IN THE COMPETITION APPEAL TRIBUNAL

Case No. : 1329/7/7/19
1336/7/7/19

Salisbury Square House
8 Salisbury Square
London EC4Y 8AP
(Remote Hearing)

Monday 21 June 2021

Before:
THE HONOURABLE MR JUSTICE MARCUS SMITH
(Chairman)
PAUL LOMAS
PROFESSOR ANTHONY NEUBERGER

(Sitting as a Tribunal in England and Wales)

BETWEEN:

MICHAEL O'HIGGINS FX CLASS REPRESENTATIVE LIMITED
Applicant/Proposed Class Representative

v

(1) BARCLAYS BANK PLC
(2) BARCLAYS CAPITAL INC.
(3) BARCLAYS EXECUTION SERVICES LIMITED
(4) BARCLAYS PLC
(5) CITIBANK, N.A.
(6) CITIGROUP INC.
(7) JPMORGAN CHASE & CO.
(8) JP MORGAN CHASE BANK, NATIONAL ASSOCIATION
(9) J.P. MORGAN EUROPE LIMITED
(10) J.P. MORGAN LIMITED
(11) NATWEST MARKETS PLC
(12) THE ROYAL BANK OF SCOTLAND GROUP PLC
(13) UBS AG
Respondents/Proposed Defendants

AND

AND BETWEEN:

PHILLIP EVANS
Applicant/Proposed Class Representative

- v -

(1) BARCLAYS BANK PLC

(2) BARCLAYS CAPITAL INC.
(3) BARCLAYS PLC
(4) BARCLAYS EXECUTION SERVICES LIMITED
(5) CITIBANK, N.A.
(6) CITIGROUP INC.
(7) MUFG BANK, LTD
(8) MITSUBISHI UFJ FINANCIAL GROUP, INC.
(9) J.P. MORGAN EUROPE LIMITED
(10) J.P. MORGAN LIMITED
(11) JPMORGAN CHASE BANK, N.A.
(12) JPMORGAN CHASE & CO
(13) NATWEST MARKETS PLC
(14) THE ROYAL BANK OF SCOTLAND GROUP PLC
(15) UBS AG

Respondents/ Proposed Defendants

APPEARANCES

Michael O'Higgins FX Class Representative Limited	Scott+Scott UK LLP	Daniel Jowell QC Gerard Rothschild
Barclays	Baker & McKenzie LLP	Mark Hoskins QC
Citibank	Allen & Overy LLP	Tony Singla QC
JPMorgan	Slaughter and May	Sarah Ford QC
NatWest	Macfarlanes LLP	Tom Pascoe
UBS AG	Gibson, Dunn & Crutcher UK LLP	Paul Luckhurst
Phillip Evans	Hausfeld & Co. LLP	Aidan Robertson QC Victoria Wakefield QC Aaron Khan David Bailey
MUFG	Herbert Smith Freehills LLP	Ronit Kreisberger QC Thomas Sebastian

Monday, 21 June 2021

(10.00 am)

(Proceedings delayed)

(10.11 am)

THE CHAIRMAN: Good morning, everybody. I hope that you can all hear me. I am not going to go through the roll call of checking whether the advocates can speak and I can hear them. We will see how it works when we move to submissions. But I hope that, if no one is hearing me when they should be, that they will speak up now or at least send a signal to the tribunal that they are not properly being included.

If there are other problems arising in relation to the transmission of this hearing can I suggest that an email be sent to Sharon, who will deal with matters, rather than it be raised through me. I think that is probably the best way of avoiding car crashes on this matter.

I am sitting here with the other members of the tribunal in a physical courtroom here. So we are together. I, of course, understand that you may or may not be in groups but are generally speaking remote, and will take it as slowly as is necessary to ensure a proper hearing of the issues before us today.

We have debated these issues before this hearing and I am going to go through a few of our preliminary thoughts before I invite submissions from, I think, Mr Jowell first.

Before I do that, though, I should make it clear that although this is a case that is being heard remotely, it is a full tribunal hearing taking place as if physically in this courtroom and as if everybody were present in that courtroom. An official transcript will be produced in the usual way and for that reason this hearing is being recorded at my direction, but it is prohibited -- and I know I do not need to say this, but I do in front of every hearing -- it is prohibited for anyone to make an unauthorised recording, audio or video, of the proceedings and that is punishable, if a recording is made or transmission made, as contempt of court. Sorry to have to say that, but I do, as I say in front of every hearing.

Moving on then to the substance of matters, I will start with the matter which will occupy us from midday onwards, which is the question of the teach-in. We see this very much as a teach-in and what we intend to do is listen very carefully and ask questions, to the extent that we consider elucidation is necessary. We stress that this is intended purely as an educative approach. We are going to do our level best to understand where each side's experts are coming from and we are clearly going to be asking questions which might be said to be directed to the merits.

That, I think, is unavoidable. I just want to make absolutely clear, as the tribunal did in its letter to the parties regarding teach-in, that nothing is to be read into that. We are trying to educate ourselves and we are very conscious that the extent to which merits are even relevant or are capable of being assessed in the July hearing are questions which are open questions, and you should not read anything into our attempt to understand or grapple with the issues that the experts have dealt with in such a helpful way in their multiple reports and submissions.

So, that, by way of introduction on the teach-in. I would only say one other thing, which certainly emerges out of my experience in the BritNed litigation, but I think Professor Neuberger and Mr Lomas share it. We are going to be quite interested in understanding the factual way in which these FX markets operated. We understand, of course, that there is going to be a degree of econometric analysis based upon the facts, but something that we are going to be interested in today, and probably interested in July, are just how these markets worked so that we have a certain degree of understanding of the factual bedrock on which the economic analysis will subsequently be built. I think we are trying to give those presenting the teach-in fair warning that there may be a number of questions from that. They may be very obvious questions, but please do not read anything into that. We recognise that this is not an area that we are at the moment expert in. That is why we are having the teach-in.

That brings me to our thinking about how the hearing in July should be structured, and we have read the parties' very helpful written submissions and their suggestions as to how the five days that we have ought to be utilised. We have had some thoughts ourselves and what I propose to do is to spend ten minutes going through those to explain our thinking, after which I think we will consider rising to enable parties to work out just how far they think we have gone down a crazy route and ought to be pulled back, and you will need some time to think about that.

So going through the points, we have as our first point a question of whether it would be helpful for us to hear from the applicants themselves, that is to say Mr O'Higgins and Mr Evans, at the outset of the hearing for, let us say, the Monday morning. We say that because there is obviously a carriage dispute element here and it seems to us that the very least we can do, out of respect to both the classes and the applicants seeking to represent the classes, to hear from the people who are actually riding point.

So we consider that might very well be helpful. We are not sure that it would be appropriate to have very much by way of cross-examination of one applicant's legal team of the other applicant, nor indeed of the respondent's cross-examining. What we had in mind was to use the Monday morning by way of a hot tub to hear from Mr O'Higgins and Mr Evans together and for the tribunal to ask such questions as the tribunal thought fit, possibly with follow-on responses, questions by the parties, but keeping that very limited. Just so that we can see, as it were, the colour of the applicants' money.

We stress we have no preconceived views as to whether this will help or hinder us in our decision, but it seemed to us something that we ought perhaps to float as something that ought at least to take place at the beginning of the July hearing.

That brings me to the structure of the hearing following that. Assuming we allocate Monday morning to the applicants themselves, the rest of the hearing would begin at 2 o'clock on the Monday and the question is then whether we go straight into opening submissions from the applicants and then the economic evidence followed by, as it were, closing submissions, or whether we do it in some other way.

Speaking for ourselves, we are quite agnostic about how the submissions are divided up. We can see that some parties might see considerable benefit in opening submissions, whereas some might want to keep their fire to the end given the rather considerable volume of material that the tribunal has read and will read again before the July hearing begins.

What we thought, in order to give the parties most direction in terms of how they use what is their time to persuade us, was an approach rather like this: we are minded to give one day to the expert evidence, and I will come to that. That leaves three days and an afternoon for submissions. We think that that amounts to 17 and a half hours which we would be minded to split 30% to O'Higgins, 30% to Evans and 40% to the respondents as a whole. That amounts, if we have got our maths right, as 5.25 or 5 and a quarter hours for each applicant and seven hours for the respondents.

We think that the parties should be entitled to use that time as they wish. We will set out the order but in terms of what is said when, we are minded to leave to parties. So the way we see it happening is there would be, if so advised, an O'Higgins opening followed by an Evans opening after the examination of the applicants themselves. We have picked O'Higgins and Evans in that order simply because it is the chronological approach. We stress that we understand that the "first in time" question is at issue between parties, but someone has to go first. We are more than willing to toss a coin if that makes people feel happier, but frankly we just thought we will go O'Higgins/Evans and that is how we are doing it, nothing whatsoever should be read into that.

So O'Higgins/Evans openings then the expert evidence. Then, we thought, respondents making their submissions followed by O'Higgins, followed by Evans, followed by O'Higgins in reply. Then we thought the final 30 minutes of the week should be spent just in case there was a catch-up point that needed dealing with in ten minutes and we would be minded to leave the last half hour for respondents 10 minutes, Evans 10 minutes, O'Higgins 10 minutes, just as a way of tying up any loose ends which might emerge. So that is quite a complicated running order, but I hope when the parties think about it, it is a little bit clearer than I have stated it.

So that is how we see the week running. If I can move on to two final topics. First of all, the expert evidence, which will either start -- well, it will either start on the Monday after the applicants' evidence if we have that, and the opening submissions, depending on how long they are, but the experts will run after those two stages and they will have a day.

Our sense is that although the parties have very kindly given the tribunal the lion's share of the cross-examination of the experts that, I think, is an invitation that we might be minded to decline and take a more traditional view of hearing the experts respond to questions in cross-examination.

What we had in mind, but we welcome pushback on this, would be that the experts would give evidence en banc or by way of a one-sided hot tub. They would have half a day each and would be cross-examined first by the respondents for about an hour and then by the other applicant for about an hour, with half an hour for re-examination, which we will be encouraging the parties to use. We would not see this as a re-examination of the usual sort in litigation where you simply try to patch holes that have been blown into the evidence of the witness. We would see this as a way of enabling the expert to expand upon points which perhaps they did not have the opportunity to do in their main cross-examination. So we would see that half an hour of re-examination as something that we would expect to be used just to assist the tribunal to understand.

Obviously, we would be taking the usual moderately interventionist view in that day and there would be questions from the tribunal, but we do not think it is sensible to apportion any particular time to that, and clearly if we are overly aggressive in our questioning we will make sure that the day runs longer so that that can be accommodated fairly and not so as to disrupt the parties.

That was the penultimate topic which I had in mind. The last one is actually chronologically the first in time, which is the written submissions that will precede the July hearing. On this, we had this by way of suggestion: we consider that there would be some merit in the applicants each producing a neutral statement on two topics.

The first would be, broadly speaking, the merits, how they intend to make good their case; and the second topic would be the benefit to the class they want to represent, which is really how do you fund it and what is the cost of funding, what is the benefit that is returned to the class if the case is successful? So those topics, broadly conceived, we would invite neutral submissions by the applicants which could then be critiqued by way of redline by the other applicant and the respondents.

I will frankly say the reason we think this might be useful is because we can use these as the platform for the parties to make the submissions on the respective merits and the opt in/opt out question that we have, having something which is broadly speaking a platform or foundation on which the submissions can be made. I will be equally frank, we have in mind that these materials could be used as the starting point for the factual part of the judgment that we are inevitably going to have to write in the course of July.

So we had that in mind by way of self-standing documents on those two topics. Over and above this there would, of course, be written submissions and we have seen what the parties have to say about the length of those. What we have in mind is, broadly speaking, that each applicant would have 25 pages on the certification question, the respondents would have 50 pages on the certification question and then the applicants would each have 20 pages on carriage. That seems to us to give, particularly with the stand-alone topics that we have identified, enough room for manoeuvre for the parties to put their cases fully but not excessively.

So that was the tribunal's preliminary -- very preliminary view as to what should happen in July. We think it probably would be helpful if we rose until, say, 11 o'clock to enable the parties to just work out how much of this they want to take and run with and how much of this they want to say, thanks for the idea but no thanks.

Mr Jowell, would it be helpful if we rose until 11.00 as I have suggested?

MR JOWELL: I think it would, sir. Might I, though, before you rise just ask -- just raise three matters?

THE CHAIRMAN: Of course.

MR JOWELL: The first is you mentioned a neutral statement, and it would be helpful to have an indication of approximate length of that document as well as for the opening submissions. I do not know if we can -- perhaps you can come back to that after the break. But another point I should mention is simply this: that you may have seen that there were some slides received for Professor Bernheim's presentation that you will hear either this morning or this afternoon, and he has tweaked those slides slightly, as is always the case with slides and presentations. I do not think that there are any objections from the defendants or Mr Evans, certainly none have been received, but we do, I think, need your permission for those tweaked versions of the slides to be uploaded and delivered. So I do not think there are any objections to that.

The third issue is just this: that I think it is agreed now between the parties, following some correspondence I had with Mr Hoskins, that from the parties' perspective there might be some wisdom in parking the issues of the dead, deceased -- deceased claimants and also the question of compound interest until after the resolution of the *Merricks and Trucks* litigation, in other words until judgment is received in those matters. That would not, in our understanding and I think Mr Hoskins' as well, would not delay the judgment that you would be giving on -- or the other issues, including on carriage and certification of all other issues, but it would delay a resolution of a judgment on those issues. So it might be necessary to have supplemental submissions and a supplemental judgment following your main judgment, if that is the course that the tribunal decides to take. But I thought I should just highlight that agreement as between the parties. But of course, that is pre-eminently a matter for the tribunal itself to decide and we appreciate that.

Those are the three points I thought might be helpful to raise.

THE CHAIRMAN: I am very grateful. Do the Evans representatives have anything to add by way of that, and then I will come to Mr Hoskins?

MR ROBERTSON: Sir, from the Evans perspective we echo the need for some guidance on the length of the neutral statements if that is going to be adopted. We do not object to the tweaked slides as such. We will make submissions on their content in due course. That is not for today.

Then thirdly, on the issues of dead and deceased and compound interest, yes, that was the agreement that we had reached with the other parties, that those should be deferred until after *Merricks and Trucks*.

THE CHAIRMAN: Just to be clear, would we be excising them completely from the July hearing with submissions to follow, or would the submissions be rolled up in the July hearing with the awaited judgment in *Merricks* to be handed down, followed by written submissions depending on what was said?

MR ROBERTSON: Our proposal was that they would be deferred in their entirety until after.

THE CHAIRMAN: Mr Jowell, that is what I understood you to be saying, just to be clear.

MR JOWELL: That is correct. But of course, we are very much in the tribunal's hands.

THE CHAIRMAN: Oh, no, no, absolutely. But it will come as no surprise to you that we take considerable account of what the parties consider is sensible.

Sorry, Mr Hoskins, do you have anything to say in response to those three points or anything, indeed, to add?

MR HOSKINS: I do. Just on the deceased persons compound interest point, I think we are all in exactly the same place. Just to be absolutely clear, what that means in practice is there will be a judgment following the July hearing. There will then have to be submissions on deceased persons and compound interest. Depending on what the judgments look like in *Trucks and Merricks* it may be as a written submission point rather than us all reconvening, but we can take a view when we see those judgments.

It does mean, I think, that the final CPO order that the tribunal may make will have to wait until the resolution of those issues because, for example, the deceased persons, defunct companies will affect the definition of the class. So it is hard to see how we can have the final order such as to make clear that that is the implication of this procedure. But I think everyone is agreed that that is the procedure that we should follow.

I just have two questions, if you would not mind, for the tribunal in terms of your comments. You talked about a one-sided hot tub, which I think just means each expert individually rather than -- the hot tub and one-sided, that I wanted to clarify what that meant.

THE CHAIRMAN: Sorry, I should have been clearer. What I meant was that the various experts that each side are calling would be in the witness box at one and the same time, but they would not be sharing the hot tub with the experts on the other side. So it would be common evidence, but from a single party, and we would have to manage quite carefully the way questions were fielded so that one does not have a car crash, particularly if it is a remote hearing, of each expert trying to answer the same question at the same time.

But what we had in mind was separate streams so that there was not a complete free-for-all of five or six people in the witness box at the same time, which I think is a recipe for disaster. I think it would be controllable in the usual way.

MR HOSKINS: So then I can see how having one side's experts all at the same time should be efficient and save time because it means you are not having to bring people in and out, et cetera, et cetera. Perfect.

THE CHAIRMAN: Well, indeed. We will give some thought as to how best to manage that, and probably what we will do is we will allow each party to identify one of their hot tub participants as the lead to whom questions are addressed and they can then decide whether they want to answer it or whether they are going to parcel it out to someone else, in effect acting as a traffic policeman. That would not be to shut out any supplemental answers from the non-traffic policemen in the hot tub, but -- which is an image that I have to say is slightly disturbing. But that way I think we could manage the answers in a way that would assist the tribunal and enable both parties to put their cases to full effect.

MR HOSKINS: I understand.

The final point I just wanted to ask you about was the neutral statement with the critique. Are we envisaging a statement which is, for example, annotated so it is produced by one of the applicants and then annotated by the other applicant and annotated by the respondents?

THE CHAIRMAN: That is exactly what I had in mind, a redlining so you can mark the applicants' homework, Mr Hoskins, a privilege rarely given to advocates but something which we would be able to take on board. We, depending on what these statements were, might very well rewrite them ourselves, but we think as a starting point it is quite a helpful way of at least working out what is absolutely neutral and what is hotly contested.

So, yes, we did have that in mind, but we are not going to say anything about the weight that we would attach either to the neutral statement itself or to the marking-up of that statement. We will simply take it as material that would, we think, assist us.

MR HOSKINS: And then the only point that leads on to, then, is obviously there is a mechanical issue just about the timing of that, but that is obviously something we can deal with once we see whether people like that idea or not.

THE CHAIRMAN: Well, indeed. I think there will be a lot of mechanics. If I can just come back on the points that I have not addressed immediately, and I am looking at both sides of the room and they can shout at me if I mis-speak and do not reflect the common view. But dealing first with the slides, of course we will permit you to admit the revised slides. Although our letter regarding the teach-in suggested agreement, I want to be absolutely clear that the fact that these are being admitted does not suggest that either the other applicant or the respondents are signing up hook, line and sinker to what is going in. They are simply agreeing that we see it and that is understood, I know. But it is probably appropriate to say it. I know there are disagreements, but today is a day when the floor is open to the experts to explain to us de bene esse, subject to all kind of points that will be taken later, and that is obviously the way we are going to approach it. So subject to that, the slides can be admitted.

