain adjustments. There are questions around those adjustments, and the experts in their conference there was a statement about whether we should be making the additional adjustments to the historic data sources and a general measure of agreement about the use of those adjustments.

PROF GRAY: Are we talking here about what's become known as the NERA correction?

DR MIRRLEES-BLACK: Yes.

DR WHEATLEY: Which are those corrections used by Dimson, Marsh and Staunton.

DR MIRRLEES-BLACK: Yes.

DR WHEATLEY: Dimson and Marsh are professors of the London Business School and Dimson is also at Cambridge now, I think.

DR MIRRLEES-BLACK: Yes. And then there's a further statement of agreement that the data used for the historic equity returns should only be for periods of 50 years or more.

ASSOC PROF PARTINGTON: Well, there should be a substantial period, that's clear. It depends on the variability in the standard error of the estimators and what you think is sufficiently accurate.

PROF GRAY: Would we all agree that 17 years is too short?

ASSOC PROF PARTINGTON: Very likely.

PROF JOHNSTONE: Who knows? That's the problem. So we're meant to be estimating something for the future from the past. I would say you would be deeming that the past 17 years aren't representative of the future. Well, who knows?

DR WHEATLEY: The suggestion is not to exclude the last 17 years, but that the past 17 years are not, on their own, a long enough period.

MR SADEH: I just think about it as simply as if I look at all the parameters in the WACC equation, what are intuitively the figures that are least likely to move? This to me is the parameter that should move the least.

PROF JOHNSTONE: Again, sensitivity analysis would be good just to see what a difference it makes over 10, 20, 30 years.

ASSOC PROF PARTINGTON: I can tell you if you did rolling averages over the last 20 years, it's been going down. It's over the last 50 years it's been going down.

MR SADEH: Relative to what interest rate, spot or average?

ASSOC PROF PARTINGTON: Relative to the rate prevailing at the time the measurements were done.

MR SADEH: So a spot rate.

ASSOC PROF PARTINGTON: Yes.

DR MIRRLEES-BLACK: That comes to the question as to over what period would you need to see lower returns in order to be able to justify that the MRP as used by the AER should fall, and I think some people are saying less than 20 years is too short, but if there is a beginning of a move down in the returns, when should you start to adjust the returns downwards that you are using in the regulatory process?

ASSOC PROF PARTINGTON: As we said before, we need high bars before we shift stuff and these things are measured very imprecisely. If I was making the decision right now, I would probably make it 5 per cent. My view is 6 per cent, which has been the consensus for a long time, is probably too high. I've felt that for a long time but I haven't felt the weight of evidence has been sufficient to move it down.

MR SADEH: Is that statistically based or is that based on a vibe?

ASSOC PROF PARTINGTON: It's based on a number of things. One thing that I came across recently is a report that was sponsored by Challenger and just published in January this year. I have a copy of it somewhere. They reckon, using the DGM, it's 4 per cent, and using working with the Dimson et al data they come up with a figure of 5.9. I don't quite know how they came up with that. But if I look at their data, they have this very interesting chart where they do do 20-year rolling averages right from the beginning of the century and from the 60s onwards there is a very clear downward trend. There's confirmatory bias here on my part because it's consistent with my priors that the rate has been going down and there are all sorts of theoretical reasons why that would be the case.

DR WHEATLEY: So what is the topic of discussion at the moment? Is it what is the long-term MRP?

DR MIRRLEES-BLACK: The question was - we are on actually

item 3f, so just confirmation that one needs a long string of data on the historic equity return in order to be able to justify a significant move down, and I think Graham was expressing a view that --

ASSOC PROF PARTINGTON: The 40 or 50 years would probably be an appropriate period.

DR WHEATLEY: You were talking about the long-term average, and now he's talking about the short-term because he’s referring to dividend growth models.

MS CIFUENTES: No, I think it was in response to Jonathan asking at what point do you start moving it down, and I think that that's what --

DR WHEATLEY: The question was about the long-term average, and --

ASSOC PROF PARTINGTON: I was responding to Ilan's question about why was I thinking it should be lower.

DR MIRRLEES-BLACK: Back on track. I think we have some form of words there which we can work with. Everyone also concluded that DGM is a useful source of evidence --

PROF GRAY: Just before we get off the use of the historical data, the Wright approach, we had some discussion about this in the expert conference.

DR MIRRLEES-BLACK: Indeed. I think we moved swiftly to 3f which is effectively that. There is a statement which I think is a hypothesis which is 3f, "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 the changes in the risk free rate precisely offset changes in the MRP." So within that, that encompasses the right approach. So there is one approach which is we assume that the model is that returns comprise a risk free rate plus an equity market risk premium, and on the other side there's an expectation about a total (indistinct) return, whether real or nominal, and that you deduct the risk free rate from the maximum (indistinct) varying MRP. I think that the consensus was that you didn't believe either of those were the truth.

PROF GRAY: The truth is somewhere between those two

theoretical end points, yes.

MR HANCOCK: I sort of lean away from the Wright and towards the sort of Sharpe-Lintner varying (indistinct), particularly because I think it's better grounded in a theory of risk as something that consumers want to avoid. So people want to avoid uncertainty in consumption streams, so that leads you to something like a relatively stable MRP more than an MRP that's correlated with the risk free rate.

PROF GRAY: What is your reaction to what happened around the time of the GFC? So, the AER's approach has been to apply an effectively fixed market risk premium. At the time of the GFC, government bond yields fell from 7 per cent to 4 per cent in the week after Lehman Brothers defaulted. So the approach of applying a fixed MRP suggests an outcome where the cost of equity capital crashed dramatically at the time of a global financial crisis, which is clearly nonsensical, but that's the outcome that a constant MRP produces.

MR HANCOCK: My response would be, okay, so you are saying the effect of that is that we drag down the cost of equity.

PROF GRAY: No, no. So what happened was the AER's allowed return on equity was considerably lower at the time that the cost of equity obviously went through the roof.

MR HANCOCK: So the question is why did the cost of equity go through the roof. Was it because of a change in the MRP or was it because of people adopting a much more bearish outlook on to the future cash flows? How do we disentangle those two?

PROF GRAY: So do you think the investors' required return on equity went up or down at the time of the GFC?

MR HANCOCK: Okay. So, if I had a security for which an investor had the view that the risk characteristics of that security were unchanged, then I'm not convinced that their required return on it changed - sorry, that their risk premium on it changed.

PROF GRAY: I think that's extraordinary, that in the heat of a global financial crisis that the required return on equity does not change.

MR HANCOCK: No, I didn't say that. So the required rate of return on equity changes because people perceive it as being much more risky. That is what has happened.

PROF GRAY: So required returns would go up or down when they change?

MR HANCOCK: So when people think things are more risky - by leaving aside the time series, at a point in time looking across safe to risky assets, then people want a higher return on the risky asset. So, a shock like this, suddenly people are evaluating assets that they previously evaluated as safe as being more risky. But it doesn't mean that the sorts of parameters that they are applying to risk or the compensation that they require for risk has changed. What it means is that they think they've got more risk, and that's influenced by what they have just seen.

PROF GRAY: Isn't that like a key part of the market risk premium, is the quantum of risk? Isn't it the quantum of risk and the price of risk?

MR SADEH: Relative to a government model, which to me is the key point, or from my perspective what did I think happened during the GFC, from an investment point of view whether you look at property markets, infrastructure markets, and you can see, whether you look at federal versus state government bonds, whether you look at it versus A grade and B grade buildings, the first thing you started to see is that the premium for risk expanded. It meant that people had a view on low risk sovereigns relative to A rated banks. If you are looking in the bank market, before the GFC virtually all the banks issued paper at the same rate, whether they were a regional bank rated BBB flat, whether they were a major domestic bank rated AA. As soon as the GFC comes in, the first thing people do is go, "Oh, no, we need to look at risk layers differently again."

So, I think in those extreme events of recession or frankly boom there is a change in the risk premium reflecting that heightened view on risk in recession and more relaxed view in boom. I don't think it's linear, so I don't think this happens during normal parts of the rate cycle. I think it only happens in extremes.

PROF GRAY: I had a list of propositions that I thought were completely uncontroversial and this is one of them.

So maybe we just sort of test that, whether people believe that the required return on equity in the real world went up during the peak of the GFC. I think it did.

PROF JOHNSTONE: Yes, I would agree with that.

ASSOC PROF PARTINGTON: Yes, I agree. Difficult to say how much.

PROF JOHNSTONE: But there's more to the story than that.

ASSOC PROF PARTINGTON: Cash flow estimates obviously collapsed as well as risk premiums went up. How you partition between the two is very difficult to say.

MR SADEH: The best way to look at it is if you look at graphs of corporate spreads between, you know, A grade, BBB grade corporate spreads, for example.

ASSOC PROF PARTINGTON: That is a default premium which is not part of the expected return.

PROF GRAY: But if we agree that required return on equity went up during the peak of the GFC, just mathematically it's the case that applying a fixed risk premium to the 10-year government bond yield would have resulted in a 3 per cent decrease in the allowed return, and so that's a real problem with applying a fixed risk premium, in my view. It produces a nonsensical outcome.

PROF JOHNSTONE: The GFC being a short period, don't we overcome that with long enough windows for the inputs, market risk premium and the risk free rate? The GFC effects are relatively short-term and (indistinct) come and go.

PROF GRAY: It depends what the AER is trying to do. If the AER is happy that it's going to undercompensate during some periods and overcompensate in other periods and over a longer period of time things will average out, then that would be okay. But I think the task for a regulator is to allow investors and charge users in every regulatory period what would be a fair return in that regulatory period. Otherwise you end up with these inter-generational equity issues.

PROF JOHNSTONE: It's very generous, though, because saying anyone who holds assets is in a certain business can

actually retrospectively get rewarded for risks that they never foresaw. So they're just immune to risk, essentially.

PROF GRAY: What I'm proposing is that if we all agree, which I think we just did, that required returns went up during the GFC, then like an NVP equals zero framework suggests that the allowed return should be equal to the required return.

PROF JOHNSTONE: That's too generous. It's retrospectively changing the rules to make sure that someone who has made a business decision to be involved in a service provider actually is always going to be rewarded as if they made a decision that day.

PROF GRAY: I'm not sure that's right. I think the way to think about it is, in relation to the return on equity, what the AER's task should be is to ask what's the return that equity holders would require for investing capital.

PROF JOHNSTONE: Yes, that day.

PROF GRAY: Today.

PROF JOHNSTONE: Yes.

PROF GRAY: And then set the allowed return commensurate with that.

PROF JOHNSTONE: That's what I'm saying, though. In other words, it just immunises these asset owners from GFC-like risk or any risk.

PROF GRAY: No, I'm not sure it's immunising. I think it's a matter of setting the allowed return commensurate with the required return.

PROF JOHNSTONE: Yes, it's the same thing.

MR SADEH: I think you really need to look at the nature of the risk free rate together with the risk premium, i.e. is the risk free rate, which it is at the moment for cost of equity effectively a spot rate. In the unlisted space when we work with independent valuers to look at our discount rates; you know, the typical MRP that they apply is over a longer term risk free rate. Now, that is

not a uniform thing in the investment community, particularly when you get to extremes in the interest rate cycle, because you have people who start to compare a long-term investment, which a network is, compared to short-term stocks and bonds, they start to look at it compared to spot rates. But generally speaking the unlisted investment community will compare their MRP over a longer term average risk free rate. To your question about should it be moving, it's also relevant to on the basis of which base rate you use.

PROF GRAY: I think there's a really fundamental point here, and this is probably on my list of uncontroversial propositions as well, is that the AER's task in relation to return on equity should be to set the allowed return on equity equal to the return that investors require. So, suppose we can reliably estimate the required return on equity. If we could do that, it would be a no-brainer, I would have thought, that the AER would set the allowed return to be commensurate with that, period by period.

PROF JOHNSTONE: But what you are saying is you set it at the rate they require that day under those circumstances and then tomorrow you set it at the rate that they would require that day under those circumstances and so they are just dynamically getting protected.

PROF GRAY: Well, first of all, it happens every five years and for each five-year period they are getting a return commensurate with the market equilibrium required return.

PROF JOHNSTONE: Five years is a lot longer period. It seems fair enough. That's why I would argue, in the interests of stability, you would use long-term rolling averages, not too long, not 100, but who knows what, but you certainly wouldn't be reacting to GFC type events and things like that.

PROF GRAY: Do others have a view on whether the AER should set an allowed return commensurate with its best estimate of the required return?

ASSOC PROF PARTINGTON: That's almost tautology, isn't it? The problem is how do you do it? As I recall, the AER did raise the allowed market risk premium during the GFC.

DR MIRRLEES-BLACK: The questions which we are addressing

ourselves to is what is the market risk premium in the circumstances. I think it is taken as a given that at the start of course we are trying to estimate what's the opportunity cost of capital for an investor who could invest in these businesses or something else, and that precisely is it reflects the required return, what the investor requires for that risk.

But coming back to your - I think if we take it that it's almost uncontroversial, your statement in terms of are returns required. You have a series of other propositions?

PROF GRAY: What follows from that, I think, and the GFC is a good example of that, is that setting a fixed risk premium or an almost fixed risk premium will not achieve that. What happened in the GFC, I think required returns went materially higher, allowed returns under a fixed risk premium would have gone materially lower. So that highlights a problem of having a fixed or almost fixed risk premium.

DR MIRRLEES-BLACK: And it also raises a problem in terms of estimation historically. If you think that's the model that drives returns in the market, your estimation needs to reflect that too. So do others have a view of Stephen's propositions around movements in the market risk premium?

MR HANCOCK: I accept the point that with a shift in subjective expectations being that things are much more risky, that you expect to see a larger risk premium go up under those circumstance, even with sort of a constant consumer price for risk, as it were, because in that case they actually have more risk and so therefore you do see a higher market risk premium. The question is can you see that correlation in the data? So can you find the correlation between the market risk premium and the risk free interest rate over a long period?

PROF GRAY: The way I think about it is this. As Jonathan highlighted a little bit, at one extreme you can take the view that the market risk premium is constant over time and we all think, I believe, that that's silly, that's one theoretical end point that does not reflect reality. At the other extreme you can have a constant real return on equity and assume that the market requires constant real return on equity. So, whenever the government bond yield decreases, the market risk premium increases to exactly

offset that. That's equally silly at the other end of the spectrum.

In terms of how would you go about processing, analysing the historical data that we've got on record, I think we all agree that the truth is somewhere between those two end points, and so I would have regard to both of those two end points when analysing the historical data. I think in terms of what can you glean just from the historical data, that's the best approach, you get the best kind of information out of the historical data. That needs to be supplemented, which I'm sure we are going to come to, with forward looking DGM type estimates and so on. But in terms of how do you get the best information out of the historical data, I think it is somewhere between those two end points.

MR HANCOCK: If we accept that there will be sort of movement in the market risk premium, that in itself doesn't assert any link with the risk free rate, though, does it?

PROF GRAY: It doesn't have to, no. So I'm not suggesting in any way that I would just place 100 per cent reliance on this Wright approach and have a constant required return on equity. All I'm saying in recommending a point within that sort of theoretical spectrum is that, in the real world, investors' required returns don't move one-for-one with changes in government bond yields. As government bond yields have decreased over time, I accept that the required return on equity will decrease in that same direction, but not one-for-one. That's why I'm recommending a mid-point between those two theoretical extremes.

DR MIRRLEES-BLACK: Graham, can I bring you in at this point and it's just in the evidence that you've written up you've said the right approach has little to recommend it. I think that's so.

ASSOC PROF PARTINGTON: Like Jim, I would lean to the other end of the spectrum. I just find it fundamentally - and in fact that's what Steve said - it's fundamentally implausible that there's an inverse relationship between the interest rate and the market risk premium.

PROF GRAY: A perfect inverse relationship.

ASSOC PROF PARTINGTON: All right, perfect. I don't want

to put words into your mouth. It's not clear to me that that is the other end of the spectrum. I'm just not sure what the alternative might be. The other contribution I would make is we have repeatedly said you need a high bar to make a change. So the real problem is, if you were to adopt a varying approach, we've got 6 per cent, 6 per cent is a well established consensus, it's widely used in practice. If you are to change from 6 per cent, you need some fairly convincing evidence of a need to change, and that's the problem, is finding that convincing evidence.

MR SADEH: I largely agree with that. I will come back to the 6 per cent point at the end. My observation is that MRP done by independent valuers in the unlisted investment market hasn't changed since before I had hair, which is a long time ago. Upwards of almost 20 years I haven't seen the two major independent valuation firms in Australia change their number on MRP by a dot.

Now, the difference is, as I said, the typical independent valuer approach does that as a premium over a long-term average risk free rate. That goes to the point about 6 per cent. I think the AER's last was 6.5 per cent which I think is consistent with what might be more of a 6 per cent over a long-term average. I looked at it yesterday. When you look at all the different independent valuer risk free rate plus MRP, it averages 0.7 of a per cent since 2000 over a spot rate instead. So I think 6.5 per cent over spot compares to 6 over long-term average.

