IN THE COMPETITION APPEAL TRIBUNAL

Case No. : 1382/7/7/21

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

Thursday 31 March 2022

Before:
The Honourable Mrs Justice Bacon
Professor Robin Mason
Justin Turner QC
(Sitting as a Tribunal in England and Wales)

BETWEEN:

Consumers' Association

Applicant

v

Qualcomm Incorporated

Respondent

_____

A P P E A R AN C E S

Jon Turner QC, Ciar McAndrew, P J Kirby QC and George McDonald (On behalf of Consumers' Association)
Mark Howard QC, Tony Singla QC, Nicholas Bacon QC, David Bailey and Alexandra Littlewood (On behalf of Qualcomm Incorporated)

Digital Transcription by Epiq Europe Ltd
Lower Ground 20 Furnival Street London EC4A 1JS
Tel No: 020 7404 1400 Fax No: 020 7404 1424
Email: ukclient@epigglobal.co.uk

Thursday, 31 March 2022

(12.00 pm)

MRS JUSTICE BACON: Good afternoon, everyone. I need to read the live stream warning again, with apologies to those who heard this yesterday. These proceedings are being live streamed, so I start with the usual warning, these are proceedings in open court as much as if they were being heard before the Tribunal physically for those who are dialling in. An official recording is being made and an authorised transcript will be produced but it is strictly prohibited for anyone else to make an unauthorised recording, whether audio or visual, of the proceedings and breach of that provision is punishable as a contempt of court.

So we are going to start with the hot tub today. Is everyone in position?

No, they're not. Can everyone get in position?

MR TURNER: My Lady, do you want the experts to be sworn first before we get into a position?

MRS JUSTICE BACON: Just let me speak -- yes. Once they get into the witness box.

So if they could be called forward. Just while they are coming forward, so you know how we're going to do this, as you may have gathered, the questioning will be led by Professor Mason. Mr Turner and I may have questions too, but you can expect that most of the questions will come from Professor Mason. We've got an hour before lunch, approximately an hour after lunch. What we propose to do is that, before the two hours are up, so before 3 o'clock, counsel will have a brief opportunity to ask further questions, clarificatory, this is not intended to be a cross-examination. So you'll get maybe five to ten minutes each to ask further questions before we conclude the hot tub and then there will be time for both of your closing submissions and then we'll have the funding submissions tomorrow**.**

Witness conferencing of DR JORGE PADILLA and MR ROBIN NOBLE

PROFESSOR MASON: Thank you very much for the note that was provided overnight on sources of data. That provides a bit of a short cut through the first of the questions

that we were going to put to you, but let me just start, and Mr Noble, if I could put this to you, first, are there any other main data sources that you intend to use that aren't in that note or is that note reasonably exhaustive?

MR NOBLE: It's reasonably exhaustive but there are a number of other sources out there. So, for example, TechInsights is another source that wasn't mentioned in my report but which I've recently been exploring which provides additional data on teardowns, which -- it is a similar sort of service to the IHS Markit service.

PROFESSOR MASON: Very good. Dr Padilla, I'll bring you in subsequently if I may, but do indicate if in the meantime there's something that you wanted to add. Given that, let me move on to the second question that we had, which was that there may be, and you refer to it at certain points in your various reports, there may be data that you would want to collect at some stage from parties that are not part of the claim, for example terms of agreements between OEMs other than Qualcomm.

MR NOBLE: Hm-mm.

PROFESSOR MASON: How would you go about collecting those data?

MR NOBLE: I read that question, I wasn't quite sure, that is about my pass-on analysis, is it?

PROFESSOR MASON: Indeed.

MR NOBLE: So the aim of my pass-on analysis is that I would get data about the costs of Samsung and Apple on the one hand and I'd get it from sources like IHS for the teardowns, from the work that Dr Chowdhury is going to be doing on the licences. So we'd know the costs of manufacture et cetera, we'd know the SEPs costs, and then I would get the public information on pricing from Pure Pricing and all the various other sources that I talk about there, and those are the primary things that would be going into the model. I don't think at this stage I'm going to need additional costs on other OEMs unless we decided to expand the data set to include, for example, HTC and other OEMs. But because the claim is focused on Samsung and Apple, in a sense that's where I focused my data-gathering thoughts.

DR PADILLA: Your Honour, if I may. I think that I would like to say something regarding the first and the second question, which is that the list is somewhat surprising for what is missing, not for what it includes. In my opinion, and I can elaborate that further, the data that is going to be used for the purposes of estimated pass-on is wholly inadequate for that purpose. There is a lot of data that is missing. There is no data about fixed costs, there is no breakdown of the cost data, there is no data and there is -- we don't know how cost in pounds or cost in dollars exchange rates are going to be dealt with. Mr Noble says that he doesn't need cost data from other handset manufacturers for his pass-on regression, I think that that's incorrect with all due respect. I think that by referring to appropriate authorities like, for example, the RBB report conducted for the Commission, you understand that for pass-on to be estimated appropriately you need to understand what competitors are doing and therefore it would be relevant to understand, you know, what the royalties are paying, what other costs they're paying, the extent to which there is more or less competition in the market. I think that all those things are very relevant and without that information, which is missing in the list, frankly speaking, I'm not sure that one would be able to control for all relevant confounding factors and I think that, in addition to that quantitative data, and I think that this was the matter of discussion yesterday, extensive discussion, one would need to have information in order to be able to ascertain which data is necessary, how to deal with that data, how to process that data, and I think that all that is missing, and so to some extent I was surprised to see that, despite the discussions yesterday, the list was as scant as succinct as it was.

PROFESSOR MASON: Okay. I'd like to return subsequently to more detailed questions about cost data, breakdowns, what's included, what's excluded, what proportion of costs and so on, so we will certainly return to that question. Let me just complete that line of questioning about what else Mr Noble anticipates collecting, particularly because at some points in your first report, so for example -- do you have your report in front of you?

MR NOBLE: Thank you. First report, is it?

PROFESSOR MASON: First report. Somebody very adept somewhere will give us some reference in the core bundle for others' purposes. It is paragraph 7.61.

MRS JUSTICE BACON: So that's core bundle page 258, tab 5.

PROFESSOR MASON: Very good. Thank you, Chair.

So there, and I choose this as an example but I think a useful example, where you say at the end of paragraph 7.61:

"If needed in order to fill any information gaps and/or produce sufficiently robust estimates, further data could potentially also be obtained at the post-CPO stage through third-party disclosure from major retailers and network operators in the UK."

So I'd like to understand that sentence a little bit more and in particular the means by which those data would be collected.

MR NOBLE: So I think the thing that was going through my mind particularly there was if one, for example, couldn't get sufficiently good retail pricing data and if one couldn't get that, how would one fill that gap.

Now, I start from the position actually I think I can. I mean, I was looking this morning at the Pure Pricing data, or the outline of it because we don't have it yet, that data has something like 5,000 rows in it showing lots of different MNOs, lots of different price plans and so on. So I start from the position I think that's going to be really good data but I think that this is the sort of safety valve in the sense of, if it turns out when I get that data there's a problem with it, perhaps it's not as good as I think it's going to be, I would then be looking to try and remedy that by getting third-party disclosure. And this sentence in particular refers to -- implicitly about price but I think the same would apply on the cost side too because, as I mentioned, I'll be liaising with Dr Chowdhury when she's doing her analysis of SEPs and obviously she will have the benefit of reviewing disclosure from Apple and Samsung on that and obviously I can then use that same information to help me with my pass-on analysis. And then again, if we need to go further, because those teardowns perhaps are not good enough and, again,

I think they are good enough. I've looked at them, they're really quite detailed. Then obviously one can go and try and remedy that through targeted requests or third-party disclosure if needed.

PROFESSOR MASON: But would that be successful?

MR NOBLE: How do you mean? In ...?

PROFESSOR MASON: Well, how exactly would those requests work? How can you be confident that the further data would be forthcoming?

MR NOBLE: From say an MNO?

PROFESSOR MASON: Yes.

MR NOBLE: So I think that the request would be to somebody like Vodafone to say, could you provide us with an extract of perhaps your pricing database that you've used over the past several years covering 2015 to -- you know, covering the claim period, could you provide an extract of that to us so that we could use that in lieu of, you know, if the Pure Pricing data, for example, doesn't come up to scratch, in a sense you're trying to replace that spreadsheet with a spreadsheet from Vodafone itself.