The length of statement, what we would have in mind, and we will talk about this when we rise, is for each neutral statement, so for the four documents, somewhere between 15 and 20 pages. Now, I appreciate that 15 and 20 pages, depending on just how small you make the font and how cleverly you space the margins can be quite a lot, but that is the sort of sense that we would have. So shorter rather than longer, but we know that these are complicated matters that cannot be dealt with in a paragraph or two. So that was the sort of compromise we had between an all-inclusive answer and something which sets out the complicated answer, obviously with reference to other documents. We are very happy to be cross-referred, but something that gives us a baseline from which to start.

Again, that is something you should feel entirely free to push back on as appropriate. I am going to go back in reverse order, Evans and then O'Higgins, just to see if there are any other points that we need to sweep up before we rise until, I think, 11:15.

MR ROBERTSON: From Mr Evans' perspective, only one comment. Font sizes, word spacing, we now have a Practice Direction on skeleton arguments, so I think we take that as applying to the neutral statements as well.

THE CHAIRMAN: Yes.

MR ROBERTSON: Other than that we do not have any comments.

THE CHAIRMAN: I am grateful. And then last word, O'Higgins?

MR JOWELL: Nothing from us, sir.

THE CHAIRMAN: Well, thank you all very much. I am very conscious that I have only drawn on Mr Hoskins. Ms Ford, you have been waiting there very patiently. I hope that you know the tribunal well enough that had you anything to say we would have entertained your interruption with pleasure, and that goes for anyone else. Grateful. In that case we will rise until 11.15. I hope we can deal with everything in the three-quarters of an hour before the teach-in is due to start, but it was a "not before midday", and if we need longer to deal with the mechanics then so be it.

But with that in mind, if you can either leave the meeting or perhaps better, kill your cameras and microphones but keep the connection live, we will be back at quarter past. Thank you very much.

(10.40 am)

(A short break)

(11.15 am)

THE CHAIRMAN: Good morning, again. I will hand over first, Mr Jowell, to you and then I will hear from the other parties.

MR JOWELL: Thank you, sir.

We are content with both of your principle suggestions. We have a few questions, tweaks, as it were.

The first is in relation to the applicants. We think that it might be helpful for each of the applicants to give a short presentation at the outset, before they are plunged into questions. We are not thinking of War and Peace, just something, you know, 10 or 15 minutes, just briefly to set out their stall and get themselves warmed up and introduce themselves. Subject to that, we are content with the timing that you have suggested and with the proposal.

In relation to the neutral statement, we would be grateful for a little more clarification on -- first of all, I should say we are content again, of course, with the proposal in principle. But we would be grateful for a little more clarification as to precisely what is meant by a neutral statement on the merits of how we mean to make good our case. I think we understand that to mean something a little bit like an expanded version of the sort of presentations you are about to receive, and so effectively an explanation of the methodology that we propose to adopt in order to calculate damages in this case for the class, without an express critique of the other side's or the other PCRs' methodology and without seeking to anticipate the criticisms that are made by the respondents. But if that is not -- then we understand that is the first part of it.

The second part is essentially to deal with funding issues and how that will then -- if it is successful, if that methodology is successful, how those damages will then find their way to members of the class. But if that is not what is envisaged then we would be very grateful for a more detailed breakdown of what it is that you would like to see in that document.

I suppose the final point I would just raise is the question of timing, which is we do not have a lot of time between now and the hearing or indeed between now and skeletons, which are due on 2 July, Friday 2 July at 4.00 pm. I think our proposal would be that the first round of this neutral statement would probably -- the earliest it could probably come would be with the skeletons, with the critique probably to follow round about the middle of the following week, which would be 7 July. But we appreciate that does not give the tribunal a huge amount of time to absorb that in advance of the hearing, although there is a bit of time. So we are very much in your hands. But that would be our proposal.

So those were the only comments that we had, and obviously we will liaise with the other side in order to create a detailed timetable. We understood you to be saying that we would have effectively five and a quarter hours and we could allocate that between the various parts of our submissions -- occasions for our submissions that you have laid down. So whether it be opening, reply or further reply. Again, if that is not correct then we would be grateful for clarification on that.

But subject to that, those are our only comments, sir.

THE CHAIRMAN: Well, thank you very much, Mr Jowell. Before I invite Mr Robertson to go on, I will give you a brief response just so everyone knows where at least we are coming from.

First of all, the suggestion of a 15- or 20-minute talk or opening address strikes us as a good idea. I am seeing nods on both sides in the courtroom. So you can take it that, subject to what others say, we would be happy for that to take place. It seems to us that the vision, as it were, that the applicants have of these applications is potentially a very important matter. So subject to what others say, fine.

In terms of the neutral statements, yes, we think that this is a matter which should eschew an attack on the other side and should eschew anticipating attacks on what you say. It is always difficult to be completely neutral, but what we are seeing is something which could act as a foundation, as I said earlier, for the defence or the attacks that will take place inevitably during the course of the other submissions and the hearing. But what we are looking at is something where you can say: well, look, if you want to see broadly speaking how we are going to be approaching our theory, our case theory, this is as good as a statement as you are going to get.

To be clear also, we entirely understand that so far as the case theory, how you are going to prove your case part of the matter is concerned, we are very much in the foothills. I have said it several times but it bears repeating, we have reached no decision about how far the question of merits can be relevant to the question of either carriage, or indeed to an intense question of certification when one is looking at opt in versus opt out. It may very well be that these matters are so far in the foothills that we cannot reach a view. What we are doing is we are exploring really whether that is the case or not. It is unavoidable to ask questions, but I do not think anyone should read too much into the fact that we are asking them, that we are minded to go down an aggressive merits route. To the contrary, we see significant difficulties in doing that, and I say that because I do not want anyone to get a false impression of where we are coming from. So I hope that answers your question about methodology.

In terms of timing, both order of submissions, you have got that absolutely right. We intend to lay down the order and then leave it to the parties how much time at each stage of that order they choose to use up, subject to the overall limit that we have articulated. So that is absolutely right.

We appreciate that we are quite close before the substantive hearing in July. For our part, provided you send us the 2 July document, each of the applicants, we can read those and we can then take on board, as it were, the homework-marking aspects more quickly provided they are done, as we envisage, by way of a redline on your original draft. So we would read those and then we would be able to see just how far the other applicant and Mr Hoskins and

Ms Ford and the other respondents think that you have failed to meet the very exacting standards that we will be setting you and you will be setting yourselves.

So I hope that deals with your questions. I am just going to check to see whether -- no -- ah, Mr Lomas has a point. Mr Lomas?

(Pause)

Mr Lomas makes the helpful point that there is a degree of, not so much critique but compare and contrast on the funding side, in the sense that there are certain parameters which can be compared on a read-across basis, and it would be helpful to have some form of hard comparator on the metrics there in these papers. I do not want to say more than that because I really do not want to be prescriptive about how these things are done. But obviously where there are similarities or differences on such objective metrics it is helpful to have them brought about, and it may be that the applicants can think about how their respective funding papers can be compiled so as to ensure that there is an easy read-across of those differences and similarities, indeed, because I suspect the similarities may be more problematic when it comes to resolving the carriage dispute than the differences.

MR JOWELL: Understood.

THE CHAIRMAN: We are very grateful, Mr Jowell.

Mr Robertson, over to you.

MR ROBERTSON: Thank you, sir. First of all, just to check that you can hear me as we switched cameras.

THE CHAIRMAN: Loud and clear.

MR ROBERTSON: Good.

So, on the short statement, yes, we agree that will be music to Mr Evans' ears, I know. Secondly, on the content of the neutral statements, thanks very much for the guidance. I think we are clear as to the task that we have been set and it is obviously us to provide you with as much assistance as we can. So we are happy on that basis.

Thirdly, as regards timetable for the hearing, while we were adjourned my learned juniors, Mr Bailey and Mr Khan put together an indicative timetable of what it would look like with those timings. The one niggle that they managed to iron out, and I should say that timetable has been emailed to the registry and to -- I hope we have all counsel.

THE CHAIRMAN: I certainly have it. Thank you very much, Mr Robertson.

MR ROBERTSON: Yes. The one change to your indicated timings is that the -- each of the applicants has five hours, not five and a quarter hours. We have realised that the five and a quarter hours did not allow for the last 30 minutes' wrap-up on the Friday afternoon. So that is why it is down to five hours per applicant, and that then lets the 30 minutes take place in accordance with the tribunal's normal hearing times.

So we would invite the other parties to consider that, respond with comments by emails and perhaps we could pick up comments on it at the end of the teach-in hearing this afternoon, if that were a convenient time for the tribunal?

THE CHAIRMAN: Well, thank you. That does seem sensible, and let me be clear, we are obviously envisaging a guillotine which, in my experience, does work quite well but only if the guillotine is not completely hard-edged. We will, I think you can take it as read, be sensible about the inevitable unanticipated points or developments that occur in the course of a week's hearing. So I am not saying we will not be firm in applying these, but we will also be careful and reasonable in doing so, and I hope that gives a degree of comfort to those who are concerned about a guillotine that has a razor edge.

MR ROBERTSON: That is all understood. Subject to that, we do not have any further comments at this stage.

THE CHAIRMAN: I am very grateful. Thank you very much, Mr Robertson. Mr Hoskins, I am going to treat you as the de facto spokesman, but anyone else who has anything to say, I will hear you after I have heard from Mr Hoskins.

MR HOSKINS: That is the way we have arranged it ourselves, so obviously I go first and if anyone thinks I have done a terrible job they will feel free to pitch in.

If I could just deal with three topics. Just in terms of -- as we understand it, but we just want to make sure we are all on the same page, there is -- on the first morning there is a presentation by the PCRs themselves.

THE CHAIRMAN: Absolutely.

MR HOSKINS: As the tribunal indicated. And then I think what was being suggested was before the experts give evidence there would be -- is that a presentation as well? I was not quite sure what was being suggested.

THE CHAIRMAN: Well, before -- so, we noted that both the O'Higgins applicant and the Evans applicant wanted an opening, and we were not minded to close that out. So these are opening submissions, which can be as long or as short as the applicants wish.

We had a debate, I will be quite frank, about the utility of this because there is an awful lot of reading which, as I say, we have done and which we will continue to do up to the July hearing, and normally the point about an opening is to educate the tribunal. We will be a very highly educated tribunal by the time matters commence on 12 July. The compromise we came up was if the applicants wanted, as is here put, an hour and 15 minutes then absolutely fine. If they want two hours, absolutely fine. But it will be deducted from their overall budget of five. If they want three minutes or nothing at all, then that too is absolutely fine.

MR HOSKINS: I think I was tilting at a different windmill, which is --

THE CHAIRMAN: Oh, I am so sorry.

MR HOSKINS: No, no, it is my fault. So the first morning, as I understand it, the PCRs themselves, ie Mr Evans and Mr O'Higgins, will make short presentations. The thing I was not clear on and we are not clear on is with the experts, does it immediately start with cross-examination or is it intended that the experts should make some sort of short statement. Sorry, that just was my question.

THE CHAIRMAN: I am so sorry. No, that is my error. So yes, the PCRs will personally make a 15-minute -- perhaps 20-minutes, but 15 minutes is probably a sensible presentation. The experts, our thinking was that we would have read and seen enough to render opening statements of 15 minutes unlikely to be of assistance. So we thought that it would be best, given that we will have read the materials submitted again, and we have read them already once, it would be best to proceed straight into cross-examination. But that is why I made the point this morning about the importance of the re-examination questions, because then I think if there is something which emerges as a point of interest there will be an opportunity for each applicant or their counsel to take the experts through that point for the half an hour that is at the end of the morning and the end of the afternoon. So that is how we envisage it working, but obviously we are all ears for improvements to this process.

MR HOSKINS: That is -- I was just -- I would not be making submissions. I am just making sure we are all on the same page.

THE CHAIRMAN: No, no.

MR HOSKINS: It appears to work for you, so I will be making submissions at the end of this and I will probably raise a red flag so you know I am in a different mode, but I am just trying to make sure we are all on the same page and you get what you want.

In the same vein, turning to the neutral statements, there have been different phrases used about what they are going to cover and I think it sort of falls down into case theory and economic methodology. I think there is a potential ambiguity between those. Of course, economic methodology could be it is a regression analysis and some detail of what the model to be put together would look like, but case theory is obviously a more narrative approach. I think the applicants have both signed up to saying, yes, we will do this, but I have to say from our side we are just still not quite clear, and it is to make sure you get what you want. Is it a case theory-type statement? Is it an economic methodology-type statement? Is it both? What is it that would be most useful to the tribunal?

THE CHAIRMAN: Well, my thinking is, and again I am going to make sure I keep an eye on both my other members, is that it is difficult to draw a decision, particularly at this early stage, between case theory and economic methodology. For my money, it is very important that we not find the facts, but have a fairly clear idea of what factual baselines the experts are going to use for their economic analysis.

As you will appreciate, Mr Hoskins and Ms Ford also, from the BritNed trial I did place a considerable premium, as is clear from the judgment, on the factual bedrock on which the economics was then built. Now, no one is for a moment suggesting that that factual bedrock can be produced for this hearing. It is not going to be there. But we would like to have a sense of the sort of factual material that is going to be of significance in assessing how the economic analysis is going to be conducted, which will lead to a quantification of the damages.

Now, it is inevitably going to be the case that both sides, both applicants, are going to be saying: well, this is an aspirational way of establishing our case. I have already said that is why it may be that this whole analysis or whole exploration of the way in which the case is made good may end up being something which is all very interesting but does not actually assist us in deciding matters. So I make that clear once again.

But it does seem to us important that we at least give the opportunity for that to be made good in case, and again, I am sceptical as to whether this will be the case, but in case there is so different an approach between the two applicants as to be material in the decisions we have to make, and again I will be quite frank, I am not expecting there to be such a thing, but we ought at least to explore it.

So I am quite inclined to give both applicants a fairly free hand in terms of what goes on, but my own feeling is that simply having a detailed description of what regression analysis could do if one had the facts is not particularly going to help us. We all have a very good idea of what regression analysis could, in the hypothetical event, do. It is more how, on the facts of this case as we understand them to be, knowing that that understanding is very nascent, very young, knowing that, what each applicant thinks they can do if they get the certification and carriage their way.

MR HOSKINS: Thank you, sir. I hope that helps the applicants as well in terms of what they are being asked to do.

THE CHAIRMAN: It is very helpful from our point of view that -- ah, Mr Lomas has a point. Mr Lomas?

MR LOMAS: Can I just make one point of clarification which I hope I have understood, which is the conversation we have just been having with the Chairman is in relation to, in a sense, the first paper. There was a second paper in relation to the funding of the case itself, and that is simply to address the choice that we are going to have to make which is to ensure that the interests of the claimants are adequately protected and, indeed the defendants are adequately protected as regards ability to pay adverse costs, insurance, the way in which fees are taken out of any pot that is obtained in any judgment and the interests of the claimants in terms of how much of that pot they receive. We just want to be absolutely clear that we have understood from both potential PCRs the way in which those economics play out from the point of view of both the other parties and their clients, and it is to get clarity on that.

MR HOSKINS: Certainly.

The next two points I really have are the timing on the neutral statement, because we are concerned that we will -- the suggestion is from Mr Jowell that the neutral statement goes in, I think, on the same day as their skeleton argument.

THE CHAIRMAN: Yes.

MR HOSKINS: Indeed on the same day as our skeleton argument, and certainly we think it would be far more effective -- we need to see the neutral statements first. Obviously we are going to be annotating them, but also we need to know, when we are doing our skeleton argument, the bones of their case. That is really what the neutral statement is going to be.

So I appreciate there are timing pressures but in our submission the neutral statement really must come, you know, with sufficient times for us to take account of it in our skeleton argument. Clearly when we are considering how we best help the tribunal, we will be considering what we do by way of a critique and what we can do in the skeleton, and indeed trying to mesh them together so that they work together as a whole. But in order for that to happen we will need to see the neutral statements in good time before our skeleton argument.

The second point on timing is in terms of the comments, of course, on each neutral statement are going to come from the other applicant and from the respondents. Again, we would have thought if time permits it is better for that to be a stepped process, because otherwise you get a bit of a mess where you get a pile-on of the other applicant and the respondents all at the same time and someone then has to sort it out. It seems to us that the natural order would be for the other applicant to go first and then for the respondents to comment on that.

We have the added difficulty, I hope you will agree, we have been trying our best to produce agreed documents all the way through, but you will understand that that is not always easy between six sets of clients and it does take a bit of time. We do not have the time of luxury of time on this, I know, with the hearing hard upon us. But we would much rather produce single documents for you. You do not want six sets of annotations from six sets of banks, but we will need the time for that.

So our suggestion is a timetable which has the neutral statement before skeleton arguments, then the other applicants, then our comments on the annotation. That would be our suggestion for how that would work.

The final submission I have to make, and here I am raising my red flag because this is a pushback rather than just trying to make sure we are all on the same page, is the length of our submissions.

THE CHAIRMAN: Yes.

MR HOSKINS: You have suggested 50 pages, and I would ask that we be given 60 pages. I say that for the following main two reasons: first of all, 50 pages gives each of the applicant groups about eight pages each, which is not a huge amount. What we would anticipate doing, if we can make it work in the time, is to give you one document again. But we will each, to do that, need to be comfortable with each other's submissions, and for that skeleton that will appear hopefully seamlessly, but at the hearing we will try and divide up the topics amongst ourselves. So I will take the lead on one issue and Ms Ford will take the lead on another, Ms Kreisberger, et cetera. So we will try -- you will only be hearing submissions on one topic from one of us, but we will try and produce a composite skeleton. But with the best will in the world, eight pages is pretty tight for us to do that on average. We will try and split them up between us if needs be.

And the other, the second point why we say 60 pages is more sensible is, the point is taken that to date the respondents have been remarkably economical in terms of the material we have given you, but of course that is a plus point in our favour. We have not been verbose.

But the point of the skeleton is not for us to repeat what we have already told you. The point of the skeleton is for us to respond to what the applicants have said, and we have got to respond to two separate applications which are not put in entirely the same way, and the applicants have produced hundreds of pages of documents. We need to respond to that. So when one is looking at what is reasonable for us, it is not what have the respondents produced to date, it is what have each of the applicants produced to date?

Viewed through that optic, we would say 60 pages, which is 10 pages for each of the respondent groups, in our submission looks eminently reasonable and I would encourage the tribunal to agree with that particular point of view.

THE CHAIRMAN: Thank you, Mr Hoskins. I will come back to that, but first of all let me make sure that you have covered all the bases that the respondents would want. So I will open the floor to whichever of the respondents' counsel would want to add something. I am going to assume endorsement of in particular Mr Hoskins' red flag, and I must say if that is the reddest the flag gets then we will be in a very happy position over the hearing, because I think we can resolve that fairly straightforwardly. But, Ms Ford?

MS FORD: Sir, Mr Hoskins has done all the hard work, I gratefully adopt his submissions.

THE CHAIRMAN: Anyone else? Ms Kreisberger, I see you on the screen, that is why I pick you, but ...

MS KREISBERGER: I am grateful, sir. No, I have nothing to add, thank you.