DR WHEATLEY: I agree with Steve that the MRP is not a constant through time and I am also aware of evidence that the mean real return on the market is not a constant through time, and that the truth lies somewhere in between the two.

DR MIRRLEES-BLACK: So if the truth is somewhere in between the two, that has two implications. One is a question for you, which is what does that mean for the way you should assess the MRP historically and, secondly, what implication does it have for how you might set the MRP in the context of a binding guideline It's just an estimation problem if you're just fixing your estimate of MRP for determination. Then the binding guideline, of course, you are setting an MRP which may then change through time. You don't have the option to revise in the context of changes vis-à-vis rate

at the time.

So there are two questions. One is historically how does it change your assessment and, secondly, how do you set the MRP in a future periods? So how should you take account of that estimation of the MRP, the fact that you are having to do two models, neither of which you think is 100 per cent true, but the truth is somewhere in the middle? What does that mean you should do?

DR WHEATLEY: A formulaic approach could work as follows. You have a number for the mean real return, you have forecasts of inflation and you have a term structure of interest rates, so that should give you the Wright forecasts of the MRP. You can then combine those with a constant MRP to give you some sort of average.

DR MIRRLEES-BLACK: So do we need historic data to construct a model of the MRP that falls between the two and then demonstrate that it has some statistical reliability?

PROF GRAY: I don't think so. One approach that the AER might adopt is just to have regard to all of the relevant evidence at the time of the guideline and to process all of that evidence and just to fix an MRP that will remain constant for the period of the guideline to be revised if there is a material change in market circumstances which we discussed last time. So that's one approach.

If that were the case, then all you need to do is the same as the approach that I laid out for beta, I think. We would start with the current estimate, which is currently 6.5 per cent, we would lay out all of the updated evidence and ask how has that updated evidence changed since we processed that evidence and got to 6.5 per cent last time.

In terms of the processing of the historical data, I would do what Simon recommended. We have an estimate from this theoretical end point, we have an estimate from that theoretical end point, and I would say that the historical data supports an estimate from somewhere in between, and that becomes one of the pieces of relevant evidence that we have regard to. Then we go on and look at DGM evidence and maybe surveys and things in addition to that.

DR MIRRLEES-BLACK: Graham, do you agree with that?

ASSOC PROF PARTINGTON: Certainly you can't argue against considering all the relevant evidence. The question is how much weight you apply to it.

MR SADEH: Is there any evidence of a negative correlation between MRP and risk free rate, because you need that to believe in having any of the Wright approach.

PROF GRAY: Just look at what's happened in the three years since the last guideline, three years in the last guideline, so if you look through the Officer data which goes back to 1888, they had a column for risk free rates and they had a column for market returns. The last three years since the guideline are the three lowest numbers in that entire series for risk free rates, and all of the reasonable evidence, I think, exogenous evidence, suggests that required returns have not come down one for one. The required returns have been relatively stable over the last three years, the headline required return on equity level, even as government bond yields have fallen to their lowest level in their 130-year history.

That's consistent (I'm sure we will come to independent experts and surveys and so on). That's consistent with what Ilan was saying, that there's two ways of accommodating that, the stability in required return on equity, even as government bond yields have fallen. One is increasing your estimate of the MRP. The other is using a risk free rate that is above the contemporaneous government bond yields. Both of those approaches will get you to the same headline number.

MR SADEH: Again I go back. My starting premise is if I look at all the parameters of the WACC, what should move the least. It should be the thing that is the broadest based in the market. I think we talked about risk free rates, they are separate, they shouldn't be a function of the market. Gearing is kind of firm, specific. Beta is industry specific. MRP is market specific. So surely that should change the least. As I said before, it should have very long observation periods.

So I agree with Stephen, the MRP certainly doesn't move in a one-to-one basis and certainly not during all normal parts of an economic cycle. I think when you do have distortions it is in extremes of the rate cycle

because what that does, which the MRP doesn't capture, is it reflects allocations of investors between the debt markets and the equity markets. That's what happens when interest rates get really low or really high. They are a function of are you in possession, are you in - so, you know, I will throw it out as a crazy idea.

One way that I would do it is kind of have a formula that says I'm not linear here and all of a sudden I'm something else. I would literally have a table that said except for - and you could almost either pick it as a confidence interval with interest rates. If the interest rate environment is lower than X per cent, then your MRP goes up by half a per cent and when interest rates are above a certain level, i.e. near the top part of the cycle or bottom half of the cycle, the MRP goes down by a bit and at all other times it is 6.5. That is, you obviously have to choose what level you want. It seems to me 6.5 per cent makes sense in the normal period.

MS CIFUENTES: Sorry, did you say 6.5 doesn't make sense?

MR SADEH: No, it does. It does if you do it over your prevailing approach on risk free rate, which is a spot of 10 years.

MS CIFUENTES: Yes. Just on that, Ilan, one of the suggestions from what you are saying is that this is really a question that comes into play when you've got extremes in the market, and if that's the case, because if you take the view that over the long-term period, 20 years, the MRP hasn't changed relative to a long-term bond rate, so pick that up, but what you tend to see is movements more in extreme conditions in the market. Does that go to Stephen's point that perhaps that should be dealt with separately as a re-opener issue rather than try and adjust for it, given that we don't actually know what is a normal period? I don't know whether the current levels of risk free rate is normal or not.

MR SADEH: That's probably a fair approach, you know, of naturally (indistinct) tables. You are right. You are talking by definition about an unusual event and therefore you should take that event circumstance into account as a re-opener. You can either specify it in a table with preprogrammed parameters or you can leave it like that. I think the circumstances should be so unusual that I think

we talked in session 1 that the re-opening issues should themselves be defined so it doesn't become just an overall subjective re-decision. Then you can use discretion in that sort of sense.

PROF JOHNSTONE: I think the arguments for stability, no-one can argue against them. So stability for the asset owners, for the consumers, it's got to be better for everyone. The question is is it stable and too high or is it stable and okay. If it is stable and too high, then it is obviously too generous and the chickens are going to come home to roost and prices are going to look too high and so on. But if it is stable and it is set at some kind of good level, stability has to be the go. Using, for example, a longer run risk free rate rather than the ups and downs in the spot rate makes a lot of sense in terms of stability, as long as it is not engineered somehow or other so that the net result is that the tariffs are too high. That's what it always comes back to.

PROF GRAY: Or too low. It's got to be symmetrical.

PROF JOHNSTONE: Yes.

PROF GRAY: So applying a fixed MRP to what's now the lowest government bond yields in the 130-year history results obviously in the lowest allowed return on equity ever. So the question is whether that's too high or too low or about right.

PROF JOHNSTONE: Yes, that's the question.

MR SADEH: And a lot of investors recognise that as a feature of the current framework which is, you know, a fixed MRP over a bond rate that moves, and that is seen particularly for long-term investors, superannuation funds, they want their members to have exposure to Australian macro-economic variables. They see this as a resetting bond in that circumstance. So they understand that in absolute sense, even though they are investing their equity for a long time, 99 years, they accept that during different five-year periods they are going to get an absolute return that is a function of the bond rate, and that's priced into the way the investment works.

PROF JOHNSTONE: But are you saying it's a function of the short-term variations in the bond rate?

MR SADEH: Yes.

PROF JOHNSTONE: So they are prepared to wear the risk, in other words.

MR SADEH: On the bond rate. Yes, on the bond rate, and that's a function of as when you look at that together with the trailing average cost of debt on the debt component because between the two of them they are something that the capital structure can fairly reflect because you do that by your interest hedging.

MS CIFUENTES: Again just if I'm understanding the logic of that you are saying from a practical real world perspective long-term investors, super funds, they are prepared to accept perhaps a lower MRP because that's part of the cycle and it's compensated for elsewhere.

MR SADEH: Sorry, I think I was saying that the MRP is quite constant and the rate of return that comes out of the whole equation by virtue of the application of the risk free rate is what goes up and down as a function of the market.

MS CIFUENTES: So is yours then an argument for saying the MRP - and we can argue about whether it is 6.5 or 6 - stays relatively constant and that is an accepted outcome for real world investors?

MR SADEH: Yes.

MS CIFUENTES: They wouldn't necessarily exit the market because they thought at any particular day or point in time that - let's assume for argument's sake they were wanting a return on equity of 6.5 or a MRP of 6.5 but the market is suggesting it's lower; that they wouldn't just accept the market?

PROF GRAY: That's not the question.

MS CIFUENTES: That's my question. Thank you.

MR SADEH: I do agree with it because, as I said, it's obviously on the basis that the stable MRP is an MRP that's fair. As I said, I do think 6.5 is fair and not 6 because it's a function of the spot or long term risk free rate that you are using.

So, yes, I do think (indistinct).

MS CIFUENTES: Thank you. Now you can ask your question, Stephen.

PROF GRAY: I was just going to say that the question is not whether a group of investors likes exposure to a particular macro-economic variable. The market risk premium is not particular to a small group of investors. It is a market wide parameter and it should be assessed in terms of what's the required return on a unit beta stock. That's what market risk premium is. The fact that a small subset of investors might find attractive the setting of allowed returns in a way that is variable in some way is I think a separate issue.

MR SADEH: I don't think it is because we're taking and reconstructing the returns into something different. I think I fundamentally do see the MRP as something that is stable and, as you said before, doesn't move in a one to one basis. In reality it probably moves in layers. Maybe it's a bit simplistic to have it flat accepting re-openers. But for the benefit of stability I think it's an acceptable trade-off. It might not be the logically most correct way of interpreting things, but the danger of having been too subjective kind of overshadows it.

DR MIRRLEES-BLACK: If I may summarise, there's acceptance that there are some nuances to the way you should look at the MRP is not fixed. There is not one for one with the right model and there is different weight which should be placed on those different approaches. But as an estimation historically it's not fitting a model. It's just saying let's look at the assessment of a fixed MRP and let's look at the assessment of a fixed market return. So both of those should be done and we should put weight on those.

Then jumping forward, but I think it is relevant to the discussion here, in terms of the approach that should be taken in the binding guideline to the MRP, Ilan is saying it is better if it is fixed --

ASSOC PROF PARTINGTON: I think as a pragmatic matter Ilan's suggestions make an awful lot of sense.

DR MIRRLEES-BLACK: And that there shouldn't be - there is the alternative of constructing a formula which would allow

it to vary but not one - one with the risk free rate, but perhaps a little bit of movement with the risk free rate, maybe 15 per cent of the movement in the risk free rate. Stephen I think is arguing that --

PROF GRAY: No, I wasn't putting that forward as a - I was saying that, just logically, there are the three approaches that the AER - so one approach would be just to set a headline allowed return on equity, one would be to fix the MRP for the period, and then the third one would be to have some mechanistic updating formula. Just logically they are the three options open to the AER.

DR MIRRLEES-BLACK: I think we accept there are those three options. Which of those three --

PROF GRAY: In terms of having a fixed MRP, I think the key thing there would be that there would have to be the option for a re-opener if there was a GFC type event, as one example.

PROF JOHNSTONE: But it should be remembered, too, that these issues are not independent. So if we work out a mechanism that stabilises the cash flow stream, then that affects the beta of that cash flow stream. So more stable, generally lower beta. So we can't decide these issues independently from one another.

DR MIRRLEES-BLACK: Stephen, are you saying that you are not recommending personally the formula or are you saying that consideration should be given to it?

PROF GRAY: I would be happy with any of those three approaches so long as it was done sensibly and there was an option for a re-opener. So one way, just to go through them, would be for the AER to set a headline required return on equity. That would have to be open to a re-opener. One thing that might cause a re-opener in that circumstance is a material change in risk free rates, for example.

The other extreme, the AER could use its current approach, which is effectively to set a fixed MRP for the period of the guideline. The key thing for a re-opener there would be a GFC type event. I would be happy with that as well.

Then in between would be some kind of mechanistic formula along the lines of what Ilan is saying. Adjust the required return on equity for changes in government bond yields, but in a less than one for one way.

DR MIRRLEES-BLACK: And would you need a re-opener then?

PROF GRAY: So it's less likely that a re-opener would be required there because, if the formula involved risk free rates, that would sort of automatically be reflected.

DR MIRRLEES-BLACK: Graham, may I summarise your views. You say that affects the MRP. The guideline would be more pragmatic.

ASSOC PROF PARTINGTON: Yes, with a re-opener.

PROF JOHNSTONE: Just very quickly, an electricity price increase in the time of a GFC is not going to be a great result. That's what we are talking about.

DR MIRRLEES-BLACK: Fixed MRP or --

PROF JOHNSTONE: I don't know. But I would say that we didn't mention all these things when we were talking about beta. I just think we have to be careful of arguments all in the one direction.

MS CIFUENTES: Can I just ask, Stephen, in your various scenarios I think one of the ones you mentioned was a material change in the risk free rate. What would be a material change? I ask that as someone that's been involved in financial markets for 20, 25 years. What was material when we were looking at this sort of stuff in IPART, you know, that was quite material. But, given where interest rates are now, it would seem much, much smaller moves. So what would be material?

PROF GRAY: I think what would be really useful in the guideline would be for the AER to set out some examples of things that would have led them to or would in the future lead them to a re-opener. So an example would be what has happened since 2013. So if it were the case that the AER set a headline allowed return on equity and soon after the 2013 guideline interest rates halved from 4 per cent to 2 per cent, so that would certainly be material and, in my view, would be the sort of stuff of re-openers, if you had

adopted a headline allowed return on equity. So that would be an example of a material move, something that we have seen since the last guideline.

MS CIFUENTES: This goes to the circumstances of re-openers. If that was to occur quite late in the regulatory period, presumably the time left for that current guideline might actually be a factor. This is the difficulty I have with the GFC. At what point do we declare a GFC?

PROF JOHNSTONE: And on the other hand in good times --

MS CIFUENTES: That's the other --

PROF GRAY: As we discussed last time, I think you sort of tie yourselves in knots if you try to write down a formula that says, "This is what is a GFC." I think last time we concluded that that's one of those events that you know what it is when you see it. So what happened around the time of the Lehman Brothers default is --

MS CIFUENTES: If we conveniently get a major default, that would be the --

PROF GRAY: Is a very clear signal. The only way I think that the AER can handle that in the guideline is to provide some examples of things that would be clear re-openers.

Just picking up on David's point, if it were the case that the AER was of the view that even if there was a GFC it would be politically impossible for the AER to make any change in a re-opener, that should be set out. So I think that reflects what the allowed returns would be, if things are going to be applied in an asymmetric way like that.

PROF JOHNSTONE: I think an obvious time for a re-opener would be when the assets are all up for sale and the owners no longer think it's good to have their money in - when we saw that, you would realise that the regulation had been too tight. Until that happens --

PROF GRAY: Keep lowering the number until something blows up.

DR MIRRLEES-BLACK: Can we just have from the other side, because it relates to a question at the end which is the

whether the AER should use the option of a fixed MRP, a fixed total market return or a formula. Jim?

MR HANCOCK: I lean towards (b), a fixed MRP. But if someone were to put forward convincing evidence that there's a negative correlation between the MRP and the risk free rate, then I might be convinced to move away from that.

DR MIRRLEES-BLACK: Ilan, I think we have your view. Simon?

DR WHEATLEY: So the formula I gave you was information at the start of the guideline period, not to be updated each year necessarily because it'd be difficult to include other information. I think it would make sense to set it to be constant with the triggers for the --

DR MIRRLEES-BLACK: The MRP to be a constant with triggers?

DR WHEATLEY: Yes, over the guideline period Not an assumption that the MRP is constant through time.

DR MIRRLEES-BLACK: No, it's not constant through time, but its fitness for the guideline for the purposes of all decisions that have to be taken during the course of the guideline. I think that's good. We have actually covered a lot of material.

One we haven't covered, though, is the estimation of the dividend growth model and how that's used. So obviously there are a variety of assumptions and evidence that can be used to derive long-term growth numbers which are a key part of the estimation. So, Graham, you have some scepticism about the use of a dividend growth model.

ASSOC PROF PARTINGTON: Yes, the dividend growth model is one of a large class of implied cost of capital. It does have the merit of being the one model in that class that is widely used in practice. Do I think the dividend growth model is hopeless? No. Do I think it can be reliably used to track changes in the market risk premium? Absolutely not.

There are a number of issues with it. One is the long-term growth rate, which we all know about. You can get varying estimates. This Challenger report, for

example, uses published Australian data on historic growth rates and from different studies it finds real growth rates varying from 0.9 per cent to 2.5. So you get widely varying estimates from the DGM just as a consequence of that. So that's a substantial problem.

Then you have the problem of what I call incurable optimism. I don't think I have ever seen an application or example of a DGM model where you are coming up from a below normal growth rate to the long-term rate. It always seems to be the case that you are coming down from above to the long-term rate. Only to be on one side of the long-term rate all the time makes no sense. It is consistent with the mountain of evidence on analysts' forecast bias that they are optimistic, their forecasts are upward biased. So as a consequence of incurable optimism what you tend to get from the dividend growth model is an upward biased estimate of the cost of capital.