In my experience of working with large corporates, they often have these, you know, very developed, you know, ERP systems, reporting systems et cetera that would mean that they would have some of this data to hand. So my expectation would be that, you know, firms, whether they're Vodafone at the retail end or Apple at the OEM end, would have databases, centralised databases, that would allow us to get that.

So if we want the data, we wouldn't be trawling through thousands of individual hard copies or individual contracts with people, you'd be looking at an aggregated form that in a sense you can then start using directly or, you know, process and then start using directly for the econometrics.

PROFESSOR MASON: And have you samples of any of these data to date or not yet?

MR NOBLE: The public data?

PROFESSOR MASON: Yes.

MR NOBLE: I don't always have the actual data but various of them I've looked at outlines of them. So, for example, Pure Pricing, that spreadsheet that I described, it's got something like 5,000 rows in it and a row would describe a particular contract, say a 24-month contract, with Tesco Mobile for, you know, an iPhone 7 at a particular time period with a certain amount of minutes, a certain amount of data et cetera and it would give you the details of, well, what was that price from that MNO, or MVNO in that instance at that time. And similarly with the IHS data, which is the costs side, in fact there's a number of examples of it on its website you can see, they go through and they set out, for example, line by line the costs that they see -- well, for a start the components that they see that are made up in a phone, so they would say what processor is in it, what memory is in it, what battery is in it et cetera and then they go through and put costs on each of those individual line items to then give you a total, plus other costs associated with, you know, manufacture, assembly, et cetera.

PROFESSOR MASON: Okay. Thank you.

I'd like two further sort of broad data-source questions and then I think we ought to move on. So to return to a point that Dr Padilla raised, and we did mention it earlier, data from other manufacturers.

MR NOBLE: Hm-mm.

PROFESSOR MASON: Do you anticipate any value in collecting that and, whether you do or not, irrespective of your response to that, if you were to have to collect it, how would you go about that?

MR NOBLE: So on the first question do I think I need it --

PROFESSOR MASON: Yes.

MR NOBLE: -- my short answer is no, I don't, that the analysis that I'm trying to perform is one about Apple and Samsung handsets, on the one hand, and Apple and Samsung handset prices on the other and I think the best way to analyse that is the costs of those handsets, the features of those handsets and the prices of those handsets and all of those data I'm going to be getting. I think the point I heard Dr Padilla making was

perhaps there are dynamics here that that model might miss. My start position in that is I don't think it will, because if there is, for example, very vigorous competition from HTC, perhaps in the Android ecosystem that particularly affects Samsung, then I would expect that to impact on the degree of pass-on that I'll observe in the Samsung data. Now, if needed, and as I say I don't think I need it, but I can certainly explore it, in a sense all of these sources go further. You know, they include other OEMs' handsets. So you can get pricing data on a Huawei handset, on an HTC handset. Similarly you get a cost teardown on a Huawei handset or an HTC handset. So almost in the same way as I'll be building up my cost and pricing for Apple and Samsung, I could if I needed to build up prices for other OEMs.

PROFESSOR MASON: Dr Padilla, if I could pass that question over to you. Now, setting aside any disagreements or qualms you might have with using solely the hedonic regression approach, we understand your points about collecting evidence and data on pricing strategies and so on, but if we just confine ourselves to the hedonic regression analysis approach. What would be the deficiencies of using data relating only to Apple and Samsung in your view?

DR PADILLA: Well, I think that we know that how costs are passed on to prices depends, among other things, among other factors, on the degree of competition and the various layers of the value chain, not only at the OEM level but also at the handset level. And the strength of competition at these levels may change over time as a result of entry, exit, changes in market structure, changes, for example, in that there is a regulation that makes one of the competitors, Huawei, to be less significant, for example, mergers among MNOs, there are changes over time and those changes may cause changes in prices and we run the risk if we don't control for market structure appropriately and the strategies of these competitors of attributing to changes in costs, changes in prices that are not the result of those changes in cost but that they reflect changes in market structure, and I think that's why we will need to control for all those elements. And we

cannot simply trust the parameter of interest, because that parameter of interest may be biased as a result of the exclusion of all those confounding factors.

If I may, just one observation about collecting data. Look, I think that collecting pricing data is complicated but it may be possible. The thing that I believe is going to be very complicated in this exercise is collecting reliable cost data and I understand the other source that Mr Noble is proposing, and I see that it has some merit, but as we all know, cost data is highly confidential and that at best is going to be a proxy and, to the best of my understanding, the source that is being proposed at most would include variable costs, it wouldn't include fixed costs, and I'm prepared to accept that fixed costs are passed on at a different, you know, with a different proportion than variable costs, but at the same time I think that going beyond economics 101 and looking at practice one understands that fixed costs matter. And again, there are changes in fixed cost over time. For example, Apple has been investing heavily in developing a new chipset, the M1, and I believe, or I will expect that it is expecting to make a return on that investment and that has to happen through prices. Again, my concern is that, if we don't control for, you know, those changes in costs, we may wrongly attribute to changes in variable costs an impact, and in particular to changes in the royalty, an impact on prices that they don't have and this is going to be complicated to collect from all the OEMs and from all MNOs.

PROFESSOR MASON: Okay. So I therefore understand -- let me try to summarise but hopefully not oversimplify, your latter points being that the cost data that there are may be inaccurate and the cost variables, including in the regression, may be incomplete.

DR PADILLA: Correct.

PROFESSOR MASON: And then actually your first point was also there may be other omitted variables which may bias the regression code in essence. Does that --

DR PADILLA: That's absolutely correct. But one more thing if I may, which is that the costs are going to differ along many, many dimensions, we can't simply focus on variable and fixed. I don't want to give the impression it's impossible, all I'm saying is it's

complex and would require data. For example, there is a fundamental difference between common costs, costs that affect everybody, industry-wide taxes, you know, we refer to that, and by the way royalties are not, industry-wide taxes or costs that are idiosyncratic to a particular company, we will need to understand those, and I believe that we're going to debate this later based on one of your questions, there are costs that are per unit --

PROFESSOR MASON: Yes.

DR PADILLA: -- and others that are ad valorem and the pass-through rates are fundamentally different and all those things need to be understood. So we need to understand not only the costs but how those costs are made. So for example, in terms of royalties, if I may, and with this I will conclude, a licensing agreement may specify an upfront fee which is going to be passed on possibly at one rate, per unit fees, which will be passed on at a different rate, and ad valorem rates, which will be passed on at a different rate. We need to be able to understand those things in order to be able to get an appropriate pass-on rate estimate.

PROFESSOR MASON: Okay. Thank you. Well, as promised now twice, we will certainly be returning to costs shortly.

Let me just conclude with two more sort of metadata questions.

So Mr Noble, if you needed at some point in the analysis to disaggregate along the supply chain along the lines, for example, that Professor Flamm did in his US study, and we've had the benefit of reading that overnight, would the data be available to you to do that?

MR NOBLE: Perhaps is the short answer. So I think there's sort of two halves to that answer. I think the first question is do I think I need to do it, and I think my answer to that is no, I don't, because, I mean, if we take Professor Flamm's answer, he says, you know, he estimates 88 per cent pass-on, and in a sense I'm trying to answer that question which is that the prospective class is end consumers and so I'm trying to answer, get a number that's equivalent to the 88. So what is the net pass-on rate that exists in the UK for the handsets that I'm focused on?

I would think that doing the sort of rung by rung analysis that he does, that would be really helpful if you wanted to know, well, say the answer is 88 per cent, where's the 12 gone? So, for example, did it end up with the MNOs, did it sit with the OEMs? Doing the rung by rung allows you to answer that question, doing my analysis doesn't, but they should give you the same answer at the bottom, you know, Flamm's rung by rung, my one step should give you the same answer when you do that properly.

If I wanted to do that, I believe Strategy Analytics provides some of the intermediate data on wholesale prices, but I haven't looked at that in any great detail so I do hesitate to go too far on that. Obviously if that were very important, then I think if public sources like Strategy Analytics were unable to provide that or unable to provide it at the level of quality that we needed, then we'd be into that sort of hierarchy of the public data hasn't got us where we need to go, let's now go and either make focused information requests or, if needed, third-party disclosure.