THE CHAIRMAN: I am very grateful. Well, I am not going to go through a roll call. What I am going to do is, I am going to articulate provisionally what I think would be a proper way of resolving the two points that Mr Hoskins has raised, and I will do that keeping an eye on Professor Neuberger and Mr Lomas so they can throw ink balls at me if I am getting it wrong. Then we will see what Mr Robertson and Mr Jowell have to say.

So first of all, for my part, I am more relaxed about page lengths than otherwise, and I would be inclined to accede to Mr Hoskins' 60 pages and we will see what Mr Robertson and Mr Jowell have to say.

I think the harder point is the question of the timing of the submissions, and I do think that there is something in what Mr Hoskins says about a properly responsive framework being articulated. We are, however, very short of time.

Now, if one takes 2 July as the date on which the applicants produce their written submissions, I am wondering whether the neutral statements could be produced by, let us say, 29 or 30 June on the basis that this is material that ought to be, and I am sure is, very well known to both sets of applicants. So if we said 28 June for the neutral statements and 2 July for the applicants' submissions, and then said -- and I appreciate that this is going to be difficult for the applicants, but said, say, the morning of 5 July for the written submissions of the respondents, say 11.30 on that day, whether that would work -- first of all, I will ask Mr Hoskins whether that would work or for him and then we will go back to Mr Robertson and Mr Jowell to see if it works for them.

MR HOSKINS: Sir, I think -- sorry, can you hear me, there is some noise outside my window.

THE CHAIRMAN: No, absolutely. Loud and clear, Mr Hoskins.

MR HOSKINS: I think that causes problems, and it is not simply a personal plea for the weekend. It is simply because we have to co-ordinate between the banks. I think the idea of trying to do that over the weekend is going to make --

THE CHAIRMAN: That is the first thing.

MR HOSKINS: It is just not going to work for us. As I say, we are keen to produce one document for you.

THE CHAIRMAN: Yes.

MR HOSKINS: A weekend is going to make that very challenging.

THE CHAIRMAN: Well, I see the point. The trouble is --

MR HOSKINS: I think -- sir, sorry just to interrupt.

THE CHAIRMAN: No.

MR HOSKINS: But my understanding, and I am sorry if I have got this wrong, was that everyone's skeletons were due on 2 July?

THE CHAIRMAN: That is correct.

MR HOSKINS: So 5 July is not -- so it is not for our skeleton, it is for our critique?

THE CHAIRMAN: Well, I was thinking of both, in fact.

MR HOSKINS: Right. So you are pushing back our skeleton time.

THE CHAIRMAN: That is right. I was bifurcating the skeleton. That was my thinking. I appreciate there are many ways in which one can slice the timetable.

MR HOSKINS: I think if the intention is for us to take account of the applicants' skeletons in our skeleton, as I say, doing that over the weekend with six groups --

THE CHAIRMAN: It is going to be hard, yes.

MR HOSKINS: -- in a single document, I just ... with the best will in the world I do not think we will manage that.

THE CHAIRMAN: No, I understand. What I think

I am going to do is, I am going to invite Mr Robertson and then Mr Jowell to come back with the earliest dates by which they can, without prejudicing their clients' positions, deal with both the neutral statements we are envisaging and the skeleton, see what those dates are, and they may be different dates, and then I will come back and see what we can do in terms of your response, Mr Hoskins.

MR HOSKINS: I am grateful.

THE CHAIRMAN: So, Mr Robertson, if you want five minutes we will happily rise to enable you to discuss it? These are difficult questions.

MR ROBERTSON: Yes. Could we have five minutes to take instructions, please?

THE CHAIRMAN: Absolutely. We will rise until 5 to 12, and if you could just either exit or still your microphones and cameras we will be back at five to. Thank you very much.

(11.49 am)

(A short break)

(11.55 am)

THE CHAIRMAN: Welcome back. Mr Robertson, I think over to you, if you can hear me. If anyone has problems could they please raise their hands, in term of communication?

MR ROBERTSON: Sir, we have a slight change of view. We are still getting our heads around this technology. But anyway, back to the proposal.

We would suggest this as the following dates for the neutral statement: we propose the neutral statements to be served, exchanged, on 29 June, that is Tuesday 29th, a week tomorrow and we suggest 5.00 pm. Then the two applicants to submit their skeletons and their critiques of the other applicants' neutral statements on the current date for service of skeletons, that is 2 July, but we would ask for another hour, 5.00 pm rather than the current 4.00 pm.

Then we would suggest that the defendants, instead of submitting their skeletons on 2 July which is the current direction, that that be extended to Monday, 5 July at 5.00 pm and their response to, or their critiques of the neutral statements also to go in with their skeleton on Monday, 5 July at 5.00 pm.

THE CHAIRMAN: Well, thank you, Mr Robertson, that is very helpful.

Mr Jowell, is that a common position with the applicants or do you have a different view?

MR JOWELL: It is common in part by fortuity because we have not been in communication --

THE CHAIRMAN: No, I appreciate that.

MR JOWELL: We agree with the first bit. We think that the absolute earliest we could put in these documents would be the 29th at 5.00 pm. Bear in mind we will not be able to start work on them until tomorrow and that then gives us one calendar week, which really is not a great deal of time, particularly given that we will need to get expert input and there are various time differences that we have to work with. So we think the 29th at 5.00 pm is the absolute earliest.

We thought of something perhaps slightly different by way of the next round. First of all, we are not convinced that it is necessary that the PCRs should go first with their critiques of each other's methodology. We also more generally think that the PCRs and the respondents are going to be critiquing from rather different perspectives and that therefore it might be, given the time constraints, that it is simply easiest to have two separate critiques, which of course one can always then create into a single document in due course.

In order to make that -- give people a reasonable time to consider their critiques, we thought that one could move exchange of skeletons and those mutual critiques by both sides to 5 July. So the tribunal on 5 July will receive the Evans critique of O'Higgins and the respondents' critique of O'Higgins and similarly for the Evans' document, and will also receive everyone's skeletons at that time as well. That seems to us to give everyone a fair opportunity.

It does, I appreciate, create more documents for the tribunal but as I have said, those critiques may be merged into a single document in due course if it is convenient for the tribunal to look at them those ways. So those are our suggestions and of course we are in the tribunal's hands.

MR ROBERTSON: Just to add that from Mr Evans' perspective we would endorse what Mr Jowell has proposed.

THE CHAIRMAN: Thank you. There are many ways of slicing a cat. So thank you both for those helpful submissions.

Mr Hoskins, you, I think, will be saying 5 July is not a great date for you, but again, I can rise if you need to for you to discuss with your other counsel, the other teams, or I can hear you now. Whichever assists you.

MR HOSKINS: Sir, I think my professional duty is to ask for time to take instructions.

THE CHAIRMAN: Of course.

MR HOSKINS: I cannot speak on behalf of the six banks just by shooting from the hip.

THE CHAIRMAN: No. I think that is entirely appropriate. I do apologise, Professor Bernheim, we are keeping you and the other experts waiting but it is important, I think, that we sort this out. I make it one minute past 12. Shall we come back at 10 past midday and we will see what you have to say then, Mr Hoskins?

MR HOSKINS: Thanks.

THE CHAIRMAN: Thank you very much. Until 10 past.

(12.01 pm)

(A short break)

(12.10 pm)

THE CHAIRMAN: Mr Hoskins, welcome back. Is everyone who needs to be here? I think so. Yes, I can see everyone there. Yes, Mr Hoskins?

MR HOSKINS: Good. If we can just -- we would like to build slightly out on Mr Jowell's proposal. So our suggestion is: neutral statement by each of the applicants on 29 June at 5.00 pm, that is in accordance with Mr Jowell. Exchange of skeletons on 5 July, again same as Mr Jowell. Where we depart is, we would like to split the critiques in this way: the critique by the other applicant on 5 July, and 5 July was the date that Mr Jowell suggested for all critiques. But we would then ask that the respondents' critiques come on 7 July. That has two advantages: one, you have the iterative process that I suggest would be a good idea, and two, we will take it upon ourselves -- famous last words -- to produce a consolidated document for the tribunal if we have until the 7th to amalgamate them all together, and you will get one document to read. So that is our suggestion for the timing.

THE CHAIRMAN: Thank you, Mr Hoskins. I will hear again from you, Mr Robertson, first and then Mr Jowell after that on that variant on the theme. You can take it that broadly speaking we are happy with 29 June for neutral statements and we are happy with 5 July for the exchange of skeleton arguments. So the point, unless you are unhappy with those, is really the responsive redlinings of the 29 June documents.

MR ROBERTSON: We are happy with the proposal that Mr Hoskins has put forward.

THE CHAIRMAN: Mr Jowell?

MR JOWELL: Subject only to the tribunal's preferences to have it earlier than the 7th, we do not think we can really object to that.

THE CHAIRMAN: No. We are happy with that, and we are very grateful to the parties for being so helpful in terms of narrowing the differences in what is, I appreciate, actually a considerable burden for all of the teams. So do not let it go unsaid that we are extremely grateful for the way in which the parties have responded to a number of balls that have come out of left field this morning from the tribunal.

But we are happy with that proposal, and rather than waste any further time debating the minutiae we will be very happy to receive an order which sets out those matters, and unless there is anything more we are very keen to move over to the teach-in part of the section. But I do not want to cut anyone off. Mr Jowell, I see there is something more, but over to you.

MR JOWELL: Just one very brief point. Mr Hoskins has asked for 60 pages and we have no objections to that, but we are cognisant that on the current allocation of time the respondents will be given no less than seven hours in which to develop their oral submissions. Given that we think we understand that the tribunal is inclined to agree with us and all the parties that compound interest and the "deceased and defunct" issue can be put off, it does strike us that seven hours does seem rather a lot for the remaining issues, particularly if they have longer on their written submissions. I think we would ask perhaps that if that could be cut down by an hour, or at least half an hour so that that time can go to the two applicants who do have rather a lot to deal with in their allotted time.

THE CHAIRMAN: Well, Mr Jowell, thank you for that. I am not going to invite a response to that. I am going to stick to the timeframe that we have, but you can certainly take it that we do not equate length of submission with persuasiveness.

Also, we are going to be sensitive to the fact that we are in the foothills of a difficult hearing and if it turns out that we have the 30/30/40 -- well, it is now a slightly different allocation -- wrong, then we will raise it, because this is an interventionist tribunal. We will not be shy in asking questions, and if we find that either applicant, or indeed the respondent, but to address your point, either applicant is being thrown off course and does not have enough time to deal with the difficult points that clearly are going to arise, we are going to be sensitive to that. So you can take that comfort. I am not going to revisit the arguments now, because frankly these things have a range of reasonable answers. I think we have a reasonable answer now, but that is only reasonable if we are sensitive to the parties' needs in the future.

I mean what I say, the fact that the parties have been so helpful and sensible and co-operative in terms of handling these very difficult questions very much inclines us to listen with more than half an open mind to any submissions that might be made about stretching days or reallocating matters in the course of the day. So unless, Mr Robertson or Mr Hoskins, you want to say anything beyond that, I am going to politely refuse that application. But I quite understand why you made it.

MR JOWELL: Well, I am grateful, sir. I should just mention that we will be commenting on Mr Khan's, I think it is, proposed detailed timetable. We will want to make a few adjustments to our allocation of time, which I think is our --

THE CHAIRMAN: Your prerogative, absolutely. I think this is just -- it is always helpful to tilt at a non-blank sheet of paper --

MR JOWELL: Oh, indeed.

THE CHAIRMAN: -- which sets out how it works, and that is all I treat it as. But I repeat what I say, that the timing of the submissions, but not the order, is a matter on which the parties have the discretion. I should make clear, I think I have, but Mr Hoskins said something which made me think I have not, but the compound interest and the "deceased and defunct parties" point is off for future discussion and we are not going to be going through that in the week commencing 12 July. I just want to be absolutely clear about that.

MR JOWELL: Thank you for that clarification, sir.

I think it then just calls for me, really, to call Professor Bernheim. I am conscious of the time. It is 17 minutes past 12. I think Professor Bernheim has sought to time his presentation so it will be one hour, as requested. I do not know whether it would be helpful to either split it into two halves now or to indicate that we will -- there will be a sit late for the short adjournment. We are very much in your hands, sir.

THE CHAIRMAN: Thank you, Mr Jowell. Professor, if you are happy with this I would be minded to run to 1.15 or a little after that to give you an hour unbroken by the short adjournment, and then we will resume at 2 o'clock for the rest of the matters. So if everyone is happy with that, that is how I am minded to proceed. I see Mr Robertson nodding. Mr Hoskins, is that satisfactory?

MR HOSKINS: It is absolutely. Can I ask one point of etiquette. We will obviously try not to intervene at all, but if we do have any questions how would you like us to behave in terms of bringing your attention to that?

THE CHAIRMAN: That is very helpful. First of all, let me say I welcome neutral clarificatory inventions and I am sure that the professor would as well. What I suggest we do is that we try the "raising your hand" option. I am just testing it to see if it works. Try the "raising your hand" option, and what I will do is I will either field the call, but professor, if you keep an eye on the little yellow hands as well, perhaps you could pause and the question can then be put. That avoids sort of car crash that one gets when one has multiple persons on a call, of trying to interrupt in the way one would in oral submissions in court where the body language is such that you know someone is making a point, but remotely I can tell you it does not work. It is disastrously bad however careful the invention. So let us try the hands. If that does not work, we will try something else.

Thank you very much, Professor. It is over to you now. You are not going to be sworn, as I think I indicated in an earlier communication from the tribunal. This is purely and simply a teach-in. We will intervene as our curiosity drives us, but what we will say I cannot remotely predict. But we will sit in your hands and listen to what you have to say. Thank you very much.

Presentation by PROFESSOR B DOUGLAS BERNHEIM

PROFESSOR BERNHEIM: Very good. Thank you, and it is a pleasure to join the session today and to have the opportunity to address the tribunal. The solicitors for the O'Higgins class have asked me to prepare a carefully timed one-hour presentation on how an antitrust expert like me approaches the measurement of damages in a case like this.

I have a slide deck, and I am hoping we can bring it up and it will not be too complicated. Ah, there it is. I am also hoping it will be possible for me to simply say "next slide" to move forward rather than asking for a particular page, so we will give that a try. In fact, let us start.

Next slide, please. So broadly speaking, the analysis that an antitrust expert would do in a case like this consists of two main parts. The first part is understanding the institutional context, understanding what the product is, the markets, the participants, the buyers, the sellers, how prices are determined and so forth, as well as understanding the cartel or alleged cartel.

The second part is to actually do the measurement of overcharges. Now, when I am brought into a case the first thing that I need to do is to spend a lot of time with part one, actually understanding and learning a lot about the market. Frequently the way that is accomplished is by assembling a team of experts who have complementary areas of expertise, which is what we did in this matter.

Next slide, please {H/578/5}. So this is our team. I am the first individual listed here. I am a Professor of Economics at Stanford University, where I am also the department chair. My broad area of specialisation is microeconomics. I have also done quite a bit of work in antitrust economics and competition economics. I am also a partner at the economic consulting firm Bates White, and the staff at Bates White provides me with support in cases like this.

The next member of our team is Professor Francis Breedon. He is a finance professor at Queen Mary University of London. He is a market microstructure expert and has written extensively on foreign exchange.

Then the final member of our team is Mr Reto

Feller, who is a former trader who also serves as an industry expert, and he works with Velador Associates. I should mention that Mr Reto is not a testifying expert in this case. We used him on our team as basically a resource to confirm our understanding of the details of the institutions.

If I could have the next slide, please, {H/578/6}. So now we are going to turn to this first part, which is understanding the institutional context.

Next slide, {H/578/7}. There are two main parts here. One is to understand the product, and I should explain that when an antitrust economist uses the word "product" we mean it very broadly. We simply mean anything that is produced or created. So services in particular are products, financial instruments are products. So the questions here are, first of all, what is the product? Who provides it, who buys it, and an important question, how is it priced? That is a subtle question in this case that is important to understand. Finally, during normal non-collusive periods, how are those prices determined? That is an important thing to understand because we are going to want to be reconstructing the non-collusive prices that would have prevailed but for the cartel.

And then the second piece here is to understand the cartels, in this case the foreign exchange cartels. We have the luxury in this instance of being able to turn to the EC decisions for answers to important questions like: who participated, when did they participate, what type of conduct did the foreign exchange cartels practice?

The other question that we ask here, and this is from the perspective of competition economics, is how might the conduct that we learn about have impacted prices? That requires insights from antitrust economics.

If I could have the next slide, please, {H/578/7}. So let me begin with the first question, which is about the product: what is it and who provides it? Now, the approach that we are taking, we are defining the product as transaction services for foreign exchange trading, and the providers are then the foreign exchange dealers. So that is the punchline.

Now let me backfill with some detail to explain that definition. Well, we know that various types of companies buy and sell currencies either for their operations, you can think for example about manufacturers who trade inputs and/or outputs internationally. Companies also demand foreign exchange for investment returns, think about hedge funds, mutual funds, pension funds.

Each transaction involves a currency pair, a base currency and a quoted currency, sometimes called the counter currency, as well as an exchange rate that describes the rate at which customers can swap one for the other.

Next slide, please, {H/578/9}. Now, as in many other financial markets, transactions go through intermediaries, and here dealers are playing that role. I should just mention to avoid confusion that the word "intermediaries" is used in different ways in the case. It is often used to describe brokers who are intermediaries between customers and dealers, but the dealers are also providing an intermediation function.

Now, one thing that a dealer might do is to locate buyers, locate sellers, match them and charge a fee for that matching service. That is in fact not what they do. Dealers enter into separate transactions with buyers and with sellers of currencies, and then they hold inventory of the currency to bridge the gaps because these orders, sell orders and buy orders, are not arriving at the same time. They are not arriving in the same amounts. So the dealer, by holding the inventory, is providing what is called liquidity to the foreign exchange market.

Liquidity is essentially the lubrication that makes the market function. In that sense the dealers are providing a transaction service. They are making the market work. That transaction service is piggy backing on the good that is actually being traded. In this case that good is currency, but -- and it is very important to keep this in mind -- the transaction service is distinct from that good. It is distinct from the currency. It is facilitating the trade of the currency.

Next slide, please, {H/578/10}.

THE CHAIRMAN: Professor, excuse the interruption. Just so that I am clear, are you saying that the way the dealer works is effectively as a principal in the market, dealing with, whether it is a buying or selling of a currency, persons who are interested, but running as it were two books -- well, probably many books, working out how many, what quantum of currency is held but not acting in a formal way as the agent between two persons on either side of a transaction, buying and selling, but actually it is a contract between dealer and another, which then the dealer reaches a view on in relation to the entire book of his institution's or her institution's business?

PROFESSOR BERNHEIM: Yes, that is my understanding, although when we start to use words like "principal" and "agent" I fear they have legal connotations and I am hesitant to say anything that is a legal opinion since that is not my area of expertise.

THE CHAIRMAN: I entirely understand. No, of course.