You also have the problem, I call it sticky dividends, Martin I think calls it temporary fluctuations in the pay-out ratio or retention ratio, and it's the sticky dividends that drive those fluctuations. The problem with sticky dividends is worse in times of crisis. So what happens? We have the GFC. What do companies do? They don't all immediately cut their dividends. They hold them. Prices collapse. Dividend yields go up. That's fine as long as you then appropriately adjust downwards your expected growth rates, but that doesn't tend to happen. So you get a high dividend yield; not much change, if any, in the growth rate. What you get? You get an apparently big cost of capital according to the DGM, but it's really been driven by sticky dividends.

Then there's an issue that seems to have received no attention which is dividend re-investment. A lot of firms have dividend re-investment plans. Participation in those dividend re-investment plans is typically of the order of 30 or 40 per cent. So what that would mean, if you had a 6 per cent dividend, effectively the cash you are distributing is only 4 per cent. So your true dividend yield is only 4 per cent.

Alternatively, you can view it as, "Well, this is classic M and M. They paid out more cash and they got it back by having a share issue." We know what the consequences of that are. The growth rate keeps getting

lower and lower each time you have a share issue and eventually, if it goes on long enough, it will actually go negative.

Then there are problems that Martin has identified. If there's a term structure in equity returns - we don't know whether there is or not; and I for one have no idea what shape it is - but if there is a term structure Martin has showed that that's another problem with your DGM estimates. I think you also have a paper, Martin, haven't you, that shows there's a problem sometimes with inflation in some of the dividend growth models, that they don't work very well in the presence of inflation. So I could go on, but I think it's clear why I don't have a lot of confidence in the estimates from DGM.

DR MIRRLEES-BLACK: In contrast, in terms of the evidence that we have had so far, Stephen has made a number of comments indicating DGM should have more material weight than I think you are suggesting, Graham. So, Stephen, do you want to outline how you overcome the problems that Graham has just identified?

PROF GRAY: Yes. Just to maybe outline a process, I think over many years we have had reports backwards and forwards addressing the same issues over and over again. I think what needs to be done - and it's been a very lucrative business model for the two of us but completely inefficient. I think what the AER really needs to do in its guideline is to set out here are the various issues and, where there is disagreement between the various experts, explain to us which view they favour and which view they reject and explain why. With respect, it's not enough to say, "We have expert support for this view" or "We have been advised that this view is appropriate." I think it is incumbent upon the AER to say, "There's a difference in views. We have carefully considered the different views that have been put forward, and here's why we have reached the conclusion that (a) is right and (b) is wrong."

PROF JOHNSTONE: It's likely to be a very long document.

PROF GRAY: I think that's the role of the regulator.

PROF JOHNSTONE: I think the trouble is it is very hard to know why you rule the way you do in these situations. To

actually articulate that is asking a huge amount, considering the diversity of arguments, the fact that we don't even raise all the different points of view that we could. Sometimes we have more than one ourselves. I think that formalisation of the process is beyond human capacities.

PROF GRAY: The other point to note is that all of these points were raised at the time of the 2013 guideline. So the AER carefully considered all of this and came up with its preferred - did a lot of work I think around the 2013 guideline, came up with its preferred specification of the DGM.

The AER has computed that model, its preferred specification, since 2006. The estimates from that approach look quite sensible to me. They vary a little. The MRP estimates - their return on equity estimates are kind of low in the initial period, so 2006/2007, during the big bull market. That seems to make sense. They increased materially, return on equity estimates, around the peak of the GFC, settled down, and since the 2013 guideline they have been very stable. The required return in the market has varied within I think just a one per cent range since the 2013 guideline, which all seems perfectly sensible and plausible. This comes back to the point of when presented with the same evidence making a different decision, I think that's the sort of thing that spooks stakeholders.

DR MIRRLEES-BLACK: On the other side, Ilan, do you have a view the dividend growth model?

MR SADEH: I think at the end of the day everybody wants quality decisions backed with rationale that gives everybody confidence, particularly the broader community who, for their luck, don't engage in debates on what valuers do and what different formula are. So we can't just go a bunch of businesses told us that 6 per cent makes sense or 6.5 per cent makes sense. So I agree with Stephen that you need to have something to demonstrate that, and I think the DGM by its nature is (indistinct) than historic.

PROF JOHNSTONE: But no model is going to give you an answer accurate to half a per cent.

MR SADEH: Correct.

PROF JOHNSTONE: In the end that's going to have to be a judgment by regulators. They have no model that's going to get the answer down to plus or minus half a per cent or to a specific number.

DR MIRRLEES-BLACK: Simon, do you have a view?

DR WHEATLEY: There is empirical evidence that dividend growth models provide useful information. A key ingredient is an estimate of dividend growth. I think estimates of dividend growth are best produced by looking at the time series of past dividend growths, looking for good predictors of dividend growth.

DR MIRRLEES-BLACK: How does that relate to the estimation here?

DR WHEATLEY: A lot of the arguments have resolved around what long-run dividend growth is. There's a natural inclination for a regulator to choose low estimates. There's a natural inclination for companies to choose high estimates. A mechanical way of estimating dividend growth would be to look at the past behaviour of dividend growth. For example, if you look back to 1980 the dividend growth of the Australian market has pretty well matched GDP growth. So that suggests that perhaps looking at GDP growth is a sensible way to go.

PROF JOHNSTONE: All these things make sense to me, but they are not going to decide between 6 and 6.5 per cent. None of that evidence is going to help you make that decision.

DR WHEATLEY: How would you construct an estimate?

PROF JOHNSTONE: I don't think there is an estimate. There's nothing that's going to help you objectively decide it's 6, it's 6.5.

DR WHEATLEY: What would you tell the AER?

PROF JOHNSTONE: Are you saying I tell them that it is 6 or it's 6.5?

DR WHEATLEY: How would you provide an estimate of the MRP?

PROF JOHNSTONE: An estimate of point estimate is statistical, historical, it's meant to be about the future; there's so much wrong about it you would have to write a book about it. The regulator in the end has to actually put a number on a piece of paper, and there's going to be no black and white answer to that. However I stated (indistinct).

DR WHEATLEY: But what would you tell the AER?

PROF JOHNSTONE: Just what I just said, which is actually staring us in the face and that is there is no objective answer to this.

DR MIRRLEES-BLACK: There is a balance of opinions here. I think in terms of coming to a decision, though, it might be worth turning to page 65 of the --

MS CIFUENTES: Sorry, if I can interrupt. Did we hear from you, Jim? Do you have a view on DGMs?

MR HANCOCK: I think there's a subjectivity in choosing the parameters that go into it. So we wouldn't want to put too much weight into the idea that we got a precise answer. Simon suggests using GDP growth as an index for dividend growth. That sounds sort of reasonable. I think 10 years ago we were thinking that the long range GDP growth of the Australian economy was three and three-quarter per cent. Now Commonwealth Treasury talks about sort of three, three and a quarter per cent. Those sorts of variations in your assumptions can have quite big impacts for the MRP result that you get out of it. So, even if you come up with sort of reasonable rules to try and forecast something, there is still going to be a lot of uncertainty that makes your estimate still sort of hostage to subjective assumptions.

DR MIRRLEES-BLACK: Does that mean that you should still do it?

MR HANCOCK: I'm not saying not to do it, but I don't have very much confidence in the numbers that come out of it, especially when I see them producing quite a wide range of estimates off what people might argue are reasonable - sorry, coming off different assumptions that people will argue are reasonable, then which one is right?

MS CIFUENTES: So would it be a question of then using

I think Stephen's more general formula that you start with whatever the number currently is, let's say 6, then you have a look at all the evidence, including DGMs, to see whether that would justify a change away from that; not wanting to put words in your mouth, but as a general model?

MR HANCOCK: I suppose what you would be doing would be looking at DGMs and looking at what you think are plausible parameters and running a few different ones and seeing what you are getting. If you are coming out of that, that process, you are getting a different point of view, then I suppose that would increase your inclination to change your MRP. But at the same time you would have to be questioning how much confidence you have got in those assumptions that are informing that decision. If you've got pretty good confidence, then put weight on it. But if you sort of think, "They sound reasonable, but I don't really know," then I don't think you can put much weight on them.

PROF GRAY: I think the starting point would be 6.5.

MS CIFUENTES: I'm just using 6 as a --

PROF GRAY: But, just in terms of the process, the AER spent a lot of time processing all of the relevant evidence in 2013 and suggested that that's overall 6.5. I think the task is how has each piece of evidence shifted since then, and is it in one direction or the other. If it is predominantly in one direction, do we think it's significant enough to warrant a change in the parameter? Does it reach that threshold bar, having regard to the benefits of stability and predictability? I think that's the exercise.

MR HANCOCK: It's sort of inherent in a DGM that you are assuming stability in the total return rather than the MRP, isn't it?

PROF GRAY: No, the data tells you that. If the market was requiring a lower headline required return that would come through in the data. There's no assumption about that that's built into the model.

MR HANCOCK: But, given that we are projecting forward and we are not (indistinct) into lots of variations, as I said a three stage model you have got some sort of trending, but

we are basically picking parameters that we think are reasonable averages and applying them going forward. The end result of that is to give us a total return that is relative - well, is stable. So previously we were talking about whether the idea of stable total return or stable MRP is the more reasonable approach. It seems to me that the DGM kind of - if you take it literally is sort of adopting that stable total return view of the world.

PROF GRAY: If we go to that page 65 that Jonathan was going to take us to a moment ago you will see the variation in the AER's DGM estimate since 2006. So there's a clear variation there. The estimates were quite low during the big bull market, which seems sensible. They went up a lot during the peak of the GFC, which also seems quite sensible. Settled back down, rose a little bit again, just a little bit during the European debt crisis, and then since the last guideline have been quite stable between 10 and 11 per cent. So there is variation in those headline required return on the market estimates within the AER's preferred specification of the DGM. So the data tells you what the market is requiring in terms of the return of market portfolio.

MR HANCOCK: Okay. I can see that it changed over time in the sort of regulatory determination. But, going forward, if you take this sort of model, unless I'm misunderstanding, you are assuming stability in total return going forward? That's what you are assuming that your --

PROF GRAY: Yes. So the application of that is to derive a discount rate to be applied to cash flows going forward. But that's the task that the AER's charged with, is to figure out what would be the appropriate discount rate or required return for the cash flows going forward.

PROF JOHNSTONE: Just remember the bubble we are in here, too, in that we are actually talking about a model completely different to the CAPM. We are saying now the market prices assets today on a dividend growth model, which is not the CAPM and not reconcilable. So again we are looking for a crutch, basically.

DR WHEATLEY: T h e dividend growth model and the Sharpe-Lintner CAPM are not inconsistent with one another.

MS CIFUENTES: Can you speak up a bit, please, Simon?

PROF JOHNSTONE: I have never seen reconciliation. One's long period. One's one period. Different variables.

DR WHEATLEY: The DGM can been consistent with --

MS CIFUENTES: Simon, would you mind speaking up, please?

DR WHEATLEY: The DGM and the Sharpe-Lintner CAPM are not inconsistent with one another.

PROF JOHNSTONE: I think they are.

DR WHEATLEY: The DGM can be consistent with other models, but it is not inconsistent with the Sharpe-Lintner CAPM.

PROF JOHNSTONE: I'm sure it is.

ASSOC PROF PARTINGTON: One is a one period model and the DGM is a multi-period model.

PROF JOHNSTONE: That's right, and many other things.

DRDR WHEATLEY: The Sharpe-Lintner CAPM can be derived in a multi-period world as well.

ASSOC PROF PARTINGTON: If all the parameters don't change. So that would solve everything because we just say, "Okay, it's fixed forever."

PROF JOHNSTONE: There is no co-variance in the dividend growth model, and that's a completely different concept than anything in that model.

DR MIRRLEES-BLACK: To summarise in terms of the MRP, maybe there are questions about the precise specifications of modelling, but I think views about historical equity returns, in terms of the DGM that we have just been talking about, care needs to be taken about the parameters, but there is evidence obtained here. How that's weighted we haven't quite discussed, but I'm sure that will come out in our discussion. There is obviously a range of views and I assume it will depend on how much weight you place on how much confidence you have in the parameters for the dividend growth model. But the general assessment is that,

with careful assessment of the parameters, there is a role to play for it in the process. I'm sure we can come to a form of words which reflects that.

There's one source of evidence which we haven't covered and that is survey evidence. In our preconference discussion the view was that little weight should be placed on the survey evidence which is basically model practitioners, what their view is of the MRP. It was considered among the experts that wouldn't be reliable, which is why we haven't spent much time on it today. But I want to confirm with everyone that they haven't changed their --

ASSOC PROF PARTINGTON: Actually, having read the paper that Simon recommended, I have rather changed my view on that. Because the thrust of that paper - and Shleifer was one of the co-authors, and he's done a follow-up paper. The thrust of the argument is actually that if you want to know what rate of return investors are thinking about and acting on then look at surveys. That's the thrust of his argument. His argument is because behaviour follows. If you look at funds flows they follow the surveys. If you look at the planned capital expenditure and the actual capital expenditure of the managers in the Graham and Harvey CFO survey, that follows their survey expectations.

So his story is, well, it's the rational economic - they call it rational expectations theory that leads you astray in terms of measuring expectations. Those expectations, however, are not much use at all for forecasting the market, for forecasting what sorts of returns are going to be. Indeed in some cases the market returns and the expectations are negatively correlated, although in many cases that correlation is not statistically significant. So Shleifer's message is if you want to know what people are expecting and thinking look at the surveys.

DR WHEATLEY: We read the paper in different ways. The message I got was, if you think the surveys say the market risk premium is high, it's probably going to turn out to be low.

ASSOC PROF PARTINGTON: Yes, it's not a good forecast.

DR WHEATLEY: That's right.

ASSOC PROF PARTINGTON: That's right. So it depends whether you are forecasting or whether you want to know what people expect.

PROF GRAY: Can I just say one quick thing on surveys. In the AER paper there seemed to be a suggestion that I had become keen on surveys after the numbers went up. I just want to clear that up. I think the surveys, the Fernandez surveys and KPMG and so on are just rubbish and should have no weight whatsoever.

But, if they are to be used - and I accept that the AER might form a different view about that. If they are to be used, then we should have recent surveys and we should certainly take into account what the same survey respondents are doing in relation to the risk free rate. My view is it is quite disingenuous and misleading to look at a survey respondent that says, "I used a 6 per cent MRP and I applied that to a risk free rate that's materially above the current government bond yield," and to then say, "Let's take the 6 per cent MRP evidence and find support for our regulatory estimate of that," but to ignore the fact that they are pairing that with a risk free rate that's well above the current government bond yield. So they were the caveats about how surveys should be used if they are going to be used.

DR MIRRLEES-BLACK: Any other comments on surveys?

DR WHEATLEY: I agree with Stephen.

DR MIRRLEES-BLACK: Jim?

MR HANCOCK: Yes, look, they are noisy. So are the movements actually signal or noise? We are not really sure. Also some question as to exactly what model people have in mind when they announce the number.

MS CIFUENTES: So is that a consensus view?

DR MIRRLEES-BLACK: We are finished for the moment on MRP). That finishes the morning session and we will reconvene at quarter to 2.

LUNCHEON ADJOURNMENT

MS CIFUENTES: Thank you. Thank you, Jonathan.

DR MIRRLEES-BLACK: Thank you very much. I hope you are all rested and had a good lunch. Now we have the after lunch session which is on the most exciting topic of the day which is tax. So we also have for this session Martin Lally, who takes the place of Graham (indistinct). So Martin is here for the tax component. In terms of the discussion issues, the first point relates to the word value of imputation tax credits. In the discussion among the experts there was not unanimity but a general view that, while experts didn't agree about the definition of the value of imputation tax as being defined in the litigation and the approach which has been proposed by the AER here, there was an acceptance that this should be the basis on which we have this discussion. But there was a dissenting view, and that was Ilan.

MR SADEH: Was it?

DR MIRRLEES-BLACK: Yes, indeed. What you have said is you didn't agree with the AER and you didn't think that it was a closed issue. So I just wanted to give you the opportunity to say the extent to which this issue should be revisited.

MR SADEH: Thank you. I did think, you know, that our position - we all had a chance to discuss it. So, in the interest of getting to a consensus, my personal view is there is a difference between the market value, but I think in the interest of understanding the AER's position on this and wanting to frankly move on with things, I'm happy to put it to one side. I think I acknowledged that the Federal Court says that the AER's method isn't the only way of doing things and it accepts that other methods aren't materially preferable, and that's fine. That's probably all. I'm happy to just move on from it because I just don't think it is productive to waste the AER's time on this.