PROFESSOR MASON: Okay. Thank you. Dr Padilla, I would be grateful if you could confirm whether you agree or disagree that doing the compounding of sequential pass-ons ought to be the equivalent of doing a single step pass-on. If you disagree could you articulate why there would be a major difference between the two?

DR PADILLA: It's an empirical question, but I think there are reasons to be careful and I would advocate for an explicit modelling of the various different layers. And the reason is the following, is that it's not just that we have OEMs and MNOs, is that for some of the key cost components are going to be, for example, price of the chipsets, okay, and you know, Samsung, for example, sources many of the chipsets directly. Apple didn't do that but now it has its own chipsets. So understanding vertical integration may have a significant impact on how we model the pass-on rate. As we know, the more layers you have, the more likely it is that you have double or triple marginalisation and that is likely to have an impact on pass-on rates. And given that we have differences across OEMs and differences for an OEM over time, I think that it is important to have that data, and I don't know exactly how that would be eventually reflected in a model,

whether this is separate models or -- but I think that that information needs to be available in order to be able to set up the model appropriately.

PROFESSOR MASON: Okay. Thank you.

MR NOBLE: If I might just add a word on that. I think that the example Dr Padilla's given I don't think would be any different -- in a sense, that issue is more a question of have we got the right measures in the model in the first place, because the kind of vertical integration that Dr Padilla I think was referring to is about the degree to which the OEM itself makes its own chips or whether it buys them externally, and I think the point you were driving at was should we do this rung by rung Flamm analysis, which is essentially to say, essentially do the OEM separately and work out the OEM's wholesale price.

PROFESSOR MASON: Correct.

MR NOBLE: In a sense -- the example that Dr Padilla gives may well be a good debate to have about the structuring of the model per se, but I'm not sure it goes directly to this rung by rung point.

PROFESSOR MASON: Okay. Thank you. I will move us on.

Could you articulate, Mr Noble -- this sounds slightly philosophical but you'll appreciate the importance -- what exactly is an observation in your data set? What's going to be the unit of observation?

MR NOBLE: So, I mean, at some level that's still to be decided because I think there are questions later on about are we talking time series, are we talking panel. I can perhaps try and answer them together.

PROFESSOR MASON: If you want to do them jointly that's fine, because it's driving at the same thing.

MR NOBLE: Exactly. I think where I'm going to start is essentially to build a panel of data. So there is a going to be Is in the data, so there are going to be handsets, and we can get to quite a detailed level of disaggregation. So you can say iPhone 7, 32 gigabyte, iPhone 7, 64 gigabyte. Those are two different models because they have different memory capacities and therefore they have different costs associated with them.

So that's essentially your I in the data and the T is then the lifetime over which that exists and at the moment I think most handsets on average last something in the order of 18 months and, in my experience of looking at technology markets, it's best to do this on a quarterly basis rather than trying to do it any faster than that, just because a lot of tech companies have processes by which they reset prices once a quarter rather than trying to do it more frequently.

So 18 months is six quarters and so over the period we're looking at something of the order of about 100 handsets, when you look at the Apple handsets and the Samsung handsets, you've got something like six time periods on average for each of those. So when you just do the handset level, which is probably going to have the smallest N that we're going to be looking at, you're going to have --

PROFESSOR MASON: Of the order of 600.

MR NOBLE: 600ish, something of that order. That's what you're going to be trying to get at. Now of course some handsets might last a bit longer, some a bit less, you might not be able to get all the data for some of them, so we can't bank that number yet, but that is the place we're trying to head to. Obviously when we're doing it for the mobile networks, we're not just analysing the handset, we are also analysing the contract that is sold alongside it and for that we have huge N, we're talking thousands, because you've got lots of MNOs, you've got lots of different price plans. For that same iPhone 7, 32 gigabyte, they'll be potentially 100 price plans available for that from different MNOs, different lengths, different minutes et cetera, so we get very, very big N when we do that. Obviously we have more to explain when we do that, because we've got to explain the handset and the contract, but the N's gone up a lot, so that's good news.

DR PADILLA: If I may, this is not going to work and let me explain why. So we are going to have I, which is say handsets. We're going to P on a quarterly basis. How often royalties change, royalty agreements change? Not that often. So what the regression that Mr Noble is proposing is going to capture, is how cost components that vary on a quarterly basis affect prices but not how royalties affect prices. And having a large N,

well first in the case of handsets N is going to be I suppose two, Apple and Samsung and the different models but, you know, it's Apple and Samsung.

The first thing that I would say is that frankly there are going to be unobserved variables that one would have to, you know, account for and that means that one way or another, either directly or through the use of fixed effects instruments, you're going to run a regression for Apple and a regression for Samsung, there would be such modelling, you know, factors also in the MNOs but the identification is going to happen over time and we have a fundamental problem, royalties don't change on a quarterly basis. I think that that's a fundamental problem with the approach that's being proposed, one among many but this is one of them that is quite critical.

JUSTIN TURNER QC: May I ask, Mr Noble, does your modelling require different royalty rates at different points? What if the royalty rate was 5 per cent over the entire period for all products? Could you still draw conclusions from your model or do you require different step changes in royalty?

MR NOBLE: I mean, this almost goes to the questions about causation. Implicit in the model is essentially the logic that a dollar of variable cost, and it normally is dollars for these companies, is a dollar of variable cost, whether or not you're paying that money to Qualcomm in the form of a royalty or whether you are paying that money to NVIDIA for a graphics chip, and so in a sense I'm drawing the link that says that's a reasonable assumption to make, that if they care about costs they care about all of the costs rather than treating them differently.

JUSTIN TURNER QC: I see, so when a cost changes, this is what's likely to be passed through to the customer. It doesn't matter whether that cost is a royalty, an increase in royalty or an increase in some other aspect of the manufacturing process.

MR NOBLE: Yes, that's correct but I think one other point to bear in mind is when you're doing a panel, or at least when you start with a panel, you have the potential to look at the movements in two dimensions. So one is how costs move over time. So I think, as Dr Padilla suggests, and in fact as I understand the facts, that Qualcomm's royalties,

maybe other royalties have moved but Qualcomm's have not very much, if at all, in this period and so in a sense the Qualcomm royalty, it's not like in a cartel where you get an event study where you say: there was a cartel and then there wasn't and now let us look at what happened when it disappeared. I did explore that. That would be a time series method. I don't think that is going to work very well here, because, as far as I'm aware, there isn't a period where we say there wasn't an overcharge and now there isn't, so we're denied that opportunity. So we have to do an alternative approach and so we're taking advantage of the fact costs do change over time, you know, graphics chips, memory chips et cetera, those go down but they also go up, you know, there have been various issues with batteries, costs have gone up. So we get a lot of variation in those costs over time, which is helpful.

We also get the cross-sectional differences, so an iPhone 32 gigabyte and an iPhone 7 64 gigabyte, as I mentioned, have different costs. The primary difference between those two is the extra 22 gigabyte of memory, but if you then look at an iPhone 8, which is sold at the same time as an iPhone 7, there are different costs associated with those. The iPhone 8 has additional features that the iPhone 7 doesn't. They're sold at the same time periods. So some of the common features like a DRAM memory chip I would expect to cost the same between them, but in a sense you'll see the difference of what is the extra cost associated with the iPhone 8 versus the iPhone 7.

JUSTIN TURNER QC: I think Dr Padilla disagrees.

DR PADILLA: It's not going to work. The reason is the following. First -- I'll go to your first question last because it's the most important one. This idea that we don't have P, we don't have variation over time, but we have variation in a cross-section along -- because we have different models, yes, but the royalty charge on Apple is the royalty charge on Apple and the royalty charge on Samsung is the royalty charge on Samsung. So you have variation in all the cost components, the memory et cetera.

Secondly, the most important question, can we treat all costs identically. Is it the case that any -- if the average pass-on rate is 88 per cent we can conclude that every single

costis passed on on an 88 per cent basis? The answer is no. I think that some costs would be fixed, some others are variable, some are fixed or a little bit more variable than others. Then there are ad valorem rates which are passed on in a different rate. One thing is thinking about the cost of a chipset, that's per unit. There is one chipset per unit. The royalty is different. The royalty, if it's ad valorem, means when you increase the price, you're increasing the royalty, so you're going to pass on less. And that's well established in economics from the days in which we decided, for example, to introduce ad valorem taxes. There are costs that are common shocks, everybody is affected in the same way, for example, a change in taxation, a change in one of the fundamental inputs, like silicon on aluminium or glass. Others are idiosyncratic and they may not be passed on.