PROFESSOR BERNHEIM: Yes.

All right. Now, if the dealer did charge an explicit fee for matching the buyers and the sellers then that fee would just be the price of their transaction service, and it would be easy to figure out what the price was. But as I said before, that is actually not what they do.

So how is this product, this transaction service, how is it actually priced? Well, at each moment in time the dealer is quoting first of all a bid, which is a rate of exchange indicating the amount the dealer is willing to pay in the base currency to buy a unit of the quoted currency; an ask, which is a rate of exchange indicating the amount the dealer is willing to accept in the base currency to sell a unit of the quoted currency. Generally the ask exceeds the bid. That is how the dealers make money.

Now, if the dealers just established an arbitrary ask and bid their inventories would tend to expand over time, either positively or negatively. So to avoid holding ever-expanding positions what the dealer does is adjust the bid and the ask to try and manoeuvre their inventories towards zero.

Next slide, please {H/578/11}. Having gone through that bit of analysis we can conclude that the price of the product that is being sold here, the price of transaction services, is actually half of what is called the "bid-ask spread". So let me begin by defining the bid-ask spread, which sometimes is more simply referred to as the "spread". It is simply the ask minus the bid, the gap between the two.

Why is that the price of transaction services, half of that? Well, imagine that -- and here unfortunately on the slides I used the word "trader" where I mean "customer", so some of the time "trader" is used to mean dealer. So here when you see "trader" on this slide, to avoid confusion, that reference is "customer". So if a customer sells one unit of currency to a dealer at the bid and then immediately buys it back at the ask, so it makes a round trip, then the trader's holdings of currency are unchanged. But the trader -- the customer, is poorer by exactly the spread.

So that means that the spread is what the customer has paid for two foreign exchange transactions, a buy and a sell, therefore it is the total price of those two transactions. Consequently, the half-spread is the economic price, the implicit fee for providing a single transaction service, foreign exchange transaction service.

Next slide, please {H/578/12}. Now, with that in mind it is important to avoid confusing the price of the transaction service, which is the spread, with the price of the currency that is being transacted, the exchange rate. It is very easy to confuse the two, because the bid and the ask are the prices of the quoted currency. Their difference is also the spread.

However, the price of the quoted currency and the size of the spread can move independently. You can have the bid and the ask move in lockstep, which means the exchange rate is changing, but there is no change in the spread.

Alternatively, you can have the bid and the ask moving apart and together without changing the mid-point between them, in which case the exchange rate is not changing and the spread is changing. So these are two different concepts.

I have an example on this slide, a numerical example. I am actually going to skip it because I want to be careful about time. So let us move to the next slide {H/578/13}.

So far, I have been talking as if there is a single notion of spread, and in fact in this matter the economic analysis will likely reference three different notions of spreads or half-spreads. The first is the quoted half-spread. This is half the difference between a dealer's ask and bid quotes at a given point in time. We currently do not expect to have data on quoted half-spreads in this matter. But that is okay, because we can look at some other notions of spreads.

One is the effective half-spread. This is the difference between the transaction price for a particular transaction and the market mid-point, which is just halfway between the bids and the asks at a given point in time. Okay, that, we will have the data to calculate for each transaction. So we will actually be able to do a calculation of the price paid for transaction services for individual transactions.

Next slide --

MR LOMAS: Professor Bernheim, I understand fully that -- I understand how you will identify the transaction price in the data, but how exactly do you calculate the market mid-point, because that presumably could be the effective mid-point or the quoted mid-point, and it may be the mid-point for a variety of dealers or for one dealer. So could you just expand on how you calculate the market mid-point, please?

PROFESSOR BERNHEIM: Right. It depends upon what data are available. If the data are available for quoted spreads, if we are able to get some data on that, you would take the mid-point of that. Without that it is necessary to use the transaction prices. There you have to be alert to the fact that the volume may be skewed towards one side or the other.

So ordinarily we take weighted averages, volume-weighted averages of prices here. There is an argument for taking an unweighted average in order to not be skewed simply by the size of transactions on both sides.

Next slide, please {H/578/14}. The final notional spread is known as the realised half-spread, and it is -- it is very similar to the effect of half-spread. It is the difference between the transaction price and market mid-point at a slightly later point in time. Because we are using the mid-point at a slightly later point in time this equals the effect of half-spread plus the change in the exchange rate that occurs immediately after the transaction.

Now, why would we be interested in that, potentially? Well, the reason is that the exchange rate months against the dealer's interests after a large trade. And that occurs for a couple of reasons. One is if the dealer has just bought a lot of currency they are trying to unload it to balance their inventory, and that will push the price in the other direction. The other reason is -- and I will get to this in a minute -- a large trade may indicate that a party knows something about the market and knows how the prices are likely to move next.

In any case, because the rebalancing is asynchronous, the dealer's rebalancing is asynchronous, the realised half-spread may provide a better measure of what the dealer actually receives from the round trip after rebalancing, and consequently what customers as a whole pay for that round trip.

If I could have the next slide, please {H/578/15}. So the next question here is, what determines prices under normal non-collusive conditions? Well, one of the most important determinants of price is cost. Competition between many dealers will tend to force spread -- spreads towards the dealer's costs, and the costs involve three components. The first is their operating costs, which includes staff, equipment, licences, legal and so forth.

The next is inventory risk. Remember that the offsetting buy and sell orders do not necessarily arrive at the same time and because of that, while the dealer is holding inventories they are exposed to risks associated with the exchange rates changing. It might work in their favour, but it might also hurt them. They are bearing those risks, bearing risks involve economic costs, so that is a cost of doing business.

And finally, we have what is called "adverse selection risk". When dealers trade with parties who have better information about the market than they do, they take the risk that the price will tend to fall after they buy and rise after they sell. So I am going to elaborate on that point on the next slide {H/578/16}.

This slide is explaining how adverse selection works. The basic idea is embedded in an old joke due to

Groucho Marx, and when I teach adverse selection I like to teach it through this joke. Marx said, I would never belong to a club that would have me as a member. Now, the idea here is that if the club is willing to take me I can infer something about the club's standards that is adverse to the value that I would derive from belonging to the club. In particular, Groucho is inferring that the standards are so low that membership would not confer status. Okay? That is a classic example of adverse selection.

So in the context of asset markets, I may be reluctant to sell to anyone who wants to buy, because their desire to buy may mean that they know that the price is likely to go up. I may be reluctant to buy from anyone who wants to sell, because their desire to sell may mean that they know the price is likely to go down.

Now, those tendencies will push up -- will create a wedge between the bid and the ask that a dealer is willing to quote. The size of that wedge will depend upon the magnitude of the adverse selection risk, which in turn depends upon the amount of private information or informational asymmetries in the market.

Next slide, please {H/578/17}. I just want to note here that research shows that adverse selection risk is an important contributor to spreads in foreign exchange markets. There are several papers that have found that adverse selection risk accounts for more than a half of the spreads.

Furthermore, any development in the market that increases the adverse selection risk that traders face will increase their costs, and that will typically cause them to increase their spreads.

Next slide, please {H/578/18}.

THE CHAIRMAN: Sorry, Professor, another interruption. Adverse selection in the way you are using it, is -- by my perception slightly different to the Groucho Marx case, in the sense that Groucho Marx is talking about the entry or non-entry into a club who may or may not have him as a member. Here, it is not a question of whether a deal is done or not done at a given quantity of currency. It is at the price at which one encourages business. In other words, one encourages a counterparty to trade with a particular dealer, or not to trade with a particular dealer, by adjusting the spread that one is -- that reflects price for the service one is offering.

Do I have that right?

PROFESSOR BERNHEIM: Yes, although it is the same economic mechanism. Add to the Groucho Marx example a membership fee, and then ask what membership fee is Groucho willing to pay? You will see that as soon as the club accepts Groucho he is willing to pay less in terms of the membership fee, and there is your price.

THE CHAIRMAN: I understand. The reason, I think, I was drawing a distinction was this: how far is the fact that there are many clubs, or let us say many FX counterparties dealing in currency, significant in eroding the ability of a single dealer to meaningfully affect spread, in the sense that if you adjust your spread in a manner that makes you an unattractive proposition because you are more expensive than anyone else in the market, is the elasticity such that you are actually going to lose an awful lot of business through a relatively small change in price?

PROFESSOR BERNHEIM: Yes. So you are anticipating where we are going with this.

THE CHAIRMAN: Right. So sorry.

PROFESSOR BERNHEIM: So if you have competition functioning properly, what is happening is competition is pushing the prices to costs and, you know, if more of your price is going to be captured in the price movement after the transaction then you are going to capture less of it, and it will be competed away and you will capture less of it in the effective spread at the time of the transaction. But it will all be competed to costs.

Here we are concerned with a slightly different phenomenon which is some of the dealers gaining an informational advantage over others, and I will come to that.

Okay. I think I did this slide. So next slide, please {H/578/18}. So the next issue here is just to understand the cartels, and as I said, in this matter we have the luxury of turning to the EC decisions for answers to these sorts of questions. This slide is an indication of who participated in the Three-way Banana Split cartel and the Essex Express cartel, according to the EC decisions as I understand them.

One interesting feature of this slide is that it shows dealers going in and out of the cartel. They are not there consistently from the beginning to the end, and that is a point to which I will return as well.

Next slide, please {H/578/19}. The EC decisions also provide us with a window into the types of conduct that the foreign exchange cartels practised. First of all, there was extensive exchange of information among the competitors concerning open risk positions, outstanding customer orders, current and planned trading activities and bid-ask spreads, as well as occasional instances of co-ordination facilitated by the exchange of information. All of these are just quotes from the decision.

Next slide, please {H/578/20}. The decisions also describe the types of transactions that were potentially impacted by the cartel. These include customer immediate orders, sometimes called market orders, an order that is placed where the intention is to execute immediately. Customer conditional orders such as resting orders, which are triggered when, for example, a given price level is reached, and customer orders to execute trades at benchmark rates, also known as fixes.

Next slide, please {H/578/21}. So now we turn to the question of how the cartel members' collusion may have impacted prices, and as a general matter this is the competition economics question. Collusion may impact prices through a number of different channels, and I have listed some here.

The first is explicit agreements among cartel members to raise their prices -- here, spreads. The second is tacit understandings to compete less aggressively. The third is co-ordinated behaviour that has the effect of raising rivals' costs. Now, this notion of raising rivals' costs is an important concept in antitrust economics. The thing to realise is that an increase in a rival's costs causes the rival to raise their prices.

So as rivals raise their prices, competitive pressure on the cartel members abates and that allows them to raise their own prices. So this "raising a rival's costs" mechanism is well understood in antitrust economics.

Now, it is important to realise that the exchange of information supports all three of these mechanisms. It is obviously important for explicit agreements, tacit understandings require access to information to be effective, and I am going to explain the role of information exchange in this third mechanism on the next slide {H/578/22}.

All right. So, this mechanism works --

MR LOMAS: Sorry, Professor Bernheim, if you go back one slide. Sorry, I was on mute.

PROFESSOR BERNHEIM: Yes.

MR LOMAS: Is it possible to have the slide back? I wondered if we were confusing here the difference between the cost of the currency and the cost of the service. Is there anything in the decisions that suggests there were explicit agreements among cartel members to raise the spread, to broaden the spread as opposed to price of a particular currency pair? Because your measure is the width of spread, not the price, a point you made earlier. So is there anything in the decisions talking about agreements to broaden spreads?

PROFESSOR BERNHEIM: So, I am not remembering anything specific. But the agreements to affect the bids and the asks -- well, anything that impacts the bids and the asks is going to broaden the spreads. So it could be that there were some sort of understandings concerning bids and asks, or alternatively it could have been that there was simply information exchange which they understood would benefit them by reducing bids and raising asks in the end. So it does not have to be explicitly an agreement to widen the spread, it could be an agreement that is focused on a piece of this.

MR LOMAS: Thank you.

PROFESSOR BERNHEIM: Okay. To go back, where were we? Ah, yes, this mechanism.

So, to begin with, here I am explaining how information exchange affects rivals' costs. So a dealer's market share gives it insight into some portion of the market, the portion of the market that it has contact with. For that portion of the market they get to see order flow and so forth. They learn a lot about that portion of the market.

Now, just imagine hypothetically that five dealers, each with 10% of the market, agree to share their information. Then each one of them will have the benefit of knowing what is going on in 50% of the market rather than in just 10% of the market, and that places their trading partners at an informational disadvantage.

Now, remember that dealers have to balance their inventories, they use the interdealer market to manage inventories. Increased adverse selection in the interdealer market arising from trades with the cartel members is going to increase their costs of doing business.

Next slide, please {H/578/23}. All right. So now I am going to turn to the second main part of the analysis, which is the measurement of overcharges.

Next slide, please {H/578/24}.

MR LOMAS: Sorry to do this, but before you go on to measuring overcharges --

PROFESSOR BERNHEIM: No problem.

MR LOMAS: -- because I think we are going to move on.

It may be that the effect operates through the impact on the spreads of the non-participating dealers. But one of the things that was troubling me, looking at this, was your basic proposition is there is an information asymmetry between the user and the dealer, which is why the dealer runs a spread.

By having the cartel, you increase the information that is available to the dealer, the point you just made about five cartel members covering 50% of the market. That reduces the information asymmetry with the user of the market vis-à-vis the customer of the dealer. So why does that not encourage them to reduce their spreads, because having more information means they can see and reduce their risk profile?

So that should reduce their spreads, which may mean they can go for volume, but benefits the user of the market. Do you have to make your loss through the impact on the non-cartelised part of the market and the impact on their spreads, and how do you trade off those two inferences, if that analysis is right?

PROFESSOR BERNHEIM: Well, it could be both and you are asking an empirical question as to where these things play out. One quick answer is, when we do the data analysis we will see how it plays out. But when rivals' costs rise, now, if within the cartel members they all had better information and they all just competed with each other, they could compete away part of the benefits that they have created for themselves.

But if they can avoid competing vigorously with each other then by raising their rivals' costs they have created headroom. Okay, they can now raise their prices without fear of losing business to the non-cartel rivals, because the non-cartel rivals are functioning with higher costs and therefore have had to widen their spreads.

So it comes down to whether the cartel dealers can raise the spreads, widen the spreads under that umbrella. As I said, an empirical question which data will answer. All right.

PROFESSOR NEUBERGER: Sorry, just one question. Does that mean that it is entirely possible on the face of the Commission's findings that though there were major losses, that the losses were incurred by dealers who were not cartel members, rather than trading parties to the banks, which were part of the cartel?

PROFESSOR BERNHEIM: Well, it certainly implies there would be losses associated with customers trading with the non-cartel members. It leaves open the question of to what extent damages were also incurred by parties trading -- with customers trading with the cartel members. And to the extent the cartel members were pricing under the umbrella that they were creating upon raising rivals' costs, they would raise, they would widen their spreads too and thereby gain that advantage. So damages could well be there as well. Again, as I said, it is an empirical question and we have to dig into the data.

The mechanisms here become reasonably complex and I want to, you know, kind of be cautious about suggesting that we can conclude too much from theory. We cannot reason this out just from theory. We can understand what the mechanisms are and that can tell us where to look, but ultimately we have to look at the data and let the data tell us exactly what went on.

Okay. So turning to the second part of the analysis, the measurement of overcharges, there is a lot to say here {H/578/25} and I am going to focus on just two issues. One is, what measure of the spreads should be using? The other is just an introduction to regression analysis. We have proposed using statistical methods called regression methods. The experts for the Evans class have proposed using the same methods, so it is important to understand basic principles of those methods.

Next slide, please {H/578/25}. So let me begin by discussing the selection of the measure of spreads. Here the analysis of the institutional context is useful because it tells us where the effect of the cartel may show up. So it could show up -- we could be looking at effective spreads or we could be looking at realised spreads.

So on this table I have listed three categories of mechanisms or modes of conduct. First, tacit or explicit agreements. Here I said to widen quoted spreads, it could be to push the bid down or the ask up at a given point in time. It can be indirect in that fashion. Where would that show up? Well, it would definitely show up in the effective spreads. Remember that the realised spread is just the effective spread plus the subsequent price movement over a short period of time. So it is also going to show up in the realised spread.

What about magnification of adverse selection risk? Well, that will show up in the effective spreads because, again, it is impacting the difference between the bid and the ask. That is what the adverse selection risk is doing.

Now, there is an asterisk in the second column there. That is just to acknowledge that there is a disagreement on that point. Professor Breedon and I have argued that that effect will also show up in realised spreads. Professor Rime has -- I am sorry, go ahead.

THE CHAIRMAN: Professor, no, it is not actually a question.

PROFESSOR BERNHEIM: Okay.

THE CHAIRMAN: We have just sustained a technical issue here. If you will bear with us for three or four minutes I hope we will sort it out. It is just one of our headsets has stopped working. I do apologise.

(Pause)

We are back up and running. Very good. Thank you, Professor, do resume. Thank you very much.

PROFESSOR BERNHEIM: Very good.

I think I was on the second category, magnification of adverse selection risk. I was simply acknowledging that there is disagreement about whether that would show up in realised spreads. Today we are not arguing, or we are trying not to argue, so I am simply going to acknowledge that disagreement.

Finally, on the last line, we have co-ordinated price manipulation such as front running, which could be co-ordinated through information exchange. That will not be measured through the effective spread but it will be measured, or can be measured, through realised spreads. It can show up in realised spreads.

Now, I want to run through a couple of figures from my first report that elaborate on some of the points in this slide, so please, next slide {H/578/26}.

The first thing that I want to show is how effective spreads can capture the impact of spread widening, the harm that that causes to a customer. So here on this figure the horizontal axis is time period. You can think of those numbers as minutes during an hour of a particular day. The vertical axis is measuring the exchange rate, and I apologise, there was a production error here. It is not in the original in my report, but it is here. The vertical axis is exchange rate and these should not be labelled with dollars. But this is exchange rate.

Now, we have two blue lines, one dashed, one dotted. The dashed line is the bid. This is showing how the bid price changes over time. The dotted line is the ask, and it shows how it changes. Halfway in between them you see a solid black line, which is the market mid-point.

Okay, next slide, please {H/578/27}. There we go. So imagine that at minute 10 a sell order arrives. That sell order will go off at the bid, which means at point X. So without collusion -- these are bids and asks that are non-collusive. Without collusion this order will transact at the point X.

Next slide, please {H/578/28}. So now imagine that there is a cartel that shares information in a way that ends up widening spreads. So here we have a lower bid line, the dashed green line; a higher ask line, the dotted green line. If these are the bids and the ask, that same order will now transact at point Y. Okay? So the impact of the cartel on the customer is the difference between X and Y. It is simply X minus Y. That is the harm per unit of currency transacted.