DR MIRRLEES-BLACK: Okay. Thank you. We will move on. The second thing on which there was general acceptance of but again not unanimity, and that is that in terms of in the framework the benchmark efficient firm is taken to pay the statutory tax rate. There's an observation that actual firms may pay less than the statutory tax rate. So most of the experts were saying that that's not relevant. In terms

of what we should be looking at, what the AER should be looking at, is that it's a reasonable assumption to assume that the benchmark firm pays the statutory tax rate. There are one or two views considering that perhaps there should be a broader look at the overall tax framework, and that reflects some stakeholder view that may need to be looked at. Jim, I think you had (indistinct) in what you have submitted there were some views that should be looked at.

MR HANCOCK: Yes, and I suppose what it comes from is sort of trying to understand why franking credits would be sort of fully valued or redeemed and then also having read the correspondence with the ATO which seems to bring into question the reliability of that data as well. I was wanting to be sure that what we are seeing measured there out of the data is consistent with the benchmark of the BEE and, if it is not, whether some adjustment needs to be made .

DR MIRRLEES-BLACK: Any other views? Ilan?

MR SADEH: Look, I think there's a number of different marginal tax rates for different kinds of entities and investors. It can be corporate tax rate, personal tax rate. I think the majority view from our pre-discussion was that the corporate tax rate is the one that makes the most sense.

PROF GRAY: Unless the AER forms a view that a company that's paying the statutory tax rate is inefficient, then that's the rate that should be used.

MR HANCOCK: The rule says that the statutory rate should be used as well. So my question is not really about changing the statutory rate, but whether it affects our interpretation.

DR MIRRLEES-BLACK: Martin, do you have a view on this? Should a benchmark efficient entity be paying the statutory tax rate?

DR LALLY: Yes, no question about that. But I think the far more interesting point here is the one that was raised by Graham during discussions in which he made the very interesting comment that it would be rather odd to in your model act as if the firm pays the tax at the full statutory rate but to estimate its distribution rate for credits from

firms out in the marketplace which are paying considerably less than that. So there's potentially a disjunction between the tax payment assumption in the AER's model and the empirical process for estimating the distribution rate.

I circulated a note on that attempting to look into that question. But, from what I can see in that analysis, I don't think it's possible for us to do anything with it. So the best I think we can do is estimate distribution rates in the way we do, inevitably from firms which may not be paying tax at the full statutory rate, and then couple that with a company tax payment in the AER's model that is determined in accordance with the full statutory rate.

PROF GRAY: I think we've accepted that T will be 30 per cent and we will discuss what implications all of this has for gamma.

DR MIRRLEES-BLACK: Good. So we have some agreement. Moving on, use of tax statistics. So there are concerns around the quality of the data and some experts have different views on this. So I think we can say, well, Martin, you have particular concerns with the use of the tax statistics data while others are comfortable that it's a reasonable method of estimation. So perhaps, Martin, can I invite you to elaborate on why you are dissatisfied with it.

DR LALLY: Okay. I think there are two distinct issues here. One of them is whether you use the tax data, the ATO data, to estimate individually the utilisation rate and individually the distribution rate. I would be surprised if anyone now or at any time has thought that you could use the ATO data to get reliable estimates for either of those individual parameters because the ATO statistics, as analysed by Hathaway in particular, show that you get wildly different estimates from these statistics for the distributed credits.

Because you get wildly different estimates for the distributed credits depending upon whether you use the FAB data or the dividends data, you cannot get a reliable estimate for the distribution rate and you cannot get a reliable estimate for the utilisation rate. But that problem does not contaminate estimating gamma from taxes paid according to the ATO data and credits redeemed from the ATO data. So it could be argued that, notwithstanding

this huge conflict within the ATO data, between FAB and dividend information, you can still reliably estimate gamma. So that I think is the primary issue: can you reliably estimate gamma? So I will then limit my comments to that question of whether you can reliably estimate gamma.

So I think the comment has been made by many people surely the Australian tax authorities know how much company tax they have collected. It seems a no-brainer. And yet according to the ATO's note, which we received last week, it's a response to the problems that have been identified in Neville Hathaway's analysis, it says, "The analysis" - referring to Hathaway's work, I presume - "does not account for non-resident companies paying company tax in Australia which do not generate franking credits."

So that raises the question when we are talking about the company tax payments for the present purposes what are we talking about: the company tax that is collected by the ATO or the company tax that is collected by the ATO that generate franking credits? In my view, it's clear it's the latter. It's not company tax payments per se. It's company tax payments that generate franking credits. I don't know what Neville Hathaway's view on point number 4 is because he hasn't had a chance to respond. But the ATO seems to think that Neville's made a mistake by looking at company tax payments and failing to deduct out that amount which doesn't generate franking credits.

If Neville has made that mistake then that damages the credibility of the ATO data as Neville has presented it for the purposes of estimating gamma in total. If indeed Neville has made that mistake - and I will not condemn someone without hearing their defence - but if Neville has made that mistake, and he has looked at this matter very, very deeply, we all know that, and could arguably be said to be the person who's looked at it most deeply of all, if he's made a mistake like that then I think it should say to all of us there may be two, three, 20 other mistakes that have been made here by Neville that we don't know about and nobody knows about yet. It kind of shakes your confidence. It shakes my confidence that the ATO thinks Neville has made such a basic mistake.

What I'm also disturbed about when I read this note is, having claimed in point number 4 that Neville's made

this mistake, that they haven't even quantified it or indeed anything else. Neville has presented detailed analysis on numbers from the ATO data and he's expressed his concerns about this huge discrepancy within the data years ago, he claims, to the ATO. So they have had years to think about this. And after thinking about it for years they give us a note that does not have a single number in it. They can't even say, "Neville, you've overestimated this number by 5 billion and here's the correct number." So that's pretty disturbing. So that's the first concern I have, and that relates fundamentally to what reliance can we place on the ATO data simply for the purpose of estimating gamma; not the individual two bits of it, but the aggregate.

The second problem I have with the ATO data is necessarily you are using exactly the same companies for estimating the distribution rate as you are for the utilisation rate by virtue of doing a grand calculation, and this grand calculation I understand is for all companies, list and unlisted. That's fine as far as the utilisation rates are concerned that you should use all companies, because it is a market parameter. But it isn't fine that you should be using all companies, listed and unlisted, for the distribution rate.

So that raises the question which companies should you use for the distribution rate, and I think there is a menu of possibilities here. The first of them would be if you want the distribution rate for a particular company just go and look at that company's financial statements. The problem with that is the company, knowing that would be done and that your estimate of its distribution rate for regulatory purposes would affect its revenues, would have a very strong incentive to manipulate its distribution rate. So I think that rules out using the company itself.

The next level would be to pick a collection of companies that are good comparators. Simon, I think you made the observation that the natural collection of comparators would be the very ones that we are using for estimating gearing and also betas. At the moment there's only three of those companies. But, if one goes back a couple of years, the set does expand to five. So that's the APA Group, DUET, Ausnet Services, Spark Infrastructure and Envestra, who have changed their name to Australian Gas Networks.

In the last week I have actually gone to the financial statements of those five companies to see if I can get their distribution rates from the financial statements. I may be the worst researcher in the world but I cannot find a recent annual report for Australian Gas Networks. I can find something called an annual review, which is everything in an annual report except the financial statements. So that's not very helpful.

Spark Infrastructure, no problem finding financial statements, but if you go to the place where you would expect to find the franking account balance, which is attached to the dividends note, it's not there. There is no disclosure in the financial statements I can find of their franking account balance. The same problem for DUET. No disclosure of the franking account balance.

So you only have two companies left to estimate the distribution rate from this set of five natural comparators: that's Ausnet Services and the APA Group. If I take the last three years, in both cases the franking account balances for these companies have gone down. Over those three years their franking account balances have gone down. That says to you that not only have they distributed all the franking credits that they have generated from company tax payments over that three-year period but some on top of that. So the distribution rate is 1 or maybe even more than 1. I think conservatively it's 1. So if you are going to use the natural comparators then - there's only two of them - obviously that raises the question of is that a big enough sample. But if you are going to use those comparators the distribution rate estimate is 1. So that's the second possibility.

The third possibility would be to go to all listed companies. If you go to all listed companies, then you've got data from the tax authorities. But the trouble with that data from the tax authorities is it's a distribution rate and therefore it's afflicted by this huge discrepancy that Hathaway has found. So that knocks out listed company data from the ATO. You could get listed company data from the financial statements of listed companies. Because you are interested in the aggregate, you naturally pick on the high value ones. I have done that exercise and it indicates a distribution rate of at least 83 per cent.

The last possibility is to take all companies, listed and unlisted. But, as we know from the analysis that has been done by many people, there's a big difference between the distribution rates for listed and unlisted companies. So you then have to ask yourself which is the better comparator. Lots of these unlisted companies are sole traders who have corporatised, presumably to reduce their tax rate from something in the 40s to 30 per cent. They are only going to achieve that if they keep their dividends down and therefore their distribution of credits down. So they are not going to be very useful for purposes of looking at our benchmark efficient entity.

So across all those five possibilities it seems to me by default you are only left with one useful and credible source of information, and that is financial statement data from high value listed companies and that gives you a figure of at least 83 per cent. So that's the second problem with the use of the ATO data which binds you to use the same set of firms for both the distribution and utilisation rates.

The final problem is as a regulator you need an estimate of gamma in the cash flows, but you also need an estimate of the utilisation rate in the market risk premium. If you are using ATO data for gamma, you presumably have to use ATO data for the utilisation rate. Then you are back to the problem that once you start looking at one of the individual two parameters you have the huge discrepancy that Neville has identified and which hasn't been denied by anyone.

I think Simon has suggested that you could take the overall figure for gamma from the ATO data and then, insofar as it's embodied estimate of the distribution rate is too low relative to your benchmark efficient entity, crank up your overall gamma estimate. But before you can crank it up you have to know what the estimate for the distribution rate is within the ATO data. And you don't. There's two numbers. One of them is about 70 per cent and one is 50, depending upon whether you believe the FAB or the dividend stuff. Nobody who has looked at this seems to have a clear view on that. Neville himself in his latest note says, "I don't know which one is right," and clearly the ATO is not saying which one of them is right. So I think that would knock out Simon's suggestion.

So that leaves you with that third problem. It's not enough just to estimate gamma from ATO data; you've got to estimate the utilisation rate. It would be rather odd if you estimated gamma from the ATO data but you estimated the utilisation rate by a completely different method. So there are my three concerns with using ATO data, even to get an overall estimate of gamma.

DR MIRRLEES-BLACK: In our statements Simon and Steve have expressed particular concern of the ATO data being a reasonable approach. Simon, do you want to --

DR WHEATLEY: What we have seen is not actually a note from the ATO. It's a description of discussions I think with the ATO. Is that right?

MR SMITH: It's a description of an email that they sent us setting out concerns and effectively it sets out --

DR WHEATLEY: We don't know what questions were asked. It's not in a sort of question and answer format. But (indistinct).

MR SMITH: Simon, we set out the email that we sent out down below in attachment 1 to the note. So there is some text that we sent out to the ATO that they responded to.

DR WHEATLEY: Right. So the most important concerns are (indistinct) because we are aware of Hathaway's concerns about splitting the data up.

MS CIFUENTES: Simon, could you please speak up? Thank you.

DR WHEATLEY: Sorry.

DR LALLY: It may be that moving that, that will solve the problem.

DR WHEATLEY: So we acknowledged that there were concerns with separating the datato estimate the distribution rate and the utilisation rate. But Hathaway claimed there were few problems with the ratio of credits redeemed to credits created. This note from the ATO raises two issues. One is that net tax is not the same as tax payable. Both Steve and myself know that to be true because the ATO makes that clear on its web site. So we already know that, and

we take that into account. We adjust the net tax figure.

The other issue is number 4, which is that there are non-resident companies paying company tax that doesn't give rise to franking credits. As Martin has said, we don't know whether that's a trivial issue or a major issue. So it would be nice to get more information on that before we do anything further.

DR LALLY: Can I just add, just reading the note, point number 4, the second sentence of that point number 4 says, "Although this proportion may appear to be small at first glance, it adds to the report's inability to reconcile the imputation system using aggregate data." That, I guess, could be read two ways, one of which is that it is small, but it could also be read as, "We, the ATO, suspect it's small but we are not sure."

DR WHEATLEY: We don't know. It's too vague. But, given how valuable these statistics could be, it makes sense to go back to the ATO and find out more about that number.

DR LALLY: But could I just emphasise that, even if you do go back to the ATO and you get a definite answer on that question, if it is accepted that after all these years of us poring over all these numbers and all Neville's work, that he has in fact made that mistake, it's got to shake your confidence in anyone's interpretations of the ATO data that there may be all kinds of potential pitfalls and trapdoors in that data. We appear to have fallen into this trapdoor. There may be many others that are there we haven't fallen into yet. We don't know.

MR SADEH: That applies to every form of data used in the history of the gamma debate. I think it's unfair to just pin it on that, because when I take your alternate approach from my own sense-check perspective you are thinking about what is gamma for a benchmark efficient entity, and there are two key features of networks that are relevant to their tax profile. A vast majority of them are unlisted, and that's the reality. So when you talk about the distribution rate, distribution rates are naturally higher for listed entities, as you said, because they try to maintain a dividend yield. You talk about short-term. In theory they can be above 1 because they have held that cash because they are trying to keep (indistinct). That is not representative of the average utility.

The second thing is that networks are capital intensive businesses relative to the normal corporate which is more an operating entity which means again by definition its distribution rate as a matter of logic has to be lower than the average entity because it is constantly reinvesting part of its money into the business because you can't 100 per cent debt fund your capex

DR LALLY: But could they be funding it through equity issues rather than through their operating cash flow to some extent?

MR SADEH: Just have a look at how often they make equity calls. Very rarely.

DR LALLY: So what you are implying is that the comparator firms we need for this purpose, it's not just enough to take the firms that we have taken, those five, but you could expand it to include other kinds of firms that have big capital expenditures.

MR SADEH: I think it's more relevant because, you know, using listed data for some of the more market based statistics makes sense, but tax has unique profiles which need to take into account the kind of companies that are in the network field.

DR LALLY: But, of these five companies that seem to be comparators, the two for which we can get the distribution rate, the distribution rates are 100 per cent in the last three years. So that seems --

MR SADEH: Number 1, it is a short-term phenomenon. As I said to you, listed entities can masquerade - this is the reality; you don't like to say it, but it's true - they do masquerade to smooth the dividend profile. Some of them have retained cash. Some have got - in the short-term there are a number of reasons why your pay-out ratio can be distorted to your true long-term position.

Then, secondly, even on a long-term basis a listed network will have a different form of distribution rate to an unlisted network. When you look at them as a whole, you know, the listed has to be the upper bound.

DR LALLY: So we can certainly deal with one of those

problems. I only had time to just look at the data in the past week for the last three years, but certainly I can look at the data for the past 10 or 15 years. Your prediction, Ilan, would be that if we do look at that data for the past 10, 15 years it will show distribution rates for these entities for imputation credits that are lowish?

MR SADEH: I would have no idea to what extent. But, yes, absolutely (indistinct).

DR WHEATLEY: A lot of these companies didn't pay a lot in tax and so did not generate a lot of franking credits, but their payout rates, I think which Steve has looked at, are not 100 per cent. So if they did have higher franking account balances they would have had difficulty distributing them.

DR LALLY: If you've got some data on this, Stephen, it would be good to see it. The other point you're making, Simon, that they didn't pay much tax so naturally their distribution rates are high. That comes back to this fundamental problem that Graham raised with us in our conversation and to which I alluded at the beginning, and I put my analysis in on that and I'm not sure we can actually do anything with that.

MR SADEH: I would agree with that, and that's why I can't escape that we need to look at more than the individual networks for these statistics because again tax is a highly delicate thing that's a function of which level of the structure are you looking at; i.e. a lot of the networks are either partnerships or trusts as opposed to corporates. It doesn't mean there's not tax being paid; it just means it's being paid a level above which you are looking at. So that's why I think you can't rely on the sample sizes distorted by the very entity structure that you are using.

PROF GRAY: I think maybe if we try to break down the discussion into component pieces. So the first piece is the use that can be made of the ATO tax statistics. So most of the points on this document that's been distributed around during the week are explanations as to why there might be a difference between the FAB and the dividend approaches to the distribution rate. So those explanations are along the lines of what's been discussed in various reports over the years. So things like the

reporting of the franking account balance and the reporting of dividends distributed is not something that affects tax payments at all. The ATO notes here that that's an information field that's provided for information only and is not needed for the tax calculation. So that's why people might take that less seriously, and it seems to be the explanation for the difference. So that's one point.

The second point is that the only new information here, I think, is this idea that foreign companies may be paying some tax in Australia that hasn't been included. I think the way we have to deal with that kind of evidence, as Simon says, is to quantify it. I don't think a vague statement that this could be an issue is a reason for abandoning that data. Let's see if it is an issue and, if so, to quantify it.

In terms of applying evidence consistently the same can be said of the equity ownership approach and the 45-day rule. So we know that the equity ownership approach is an upward biased estimate because it ignores the fact that some credits are going to be not redeemed because they run foul of the 45-day rule. The AER has said, "We think that's small, so we are not going to take any account of that." I think the appropriate approach in both cases is to quantify what the effect might be, see if it is small or if it is material. So I think that sort of consistency has to be applied throughout.