So I cannot -- and furthermore, there is three other things that we need to keep in mind: focal pricing policies, menial costs, prices don't change every other day, which, by the way, in the particular instance of this case is particularly important, because we have prices that are nominated in pounds when the costs may be changing in dollars and prices in pounds are not modified, so many costs. But then there is something even more fundamental in the theory of pass-through, which is that the pass-through rate is not linear. The pass-through rate is not a number. You may pass through small cost increases to a very small extent and large cost increases to a very large extent or vice versa. I don't know in which direction the buyers will go. It's almost impossible to determine a pass-through rate that is using a linear model. If you impose a linear model, as Mr Noble is proposing, you're going to get a linear answer, but is that answer meaningful? I don't think so.

PROFESSOR MASON: So we'll get on to questions of specification later, if that is all right.

Okay. So we've got a better sense of the shape of the data, recognising that it will vary according to the unit of observation. We've already touched on variability, so let's move on to the variables. I'm going to refer to left-hand side and right-hand side variables. I think that will hopefully avoid any or minimise any confusion. So let's start

on the left-hand side, okay? And again it will depend on the unit of observation, but if you could just unpack a little bit the price variable that will be used on the left-hand side of the regression.

MR NOBLE: So for the MNOs it would be the price associated with the contract and, as I said, I get that from the Pure Pricing data and what I haven't determined yet is precisely how I'm going to represent that because of course different contracts have subcomponents within them. It's quite common to have an upfront cost and then a monthly rate. What I haven't determined is what is the best way of distinguishing the two. Should I NPV it to get a single number, like a lump sum upfront? Should I take some sort of average across it? I haven't determined that and that goes a little bit to the model specification. But, you know, we'll be seeking to try and get a representative of the price on the left-hand side for the contract represented in some way that it's then explained by the variables on the right-hand side. In that instance it would be things like the mobile contract.

For the handset, it's easier, because typically you are just talking about a price. It is, you know, you're buying a phone at a price and I expect to be able to get lots of prices for the same phone and then I have a choice: I can either average them to get some average number with, you know, the costs, or I could potentially, you know, separate them out and do either multiple models or some other adjustments to account for that. So if we thought, for example, that sales by different routes might have materially different pass-ons, we could look at that, because, you know, as long as we've got a price data for it and the cost data that marries up with it, then we can explore that topic.

PROFESSOR MASON: So let me go back to the first case, which is the more difficult. So you've got multi-part pricing.

Is there any theoretical guidance as to what's the appropriate -- I mean, will you include multiple components of the price or are you looking after a single price on the left hand? I'm not still -- I understand it's work to be done, but nevertheless --

MR NOBLE: I think I'm going to try and explain it as a single price variable on the left. I think if we start to introduce complexity of -- because often mobile contracts come, they're often choices, do you want zero upfront costs and only a running rate and so on. I think we're introducing almost unneeded complexity when we do that. So I think I want to go to a single number is the short answer. Precisely how I'm going to do that I think the jury is a little bit out on that. As I said, you could simply add up the nominal amounts and get a nominal value associated with it. I think the challenge with that was nicely articulated by Dr Padilla in his report where he highlighted the fact that implicit in monthly contracts are actually quite high interest rates, something Ofcom has commented on. But I think that's almost then a motivation for why you might do an NPV which is to say, well, we can infer from this data what kind of interest rates are in fact being charged implicit in that and then you can almost do it the other way round, crunch it back down using that to say this is the equivalent lump sum amount that we have at the beginning to then get to that single variable.

I would say we're not making particularly strong assumptions there because in a sense the APR, the interest rate that's implicit in that, is essentially a quasi-market rate that you're calculating in the sense that, you know, as I pointed out in one of the annexes of my, I think third report, yes, it does cost more to buy a phone like that but consumers do have choices -- they could pay for it on their credit card upfront to avoid that -- but it looks as though we may well be in equilibrium because the interest rate that's implicit in that contract is in the same region as the kinds of interest rates that consumers can get if you're going to take a personal loan or pay with a credit card.

PROFESSOR MASON: Okay. Thank you. Dr Padilla, any observations you want to make about the construction of the price variable?

DR PADILLA: This is not my main area of concern. I would say with respect to handsets I think it's relatively simple.

With respect to MNOs, look, I think that one can do things, it will be hotly debated in due course because, you know, you need to decide for example what are the relevant units,

are you looking at nominal prices, are you looking at real prices, are you looking at price per megabit. You know, my experience of working a number of mobile mergers and doing some post mortems of this and my experience is that different analysts, including myself, have been using different methodologies. You ask the European Commission or you ask me about whether the mergers in Austria led to higher prices or not and we're going to have radically different questions because they're using Apples and using price by unit of megabit.

PROFESSOR MASON: All right. Thank you. Shall we move on to the right-hand side.

MR NOBLE: Hm-mm.

PROFESSOR MASON: And let's start with costs, since that's what's been promised, and just to -- I think we're clear, but let me restate it and see whether the summary achieves agreement. I think I've heard both experts say that there will be limited, sometimes zero, variability in royalty rates. So it will be variability in other cost components that will be important for pass-through and then the assumption will be that pass-through rates on different cost components are the same and therefore it can be applied to a step change in royalty rate.

Mr Noble, do you recognise that as a bit of a paraphrase?

MR NOBLE: I think that's a good paraphrase. I would think, I mean, just to respond indirectly to some of what Dr Padilla was saying, in a sense we are very unlikely to have the benefit of lots of movement in royalty rates. I wouldn't want to rule that out, because we haven't gone and got those royalty agreements and they may well move. I think we're pretty sure that the Qualcomm ones don't but it may be that there are sufficiently big movements in other royalty rates that we get variation there. I think we'll find that out when we go and get the information.

On the other point about is the only way to do this to collapse it altogether, that's what I expect to do but it's not the only way you have to do it in this analysis, because I think Dr Padilla was alluding to, well, what if there are different bits of the cost and could you treat them differently.

PROFESSOR MASON: Yes.

MR NOBLE: I mean, in the teardowns for example, they're very, very detailed. They give you line by line what all of these different elements are in them and so, if we were to take the view, well, perhaps some of them have different relationships, you know, one of them is more likely to be linear, one of them is less, there's good, you know, conceptual reason why we might think that, we can obviously aggregate the data in a different way. We could create two cost variables, you know, one that we think behaves in a linear way and another one that we think behaves in a non-linear way, something like that, if we wanted to. Now, I don't expect to do that and I don't think it's something that Dr Flamm did in his analysis either, but I think in a sense the teardown analysis is actually really quite detailed. So it does gives us a little bit of freedom to explore a few items like that if we needed to.

PROFESSOR MASON: But nevertheless, accepting that you haven't seen the detailed data yet, it's reasonable to say that the expectation of the variability in royalty rates will be less.

MR NOBLE: I would expect it not to be big.

PROFESSOR MASON: Okay, and therefore it's almost by way of an identifying assumption that the pass-through rate on royalty rates will be similar to the pass-through rates from other cost components.

MR NOBLE: I think that's quite likely, yes.

PROFESSOR MASON: All right. Dr Padilla, anything that you want to --

DR PADILLA: I think that your characterisation is correct and I also think that Mr Noble is right in saying that Dr Flamm didn't take that into consideration; the reason why I think that the numbers that he estimates are unreliable. But I think that we are talking about the key issue here because the problem that we face potentially is an empirical question. But the problem that we face is that we may have an average 88 per cent pass-on which reflects 110 per cent pass-on of certain costs and a zero per cent of the royalty and for the purposes of the exercise here that would be a really big mistake and so we

need to think carefully how to design a model that is not capable of producing those false positives. By the way, it could produce a false negative as well and I don't think that the methodology that has been proposed to date is capable of, you know, giving us that confidence and that's why I don't think that that is acceptable. It would need to be modified very significantly.