Next slide, please {H/578/29}. All right. All I have done here in this slide is add the market mid-point, which is point A. Now we are going to look at the effect of half-spreads. The non-collusive effective half-spread is the difference between the market mid-point and the transaction price. That is just A minus X. The collusive effect of half-spread -- whoops, please go back a slide. The collusive effect of half-spread is the difference between the market mid-point and the transaction price, which is now Y. So it is A minus Y. The change in the effective half-spread that results from collusion is therefore the difference between those two terms. The A is cancelled and you are left with X minus Y, as I just said a minute ago, X minus Y measures the harm inflicted on the customer from the change in the transaction price. So the change in the effective half-spreads will measure, here, the harm to the customer.

Now, what I have just described applies to immediate transactions, market transactions. What about resting orders? So a resting order is a conditional order. Think, for example, of -- imagine that the current bid is 110. A resting order may say transact the following amount of currency in the bid falls to 100. Okay. You might think that a widening of spreads would not impact the resting order, because if the resting order says transact at 100 and it does not change, then it will transact at 100 in the non-collusive regime and in the collusive regime. But that logic actually involves a couple of mistakes.

The first issue -- the first problem is that a customer who has seen a history of higher bids under the collusive regime may well choose a higher trigger price for the resting order. But let us set that issue aside, because it turns out that that issue does not really matter. There is a more fundamental error in the logic that I just described, which is that it confuses the price of the currency for the price of the transaction service.

Okay, so let me explain that. Let us say that the non-collusive spread is five. The resting order that I just described, when the transaction occurs at 100 the market mid-point is 95. The market mid-point is basically telling you the value of the currency that you are getting. So the difference between 100 and 95, 5, is the fee that you are paying for that transaction service.

Now, let us say under collusion the spread is 10 rather than 5. Then when the transaction occurs at 100 -- the half-spread. When the transaction occurs at 100, the market mid will be 90 rather than 95, and consequently the price of that transaction service, the implicit fee will be 100 minus 90, which is 10 instead of 5. What is going on here is that the widening of spreads is causing the transaction to go off at a different point in time when the currency is actually less valuable. So the customer who transacts at the ask is still paying a wider spread, still paying the higher fee -- implicit fee for the transaction service.

All right. Next slide, please {H/578/30}. Now I want to discuss the realised spread and what we can learn from it. So, in this slide I am just starting over again with a path of bids and asks, non-collusive bids and asks as well as a market mid. Next slide, please {H/578/31}.

Let us imagine that in this case it is a sell order that arrives at minute 10 and goes off at the price -- the exchange rate X, when the market mid is A.

Next slide, please {H/578/32}. All right. So here I have removed the bid and the ask just so we can see what is going on a little bit more clearly. Imagine that this dealer knows that that order is coming, they had advance information, and imagine it is a very large order. In that case they are going to be buying, when the order arrives, they are going to be buying a large amount of currency. They would obviously like to buy that currency on the cheap, if possible. So they have an incentive to try and make sure that the exchange rate comes down. They can do this through a practice called front running and in principle they could co-ordinate with other members of the cartel to make that more effective.

So here I am imagining that there some sort of conduct of that form that brings the market mid-point down from A to B at minute 10, so that the dealer can now buy this currency at a lower price. Now, this manipulation, the effect of it is going to be short-lived. So at some point not very long after that we are going to have returned to the normal market mid-point. I have that occurring at minute 21 or 22 here, at point C.

Next slide, please {H/578/33}.

MR LOMAS: Sorry, again, Professor Bernheim --

PROFESSOR BERNHEIM: Apologies, I am not seeing the hands. I will do that --

MR LOMAS: Apologies, I was not putting my hand up.

PROFESSOR BERNHEIM: Oh, okay.

MR LOMAS: This is a slightly different point, is it not? Because your starting point is the collusion widens spread. Widening spread does not move the cartel mid-price -- sorry, does not move the mid-price, because it happens on both sides. So this is about one specific set of cartel behaviour which is intended, essentially, to be front running or changing the index. So do we not need to be super careful that we do not muddle up impacts of the cartel which widen spread from other price manipulation which changes the fundamental price?

PROFESSOR BERNHEIM: So, what I am -- the purpose of going through this is to show that certain types of conduct can widen realised spreads even though they do not widen effective spreads. Ultimately we are going to be just asking the data. We are going to be interrogating the data to determine the extent to which effective spreads widened and the extent to which realised spreads widened.

You know, to the extent certain of these kinds of mechanisms are prevalent, we would end up finding bigger effects on realised spreads that on effective spreads, because we will be capturing part of the effect of the cartel that is not in the effective spread. But, you know, we are not assuming in advance that any particular mechanism is necessarily prevalent. We do not know that yet. We have not interrogated the data. So we are just trying to map out the possibilities and have empirical methods that can capture all the possibilities.

Okay. So -- all right. So now let us go to the next slide {H/578/33}. All right. So on this slide I have put the bid and the ask back on the figure, and this is the collusive bid and ask, so I have imagined that the cartel has widened the spreads. You can see that with the green lines this sell order, when it arrives at minute 10, will go off at the point Y rather than at the point X.

So the impact of the cartel here is the vertical distance between X and Y. It is just X minus Y. Now, we can decompose that into two components. One is the reduction of the market mid-point from A to B, and that is just A minus B. The other is the fact that the transaction is now further from the market mid-point. That is just the widening of the effective spread. So the impact of the cartel here is equal to the sum of the change in the effective spread and the change in the market mid-price.

Now, if you were just measuring effective spreads you would catch the first piece but you would miss the second piece.

Next slide {H/578/34}. So here what I am showing is that realised half-spreads can in principle resolve this problem. So, without the cartel what is the realised half-spread? The realised half-spread is the market mid-point at some time shortly after the cartel. So -- I am sorry, the manipulation, the transaction. So let us take point C. It is the difference between that and the transaction price. So without the cartel the realised half-spread is C minus X. With the cartel, again, calculating the realised half-spread the same way, it is C minus Y.

Now, if you think about the change in the realised half-spread caused by the cartel, you just take the difference between those two quantities, the C is cancelled and you end up getting X minus Y, and looking at the top of the slide we said that X minus Y is the harm to the customer per unit of currency.

Next slide {H/578/35}. Okay. Now I want to turn to regression analysis and talk some about regressions. Oh, before I do, let me say one other point. With respect to the manipulation that I just described, it is important to acknowledge that customers on the buy side -- at that particular moment in time I was talking about a customer on the sell side. If you have a customer on the buy side then for that transaction they will actually benefit from that manipulation.

But the manipulation is only going to occur if the cartel has good information that most of the volume is on the sell side. If that were not true they would be manipulating the market against their interest. So on average customers are going to be harmed through this manipulation.

Now, the fact that a customer may benefit on a particular trade because they happen to be on the right side does not mean that they benefit overall. Most of these customers are trading -- are involved in a fair number of trades and averaging out over those trades, if the impact on customers is adverse it will tend to be adverse for that party.

All right. There are other circumstances in which customers in particular situations might benefit from a widening of the spreads. We will come back to that in just a second.

So now let me talk about the slide that we have up. Before I talk about regression let me describe a very simple approach to measuring damages, which is simply calculate the average spread for transactions during the operation of the cartel and for transactions during a clean period, and then compare them. That is what this histogram is supposed to illustrate.

We have a bar for the clean period showing the spread, a bar for the cartel period showing the average spread. By the way, totally hypothetical data, obviously. We have not looked at the real data yet. In any case, the comparison of that might tell you something about the impact of the cartel.

All right. So an important advantage of comparing averages is that we are accounting for the possibility that in principle some transactions in these groups may have benefited and some may not have been affected at all. Those are in the averages, and they are in the advantages with the appropriate weights. So to determine the average impact we do not have to assume that all of the transactions were impacted, or even that they were all adversely impacted. We can still calculate the average.

Now, if we think that those averages differed by type of transaction obviously we could do this differently for different groups of transactions, but again, the same principle would hold within those groups.

Next slide {H/578/36}. Okay. So now let me talk about regression analysis. The reason that I just described this approach using averages is that you should think of the technique that we are proposing using in this case, at least at this point, ordinary least squares regression. That is simply a way of calculating the average of a variable conditional upon the values of other variables. But it is just, ultimately, getting at averages.

So here I have written down the simplest regression equation. I am using (i) to stand for a transaction, (t) to stand for the time that that transaction occurs. So this equation says that the spread for a particular transaction is equal to some number, (a). We do not know what it is until we run the regression, until we estimate it. But some number (a) plus -- and the epsilon "it" is what we called a statistical disturbance term. It captures the variation in spreads that is not explained by this very simple model.

Now, if we went ahead and estimated this simple regression equation, the estimate of (a) would just be equal to the average spread. So I am making this point to hammer home the idea that a regression is in some sense capturing averages.

Next slide, please {H/578/37}. So now we come to the task of measuring the effect of the cartel. We might to do that define a -- what is called a dummy variable, and here I will write it as (c) for cartel. (c) sub "it" equals one of the transactions in the cartel period and zero if it is not, if it is in the clean period. I am just taking a very simple version of a cartel. In that case we could expand our equation, our regression equation to include a new term. This is the same equation as on the last slide. The new term is in bold, and it is a number, (b) -- we call it a coefficient, we do not know what the value of that is until we estimate that with data -- times this dummy variable. If we estimated this regression equation, the estimate of (a) would just be equal to the average spread during the clean period. The estimate of (a) plus (b) would just be equal to the average spread in the cartel period. So (b) would just be equal to the difference between the averages.

In other words, the regression that I am describing here would just reproduce the original picture which I have on the next slide {H/578/38}.

So this is just showing that that (a) ends up being the height of that bar for the clean period. (b) ends up being the difference between the height of the two bars. That is all this simple regression is doing.

Next slide {H/578/38}.

THE CHAIRMAN: Pausing there, could you stay on that slide for a moment.

PROFESSOR BERNHEIM: Sure.

THE CHAIRMAN: Could I ask you a little bit more about your variable little (t), which is, I think, the time at which the transaction occurs.

PROFESSOR BERNHEIM: Yes.

THE CHAIRMAN: How important is it that you -- or is it important at all, that you select transactions within, or at, time (t) which are in the cartel period or in a clean period? Is it something which affects your outcome, having a hypothesis as to whether the cartel was in operation?

PROFESSOR BERNHEIM: Right. So, we look to the EC decisions to tell us when (t) falls within the cartel period. The complication here, which is more of a complication than is in that simple model, is that there are transactions at "(t) is within the cartel period" that are not part of the cartel. In principle those could be affected differently. The way we handle that is through a slightly more complicated equation that involves what are called interaction terms. So we can have another dummy variable for whether this is a transaction with an active cartel member, and we can interact that with the cartel dummy variable and in that way measure the separate effects for members -- for transactions with members of the cartel and transactions with other members. So there is a complexity here that we have to deal with.

Okay. Next slide, please {H/578/39}. Now, if all the regression is doing is just calculating these averages then you might naturally ask, why do we need a fancy technique to do that? Why do not we just calculate the averages? If all we are doing is calculating those two bars we do not need the regression. But the important point is that spreads may depend upon other market conditions. Other market conditions may have changed between the clean period and the cartel period. So to take an example, let us imagine that costs were lower during the cartel period than the clean period. Lower costs tend to lower prices. So then we will conclude that the cartel increased spreads by less than they actually did.

Alternatively, if costs were higher during the cartel period than in the clean period we will conclude that the cartel increased spreads by more than they actually did. Here, when I am talking about costs I mean costs other than those that the cartel ended up impacting through adverse selection. Obviously that is part of the effect we want to measure.

Next slide, please {H/578/40}. So the solution to that issue is to include other factors like costs in the regression equation. So this is the same equation that I had before but I have added a new term, and the new term again shows up in bold and it is just a number (c), we call it a co-efficient we are going to figure out the value of that, times the market condition applicable to that transaction, whatever it is. To keep this simple I am showing this equation with one market condition. In principle the regression equation could have many of them, and each one would have its own co-efficient.

All right, now this coefficient of (c) will tell us how the average spread varied with the market condition. Critically (b), which before measured the difference in the average of spreads between the cartel period and the non-cartel period, that continues to measure the same difference. However, it measures that difference adjusting for the difference in market conditions. Okay?

This is what is known as the single cartel dummy variable model that we have been writing about a lot in our reports.

Next slide, please {H/578/41}.

THE CHAIRMAN: Professor, I am not going to cut you off, except to say we have been going an hour. We have been interrupting you so you have a lot of time more, so do not worry about that. But would that be a convenient moment for those of us in England -- I appreciate that you are in a different time zone -- to rise until our time 2 o'clock and we will resume then? Is that a convenient moment?

PROFESSOR BERNHEIM: Yes, totally fine.

THE CHAIRMAN: Very good. Well, very grateful for your efforts so far. We will adjourn until 2 o'clock, when we will be back for the second instalment. So thank you very much.

PROFESSOR BERNHEIM: Thank you.

(1.20 pm)

(The luncheon adjournment)

(2.00 pm)

THE CHAIRMAN: Professor, do continue. Thank you very much.

PROFESSOR BERNHEIM: Thank you.

All right. I have just finished introducing the single dummy variable model and explaining its foundation. There are a number of other tools that we use to measure damages. They include models with what are called cartel interaction terms, models with multiple cartel dummy variables and what is called the prediction approach.

I want to give you some sense of why we use those methods and what they involve, and this is actually my last topic. I will say in jumping into this topic that there is some disagreement with the experts about the advantages and disadvantages of these methods. So I am going to try to be sensitive to that disagreement as I go through here, but I still have to explain what motivates the use of different methods.

So the motivation for these approaches is the possibility that the effect of a cartel might vary over time, possibly because the intensity of collusion varies or possibly the number of cartel members varies over time, which is something that we saw in the EC decisions. That is illustrated in the figure at the bottom of this slide, which again, is purely hypothetical data.

It is just -- okay, so here we have price on the vertical axis and date on the horizontal axis, and the blue line is intended to represent how prices would behave under normal non-collusive conditions. The dashed portion occurs during the cartel period and it is dashed because we do not actually observe that. What we observe instead are the collusive prices, which is the red line.

The vertical distance between the red line and the dashed blue line is shown by the black curve at the bottom of this graph. That black curve is showing what we call overcharges, the difference between the collusive price and the "but for the cartel" non-collusive price. Here, I have illustrated a case where that varies over time.

Next slide, please {H/578/42}. I have just reproduced that one piece, just the overcharges, from the previous slide. Now, the point that I want to make is that taken literally, mathematically, the single cartel dummy variable model implies that subject to statistical noise the effect of the cartel does not change over time. Its effect is estimated to be A, amount and it is estimated to be A at all points in time, and therefore, that flat line, the orange line, represents what that model, a restriction that that model is imposing on the data.

Next slide {H/578/43}. So, you know, we ask ourselves is that a problem? Could it be that the single cartel dummy variable regression actually accurately measures the average overcharge, even though it does not capture the pattern of overcharges, in which case it would be fine for measuring average overcharges? And the answer to this, and here this is just a matter of mathematics, the answer to this is maybe "yes", maybe "no". It depends on whether the effectiveness of the cartel is correlated with the market conditions. If there is no relationship between the effectiveness of the cartel and the market conditions that determine the spread, then this approach will measure the cartel's average effect correctly. That is, the single dummy variable approach will. If the correlation is small, then there may be a small error, but it may not be an error that we are terribly troubled about.

Next slide, please {H/578/44}. Now, the issue that worries some of us is that there are often reasons to think that the effectiveness of a cartel is correlated with market conditions. Imagine what goes on if you control for the market conditions but do not have a model that allows the effectiveness of the cartel to vary over time. Let us say that some market condition spikes during the cartel period at a time when the effectiveness of the cartel was increasing because the effectiveness is correlated with this market condition.

The regression equation will have a tendency to attribute that spike in the price to the market condition, because it is correlated with the spike whereas this flat cartel dummy variable is less correlated with that. Okay, so we are worried about possibilities like firms may become more opportunistic and less likely to collude when their costs rise. Firms may drop out of the market as costs rise, making collusion easier. Demand may become more or less sensitive to price at different points in time, making it either respectively harder or easier to collusively raise prices, and -- a phenomenon we did see in the EC decisions -- a firm may join and drop out of the cartel, and that may depend upon the market conditions.

Next slide, please {H/578/45}. So there are a couple of solutions that we can use to address whether this issue -- and to figure out whether it is a significant issue or not. It might not be a significant issue. There are some techniques that we can use to determine whether it is, and to correct the estimates if it turns out to be a serious problem. One solution is to add what are called cartel interaction terms to the regression equation.

So this is the same regression equation as before.

The first line there is just the single cartel dummy variable model. I have added here the bold term, and this is a number (d) -- we do not know what it is, the data are going to inform that -- times the cartel dummy variable, times the market conditions. So what this is doing is allowing the market conditions to affect spreads differently when the cartel is active, because those market conditions may be impacting the degree of effectiveness of the cartel. So we are allowing for the possibility that the effect on the cartel on average spreads actually varies with the market conditions. So that is one solution.

Let me just add that this strategy of using what are called interaction terms, which is multiplying two variables together and putting them in the regression, this is a strategy that can be used for all sorts of purposes in the analysis. For example, if we think that there is a possibility that the cartel affected different type of transactions differently, we can interact the cartel variable, the cartel dummy variable with another indicator variable for those types of transactions. That is something that I actually gave an example of before we broke.

If we think that different types of transactions are influenced differently by market conditions we can interact dummy variables for those types of transactions with the market conditions as well. So these interactions give us a lot of flexibility for how we model different patterns of how market conditions as well as the cartel-affected spreads.

Next slide, please {H/578/46}. Another approach is simply to use more than one cartel dummy variable. This is what is called the multiple cartel dummy variable approach. I have illustrated it here with the simplest version, where we just have two cartel dummy variables; one for the first half of the cartel period and the other for the second half of the cartel period. So the first is equal to 1 if the transaction is in the first half of the cartel, 0 otherwise, similarly for the second.

In that case we would modify the single dummy variable model in the way that is shown here. The modification is the bold part. What we have done is, instead of having the constant (b) times the cartel dummy variable, we have one constant (b)(f), (b) sub(f) times a dummy variable for the first half of the cartel, and another coefficient, (b) sub(s) times the dummy variable for the second half of the cartel. So this equation is allowing for the possibility that the cartel had a different impact on spreads in its first and its second half.

Next slide {H/578/47}. That is the same model. I have it on this slide because I want you to notice something about this model, which is that the single cartel dummy variable model is a special case of this model. If you impose the restriction that (b) sub(f) is equal to (b) sub(s), that the effect is the same in the first and second half, you would end up with the single cartel dummy variable model. So once we estimate this model we can actually test the validity of the restriction that leads to the single dummy variable model and determine whether the data are consistent or inconsistent with that restriction, and consequently with the single dummy variable model.

Now, my experience has been that when these two models imply very different averages effects of the cartel we probably will find that the data reject the single dummy variable model. But I want to emphasise, this is an important point, that there is a trade-off here. If the restriction is true, there is an advantage to imposing it because you gain what is called statistical precision.