The great advantage I see of the ATO data is that it enables you to get an estimate of gamma that does not require a distribution rate. I think the distribution rate, estimation of that is extremely problematic. That gives you an estimate that is free from having to estimate the distribution rate. So that's got to be a big plus for the ATO data and makes the ATO estimate of gamma certainly relevant evidence, in my mind. So we will come later on to the problems with other approaches for estimating the distribution rate.

The third point I want to make is that Hathaway has, as Martin just said, estimated the distribution rate or rounded the distribution rate to somewhere between 50 and 70 per cent, depending upon which method you use. So if we are going to pair a distribution rate estimate with a different approach for utilisation equity ownership, for example, we need to take one of those estimates.

Traditionally, the upper bound of that possible range, 70 per cent, has been used. So that's that. It builds some conservatism into the estimation of gamma.

DR LALLY: But, if I can just chip in, those numbers - 50 and 70 - are for all companies, listed and unlisted. If you think, for example, the better comparator for the distribution rate is listed companies you don't want 50 to 70; you want something else.

PROF GRAY: I will come to that in a minute when we get to estimating the distribution rate. If it turns out that, independent of the tax statistics, a good estimate of the distribution rate is in the order of 70 per cent, then that problem goes away. Perhaps we will come to that when we talk about estimates of the distribution rate going forward.

I agree with the comments that have been made about how problematic it is to infer something about distribution rates from individual companies. Maybe if I just give two examples of why that's the case, and then we will move on to other things. One example is BHP. So BHP is actually a pair of companies: so BHP Ltd, which is listed in Australia, and BHP Plc, that's listed in the UK. BHP has what they call a dividend equalisation scheme. So most of the revenues, it turns out, are generated in BHP Ltd. In order for dividends to be equalised across the two component pieces BHP Ltd writes a giant dividend cheque to BHP Plc every year. Over the last two years I think BHP Ltd has distributed about $1.5 billion of imputation credits to BHP Plc in the UK where they are completely wasted. So that shows up in the data as though BHP Ltd has distributed 1.5 billion of imputation credits, but it hasn't. So we have to take that into account. That's obviously one of the primary reasons behind the shareholder activism that BHP is confronted with at present.

Another example is AGL. So AGL had a major tax case with the ATO which it was successful in and had a $300 million company tax bill overturned. So that showed up in the franking account balance - when AGL won that case, the franking account balance declined by $300 million because tax that had been paid and had gone into the franking account balance was then reversed. So if you start your period where the $300 million is in that franking account balance and then all of a sudden it's gone

because of that tax litigation it looks as though it's a distribution to shareholders. So both of those things - they are just two examples.

I think if we are going to use data for individual companies what we need to do first is to go through really company by company and sort out any of these sorts of issues, make adjustments for any of those sorts of issues, which is very problematic and time consuming. I think, as we will come to in a minute, there's a much easier way.

DR MIRRLEES-BLACK: Does anyone want to add on the use of tax statistics?

MR SADEH: I just really want to reinforce that the tax statistics should be based on the benchmark efficient entity, not on an individual. It's not an independent tax concept.

DR LALLY: And what would you see the benchmark firm as being?

MR SADEH: I think we defined it as a corporate entity which pays the corporate tax rate. They have an average representation of investors which is why, say, there's listed investors, then there's unlisted investors, because that leads to an average distribution rate and average utilisation rate.

PROF GRAY: And which operates entirely within Australia. I think that's important as well.

MR SADEH: Yes, that's right.

DR LALLY: Anything else? You mentioned earlier about having a capital expenditure program that was comparable with the network businesses.

MR SADEH: Well, I think it's hard to sit and identify a whole list of entities that go through that. I'm just leaving that to be a qualitative fact to kind of make sense of the data when it comes out. But I don't think you can filter it.

DR MIRRLEES-BLACK: That's helpful saying that’s the benchmark efficient entity and those are the characteristics. It's another step to actually be able to define it precisely

. While we are on tax, Jim, did you have anything to add?

MR HANCOCK: It does seem a bit disappointing that the ATO hasn't been able to engage with the enquiry sort of in a bit more of an informative way than they have. In my view it's worth going back to them and asking them to take it on as an important issue and tell us if they can actually tell us what we want to know. Having done that, we may still be left with a question as to exactly how we relate that to the idea of a benchmark efficient entity, as you were just saying. So it may not answer everything, but I would have hoped the ATO could at least give us that much information.

DR LALLY: There may be a cultural issue that's involved here. I'm a New Zealander rather than an Australian, and I understand Australians are a bit blunter than New Zealanders are. I think we are probably closer to the English, Jonathan, than to Australians. But when you read number 6, "There is a reporting issue with the FAB label. The integrity of the label can be considered low." That sounds to me like a very polite way of saying they have made a mess and they are pretty embarrassed and, "Please don't press us on this any further."

If you go to the first page, the third paragraph, "There are certain limitations in relying on taxation data as an analytical tool in the calculation of imputation credits." In New Zealand that would be interpreted as, "Please, don't use our data for what you are doing." So I don't know how to read this in Australia, but I would know how to read it in New Zealand.

MR SMITH: Martin, can I clarify: the material above the issues noted by the ATO is (a) our commentary. So that was our commentary saying there are certain limitations flowing from what the ATO said. So just to clarify that was AER staff who noted those limitations in light of the responses we received.

DR MIRRLEES-BLACK: David, did you want to comment?

PROF JOHNSTONE: No, it's all been said and it's all been useful. I have nothing more to add, except the fact that obviously there's no direct answer, like so often.

DR MIRRLEES-BLACK: Thank you. So different

perspectives here. Martin, I might summarise what you have said and what you have written. They shouldn't be used because they are not needed and they shouldn't be used because we have got some other direct evidence, but there are ways in which they could be used as an estimate of the implications of this. Do you want to elaborate on your views? - -

DR LALLY: Yes, please. Indisputably we are using this Officer model. Indisputably this model, or at least almost indisputably this is a model that assumes that national equity markets are segmented. So Australians can't invest overseas, and overseas people can't invest here. Of course that model isn't descriptively accurate. Australians do invest overseas and foreigners do invest here. But the model per se assumes that there's no foreign investment.

Consistent with that assumption of the model that there is no foreign investment then the utilisation rate is essentially 1, subject only to 45-day rule stuff. You have none of the problem of foreigners, who can't at least notionally use the credits. So that would be my first best solution, so to speak, that the utilisation rate is 1 and the distribution rate is at least 0.83. That's a different issue.

The view that I'm holding here is clearly a minority view and may even be a minority of one. Others seem to feel that, notwithstanding the fact that you are using a model which assumes that national equity markets are completely segregated, you should be incorporating into that model parameter estimates that reflect the empirical realities. One of those parameters is the utilisation rate. The empirical reality here is that there are foreigners who are going to push down that utilisation rate. I think there are reasonable arguments on both sides of that. I nevertheless favour the utilisation rate of 1, but I can see there are reasonable arguments in accordance with what the AER has done, which is to in its empirical estimate take account of foreign investors.

So my second best solution in this area is to say, if you are going to incorporate foreign investors, you go back to the model and you ask, "Well, how is the parameter defined in the model?" Officer is unfortunately not terribly helpful because he doesn't supply a rigorous derivation of the model. But rigorous derivations have been supplied, and those rigorous derivations make it clear

- in fact I do not know anyone who disputes that a rigorous derivation of the model shows that the utilisation rate is defined as a weighted average of the utilisation rates of individual investors.

There is some debate about what the weights are, but it looks like the best you can do is market value weights. Therefore the utilisation rate in the model is defined as the value weighted average of the utilisation rates of individual investors. To a pretty reasonable approximation all Australians can utilise the credits. So far as we can see, foreigners can't. I'm sure some can. So there will be some bias in assuming they can't. But let's take that as a reasonable position. Foreigners can't use them. Locals can. So necessarily your utilisation rate is the proportion of Australian equities held by Australians. That just follows logically.

PROF GRAY: Can I just interrupt there. I'm not sure that that's right. I think that in your model, the Lally-Van Zijl model, the weighted average is a weight of total wealth of Australian investors versus the total wealth of foreign investors, not just the wealth that foreign investors happened to have invested in Australia.

DR LALLY: Well, in that model it just says a weighted average over investors. It doesn't make any reference to foreigners or locals. But, since the model assumes that there are no foreigners because it's a segmented markets model, then it necessarily has to be a weighted average just over Australians. That just seems logical.

PROF GRAY: Right. So that gets you back to 1.

DR LALLY: Yes.

PROF GRAY: That doesn't get you to an equity ownership estimate.

DR LALLY: Indeed. That's where the bastardisation of the model occurs. You've got a model which says there's no foreign investors, but you are confronted with the empirical reality that there are. The AER has chosen to address that by using estimates of the utilisation rate that reflect the presence of foreign investors. It's chosen to go down that route.

PROF GRAY: But just to confirm, though, I think it is worth making clear, and I think you and I will agree 100 per cent on this, that the AER's approach is not consistent with any equilibrium model.

DR LALLY: Clearly if you have a model which says there are no foreign investors and you are using an estimate for a parameter in that model that reflects the existence of foreign investors there's a mismatch, indisputably. But it is also true, Stephen, that if you use an estimate of the utilisation rate which comes from DDO studies, which will naturally reflect the existence of foreign investors, you have exactly the same problem.

PROF GRAY: I'm not arguing for that for a moment. I think that ship has sailed. The Federal Court clearly did not understand the issue. So that's the end of that. The point, though, is going to be relevant when we come to how we go about estimating the two different parameters: the distribution rate and the utilisation rate. We need to have some kind of framework for thinking about how they would be best estimated within the context of what the AER is doing.

I think it's important to recognise that that framework is not the outcome of a regular economic equilibrium. It's something that the AER has created and that's what we are going to use. But it's not an equilibrium economic outcome, and that's going to be relevant because it will guide how we go about the estimation task. So normally the estimation task flows from the outcome of an economic equilibrium. That's not the case here.

DR LALLY: Indisputably the model says there are no foreign investors. So what you ought to be doing is estimating the parameter consistent with that which would lead you to a utilisation rate of 1. But nobody seems to agree with me in that minority position and everyone, apart from me, seems to think you should estimate the utilisation rate by using methods that reflect the existence of foreign investors, whether that be by looking at the percentage of equity that's held by Australians, whether you look at the redemption rate in the tax statistics or whether you look at DDO studies. All three of those methods are estimating a parameter by taking account of the existence of foreign investors, and then parking that parameter estimate into a

model which says there are no foreign investors. I can see pluses and minuses from doing that. So I'm not faulting the AER for combining a model which says there are no foreign investors with a method for estimating a parameter which is incompatible with it.

PROF GRAY: All I'm saying - I think we are in agreement - is that, given what the AER has done, we can't appeal to a model to guide us in the estimation task.

DR LALLY: Yes, I think that's an interesting point. But, given that they are using a model which says that the utilisation rate is a weighted average over the utilisation rates of the individual investors, at that point you have said nothing about foreigners or locals. But if you then append to that the statement, "We're going to reflect the existence of foreigners," then I think that marriage leads you to a utilisation rate which is a weighted average over the utilisation rates of Australians and foreigners, and therefore leads you logically to use ABS type data for estimating the parameters.

DR WHEATLEY: Except the average is going to be wealth weighted, and so - I mean, once you acknowledge that the Australian equity market is largely integrated with foreign markets then gamma is going to be zero, which is the presumption the Australian Treasury makes in a number of its research reports in examining the impact of changing the corporation tax.

DR LALLY: If you define the utilisation rate to be the value weighted average where the value weights are the value of all equities held by Australians versus the value of all equities held everywhere by foreigners of course you will get zero. But that is a definition for you that belongs in an international CAPM. What we have got here is a halfway house. We are combining a model which by its very nature is segmented markets with --

DR WHEATLEY: Steve's point is that the halfway house isn't a model of equilibrium. You are either segmented or integrated.

DR LALLY: I agree with you. But Stephen Gray and all others have been doing this halfway house for the last 20 years. They have taken the Officer model and put into it parameter estimates that reflect the existence of

foreign investors. Everyone has been doing a halfway house. I'm being the minority, the purest, who has said, "Look, the model implies this, therefore." But I think there is a way of dealing with that concern that we can maybe talk about later. I did mention to Jonathan it's long been my view that, given that we are in a world in which markets aren't completely segmented nor are they completely integrated, models that try to reflect the messiness that there is some local bias, some people will invest in Australia for "this is my country", patriotism, "foreigners, they are different and I don't want to get involved there", those models for trying to embody theoretically partial integration are full of messy parameters you can't estimate. So the only clean models in this world are complete integration and complete segmentation.

My view is that you should estimate cost of capital under each of these two extremes and then you as a judgment call decide where you are going to lie between those two extremes. When you estimate the model under complete segmentation your utilisation rate will be 1. When you estimate the model under complete integration your utilisation rate will be zero. I think you should take those two extremes instead of trying to do this halfway house thing.

PROF GRAY: We've been through this, though. This is the conceptual goalposts approach that the AER considered last time.

DR LALLY: No.

PROF GRAY: It's not?

DR LALLY: No. The conceptual goalposts was not those two extremes. It was intended merely to show whether combining a utilisation rate that had been taken from market evidence with a segmented markets CAPM gave you a cost of equity capital that lay outside those two bounds. If it did lie outside those two bounds it was my proposition that that result did not make sense. So that exercise I went through was not one of, "You should calculate these two goalposts and then put your answer somewhere between them." It was merely intended to demonstrate that the existing halfway house approaches were producing results that were not sensible because they lay outside the goalposts.

PROF GRAY: To get that left-hand end of, "Here's what the cost of capital would be in a purely segmented market," so there gamma is easy, you use a gamma of 1. But then you would have to re-estimate what would the risk free rate be if there was no foreign investment.

DR LALLY: Not necessarily. It depends on your international CAPM. If your international CAPM is the Solnik model, the Solnik model says that the cost of capital for an Australian stock is the Australian risk free rate plus a world MRP multiplied by a world beta. So in the Solnik model you are still using the observed risk free rate for Australia. As in the Sharpe-Lintner, it is an exogenous parameter. You don't care how it's determined. It's just an observation. So you don't have to take the observation and try to adjust it for what the risk free rate would be like if there were no market integration.

PROF GRAY: It sounds to me that this is getting steps way beyond what's going to be --

DR MIRRLEES-BLACK: I think this proposition we discussed it briefly in the break, something which maybe we pick up at the end as to how we deal with that. The question we are addressing to ourselves now is in particular the equity ownership statistics and your view about they are not useful precisely because they are based on a model approach that you have Australian investors, it makes no sense, and the other --

DR LALLY: But, just to clarify that, once you do decide to use local information, the ABS data are the natural way of estimating the utilisation rate.

DR MIRRLEES-BLACK: Stephen, your views on equity ownership data?

PROF GRAY: I think where we have got to from this discussion about the models and what comes out of that is that the equity ownership data is relevant because the AER has defined it to be relevant. If that's acceptable, then it is relevant per se because it's been defined to be so.

DR MIRRLEES-BLACK: Rather than it fits in with the model.

PROF GRAY: It doesn't fit with any model. But there's no

justification for that simple average that comes out of any model. I think we agree on that.

DR LALLY: But the same problem would afflict your recommendation that we use the redemption rate from the ATO data.

PROF GRAY: Yes.

DR LALLY: You agree?

PROF GRAY: Yes. It's all silly, isn't it?

DR LALLY: Good.

PROF GRAY: It's all silly. But it's been approved by the Federal Court and I think that's the point. So we've got to estimate something that no-one agrees is the correct thing using bad data. That is the task before us.

DR LALLY: But at least I'm offering an alternative to what you describe as silliness. I'm saying take the two pure extremes rather than engage in this mismatching --

PROF GRAY: Let me give you my approach. So constrained to be within this utilisation interpretation of gamma, which is where we find ourselves, how do we go about estimating the distribution rate? So we have seen that there are issues with trying to estimate that with the Tax Office data, and there are issues trying to estimate that from individual firms and looking at their franking account balances and so on. It's very hard to do.

I think we are in 100 per cent agreement that the task is what would be the distribution rate for the benchmark efficient entity. So what does the benchmark efficient entity look like? What are the sort of relevant characteristics so far as the distribution rate is concerned? One point is that the benchmark efficient entity operates solely within Australia. So if you have a company that operates solely within Australia, as paying corporate tax only within Australia, then I think we agree that the dividend distribution rate and the credits distribution rate would be the same thing.

DR LALLY: Not necessarily.

PROF GRAY: So why not?

DR LALLY: The dividend distribution rate may or may not be equal to the credit distribution rate. It just depends on whether the company is paying large dividends or small dividends. If it pays practically no dividends, its credit distribution rate is going to be tiny, but not necessarily the same as its dividend pay-out rate. To get those two parameters to be the same, Stephen, you also need that taxable income is the same as profit. The pay-out rate is defined as dividends over profits; okay? So the profits, however they are defined in that ratio, have to be the same as the taxable income. If they are, then those two parameters, the dividend pay-out rate and the credit distribution rate, will be the same; but only if taxable income is the same as whatever that number is you used to measure the pay-out rate.