PROFESSOR MASON: But it is an empirical question. Is anybody proposing a theoretical objection?

DR PADILLA: My objection is -- the answer is empirical, the objection is theoretical. First, as we know, pass-through rates depend on curvature of cost functions and curvature of demand functions. So most generally the relationship between prices and costs is going to be non-linear, so you're not going to have just a cost, a cost per square, a cost cubed blah blah.

Secondly, we know that these companies price in the UK in pounds, as they have to, but the costs are in dollars and that introduces friction in the way that costs are passed on. That will have to be thought of.

Then we know that there are many costs: not everybody adjusts prices on a constant basis. Aluminium prices have skyrocketed and iPhone prices didn't go up immediately and then plummeted and they didn't go up immediately and that needs to be thought of and we also need to think about which cost components are common and which ones are idiosyncratic and we need to think about that.

Royalties tend to be idiosyncratic. Despite the ND portion of the FRAND commitment they tend to be idiosyncratic. All these things need to be answered to have a plausible methodology, because otherwise empirically those are theoretical objections, but empirically if we don't take care of all those objections that the theory proposes, we may get the result that, frankly, is as useful as the answer to the meaning of life being 42.

PROFESSOR MASON: Okay.

All right. Thank you.

Let me finish off on cost data. I'm just checking the time.

Mr Noble, you've spoken about the teardown cost data and the degree of granularity that can be obtained through those sources, what proportion of total variable costs can you -- and then I'll ask about what proportion of total costs, but the portion of variable costs that you can derive from those teardown data sources.

MR NOBLE: My understanding of what they're trying to achieve is 100 per cent of the total component costs, the total manufacturing costs et cetera. I think it's ultimately an empirical question about how much they achieve that and I think that's something I want to explore further. But my expectations is, and certainly having reviewed several of them, I've struggled to think of what is it they might be missing and the whole point of these teardowns is so that people can understand what does it cost to make a phone. They're used by equity analysts to understand what is the gross margin earned by Apple on an iPhone, because Apple doesn't report that. Similarly rival manufacturers use them to understand, you know, how is it that Samsung is selling this phone, you know, what costs, what components are being used within it. So my expectation is that it's a very large, potentially 100 per cent of those costs.

PROFESSOR MASON: Dr Padilla, I'll put a particular question to you and you can add on what you were going to say, if it differs from the answer to the question.

We understand that you argue that there are other costs that are material for pricing decisions, so if we just set that point to one side for a moment, are there any concerns about teardown cost data that you would want to air?

DR PADILLA: To tell you the truth, I don't know whether there are concerns but I think that we would need to check, at least in a cursory manner, whether they reflect the true costs of the operators in question. Look, because of experience in other cases, I understand that different OEMs have different agreements, for example, with chipset manufacturers, they may benefit from all sorts of rebates. They also have special agreements with a supplier of glass, for example, they may use different types of glass and they may have rebates related to volumes et cetera. It seems to me difficult for

IHS or any other third party that is, you know, to understand all those, you know, details and to -- because this is quite highly confidential data. So I think it would be important in my opinion to cross-check the validity of that cost data with OEM data because otherwise, given the prominent role that is given to all those other costs as an identification factor in these regressions, to make sure that we have the right data.

MR NOBLE: And I was just going to say, I mean, it's a useful point actually because I think -- we will have access to at least one cross-check, which is going to be Qualcomm chipsets, because we'll know, if Qualcomm are willing to give us that data, what those cost and so we can cross-check that against these teardowns. So, for example, when they refer to a Qualcomm chipset, we can check whether that number tallies up and how close it is. A number of the other components I would say, one can't rule out there might be a special agreement but a lot of them are quite commodified components, so a unit of DRAM is very similar to the next unit of DRAM and if we needed to, we could go to other specialist data providers, DRAMeXchange for example. I have done cases in TFT LCD, there are specialist data providers that if we need to go check to see, you know, the validity of those costs against other benchmarks we can do that.

PROFESSOR MASON: Presumably providing any idiosyncratic rebate didn't itself vary over time, the extent of it, that that would wash out in a regression analysis.

MR NOBLE: Yes, if it's just a fixed percentage off, then it should wash out.

DR PADILLA: I have a problem here because I cannot disclose confidential information, but I would think that, even things that Mr Noble may consider commodities, a company that has significant bargaining power is able to extract rebates and those may change over time. We're talking about a long time period for an industry like this, 2015 onwards. I would cross-check because otherwise, you know, we may find that some costs are not moving when they're moving and some costs are moving when they're not moving or the other way round.

PROFESSOR MASON: Okay. Thank you. If the chair agrees, there's one other short question that I would like to dispose of before the break.

So final question before we rise for a break is the matter of fixed costs. So Mr Noble, you anticipate using only variable costs on the right-hand side of the regression. If it became necessary to include also fixed costs, would your data sources allow that?

MR NOBLE: So IHS and others don't focus on fixed costs but we do have other sources. So we can -- I think I referred to in my third report that we can go to public disclosure by Apple and Samsung, they're both publicly listed companies and so you get reams of documents being published by them quarterly and annually that give you a lot of insight into what those fixed costs are. Now, obviously, I mean, I guess one objection you might have to that is to say, well, you know, they're going to be at the company-wide level, but I think certainly my understanding of the way that a lot of these fixed costs are relevant, for example on software and so on, or technology development, is that they often apply not just to handsets. So, you know, for example if you're developing a new processor or a new user interface, for example, Apple and Samsung often deploy those across their whole suites, both their tablets on the one hand, which aren't what we're talking about today, but also the handsets that they are using as well. And so I think, you know, you're going to have access to sources and obviously, as ever, if we think that's really important, we need to do something with it, if the public sources aren't good enough, you can obviously go and ask the OEMs and then we could go and if we had to, we could then go and get third-party disclosure if we had to.

PROFESSOR MASON: What would make you conclude that it would be necessary to include an element of fixed costs on the right-hand side?

MR NOBLE: So I think the first step when we go into model design now is to think very hard about a lot of the questions that you've been asking about, you know, precisely how are we going to define these variables, what is the structure of the regression, is it going to be linear, is it going to be level, is it going to be logs et cetera, I think we need to think about all of those points. As we'll do that, I'll be reviewing public information

about industry in further detail and it may well be that we go through some of that and, you know, I would highlight there's an awful lot of public information about these companies. There's an awful lot of information, you know, third parties, competition authorities analysing their behaviours and so it may be that there are features in there, you know, for example the Android and Apple investigations, there may be features in there that I've identified that make me think, do you know what, we do need to factor in those fixed costs, let's go and get a measure of them, let's put them into the analysis. For example, similar things happened in I think it was a lithium batteries case where there were debates about the extent to which capacity needed to be taken into account and, in fact, you could arrive at conclusions about whether you thought that was a good idea or not largely by looking at the public disclosure from the battery manufacturers themselves.

PROFESSOR MASON: Dr Padilla, again, append the point that you were going to make to your answer to my question if you could. Are you aware of other studies, particularly if it's hedonic regression but other studies generally where fixed costs have been incorporated into the analysis of price-setting from the econometric literature?

DR PADILLA: There are studies of course and I think that what they find typically is the pass-on is significantly less than on variable cost. But again, it's potentially -- they're there and we need to account for those.

I was going to make two points with your permission. One is that first I think that, you know, what Mr Noble is saying is commendable, I mean, he is saying, you know, we will amend all these things, but I think that the devil is in the details. So I think that we will need to judge that methodology when it's set out. I think there are fundamental changes and lots of changes that need to be implemented. And that model that he may consider doing is fundamentally different from that done by Dr Flamm and the 80 per cent figure that has been used in this case, because Dr Flamm didn't do any of this, absolutely nothing.

The second comment I wanted to make is that there is an additional cost that needs to be considered here which is not just fixed or variable, is the opportunity cost. And what is the opportunity cost? If one looks at what Apple itself is stating, for example, in its litigation in the context of the investigation of the app store pricing and a number of economists that are working for Apple in that matter, its handset prices reflect in part the revenues that it makes through the app store and selling one less phone means that it isn't going to make less money on the app store. That may be correct or incorrect but that's a statement that has been made and that means there is an opportunity cost, that would need to be a factor, which is relevant for Apple but not for Samsung. Again, that's another consideration that would be important, can be coped with, but it requires fundamental changes in the methodology that has been proposed, which is one that Dr Flamm used in the US.

