TRANSCRIPT OF PROCEEDINGS

AUSTRALIAN ENERGY REGULATOR

RATE OF RETURN INSTRUMENTS
CONCURRENT EVIDENCE SESSION 2 of 4

MATTERS DISCUSSED:
Term of the rate of return, and
Weighted trailing average

FACILITATOR:
Ms Anna Brakey (Commissioner, ACCC)

AER STAFF PRESENT:
Mr Warwick Anderson (GM Network Pricing, AER)
Mr Jim Cox (Board Member, AER)
Mr Eric Groom (Board Member, AER)
Ms Catriona Lowe (Board Member, AER)
Mr Justin Oliver (Board Member, AER)
Ms Clare Savage (Board Member, AER)
Mr Esmond Smith (Senior Financial Advisor, AER)

EXPERTS PRESENT:
Dr Glenn Boyle
Dr Tom Hird
Mr Jim Hancock
Mr Dinesh Kumareswaran
Dr Martin Lally
Professor Graham Partington

RECORDED VIA VIDEOCONFERENCE

THURSDAY, 10 FEBRUARY 2022 AT 1.30PM

```
 1    MS BRAKEY:   For those who weren't with us this

 2          morning for the first session, welcome.  We have

 3          with us a group of experts and the AER board

 4          members.  And I am Anna Brakey, one of the

 5          commissioners at the ACCC, and I am your

 6          facilitator for today.

 7               I will just re-acknowledge the traditional

 8          owners of the country throughout Australia and

 9          recognise their continuing connection to land,

10          waters and community.  I would like to pay our

11          respects to them and their cultures, elders past,

12          present and emerging.  And finally, I extend that

13          respect to other Aboriginal and Torres Strait

14          Islanders who are with us today.

15               This morning, I described that this session

16          is to help the AER board members decide on the

17          2022 rate of return instrument by having a

18          discussion and hearing from experts on the

19          subject.  We've got all of the AER board members

20          present, and I explained this morning the

21          importance of the instrument itself, so I won't

22          go through that again.

23               If you want any information about the

24          process, which I also went through this morning,

25          please go to the AER website where there are a

26          series of papers that set out the process.  But

27          in short, this today is a discussion between the

28          participants, the experts and the board members,
```

1	and we do have a lot of people observing, and
2	you'll notice that you don't have the ability to
3	speak or use the chat function. That is because
4	of your status as an observer. However, you do
5	have the ability to engage in the submissions
6	process that is open until 11 March.
7	Following on from this morning's session,
8	this afternoon we're going to focus on the rate
9	of return and the weighted trailing average. The
10	experts that will be discussing the issues with
11	the board today are Professor Graham Partington,
12	Dinesh Kumareswaran, Tom Hird, Glenn Boyle,
13	Martin Lally and Jim Hancock. A reminder that
14	we're using the hands-up function so that helps
15	me just to navigate the way through it.
16	We'll start the session with short
17	presentations first up from Martin and Dinesh
18	with their thoughts on the rate of return, after
19	which we'll call for other points that are
20	additive from the other experts.
21	We'll then spend about an hour on general
22	discussion on the term of the rate of return
23	focused on two main questions set out in the
24	agenda, and they are, "Should the AER use the
25	10-year term for estimating the return on equity
26	or a term that matches the length of the
27	regulatory period?", and, "If the AER were to
28	adopt a five-year term, what other adjustments

1   would need to be made? For example, would they

2   need to estimate the beta, risk free rate, or MRP

3   on a different basis?"

4   We'll then move on to the second part where

5   we talk about the weighted trailing average. We

6   will also start out with short presentations from

7   Tom Hird and Graham Partington, followed by

8   additional other points. The general discussion

9   will also run for about an hour and will be

10   focused on two main questions, being whether

11   there is a case for taking a more tailored

12   approach to determining the return on debt for

13   regulated firms with temporary large CapEx.

14   (Capital Expenditure) programs, and if the AER

15   adopted a weighted trailing average, what

16   incentives it might create for financial

17   engineering that need considering.

18   We will aim to finish by about 4 o'clock

19   Sydney time. Unless, Clare, anything to add

20   again from the board?

21 MS SAVAGE: No, other than to welcome the experts and

22   thank you for the introduction.

23 MS BRAKEY: I will pass off to Martin.

24 DR LALLY: Thanks, Anna. I will endeavour to keep to

25   the five minutes. The first issue, the

26   appropriate term for the allowed cost of equity.

27   I have circulated a paper. I trust you have got

28   that in front of you.

1   The issue is in a scenario where the

2   regulatory cycle is five years, do you use the

3   five-year allowed cost of equity or the 10-year

4   allowed cost of equity? Just to keep the point

5   as focused as possible in my example, I imagined

6   a regulatory cycle of one year rather than five

7   years. So the issue then becomes do you use a

8   one-year allowed cost of equity or two-year

9   allowed cost of equity? To further keep the

10   example simple, I omitted debt, taxes and

11   operating expenses. So in the regulatory cycle

12   of one year, the regulator sets the allowed

13   revenues at the beginning of the year and they

14   are received at the end of the year. That gives

15   rise to the first equation on the page in

16   question.

17   The value of the regulatory cash flows is

18   the regulatory cash flows, allowed cost of

19   capital, plus depreciation and then the

20   regulatory book value at the end of the year

21   discounted at some discount rate. So the two

22   rates here that are important are the discount

23   rate, D, and the allowed cost of equity, K, and

24   the numerator. It is uncontroversial that

25   whatever you choose for D, K must be the same in

26   order to ensure that the value of the regulatory

27   cash flows is equal to the initial investment.

28   There doesn't seem to be any dispute on that

1   question.

2   So the real question then is what is the

3   allowed cost of equity in the numerator, but what

4   is the discount rate? Once you answer that

5   question, what is the discount rate, then you

6   have automatically have answered the allowed rate

7   of return in the numerator. Other things. Now,

8   I say in this situation the discount rate should

9   be the one-year rate because the things you are

10   discounting back are arising in one year.

11   Two primary contrary arguments have been

12   raised, one by Dinesh and one by Graham.

13   I interpret Dinesh's contrary argument as, "Let's

14   look at standard market practice. What do market

15   practitioners do? If they, in the five-year

16   regulatory situation, choose the 10-year discount

17   rate rather than five-year rate, we should follow

18   them." A seemingly reasonable point.

19   And he cites a paper from the ENA which in

20   turn cites a number of other papers. And the key

21   one seems to be a report by Incenta back in 2013

22   where they interviewed 14 investment analysts.

23   They posed the question, what risk free rate

24   should be used in valuing a regulated business

25   subject to a five-year regulatory cycle and would

26   the rate be different for an unregulated

27   business? Incenta claimed that all the

28   interviewees used the 10-year rate in valuing

1   both regulated and unregulated business, and

2   therefore concluded that regulators should follow

3   this practice.

4   I disagree with this line of thinking for

5   two reasons: First of all, I don't favour simply

6   copying what a set of people out in the

7   marketplace claim they are doing, or even are

8   doing for that matter. For example, a government

9   bond maturing in one year must be valued using

10   the prevailing one-year yield to maturity on the

11   government bond, not the two-year rate. And if

12   you find a collection of bond valuers out there

13   who are using the two-year rate, you surely would

14   not go, "That settles it. They're the two-year

15   rate so I'll just copy that. You'd say to

16   yourself, "Well, that's pretty strange." You'd

17   want to know why they are doing something that's

18   wrong.

19   And it could be that you've missed

20   something, and once you've heard their reasons,

21   you go, "All right. I accept that." But you

22   won't accept it until you first hear their

23   reasons and you are persuaded that those reasons

24   are sensible ones. So that's the first problem,

25   that the Incenta survey doesn't give us,

26   essentially the reasons why people are doing it.

27   The second problem is that in that Incenta

28   exercise the prevailing 10-year rates were around

1   about 3 per cent, but the average of the

2   responses that they got to the survey was

3   5 per cent. So clearly, these interviewees were

4   not in general using the prevailing 10-year rate.

5   They were doing something else.

6   And what were they doing? Mr Edwards of

7   Lonergan Edwards was using a rate higher than the

8   10-year rate, because the cash flows run out to

9   infinity. A number of others said they were

10   using a rate through the cycle, so they were

11   doing some kind of historical averaging which

12   gave them the 5 per cent. But they weren't using

13   the prevailing 10-year rate. So if they weren't

14   using the prevailing 10-year rate, they can

15   hardly be relied on to guide the AER to the

16   conclusion that it should use the 10-year rate.

17   A second contrary argument is raised by

18   Graham, who notes correctly that the debate is

19   whether you use the five- or 10-year government

20   bond rate. Graham favoured the 10-year bond rate

21   because it is more liquid. Well, I think that's

22   true. But if you were valuing a five-year

23   government bond, you wouldn't use the 10-year

24   rate to value it just because it was more liquid.

25   You would have to use the five-year rate. So the

26   fact that the 10-year bond rate is more liquid,

27   true as it may be, is not a crucial consideration

28   in choosing the appropriate discount rate.

1   Graham raises some other points there that

  2   I think are not crucial to the issue here, so I

  3   pass over those, bearing in mind that my time is

  4   probably over, and just quickly turn to the

  5   second question. If you are going to use a

  6   five-year cost of equity, what does it imply

  7   about the risk free rate, the beta and the MRP?

  8   Well, you have to use five-year terms for

  9   each of those components of the cost of equity.

 10   The five-year risk free rate is observable, no

 11   problem. The MRP? Well, the technology the AER

 12   primarily favours is historical averaging, market

 13   returns minus risk free rate, historically

 14   averaged.

 15   If you want an estimate like that for a

 16   five-year period, you deduct out the five-year

 17   risk free rates rather than the 10-year risk free

 18   rates. So there seems to be no problem in

 19   getting a five-year MRP if that's what you want.

 20   Beta is more problematic. It is not at all

 21   obvious what the right historical period is for

 22   estimating beta. There was a great deal of

 23   discussion of that this morning, and whatever it

 24   is, whether it is five years or 20 years or

 25   whatever, whether that is changed depending on

 26   whether you are trying to get a beta over the

 27   next five years rather than the next 10 years.

 28   I am inclined to the view that one should be

1	using a long-ish historical period for reasons
2	that we discussed this morning, and that choice
3	is not affected by whether I'm trying to estimate
4	a five-year future beta rather than a 10-year
5	future beta.
6	MS BRAKEY: Thank you, Martin. Dinesh?
7	MR KUMARESWARAN: Thanks, Anna. I circulated a set
8	of slides, so if you'd all have that in front of
9	you. Let me turn to the second question, which
10	Martin has just dealt with. I agree with him
11	that if the AER were to move to a five-year term
12	for the risk free rate, the MRP should also be
13	estimated using a five-year term. The reason for
14	that is the AER is applying the capital asset
15	pricing model, which is a single period model,
16	and there is only one risk free rate in the
17	model. So if you are using a five-year risk free
18	rate for the first term, you should also use that
19	for the market risk premium. We covered the
20	discussion on beta estimation in quite a lot of
21	detail this morning, so I won't repeat the points
22	there.
23	Let me turn now to the first question,
24	should the AER use a 10-year term or a five-year
25	term? I am on slide 2 now. I agree with Martin
26	that the right way to think about this choice is
27	to use the NPV zero criterion. I think that is
28	the correct framework. I think one of the best

1   estimations of the NPV criterion I've seen is the

2   one put forward by Graham and Stephen Satchell,

3   which the AER has adopted. I've got the quote

4   there, and I'll just read the second sentence

5   from that quote:

6   *A zero NPV investment means that the*
             ex-ante expectation is that over the
7   *life of the investment the expected*
             cash flow from the investment meets
8   *all the operating expenditure and*
             corporate taxes, repays the capital
9   *invested and there is just enough cash*
             flow left over to cover investors'
10   *required return on the capital*
             invested.

11

12   I agree with that definition and I think the

13   implication of that definition is that whatever

14   the return required by investors, that's the

15   return that the AER should seek to allow. And if

16   the AER does that, the NPV zero criterion is met.

17   Let me go to slide 3. This is basically a

18   one-period version of the mathematical example

19   that Martin has just described. The key insight

20   from this, I agree with Martin, is that if the

21   allowed return is equal to the discount rate then

22   the NPV zero criterion is satisfied. What does

23   the discount rate represent? It represents the

24   return required by investors. Again, consistent

25   with that definition of the NPV zero criterion on

26   the previous slide.

27   Martin is right that the key distinction

28   between our positions is that he says because the

1   regulatory period has a five-year length, the

2   cash flows that the regulator should focus on are

3   just those five-year cash flows, and therefore an

4   appropriate discount rate is the five-year

5   discount rate.

6   My view is that the AER should think about

7   what term investors are actually using to value

8   these types of assets. On that, I think there is

9   good evidence that investors are using 10 years

10   generally, both for unregulated assets and

11   regulated assets.

12   Now, one of the criticisms that Martin makes

13   is that we shouldn't just adopt what investors

14   are doing at face value. We should think about

15   why they are doing that. I think there is a very

16   good reason why equity investors are doing that.

17   It's because the cash flows to equity arise over

18   an indefinite period of time. Martin

19   acknowledges that in his report.

20   I think one of the problems with the little

21   mathematical examples that Martin provides is

22   that it abstracts too much from reality by

23   assuming there is a finite term for these cash

24   flows. So all of his examples use two regulatory

25   periods, and at the end of each regulatory period

26   you have an expected value of the cash flows that

27   are expected to occur over the next regulatory

28   period. So what Martin is saying is that the

1   regulator can just restrict their attention to
2   the expected cash flows over this regulatory
3   period, and if you do that, it should be the
4   five-year discount rate that's used.
5   What Martin is effectively doing is
6   describing the regulatory process something like
7   a bond. And I don't think that equity should be
8   described in that way. Equity is fundamentally
9   different. So I think the reason that investors
10   use a longer term discount rate, something like
11   10 years, is because they are thinking about the
12   cash flows not just over the five years ahead of
13   them; they are thinking about the cash flows that
14   will arise beyond the five years as well.
15   I think a second problem with Martin's
16   examples is that he is using the standard capital
17   asset pricing model, which is a single period
18   model, but he is applying that to a multi-period
19   valuation problem. You can't do that. I think
20   that is one of the sources of the problem.
21   There is no easy way to value a multi-period
22   asset. So a simple heuristic or rule of thumb
23   that investors use is to try and match the
24   discount rate that they use over the terms that
25   the cash flows there are expected. So if they
26   are expecting long term cash flows, they are
27   using a long term discount rate to discount those
28   cash flows.