PROF GRAY: Right. Okay. Call it a taxable income pay-out rate. So if you have a company that earns $100 pre-tax profit, pays $30 of corporate tax, that leaves $70 available for distribution. If that company then distributes 70 per cent of that profit, post tax profit, as a dividend then its credit distribution rate will also be 70 per cent. That's all I'm saying.

DR LALLY: That's fine.

PROF GRAY: So that's one characteristic of the benchmark firm. It comes from operating within Australia. If you also then tell me what the dividend policy or an appropriate dividend policy would be for that firm, given the correspondence between the credit distribution rate, a dividend distribution rate, if I tell you the dividend distribution rate then that implies a credit distribution rate.

DR LALLY: But where do you get this dividend --

PROF GRAY: Which I think is an easier task than estimating the credit distribution rate because we are trying to infer that from franking account balances or the noisy Tax Office data. So where could you go to get information about a dividend distribution rate? So APA has on its shareholder web site a stated policy to the market that its approach will be to pay out 60 to 70 per cent of its profits, of its operating cash flow.

DR LALLY: But, Stephen, the 60 to 70 per cent it's referring to is not dividends relative to taxable income; it's dividends relative to accounting profits. The denominator is different.

PROF GRAY: You can look at that dividend distribution over some period and there's quite a deal of stability in that, over some period. So from year to year there are adjustments which might mean that it's higher or lower. But over a period it's quite stable for all of the benchmark firms. So I'm thinking that a way of more sensibly estimating the distribution rate is to look at or to make an assumption, as the case may be, about what would be a sensible dividend and therefore credit distribution policy for the benchmark efficient entity.

DR LALLY: But you cannot get that policy by looking at the announcements of a firm when the firm is thinking about pay-out rate being defined as dividends over accounting profits. Accounting profits are not taxable income. One is not even on average the same as the other. They are two fundamentally different concepts.

PROF GRAY: So APA reports that 60 to 70 per cent figure relative to operating cash flow.

DR LALLY: Again, that's not taxable income. It's two different concepts, Stephen.

PROF GRAY: It's not going to be the case that any of these methods are going to give you a perfect answer. I think it's a much easier task for the AER to estimate and then to settle on a number for what do we think would be an appropriate pay-out rate for the benchmark efficient entity than to try to infer that from franking account balances that companies like BHP and AGL or to pick one of the either 50 or 70 per cent numbers from the Tax Office data.

DR MIRRLEES-BLACK: Are you saying that there would be a - it almost sounds like a matter of judgment.

PROF GRAY: Yes, and I think the evidence that can bound that are information from the firms themselves and what their approach is. I was just going to address Martin's point about whether that could lead - if you are getting that sort of information from the firms themselves,

Martin's point is that that could lead to gaming among the firms to lower their pay-out rates to try to scam the regulator in relation to gamma. I think that's an extremely low risk. Maybe we could hear an industry perspective on how likely it is that a firm would slash its dividend policy to try to scam a few basis points out of the regulator on gamma.

DR LALLY: My point is that if you got the parameter estimates solely from that one firm there would be a risk of them gaming you. But if you are averaging over several firms it's not a problem. But can I check something here with you. Given your new proposal for estimating the distribution rate, it appears you are no longer recommending use of the ATO data to get the distribution rate.

PROF GRAY: So my approach is the same as with all of the other parameters. I think we need to set out all of the relevant evidence. So I think the ATO data is relevant evidence. I accept your point that if we are going to marry something with the equity ownership statistics we need to derive a distribution rate out of that, and the issues with that would have to be taken into account. But the great benefit of the ATO data, which I would give material weight to, is the fact that that provides an estimate that does not require the separate estimation of a distribution rate. So that's a big tick in its column

DR LALLY: That's fine. But if you choose to estimate the distribution rate in the way you have just described from a dividend pay-out rate how then do you get the utilisation rate? You can't use ATO data.

PROF GRAY: No, that will only inform the distribution rate.

DR LALLY: I understand. But how then will you --

PROF GRAY: Two methods. One is we can have some reliance on the equity ownership data. Recognising the sort of statistical issues and problems with that data and recognising that it's an upper bounds, at least to the extent that it doesn't factor in the 45-day rule, we have to take those into account, but that's relevant evidence that goes into the pot. Also if that number, that exercise that I described, comes up with a distribution rate that's

close to 70 per cent, then the ATO data will then imply - given that we have a distribution rate of 70 per cent, that implies a unique estimate for the utilisation rate, because we have got gamma and we have got a distribution rate. So we can reverse engineer.

DR LALLY: You have gamma for all companies. But if you get the distribution rate from just a subset of companies you can't marry it with the ATO data on all companies.

PROF GRAY: You can if it turns out that they are the same. So if it is 70 per cent from your sample of companies and the 70 per cent number that Hathaway derives, then if it turns out that they are both the same then --

DR LALLY: That would just be a coincidence then, wouldn't it? What significance would there be in a coincidence?

PROF GRAY: If that's how it turns out, which is I think how it does.

DR LALLY: It would just be a coincidence, because the ATO data in aggregate is for all companies. You are proposing getting a distribution rate from just some companies. Those two don't match. If they did, empirically it would just be a coincidence.

DR WHEATLEY: But you could say, you know, if you've got two estimates from the ATO data, 50 and 70 per cent, if the estimate from these firms are 70 per cent, then the mid-point of 50 and 70 is 60; it's going to be a fairly small --

DR LALLY: Yes, but those two numbers, 50 and 70, are for all companies.

DR WHEATLEY: I understand that.

DR LALLY: You can't marry it.

DR WHEATLEY: You could take the gamma figure and adjust it for the difference between the distribution rate for a benchmark and the two estimates of the average for the economy as a whole.

DR LALLY: That's okay.

PROF GRAY: Well said. That's what I was trying to --

DR LALLY: That's okay.

DR MIRRLEES-BLACK: All three concur. Quick, write it down. Do you want to translate it, Simon?

MS CIFUENTES: That would be useful.

DR WHEATLEY: So the idea is you take the properly adjusted ATO credits redeemed to credits created estimate, that is, the overall estimate for gamma for the economy as a whole; you take Steve's estimate of the distribution rate for a benchmark efficient entity; and then you compare that with the average of Hathaway's two estimates, which are around 50 per cent and 70 per cent; and then you use any difference to adjust upwards or downwards the gamma for the economy as a whole.

DR LALLY: But the result will be two distinct estimates for gamma, one arising from the 50 per cent figure and one from the 70 and --

DR WHEATLEY: I'm suggesting just take an average, barring any other information. My understanding is that we are trying to find the right wrong number.

MS CIFUENTES: I think that was well stated.

DR LALLY: Let's just take that suggestion that we take the 50 or 70 from the ATO data on the grounds that one of these must be right so we will just split the difference. Is it possible that the truth actually lies outside the bounds given by the ATO? Remember the last sentence in their note is, "The integrity of the FAB label can be considered low," which seems like a polite way of saying, "This is rubbish." If the FAB stuff on credits distributed from the ATO was rubbish, then the 50 and 70 per cent numbers are both rubbish.

MR SADEH: (Indistinct). Again I think it is a very harsh way to judge that that data can be totally useless because of someone's comment like that. To me it's also (indistinct) certain that theta can't be 100 per cent. It can't humanly be 1 because if that were the case I would go up to everyone here and say, "Who wants $100 bill or a note for $100 of franking credits," and no-one would take the

franking credits for a number of reasons. We talked about the 45-day rule. What about things like there is risk in the tax system, change in the future. You only need to look in the papers to see what happens --

DR LALLY: You are saying for some reason a distribution rate can't be 1. Why not?

MR SADEH: Because people won't value it.

DR LALLY: No, we are not talking about values. This is just a mechanical thing. A company pays a million dollars in company tax. If it distributes it all by attaching that to the dividends, why can't it do that? Some companies do do that. They are attaching all of them. What's stopping a company from distributing all its imputation credits? This is just distribution, Ilan, not valuation.

MR SADEH: I'm just trying to think of it because I know there's an accounting issue that comes up all the times as companies like this end up having issues with their retained profit accounting. It becomes higher and higher over time, distributing franking credits out from the underlying assets.

DR LALLY: Okay. Maybe we can sort that one out later on.

MR HANCOCK: Martin, just on that utilisation rate of 1, if I think about it you have an Australian resident entity and it's raising money in the capital markets. So for a domestic investor, if I accept the proposition that basically every domestic investor can use the franking credits that are distributed to them so that those investors value it at 1 or near enough to 1, then the presence of a foreign investor perhaps doesn't really matter because the entity is not going to have a different price for the foreign investor than it has for the domestic resident investor. So the foreign investor has to accept the rate of return that is accepted by the domestic investor.

PROF GRAY: You're falling into the trap of thinking in terms of economic equilibrium models.

MR HANCOCK: Can you explain?

PROF GRAY: Where there is one price, where this is just a

market clearing condition, the market clears and there's a single price that's market wide. That's not the world that we are in here. We are in a non-model world where gamma has been defined to be the redemption rate not an equilibrium value.

DR LALLY: I think you may have misunderstood. Jim, the way I interpreted in terms of you saying that necessarily the market value of imputation credits is a utilisation rate of 1 because Australian investors can utilise them and it doesn't matter that foreign investors can't. Well, if you take an international CAPM which recognises the existence of both foreigners and locals and you run through the mathematics of that it will give you a utilisation rate of pretty close to zero. That's the mathematics of these models.

So your intuition is telling you something different, but you give us a model - in the presence of foreign investors you give me an equilibrium model in which U equals 1. I'm sure there would be a mistake. It just doesn't seem feasible. Foreigners, like locals, will influence the result largely in proportion to their market value weight. So when an international CAPM with no restrictions and everyone just chooses an optimal portfolio without local bias, the market weight of the foreigners will drown out the Australians and the utilisation rate in the model will be zero.

DR WHEATLEY: Except with imputation credits there will be a bias. So you're making it sound as though it's counterfactual. With imputation credits, domestic investors will hold more domestic assets than they would otherwise hold.

DR LALLY: Yes.

DR WHEATLEY: But still gamma would be zero.

DR LALLY: Yes, that's a clientele effect. Because the market pricing doesn't take account of the imputation credits, they will be driven even more strongly to focus on Australian --

DR WHEATLEY: That's right.

DR LALLY: But that's just the dividend clientele effect.

That's not a valuation issue. The dividend clientele effect is magnified by the valuation issue precisely because they are valued at zero in this international CAPM that magnifies the dividend clientele effect.

PROF JOHNSTONE: It wouldn't be big enough either, would it, to swamp the wealth weight of the international investors? I think your point was the utilisation rate would go to zero if you thought of the world as 1.

DR LALLY: Yes. That's what is an international CAPM. The world is 1.

PROF JOHNSTONE: Yes.

PROF GRAY: I think we are getting off the track and beside the point because we are talking about equilibrium asset priced models --

DR MIRRLEES-BLACK: I think you agreed that this is not an equilibrium concept model and that we are using a different process to come up with these estimates. Coming up with these estimates, one approach which we haven't talked about specifically there is Martin's approach of using the top 20 listed firms. and using these or a larger number of firms as representing the benchmark efficient entity. Views on that? Martin, do you still think that's relevant?

DR LALLY: I think your benchmark efficient entity is something other than listed equity. I think it's a group of comparator firms. But I'm not sure how far to push that. The five that we have got or we had up until two years ago, three of them I can't get data on; the remaining two, they tell me the distribution rate is 1. Ilan is suggesting the definition of a benchmark efficient entity needs to be expanded and you need to take more historical data. Doing both of those things might give us a different result. In principle, that is a better approach than taking all listed equity. But the problem is all listed equity is definitionally clear enough. The definition of a benchmark efficient entity that Ilan is suggesting and others are suggesting, it's pretty woolly at this stage and it will be subjective. Different people will have different views. So that's a pragmatic problem. In principle you do want to choose similar companies, but pragmatically that's the problem. Which ones are you going

to pick?

MR SADEH: That's why I revert to the tax system as a whole. Do I agree with the concept I thought was being fleshed out about using the ATO data for the whole of the (indistinct).

DR MIRRLEES-BLACK: Okay.

DR LALLY: If we can come up with a definition of a benchmark efficient entity that we all agree on and we run the numbers and the distribution rate turns out to be 0.7, so be it. I have only ever promoted using all listed equity because I thought that was the second best. There were just problems with trying to define and deal with the benchmark efficient entity.

DR MIRRLEES-BLACK: So the proposal here is to define a benchmark efficient entity and probably use some judgment informed by the evidence from the other sources, and it may not be an average or be informed by the evidence that you get from this range of sources. Is there concurrence around that?

PROF GRAY: Yes, a key component of that definition would be operating in Australia.

DR MIRRLEES-BLACK: It sounds like we shouldn't come up with an estimate of what that number is now.

DR LALLY: And it may be that once you impose the restriction of no foreign operations even one per cent of your operations being foreign knocks you out. The set of comparators falls to zero along with all the other criteria that have to be invoked as well.

PROF GRAY: No, that's too strong. So that would be the same when we are estimating beta. We say APA is out because they own some unregulated pipelines.

DR LALLY: Okay. But then you get the subjective problem, if we won't knock someone out for having 1 per cent foreign income, at what percentage do we knock them out?

DR MIRRLEES-BLACK: It is a matter of judgment.

DR LALLY: Yes.

PROF JOHNSTONE: I think that has been a terrific discussion and it's really revealed different angles and the difficulty with all of them and the difficulty of actually choosing between them. If it was me I would be plugging in some numbers and looking for a ballpark and hopefully looking for some agreement and then in the end working out as a matter of judgment where to call it. That's all you can do in that situation. One of the approaches would obviously be the benchmark efficient entity, as hypothetically defined. But then there's others as well. Ideally we are talking in a vacuum here because we don't actually look at the numbers that come from the different points of view. I think that's going to make a huge difference.

DR LALLY: That's actually good because if people commit themselves to something in principle and then the numbers don't favour their client they can't back out then.

PROF JOHNSTONE: Yes, sure. Sometimes it's been worked out in advance, though.

MS CIFUENTES: Just a quick question. When we are talking about looking at the definition of the BEE, the benchmark efficient entity, and I'm mindful of the fact that a lot of this discussion has been driven by trying to solve the gamma and distribution, I'm assuming that if there was a collective view about a new BEE that it is a benchmark efficient entity that applies across the whole of the WACC considerations, across whole of cost of capital; we wouldn't have different BEEs for different bits of the formulas.

DR LALLY: So long as the exercises are all concerned with regulated energy network businesses you would be using the same benchmark efficient entity for all of them. But if tomorrow you start regulating airports then the benchmark efficient entities --

MS CIFUENTES: No, the question is about internal consistency of having just one concept of a BEE within this regulatory framework.

DR MIRRLEES-BLACK: I suppose that's to say when you are looking at beta the question is there are systemic risks, but are relevant issues for estimating gamma when you have

the tax considerations does it matter if they have different systematic risk or is it the nature of the investment program, the nature of the Australian - so potentially you could have different benchmarks.

MS CIFUENTES: That's the question I'm asking. Are you contemplating that there might be different BEEs for different elements of it?

MR SADEH: I wouldn't be. I think it should be the same benchmark efficient entity struck in a concept applied to each of the parameters. I think the data that you then use for assessing those parameters will be different. For example, gearing is something that you can use for listed companies because they are not distorted relative to unlisted companies because they are generally all bound by the same issue, being credit rating; whereas tax is something that is distorted by a pay-out ratio which is different between listed and unlisted. If the concept is the same, we would apply the data. It would be different just for gamma.

DR LALLY: It's important to emphasise that in the Officer model the distribution rate is a firm specific parameter. But for reasons of risk of manipulation you wouldn't want to take it from that particular firm. You've got to do some sort of averaging over a set of like firms. It follows from that that so long as the firms you are looking at are all regulated energy network businesses, the benchmark efficient entity would be the same for all.

MS CIFUENTES: That they are regulated? Do they need to be regulated?

DR LALLY: That's a good question and it strikes to the heart of what's the definition of a benchmark efficient entity. That's a good question. Do they have to be regulated?

MR HANCOCK: In thinking about that BEE we do know we have got this shift from listed to non-listed, and potentially that's motivated by the fact that there are cost of capital advantages through the non-listed path. So we need to try and pick those up and throw them into the regulatory rate of return if we are able to do so.

DR LALLY: There is certainly nothing in the model which

demands that the firms you use as comparators have to be regulated.

PROF GRAY: I think there's a difference. I think that's the last point as well. I would think that the AER would write down a single definition for what the BEE is and then as you go through parameter by parameter there might be a range of different evidence that's used to inform your estimation of each parameter.