Now, I want to make sure that we do not confuse meanings here. The way statisticians and econometricians use the terms, for us the words "accuracy" and "precision" are completely different. Colloquially -- it is early in the morning for me -- they are often used interchangeable, okay? But for us they are completely different.

"Accuracy" means that on average the estimator will be correct. On average -- not every time, but on average, and if it is wrong on average we call that statistical bias. "Precision", what is that? Well, regardless of whether the estimator gets the answer right on average or not, it is precise if it does not vary much from its average. So here is a really trivial example. Let us say I have an estimator that, no matter what data you give me it spits out the answer of 2. Okay? Now, for whatever purpose we have in mind that is likely to be a really inaccurate estimator. Far from the truth. But it is extremely precise, because it does not vary.

As a matter of statistics we value both precision and accuracy, and there is often a trade-off between the two. So by imposing this restriction we will gain precision if it is true. We may also lose accuracy if it is not true. And we have to balance the two. And the way an economist balances the two is by interrogating the data, working with different kinds of models to determine whether certain restrictions are doing violence to the model, to the data or not. If they are not, then imposing the restrictions can yield a gain.

Next slide, please {H/578/48}. All right. Now, I showed you the model with two cartel dummy variables. We could add more. This figure shows what we might get if we had a cartel dummy variable, a separate one, for every year, okay? One for 2003, one for 2004 and so forth. And this picture is making the point that as you add dummy variables for finer and finer time periods you endow the model with the ability to more closely approximate the variation and the effectiveness of the cartel over time.

In that way, you also immunise the model to a greater degree against the possibility that you may be mismeasuring things due to correlations between market conditions and the effectiveness of the cartel. So here we end up with a step function, the orange line, because we have a dummy for each year. It is constant within each year but it jumps at the end of each year.

Next slide, please {H/578/49}. Now, a natural thought that you might have at this point is that if we achieve a better approximation for the variation in the cartel's effectiveness over time by using more cartel variables representing shorter and shorter periods, why do we not just take the shortest possible period? That will give you the most flexibility to match the actual pattern of overcharges and immunise you against these correlations that I have been talking about.

Well, mathematically, if we did that, what that approach would do that is what is called "dummying out" all of the data within the cartel period, and in terms of computations there is an easy way to do it. The way you do it is as follows: first, you estimate a simpler regression equation, depicting the relationship between spreads and market conditions, using only data from the clean period. You do not have any of those dummies, the cartel dummies in it because you are not using the cartel period data. So what that regression is doing is capturing the relationship between spreads and market conditions under normal conditions.

Then you use that equation to predict spreads for the cartel period. Then you can evaluate the impact of the cartel for any transaction and any point in time by calculating the difference between the actual and the predicted spreads. You can do that for each transaction. Then -- it is not going to be very precise for each transaction. There will be a lot of noise in that measure, but if you average those measures over periods of time, certainly a month, probably a week or even a day, you are going to get pretty precise estimates. That is basically a way of recovery -- this is just a simple computational way of recovering the dummy variables for each one of those very fine time periods.

Next slide {H/578/50}. Okay. So this procedure goes by the name of the prediction approach, and sometimes people do talk about it as if it is an alternative approach. However, it is also the most flexible version of the dummy variable approach. I have tried to emphasise on the previous slide that it is no more computationally complex than the single dummy variable approach, and you may get -- it is easy to get confused and think that it is more complex computationally, because you might have a gazillion dummy variables and you have to have the computer estimate a model that is a really big model. That it is not the way we do it, as I explained on the previous slide. You can actually do it through the simple procedure that I described on the slide and recover all of those dummy variables if you want, or average them over periods. It is actually quite simple.

I have used this approach as well as the other approaches that I have described in a number of matters. I see the advantages of the prediction approach as follows: as a formal matter, the statistical assumptions that are required for the validity of this approach are less restrictive than those required for the validity of the other approaches that I have mentioned. You arrive at the other approaches by imposing restrictions on the dummy variable model corresponding to the prediction approach. So any assumption that is required for this approach is required for the other approach, plus some additional assumptions about the validity of restrictions.

I want to acknowledge one issue that Mr Ramirez raises about the prediction approach in his most recent report, which is the possibility that the prediction approach might have trouble accounting for events that are entirely confined to the cartel period. You do not have anything like them in the non-cartel period, so you cannot estimate a model that would tell you what they would do.

That is right, to a point. There is also a variant of the prediction approach that deals with that possibility -- that deals with that possibility essentially by using the methods twice. First you would use them just for the cartel period data to back out the effects of the events that are confined to the cartel period. Once you have done that you can proceed exactly as before, and basically you are predicting the price that would have prevailed but for the conspiracy and but for those events, but you know the effect of those events so you can capture the effects of the cartels.

I actually used that very approach in a case involving a cartel in the vitamin C industry where the SARS epidemic occurred right in the middle of the cartel period. So it required me to apply the method twice, once within the cartel period and then once overall.

The final thing that I would just say here, and this is my final comment: all of the methods that I have described, the single and multiple cartel dummy variable approaches and models within interactions, cartel interactions and other kinds of interactions as well as the prediction approach, these are all accepted methods in terms of the standard of our profession. They are widely used to measure cartel damages in the United States, which is where I have had my experience with these kinds of cases, and they have been accepted by courts.

I think that is the end. If we go to the next slide, I think that is my -- yes, that is it. Thanks very much and I stand open for other questions.

THE CHAIRMAN: Well, thank you very much, Professor. I suspect we all will have some questions. Perhaps I could begin with one.

You were discussing around page 41, 42 and 44 the notion that the effect of the cartel might vary over time or according to circumstance {H/578/41}, and you therefore postulated the use of multiple dummy cartel variables.

To what extent do you consider it safe -- and that is going to come to my second question, but I will use the word "safe" -- or robust to, rely upon statistical proxies as to what may or may not have been going on in the collusive conduct of the dealers, rather than seeking information as to what in fact they were doing?

Let us suppose a group of dealers that, for reasons that I am not even going to speculate in relation to, but let us hypothesise that a group of dealers decided that they simply wanted to fix the -- or affect the price of FX transactions on the third Thursday of every month. They, for reasons that are known only to themselves, they did not care about any other day in the month, but the third Thursday their price was, for them, important to be directed and that is what they did over a five-year period. So assume for the sake of argument that one could establish to the satisfaction of a court on the facts that that is what they did and that apart from that and apart from any short-term effects of their fixing the price on the third Thursday, there were no cartel effects.

You would presumably be able to model that behaviour and work out what the short-term effect to the price would be, if that is what they did? That is my first question. I have some follow-ups.

PROFESSOR BERNHEIM: Yes, sure. No, that is a great question and what you said in closing is exactly right.

So, these sorts of methods are generally informed by our understanding of the record, and we have not been able to really dig into the record yet. So all we are doing is mapping out our, you know, sort of our general analysis plan. We cannot fill in all the specific details yet. We have to describe our general strategy for analysing the data.

So if there is really good evidence that the cartel did something on, you know, every third Thursday you could accommodate that very easily into the analysis, because we know what transactions fall into that category. We could include a dummy variable for those transactions and interact it with the cartel dummy variable. We could potentially interact it with other things in the model as well, but most naturally with the cartel dummy variable. Then it would tell us how the cartel impacted those particular transactions and whether it impacted them differently, and if that was the main channel of activity of the cartel we would find an effect there, but not generally.

That said, I would just add a couple of things. We do think that some of the things that the cartel was doing was -- would have had broader effects, potentially. This information exchange impact on adverse selection, the EC decisions do refer to this -- the exchanges of information being nearly daily, I think is the phrase that they use. So that is something to consider.

The other possibility, and here again it would be -- this requires a better understanding of the record, but one of the things -- one of the issues that frequently comes up in cartel cases is that in terms of the operations of the cartel we often only see the tip of the iceberg. You know, we may see some of the communications but not all of the communications. Now, in this case maybe they only used one channel of communication and we have all of it. I do not know. But if there are other channels of communication, phone communication, person-to-person or whatever, then it may be more pervasive than what we are seeing.

The general analysis can pick up what is going on generally on average rather than only trying to isolate the things where we can, you know, tie that effect directly back to something in the record. But we can do both, is the point, and I think a good analysis would pursue both. It all ends up being a matter of interrogating the data and seeing what the data has to teach us.

THE CHAIRMAN: Well, thank you. That was a very full and helpful answer. Thank you.

Following on from that, you referred a few times to "the record". Now, please tell me if you do not want to answer this, because I think I may well be taking you outside the area in which you are comfortable in speaking. So if you want to say "I do not want to answer this", then that is absolutely fine.

But when you refer to "the record", are you simply referring to that which you can confidently extrapolate from the Commission decisions, or are you envisaging some kind of independent fact-finding exercise to work out, for example, whether the authorities picked up everything or whether there was more going on, or for example, what precisely the motivation for the anti-competitive conduct on part of individuals was, so that one can get a more specific -- I am not going to say "better", but a more specific or fuller picture?

So I suppose my short question is, what do you mean by "the record" and do you envisage augmenting it?

PROFESSOR BERNHEIM: So, the record could end up being just the EC decisions. I mean, I do not know what is going to be available in terms of information on the cartel. It could be the detailed chatroom transcripts. I do not know whether those would be available.

You know, as I have worked on different cases, some of the time the record includes a lot of information from multiple sources and some of the time it is rather sparse. The general practice is to work with what we have and, you know, what we have is always constrained by the constraints of discovery and other aspects of the legal process.

So if we do not get a lot of information beyond what is in the EC decisions, I think that we will be hunting for these sorts of generic average effects of the cartel to a large degree. We will look to see whether there is anything more specific we can do. But I do not know whether that is a full answer to your question. It is sort of like: I am not sure yet what exactly we are going to get our hands on. Generally the policy is to use what we can get our hands on.

THE CHAIRMAN: No, thank you. That was a very helpful answer. Mr Lomas has a question, I think.

MR LOMAS: Thank you, Professor. I have one question which goes back to something the Chairman was saying, I think, in a sense. I think I know what your answer is going to be but let me test you on this anyway.

If you have a classic cartel selling widgets, companies A, B and C, they co-ordinate and push up the price of widgets, their customers suffer and it is a uniform price for their widgets across the market or in the market they define. This is slightly different. We have trading desks here. Let us assume we have traders X, Y and Z in different institutions. These are individuals. They are motivated by bonuses, the performance of their personal book, their return on the capital that they have been allocated, their trading record, and that affects their bonuses, which in my experience of traders is the thing that most motivates them.

Suppose that in the chatroom, which after all are -- as I understand it, are individual chats with individual people entitled to access them, so Mr X from bank A accesses the chatroom and corresponds with Mr Y from bank B, but it is not the case the whole of the trading desk of bank A and the whole of the trading desk of bank B are in these chatrooms. They can be taking short-term decisions or short-term co-ordination which suits the individual trader's position on the day and makes his book look good, or enables him to help out a colleague by getting some dollars or some euros, or whatever.

But the effect may be limited to the trading pattern of the individuals X, Y and Z who are in the chatroom and are taking these decisions. I am not sure there is any evidence that they are sharing that information more widely with the trading desk. They are doing deals as individual traders. To what extent, if that were the fact pattern and that is a hypothesis, does the regression model pick up and deal with the fact that you are talking about individual behaviour rather than, perhaps, corporate behaviour? I suspect the answer is going to be, it is a reduced effect but you pick that up in the coordinates and the coefficients. But I wondered how you would deal with that when it is individual traders necessarily rather than the whole trading desk.

PROFESSOR BERNHEIM: Right. This sort of thing -- well, this sort of thing generally is more common than you might think. The standard conspiracy where A, B and C get together and agree on a fixed price for widgets, a uniform price, is actually really uncommon, and methods of collusion generally are, you know, they tend to be more subtle. Oftentimes they will, you know, work through things like a sort of implicit market division or joint efforts to reduce capacity over time that then has the effect of pushing the prices up. So it is indirect. So it is really common to see heterogeneity in the prices being charged during the conspiracy and potentially heterogeneous effects of the cartel. So these effects are -- those characteristics are more common, you know, than the widget example would suggest.

That said, you know, it could be if these parties are operating independently for just their own interests, possibly they are working against the interest of another trader at the same dealer, I suppose it could be --

MR LOMAS: It could be, it could be. I want to look good rather than the guy next door to me.

PROFESSOR BERNHEIM: Yeah. So if we -- the first thing to say about this is that just the presence of people doing this in the market, because of the impact on the information flows and the market and so forth can have pervasive effects in the market, so there is no reason to think that the impact of such a cartel would just be confined to the trades of those who are actually doing the co-ordination. The extent to which it bleeds over into other things, it is an empirical question, we can evaluate it.

What the regressions can measure if we do not have information on which dealer -- which trader within the dealer is responsible for each trade, is the average impact for that deal. So we would be blending those things and computing, in a sense, the average. We also had -- if we also had data on, you know, which trader was responsible for the trades, in principle you could then put in dummy variables for the trader and interact those with the cartel dummies and pick up -- this is all a matter of what data is available for us to work with.

MR LOMAS: Thank you.

PROFESSOR NEUBERGER: Professor Bernheim, regression techniques, as you say, are common in cartel cases. I was wondering if you could say a bit more about the interpretation of the results, because what happens is you hope to be able to show from the data that during the cartel period the prices or spreads, whatever, are somewhat elevated compared with other periods, with the clean period. How do you convince people that it was not only that they are higher during that period but it was due to the cartel?

Because presumably, I mean, you are controlling for market conditions but you can only do that imperfectly. There are things -- market conditions that are hard to measure, there are relationships that you are not able to capture or you may not be aware of. So how do you end up convincing a court that the number you come up with is actually the impact from the cartel and not due to other sources?

PROFESSOR BERNHEIM: Right. Great question, because -- okay, so controlling for market factors is a way of sort of, you know, ruling out suspects. You see price elevation, it is like a criminal investigation, there is the dead body and we need to find out who the murderer was, and we can rule out certain suspects, right? At the end of the day, we want to be able to say more than we have ruled out certain suspects. We actually want to say we have evidence that it is this suspect.

So it is hard to predict at this point what we will be able to do, exactly, along those lines. I can tell you the kind of thing that I have done in previous cases that has been very useful.

Working with the record, depending upon what is available in the record, you can often get measures of variation in cartel intensity. That might include things like the frequency with which they are speaking with each other. Here it would definitely include the number of cartel participants, since we did see variation in that over time.

So there are various proxies that -- for cartel activity, the intensity of cartel activity, that may be available. What I have done in previous cases -- in at least one, I think two previous cases when I was able to assemble information on those kinds of considerations, is track them over time and see how that relates to the estimated overcharges. And when you see the overcharges rising, when the indexes are saying there is more cartel activity, that is a pretty good indication -- it is a pretty good corroboration that it is the cartel that is driving it.

So it is a combination of ruling out explanations associated with these market conditions while at the same time looking for aspects of cartel activity that we can correlate with what is going on in the market.

PROFESSOR NEUBERGER: Thank you very much. Thank you.

THE CHAIRMAN: That, I think concludes our questions, Professor. We are very grateful to you for your time. Thank you very much. I found that extremely interesting and helpful and, thank you very much.

PROFESSOR BERNHEIM: Thank you. Should I drop off now, then?

THE CHAIRMAN: Well, what I was going to suggest is perhaps, does the Evans application need a bit of time to set up or are you ready to move seamlessly over to your presentation?

MR ROBERTSON: We are ready to go.

THE CHAIRMAN: Well, in that case Professor, sit still and enjoy the show and we will see what happens. Thank you.

PROFESSOR RIME: Thank you, sir.

THE CHAIRMAN: Good afternoon and welcome. Thank you for giving your time. You saw, I hope, how matters went this morning. We will follow exactly the same process as this morning. Feel free to make your presentation and we will ask questions as and when they occur to us, and I hope those who have questions of a clarificatory nature will also ask them.

Let us continue trying to use the raising of the hand on the screen approach, but if that does not work I will intervene to make sure the questions are put. Thank you.

Presentation by PROFESSOR DAGFINN RIME

PROFESSOR RIME: Thank you. So my name is Dagfinn Rime. I am a professor at BI Norwegian Business School and an expert on foreign exchange microstructure. I do not have slides for my presentation, but hopefully we will manage to keep track of where I am in my topics and keep an eye on the big picture.

So, my presentation will follow my first report, in particular sections 3 to 6, and I will inform you, sir, when I move on to the next topic. So these sections are: overview of foreign exchange markets and foreign exchange trading; insights from the academic field of FX microstructure; and impacts of the cartels, that is my theory of harm, that is in section 5 of my report; and then finally, briefly on the econometric measurement of the harm. I will also draw a bit on Mr John Ramirez's first report.

So, Mr Ramirez also discussed other topics like number of affected customers and their volume of commerce and described a very clear stepwise procedure to go about estimating those, so I will not have anything to add on that.

So, my plan following these four topics is to first, by describing the market, sort of spell out what is the opportunities and what are the constraints set by the organisation of the market for the market participants. Then couple that with insight from microstructure, which is primarily about behaviour on the different market structures. I will add my theory of harm. So those -- the theory of harm will build on those two, and the econometric measurement will also build on this.

So let me then turn to overview of the market and section 3 of my report. So, as I said, this structure of the market gives both opportunities and implied constraints for the market participants. So it is important to understand the details of the structure.

The reason for trading foreign exchange, and I am dropping the definition of foreign exchange because Professor Bernheim did that very clearly, it is basically three-fold, and this goes for the different market participants, it is accessing a foreign good that --

THE CHAIRMAN: One moment, Professor, I think we may be having a technical glitch here. Would you mind pausing for a moment?

PROFESSOR RIME: Yes, sir.

(Pause)

THE CHAIRMAN: I am so sorry, Professor, do continue. We have overcome our issues at this end. Thank you.

PROFESSOR RIME: Thank you. So as I said, so the reasons for trading by the market participants is three-fold. It is accessing a foreign good, that might be an asset or investment opportunity or some ordinary good, for import/export. It is speculating on foreign exchange movements, so over the last 20 years foreign exchange has developed into an asset class on its own. So this is a big part of the market. It is finally, also, risk management of market participants' foreign exchange exposure.

Trading is conducted via, in particular, two instruments. It is spot trading, which is immediate delivery of currency which means within two days, and our main attention will be at this segment of the market, because this is the main price and most other prices follow this price. In our application we also consider forwards.

There are other instruments that show up in statistics, like FX swaps for example, but these do not involved foreign exchange risk as such. It is more like an interest rate instrument, as we do not consider those.

The market participants is, of course, very important and we will focus primarily on two of these groups. Those are end users and dealers. There are also other types of intermediaries that primarily act as brokers between dealers, but I will not consider those today.

So the end users are particularly important because those are the ones that have a final need, a final demand for currency. So these are non-financial customers. For example, trading currency for import/export purposes. There are financial customers that are not dealers. These could be hedge funds, mutual funds, pension funds, smaller banks, et cetera. Then we have the other very important group, the dealers in major banks that service the end users, so provide the liquidity to the end users, or what we often call market-making, and their business is basically providing this liquidity and they get compensation via the bid-ask spread as defined by Professor Bernheim.