1   I'll pause there and perhaps we'll get into

2   the discussion.

3   MS BRAKEY: Thanks, Dinesh. I might go to the board

4   members first. Do you have any questions? Jim?

5   MR COX: Thank you, Anna. Probably a question

6   directed to any and all of the experts. I think

7   I understand the logic of Martin's argument.

8   I think I do. The question in my mind, it is a

9   change from what we do at the moment to move to a

10   different length of the regulatory period. And

11   I'm just wondering in practical terms what would

12   we gain and what would we lose if we made a

13   change as opposed to not making the change? That

14   is the issue, probably, in my mind. And if the

15   experts could address it, it would probably help

16   me.

17   DR LALLY: Well, the consequence of the AER moving

18   from the 10- to the five-year allowed rate of

19   return is that because on average 10-year rates

20   are larger than five-year rates and equivalently

21   on average five-year rates are lower than 10-year

22   rates, then on average if you switch, you are

23   over time on average going to go be providing

24   lower allowed revenues than you were previously.

25   Now, your customers are going to be happy;

26   the regulated businesses are not going to be

27   happy. But we are not engaged in a popularity

28   contest. The question is, which is the right

1   course of action? And I put it to the AER that

2   the mathematics here demonstrates that the right

3   course of action is to use an allowed cost of

4   capital that matches the regulated cycle. The

5   consequence of that is that your customers will

6   like it, and your regulated businesses won't.

7   But you are in the business of trying to find the

8   right answer regardless of how they react to it.

9   MS BRAKEY: Tom?

10   DR HIRD: I think Martin's right. But I think you

11   implicitly include the assumption, Martin, that

12   if the equity beta is less than one and the AER

13   retains the rest of its approach to setting the

14   market risk premium, essentially the market risk

15   premium will go up by on average approximately

16   the amount the risk free rate falls, so with an

17   equity beta of one there is no impact on any cost

18   estimate, but with an equity beta of less than

19   one there is a negative impact and the estimated

20   return falls.

21   I just wanted to make a very brief related

22   comment on that, which is that Martin has built

23   some logic on a multi-period model and Dinesh is

24   saying that we are using a single-period model to

25   estimate the rest of our parameters. And so, a

26   long time ago in 2008 Bruce Grundy and I wrote a

27   paper for the then gas and electricity peak

28   bodies where we were just trying to describe why

1   it was that - well, part of that paper was to

2   say, "We observe a low beta bias," that when you

3   apply the Sharpe-Lintner single period model,

4   CAPM, you estimate firms with low betas tend to

5   have higher actual returns than estimated by the

6   model.

7   And one of the core explanations that we

8   said likely plays a role in why we see that is

9   because the truth is probably investors have a

10   multi-period way of looking at the world. In the

11   Sharpe-Lintner, this single-period CAPM model,

12   what's happening - and it's pretty useful just to

13   say this out loud so everyone has in mind how

14   crazy this model is if you think of it as

15   actually describing fully how investors think

16   about things - you start on day one and you have

17   a bunch of money. You invest that for a fixed

18   period. At the end of that fixed period, which

19   is undefined, you take all the money and you

20   spend it all. You consume it all. You have some

21   savings, you have a period of investment and then

22   you have a period of pure consumption.

23   And out of that, if you are interested in

24   minimising your risk, you care about this measure

25   of beta. That is the logic of that. That model

26   was fairly quickly built on by Mertens into what

27   is commonly called the consumption CAPM. He

28   said, "Yeah, that model is good. That is a

1   really key insight. That beta concept is a

2   really great model for explaining this concept of

3   diversification and beta, but what if we are

4   actually investing over multiple periods of our

5   lives and consuming along the way?"

6   That is a different version of the CAPM

7   called the consumption CAPM. And in that model

8   we don't just care about beta; we actually also

9   care about the correlation between the returns on

10   your asset and the general reinvestment risk

11   rates in the rest of the economy.

12   And I'm not saying that the AER should go

13   out and try and implement a multi-period

14   consumption CAPM, but I am just saying that we

15   are a long way from an exact science and we are

16   making some simplifications, and that is sensible

17   in just adopting the Sharpe-Lintner and the CAPM.

18   But given the existence of the low beta bias

19   that we observe, and I think there was this paper

20   that we wrote, for the record, which is called

21   "Estimation and correction biases inherent in the

22   Sharpe CAPM formula." I think it was in 2008 or

23   so. If you accept it, and I think there is

24   overwhelming evidence that there is a low beta

25   bias, the question is whether you want to make

26   that potentially worse by adopting a shorter risk

27   free rate and a larger MRP.

28   MS BRAKEY: Thanks, Tom. Dinesh?

1 MR KUMARESWARAN: I agree with the way Tom has just

2   described the multi-period problem. There is

3   actually quite a large literature on multi-period

4   asset pricing models, and there is no single best

5   multi-period asset pricing model. And I don't

6   think anyone is suggesting that the AER should

7   try and apply a multi-period asset pricing model.

8   I think the key point is that that

9   literature demonstrates that the sequential

10   application of the single period CAPM gives you

11   the wrong answer for a multi-period valuation

12   problem. That's the first point.

13   And then to Jim's question, what is the

14   implication if the AER were to move to a

15   five-year term rather than a 10-year term? Well,

16   if it is the case that investors in fact require

17   a 10-year return rather than a five-year return,

18   and if on average the 10-year rates are higher

19   than five-year rates, the implication would be

20   that from an investor's perspective, the AER

21   would be targeting a NPV-negative outcome rather

22   than NPV-zero outcome. And all of the investment

23   incentive problems that follow from that will

24   just arise.

25 MS BRAKEY: Thanks, Dinesh. Graham?

26 PROFESSOR PARTINGTON: The first thing I want to say

27   is if we assume that the term structure of equity

28   follows the term structure of government bond

1   rates then I can't fault Martin's analysis. The

2   logic goes through. However, I still feel uneasy

3   about adopting Martin's approach because it is so

4   different from what I have considered to be

5   standard practice. First of all, using a long

6   term interest rate to work out the cost of

7   equity, and secondly what goes on in capital

8   budgeting.

9   What I taught my students was when you are

10   doing capital budgeting, you should use different

11   discount rates for different project risks. I

12   also suggested that perhaps it was ideal if you

13   matched the discount rate to the term of the

14   project. But then I told them that it was too

15   difficult, and as far as I can see no firms ever

16   did it. In fact, some firms find it difficult to

17   even discriminate across risk classes. Some

18   firms do and have divisional costs of capital.

19   However, the point is whether firms do or do

20   not discriminate across risk classes, they use

21   the same discount rate irrespective of the

22   capital project that they are evaluating. So in

23   capital budgeting, typically the practice is not

24   to match to the term of the investment. And in

25   determining the cost of equity, the typical

26   practice is to use the long term interest rate,

27   which is typically 10 years. More, if there is a

28   reliable interest rate available of longer term.

1   MS BRAKEY: Thanks, Graham. James?

2   MR HANCOCK: Thanks, Anna. I agree that the ex-ante

3   NPV equals zero is fundamentally important. We

4   are talking here about investments that typically

5   have a longer life than five years or a

6   regulatory period. Now, the investments that are

7   made by a network will in fact vary somewhat in

8   terms of their lives and their return

9   characteristics, but we are only going to set one

10   rate of return, so what we want to do is choose a

11   rate of return that is close to the average of

12   the required rates of returns over the sorts of

13   investments that networks do.

14   And I think it seems reasonably clear that

15   the four or five years is shorter than the

16   investment lives of the project, and so a 10-year

17   horizon is more reflective of the lives of those

18   projects. It seems to me that we do want to

19   achieve ex-ante NPV over 10 years and I think,

20   Martin, that you agree with that. And I think

21   what you are saying is that if we aim for ex-ante

22   NPV in each regulatory period, and I suppose

23   we're talking about two five-year regulatory

24   periods for argument's sake, if we aim at ex-ante

25   NPV equals zero in those two regulatory periods,

26   that will get us to the longer term ex-ante NPV

27   equals zero.

28   If that works, well and good. But there may

1   be a problem with it, and this is the point

2   Graham raised a week ago, which is to do with the

3   term structure issue. I'm not sure to what

4   extent you can correct this with a market risk

5   premium, but if it's the case that I discount the

6   second regulatory period at a higher discount

7   rate today than I would in five years' time, at

8   the beginning of that regulatory period in an

9   expectational sense then that would be consistent

10   with having a risk premium in the term structure,

11   then I think it becomes impossible to have NPV

12   equals zero at the beginning of each regulatory

13   period in a way that is consistent with NPV

14   equals zero over the life of the asset.

15   So that seems to me a potential risk with

16   going to an NPV equals zero over the regulatory

17   period. And if we keep our eye on NPV equals

18   zero over the life of the asset, I think we are

19   on safer ground.

20   MS BRAKEY: Thanks, James. Martin, did you want to

21   respond to that?

22   DR LALLY: I have a number of points here. In

23   respect of Jim's comments, if you can put that in

24   a mathematically formal way, Jim, that would be

25   good. And then we can just clean up the

26   ambiguity. Expressed in the English language,

27   it's just too ambiguous.

28   MR HANCOCK: Yes.

DR LALLY: That's the beauty of mathematics. It
            cleans up all the ambiguities.

            Now, Graham, let's take an example of a firm
            that has a book, a manual, a capital budgeting
            manual. "Thou shalt use the 10-year discount
            rate for all projects." So here we've got Bob,
            who does the investment analysis and comes across
            a project in which the cash flows will arise only
            in one year. Bob faithfully pulls out the manual
            and uses the 10-year discount rate. Well, it
            would be nonsense, wouldn't it, Graham, to
            discount back the cash flows on a project that
            arise in one year on a 10-year rate.

            And that has happened because the firms are
            doing something that is not sensible. Just
            because firms do things, it doesn't mean that we
            should copy them. We have to ask, "Why are we
            doing this?" And the answer to the question in
            the example here is that Bob did it because the
            manual told him to do it. That is not a good
            enough reason. That might be okay for lots of
            firms doing their DCF exercises. They don't have
            to subject themselves to external scrutiny and
            have consumer groups on their back saying, "This
            is too high and too low," and regulated
            businesses the other way around.

            The AER is writing reports that are hundreds
            of pages long and is trying to get it right.

1   What the firms might do with their simple, crude

2   methodologies just don't have any relevance to

3   what the regulator is trying to do.

4   Now, the consumption CAPM, a fascinating

5   discussion, but we are not engaged in the

6   consumption CAPM and frankly, the mathematics

7   that I have gone through doesn't even mention the

8   CAPM. We haven't even got there yet. All the

9   mathematics I've gone through demonstrates is

10   that if the regulatory period is five years and

11   the regulator is trying to discount back those

12   cash flows over the first five years plus the RAB

13   at the end, the right discount rate is the

14   five-year rate.

15   I haven't mentioned what model we're using.

16   You can get to the conclusion that the five-year

17   rate is right before you've even mentioned the

18   subject of the CAPM. So talking about

19   consumption CAPM, Sharpe-Lintner CAPM, that is

20   way beyond what is needed to answer this very

21   simple question. You do not need to even have a

22   CAPM to get the right answer there. It is there

23   in the mathematics.

24 MS BRAKEY: Thanks. Glenn?

25 DR BOYLE: First, a question. Can you see me?

26 MS BRAKEY: Yes.

27 DR BOYLE: Right. Because I can't see any of you.

28   Well, I can see Jim but he is frozen in time from

1   about 20 minutes ago. So perhaps I should say

2   what I've got to say and then maybe log out and

3   try and come back in. Would that be a reasonable

4   plan?

5   MS BRAKEY: Yes, although our vision of you and the

6   audio are both good.

7   DR BOYLE: So it might be better if I just live with

8   it, then?

9   MS BRAKEY: It's up to you.

10   DR BOYLE: There has been an awful lot raised here

11   and I'm not sure I have successfully kept track

12   of it all. But here are a few thoughts I have on

13   this. Basically, overall, starting with the

14   bottom line, I agree with Martin on both

15   questions 1 and 2.

16   Now, why? Well, first in terms of some of

17   the things that have been raised, it's not quite

18   true that the CAPM is inconsistent with

19   multi-period valuation. Jean Farmer set out the

20   conditions for them to be used together 40-plus

21   years ago. Admittedly, they are fairly

22   restrictive conditions, but there isn't a

23   complete dichotomy between the CAPM and

24   multi-period valuation.

25   That said, I don't think any of us would

26   argue that the CAPM has some problems in terms of

27   its ability to explain average returns. And this

28   is the issue that Tom was referring to. But I

1   don't think that should be addressed by making

2   ad hoc modifications to CAPM parameters. If

3   there's something wrong with the model, change

4   the model. Don't try and arbitrarily adjust

5   particular parameters in the model that you don't

6   like.

7   Now, as for the evidence that firms use

8   10-year rates, well, I mean, there's lots of more

9   compelling evidence that firms do all kinds of

10   strange things that are at odds with finance

11   theory. Oftentimes it turns out that in fact

12   they are doing them for good reason or they are

13   not actually doing them at all. But even if they

14   are doing them and we can't really explain it, so

15   what? That only matters if they are the marginal

16   investor, the price setter. If they are not,

17   well, whatever they say they are doing is neither

18   here nor there.

19   As I explained in the note that I sent

20   around, even if they are the marginal investor,

21   the fact that they are using the 10-year rate for

22   all future cash flows is simply an approximation

23   to the correct procedure, which is the one-year

24   rate for one-year cash flows, two-year rate for

25   two-year cash flows and so on until kingdom come.

26   Now, if those rates have an upward sloping

27   term structure then the long term rates will be

28   high, higher than both the 10- and five-year

1   rates, and of course the five-year rate will be

2   the lowest. So if you are only going to use a

3   one rate, it is going to have to be some kind of

4   average of all of those. And so the 10-year rate

5   is really just reflecting that kind of heuristic.

6   It doesn't mean that the first five years of cash

7   flows are being discounted at the 10-year rate.

8   It's just reflecting the heuristic used for

9   valuation purposes.

10   If in fact the first five years of cash

11   flows really were being discounted or valued by

12   the market at the 10-year rate then hedge funds

13   would be buying portfolios of these regulated

14   companies up like mad, splitting the first five

15   years of cash flows off for separate securities

16   and selling them at the higher price reflecting

17   the higher rate, and pocketing the difference.