PROFESSOR MASON: Okay. Thank you.

MRS JUSTICE BACON: All right. We'll rise for lunch and we'll return at five past two.

(1.07 pm)

(The luncheon adjournment)

(2.14 pm)

PROFESSOR MASON: So we'd like now to move on to questions relating to causation.

Let me paraphrase the arguments as we see them and then we can go further into the detail.

Mr Noble, I take your position to be that causation can be sufficiently established within the hedonic regression analysis by dint of the number of control variables that appear in the regression.

Dr Padilla, I take part of your argument to be a concern that there may be omitted variables which may confound the question of causation correlation. So first I suppose let me just -- I know that's very high level, but does that capture at least a good part of your respective positions? If I start with Mr Noble.

MR NOBLE: I think yes. I mean, the only part I would add to what you just said is almost I think I proceed in almost the language of hypothesis testing, that one has a

hypothesis that's based on the material we have in front of us about the fact I expect that there is likely to be pass-on and then I'm going to test that empirically in the way that you've just described, you know, with my model.

PROFESSOR MASON: Okay, thank you. Dr Padilla.

DR PADILLA: Broadly speaking I think the characterisation is correct, but, as we know, causation is a big problem. Regression analysis by itself is not a guarantee that you're obtaining a causal relationship. You have a conditional correlation, because you're controlling for a number of factors. We are not in this particular case going to perform a randomised trial experiment, we don't have a change in royalty and then we are not contacting before and after and therefore it is central that we condition a control for everything that could have an impact and could generate a problem.

But in addition to that we have to be careful with reverse causation. Reverse causation can be another significant problem in terms of, you know, when you infer from a correlation a causal relationship and here we have at least two sources of potential reverse causation, one, if royalties are ad valorem, then there is a potential for reverse causation, because higher royalties imply higher prices, but higher prices imply higher royalties.

And secondly, and I think that this is more fundamental perhaps, we have the problem that, according to the theory of harm that I think has been presented, the increase in the royalties not only causes increases in price but allegedly also cause changes in quality, and given that, using your terminology, quality variables are on the right-hand side, there may be a joint determination of quality and price and that may generate a reverse causation problem, and those things have to be taken care of.

PROFESSOR MASON: Okay, shall we deal with those two issues therefore in turn. So, Mr Noble, first royalties being ad valorem and therefore prices causing absolute amounts of royalty payments rather than causation running in the other direction.

MR NOBLE: Yes, and I think that's something we have to think about carefully when we're designing the model, I think we are helped slightly here by the fact that, based on the

facts as I understand them, a number of the royalties, and particularly the Qualcomm royalties, are not always ad valorem. For example, the Apple royalties were either $7.50 or $10. So I think that helps break that concern down somewhat.

And I think also the other point is that if we're concerned about the reverse causation, then we can zoom out that little bit further and look at the variable cost as a whole and then we don't get that same reverse causation endogeneity concern at that level.

PROFESSOR MASON: Just remind us if you would, what proportion of the overall variety costs would the royalty payment comprise?

MR NOBLE: Something in the order of 10 per cent. That's my understanding. It could be a little bit more than that. Perhaps if the -- yes, that sort of order. And of course I think we expect that not all of that has this feature because a number of royalties may well be fixed and therefore don't have that reverse causation issue.

PROFESSOR MASON: Is that an argument for treating royalty rates differently between Apple and Samsung?

MR NOBLE: Possibly, but, again, Samsung also has a cap that applies to some of its royalty rates. I think I explained it in my report, there's a 400-dollar cap that kicks in. I can't recall off hand what the ratio is between the below 400-dollar and above 400-dollar amounts but there's certainly a good number of capped handsets in the Samsung bucket too.

PROFESSOR MASON: Okay. All right. So we can return to that if necessary. Let's move onto the second factor that's been raised, which is effects operating via quality variables on the right-hand side of the regression.

So, again, what would be your intention about addressing that?

MR NOBLE: So the way I envisage the regression working is that on the left-hand side you have the prices, on the right-hand side you have costs, you have the other factors. So if we just talk about handsets because that's the simpler version, we have a long list of characteristics available to us that we can put in there and so the logic of what the model is trying to calculate is to say what is it that these quality factors are worth in

and of themselves to the consumers and in a sense what this model is telling you is in the factual we know what the quality choices are that the OEMs made.

I think where I start with this though is that in a sense it's probably not impossible, but it's very, very difficult to get into the mind of Jony Ive and think what would Apple have done had it had a bit less cost and a bit more margin to play with in terms of a design decision. And so I'm much less worried about the fact that there is this sort of reverse causation logic. It's more that what I'm trying to articulate is that we get an estimate of the harm to consumers in price terms and you can interpret the results of the regression as being either, as I explained in my third report, that there's a price effect, which, as I explained there, is simply they paid more than they would have done, or it's possible that the OEM might have made some other choice. I query how fruitful an exercise it's going to be to try and work out would they have done that and precisely what kind of change they would have made, but what it does allow you to be confident in is that the impact on the consumer is at least as big as the price effect because, as I explained there, if the OEM had made an alternative choice, then customers in a sense in the counterfactual would have been able to either accept that and therefore benefit from that higher quality or switch to another phone, because both Samsung and Apple sold multiple versions, multiple different phones simultaneously, so that sort of choice is being made every day by consumers when they go and buy a phone. They're making that trade-off between do they pay a bit more, have a few more features, do they pay a bit less, have fewer features.

DR PADILLA: If I may, with all due respect, Mr Noble, I think that's all too complicated. I think that things are simpler. The quality choices are exogenous or endogenous, are determined exogenously or are part of or respond to their royalties. If they are determined exogenously, if they have nothing to do with the royalties, it's legitimate to put them in the right-hand side of the explanatory variables. If they're chosen together with prices then there is an issue in the way that you are modelling because then there is reverse causation. That can be dealt either having a system of equations in which

you are trying to explain prices and non-prices at the same time, or you may adopt a methodology called instrumental variables, which you know as well as I do, and implement those. But those are the two options and I think that the theory of harm has to decide were quality characteristics exogenous or were they endogenous, and if so then the methodology has to be changed. And again, unfortunately with respect to Dr Flamm, which is where you take inspiration, none of that was considered by Dr Flamm.

PROFESSOR MASON: That was indeed where we were heading. Let us suppose for the moment that the endogeneity problem is material and therefore -- I'm not saying this is the case, because ultimately it will be an empirical question, but there are insufficient control variables that we have available to us on the right-hand side so that a standard one step regression doesn't suffice due to the presence of endogeneity. Are there any other tests, approaches that are possible given the data available that would address the endogeneity question?

MR NOBLE: Well, I think as Dr Padilla alluded to, one could adopt an instrumental variables approach and one way you could try to instrument this is through lags --

PROFESSOR MASON: With quite short T?

MR NOBLE: Yes, it's not ideal that you would have to do it that way, but the T is short for any individual handset but then the quality, the characteristics of a handset is set for that. So respectfully what you're having to try and do is to look across the handsets about how this is being determined at the time.

PROFESSOR MASON: I'm not sure I understood that.

MR NOBLE: So what you're trying to do is you're trying to instrument the quality variable and you're trying to find something that's correlated with the quality but it's not caused at the same time with that and what I'm appealing to is the logic that the quality in general, as a sort of if you were able to collapse this into a single variable, would be something that you would try and -- you could try and lag it, because if you think of almost quality as a continuous function rather than this discrete measure that we've got here, you

could think of it as a lagged, take a lag of it, and that way you don't get the endogeneity that I think you're concerned about.

PROFESSOR MASON: And you would only lose one time observation from doing that, is that --

MR NOBLE: I think so, yes. I think that's right.

PROFESSOR MASON: All right.

DR PADILLA: If I may, I don't think it's going to work because the frequency that Mr Noble is proposing is a quarterly frequency, so lagging one quarter is not going to make a difference. I believe you could try and instrument using quality characteristics of competitors, okay, which is -- that's a possibility. But I think there are two issues here: one, is going to require extensive data on the characteristics of the competitors' products, which I suppose that can be collected, and secondly, the concern that we will all have in due course is that, as we all know, instrumental variable regressions are sometimes fragile, and in particular this is a problem in this case because we're talking about small magnitudes. At the end of the day we're talking about whether it is £4 or £5 or zero, and -- you have some questions around uncertainty, but once you add uncertainty, this is the uncertainty in the methodology that's particularly troublesome.