These different end users, they trade a bit -- are different, obviously have different demands and they trade a bit differently. There is a huge volume in the foreign exchange market and it is very difficult to get hold of precise data. But the BIS do a survey every third year. The last survey was in 2019, which basically gives the best overall picture of the activity in the market. In 2019 daily spot, which is the focus of us -- for us, trading volume was almost USD 2,000 billion, and this has been increasing steadily over the last 20/30 years, so since early '90s it is been a four-fold increase.

The strongest increase in this period has been trading by the category of financial customers. So this group consists of relatively few entities, but each of them trade relatively frequently and they often trade quite large trades. In the literature, and it is my understanding also by banks, these type of customers are regarded as sophisticated, having a very good idea of what they are doing, having a very good idea about what is a fair value of currency, and often are relatively well informed about future price movements.

Banks value obtaining their information and also possibly speculate based on their trading, and this is supported by research. Non-financial customers, their share of the total has either been steady or downward trending over this period, so the strongest increase has been by the financial customers.

Non-financial group is consisting of many entities, but each of them trade quite small volumes and a lot less frequently than the financial customers, and hence, sort of, not being that active in this market, are typically not regarded as informed or sophisticated. Banks still sort of value their trading because they can benefit from the bid-ask, make money by trading -- servicing that segment. So these are the two main customers that the dealers service.

A very important aspect of the foreign exchange market structure is that it has a two-tier structure, and this makes it somewhat different from many other markets. These two tiers are the dealer-to-customer tier and the interdealer tier. So I like to think of this as a customer tier. So you have an outer circle where you have the customers interacting with the dealers, and then you have the interdealer market are, sort of, in the middle. Customers do not typically trade with each other. So there is -- it is the dealers that gives them access to foreign exchange trading opportunities.

So dealers are sort of liquidity suppliers, what Professor Bernheim called transaction services -- I call it liquidity services, it is basically the same -- and customers are consumers of liquidity services. The interdealer market is really crucial in this ecosystem.

Dealers rely on this market to service their customers. This is a bit like the wholesale market of FX. Dealers sort of need access to this raising inventory in order to produce the transaction services. So it is a bit like an input market. But an important element is that it is also a source of profit for the dealers in itself.

So dealers access the interdealer market both for speculation and they do liquidity provision and then making money from bid-ask spread in the interdealer market as a separate business, almost. An example sort of underpinning that is that some dealers do not trade with customers but they simply make money by providing liquidity, making the bid-ask spread, and speculating in the interdealer market. Thereby they gain lots of knowledge about how this works, and that is presumably useful at the trading desk. But important that the dealers have these two sources of profits.

Over the last 10, 15 years it has been introduced new electronic trading platforms that offer new trading channels to customers, but by and large this two-tier structure remains the dominant thing. The reasons for this is two-fold. Dealers are still the main liquidity providers, they have a competitive edge in doing this liquidity provision, and the interdealer market is still the main source for what we call price discovery, so where you typically see the changes in prices.

These new platforms may enable some customers to at points provide liquidity, but that is not part of their business model. It is, rather, part of a trading strategy at that particular point in time.

Professor Bernheim explained the bid-ask spread very well, I think. That is the price that we are concerned about here, it is not an exchange rate in itself. We are not going in depth on that now, but there are two components to it. We have a sort of constant part covering technical costs or operational costs, and then there are a time-varying and also trade-specific part covering the risks, that Professor Bernheim discussed.

But one thing I think it is important to notice that is this constant part which also contains what we call excess profits. So that is captured by the dummy approach that Professor Bernheim discussed earlier.

One thing that I would like to discuss is the mid-point of this bid-ask spread. So the dealer quotes a high ask and a low bid, and he is selling at the ask and buying at the bid, hence making some profit. So that typically the mid-point between these two is assumed to be an estimate of fair value, sort of the true (inaudible). That is an unobservable object, of course, but we believe that is a good assumption, that the mid-point is fair value.

Why? Because then the dealer is not exposed to demand pressure from either side. But in general it is the distance between the transaction price and the fair value that is the cost to the customer. If it is a reasonable assumption that this mid-point also is the fair value, then this half-spread represents the transaction cost to the customer, and that is the typical assumption in the literature.

We do have cases where this distance between the transaction price -- take the ask as an example -- and the fair value is maybe less than the mid-point. So that means if mid-point is here, then maybe the fair value is up here. So then the ask is low, and that is kind of that transaction services are on discount. So dealers might use this to get rid of excess inventory.

That used to be kind of an important channel for dealers to control their inventory, but with the advent of electronic trading not so much any more, shows empirical studies.

The distance between a transaction price and the fair value could also be larger than the mid -- the half-spread. So imagine, again, we have the half-spread here. We have the bid-ask spread here and the mid-point is here, but the ask is pushed up. So now the fair value is down here. This may occur, for example, if it is done front running. So then you push that up. But typically the literature assumes that the mid is the best estimate of the fair price and then the half-spread is the cost to customers.

A further important aspect of the foreign exchange market is that it is a global market. The dealers in this market interact across the globe either via electronic networks or the phone, and it is a really fast-paced market. So imagine that you are going to squeeze USD 2,000 billion daily through the active trading hours, which typically is sort of extended European trading hours. Then it ends up being quite intense trading. To squeeze in so much it has to go really fast. So to put this 2,000 billion in perspective, it is about 100 times the GDP of well developed economies with a large financial sector, for example UK and Switzerland. So it is huge volumes.

Exchange rates, they jump on news, incorporate public news, say, macro announcements, extremely fast. Dealers control their inventories extremely fast. In FX it could be seconds, it could be minutes. While studies from equity markets show inventory control that is a lot slower, maybe days, FX is super fast. Mis-pricing, for example, mis-pricing according to what we call triangular arbitrage, happens typically within seconds. So this is a superfast market. That is important to have in the back of your mind as a sort of figuring-out approaches to study this market.

Okay that was the background of the market. Let me now turn to overview of foreign exchange market structuring. Financial markets in general provide two key services: one is facilitating credit, that is what we call liquidity; and the other is providing correct prices, that is what we call price discovery. A microstructure is the study of how these two services operate under different organisations of the market.

The study of dealers is very important in microstructure given that dealers are important in many structures of the market. FX microstructure applies and adapts the tools of microstructure to foreign exchange markets. So foreign exchange markets are somewhat different from, for example, equity markets and we try to take account of that.

Information and how it is distributed among the market participants takes centre stage in microstructure. This is because information is important for the price discovery, understanding how prices evolve, and it is also, as we understood from the description of adverse selection, important for the willingness for liquidity providers to actually provide liquidity.

When it comes to information, again FX is somewhat different from other markets. The trading process in FX is what we call very opaque. The market has low transparency. There are two main reasons for this. First is that foreign exchange trading is over-the-counter, meaning simply that it is not on a centralised exchange, and the second is that FX lacks much of the regulation and the supervision and disclosure requirement that is present in other markets.

I see a hand raised.

MR LOMAS: Yes. Thank you, Professor. I was just going to ask on your transparency point. I understand that the market is not particularly transparent to regulators or, if you like, to outside observers. But if you are a large institution trying to buy USD 100 million, is it possible for you to get quite rapidly an indication of the various prices for buying USD 100 million in sterling from a variety of different market providers? So is the comparative pricing transparent to the market user even if it is not transparent more widely?

PROFESSOR RIME: So, in general we think of trade transparency, what is going on and we think of price transparency. Now, you are asking a very specific question about the huge volume and if a customer might get that price easily.

Probably depends a bit if that customer has a relationship with the banks that he approached or not. Most likely his, sort of, main bank and very often customers do not have that many bank relationships, their main bank would often quote a better price and have -- because they have a relationship, they have more information about this customer than others. So there are some risks that this bank -- their main bank do not face because they know more about the customer than others. I am coming a bit back to this later, but they have to seek this information quite actively. It is not readily available as it maybe would be in an equity market.

Transparency is very important because more transparent markets are more efficient in aggregating information and makes it available to market participants and aggregated into prices faster than less transparent market. An example being taking market structure, where all market participants are in the same room at the same time, a call option, that is extremely efficient.

FX is kind of the opposite of this structure. So this means that the consequence is that for example a customer/dealer trading is primarily only observed by the two parties involved. So that is like a bilateral trade. So the dealer taking part is the only one knowing this. Hence it becomes an important information source for dealers.

Furthermore, this lack of transparency makes it difficult for customers knowing what is going on in the market, difficult to know who is quoting the best prices and for what sizes are these prices good, and who is trading different volumes and are they buying or are they selling. Even how is the competition, how is the competitive environment is difficult to know in FX. It is difficult to obtain precise estimates of market shares of the different dealers.

While, as an example, by comparison equity markets have a lot more disclosure. Funds might report their positions, firms report the registry of equity ownership, insiders flag their trades, et cetera. So it is a very different information environment.

So we add to this that there is little real-time information available. For example, take a macroeconomic information that is published with long lines. Then we end up with an information environment for this market where the pieces of relevant information is spread out on many market participants. We call it dispersed information in economic theory.

So all the market participants may have relevant pieces, but it is difficult to aggregate this and get it reflected in price. If a dealer is able to collect more of all these pieces, he gets an information advantage. And since this information presumably eventually will be reflected in price, this information adopted gives him a possibility to benefit in trading, so gives rise to trading opportunities.

So there was a question earlier whether dealers were sort of less informed than their customers or not. So in some sense they are probably better informed because they see lots of customers, but they are still interested in trading with all these customers to get the pieces that each customer might have. So the adverse selection element is not that much in the dealer/customer segment, but it happens in the interdealer, the wholesale segment, that dealers rely on in order to get access to their inventory. So that is really where the adverse selection component is.

So as I already said, it is the end users, because they are holding the risk. Those are the final users of currency. It is those -- their trading that is especially important. Research has shown that position-taking trades by customers, especially financial customers, is important for banks, gives them opportunities to benefit in interdealer trading and have a lasting impact on prices, not transitory impact, but shifts in customers trading, move prices persistently.

Armed with having an information advantage a dealer may turn around to the interdealer market and benefit from this information advantage, speculate based on that information. So imagine that a customer is buying and this is a customer that often buys in the correct direction, then the interdealer might join in and do the same in the interdealer market, and the liquidity provided in the interdealer market is sort of adversely selected into the trade.

In order to cover his loss he increases his bid-ask spread. So this speculation by the informed dealers that creates this bid-ask spread component and that is eventually passed on to customers. The adverse selection component is increasing in the frequency of informed trading and we can think of that as the market share of the informed traders. It is increasing in the precision of the information that the informed traders hold. So if they have more precise information the informed traders will be more confident and trade more aggressively. And it is also the bid-ask -- the adverse selection component is also increasing in potential loss to the liquidity provider.

The liquidity provider will experience a loss in response to persistent changes in prices. Again, (inaudible) used this as a bid, this is the ask, and there is a time dimension here, maybe it is easier to think of this direction, and mid is here. There happens to be a trade at the ask and eventually the information reflected in the trade is reflected in prices, and prices move up here permanently. The liquidity provider at this point in time will then realise that he sold too low in response to this persistent increase.

But if this increase is transitory, so it goes down again, he will not, if he is using different time windows after his trade, not appear as a loss. So what might appear as a loss at the transitory increase does not appear as a loss as it goes down again. So adverse selection is a component of bid-ask spread that protects against the informed guys that have information that will have a persistent permanent impact on prices.

Microstructure often deals with very complicated market structures, and the market structure of foreign exchange is very complicated. There are many different segments, lots of different trading platforms and channels for trading and you can even trade a currency via other currencies. So if I am interested in buying sterling (inaudible) I can do it directly or via euro. So if these alternatives are very close substitutes they would also be priced similarly. So that is what we call an equilibrium. If so it is not the case, forces of demand and supply will be set in motion that take advantage of the price differences, and dealers will either experience excess buying or selling pressure at their bid-ask prices and realise that their prices are out of sync and need to be corrected.

In a fast-paced market this correction is really fast, so we are quite in a tight equilibrium almost continuously. Remember this triangular arbitrage example I mentioned earlier where correction to mis-pricing could happen within seconds. Low transparency in some segments of the market hamper this process, but the mechanism is still in place.

Okay, so now I turn to my theory of harm, the impact of the cartels. Yes, I see a raised hand.

MR LOMAS: Just before you go there again, I am back on my transparency point. Thank you for a very clear answer in relation to the users. But if you talk about the interdealer market, and this may be what drives the arbitrage taking out price differentials very rapidly, could you spend a second or so on the degree of transparency in that market, because presumably some of these institutions are on electronic trading platforms where prices are displayed and the dealers can pick up changes in prices, at least among some trading banks, instantly and respond to them. So do we have a very different quality of transparency, if you like, between the wholesale market and the user market? I know it is not a retail market, but the user market?

PROFESSOR RIME: Yes, yes. Very good question. Absolutely, the transparency is very different. So while the customer/dealer market is extremely opaque, there is quite a lot more transparency in the interdealer segment.

Yet -- and that is partly because of electronic trading platforms where you might observe high frequency changes of prices and you also observe quite a bit of trading activity. Again, the foreign exchange market is less transparent than, for example, equity markets. In equity markets you may see a lot more details on who is providing liquidity, who is trading, and you might see this information, some of it both before trading and after trading. In FX markets you do not see who is behind the prices that is offered as liquidity and you do not see all the trading, and the trading you see you cannot sort of see who is behind it except the trades that you take part of yourself. So it is less transparent. Maybe most important, especially for the adverse selection, is that before trading you do not know who you are trading with. It is what we call pre-trade anonymous. So you cannot condition your bid-ask spread on who you are going to trade with.

But there is more transparency in the interdealer than it is in the customer dealer, but yet less than is common in other markets like an equity exchange.

MR LOMAS: Sorry to push back on this. This is very interesting and valuable. If the transparency is less than some of the markets, say equities, why is it that the price correction mechanism is faster than some of the markets, say equities?

PROFESSOR RIME: Well, I mean, this is also part of the reason why FX volumes are so enormous. So dollars/sterling is a lot bigger market than Microsoft equity. So there is not the same liquidity in Microsoft, and that is a huge company, as it is in dollars/sterling. So that also goes for the inventory control of a Microsoft dealer. Trying to control inventory as intensely as an FX dealer is doing would be very costly. You simply have to try to be more patient.

MR LOMAS: I see. Thank you.

THE CHAIRMAN: Professor, before you go on, we transcribe these hearings and it is customary for us to take a five-minute break in the course of the morning and afternoon sessions. Would that be a convenient moment for you, for us to take a break until let us say 25 past 3 our time?

PROFESSOR RIME: Yes, 3.25. Yes.

THE CHAIRMAN: Very good. Well, thank you very much. We will resume then, if we can still our cameras and microphones, we will be back at 25 past. Thank you.

(3.20 pm)

(A short break)

(3.25 pm)

THE CHAIRMAN: Good afternoon, and welcome back. Professor, do please resume. Thank you very much.

PROFESSOR RIME: Thank you.

So I had just finished the two first sections of my report on the market structure and on the insight from microstructure research. Now, coming to my theory of harm.

The theory of harm is based on these two other (inaudible), so how one can benefit from cartel as a dealer is a function of the organisation of the markets. So as I said, the dealers, irrespective of being part of a cartel or not, operate and make money in both tiers of the market. Hence, they have incentives to utilise the cartels so that they benefit in both tiers of the market.

How they benefit will be different in the two tiers, because the two tiers of the market give different opportunities for the dealers. For example, dealers do not seek to speculate against their customers because customers do not stand ready to take their trades when dealers want to speculate. It is the participants in the interdealer market that stand ready to speculate, to take their orders when they want to speculate.

So in the dealer-customer tier, the tier, our theory of harm is that the dealers will increase the bid-ask spread to their customers because they have more market power as a cartel. They have a strong incentive to do this as they can benefit on each trade with their customers. I will explain that, how they can do that later.

In the interdealer tier they will benefit by speculating based on their acquired information advantage. Each dealer in the cartel receives customer trades that gives them bits and pieces of this dispersed information. When they communicate this within the cartel they share this information and get the bigger picture of the total information structure and get the information advantage that they can use in their interdealer market with speculation.

These two types of cartel behaviour give rise to harm to customers to two different groups of customers: and we label the harm as direct harm to the customers of the cartel banks, this class of customers is labelled Class A; and customers of non-cartel banks, they are what we label indirectly harmed in two ways.

First is that when the cartel increase their spread to their own customers they also make the market less competitive, and this enables non-cartel banks to increase their spreads to their customers. So that is a harm to customers of non-cartel banks.

Furthermore, the adverse -- the speculation by the cartel dealers in the interdealer market gives rise to increased adverse selection risk. This increased risk increases bid-ask spreads, and this increased cost is passed on to customers of non-cartel banks. So these are two channels for indirect harm to non-cartel banks. The two tiers and two sources of revenue is very important in the FX market, and cartels in other markets may not raise revenue or have the same type of incentives as dealers in FX have.

The two types of cartel behaviour are very different and the two types of harm are also different. So we have two classes and we will also distinguish our econometric analysis based on the different types of harm. Bid-ask spreads, prices are set in an equilibrium, that is consistent with each other. The bid-ask spreads by competitors, by the cartel banks and in the interdealer market are set in equilibrium consistent with each other.

The increased profits that cartel dealers receive from their interdealer trading, which is an incentive they have in itself, also has as a by-product that it makes it easier for them to increase spreads to own customers because it increases the cost that is passed on to customers of non-cartel banks.

Let me now turn to the different types of harm. I begin with direct harm to what we call class A customers, which is the customers of the cartel banks, while these banks are part of the cartel. So the chats that have been presented in the decisions show that they do chat about bid-ask spreads. They do so occasionally, it is said, in the decisions. So the theory of harm here is the consequence of this chatting, and I explain that more thoroughly now.

Banks do have the incentive to raise bid-ask spread if they can do so without losing too many customers to competitors. Then they will make a gain. By knowing that they are a cartel, by learning what they previously did not know, because of low transparency, namely pricing strategies of other cartel members, they might attempt to increase bid-ask spreads. The losses can be limited in FX for two reasons.

First, banking literature tells us that customers do not necessarily switch bank relationship that often, and many customers do not have several bank relationships. That is one reason why this creates a cost for doing -- customers to switch banks. Furthermore, the low transparency of the market makes a shift more difficult. Remember, the customers and not all the banks either know the state of the market, do not know if it is a cartel or not. It is a secret.

So a customer might believe that the market is equally competitive as before. But that costs, for example coming from inventory risk or adverse selection, has increased. It may also be difficult to know who to turn to, to ask for better bid-ask spreads, because they do not know who is part of the cartel or not, who is the really competitive one. So it is not that easy for a customer to switch. They may ask for a quote from another cartel bank and then might see the same rate as they got with their existing.