18   Perhaps there is some of that going on, but I'm

19   not aware of it.

20   What else? Oh, the term structure issue

21   that Graham raised. That's certainly an issue,

22   but it's an implementation problem, basically

23   saying that we observe the five-year discount

24   rate, or one year in one period in Martin's

25   model, with error. Now, there's no doubt that we

26   do because we don't know what the risk premium

27   is. But that problem will still be there if we

28   use the 10-year rate. It doesn't make it go

```
 1          away.  Estimation error of the discount rates is
 2          still going to be a problem.  And I think I've
 3          exhausted the various topics that were brought
 4          up.
 5   MS BRAKEY:   Nothing else from the experts on that?
 6          In that case, back to the board members?  Do you
 7          have any questions?  Nothing else?  Clare?
 8   MS SAVAGE:   It's a tricky one to sort of weigh in one
 9          here, particularly if Martin will require me to
10          phrase my question in a mathematical formula as
11          you requested of Jim.
12              I think one of the things we are struggling
13          with is I think there is an alignment on the NPV
14          neutrality principle; I think there may be a
15          difference of views amongst the experts around
16          how that is achieved.  And one of the challenges
17          I think we have then is to form a view,
18          obviously, as to what - and the definition that
19          Dinesh has called out is around what investors
20          require.
21              And so then on the one hand we have Martin's
22          suggestion around obviously almost a resetting
23          bond, which is a discount across the cash flows,
24          and then we'll take the longer term rate because
25          that will reflect the investors' financing costs
26          or construction of equity costs.
27              And so they are quite different positions,
28          and you are almost arguing them on different
```

```
 1          grounds.  There is no empirical data to bring

 2          those two points together, I guess, and that is

 3          one of the challenges that I'm hearing in the

 4          evidence.

 5   DR LALLY:   Well, the best empirical evidence that

 6          Dinesh cites is the survey by Incenta, and I

 7          don't think you couldn't have got a more targeted

 8          survey.  Incenta went out and put two very

 9          precise questions to people and got back very

10          precise answers.

11              The trouble is the answers they got back did

12          not in fact support the conclusion that Incenta

13          drew from it, that these people were using the

14          prevailing 10-year rate.  They weren't.  Most of

15          them were doing something else.  There might have

16          been one or two of them who were using the

17          prevailing 10-year rate, but on average both the

18          average and the median rate they were using was

19          5 per cent - in their own survey.

20              It is just extraordinary how Incenta could

21          have failed to notice that the average answer

22          given was 5 per cent and yet the prevailing, that

23          is to say the average 10-year rate over the

24          preceding year was 3.2 per cent.  That's the sort

25          of prosecution evidence that defence counsels

26          would die for.

27   MS SAVAGE:   I'm wondering, Martin, if you have some

28          comments perhaps on Graham's comments about term
```

1   structure. Because I think we heard the comments

2   you made before about the Incenta survey, but I'm

3   just interested in whether you had any response

4   to Graham's comments about the term structure?

5   DR LALLY: Well, Graham poses the quite interesting

6   question of whether the structure of the cost of

7   equity matches the term structure of risk free

8   rates. With the five-year risk free rate, just

9   to keep it simple, as 5 per cent, and 10-year

10   risk free rate as 10 per cent, clearly the cost

11   of equities will be larger for those two numbers

12   and that increment is called the risk premium.

13   And is the risk premium for five years

14   different to the risk premium for 10 years? Very

15   fair question. But whatever the answer to that

16   question is, it is still true that the right

17   discount rate to use for the regulatory cash

18   flows over five years plus RAB at the end is the

19   five-year rate. So Graham's posing an

20   interesting question, but it doesn't in any way

21   relate to the problem we've got here, "What's the

22   right discount rate on the five-year cash flow?",

23   so an interesting question but it doesn't answer

24   the one we are interested in.

25   MS SAVAGE: But did you say in your earlier comments

26   that you thought if the return on equity is five

27   years then the market risk premium would also

28   need to be an equal rate? Or do you imagine it

```
 1          could be a five-year risk free rate and a 10-year
 2          market risk premium?
 3   DR LALLY:   No, I said in my initial presentation that
 4          if the AER is going to go to a five-year cost of
 5          equity for the discount rate and therefore the
 6          allowed rate, that five-year cost of equity must
 7          be made up of a five-year risk free rate, a
 8          five-year MRP and a five-year beta.
 9              And I further said that the five-year risk
10          free rate, that is easy to observe.  The
11          five-year MRP, well, you can estimate a five-year
12          MRP as opposed to a 10-year MRP.  So that is kind
13          of doable.  But with the betas, it's pretty hard
14          getting a reasonable answer.  How that answer
15          differs over five and 10 years, I don't know.
16              So they are implementation questions, but
17          the question I think we are posing here is, "In
18          principle, what's the right cost of equity for
19          the regulatory cycle?"  Once we've answered that
20          question then we can move into the details about
21          how you estimate it.  But I think unambiguously
22          because the things you are discounting are over a
23          fire-year period then you must be using the
24          five-year cost of equity.  That's just basic
25          finance.
26   MS BRAKEY:   Thanks, Martin.  Clare, are you all right
27          if I go onto Dinesh or do you have a follow up
28          question there?
```

```
 1   MS SAVAGE:   I might have one, but I think Dinesh and
 2         Tom have got their hands up and it looks like
 3         Graham might be leaning for the button as well.
 4   MR KUMARESWARAN:   Let me just address Martin's point,
 5         his suggestion that the evidence that investors
 6         are actually using 10 years as the relevant
 7         discount rate is scant that the only evidence
 8         seems to be this Incenta survey. That is just not
 9         correct.  There are many, many independent
10         valuation expert reports that relate to the
11         regulated assets, the assets that the AER is
12         regulating, and the independent valuation experts
13         all say that they are using a 10-year term.
14               Even the most recent transactions involving
15         Spark and AusNet, those independent valuation
16         expert reports say they are using 10-year
17         discount rates.  Martin makes a point that the
18         average discount rate, the single average risk
19         free rate in the Incenta survey, was higher than
20         the prevailing risk free rate.  But that risk
21         free rate was based on a 10-year term.  It's just
22         that the valuation experts may have been making
23         some adjustments to that.  So maybe using a
24         longer averaging period to reflect that
25         government bond yields have been falling.
26               There's very well-documented evidence that
27         valuation experts have made adjustments to things
28         like the risk free rate or other adjustments to
```

1   their capital asset pricing model estimates to

2   account for the fact that government bond yields

3   fell after the GFC.

4   MS BRAKEY: Thanks, Dinesh. Tom?

5   DR HIRD: Just a point of clarification for Martin.

6   Is it your position, Martin, that actually there

7   is no term structure of the return on the market,

8   if you like? That that's, you know, at one year,

9   two year, five years, at any given point in time

10   that's the same, but just for these firms that

11   have equity betas that are different to one, that

12   investors will respond to different levels of

13   short and long term interest rates differently?

14   You're not saying, I don't think, that when the

15   five-year rate falls, if we were regulating a

16   firm with an equity rate of one, that that would

17   make any difference. Have I got that right?

18   DR LALLY: No, what I pointed out was that if you

19   estimate the MRP by the historical averaging

20   methodology, you've got to take the average

21   market return and deduct the average risk free

22   rate over that period, okay? And if you're - for

23   a five-year period - deducting out naturally the

24   average of the five-year risk free rates, for a

25   firm with a beta of one, it all washes out.

26   But if you estimate the MRP in a number of

27   other different ways, you may not get that

28   washing out occurring. I simply pointed out that

1   using the AER's preferred methodology for

2   estimating the MRP, this mathematical consequence

3   would occur. I wasn't saying that's the best MRP

4   method to use. And in fact, I think I have

5   clearly said I think the AER should be using a

6   wide range of MRP estimation methods.

7   DR HIRD: I think that is important context. If the

8   AER does maintain its current approach to setting

9   the market risk premium, and it is sort of

10   doing - we have to think about what the AER might

11   be doing in adopting a five-year term in the

12   context of everything else that it does and ask

13   whether that makes things better or worse.

14 DR LALLY: I don't agree with that. My view that the

15   five-year cost of equity should be used is

16   completely independent of my view of what the AER

17   should be doing to estimate its MRP. In other

18   words, I don't mould my view on the appropriate

19   cost of equity to use according to what the AER

20   does as an estimation technology from the MRP.

21   That's a separate exercise.

22 DR HIRD: Fair enough, but I think the AER needs to

23   do that. Because it's making all those decisions

24   simultaneously, it needs to think how they bundle

25   up together to give a sensible result.

26 MS BRAKEY: Thanks, Tom. James?

27 MR HANCOCK: I want to make the point that I think it

28   is important to have ex-ante NPV equals zero over

1   the full life of anticipated investments to get

2   efficient investment signals. In saying that, it

3   comes from a prior. It doesn't come from any

4   evidence about what market practitioners do.

5   We know in economics generally that when

6   people state their valuations, they can widely

7   diverge from the sorts of valuations that we

8   actually observe in the market. And so that

9   potentially is what's happening here in the

10   criticisms you're making of the Incenta report.

11   It is also a problem that arises, for

12   example, with the dividend growth method. We're

13   relying on statements that don't really have much

14   skin in the game. So when I favour a model that

15   looks at ex-ante over the life of the asset, I'm

16   not relying at all on what those market

17   practitioners are saying; I'm relying on a

18   conception of what a rational investor would need

19   to make an investment.

20   DR LALLY: Yeah, that's fine. The mathematics I've

21   gone through not only gives you NPV equals zero

22   over the first regulator period, but because you

23   apply that at the beginning of each new

24   regulatory period, you get NPV equals zero over

25   each regulator period out through the life of the

26   asset and therefore NPV equals zero over the full

27   life of the asset. There's no problem there.

28   MS BRAKEY: Thanks. Glenn?

1   DR BOYLE: Two things. First one is one sentence:

2   Independent valuation expert reports, no matter

3   how many there are of them, are not market

4   evidence.

5   The second point, I agree with Martin on

6   this. There are two relevant questions here.

7   The first one is what rate satisfies NPV equals

8   zero, and that's got to be the one matched to the

9   term of the cash flow.

10   The second question is how is that

11   implemented? There, there is room there for

12   argument. I agree with Tom that the AER may need

13   to consider how that interacts then with the

14   estimation of the market risk premium. But it is

15   a separate question. As far as the first

16   question, what rate satisfies NPV equals zero,

17   there is only one answer to that.

18   MS BRAKEY: Thanks, Glenn. I'll just quickly go to

19   Dinesh and then I'll go back and see if Clare is

20   satisfied that her question is answered. Dinesh.

21   MR KUMARESWARAN: Sorry, Glenn, can I clarify? You

22   said what would satisfy an NPV zero outcome is if

23   the discount rate is matched to the length of the

24   cash flows? Did I understand that correctly?

25   DR BOYLE: That's correct, Dinesh, otherwise there

26   are arbitrage opportunities.

27   MR KUMARESWARAN: Yes, but the cash flows from the

28   perspective of an equity investor are long-term

1   cash flows.

2   DR BOYLE: Yes, but the regulator is tasked, as

3   Martin points out, with achieving NPV equals zero

4   over the regulatory period. If they do that

5   every period, then it is NPV equals zero over the

6   entire life of the asset.

7   And so the question is, what's the relevant

8   discount rate to be used by the regulator with

9   its horizon of five years? Well, those cash

10   flows are all received in the first five years,

11   and by definition of what a five-year rate is,

12   the appropriate discount rate the apply to those

13   cash flows is the five-year rate. Now, how we

14   measure or estimate the five-year rate is a

15   different and fraught issue, but it is different.

16   MR KUMARESWARAN: Yes, I agree with that. I would

17   just take issue with your characterisation that

18   the relevant cash flows just arise over the

19   single regulatory period. I don't think from an

20   equity investor's perspective that is correct.

21   What equity investors care about - this is how

22   I've seen actual investors in these networks

23   value these assets. They forecast the cash flows

24   from these assets over a long period of time,

25   well beyond a single regulatory period, and then

26   they apply the longest feasible discount rate

27   that they have access to, which is the 10-year

28   rate, to discount those cash flows.

1   DR BOYLE: Yes. As I say, that is just an average

2   over the cash flows from today until kingdom

3   come.

4   MR KUMARESWARAN: Yes, I agree with that.

5   DR BOYLE: But it doesn't mean they are effectively

6   discounting the first five years' cash flows at

7   the 10-year rate. If they were then, as

8   I pointed out before, there would be arbitrage

9   opportunities. Hedge funds would be into this

10   like a tonne of bricks.

11   MR KUMARESWARAN: In Martin's report on pages 18 and

12   19 he has an equation which he says describes the

13   way that investors typically value unregulated

14   firms. And he says that the way that type of

15   asset is valued is for the investor in the

16   unregulated firm to forecast cash flows out to

17   infinity and then to apply a 10-year discount

18   rate. Do you see any problem with that?

19   DR BOYLE: Do I see any problem with that? Well, not

20   necessarily. I think that's just the situation

21   I've described, where instead of using matched

22   year rates for each yearly cash flow, which would

23   be a very difficult task because most of those

24   rates are not observed, instead investors act as

25   if they do that by applying one single discount

26   rate to all future cash flows that sum, in

27   effect, some complicated average of that term

28   structure of expected returns.

```
 1    MR KUMARESWARAN:   Yes.

 2    DR BOYLE:   But I may be getting Martin wrong there

 3         since I haven't got what he said in front of me.

 4         So he may want to jump in here.

 5    DR LALLY:   Neither have I, and I don't want to lose -

 6         we were told before we weren't going to share

 7         screens.  What I'd like to do right now is just

 8         go to the document that Dinesh is referring to,

 9         take his page references and see whether his

10         claim is correct.

11              I don't believe it would be.  Whenever you

12         are doing a discounting exercise over many, many

13         future years with a standard capital budgeting

14         project, whenever you use a single discount rate

15         you are averaging in the way that Glenn has

16         mentioned.  And that is common practice.

17              And so long as your weights that contribute

18         to that average are right, you'll get the same

19         answer.  But it is still true, as Glenn points

20         out, that that average embodies within it

21         discounting the cash flows for the first year at

22         the first-year rate, the second year at the

23         second-year rate and so forth.  Just because just

24         people use an average, doesn't mean effectively

25         they are discounting the first few years' cash

26         flows at the 10-year rate.  They are just doing

27         an averaging process.  There is nothing in this,

28         the use of a single discount rate, which
```

1   contradicts anything that's been said here. It

2   is just a simple averaging process that disguises

3   the complexity of the individual discount rates.