MR NOBLE: I always enjoy listening to Dr Padilla because he always has very interesting things to say, and the point he just made about instrumenting essentially cross-sectionally I think is quite an interesting point about the idea -- because we can get those kinds of quality factors, because SpecTRAX and all of these other data sources I've talked about do give you that. We're not short of knowing about the characteristics of all of these phones. So I haven't thought in detail about how you would actually make that work. I suspect you might have to try and collapse those into a kind of unified quality variable but, you know, it is possible to do these sorts of things. You identify the things that matter most to consumers, and we could do it by looking, for example, at the advertising campaigns that OEMs adopt. You know, Apple, for example, gives us a show every year of what it thinks matters to its consumers. So

you can try and weigh some of those, create this unified quality variable, do it for various of the OEMs and then, as Dr Padilla suggests, essentially you cross-instrument across the model.

It's quite a complicated way to deal with the topic. I'm not sure I'm enormously drawn to it because, as I started out, I'm not convinced that the model really suffers from the problem that we're talking about here, because I think you can interpret what I'm saying in that way, which is in a sense it's telling you the quality adjusted price.

PROFESSOR MASON: Except that quality adjusted price doesn't really address the issue of whether the quality variables are endogenous, as far as I understand the way that you've presented the framework.

I'll let you come back to that in a second, but certainly in the case of ad valorem royalty rates, we do have a reasonable, would you agree, supposition that endogeneity may be a problem?

MR NOBLE: Yes. Yes, I think on ad valorem royalty rates I think there is a question mark about that. I think I've mentioned that a number of the royalty rates we're most interested in are not or at least may well not be ad valorem.

I think on the endogeneity of quality, we've got to remember that OEMs get to choose the quality choice once per cycle, as it were, and so I think we are able to start to try and tease apart some of these effects because, yes, when they launch a handset, they're simultaneously determining the basket of quality features and the price but they're also, over the lifetime of that handset, that then becomes fixed. And so I'm thinking aloud we may well be able to tease apart some of these points because we have a quality fix. If they made a bad call, for example, perhaps customers don't value a bigger screen or an NFC chip or something like that, then actually they're going to have to reprice that handset, because it's going to start to reflect very quickly what do consumers actually value about this handset as opposed to what do they think they value about it.

PROFESSOR MASON: Right, thank you.

I would like to move us on in the causality discussion to two other topics and then we need to talk about model specifications and robustness.

So still on causation, so we've spoken about instrumental variables which may come from using lag variables in the data. Any other means available to us if endogeneity were a material concern, given the data available?

MR NOBLE: I mean, within the analysis, I think as I explained at the beginning, I think this is almost adopting the language of hypothesis testing, that we're trying to set out a hypothesis, we're then trying to test that using the available data, and obviously that's subject to having a robust model at the end. I think we can supplement that if we need to, if there is concern about the model not doing what we expect it to do et cetera, by -- well, in fact, we don't need to supplement it. I intend to in this framework be drawing on lots of documentary evidence that's available in the public domain to motivate and justify why I think that's the right framework. If when I go through that process I'm still concerned about that, then in a sense we can do what it is that Qualcomm I think are arguing, which is that we go and ask the OEMs, go and get the documentary evidence from them to help us understand, you know, is this the way that they're actually behaving.

So we're then supplementing -- because within this framework we're going to have both the qualitative evidence in the public domain about what Apple says it does, what Samsung says it does, what Qualcomm thinks they do, what is publicly known by competition authorities about what they think they do. We're then going to have the quantitative regression that we've just talked about. What we're not going to have is one thing, which is the internal documents from Apple and Samsung about how they make those kinds of choices. But if we go through that exercise and these worries about endogeneity et cetera are serious concerns at that point, then I think, as I've indicated, it's at that point that then I would be thinking, that's when we need those documents, because they help, you know, untangle something for us.

MRS JUSTICE BACON: Can I just ask, what do you mean by getting documents to see how they make those choices? What choices are you talking about?

MR NOBLE: So the concern of endogeneity is -- well, essentially the causal connection that we're trying to articulate is to say that, in the presence of a change in cost, that we think that an OEM is going to change its price, and we also allow for fact that that OEM might not change the price but might choose to make a quality change and so -- but the concern with that is that we might get the wrong answer from our regression, if you think endogeneity is a significant issue, because price and quality are simultaneously being determined by the OEM. And so I think we've just debated whether or not we think there's an issue to start with. If we continue to think it's an issue once we've done our analysis, then identifying a document that tells us that almost the thought process that Apple went through as it made that choice that perhaps speaks to there is a Qualcomm royalty or there is a royalty generally, this is how we treat that, I think would help us be sure about, you know, is there an endogeneity problem, is there a causal connection there.

Is that making sense?

MRS JUSTICE BACON: Well, I think the answer that you gave would illustrate whether there was an endogeneity problem, if you're talking about the logic that they went through in deciding how to respond to the royalty, but it doesn't really answer my question as to what you would do to build that into your analysis so that you didn't then have a reverse causation problem. So you might use the internal documentation to see that there is an endogeneity problem, but then how do you cure that?

MR NOBLE: I think this goes back to the issue of if we think there's an endogeneity problem, which we use one of the standard tools to solve that, that's lagging and so on, would be the answer to that.

DR PADILLA: So if I may --

PROFESSOR MASON: And in this, Dr Padilla, if you could also cover the question, because I would like to move on to specifications, so it would be good if you could address this

as well. Endogeneity may always be a problem, it's always a possibility. The question is empirically does it matter so much that we need to deploy all the techniques with their shortcomings in order to address it.

So your view on how we will know if this is sufficiently material that it's not just a possibility, it's something that needs to be addressed?

DR PADILLA: Precisely, that's the point I wanted to make. I think we are talking here about the endogeneity as a possibility. Under the theory of harm of the plaintiff there is an endogeneity problem. The plaintiff is telling us that in response to increasing royalties, Apple and Samsung adjusted prices and/or quality and therefore that means that prices and/or quality are jointly determined. If they are jointly determined in response to a common factor, that's what in econometrics we say corresponds to an endogeneity problem. So under a new hypothesis, if I may be pedantic in the terminology of the statistics, Mr Noble should have produced a methodology capable of addressing that endogeneity. His model is unable to do that, so that's the same problem for Dr Flamm. And Dr Flamm is even clearer, because while Mr Noble doesn't seem to accept focal pricing, Dr Flamm does accept focal pricing and therefore interprets the 88 per cent as a quality adjustment more than a price change. But I think that again the problems remain, under the theory of harm, we have an endogeneity problem, it is therefore incumbent upon the party that proposes that theory of harm to develop a model that conforms with that theory of harm and addresses that theory of harm and produces estimates that are consistent with that theory of harm. What we cannot do is to posit a theory of harm and then develop a model that assumes that quality is taken exogenously, and then frankly I didn't understand any of the explanation about how you solve these conundrums. I think that there is a problem of endogeneity that needs to be faced, econometricians have techniques to address it, here we go.

PROFESSOR MASON: Okay. Thank you.

We need to move on to model specification and robustness.

Actually let's take it in that order. We understood, Mr Noble, from what you said previously that a linear specification is your starting point.

MR NOBLE: Yes. Yes, that's right, and quite possibly in levels, so it's then easier to interpret what the variables mean in terms of pass-on, but I think it may be log-log, it may be something like that.

PROFESSOR MASON: Okay. Let's pick up the issue of focal pricing here and specification, because one way to view that issue is that it is a non-linear specification of the price variable. It doesn't move linearly, it moves in steps in response to the right-hand side variable.

So if you could address that particular issue but also talk us through how you will come to choose the specification that you feel is the preferred one.

MR NOBLE: So do you want me to talk through the general specification approach first or --

PROFESSOR MASON: That's probably the better order I agree.