So there are costs for switching. The cartel banks, they chatted occasionally and could increase, of course, bid-ask spread on those specific cases. But I think what is more important by this occasional chat is that they reveal a pricing strategy by their other cartel banks that enables them to tacitly co-ordinate then on bid-ask spread to all customer trades, also those that are in between the chats.

Dealers know their own pricing strategy very well. They know how they should adjust bid-ask spread as economic conditions change. They know how to price to a very sophisticated client and how to price to less sophisticated clients. So that is the strategy. When they chat and co-ordinate on specific cases they know all these conditions that are part of that specific case, and then from that specific case they infer a strategy and they can infer what I call a baseline level of spreads for which they can switch. Think of this as a constant term. They can co-ordinate on this constant term instead of how all these other economic conditions influence prices.

Then they can apply this new cartel strategy to all customer trades, and that will be in their interest. That would be also possible to co-ordinate on such a baseline part instead of sort of co-ordinate on response to, for example, increase volatility and what have you. So these occasional chats gives them opportunity to learn strategies that they can use also in between their occasional chats.

When it comes to the indirect harm that was split into two components. First was from less competitive markets, and second from adverse selection. Let me take those two in a row. At any point in time there is huge dispersion in spreads prices in FX market, both within a bank for different types of customers, also across banks because of the low transparency. But some customers will be discontent and most likely attempt to get better spreads. This will -- some of non-cartel banks will experience an~increase in demand, and that will signal to them that they might increase their spreads without losing customers because there is increasing demand facing them.

So that is the impact on non-cartel customers via the less competitive market. The chats also reveal that dealers share information like information on customer trades, which we typically believe would be valuable in interdealer speculation. So we have this case where the cartel enables the dealers to collect more of these bits and pieces that are dispersed, which can be used for speculation in interdealer trading.

The dealers apparently did not explicitly co-ordinate or discuss interdealer trading in their chat, but they did not have to. Again, they are talking about the consequences of what they shared. So having received the same information and having an understanding, a similar understanding of the implications of this information, they could trade in the interdealer market as if they co-ordinated their trading. For other dealers in the interdealer market, those that are providing liquidity to the cartel dealers as they start speculating, they will experience that there are more trading on the same information, so that is similar to having a huger frequency and higher market share of informed traders, so this leads to increased adverse selection.

The cartel dealers, having cross-checked the information with each other, can also trade with more confident. It is like they have more precise information.

THE CHAIRMAN: Professor, I think Professor Neuberger has a question for you.

PROFESSOR NEUBERGER: Yes, I am sorry. Thank you very much, Professor Rime. I am just trying to understand a bit more about this pooling of sensitive information and then trading on it in the interbank market. If I happen to know that my customer is likely to be buying a lot and therefore the currency is going to appreciate, I can see that is valuable information which I may decide, probably illegally, to take advantage of. But what is my interest in sharing it with competitor banks?

PROFESSOR RIME: So, that is a very good question. I actually think they have every interest to co-ordinate and share this, because it is a very liquid market, and each dealer in itself might have limits from the banks on how aggressively they might trade.

So moving the market, or sort of starting trading aggressively and having that impact quickly might be difficult, while if they co-ordinate and trade aggressively prices may move faster and more than if they did alone. So if they do this together they might be more effective.

PROFESSOR NEUBERGER: But is there not a strong risk that they actually move -- each trader moves prices against themselves, and by acting collectively therefore they actually make a lot less money than if they had acted individually?

PROFESSOR RIME: Sure, they need to act quickly and together and in order to get the price moving and trade before the price gets moving. But again, often there is quite a lot of liquidity in this -- these limit order books.

Dealers cannot really see that, but data have shown us that these markets at many points in time are quite deep. There is quite a lot of liquidity. So again, this is the bid and the ask in a limit order book, there might be lots of bids and asks behind the best bids and asks. If the liquidity is such that basically this limit order book is completely flat for, say, 100 million then being an only dealer, it might be a bit difficult to have this information than a sort of a single dealer, like a drop in the ocean. For having market power it might be easier to enable the rest of the market to see the information content that is reflected in the customer trade.

PROFESSOR NEUBERGER: I can imagine two different situations: one is I know as a dealer that the price is likely to go up and therefore I want to buy ahead of it, in which case the other dealers are competitive with me and I do not see the reason for sharing. The other situation, which is, I think, the one you are talking about, is when I want to move the price in a particular direction, maybe because I have a large benchmark or whatever. Under those circumstances, I can well see that I would like a lot of other banks to join with me in trading in the same direction to move the price. But in that case, I cannot see their interest in trading at what would be an artificially high price. My interest is I have somebody who I am going to sell to at that high price. They have no comparable interest. I do not understand what the motivation would be under those circumstances for sharing the information.

PROFESSOR RIME: I am not sure I completely agree. I think the second case you describe is a bit like front running. So then we might need to collude in order to do the front running. So we buy at the ask in an attempt to push it upwards, but there is no real information behind it, so we will -- the true price is still here, but we buy at the ask and push it upwards, away from the true price. At that process, the colluding partners are actually buying very expensively, possibly not at an information that will be persistent in the price. So the last one is buying up here, and then later on it goes down. So he makes a loss. So that kind of collusion, I am not sure that is so attractive for the dealers. But having shared the information that this is, very likely is going to shift prices upwards persistently then they want to join in and trade before that shift is happening.

PROFESSOR NEUBERGER: Fine. Thank you.

THE CHAIRMAN: Professor, just before you go on, a follow-up on that. I certainly do not want to insert myself between the hard place of one professor and the rock of another, but what I want to explore with you is the factually driven basis of the theory of harm.

We have been talking just now about the different ways in which, entirely unlawfully, dealers might use information that they have and they might, as Professor Neuberger was hypothesising, use it on their own or they might either overtly or tacitly collude, as you are suggesting. Now, my question is really not who is right, because I have absolutely no view on that, but how, if one got to a decision on the merits, one would determine who was right, what the case actually was?

What I am really asking, it is a similar question to the question asked this morning, is: what will inform the inputs that you will be making in terms of your theory of harm? Will you simply be parsing the Commission decisions with a view to extracting findings of fact that have been made, which you will say constitute the inputs into your theory of harm, or will you be ranging more widely than that, or will you be making -- and this may be the route -- a series of informed assumptions based upon what the Commission has decided? What is the source material of your -- informing your theory of harm?

PROFESSOR RIME: So, that is a very good question. So if I am not misunderstanding, I think it would be first very valuable to, if possible, to have more information from the chats transcripts because that could potentially inform us about the extent that they shared this information even more.

Conditioned on that, it could be possible to hopefully then, based on the knowledge I have of what type of data the banks can provide, and I would expect them to be able to provide data on what they are doing in the interdealer market, it would be possible to also test for correlated trading by dealers. But in any case, this adverse selection is a component arising in the interdealer market. Mr Ramirez has described an approach where he wants to sort of use data from the interdealer market, the market, the segment where this cost arises, specifically to measure the adverse selection component of the bid-ask spread. I think that is the best approach, and that is how it would have been done in an academic paper as well. So I think it is important to estimate the different harm in a different way in order to get as much precision and information of that particular harm as possible.

Then for adverse selection I would turn to the market where that is going on and use the tools used typically to estimate adverse selection costs.

THE CHAIRMAN: Thank you very much. Thank you. Do continue. I think that has exhausted our questions for the moment, but I am sure we will be back. But do carry on.

PROFESSOR RIME: Very good, thank you.

So I think I have done -- concluded on the indirect harm via adverse selection, and sort of argued that liquidity providers, non-cartel liquidity providers, in the interdealer market would experience that there were increased frequency of informed trading and that these would trade with more confidence because they have more precision from having checked this information against each other.

So let me now sort of quickly discuss equilibrium spillover effects to other currencies or to other platforms. I have already discussed how currency pairs are linked via triangular arbitrage and that this process is really fast. So I think it is clear that increased spreads in one pair can spill over to different pairs via triangular arbitrage, so I will not spend more time on that. Spillover from spot to forwards is also something quite easy, in the sense that forward prices to a large extent are set on what we call forward points on top of the spot prices. So it is a very close link again.

More interesting maybe is to understand how it can be spillover to different platforms, e-commerce platforms. Here the key to understand this is to understand and remember that the interdealer market remains, even under this new market structure with different trading platforms, remains the segment for main price discovery. So that is the market that sort of aggregates prices, information into prices and where new information is reflected first, and the interdealer market remains the main market for dealers doing inventory control.

They do not rely on inventory control against their customers because they arrive to the dealer at a sort of irregular frequency and time, so when they want to control their inventory they typically turn to the interdealer market. The same is true for inventory imbalances coming from an e-commerce platform. It will most likely be managed in the interdealer market. Hence one is facing the cost from the interdealer market in inventory management of that inventory imbalance, and it is also there that prices adjust first, so you want to pick up on those price changes on the e-commerce platform. So that gives -- any algorithm for e-commerce must put a large weight on interdealer prices, in addition to other pieces of information that is relevant. That could be in customer type, for example. So a non-financial is typically less sophisticated, lower bargaining power, so even on an e-commerce platform they would receive wider spreads than the more sophisticated customer. But also to avoid this competition between different channels within the bank, so competition between the dealer and the e-commerce platform, there will be some alignment of these prices according to concept of equilibrium.

So this is basically concluding my theory of harm.

I have stuff that I would like to say on my econometric measurement, but I am also aware that I have been talking for more than my one hour time, so I will try to be brief on this.

THE CHAIRMAN: Yes, Professor, well, you have had the burden of several interruptions from us and we are very grateful for your responses there. I certainly think you should go on to explain your econometric approach.

PROFESSOR RIME: Yes.

THE CHAIRMAN: For my part, we can certainly run until quarter past and if that gives you enough time then we would be delighted to hear from you until then.

PROFESSOR RIME: Okay. Very good. So that would be plenty, actually.

So, as Professor Bernheim said, regression analysis is completely standard to -- in economics and financing. In many ways that is the preferred way to do empirical analysis, and in microstructure that is the sort of way to analyse bid-ask spreads and changes in bid-ask spread. I see a hand.

THE CHAIRMAN: Ah, excellent.

MR LOMAS: Yes. Thank you, Professor. Before you got on to that I wanted to pick up a couple of bits on what you have been saying in the earlier section, and by all means give very short answers to these questions because time is pressing a little bit.

You mentioned the rapid growth and use of foreign exchange by financial intermediaries over, sort of, end users and that they accounted for a big part of the market. Do you have any idea of the segmentation of that? If you looked at those financial users, the speculators, hedge funds and so forth, is it a sort of pareto rule that 80% of trading is accountable by 20% of them, or by 10% of them or 50% of them? Do you have any idea of the concentration of usage in that market?

PROFESSOR RIME: From the BIS surveys we have some idea of the aggregate market for what they call -- what they label "other financial institutions". That has, as I said, grown so now it is -- it could be, if I remember correctly, it is about 60%, maybe 50% or 60% of total market. Then non-financials and dealers taking up rest.

How this is concentrated within that segment is, it is really difficult to say because, again, as I said its very opaque nature and lack of regulation, it is difficult to get hold of data on how many customers are behind this and how it is sort of spread between them. I am sure there are quite huge differences within this segment. So some are -- I would think -- very clever, very professional, do a lot of trading, and there are also financial institutions that do not trade that often, because it is related to their portfolios and their business, so ... but --

MR LOMAS: I will not ask you to take up time speculating on that.

My second question: presumably the costs of running a foreign exchange desk are, in the short to medium term relatively fixed. You may have a bit of costs of capital, but your traders, your infrastructure and so forth is relatively fixed. Does that mean that the profitability of a desk or the profitability of an individual trader's performance is quite heavily driven by the volume of trades rather than marginal pricing changes, or does it not work that way?

PROFESSOR RIME: So, yes, maybe not for the individual dealer, but for the desk or the bank as such these fixed costs, if they could be spread on a larger volume that would be profitable for them.

MR LOMAS: Okay. Thank you.

PROFESSOR RIME: Okay.

As I said initially, econometric measurement is primarily, or to a large extent, covered in Mr John Ramirez's report, but I like to sort of touch upon a few principles that are guiding his approach, because Mr Ramirez, he suggests to use different models for the different types of harm. I think that is a very good approach because the different types of harm will be best explained by different sets of explanatory variables. By not forcing the same type of models on all types of harm we can measure the harm more precisely, because we do not necessary include in our regression analysis variables that are less relevant for different types of harm and we can, what we call, model harm in a parsimonious way using as much information as relevant, but not more, being careful but not including irrelevant variables.

We are using sufficient relevant information that goes along two dimensions in econometrics. You have the dimension of having sufficient, many observations. That is typically not a problem in FX, in a market where you have second-by-second trading and 2 trillion a day.

An example on that is that the academic papers on dealer behaviour have so far used, say, one week of data. So we will have a lot more data than simply one week, so lack of observations and sort of the time dimension will not be a problem for gaining precision in our estimation.

So then rather it is important to try to include explanatory variables that describe each observation in a sufficiently precise way. Mr Ramirez has suggested a set of explanatory variables, which I believe is very much in line with the suggested theory and this could be market conditions like volatility and conditioning being macroeconomic announcement, or in the case of dealer customer situation it could be data on type of customer. Relevant could also be data on the type of order if it is a resting order, for example.

We have decided to exclude resting orders for several reasons, but the point is that these orders are different objects and are dependent on different explanatory variables and it is important in order to gain precision in the impact of the different explanatory parts not to include more than necessary. But it is important to include as much as possible, but not more than what is needed.

Mr Ramirez suggests to use cartel bank data from cartel banks to study the direct harm and my own experience from seeing data from banks, and also what is suggested by the academic literature, that databases that banks have are very rich. So I expect it to be possible to have lots of information that characterise each trade, including whether it is a resting order or not. Since I have already said that those might be driven by different economic mechanisms than other trades. Mr Knight's first report, industry expert, also confirms that it is likely that the banks have lots of data that can detail information on each particular trade.

So those data can be used from the periods where the cartel banks are participating in the cartel and we see that that varies over time. For periods with the cartel banks are not participating, we could capture their indirect harm from less competitive markets. Again, the data by the cartel banks is relevant data for understanding customer bid-ask spread and using it outside of the cartel period we have relevant data to study the cost from less competitive markets.

Finally, as I have already touched upon, adverse selection risk, I think it is best addressed using market by data from the interdealer market and then the interdealer platforms called EBS or Reuters are the dominant platforms for interdealer trading and hence, in my view, the best platforms for studying adverse selection.

It would not be good to use cartel bank data for studying adverse selection, as these banks may not be representative of the whole market. After all, they are large dealers, presumably quite well informed, also prior to the cartel and hence their trading may not be representative of the wider market.

Our object to analyse would be the effective spread, as defined and explained by Professor Bernheim and my reason for doing -- our reason for doing this is, as I explained, this is capturing the cost of trading to the customer. As long as the mid-point is a fair estimate, as a good estimate of fair price, then the half-spread will be the transaction cost for customers and that is also how effective spreads are used in the academic literature.

I think this actually concludes my presentation on econometric measurement. I realise that, given Professor Bernheim's discussion, there could be quite a lot to be said about the number dummy variables et cetera and further details on the econometric specification used, but as also Professor Bernheim says this will, to a large extent, be determined when we get data and it is not like Mr Ramirez had been locked into some particular formulation specification of his regression at this stage.

Having said this, I think our approach should be informed by theory and theories suggest that dealers would try to exploit their market power as quick as possible. That means that they will try to get to the maximum spread level that they can charge given their competitive position as quickly as possible. That would have implications for their use of dummies et cetera. But I see a raised hand and then --

MR LOMAS: Sorry, yes. Yet another question from me, I am afraid. As I understood you, Professor Rime, you were saying that to conduct the econometric analysis that you thought was appropriate in certain cases you would not want to use data from the cartel banks, but from other sources because it would not be representative. Practically, how easy is it going to be to get that data from banks that are not parties to litigation or from trading platforms?

PROFESSOR RIME: So, I think it would be very difficult to get data from non-cartel banks. But you do not need that. It is sufficient in order to measure the adverse selection cost, which is the sort of component we want to measure from interdealer trading, to have data from the interdealer platforms. Remember, the interdealer platforms offer data on bid-ask spreads and transaction prices. Since these transactions and these prices are pre-trade anonymous you do not need to know if it was Commerzbank or Citi that was behind that particular quote. And these data are readily available --

MR LOMAS: That was my question. From the electronic platforms you can get that data?

PROFESSOR RIME: Absolutely. I have several papers analysing such data.

THE CHAIRMAN: Thank you very much, professor. Do you have any more questions, Mr Lomas? No.

Professor, thank you very much, that concludes your presentation and our questions in relation to it. Thank you very much for what was a very interesting and helpful presentation. We are all very grateful.

That, I think, concludes the teach-in. I just want to make sure that we have covered everything on the more legalistic front for the hearing, since this is the last time we will be all before the court before we start on 12 July.

So, in the order that I assumed this morning, Mr Jowell, is there anything that you feel it is necessary or appropriate to raise before we finish?

MR JOWELL: Sir, I think we have covered all the bases, so, from our point of view, we will write in with a more detailed timetable once the parties have liaised about timings and provide that to you.

THE CHAIRMAN: Well, that is very helpful. Obviously, we are available more informally, or perhaps more formally, through the email or communications if there is any problems and we stand ready and willing to assist on that but that is very helpful.

Yes, next in line.

MR JOWELL: I am grateful and I am sure we are all grateful. Thank you.

THE CHAIRMAN: Thank you, Mr Jowell.

Yes?

MR ROBERTSON: Sir, I do not think there is anything that we wish to add. We have set the ball rolling on getting the timetable for the hearing sorted out and the parties will liaise and be in touch with the tribunal.

THE CHAIRMAN: Thank you, again. We are very grateful.

Mr Hoskins?

MR HOSKINS: There are just some things that need to appear in an order. I am thinking particularly of deceased persons, defunct companies, compound interest, if that is going to be stood over. You probably want to record --

THE CHAIRMAN: Yes, I think if the parties could pull together an order for our attention, that would be very helpful, just so both matters that have been ordered today are reflected and I am sure it will not happen, but it may do, any misunderstandings are ironed out, because the devil is always in the detail and we can make sure that we all have a clear understanding of where we are going. So that would be extremely helpful, Mr Hoskins.

MR HOSKINS: Certainly, will. I am sure we can manage that between us.

THE CHAIRMAN: Well, then, unless there is anything more, and I will pause for seconds just to allow the following market, as it were, to say something if they wish to, I see shaking of heads. Well, then, in that case, it simply remains for me, on behalf of the panel as a whole, to say thank you to both professors and to all of the advocates for what has been for us an extremely helpful day and I am very grateful to all of you for arranging it and

I will reiterate my thanks for your help in terms of the logistics for the hearing. So, thank you all very much and with that, I will conclude this hearing. Thank you very much.

(4.15 pm)

(The hearing concluded)

I N D E X