4 MR KUMARESWARAN: Yes. The point that I was trying

5   to establish was whether Glenn agrees that that

6   is how investors in an unregulated asset would

7   value those cash flows. And if so, does he see

8   any problems with that?

9 MS BRAKEY: I think he said no. Did you have a

10   follow on point?

11 DR BOYLE: I don't have a problem with that as a

12   description. Whether that's actually how markets

13   value any particular asset or security, that

14   requires market evidence. But as a model,

15   description or approximation of how that

16   valuation takes place, that seems fine to me for

17   the reasons I've explained.

18 MS BRAKEY: Dinesh, did you have a follow-on point?

19 MR KUMARESWARAN: I guess the point I'm making is

20   that that is precisely how I understand investors

21   in regulated assets to be valuing those assets as

22   well. Regardless of whether the regulator resets

23   allowances every five years or not, what they

24   care about are long term cash flows and they use

25   a long term discount rate to value those cash

26   flows.

27 MS BRAKEY: Thanks, Dinesh. Clare, back to you.

28   Does that answer your initial question? I know

1   Eric has had his hand up for a long time, but I'm
        2   presuming he will change the topic so that's why
        3   I've let this run.
        4   MS SAVAGE: I'm sort of hoping he will. But I need
        5   to make sure. This is actually much more
        6   interesting than I thought it was going to be.
        7   But I need to make sure I understand the
        8   difference of positions in the room, and so I'm
        9   going to try and articulate it. I am not the
       10   expert, but I do need to be a decision maker.
       11   I think everybody agrees on the NPV neutrality
       12   principle and I think everybody agrees that that
       13   requires discounting over the term of the cash
       14   flows.
       15   I think there is then a difference of view
       16   as to what the term of the cash flows means. I
       17   think Martin is suggesting that the resetting
       18   nature of the regulatory periods means that NPV
       19   neutrality is achieved if you use a five-year
       20   rate because you reset every five years and
       21   therefore you will achieve NPV neutrality across
       22   the whole life.
       23   I think Dinesh is arguing that investors
       24   have a multi-period view of cash flows, so a
       25   longer view of cash flows, and therefore a
       26   10-year rate would be appropriate because it is a
       27   proxy for a multi-year, long term asset, and so
       28   therefore you are almost seeing a very long term

```
 1        of the cash flows.

 2            I think Glenn is sort of in the camp of the

 3        shorter term of the cash flows, but you see the

 4        long term 10-year rate as being effectively an

 5        averaging of individual annual rates.  And

 6        therefore I thought, Glenn, you were coming back

 7        towards a five-year rate but you don't know how

 8        to estimate a five-year rate, so that's where I

 9        was getting a little bit unsure.

10   DR BOYLE:   No, no.  I'm definitely in the five-year

11        rate camp.

12   MS SAVAGE:   And you think the five-year rate can be

13        estimated through the five-year Commonwealth

14        secured government bond rate?

15   DR BOYLE:   Correct.

16   MS SAVAGE:   And Graham, I think you're more in the

17        multi-year longer term structure of cash flows.

18        Is that correct?

19            And Tom, I'm just assuming you're there too.

20        And James, I think you're there as well.

21   PROFESSOR PARTINGTON:   Well, the logic of Martin's

22        approach, I think, is unassailable.  But then it

23        does concern me that people seem to do something

24        quite different.  As Brealey and Myers put it,

25        businesspeople often act smarter than they talk.

26        With academics, it's often the other way around.

27   MS SAVAGE:   So we just have to find the truth in the

28        middle of that.
```

1   PROFESSOR PARTINGTON: And if there is a practice
 2   which has gone on for decades then it can't be
 3   too egregious.
 4   MS SAVAGE: So you think logically Martin is correct,
 5   but in practice Dinesh is?
 6   PROFESSOR PARTINGTON: In practice? Well, in
 7   practice I don't really know. You see, I think
 8   the argument that Glenn and Martin have put that
 9   this simple rate is some sort of complex
10   geometric average of the individual rates, that
11   might have some legs. I don't know whether
12   that's the truth, but it has some legs.
13   MS SAVAGE: Thank you. And Tom and James, have I
14   characterised where I think you are sitting
15   correctly? I just need to make sure it's clear
16   in my head before we move onto the next topic.
17   DR HIRD: Yes, I would agree with Martin's logic if
18   we were dealing with risk-free assets. Once
19   we're dealing with risky assets, the logic falls
20   apart because we don't have an asset model of the
21   term structure of the risk premium that we're
22   working with, right? We don't have one.
23   So I don't think there's evidence to say
24   that, you know, in sort of moving from a flat to
25   a steeper yield curve, swivelling around the
26   middle would lower the expected return for
27   regulated businesses. That's the implication.
28   MS BRAKEY: James, can you just confirm for Claire

1   your position?

 2   MR HANCOCK: Yes, basically, except that I remain

 3   concerned that there is a possible inconsistency

 4   arising from the term structure. Martin's asked

 5   me to do some maths on that, so I'll do that and

 6   either find that I'm wrong or find out how Martin

 7   thinks differently on it.

 8   MS BRAKEY: Okay, thank you. Over to Eric now.

 9   MR GROOM: Thanks. Clare really helped me get

10   through the sorting out of the issues that I was

11   trying to get to anyway. It does seem to me that

12   there are some issues raised that may come up

13   next week in the discussion about MRP and its

14   variability through time. I always feel

15   uncomfortable to make a decision to compensate

16   for a perceived error in another decision, so to

17   speak, as we are building up. We do have to get

18   to a decision, I think, that's reasonable in the

19   round. But the idea that we will make an

20   assumption here to offset Tom's assumption about

21   a low beta bias is an uncomfortable position to

22   be in, in some ways.

23   The other thing is it seems that we have

24   moved away from the life of the assets to the

25   period over which people value the income stream,

26   which I think is a positive move because even the

27   10-year seems to be a matter of convenience. It

28   is not equating to the life of the assets.

1   What I'm not sure of is whether there is any

2   evidence on market practice that would alleviate

3   Martin and Glenn's concern that as a matter of

4   principle using a period longer than five years

5   is wrong. The five-year discount rate in

6   Dinesh's term characterises Martin saying, "Well,

7   that's the one that they should use, they ought

8   to use, so that's the basis for the valuation."

9   And sorry, I haven't got a question here;

10   I'm just trying to pull together the arguments.

11   When we get to a longer term and the argument for

12   the 10-year or longer period of valuation and

13   10-year or longer rate, it's a certain

14   squeakiness to the assumptions there because it

15   seems, as Dinesh and Martin have noted, that in

16   practice the people doing the valuations aren't

17   strictly limited to the 10-year term. They're

18   sort of making adjustments to the risk free rate.

19   Now, in the case of the Spark valuation

20   report it seemed as though they were making an

21   adjustment on the assumption of a return to sort

22   of higher risk free rates post the 10-year term.

23   That is, they were building in a longer term ,if

24   you like, to the discount rate. But it is not

25   terribly transparent and not terribly hard and

26   firm. Martin is giving us a hard, firm rule that

27   he reckons is right, whereas the 10-year term is

28   more a matter of convenience than a hard and fast

1   rule, if I can characterise it that way. Have I

2   got it wrong or have I summarised the discussion

3   unfairly?

4   MS BRAKEY: Tom, I'll go to you and then to Dinesh.

5   DR HIRD: I just take one issue with your

6   characterisation of my position, Eric. It was

7   not that Martin's right but you shouldn't do that

8   because it will make the low beta bias worse,

9   it's that actually the evidence is not there for

10   what Martin is saying because we don't have a

11   multi-period model that we're working with that

12   deals with the risk premium. And you should also

13   would be cognisant that if you nonetheless did

14   follow Martin's advice, you would make the low

15   beta problem worse.

16   MS BRAKEY: Thanks, Tom. Dinesh?

17   MR KUMARESWARAN: I understand Martin and Glenn to be

18   saying that anything that we can observe actually

19   happening as commercial practice is not relevant,

20   because that's not the market clearing price of

21   capital. But where does that get us? I mean, we

22   can't observe what the actual cost of equity is

23   in the market. I mean, if we could do that, the

24   AER wouldn't have to go through this process. So

25   what's the best evidence that we have? Well,

26   it's what investors are actually using.

27   What Martin and Glenn seem to be saying is,

28   "Let's disregard what investors are actually

1   doing. Let's use some finance theory to

2   determine what rate ought to be used." But their

3   result depends on some very restrictive

4   assumptions, which I don't think represent

5   reality very well.

6   MS BRAKEY: Thanks, Dinesh. We'll go to Glenn and

7   then I think we might wrap up this topic because

8   I'm not 100 per cent sure we're going to land

9   anywhere aside from where Clare has suggested

10   that everybody is and summarised their positions.

11   But Glenn, just quickly to wrap up on that?

12   DR BOYLE: Very much so. Dinesh is absolutely right

13   that the position Martin and I are adopting is

14   based on finance theory. That is because Dinesh

15   is also right in saying that it is very difficult

16   to obtain - I don't know of any actual way of

17   obtaining the market evidence. In the absence of

18   market evidence, we rely on theory. It doesn't

19   follow to me that we rely on what people say they

20   do or alternatively neither.

21   If we didn't go to a theoretical solution,

22   that would imply that we wouldn't use the CAPM

23   and we just average realised returns on whatever

24   securities we were interested in for as far back

25   as we can. We don't do that; we use the CAPM.

26   And really I think all Martin and I are saying is

27   that in the absence of market evidence, we should

28   apply the best available theory. So I agree with

1   Dinesh; I'm just explaining why.

2   MS BRAKEY: Excellent. All right. Well, now we will

3   move on to the weighted trailing average, and we

4   have Tom as our first presenter.

5   DR HIRD: I think this is fairly - I have not a lot

6   to say on this. I'll just bring up my notes.

7   Just going back to the sort of framework that I

8   talked about in relation to the EICSI, the first

9   decision the AER has to make when coming up with

10   as part of setting an allowance for the cost of

11   debt is what an efficient benchmark debt

12   management strategy is.

13   Now, to date the AER has adopted the

14   issuance of a 10-year bond and an evenly weighted

15   trailing average. That's an approximation to

16   what a business would actually do for a range of

17   reasons, but including that it may be that their

18   debt portfolio is rising over time, falling over

19   time or is just moving around more and it's hard

20   to maintain a constant, steady - you know, it's

21   not in a steady state equilibrium. In principle,

22   if there's a material deviation between what NSPs

23   were actually doing and that simplification of

24   the trailing average, I would see a version of

25   the weighted version of the trailing average

26   better reflect what an NSP actually has to do to

27   maintain its business as a reasonable approach.

28   It just depends on the extent to which that

1   situation arises and the cost of any additional

2   complexity of reflecting that in the regulatory

3   building block models. And I am agnostic and I

4   can see a situation where that might well be the

5   case that that was justified.

6   MS BRAKEY: That was quick. Thanks, Graham. Over to

7   you.

8   PROFESSOR PARTINGTON: It is well-known I've never

9   liked the trailing average. It creates problems

10   and I think today's discussions have demonstrated

11   that. But my concern is a much more fundamental

12   issue, so let me explain. We are now onto

13   slide 2, which is talking about fundamentals.

14   What I have got there is that the expected

15   return on the asset is equal to the expected

16   return on the portfolio of issued securities. So

17   the point of that is that it is the asset that

18   determines the cash flows and their risk. The

19   portfolio of issued securities inherits the cash

20   flow characteristics of the assets.

21   In other words, you can think of it as being

22   a mirror to the assets. Sometimes it seems more

23   like smoke and mirrors because you get all sorts

24   of arcane and largely irrelevant discussion about

25   what firms are actually doing about their

26   financing. The whole point of the portfolio of

27   issued securities is to use it as a measurement

28   instrument to measure the WACC. But the driver

1   of that WACC is the nature of the assets that you

2   invest in. High risk assets, high WACC. Low

3   risk assets, low WACC.

4   So we want the expected return on the assets

5   because we are interested in computing the

6   present value and we are interested in the NPV

7   equals nought criteria. So what do we do? We

8   take the expected cash flow from the asset and

9   then we discount it at the current equilibrium

10   expected return for the asset. Equilibrium is

11   important there because in equilibrium, the

12   expected return is equal to the required return

13   for investors.

14   And where does that required return come

15   from? It comes from the capital market. It's

16   the current opportunity cost of capital. Look at

17   the characteristics of the cash flows from the

18   asset, look at how you could recreate those

19   characteristics by investing in the capital

20   market, what's the rate of return on that

21   investment in the capital market, that's your

22   benchmark for your investment in assets.

23   Now, notice that the current opportunity

24   cost of capital is determined by the market. It

25   is not determined by what the networks do or did

26   about their financing or plan to do. It is

27   determined by the market. Neither is it

28   determined by the history of interest rates. Our

1   objective here is not to compensate the firm for

2   the costs of debt historically incurred.

3   I'm not walking alone here. There is plenty

4   of support for my arguments. In fact, I could

5   produce a small mountain of finance texts which

6   would all tell you that when you are working out

7   the weighted average cost of capital, you should

8   use the current cost of debt, not the historic

9   cost of debt.

10   Indeed, I can even claim support from the

11   AER. If you look at the document assessing the

12   long term interests of consumers, what you will

13   find there is the statement that the allowed rate

14   of return should be the best estimate of the

15   investors' expected returns matching the market

16   cost of capital. And if you do that, you're

17   going to deliver the best outcome for consumers.

18   There is also a federal court decision on

19   what is in consumers' interests, and the federal

20   court concluded that consumers' interests were

21   served by providing investors with a return which

22   covers the opportunity cost of capital. And

23   I would entirely agree with that.

24   Okay, so conclusions: Historic costs of debt

25   are not an expected return. Historic costs of

26   debt are not an opportunity cost of capital. And

27   so the use of historic costs of debt is

28   fundamentally inconsistent with using the

1   expected return and hence fundamentally

2   inconsistent with the NPV equals zero criterion.

3   Also to date it's been costly for consumers.

4   Whether they will ever be compensated by the

5   swings and roundabouts principle is an open

6   question.