DR LALLY: So certainly for purposes of estimating beta, because regulation presumably influences beta, the comparators you use for estimating beta have got to be regulated. But there's no necessity for it when it comes to the distribution rate.

MR SADEH: Just because that's the best alternative, I think. Conceptually the BEE is a regulated network. But as you say then when you go, "Well, in theory I would like to find the data that best informs gamma representative of a regulated network, however I can't because it's distorted for this reason." But the BEE is always a regulated network because otherwise, as you say, beta and other parameters don't line up to anything.

PROF GRAY: That's right. Different elements of the BEE definition have different implications for each parameter. So, the distribution rate, it is important that the comparator firm complies with the BEE definition of operating within Australia. But that doesn't constrain your estimation of beta, for example.

DR MIRRLEES-BLACK: Do you have any other questions? Any other points you would like to make?

PROF GRAY: Just one very briefly, which is my view is that the same approach would be applied to all three parameters that we have discussed today. So gamma would be the same. Start with the peg in the sand that's at 0.4. What's changed? What new evidence have we got since the last time? Is that new evidence all in one direction? Is it above or below? Is it material enough to move us from that? That threshold of materiality has to be applied consistently between the three parameters.

DR MIRRLEES-BLACK: Thank you very much. We will break there. We will reconvene at quarter to 4 for the final

session. Thank you.

SHORT ADJOURNMENT

DR MIRRLEES-BLACK: Okay. 45 minutes to discuss every other single issue there is within the rate of return objective. I think the purpose of this last session is to - I don't think we should summarise and set out agreement here. I think it's more useful for everyone to have the opportunity to raise issues that haven't been raised so far and which, on reflection, they think should be raised as issues that should be there for the AER's consideration. I have got some ideas. But perhaps before I start I will open the floor up for others to propose things.

DR LALLY: Let me be bold enough to take you up on the offer. I have already raised an issue in our gearing session that wasn't anything to do with gearing, but it arose by accident and I think it's an issue worth considering, that one should seek one's best guess about individual parameter estimates and then, having put them into the WACC formula, you come up with a number, then go through a transparent process for raising that number if one feels some protection is needed against the problems arising from estimation errors. So transparency rather than kind of surreptitiously cranking up the estimates for individual parameters. So no need to say any more on that.

The second issue which I think is worth commenting on is that Australia uses the Officer model rather than the standard version of the CAPM for the very obvious reason that Australia has an imputation system and the standard version of the model was developed in a market, the US, which didn't have imputation nor has it ever had imputation. But the standard version of the model assumes that all sources of personal investment income, which is interest, dividends, capital gains, they are all taxed at the same rate, whatever that rate is, for each individual investor. That's clearly not the case in Australia because capital gains are taxed less onerously than ordinary income.

One of the reasons why it's taxed less onerously than ordinary income is that you don't pay capital gains tax until you sell it. At least that's usually the case in most regimes. There was an exception to that I know in New

Zealand, but in most tax regimes where capital gains are taxed you pay on realisation. Realisation could be decades into the future. Every year that you defer realising the asset and therefore defer paying the tax you are effectively grinding down the rate.

The Officer model doesn't make any allowance for that. By contrast, the New Zealand regulator, the Commerce Commission, uses a model that does recognise that capital gains are taxed differently to ordinary income and, on the basis that the average tax rate on capital gains is much closer to zero than it is to the ordinary tax rate, assumes that capital gains are tax free. Whilst I'm not suggesting that one go that far in Australia, it is possible to modify the Officer model to incorporate differential taxation on capital gains and ordinary income, and that has been done. So the theory is there and also some empirical estimates on what that tax parameter would be, and it can be material. If a beta is sufficiently below or above 1 and under other conditions it could make a material difference. I would like to chip in with that suggestion as well. That's probably enough from me.

DR MIRRLEES-BLACK: Does anyone have any comments on that? Just a response on the capital gain, do you have a view even in a ballpark how material it might be or would you need to reflect further as to --

DR LALLY: If one is not sure it is better to say nothing. It can be supplied. So it would be better if I supplied it after this meeting than to conjecture a number and then suffer the humiliation of having to report how wrong it was.

DR MIRRLEES-BLACK: And a clarification on your suggestion of making a best estimate of each parameter and at the end going through a process, are you envisaging something like what is done in New Zealand?

DR LALLY: Exactly.

DR MIRRLEES-BLACK: Where there is a process of building up and then there's a construction of a range and then a picking of a point in a range; is that your suggestion?

DR LALLY: No, you generate a point estimate for WACC using your best estimates for the individual parameters. You

then estimate the standard deviation of the distribution from which that point estimate has come. You then come to a view about how far you want to go into the right-hand tail of that distribution. So if you want to go to the 70th percentile then you are adding something like one standard deviation to your point estimate of WACC. So if your point estimate of WACC is 8 per cent and your standard deviation is 1 per cent then you would be adding something like one percentage point to your WACC point estimate to build it up from 8 to 9.

MS CONBOY: And those are easily enough found in terms of the decisions of the New Zealand Commerce Commission in terms of how they have moved away from that and the rationale that they have put in.

DR LALLY: Yes. There's a lot of material on that issue available.

MS CONBOY: Thank you.

DR MIRRLEES-BLACK: Does anybody want to comment on those proposals?

DR WHEATLEY: The pricing model should be confronted with the data to find out whether it performs better than the alternatives.

MS CONBOY: The which, sorry?

DR WHEATLEY: Any pricing model should be tested.

PROF JOHNSTONE: But there hasn't been a lot of success testing pricing models academically or anyone where else. Untestable mixed results, different results in different situations. It's not like we are going to get any truths emerging.

DR WHEATLEY: I think Steve and I referred to a mountain of evidence that the slope of the empirical security market line is lower than the Sharpe-Lintner CAPM would have predicted.

PROF JOHNSTONE: That sounds like a rejection of one model in one --

DR WHEATLEY: No, but you just said that tests of asset

pricing models typically produce different results.

PROF JOHNSTONE: They do, I think.

DR WHEATLEY: I just provided an example where that is not the case.

DR MIRRLEES-BLACK: Can we take a step back. I think the first factor is I was wondering were there comments specifically on Martin's proposal. The first one was to go through an estimation process and then construct ranges based on estimates of the parameters so that you don't - you make each estimate conservative, but you are making a best estimate of each one. Does anybody have any comments to make on that, particularly if you are familiar with the New Zealand approach?

PROF JOHNSTONE: That fits very much with the pragmatic approach that I think is inevitable, and that is basically plugging in numbers, trying to do it - aiming for perfection or hoping it comes up pretty good, basically. The only way to actually get to the bottom of a lot of these arguments that we have left this time and time again today and the other time where we have left the job to be done and that is let's try it and see. So there's been different positions put but no outcome numbers attached to them.

To me the debate would be a lot more revealing and get us more quickly to an answer if - and I know experts are funded by somebody and there's not an infinite budget for the work, but when a position is put there really should be some outcome attached to that so that people could see what the consequence would be rather than just thinking about it in the abstract. As much as possible that would make the debate much more revealing and interesting.

DR SATCHELL: Just in terms of where we are already, the AER approach of having the 95 per cent confidence interval on beta over a sort of relatively small range of values on the equity risk premium and so forth put all together might well give you a result that's not that much different from the WACC result. This is a conjecture. It might be interesting to see whether the existing approach and the proposed approach by Martin are in fact pretty compatible. I'm suspecting they are.

DR MIRRLEES-BLACK: Okay.

MR HANCOCK: I certainly support the idea of coming up with best estimates of parameters and calculating and then thinking about a margin for conservatism, if appropriate. I suppose the other side of that is if we are thinking about conservatism at the parameter level then we can also calculate in that way and actually see what conservatism margin is being built in from that sort of coming up from the individual parameters.

DR MIRRLEES-BLACK: So a measure of agreement. Stephen, do you have a view on that?

PROF GRAY: Just a word of caution. You would have to be careful about what range you put around that. I think what Martin is suggesting and the New Zealand experience has been to come up with an estimate of a parameter that you think is the best estimate and then there would be some range for estimation error around that. So that first point of getting the best estimate, that becomes the centre point for your distribution. Then there's probably a symmetric distribution around that. That first point estimate reflects all of the evidence that you think is relevant to that parameter, and then you pop a range around that.

So in relation to beta, for example, you certainly wouldn't say that the range for beta that I'm going to use in this analysis is 0.4 to 0.7 for two reasons. Number one is that's not a statistical confidence interval, a 95 per cent confidence interval. The AER has said that's their judgment about what the subset of the domestic comparators tell you.

Secondly, it doesn't reflect all of the relevant evidence that will be used to inform the debate. So in that case it would be 0.7 is - if you are applying this with the current estimate, 0.7 becomes our centre point for beta and then there would be some range around that that would feed into the process that Martin is talking about, I think.

DR LALLY: The process, though, that I'm describing is not a range. It is a standard deviation; not a range.

PROF GRAY: My point is only that it is centred around the best point

estimate.

DR SATCHELL: But it is not clear 0.7 is the best point estimate, is it?

PROF GRAY: No, no, no. But whatever you come up with. Whatever you come up with.

DR SATCHELL: Whatever it is, yes, 0.58.

PROF GRAY: Or 1.3, that becomes the centre point.

DR SATCHELL: Yes, absolutely.

PROF GRAY: For the purposes of this analysis.

PROF JOHNSTONE: The end result is going to be quite wide because of the multiplicity of elements in the model. You have a wide range for each parameter and the upper and lower end result for the deemed rate of return could be very wide.

DR LALLY: No, it's not a range. It's a standard deviation. The fact that these things are multiplied together, so long as the beta and the market risk premium, that estimation errors are uncorrelated, the effect of that will be instead of blowing out the standard deviation of WACC it will be to compress it.

PROF JOHNSTONE: So you take the middle points, you mean?

DR SATCHELL: No, it's just a statistical consequence that these two under normality are uncorrelated with each other. So the standard devs aren't additive. They are much less than additive.

PROF JOHNSTONE: So in the model where you are multiplying two things by each other or whatever, if you have a standard deviation which I'm taking to be a range around --

DR LALLY: No, standard deviation, I'm using that term in the conventional statistical sense --

PROF JOHNSTONE: But you can't plug a standard deviation into a model. What are you plugging in?

DR LALLY: You get the point estimate for WACC in the usual

way. You take a standard deviation for beta, a standard deviation for MRP and you use the laws of mathematics to translate those two standard deviations into a standard deviation for WACC.

PROF JOHNSTONE: So that's the standard deviation of, say, A times B, for example?

DR LALLY: Yes, exactly.

DR SATCHELL: But the point is that A times B isn't normally distributed. So to think that you are doing it plus two standard deviations minus two standard deviations equals 95 per cent is not appropriate. That's why quite correctly the New Zealand - I think what they are doing is they are getting the mean for WACC, they are getting the standard deviation for WACC and they are simply just saying the question, "What happens if you are one standard deviation away?"

DR LALLY: They are coupling standard deviation and point estimate with the assumption that the distribution is log normal rather than normal to ensure that you don't get a WACC value below zero.

DR SATCHELL: Sure.

DR LALLY: So combining log normality, standard deviation and point estimate you have the whole log normal distribution.

DR SATCHELL: You can probably do even better than that, but that's a research question.

PROF JOHNSTONE: Basically what you are saying is there's four or five inputs that feed into the WACC formula. They have each got a standard deviation attached to their estimate. That results through the maths of the structure to a standard deviation for the WACC at the end.

DR LALLY: Yes.

MS CONBOY: I follow what you are saying in terms of calculating each individual parameter taking the standard deviation around it. The point estimates then give you your WACC. Then you've got a mathematical method of getting around that standard deviation of the overall point

estimate of the WACC.

DR LALLY: Yes.

MS CONBOY: I understand that component. What I am struggling a bit with when Stephen was talking about you've got a certain type of estimation that you are going to do, but you need to step back and look at different evidence in front of you.

DR LALLY: Yes.

MS CONBOY: So are you saying that you've gone through the step that Stephen has articulated and other people have agreed with?

DR LALLY: Yes.

MS CONBOY: And you have come up through going through that this is the best comparators, this is a little bit weaker, a little bit weaker, a little bit weaker, we go through that exercise.

DR LALLY: Yes.

MS CONBOY: And we come up with that point estimate that has a standard deviation around it and then you do that subsequent --

DR LALLY: Yes. In fact to take the MRP as an example, suppose there are two methods of estimating the MRP, method 1 and method 2, and you choose to put 50 per cent weight on each of them that will give you the point estimate. Each of those individual estimation methods has a standard deviation. If the estimation methods, the errors are uncorrelated, then again the laws of mathematics will tell you how to get a standard deviation for that average of the two. So the standard deviations are, first of all, cranked out for individual parameters using the individual methods that you use to estimate that parameter and from there again the laws of mathematics will give you a standard deviation on WACC.

PROF JOHNSTONE: There is the potential of garbage in, garbage out, though, I think in those original estimates, right?

DR LALLY: But at least you are being transparent about it and people can then say, "I disagree with that estimate for standard deviation" or this or that. The debate can at least be focused on things people don't agree on.

MS CONBOY: That works when you have an empirically derived point estimate. What happens when you are using other types of estimates to inform the direction of the point estimates? So before when we were talking about perhaps there was a range, understanding the fact that Stephen says perhaps you are compounding the error if you are just taking those three and you are looking at the comparator to help you within that band, but what role does that sort of cross-check other type of analysis that you're using as a cross-check to help with the direction of that point estimate?

DR LALLY: Okay. I think what you would do is suppose you come up with a point estimate of WACC using your quantitative methods of 8 per cent and you come up with a standard deviation for the distribution of 1 per cent and you say, "I want to be one standard deviation above to give me protection. That gives me a WACC of 9 per cent." At that final point you would then say, "Mm-hm, what qualitative information have I got and what does that qualitative information suggest to me?" That qualitative information might say, "A WACC of 9 isn't enough. I should add something." Then you decide what that will be. That qualitative information might indicate to you, "I'll take something off." So what you do is everything I've described as a process for dealing with the quantitative information, once you have done that then you can bring in whatever qualitative information you like and adjust accordingly.

MS CONBOY: But that's for the overall WACC, not for the individual parameters.

DR LALLY: Yes.

MS CONBOY: And then would that qualitative assessment also assist you in determining where you are going and how far you are going within your standard deviation or are you using something else?

DR LALLY: Potentially it could, but the primary reason for choosing that margin is a recognition that the consequences

of underestimating WACC are more serious in the long-term than of overestimating, and that is why you would want to go above the mean of distribution.

MS CONBOY: Thank you.

DR MIRRLEES-BLACK: How would investors react to something like the proposal?

MR SADEH: Look, I agree with comments before that anything should be rigorously tested if it is going to be adopted. But I don't think I know enough about the (indistinct) on the simple fact, "Well, that's something that has a number above mean." I'm trying to avoid that temptation, but I would just say that either for something - I'm not trying to advocate (indistinct) that results in a higher or lower number. I'm just trying to look at something that results in an appropriate number. I think for what we have said that, given that the current framework is good and given the proposed changes to the (indistinct) rate of return guidelines which provide more discretion between all of that, I think that there's just overall a threshold to find something needs to be superior rather than just incrementally smarter, therefore let's change it for the sake of changing it. There is a cost of investor confidence. So if all of this can be proven to be more robust and accurate, great. But, until it is significantly better, I don't think we should just be constantly changing.

DR LALLY: It may be Steve's suggestion here about compare it with what we are doing at the present time, it may be that there really isn't any difference, and if that's the case then stay with what you are doing.

DR SATCHELL: Just from a methodological perspective, if it is WACC that you are interested in then that's the distribution you should be looking at rather than ending up with a single number and having a whole range of distributions and all the other components that go into it.

MR SADEH: From an investor perspective I'm not looking for a WACC to be a fixed number, if that's what you mean, because at the end of the day for investors to be able to - the existing risk profile of the regulatory framework here is that I can respond to it through my capital structure. That requires the risk free rates to be

separated as elements that I can hedge, that I can deal with, that I can understand. It wouldn't work if you do it that way. We have said a few times today that you don't turn over your whole capital structure every five years.

PROF GRAY: Just as a general point on that, the reason that the New Zealand Commerce Commission uses this process is because it's come to the view that the cost of getting the number too low is greater than the cost of getting the number too high. It would be useful, I think, in a guideline to set out the AER's view about that. So the AER might come to the view that they think the cost of misestimation in each direction is equally costly, and I think that's been implicit in what the AER has done so far. But just to have a statement at least about what view the AER has come to on that point would be useful.

DR MIRRLEES-BLACK: Any views on formally relating CAPM to differential tax treatment on capital gains or income, which was a statement of Martin's.

PROF GRAY: Another tax parameter to estimate.

PROF JOHNSTONE: Just in that whole statistical process which strikes me as totally terrific and to do it and find out what it says and obviously want to see that, but there would be some dependence between these estimates. I think a lot of them are coming off similar data and similar argument models. That would be one problem.