7   Turning to the issue of lumping investment

8   and the weighting mismatch issue, what I would

9   say, of course, is that problem arises from using

10   the wrong cost of debt to begin with. But it is

11   clear that there is a problem, and it is a

12   problem which needs to be addressed. That is

13   rising interest rates. Well, they may be a year

14   or so down the track, but it is almost certain

15   that in the not-too-distant-future, the current

16   interest rate is going to be running away from

17   the historic weighted average. When it does, I

18   predict you are going to hear a lot from the

19   networks. I don't think that would surprise

20   anybody. And with substantial investment to be

21   undertaken, they will have a good story to tell.

22   I have a suggested solution, and that is to

23   create a separate asset base for new investment.

24   That would need some definition. And then really

25   and truly apply the expected rate of return to

26   that new investment asset base.

27   Now, of course there are some problems.

28   First of all, you've got two RABs (regulator

1   asset bases), which I understand would creates a

2   regulatory issue and that would need to be

3   resolved. Consumers will not be fully

4   benefitting from the swings and roundabouts

5   principle that is supposed to apply under the

6   trailing weighted average, and networks may

7   complain about the difficulty of hedging, to

8   which I would respond that hedging is not

9   compulsory. It is a choice. I have simple

10   valuation illustration at the end of my

11   presentation, but I think it is so blindingly

12   obvious that it doesn't need me to go through it.

13   MS BRAKEY: Thanks, Graham. And those two

14   presentations, I should have explained earlier,

15   when the AER set the agenda and picked which

16   experts would lead the discussion, they picked it

17   such that there would be contrasting views put up

18   in those initial discussions. And I think that

19   is a good illustration of those contrasting

20   views.

21   I'll first go to the board members to see if

22   they've got any questions. No? Okay. To the

23   other experts - sorry, Clare?

24   MS SAVAGE: So I guess, Graham, just to clarify, if

25   we were to change - and I understand the

26   arguments you're making about why we may not have

27   used a weighted trailing average of debt, but we

28   are using one at the moment and we are mid-way

1   through the full 10 years. If the AER was to

 2   continue using a 10-year trailing average of

 3   debt, your view is a separate WACC is the way to

 4   deal with the up-front large lumpy CapEx?

 5 PROFESSOR PARTINGTON: Yes.

 6 MS BRAKEY: Thank you. Jim?

 7 MR COX: A couple of questions. I sort of realise

 8   from Graham's point of view the original sin was

 9   to go to the trailing average in the first place,

10   but we have got there. I'd like you to say a bit

11   about why you think a separate RAB and a separate

12   rate of return based on opportunity costs of

13   capital is better than the weighted trailing

14   average approach?

15 PROFESSOR PARTINGTON: Well, because it is consistent

16   with an NPV equals zero criterion, whereas the

17   historic cost of debt is not. Now, why do I

18   suggest a separate set of assets? Because that

19   is a quick way to get you back to using the

20   proper weighted average cost of capital.

21   And obviously, you know, there would be

22   enormous problems with transitioning everything

23   to the on-the-day approach. You know, if you

24   transitioned in, you've got to transition out.

25   So it can't be solved quickly by looking at

26   getting rid of the weighted trailing average.

27   But there is, it appears, going to be a problem.

28 MS SAVAGE: That would be a 50- to 80-year

1   transition, wouldn't it?

2   PROFESSOR PARTINGTON: Yes. Well, 10 years in and 10

3   years out, right? But clearly one would expect a

4   capital strike if the current cost of debt starts

5   going well beyond the trailing weighted average.

6   MR COX: Thank you. Can I then ask Tom how he

7   responds to Graham's suggestion of a separate RAB

8   and on-the-day approach being applied to it?

9   DR HIRD: I might respond with a question, because I

10   wasn't entirely sure how a separate RAB is

11   different to a weighted trailing average. In my

12   imaginings of what that meant, you say, "Well,

13   next year we're going to invest in this much

14   CapEx and then we're going to assume that it's

15   financed with 10-year debt," and then that sits

16   there on its own, you know, as 2022 RAB.

17   The CapEx just means your change in RAB for

18   2022 and then that just gets refinanced every

19   10 years for forever. And then you do it again

20   for 2023 for the change in RAB in that year and

21   then it goes on forever. That is what I thought

22   Graham was talking about, which then I thought

23   that's just a weighted trailing average or a form

24   of one. But I think that's not what you meant,

25   is it, Graham?

26   PROFESSOR PARTINGTON: No, no. I'm saying we have a

27   separate set of assets - sorry, go on.

28   DR HIRD: The AER currently updates its trailing

1   average every year, so it uses a current estimate

2   of the cost of debt every year, so if I'm

3   imagining the situation that you are putting

4   forward, Graham, it would be something like

5   instead of just updating the trailing average

6   every year, we just update the cost of debt every

7   year. And that would be prevailing for that

8   year. It would be a current estimate. We have

9   these on the debt side of things; we would have

10   these one-year little mini determinations. Does

11   that satisfy the desire that you have to have a

12   prevailing estimate of the cost of capital?

13   PROFESSOR PARTINGTON: Yes, you could do it annually

14   or you might want to do it for the five-year

15   period. There would be other factors that would

16   come into play.

17   DR HIRD: Assuming we already have the infrastructure

18   in place to do it annually, we could just do it

19   annually. I think that highlights the reason why

20   I think it would be is a bad decision. Even

21   though it would best satisfy the criteria that

22   you have, it is because I think it really matters

23   what an NSP would actually do as they are the

24   ones that have to operate in this environment.

25   And if we could sort of step away from that

26   completely and say, "We are just interested in

27   some - because when we write out our finance

28   textbooks and we come to value a cash flow at any

1   given point in time we use the current cost of

2   capital." And I think that is just not relevant

3   to asking how do we regulate on behalf of

4   consumers a relatively low-risk business?

5   And the way you do that is that you

6   compensate them for what they would efficiently

7   do. You can not do that, but as soon as you

8   start not doing that, you are adding to the risk

9   of those businesses.

10   PROFESSOR PARTINGTON: Well, you either compensate

11   them for what their costs were and don't have the

12   NPV equals nought criterion or use the current

13   cost of capital and do have the NPV equals nought

14   criterion.

15   DR HIRD: Would you agree, Graham, that a perfectly

16   weighted trailing average would satisfy the NPV

17   equals nought criterion on all new investment at

18   the time it was being made?

19   PROFESSOR PARTINGTON: No, I wouldn't agree with

20   that. Let's think about what happens when

21   interest rates change. First of all, there's a

22   change in the value of the underlying asset.

23   We've seen that recently with respect to tech

24   stocks in the US. Then there's a revaluation of

25   the debt and equity. There's a repartitioning of

26   the value of the debt and the value of the

27   equity, and there's a wealth transfer between

28   those two groups. It depends on which way

1   interest rates have moved.

      2   So the market values have actually already

      3   shifted. The trailing average is just a piece of

      4   history. It is very nice for a firm to have its

      5   historic costs of debt more or less guaranteed by

      6   the regulator. I think it has very little to do

      7   with ensuring that the net present value of the

      8   investments going forward is zero.

      9   DR HIRD: I would respond to that by saying that in

     10   expectation you have them in both situations,

     11   probably, in terms of a long running sense. You

     12   have the same expected revenues, the same

     13   expected prices, assuming there is no change in

     14   risk moving between those regimes.

     15   You are proposing a regime that is riskier

     16   and will cause those debt costs to be higher and

     17   likely equity costs to be higher as well. So I

     18   don't see that anyone wins from that proposal.

     19   I think the AER was very sensible and it has

     20   followed regulatory practice around the world to

     21   try and set up a regime where the compensation

     22   for the debt portfolio matches broadly what an

     23   efficient business would have to pay out, which

     24   inevitably means most of those costs are

     25   historic.

     26   PROFESSOR PARTINGTON: There is another problem,

     27   right? We have to define what is an efficient

     28   financing structure? I defy anybody to actually

```
1              describe what that optimal structure truly is.
2              Some assumptions would be made.
3    DR HIRD:   I would characterise your position that it
4              wouldn't necessarily stop at a financing
5              structure.  Your position would be a bit like the
6              ACCC actually implemented for a long time in
7              telecommunications.  They said, "What would it
8              cost to build this network again today?"  The way
9              the ACCC went about setting regulated revenues
10             for Telstra was just every couple of years to
11             say, "How has the cost of digging trenches
12             changed?  We know you've got some existing
13             trenches, but they are not the efficient
14             forward-looking trenches so we'll just model some
15             new trenches that are being dug up overnight."
16             And I don't see why the logic that you're
17             putting forward stops that at debt.  Why doesn't
18             it stop at every aspect of a business's historic
19             decisions?  Why do we take the existence of
20             transformers, why do we take the RAB as being
21             something that is a historic value that is into
22             existence?  Why don't we just do that every year?
23             The answer to that has been assessed by the AER
24             that - the ACCC has changed its position by the
25             way - and regulators around the world that
26             historic costs are a relevant factor and it is
27             sensible to take that into account.
28   MS SAVAGE:   I think it would be really helpful, Anna,
```

1   if we could focus the conversation a bit more on

2   the weighting question. We're talking a lot

3   about trailing average of debt and one of the

4   things that we were really grappling with in our

5   information paper and also in the omnibus paper

6   was the nature of especially the large integrated

7   system plan projects and the fact that we will

8   have very large CapEx projects being added.

9   Now, Graham has talked about a separate RAB.

10   We have put forward a few other options in our

11   paper and I would be really keen to hear the

12   spectrum of views from the experts on that

13   question. It is not that this isn't fascinating,

14   but it is a separate question to one of the

15   questions we are actually grappling with at the

16   moment. So I just wonder, Anna, if we could get

17   some views on how to address those very large,

18   discrete projects.

19   MS BRAKEY: I might start with Glenn, then,

20   DR BOYLE: Right. Well, I guess the first thing -

21   and I don't know the answer to this - is there is

22   apparently going to be a lot of new, large CapEx.

23   That's fine, but that just raises the level.

24   These won't be, by the sounds of it, bang-bang

25   projects. They are not going to be completed

26   overnight or even in a year or even in several

27   years. They will take time to plan, organise and

28   most importantly build, as I understand them.

1   So it is not clear to me as yet, anyway, and
        2   it may be clear to everybody else, that the very
        3   existence of incoming large CapEx necessarily
        4   moves these firms away from one over N or raising
        5   debt roughly one-tenth each year, especially if
        6   there is an ongoing series of these large CapExs.
        7   So I guess that's my first observation. It's not
        8   clear to me just how these new projects will
        9   actually deviate from the one over ten.
       10   MS BRAKEY: Thank you. Martin?
       11   DR LALLY: If you have an existing set of assets that
       12   are on the trailing average and then suddenly you
       13   have a new investment that's on the day, there's
       14   always some weighted average which produces
       15   exactly the same result as breaking the RAB up
       16   into these two parts. But to me breaking it up
       17   into the two parts is transparent. You can see
       18   exactly what's going on. This bit over here gets
       19   on the day and this bit over here, the existing
       20   stuff get the trailing average.
       21   So I would favour transparency and going
       22   with breaking RAB up into its pieces. Having
       23   said that, it may very well be that the weighted
       24   average which is equivalent to that partition is
       25   very close to one over ten, as Glenn
       26   hypothesises. And if it is then don't bother.
       27   Having said that, I wonder if I could just
       28   say something that's a bit more fundamental. So

1   I always interpret the NPV rule, and the examples

2   I have ever presented to the AER have always

3   been, today is the first day in the life of a new

4   regulated business. So if today is the first day

5   in the life of a new regulated business which

6   will borrow some money, raise some equity capital

7   and off it goes, that scenario must use the

8   on-the-day rate for debt.

9   But we, I think, generally agree that a

10   business that starts off like that will not

11   borrow for 10 years and just roll it over every

12   10 years, because that would subject it to huge

13   refinancing risk. A business that borrows all

14   that money on day zero to commence a regulatory

15   operation will stagger the debt. It will borrow

16   a tenth of it to mature in a year and a tenth of

17   it to repay in two years and so forth. So after

18   10 years, it has then got a trailing average.

19   So the NPV rule, to me, says with a newly

20   commencing business you start off with on the day

21   and then you will transition to a trailing

22   average over 10 years. And once you've got to

23   that trailing average, you just stay there. The

24   only thing that will disrupt that beautiful

25   trailing average equilibrium is CapEx.

26   Now, in the work I've done for the AER, if

27   the CapEx is fairly small each year, you can just

28   stay with the trailing average. But if the CapEx

1   gets big enough, at some point you've got to do

2   what Graham says and you've got to partition or

3   equivalently using a weighted trailing average

4   which isn't one over ten.

5   And when you do, if you do partition it as I

6   suggest, because that is transparent even though

7   it is mathematically equivalent to a non-equal

8   weighted trailing average, once you initiate that

9   new CapEx, that new CapEx will just be like a new

10   firm. It will start off with on-the-day and it

11   will then over 10 years phase into the trailing

12   average.

13   So in truth the right way to do this is it's

14   a mixture of trailing average and on-the-day.

15   The arguments sound like it's one or the other.

16   Both are true. When you commence a new

17   investment, it's got to be on the day but in

18   10 years it has become a trailing average.

19   And if that is what the efficient practice

20   of business is then it is sensible for the

21   regulator in making allowances to recognise that.

22   So after 10 years, the regulator reaches a point

23   where it is just using a 10-year trailing

24   average. And that is not inconsistent with NPV

25   equals zero because NPV equals zero was

26   formulated on the day that the business

27   commenced.

28 MS BRAKEY: Thanks, Martin. James?

1   MR HANCOCK: I share Graham's view that the trailing

 2   average isn't reflective of opportunity costs.

 3   So I think here we are worrying about an entity

 4   where we are using the trailing average costs of

 5   capital, but an entity is concerned that without

 6   proper weighting it is inconsistent with the

 7   financing costs that it faces in the market.

 8   But that is really what the opportunity

 9   costs question is saying, that with the trailing

10   average we will regularly have situations where

11   this trailing average cost of capital is

12   inconsistent with the rates of return that the

13   network needs to carry out investment, in this

14   case, potentially large monthly investment.

15   MS BRAKEY: Thanks.   And Dinesh?

16   MR KUMARESWARAN: I think the approach that Martin

17   has laid out makes a lot of logical sense to me,

18   that if you are dealing with new CapEx, you can

19   partition the RAB between the existing RAB and

20   new CapEx.   That new CapEx would get an

21   on-the-day rate to start with and then would

22   eventually transition to a full trailing average

23   over a period of 10 years.

24   And then once it has achieved that point, it

25   just gets rolled into the rest of the RAB.   The

26   AER could do that right now with any new CapEx,

27   but my sense is that the AER doesn't bother doing

28   that because it wouldn't be worth the trouble

1   doing that.

2   But it is conceivable that if the future

3   CapEx gets so large then it would be worth doing

4   that because that would give you a better match

5   between the cost of capital and the regulatory

6   allowance, and that would satisfy the NPV zero

7   principle better. So I think the approach that

8   Martin has laid out makes sense. The question

9   really for the AER is, is it worth doing that and

10   at what point does it become worth doing that?

11   MS BRAKEY: Thanks, Dinesh. I might move on to the

12   second question, which is if the AER were to

13   adopt the weighted trailing average, what

14   incentives it might create for financial

15   engineering? So perhaps not just the weighted

16   average as contemplated by the AER but this kind

17   of on-the-day for new rolling into a trailing

18   average as well, and perhaps Graham wants to deal

19   with the financial incentives under an on-the-day

20   approach in general. So maybe I'll start with

21   you, Graham?

22   PROFESSOR PARTINGTON: I think if you are using the

23   on-the-day approach, you're giving the firms the

24   right incentive. You are saying, "This is the

25   return that your investors currently require in

26   the market. We are going to offer you the

27   opportunity to earn that return."

28   I might also point out that if you adopt the

1   on-the-day approach, you are probably going to
2   stabilise or reduce volatility in the valuation
3   of the underlying assets. And the logic behind
4   that is think about what happens when interest
5   rates change. Interest rates go up, value of the
6   underlying assets go down. That's the bad news.
7   The good news is when we get to the next
8   regulatory period, the regulator is going to
9   increase our allowed cash flow. So you have got
10   two offsetting effects there.
11   Now let's think about what happens when
12   interest rates go down. The good news is the
13   value of the assets goes up, the bad news is the
14   regulator is going to reduce our allowed cash
15   flow in the next regulatory period. So again
16   those two effects are to some extent offsetting.
17   I think it is clear. From finance theory,
18   what you should be using is the on-the-day
19   approach. I've been through Martin's switching
20   the weighted average hybrid approach. I can't
21   quite understand why it works. It seems like
22   magic to me, and I don't believe in magic. So I
23   can't quite put my finger on it, but I think it's
24   something to do with the market value of debt
25   somewhere in the model being constrained equal to
26   its book value, which it is right at the start in
27   Martin's model. But then I can't keep track of
28   what happens to it as we roll forward through

1   time.

2   MS BRAKEY: Thank you. I might go in the reverse

3   order than we did before. Dinesh?

4   MR KUMARESWARAN: I guess I don't really understand

5   what the question is getting at. Is the question

6   asking is there a greater need for some kind of

7   hedging by the businesses? Is that what the

8   question is?

9   MS BRAKEY: As I understand it, no. But Eric, did

10   you want to talk about the question a little bit

11   more?

12 MR GROOM: I guess this is the second question: If

13   we adopted a weighted average trailing approach,

14   what incentives might it create for financial

15   engineering? I guess it's the question you were

16   getting at, wasn't it, Anna?

17 MS BRAKEY: Yes.

18 MR GROOM: And that's where we look at it

19   practically. We put forward a set of options for

20   a weighted average approach. Now, I guess Martin

21   has put forward another option now, an

22   alternative where we start with the on-the-day

23   rate and for a new major investment and

24   transition to a trailing average.

25   Perhaps one thing I would like clarification

26   with Martin on, it was partly because he said,

27   "Well, a new business won't just finance it all

28   by 10-year debt. They will have a portfolio of

1   debt of different maturities and over time that

2   will lead them to get to a trailing average. So

3   is the transition path based on their proposed

4   strategy for the portfolio of debt in terms of

5   financing the original investment or an

6   assumption by us that over time within 10 years

7   they will get to, say, a 10-year trailing average

8   for the debt for that new investment?

9   DR LALLY: The transition from on-the-day to trailing

10   average should reflect what the efficient

11   business would be doing, which would be one tenth

12   of the new borrowing would be for one year, one

13   tenth for two years and so forth. And each of

14   them, when they mature, then still roll over to

15   be a 10-year debt.

16   MR GROOM: So that's still a decision that's

17   independent of the actual financing decision

18   taken by the firm?

19   DR LALLY: Indeed, the firm can do anything it wants.

20   But that would be what we would generally regard

21   as the most efficient strategy because it most

22   quickly transitions a firm from on-the-day, from

23   all the debt arising at one point in time to

24   staggering over time.

25   MR GROOM: I guess the thinking behind the question

26   we posed in the brief that went out is, as we

27   move to an approach that has a weighted average

28   for specific classes, you know, if you are a

1   network and your new investment exceeds a certain

2   proportion of your RAB, if you are a TNSP or if

3   the investment is an ISP, it introduces a

4   difference between the treatment of that debt

5   versus the treatment of the rest of your debt

6   when you are just on a straight trailing average.

7   Does that introduce any biases in terms of

8   choices of financial vehicle or financing

9   strategies that could end up being less efficient

10   and driven by that choice?

11   To raise a hypothetical example, suppose we

12   said that if your investment is greater than a

13   large proportion of your existing RAB, you'll go

14   into the weighted trailing average with a large

15   weight given to the debt at the current time,

16   almost an on-the-day rate? Would that encourage

17   the entity to, say, create special vehicles for

18   that project, as separate entity, and finance it

19   through that entity rather than financing as part

20   of its normal sort of CapEx?

21   That is, does it introduce any incentives

22   for financial engineering that may be driven by

23   the regulatory rules rather than whether it is an

24   efficient or inefficient strategy?

25   DR LALLY: No, I don't think there is any problem

26   there for the firm whose CapEx is large enough to

27   get it moved into this new regime because the new

28   regime I'm proposing would mirror the financing

1   strategy of an efficient firm. The only

         2   incentive problem would arise for firms that have

         3   got CapEx but it is not large enough to get them

         4   moved into the new regime. So the allowance they

         5   get on their borrowing for new CapEx is just the

         6   10-year trailing average, and Graham would

         7   rightly say they are not paying the 10-year

         8   trailing average on that new CapEx; they are

         9   paying the on-the-day.

        10   So there would be an incentive problem there

        11   for small CapEx, but if the cut-off point is

        12   sufficiently small, one might think that firms

        13   wouldn't be too troubled by the difference

        14   between on-the-day and trailing average for a

        15   relatively small amount CapEx.

        16   MR GROOM: Does that explanation help you, Dinesh?

        17   MS BRAKEY: Yes, that's what I was about to ask.

        18   Dinesh, does that help you answer the question?

        19   MR KUMARESWARAN: Yeah, I think that's right and I

        20   agree with Martin. I don't think it creates any

        21   bad incentives. I think what the AER would

        22   implicitly be assuming is that the steady state

        23   efficient debt financing approach would be the

        24   same as the existing firm.

        25   It's just that there's just this new CapEx

        26   that needs to be accounted for and that will

        27   eventually be transitioned to the existing RAB.

        28   And so this transition would be completely

1   consistent with what the AER would be assuming

2   would be the efficient debt financing approach.

3   MS BRAKEY: Thanks, Dinesh. Clare?

4   MS SAVAGE: I was just going to say I think the point

5   that Eric is trying to draw out here is the

6   tricky grey zone. If you took a business like

7   TransGrid, for example, which has a RAB of about

8        $8 billion over a five-year regulatory period,

9   its CapEx might be something like $1.5 billion.

10   That new $1.5 billion may not trigger a threshold

11   and therefore might be a normal 10-year trailing

12   average, whereas the additional $8 billion that

13   they might spend over the next five years on ISP

14   projects would be lumped into the on-the-day rate

15   with the 10-year rolling approach that Martin has

16   described.

17   And so it is the decision about where you

18   set - and you were saying, Martin, as long as you

19   don't set it too high so that your small CapEx

20   are not incentivised or you don't break projects

21   up, effectively, to keep them in the trailing

22   average. But that still $1.5 billion on an

23       $8 billion RAB as ongoing CapEx is still quite

24   large. So how do we make the distinction between

25   the stay-in-business CapEx and the really big

26   projects?

27   MS BRAKEY: Does anybody have any comments on that

28   aspect?

1   DR LALLY: So long as that cut-off figure between

        2   firms that will get the two RABs and those that

        3   will be on the present model is low enough, there

        4   won't be a problem. And a low enough figure

        5   would be considerably lower than the kind of

        6   number for the firm you're mentioning.

        7   Considerably lower.

        8   Bearing in mind that this is really just a

        9   relatively simple Excel spreadsheet task. This

       10   is not rocket science. This isn't building the

       11   Eiffel Tower. This is a fairly simple exercise.

       12   The costs of it are absolutely inconsequential

       13   relative to the numbers involved. You mentioned

       14   figures in the billions. This is just a few

       15   dollars of spreadsheeting calculations. It

       16   really is nothing.

       17   MS SAVAGE: But it is quite an interesting point you

       18   make there, because that is picking up quite a

       19   different set of problems to what we articulated

       20   about in the discussion paper, because we were

       21   talking about the very large ISP projects.

       22   Whereas if we are going to start talking about

       23   the $1.5 billion of CapEx that's spent over a

       24   five-year reset period, that is picking up augex,

       25   repex, ICT CapEx, a bunch of different things

       26   that are not about the really brand-new projects

       27   but are really the sorts of projects that

       28   transmission companies undertake all the time.

1   So then that speaks to really pulling out

2   most new CapEx, putting it into an on-the-day

3   rate and then transitioning it back into a

4   10-year, which starts to become, as Tom was

5   describing, almost you would have a '22 RAB, a

6   '23 RAB and a '24 RAB at that rate,

7   DR LALLY: That's fine. For a company with billions

8   of dollars of assets, what harm is there in

9   having a spreadsheet with 24 rows in it? Or even

10   100 rows?

11   MS SAVAGE: We have 30-something of those companies.

12   MS BRAKEY: Tom?

13   DR HIRD: Yeah, so I was just trying to clarify in my

14   mind what this question meant. The way that it's

15   put is financial engineering on behalf of the

16   business. But I think I heard then - I didn't

17   really understand how that worked, given that

18   what the business actually does doesn't feed

19   directly into any decision that you make in terms

20   of how they raise their debt. Not directly

21   anyway.

22   But am I hearing that the concern is that if

23   you have a threshold then people will in some

24   circumstances try and stay below the threshold

25   and in other circumstances jump over the

26   threshold? That seems like it could be a

27   problem.

28   MS BRAKEY: Thanks, Tom. James?

1   MR HANCOCK: If I was a network and my trailing

2   average was weighted taking into account the

3   pattern of my capital expenditures, let's imagine

4   seven years down the track and suppose interest

5   rates are three or four percentage points higher

6   than they were three years ago, so that I know

7   that next year I'm going to be bringing in a

8   considerably higher interest rate and dropping

9   out an old interest rate. So I have an incentive

10   to delay my CapEx by a year and be awarded that

11   higher rate of return.

12   MS BRAKEY: Thanks, James. Dinesh?

13   MR KUMARESWARAN: I now sort of understand what

14   Martin is suggesting that the threshold for

15   splitting the RAB should be set quite low to deal

16   with this incentive problem, and I understand

17   what that incentive problem might be. But it

18   seems a little bit uncomfortable to me that we

19   are now moving away from the original reason why

20   the AER raised this issue, which was to really

21   deal with extraordinarily large CapEx that might

22   need some new finance.

23   It seems like if we adopt Martin's approach

24   then we will be implementing a new trailing

25   average approach for business-as-usual CapEx.

26   And I'm not sure - maybe the AER thinks that is

27   appropriate, but I'm not sure - I mean, is that

28   really the original problem that we're trying to

1   deal with?

2   DR LALLY: I thought the original problem was indeed

3   big CapEx, but the trouble is that "big" is

4   undefined and once you define it then you get

5   this incentive problem for people just under it.

6   And that then propels you to define "big" to be

7   even smaller.

8   So you are led, starting with a perfectly

9   good idea, understanding how people react to it,

10   to then having to basically make it more

11   expensive to deal with that incentive problem.

12   It would be nice if people didn't react to

13   the perverse incentives that would arise once you

14   have this dichotomy between big and not big

15   CapEx, but unfortunately people are such clever,

16   calculating and devious things, and we have to

17   recognise how they might react.

18   MS BRAKEY: I guess this is a good illustration of

19   how things can get very complicated and create

20   all sorts of incentives. Catriona?

21   MS LOWE: Thanks, Anna. It is a somewhat related

22   question, I suppose. One of the speakers earlier

23   mentioned about consumers missing out on the

24   swings and the roundabouts. And I guess we have

25   talked about some of the incentives that shifting

26   our approach might create.

27   I guess I'm interested across the spectrum

28   of options that we have talking about today, so

1   not confining it to the question that we

2   originally asked, which of those options you

3   think would minimise consumers missing out on the

4   benefits of the swings and roundabouts,

5   acknowledging that they have already paid some of

6   those costs over the last few years of their

7   trailing average?

8   MS BRAKEY: I'm not sure who to go to to answer this

9   one.

10   MS SAVAGE: It was Graham who made the comment

11   originally. And I think it was related to will

12   we see interest rates start to rise. But you

13   then went on to say that you think they will,

14   Graham.

15   PROFESSOR PARTINGTON: I think the swings and

16   roundabouts principle just requires you to keep

17   soldiering on with the trailing weighted average.

18   MS LOWE: So no change?

19   PROFESSOR PARTINGTON: No change.

20   MS BRAKEY: Thanks, Graham and Catriona. Jim?

21   MR COX: I wanted to make a similar point. I think

22   Martin says quite rightly, the lower you set the

23   threshold, the less the adverse incentive effects

24   will be, but possibly also the larger the price

25   increases may be for consumers. And there is a

26   balance there that we will need to think about, I

27   think.

28   MS BRAKEY: I'm not sure that's a question, so much

1   as a statement.

 2   MR COX: No, that was a statement.

 3   MS BRAKEY: Thank you.

 4   MS SAVAGE: That's a volatility point as well, I

 5   presume, Jim?

 6   MR COX: Mainly. But I don't think particularly.

 7   I think the point I wanted to make - yes, there's

 8   a volatility of prices through time. I guess

 9   that's probably right. But there are different

10   price implications for various things we're

11   talking about, I guess is what I'm saying,

12   important though the incentive effects are.

13   MS BRAKEY: To the board members, do you have more

14   areas that you wanted to test in relation to this

15   issue? And if the answer is no to that, other

16   issues?