DR SATCHELL: It's a consequence of a boring bit of mathematics that the estimate of beta and the estimate of the equity risk premium are independent. So you do get some independence. But that's not generically true if the distribution is different et cetera. But, yes, there is dependence. Generally there would be dependence.

DR LALLY: And what helps quite apart from the esoteric maths is that MRP estimates that are based on 110 years of data versus beta estimates that are only taken from the last 10, that fact alone will produce a correlation that's close to zero.

DR SATCHELL: Yes.

DR MIRRLEES-BLACK: Any other comments on tax? No, okay. That's a proposal. I think we will include it as a

suggestion. I think there was a question as to --

DR LALLY: And there was a third one which I had already mentioned in the last session and that was that instead of trying to, as is done at the moment, couple a CAPM that assumes complete segmentation with parameter estimates that actually reflect some degree of integration, to come up with cost of capital estimates under the two extremes - complete integration, complete segmentation - and then it's a judgment question of where do you lie between the two. One of the nice features of that is that if the numbers are pretty similar under both complete integration and complete segmentation then it's going to be pretty easy to pick it up. You don't really care what you choose in the band.

DR MIRRLEES-BLACK: But what if they are significantly different and what if the required return for international investors is significantly below Australian investors, let's say?

DR LALLY: If you use an international CAPM there isn't a cost of capital for both Australians and a cost of capital for foreigners. There is only one cost of capital. The same with the Officer complete segmentation. There's only one cost of capital coming out of each of these models.

PROF GRAY: It sounds to me like that's something to be explored in time for the next guideline as opposed to - it certainly goes beyond an incremental --

DR MIRRLEES-BLACK: I think that's possibly correct. We can maybe write some comments on that in the --

DR LALLY: And another feature of it which may or may not be the case depends on the parameter estimates. But if you find that, having found these two extremes of say one of them is 7 per cent and the other is 8 per cent, if you find that what you are doing at the moment, which is to couple the Officer model, which is a segmented markets model, with parameter estimates for the utilisation rate that are somewhere between zero and 1, if the result of that bastardised model is to produce a cost of equity that lies outside those two extremes, then clearly that doesn't make sense and that will be a strong signal about a defect in the current regime.

PROF GRAY: The only problem is, like, as much debate as

there's been about how you go about estimating beta and so on in the real world, multiply that by 100 for estimating all of the parameters in each of these theoretical counterfactual worlds.

MR SADEH: I'm quite concerned from an investor side. I think I said in session 1 the biggest concern that I would have is that discretion is expanded kind of through a backdoor discretion. To paraphrase "We don't really know which one of these is right because there are imperfections with every different technique we use, so let's go through them all and clump them all on a page and then, AER, you decide somewhere in that ballpark." That is backdoor discretion and without a level of objectivity. This is why I keep going back to there should be a high bar to change parameters that should by their nature be (indistinct) stable. I have a very real concern that that could lead to discretion that isn't in anyone's interest.

DR WHEATLEY: I would like to make the point that any international model should be confronted by the data. So the model should be tested.

DR LALLY: But it is implicit in my suggestion that the truth is neither an international CAPM nor a segmented markets one. The truth is somewhere between the extremes. So any empirical testing which says the international CAPM is wrong doesn't invalidate the process. What it might indicate to you is that in choosing between the two extremes you might tilt more towards the domestic CAPM --

DR WHEATLEY: Or go beyond because both may be wrong.

DR LALLY: Right, but the truth is somewhere --.

DR WHEATLEY: In fact they both probably are wrong.

DR LALLY: But the truth is somewhere between the two of them.

DR WHEATLEY: Or beyond the bounds.

DR MIRRLEES-BLACK: I think that's for exploring. We can write some words on that in the joint report. I have a question which --

MS CIFUENTES: Sorry, before we go on to completely

different questions, can I just ask a follow-up question, just something that Stephen has said, at least Stephen and perhaps some of the others, that the AER should follow the New Zealand example and state a view on whether we consider that the risk of underestimating the WACC is higher than the risk of overestimating. I think you said the AER hasn't done that, but it seemed implied in the decisions that we have an equal weighting perhaps. I haven't turned my mind to that explicitly.

I guess the question I've got is how would we go about informing ourselves of whether past WACCs have been too high or too low. It is one thing to say, "Okay, we think there's a risk that the model may actually set the WACC too low so we are going to adjust it." But how do we know? What evidence can we look at to say has the WACC that has been set in the past been either too low or too high?

DR MIRRLEES-BLACK: That was my question.

MS CIFUENTES: Was it? I'm sorry. I'm channelling. But there's a utility in actually at some point saying, "Yes, we considered that the risk of underinvestment is greater, the impact of underinvestment and therefore the risk is greater than the impact of overinvestment." But how do we actually know that the WACCs have been inappropriate? Is there something that we can consider: large-scale dissatisfaction from investors, a shortage of capital?

DR MIRRLEES-BLACK: So the question is how do you know whether you have met the rate of return objective or how do you know whether your decisions have been consistently --

MS CIFUENTES: That's part of it. But part of it is informing us of whether there should be this sort of adjustment for a level of conservatism or not. They are sort of separate questions, but they are related.

DR LALLY: It may be that you have in fact been allowing for this but through the parameter estimates. So you might have found a range on some parameter from 0.4 to 0.7 and you have chosen the point estimate 0.7. So by doing that it looks like you have gone above the mid-point, quite possibly with this purpose in mind.

PROF GRAY: No, that's an example where that's not the case, I think. The AER has been pretty particular about

how it's got to the 0.7 figure.

DR LALLY: I just pulled those numbers out of the air, Stephen. I wasn't just --

PROF GRAY: Let me just finish this point. The AER has stated that it started with a best statistical estimate, which was 0.5, the last go around, and then they had a range of 0.4 to 0.7. What led them to end up at 0.7 and not at the statistical estimate of 0.5 was two things. One is evidence from international comparators which sat above the 0.7 bound, and the second was in relation to evidence from the Black CAPM. So I think it was quite clear that there wasn't a degree of conservatism that led the AER to that point. I think the AER's process throughout its existence has been to find the best unbiased mid-point estimate for each parameter and plug that in. But I think that's been what has been done historically. So that's the historical record.

Then to answer the question has that approach led to estimates of being too high or too low, there's no way of - it's not like after the event there's an announcement made that this is what the true WACC was and we can compare that with what was allowed. So it's always going to be, like, the same task that you confront. There's no objective, observable required return. All you can do is to estimate that required return. So I know that's not a satisfactory answer. But what I warn against is the approach that I think - David will have his chance next - is the approach of let's keep reducing the number until something bad happens. I think that's a very slippery slope.

MS CIFUENTES: I agree with that, but isn't the other side of it is to the extent that we haven't seen any crisis of capital is that --

PROF GRAY: No, for the same reason as, you know, I think the RAB multiples and so on are not really useful evidence. So when investors are purchasing these assets they have 50 or more year terms in mind. The allowed rate of return for this particular period is going to go for five years out of 50 or TransGrid is 100 years. So the extent to which - even if the number were a little bit too low for the current five-year period, if it were too low in a way that was likely to cancel out over the 50 years there's not

going to be any capital strike. You are only going to get those sorts of effects if the number is systematically way below what everyone requires.

Martin has written before, for the New Zealand Commerce Commission, about the use of a constant MRP, for example. So I think the required return on equity since the last guideline has been quite stable. The AER's allowances have reduced by two or more per cent for the return on equity since the last guideline following one for one down the decline in government bond yields. That in my mind has resulted in recent decisions having an allowed return on equity that is too low.

But to the extent - and this is Martin's point - that that is likely to cancel out over 50 years, having constant market risk premiums likely to understate the required return on equity when government bond yields are low and overstate it when government bond yields are high, if you have a 50-year horizon that's not going to cause a capital strike. The problem with that is that not all investors are going to have their money in that stock for the 50 years and not all customers are going to be purchasing for the 50 years. So you have got that intergenerational equity issue.

MR SADEH: This is where a lot of investors now - incrementally a lot of the transactions in the market are unlisted investors, they are superannuation funds, they are long-term investors. I agree with Stephen when he says investors can look through short-term issues because it is a long-term concept for everyone. Therefore the most important thing is the objectivity around the decisions. So people can understand when interest rates are low that WACCs get low and then they get higher as interest rate cycles change.

The bigger danger is that there is a perception of uncertainty and randomness, if you will, in the framework. That is something that could lead to bad investment decisions. You don't want to get to conditions that you see that happen because, as I said, there's a fair bit of tolerance, but once you get there it can be quite lethal because we only need to look in the generation space to see what market's views of uncertainty around the RET scheme, around other things have done in terms of investment over previous years into different forms of generation. It's

not something that anybody wants to see happen.

DR SATCHELL: If I was thinking about this as a research question I would be very tempted to look at, say, regulated companies versus non-regulated companies and then examine the two groups to see which suffers from low beta bias. The low beta bias may be explained by, for example, the regulated companies using their power to push the WACC up high enough over and above the sort of fair profit level, if you like, and that would then exhibit itself as a positive alpha.

I'm sure everyone will scream about this, but it seems to me something that's a statistical question that's worth looking at. That's purely looking at the share price side of the argument. There are obviously other issues that you might want to address to see whether you have got it right or wrong, and that's a question of what the prices should be perhaps relative to other countries of similar economies. Just looking at share prices, at least have an initial enquiry into the question.

DR WHEATLEY: If the regulator is overly generous, it should affect the price but not the required rate of return. Unless markets are continuously surprised.

DR SATCHELL: I was actually looking at not the required rate of return but the actual rate of return.

DR WHEATLEY: But it would have to be a surprise.

DR SATCHELL: I'm sorry?

DR WHEATLEY: If people knew that the regulator was overly generous it would affect the price up front. It wouldn't affect the rate of return year after year..

DR SATCHELL: It is a question of how markets react to information. Whatever they do or they don't do, it would be worth having a look. That's all I'm suggesting.

DR LALLY: We know markets are inefficient in some respects, but all the evidence is that they are not this dumb.

PROF JOHNSTONE: We have to be very careful to distinguish between ex ante and ex post perspectives. Looking into the

further, we are trying to price electricity at the right price. We can argue about what that is in a moment or whenever. But we are trying to price it at the right price. To do that we are invoking this CAPM methodology. So we are talking in this weird world of CAPM. But then after the event we have achieved a certain result, and that result is evident in things like the financial performance of the entities, how much money they made. It's evident in their actions, how much more are they investing. It's evident in things like RAB multiples. These are the after effects of the regulation from earlier.

I remember it was argued the last time we were here that this financial performance data is irrelevant. That's obviously a very convenient response, that we can just ignore the effects of our regulation, because that financial performance data is the effects of the previous regulation largely.

Secondly, coming back to the issue about which you weight more, being too generous or not generous enough, I think the argument that I have heard from engineers is if the regulator was to be too tough and the industry was to withhold capital that wouldn't happen overnight. It would be evident. There would be bleating. These things take four, eight years to build anyway. There are all sorts of lags, giving us plenty of time to adapt.

We heard today about calling the whole process back and starting again. That could happen very quickly if there is evidence that the regulator has been too tough, and that evidence would come out pretty quickly. There would be a lot of complaints. We would be hearing a lot from the asset owners and they would have good evidence of what they are saying. So I think this danger of being too tough on the asset owners is way overstated because if that were to happen it would become evident quickly and it could be corrected quickly.

DR MIRRLEES-BLACK: May I attempt to summarise. Would you say to judge whether the regulator has got it right or not there are two aspects. One is you look at the financial performance.

PROF JOHNSTONE: Ex post, yes.

DR MIRRLEES-BLACK: And I think we would have to sort of

assess quantitatively what that would be.

PROF JOHNSTONE: Stock prices, profits, cash flows.

DR MIRRLEES-BLACK: And, secondly, something behavioural in terms of the way the companies and investors were responding.

PROF JOHNSTONE: Yes. Motivations. Because people's outlooks are evident in their actions. So if there is gold-plating - and that is a word that doesn't get used except outside (indistinct) the time - then that's an indicator that there is a generous rate of return and people want to get a hold of it.

DR MIRRLEES-BLACK: (how you would assess whether the AER has got it right or wrong? Ilan, any views?

MR SADEH: I think it is hard to - when you are looking at a question of total success or failures, success or failure of the overall regime, it's hard to look at ex post numbers. I really don't agree with that, particularly when the return on a listed stock. Number one, empirically listed networks tend to be among the top performers of a group; and number 2 and probably more relevantly the total return includes the outcome that they get as a result of being in the top four, five or so of networks from out-performance which is not kind of the rate of return.

So you are actually comparing - in my CAPM as an investor I have alpha that takes into account the total risks of all the cash flows, including the operational and non-systematic, for instance, that isn't reflected in the rate of return that just takes into account the systematic risks (indistinct) separate. So you would be judging something ex post that, if it's working properly, those top performers should absolutely be generating those incentives because that's the whole purpose of them.

DR MIRRLEES-BLACK: Jim, how do we assess whether the numbers are appropriate?

MR HANCOCK: I think it's hard to do. If you think about sort of looking at recent outcomes on things like stock prices there are stochastic influences in that and you see that looking for excess returns periods. They bounce

around a lot. So even if you saw sort of surprisingly strong runs in stock prices it's hard to know what to make of that.

I suppose the other thing that people talk about is high rates of investment. If I go back to the '90s with the introduction of competition policy there was a suggestion that the government-owned entities just never saw anything they didn't want to build and needed to be subject to market discipline and much sort of stricter about what they built, and what we have seen is that investment has been very strong in those entities. We have gone to higher rates of reliability. I think that contributes to an idea that there has been some what's sometimes called gold-plating or that perhaps the regulatory environment has been excessively encouraging of investment. So to make a conclusion about that you would actually need to sort of weigh it up against what consumers are willing to pay for as well.

DR MIRRLEES-BLACK: Simon, do you have any views on how we would measure ex post --

DR WHEATLEY: The cost of equity component could be evaluated by back testing the model that's used or the method that's used. There are long time series of returns that are pretty reliable that are provided by the ASX and can be used for that purpose.

PROF GRAY: I think you need to look over a long period as well. So in the last guideline in 2013 allowed returns were reduced very materially. So looking at what happened with investment and so on prior to that is not going to provide useful information on the adequacy of the current level of returns.

PROF JOHNSTONE: What about after that, though?

PROF GRAY: Yes, so we have got three years. So that would be - I'm saying that's too short to get anything meaningful.

PROF JOHNSTONE: Well, it is better than nothing.

PROF GRAY: Yes, I agree.

PROF JOHNSTONE: We have already said three firms is good

enough to measure beta on.

PROF GRAY: I said the opposite, but that would be the relevant period that we have available to date.

PROF JOHNSTONE: And that would be a good thing to look at.

DR MIRRLEES-BLACK: Cristina, Paula, do you have anything else you would like to use the last few minutes? I think we have come a long way today. Thank you very much, everybody, for your contribution and I look forward to developing our paper over the coming days. I will be in touch about that.

MS CONBOY: Thank you. I would like to say this was very worth while. I will let you do that, but I just thought these past two days, from my perspective, particularly not having gone through the 2013 guideline approach, very worthwhile and having that benefit of that across the table discussion. I hope I haven't cut across your closing remarks.

MS CIFUENTES: No, I can just go on to next steps. I think there's been general agreement that both of those second session of concurrent evidence has been very useful. I would like to think that it's not just been useful for the AER Board and the AER team but also for the other stakeholders that haven't necessarily had the opportunity to participate in this. I would like to encourage all the stakeholders to take on board the views that have been expressed by the experts in formulating your submissions to the AER through the rate of return guideline process. I think that would be very useful for us as well. So don't just assume that where Jonathan and the experts say there's an agreed position here that you need to be bound by that. You may have a different view altogether, as may the AER. So it is important that the other stakeholders do express their views on this. As I said, this is only just one input into the process that we are conducting.

It would also be very useful for the AER to have your feedback on how you thought this process worked, whether it actually added value. This has been a very novel process for us. Some of you were part of the 2013 exercise. Some weren't. So it would also be useful to get your feedback, and the stakeholders, on whether this actually has been a useful process for us.

So, as with the position, we will be publishing a review but an unproofed version of today's discussion, and that will be on the web site presumably in the next few days. Then the experts will have the opportunity to review that transcript and we will then publish a proofed transcript as soon as possible. There is a consultation period open for submissions on both the discussion papers that were published in advance and on the transcripts, and those submissions are due by 4 May.

So, with that, I think both Paula and I, and I can also speak on behalf of Jim, do thank you. I think that it has actually been very useful, if for no other reason that I think everyone has an appreciation now that even the most informed minds, our experts, have very different views on some of these and that they cannot be reconciled. I think that that's an important starting point as well, that if the most informed and the best minds here cannot necessarily agree, it does point to the difficulty of the exercise.

So thank you all very much for coming, and for those - Martin has already gone - and the trip to Sydney. Thank you very much. Hopefully we will get something sensible and appropriate and reasonably accurate, justified, transparent and objective. Thank you.

ADJOURNED