17   I'll take that as a no. In that case,

18   I will go to the experts and ask them if there

19   are any points that you want to make on this or

20   other issues. Glenn?

21   DR BOYLE: Just one very simple thing. This question

22   about incentives and in particular perverse

23   incentives. It certainly would seem on the face

24   of it that whatever scheme is adopted, a

25   threshold or a weighted trailing average, there

26   could be incentives to delay investment or to

27   accelerate investment. And either of those

28   changes may be inefficient.

1   But the only real reason for doing that is

2   to take advantage of changes in interest rates

3   and bond yields. And long term bond yields, all

4   the evidence suggests they are unpredictable. So

5   basically they persist for a long time, then

6   there is a big change which is unpredictable and

7   then they persist for another long time. So it

8   would be a brave network, I think, that would try

9   and take advantage of that. That is assuming, of

10   course, that the rates are set ex-ante. If they

11   are set ex-post that's a different ball game.

12   But I'm assuming nobody's considering that.

13   MS BRAKEY: Any other comments from any of the

14   experts or any other topics that you would like

15   to use this time to raise? Clare?

16   MS SAVAGE: I just think I would be interested if

17   there's any feedback on how the experts feel the

18   sessions have gone today before we get to next

19   week.

20   MS BRAKEY: I might do that at the end. I see a few

21   hands going up for potentially other issues that

22   we can deal with. I might deal with that at the

23   end if that's all right, Clare. Dinesh?

24   MR KUMARESWARAN: I just wanted to ask Martin a

25   question about the term issue that we were

26   talking about earlier. The allowed rate of

27   return in those examples, is that - I understand

28   that to be the WACC rather than the return on

1   equity just alone?

2   DR LALLY: Correct. To simplify the analysis, I said

3   no debt, no OpEx, no taxes. So if there's no

4   debt, the WACC is the same thing as the cost of

5   equity. That is just to keep everything simple.

6   MR KUMARESWARAN: But suppose there is debt, and the

7   evidence is that investors - that these types of

8   businesses raise 10-year debt. Would you advise

9   using a 10-year term for the allowed return or

10   debt or not?

11   DR LALLY: Absolutely. All of the discussion earlier

12   about the cost of equity where I'm saying

13   five-year allowed cost of equity because you're

14   discounting back for five years, that's just

15   equity.

16   Once we go to debt, the whole ball game

17   changes. The efficient practice for firms is to

18   borrow for, say, 10 years and a regulator has got

19   to compensate firms for that efficient strategy,

20   and so it's a completely different ball game.

21   The mathematics of all this, WACC can be put into

22   the discount rate but that's just a mathematical

23   transformation of something that's going in the

24   numerator. So the cleanest way of looking at

25   this is to treat debt just like OpEx. It's a

26   cost that the firm bears and all the discounting

27   is done just through the cost of equity. Debt is

28   just a cost like OpEx which the firm must get

1   compensation for if it acts in an efficient

 2   fashion.

 3   MR KUMARESWARAN: So you say that if the cash flows

 4   that arise over the regulatory period are

 5   five-year cash flows, then it is appropriate to

 6   discount that using a WACC that uses a 10-year

 7   cost of debt?

 8   DR LALLY: I am saying to you that the cost of equity

 9   is a five-year cost of equity. The cost of debt

10   is a 10-year cost of debt.

11   MR KUMARESWARAN: In your example, you're discounting

12   those cash flows over a five-year period, and I

13   understood you to say that you should use a

14   five-year discount rate because you are

15   discounting five-year cash flows. So why does it

16   have to be a five-year cost of equity but it is

17   okay to have a 10-year cost of debt?

18   DR LALLY: As with so many of these things, Dinesh,

19   that one struggles with the English language to

20   explain, it can be done very simply in

21   mathematical terms. I will modify the example to

22   deal with two-year cost of debt and send it to

23   you, and I hope that will clarify it. But trying

24   to do it through the English language, it's just

25   the wrong tool for trying to answer the kind of

26   question that you are asking.

27   MS BRAKEY: Having said that, I guess it does need to

28   turn into the English language in order to have a

1   debate about it and to engage with board members.

2   But I'll leave you to find a way to do that.

3   DR LALLY: Yes. The compromise is to construct a

4   mathematical formulation and then talk through it

5   using the English language with the maths in the

6   background to hang the discussion on.

7   MR KUMARESWARAN: Yes, I guess an explanation of the

8   intuition would be useful.

9   DR LALLY: Yes. But first get the maths and then

10   here's the intuition for it.

11 MS BRAKEY: Glenn?

12 DR BOYLE: Have I got my hand up?

13 MS BRAKEY: Yes. You don't have to.

14 DR BOYLE: I don't have anything to raise at this

15   point so no, I'll lower it.

16 MS BRAKEY: Good. James?

17 MR HANCOCK: I'm just thinking about the trailing

18   average and the divergence from opportunity cost

19   of capital. I mean, if you look at interest rate

20   movements over the last decade or so and consider

21   that they might have a similar pattern of ups and

22   downs, it is easy to imagine that the weighted

23   trailing average might be sort of 50 to 100

24   points away from the contemporaneous cost of debt

25   in any one year. It obviously is hard to

26   quantify what the sort of size of the distortion

27   to investment decisions would be, but potentially

28   there is some distortion there.

1   It seems to me that that is a cost of using

2   of trailing average. So then I ask myself what

3   is the benefit of using the trailing average? It

4   seems to me the main benefit is that it

5   simplifies the network's financing task so that

6   they don't have to restructure their borrowing

7   books to take into account anticipated future

8   market developments and it spares them the

9   embarrassment of marking to market if things go

10   wrong. And we know managers don't like that very

11   much.

12   But I'm just left wondering how much these

13   costs really are and so how much we really want

14   to pay to avoid those costs of inconvenience to

15   the networks as set against the impact on

16   investment decisions.

17   MS BRAKEY: Thanks, James. Tom?

18   DR HIRD: Just in response to James's commentary

19   there, I completely agree that it is quite

20   possible for the trailing average, unweighted or

21   weighted, to be quite different to the on-the-day

22   estimate of the cost of debt, but that doesn't

23   create the incentive problems that I think you

24   imagine, James.

25   Let's take the weighted trailing average.

26   Then you know what you're spending in that year

27   is getting the weight that it has in your entire

28   RAB. The fact that the weighted trailing average

1 is different to the on-the-day rate doesn't

2 affect you at all as long as the weighting is

3 done properly, because you know that it's

4 entering into your RAB with a weight that

5 actually reflects your expenditure. And that may

6 or may not be perfectly true with a simple

7 trailing average, but it still the case that it

8 is going to go into the RAB at the cost that you

9 finance it at today and it is going to stay there

10 for 10 years, which is the time of the period for

11 which you invested.

12 And so it may be that the on-the-day rate is

13 lower than the trailing average at the beginning

14 of that process, but likely it is higher at the

15 end. So it is not as simple as saying that if

16 the trailing average is different to the

17 on-the-day rate, that creates incentive

18 distortions. I don't think that is correct.

19 MS BRAKEY: Thanks, Tom. Dinesh?

20 MR KUMARESWARAN: Yes, I think Tom is right. The

21 whole idea of the trailing average approach is

22 that in each year you set the regulatory

23 allowance equal to the cost of debt faced by the

24 firm. And the cost of debt for the firm in each

25 year is a trailing average of the debt that it

26 has raised over the last 10 years. And there is

27 no loss to consumers as a result of that, because

28 they are paying the efficient cost of delivering

1   the regulated service.

2   MR HANCOCK: I accept that I can see this sort of

3   running as a pool in which there are swings and

4   roundabouts, and consumers recompense the

5   networks and the networks get back what they

6   spent. Like, I can see that potentially that can

7   work.

8   But at a point in time as a network, I have

9   a particular cost of capital in mind that I have

10   to meet and that maybe different from what's

11   coming out of the trailing average model. In

12   that case, my decision about new investment may

13   be distorted.

14   MS BRAKEY: Thanks, James. Eric?

15   MR GROOM: This first question is really on the same

16   thing. I think, Tom, you said if it's a weighted

17   trailing average then you have an equivalence

18   between the cost of debt to the firm and the

19   market cost of debt at that point in time because

20   the firm gets the current cost of debt weighted

21   by the amount they spend in that year.

22   But then I think you said that that may or

23   may not be true for if it's a simple unweighted

24   trailing average because you break that linkage

25   between their investment decision and the weight

26   of the debt from that year for that year.

27   MS BRAKEY: Tom?

28   DR HIRD: Which is the reason the AER is considering

```
1            a weighted trailing average, because when it
2            comes to percentages, that may be important.
3    MR GROOM:   But it does enliven some of James and
4            Graham's concerns, does it not?
5    DR HIRD:   Yes, I think it does.  To the extent that
6            you are actually refinancing 10 per cent of your
7            debt, then the weighting is right.  Now, maybe
8            you're sort of financing 11 per cent of your RAB
9            in a given year and on that extra 1 per cent
10           there's a sort of incentive issue, but it's not
11           on the entirety of what you are financing or
12           refinancing in that year.  So the difference in
13           the weight between the trailing and the weighted
14           trailing average.
15   MS BRAKEY:   All right.  Well, thank you.  I think
16           today's discussion in both sessions has been
17           really, really valuable.  I think I really
18           personally appreciate the spirit and the nature
19           with which the experts and the board members have
20           engaged.  I think it's been a very, very
21           worthwhile process from me as an outsider's
22           perspective at least.  So hopefully the board
23           members are finding that as well.
24               But Clare did pose the question about
25           whether you felt that the way we run it today is
26           working for you and if you have any suggestions.
27           Graham, you have your hand up.
28   PROFESSOR PARTINGTON:   Two things: First, with regard
```

1   to the sessions, I have found them interesting

2   and stimulating. The real question is, have they

3   been helpful to the board members? That is the

4   real question, right? And only you can judge

5   that.

6   The other thing is just an interesting bit

7   of history. I've gone back to the Energy Users

8   Network submission that started this whole rule

9   change business with regard to the cost of debt

10   rolling. And their complaint at that time was

11   that the actual debt cost of the network NSPs was

12   250 basis points less than the allowance. And so

13   obviously they felt that if we moved to the

14   trailing average they'd be better off. It is

15   somewhat ironic that actually moving to the

16   trailing average, they haven't been worse off and

17   it is even more ironic that we are now saying,

18   "Well, actually there could be a problem because

19   the trailing average is going to be less than the

20   on-the-day rate." I'll just throw that in as an

21   interesting insight on how things evolved.

22   DR LALLY: The same point occurred to me, Graham,

23   thinking back to the history of all this.

24   MS BRAKEY: That aside, can we get back to the

25   question?   Clare, what were you going to say?

26   MS SAVAGE: I was just going to say I found them, to

27   answer Graham's question, extremely useful. I

28   wasn't quite sure what to expect today, not

1   having participated in the 2018 instrument.

2   I think what would be helpful next week is

3   where you can identify that you are making a

4   point of difference to someone else, more

5   directly calling that out is quite useful.

6   I found that I was almost needing to categorise

7   the views a little bit so that it was clear what

8   was alignment and what was opposition and the

9   grounds for that. And I think to the extent that

10   as a group of experts you can more clearly say,

11   "Well, yes, I agree with this part but disagree

12   with this part for these reasons," it just helps

13   us in terms of being able to - for the transcript

14   as well, but for our own understanding and

15   thinking on this.

16   MS BRAKEY: James?

17   MR HANCOCK: Just on that, I was involved in the

18   second of the sessions for the 2018 decision and

19   what happened then was that Jonathan

20   Mirrlees-Black was sort of a coordinator for

21   those experts, and he drew up a document that

22   sort of listed a number of propositions under all

23   of these types of categories that we are talking

24   about today. This is after the discussion, he

25   picked out what he thought were the key

26   propositions that came out and then asked the

27   experts to agree or disagree. And so he tried to

28   pick out the ones that he thought were bones of

```
 1          contention.  And I think that that process helped
 2          to actually crystallise where there were points
 3          of difference.
 4   MS SAVAGE:   Thanks, James.  I think we did have a
 5          discussion about that when we were looking at the
 6          format for this year, but can't quite recall
 7          where we landed on that or why, to be honest.
 8   MR HANCOCK:   Yes.
 9   MS BRAKEY:   Perhaps the board and staff could have a
10          chat about that and come back with an answer or a
11          proposed way forward.  Catriona?
12   MS LOWE:   Thanks.  I was just going to say I'm very
13          happy for there to be discussion about what has
14          been useful in the past.  But one of the things I
15          certainly found enormously useful today was
16          where, particularly given the extremely
17          constructive and respectful nature of the
18          discussion, where the experts were almost
19          directly engaging with each other about some of
20          those points of difference, I found that
21          enormously helpful just in terms of exploring
22          those, perhaps in a bit of greater depth which
23          I think might get lost in a more paper-based
24          format.
25   MS BRAKEY:   Good.  I'm glad, Catriona.  That's how I
26          viewed it as well.  Does anybody else have
27          suggestions or comments?  Glenn?
28   DR BOYLE:   I've just got a tongue-in-cheek
```

```
 1          observation to make.  I found this morning's
 2          discussion very interesting.  This afternoon's
 3          has been a bit challenging due to the fact that
 4          for at least the last hour and a half I have been
 5          staring at two frozen frames of Graham and James.
 6          Graham looks like he's had a stroke and James
 7          looks like he's 16.  All of that has been a bit
 8          disconcerting.
 9     MS BRAKEY:   Perhaps I should have said, "Yes, go and
10          log off and log back on again, please."
11     DR BOYLE:   I'm starting to think I should have done
12          that, yes.
13     MS BRAKEY:   I do apologise.
14     MS SAVAGE:   It's an alternative universe for you,
15          Glenn.
16     DR BOYLE:   That's right.
17     MS BRAKEY:   But from our perspective or certainly
18          from my perspective the technology worked quite
19          well and nobody froze from where I am, so it was
20          all good.
21     MS SAVAGE:   And Anna, I think you've done a great job
22          in chairing, too.  Thank you very much for that.
23     MS BRAKEY:   Thank you.  It's actually been a pleasure
24          because it's been very interesting.  Graham?
25     PROFESSOR PARTINGTON:   I just wanted to second
26          Clare's comment.
27     MS BRAKEY:   Thank you.  All right.  I'll give you
28          nine minutes back in your day and we will see
```

1   most people, I presume, next Thursday for

2   round two. Looking forward to that as well.

3   Thanks, everybody.

4   **THE SESSION CONCLUDED AT 3.51PM**

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

obvious [2] - 9:21, 52:12
obviously [5] - 27:18, 27:22, 53:21, 80:25, 85:12
occur [2] - 12:27, 33:3
occurred [1] - 85:21
occurring [1] - 32:28
odds [1] - 25:10
OF [2] - 1:8, 1:10
offer [1] - 64:26
offset [1] - 43:20
offsetting [2] - 65:10, 65:16
often [2] - 41:25, 41:26
oftentimes [1] - 25:11
old [1] - 73:9
Oliver [1] - 1:18
omitted [1] - 5:10
omnibus [1] - 59:5
on-the-day [23] - 53:23, 54:8, 61:8, 62:10, 62:14, 63:21, 64:17, 64:19, 64:23, 65:1, 65:18, 66:22, 67:9, 67:22, 68:16, 69:9, 69:14, 72:2, 81:20, 81:28, 82:11, 82:16, 85:19
once [10] - 6:4, 7:20, 30:19, 42:18, 61:22, 62:8, 63:24, 74:4, 74:13, 78:16
one [78] - 2:4, 5:6, 5:8, 5:12, 6:9, 6:10, 6:12, 6:21, 7:9, 7:10, 9:28, 10:16, 10:28, 11:2, 11:18, 12:12, 12:20, 13:20, 15:12, 15:17, 15:19, 16:7, 16:16, 20:9, 22:9, 22:13, 25:23, 25:24, 26:3, 26:24, 27:8, 27:12, 27:16, 27:21, 28:3, 28:16, 29:24, 31:1, 32:8, 32:11, 32:16, 32:25, 35:1, 35:7, 35:8, 35:17, 37:25, 42:22, 44:7, 45:5, 52:28, 54:3, 54:24, 55:10, 59:3, 59:14, 60:4, 60:5, 60:9, 60:25, 62:4, 62:15, 66:25, 67:11, 67:12, 67:23, 69:12, 74:22, 75:9, 76:21, 79:19, 80:25, 87:13
one-period [1] - 11:18
one-tenth [1] - 60:5
one-year [6] - 5:8, 6:9, 7:10, 25:23, 25:24, 55:10
ones [3] - 7:24, 55:24, 86:27
ongoing [2] - 60:6, 70:23
open [2] - 3:6, 51:5
operate [1] - 55:24
operating [2] - 5:11, 11:8
operation [1] - 61:15
OpEx [2] - 78:3, 78:28
opportunities [2] - 35:26, 37:9

opportunity [9] - 49:16, 49:23, 50:22, 50:26, 53:12, 63:2, 63:8, 64:27, 80:18
opposed [2] - 14:13, 30:12
opposition [1] - 86:7
optimal [1] - 58:1
option [1] - 66:21
options [4] - 59:10, 66:19, 74:28, 75:2
order [3] - 5:26, 66:3, 79:28
organise [1] - 59:27
orgex [1] - 71:24
original [5] - 53:8, 67:5, 73:19, 73:28, 74:2
originally [2] - 75:2, 75:11
otherwise [1] - 35:25
ought [2] - 44:7, 46:2
outcome [4] - 18:21, 18:22, 35:22, 50:17
outsider's [1] - 84:20
overall [1] - 24:13
overnight [2] - 58:15, 59:26
overwhelming [1] - 17:24
own [3] - 28:19, 54:16, 86:13
owners [1] - 2:8

P

page [2] - 5:15, 38:9
pages [2] - 22:28, 37:11
paid [1] - 75:5
paper [10] - 4:27, 6:19, 15:27, 16:1, 17:19, 59:5, 59:11, 71:20, 87:22
paper-based [1] - 87:22
papers [2] - 2:26, 6:20
parameters [3] - 15:25, 25:2, 25:5
part [6] - 4:4, 16:1, 47:10, 68:19, 86:10, 86:11
participants [1] - 2:28
participated [1] - 85:28
particular [4] - 25:5, 39:13, 76:22, 83:8
particularly [3] - 27:9, 76:6, 87:15
Partington [3] - 1:23, 3:11, 4:7
PARTINGTON [18] - 18:26, 41:21, 42:1, 42:6, 48:8, 53:5, 53:15, 54:2, 54:26, 55:13, 56:10, 56:19, 57:26, 64:22, 75:15, 75:19, 84:27, 88:23
partition [4] - 60:24, 62:2, 62:5, 63:19
partly [1] - 66:26
parts [2] - 60:16, 60:17
pass [2] - 4:23, 9:3
past [2] - 2:11, 87:13
path [1] - 67:3
pattern [2] - 73:3, 80:21

pause [1] - 14:1
pay [3] - 2:10, 57:23, 81:13
paying [3] - 69:7, 69:9, 82:27
peak [1] - 15:27
people [17] - 3:1, 7:6, 7:26, 28:9, 28:13, 34:6, 38:24, 41:23, 43:25, 44:16, 46:19, 72:23, 74:5, 74:9, 74:12, 74:15, 88:27
per [12] - 8:1, 8:3, 8:12, 28:19, 28:22, 28:24, 29:9, 29:10, 46:8, 84:5, 84:7, 84:8
perceived [1] - 43:16
percentage [1] - 73:5
percentages [1] - 84:1
perfectly [3] - 56:15, 74:8, 82:5
perhaps [11] - 14:1, 19:12, 24:1, 26:18, 28:28, 64:15, 64:18, 66:25, 87:8, 87:21, 88:8
period [67] - 3:27, 9:16, 9:21, 10:1, 10:15, 11:18, 12:1, 12:18, 12:25, 12:28, 13:3, 13:17, 13:18, 13:21, 14:10, 15:23, 15:24, 16:3, 16:10, 16:11, 16:18, 16:21, 16:22, 17:13, 18:2, 18:3, 18:5, 18:7, 18:10, 18:11, 20:6, 20:22, 21:6, 21:8, 21:13, 21:17, 23:10, 24:19, 24:24, 26:24, 30:23, 31:24, 32:22, 32:23, 34:22, 34:24, 34:25, 36:4, 36:5, 36:19, 36:24, 36:25, 40:24, 43:25, 44:4, 44:12, 45:11, 55:15, 63:23, 65:8, 65:15, 70:8, 71:24, 79:4, 79:12, 82:10
periods [5] - 12:25, 17:4, 20:24, 20:25, 40:18
persist [2] - 77:5, 77:7
personally [1] - 84:17
perspective [6] - 18:20, 35:28, 36:20, 84:21, 88:15, 88:16
persuaded [1] - 7:23
perverse [2] - 74:13, 76:22
phase [1] - 62:11
phrase [1] - 27:10
pick [1] - 86:27
picked [3] - 52:15, 52:16, 86:24
picking [2] - 71:18, 71:24
piece [1] - 57:3
pieces [1] - 60:22
place [3] - 39:16, 53:9, 55:18
plan [4] - 24:4, 49:26, 59:7, 59:27
play [1] - 55:16

plays [1] - 16:8
pleasure [1] - 88:21
plenty [1] - 50:3
plus [3] - 5:19, 23:12, 29:18
pocketing [1] - 26:17
point [37] - 5:4, 6:18, 18:8, 18:12, 19:19, 21:1, 31:4, 31:17, 32:5, 32:9, 33:27, 35:5, 39:4, 39:10, 39:18, 39:19, 48:17, 48:26, 53:8, 56:1, 62:1, 62:22, 63:24, 64:10, 64:28, 67:23, 69:11, 70:4, 71:17, 75:21, 76:4, 76:7, 80:15, 83:7, 83:18, 85:21, 86:3
pointed [3] - 32:18, 32:28, 37:8
points [14] - 3:19, 4:8, 9:1, 10:21, 21:22, 28:2, 36:3, 38:19, 73:5, 76:19, 80:24, 85:11, 87:1, 87:19
pool [1] - 83:2
popularity [1] - 14:27
portfolio [7] - 47:18, 48:16, 48:19, 48:26, 57:22, 66:28, 67:4
portfolios [1] - 26:13
pose [1] - 84:23
posed [2] - 6:23, 67:26
poses [1] - 29:5
posing [2] - 29:19, 30:17
position [8] - 32:6, 43:1, 43:21, 45:6, 46:13, 58:3, 58:5, 58:24
positions [4] - 11:28, 27:27, 40:8, 46:10
positive [1] - 43:26
possible [3] - 5:5, 43:3, 81:19
possibly [1] - 75:24
post [2] - 44:22, 77:11
potential [1] - 21:15
potentially [6] - 17:26, 34:9, 63:14, 77:21, 80:27, 83:5
practical [1] - 14:11
practically [1] - 66:19
practice [16] - 6:14, 7:3, 19:5, 19:23, 19:26, 38:16, 42:1, 42:5, 42:6, 42:7, 44:2, 44:16, 45:19, 57:20, 62:19, 78:17
practitioners [3] - 6:15, 34:4, 34:17
preceding [1] - 28:24
precise [2] - 28:9, 28:10
precisely [1] - 39:20
predict [1] - 51:18
preferred [1] - 33:1
premium [15] - 10:19, 15:14, 15:15, 21:5, 21:10, 26:26, 29:12, 29:13, 29:14, 29:27, 30:2, 33:9, 35:14, 42:21, 45:12

PRESENT [2] - 1:16, 1:20
present [5] - 2:12, 2:20, 49:6, 57:7, 71:3
presentation [2] - 30:3, 52:11
presentations [3] - 3:17, 4:6, 52:14
presented [1] - 61:2
presenter [1] - 47:4
presume [2] - 76:5, 88:27
presuming [1] - 40:2
pretty [3] - 7:16, 16:12, 30:13
prevailing [11] - 7:10, 7:28, 8:4, 8:13, 8:14, 28:14, 28:17, 28:22, 31:20, 55:7, 55:12
previous [1] - 11:26
previously [1] - 14:24
price [5] - 25:16, 26:16, 45:20, 75:24, 76:10
prices [2] - 57:13, 76:8
Pricing [1] - 1:16
pricing [6] - 10:15, 13:17, 18:4, 18:5, 18:7, 32:1
primarily [1] - 9:12
primary [1] - 6:11
principle [9] - 27:14, 30:18, 40:12, 44:4, 47:21, 51:5, 52:5, 64:7, 75:16
problem [37] - 7:24, 7:27, 9:11, 9:18, 13:15, 13:19, 13:20, 18:2, 18:12, 21:1, 26:22, 26:27, 27:2, 29:21, 34:11, 34:27, 37:18, 37:19, 39:11, 45:15, 51:9, 51:11, 51:12, 53:27, 57:26, 68:25, 69:2, 69:10, 71:4, 72:27, 73:16, 73:17, 73:28, 74:2, 74:5, 74:11, 85:17
problematic [1] - 9:20
problems [9] - 12:20, 18:23, 24:26, 39:8, 48:9, 51:27, 53:22, 71:19, 81:22
procedure [1] - 25:23
PROCEEDINGS [1] - 1:8
process [10] - 2:24, 2:26, 3:6, 13:6, 38:27, 39:2, 45:24, 82:13, 84:20, 86:28
produce [1] - 50:5
produces [1] - 60:14
Professor [2] - 1:23, 3:11
PROFESSOR [18] - 18:26, 41:21, 42:1, 42:6, 48:8, 53:5, 53:15, 54:2, 54:26, 55:13, 56:10, 56:19, 57:26, 64:22, 75:15, 75:19, 84:27, 88:23
programs [1] - 4:14
project [8] - 19:11, 19:14, 19:22, 20:16, 22:8, 22:12, 38:14, 68:18
projects [13] - 20:18, 22:6,

writing [1] - 22:27
wrote [2] - 15:26, 17:20

Y

year [132] - 3:28, 5:3, 5:6,
5:8, 5:12, 5:13, 5:14,
5:20, 6:9, 6:10, 6:15,
6:17, 6:25, 7:9, 7:10,
7:11, 7:13, 7:14, 8:22,
8:25, 9:6, 9:8, 9:10,
9:16, 9:19, 10:4, 10:11,
10:13, 10:17, 10:24,
12:1, 12:3, 12:4, 13:4,
14:18, 14:20, 14:21,
18:15, 18:17, 18:19,
20:23, 22:9, 22:13,
23:14, 23:16, 25:23,
25:24, 25:25, 25:28,
26:1, 26:23, 26:24,
28:24, 29:8, 29:19,
29:22, 30:1, 30:4, 30:6,
30:7, 30:8, 30:9, 30:11,
30:23, 30:24, 32:8, 32:9,
32:15, 32:23, 32:24,
33:11, 33:15, 36:11,
36:13, 36:14, 37:22,
38:21, 38:22, 38:23,
40:19, 40:27, 41:7, 41:8,
41:10, 41:12, 41:13,
41:17, 44:5, 51:13,
54:13, 54:20, 55:1, 55:2,
55:6, 55:7, 55:8, 55:10,
55:14, 58:22, 59:26,
60:5, 61:16, 61:27,
67:12, 70:8, 71:24, 73:7,
73:10, 78:13, 79:5, 79:9,
79:12, 79:14, 79:15,
79:16, 79:22, 80:25,
81:25, 82:21, 82:24,
83:20, 83:25, 84:8,
84:11, 87:5
yearly [1] - 37:22
years [59] - 5:2, 5:7, 9:24,
9:27, 12:9, 13:11, 13:12,
13:14, 19:27, 20:5,
20:15, 20:19, 21:7,
23:10, 23:12, 24:21,
26:6, 26:10, 26:15,
29:13, 29:14, 29:18,
29:27, 30:15, 31:6, 32:9,
36:9, 36:10, 38:13,
39:23, 40:20, 44:4, 53:1,
54:2, 54:3, 54:19, 58:10,
59:27, 61:11, 61:12,
61:17, 61:18, 61:22,
62:11, 62:18, 62:22,
63:23, 67:6, 67:13,
70:13, 73:4, 73:6, 75:6,
78:14, 78:18, 82:9,
82:25
years' [2] - 37:6, 38:25
yield [2] - 7:10, 42:25
yields [4] - 31:25, 32:2,
77:3
yourself [1] - 7:16

Z

zero [29] - 10:27, 11:6,
11:16, 11:22, 11:25,
18:22, 20:3, 20:25,
20:27, 21:12, 21:14,
21:16, 21:18, 33:28,
34:21, 34:24, 34:26,
35:8, 35:16, 35:22, 36:3,
36:5, 51:2, 53:16, 57:8,
61:14, 62:25, 64:6
zone [1] - 70:6