MR NOBLE: So I think at the moment I'm open-minded about exactly how I'm going to specify this. As I said, we've got what looks like it's going to be a panel set of data and so then I'm going to build a regression equation. There isn't one in my report because I haven't reached a landing on what I think exactly it should look like. I'm going to think about all of the topics, you know, for example, we've debated today and it's been in Dr Padilla's report the issues that have been debated in Dr Flamm's work et cetera in terms of trying to build up a robust equation that I think is going to accurately; represent the features of the industry and obviously, as we go through that, there are lots of issues to address. So for example, as well as all these issues we've just touched on, there are, well, how many variables are we going to have. Obviously we don't want to overspecify the model, so we don't want to put too many in, but we also don't want to have an omitted basis, so we don't want to miss something important. We go through the standard process of model development, which is we look at the material we have, of which we have lots, you know, these are not black boxes, you know, they're black but they are, in a sense, open boxes, we can understand the things that go into a

smartphone. I mentioned all of the public utterances that come from the OEMs about what they think their customers value et cetera. We can use all of that to help us develop, you know, a sensible specification. You know, it's parsimonious, but it's still going to pass the standard statistical test, it's going to have good R squared et cetera et cetera. So that's how I think we would try and build up that model.

I think the point you alluded to earlier was about focal pricing and I think what I think I heard you suggesting is almost maybe we should have some sort of logic model or something like that, some likelihood estimator as opposed to a linear specification. That's certainly a possibility.

I think in the context of trying to calculate an aggregate damages award though, I wonder whether that's really the right way to do it, because in a sense what we're looking for is a sort of grand weighted average of what do we think across all of these handsets, across all of these different OEMs, across all of these different sales channels, on average what do we think that the pass-on rate is. And of course with something like focal pricing, the Alexandrov article is actually very instructive on this. It reminds us that the wrong way to think about focal pricing is to assume that the price that has been chosen today is almost the optimal price. That's the wrong way to start. And in fact I heard counsel from Qualcomm appeal to that logic, which is that we're at the right price. If the cost moves by £7.50, then is that enough to shift us all the way by, say, £50 in their example. I think that's the wrong way to think about it, because what is it that makes us think that, you know, £649 is the perfectly optimal price for Apple. It might not be. It might be the optimal sort of fully flexible price for Apple is actually £625 and so that if the price in a sense and the costs move, the optimal price may go down to £620, and then suddenly they jump to the next price point, the closest one to it, which in that case would be £599. And the analogy that Alexandrov has in the article is about the traffic lights and it's to say, well, depending on how frequently they change colour, if you put your foot a little bit harder on the accelerator, quite a number of times you will simply get to the red traffic light a bit earlier and you'll sit there waiting a bit

longer, but occasionally you'll get there sufficiently early, get through on the earlier green. And of course in a sense that's what's going on with focal pricing, it tends to mean, for any individual pricing choice, that you either get zero or a big number, and usually a lot more than 100 per cent. But on average it doesn't mean that. On average, you know, if all the cars go a little bit faster, most of them just wait a bit longer than they would have otherwise, a few of them wait a lot less. So to my mind in a sense the linear specification actually is potentially quite relevant in this situation because of the question we're trying to answer.

PROFESSOR MASON: Okay. So if I understood correctly there, there's sufficient averaging across phones, and even for a particular phone over time, that any kind of non-linear response of price to cost is smoothed out and therefore a linear specification emerges as an acceptable average of any non-linearity there might be.

MR NOBLE: Yes. And to add to that there's also the point that in a sense the example that's often been cited is Apple's own direct to consumer retail prices. I'd be very surprised if Apple has focal prices at the wholesale level because they don't really make so much sense. Focal prices are about consumer behaviour, people respond to a £99. It's much less obvious to me that O2 or Vodafone responds in this way. Particularly when they're setting handsets and contract prices, then in a sense you're in completely a different world because they're bundling it up with their own product at the same time, and yes, there might be focal pricing there, but when I've looked at their pricing schedules, the increments are often very, very small. Some of them are a few pence, some are a pound a point, and so it's much less obvious that when you look at it across the totality of the sales channels, because you've got to remember this is an operator-led market in the UK, the OEMs are actually very, very important in terms of the route to market. Actually in a sense it becomes much less of a problem, I think, just per se when you're talking about the whole market, all the volumes that we're talking about.

PROFESSOR MASON: Okay, thank you. Dr Padilla.

DR PADILLA: I couldn't disagree more. Perhaps it would be helpful to take a look at Alexandrov, and I don't know whether this is any of the bundles, but we could look at Alexandrov and whether Alexandrov says this in conclusion. With the averaging that Mr Noble is referring to is he is saying, look, as a result of focal pricing and menu pricing, some costs may be passed on as zero, sometimes, you know, even if it's a small cost change, it may be pass on infinity. If you take an entire set of possible cost changes and under certain assumptions that are included in a model, you know, you take a particular distribution of royalty changes over time and you take an average, maybe, you know, under his assumptions you get the same average pass-on.

But that's not what happens. Here we are testing whether the particular increases that are allegedly to be infringing, those have an impact on prices or not. That's not a hypothetical set of cost changes or royalty changes and then we take an average. No, no, there is an alleged royalty that was excessive and we want to see whether there is a price increase as a result, and then we need to look at whether that change in costs was passed on or not and taking an average is bound to be incorrect.

The linear model averages between cost increases which are very small and cost increases that are very large. The only way to know whether the linear specification is correct or not is to go to the documents to understand the pricing policies of these companies and realise whether they pass on a small cost changes in the same way that they pass on large changes. We may find that they have a price ladder. Apple has a price ladder for almost each and every one of its products, wholesale, and then there is the rounding at £99 retail. That's what we should do. That's what we should do in response to reality.

That may mean that we need to have not only costs but costs squared. That may mean that we want to have a variable that is cost changes above 10 per cent and cost changes below 10 per cent, above 2 per cent or below 2 per cent, and that would depend on what is the information that is extracted from these documents. Otherwise we risk having a fundamental misspecification.

Now, let me be clear about this, the model that we are presented today is not a pass-through model. This is a hedonic regression in which a cost variable has been added. This doesn't look like the pass-on models that you can see in the RBB reports produced for the UK government, for the UK competition authority and the European Commission. Those typically, you will find in those documents that there are references to non-linear terms and costs even in the absence of focal pricing. You will find that they control for costs and variables from other competitors from the level of demand. This is a hedonic pricing model to which a cost variable has been appended. And what I claim is that with that specification the likelihood that we get a non-causal relationship that we are attributing to the royalty, a pass-on rate that corresponds perhaps to the cost of glass or to the cost of the chipset is very high. And by the way, the bias could be in one direction or the other. I'm not saying here the bias is necessary in favour of one party or the other. I'm just saying, with all due respect, these models would leave me cold. I would not know whether that number is meaningful and in which way it relates to the 2 per cent rate.

PROFESSOR MASON: But the way to address that concern presumably then is to look across a range of model specifications and see --

DR PADILLA: Correct. Correct.

PROFESSOR MASON: And would that be sufficient to address your concerns?

DR PADILLA: At that point we will need to have a proper pass-on model, to go to the pricing policies of the companies and identify how they price and try a specification and, as you will know, and Mr Noble I'm pretty sure will agree, then we will need to test robustness, test -- but at least we will have a model whose specification is such that you're giving a chance to a pass-on rate that is high or low but is not bound, linked, to the pass-on rate of the other cost changes.

PROFESSOR MASON: Okay. Thank you.

You look as if you have --

MR NOBLE: I have one just very quick point to make on what Dr Padilla says, which is, again, this goes back almost to what the conceptualisation of what the counterfactual is, because I don't see why it's right to think of this as almost a world in which Apple or Samsung are sat in a boardroom and it is announced to them unexpectedly that there's a small price change, that Qualcomm has arrived and it's announced today that it's putting its price up or it's putting it down. That isn't what the counterfactual is. The counterfactual is that it was always lower and so whatever the costs are, whether they're big costs, small costs et cetera, it's just lower by the amount that we say it is by the overcharge. So to my mind it's almost just starting at the wrong end of the telescope to draw a distinction between big and small, because that isn't the choice that's being put in front of an executive, it's the fact that they would have been engaged in optimisation process throughout all these years and in the counterfactual they would have never known any different, it would simply be in our counterfactual point a 1 per cent royalty rather than the amounts they actually charged.

DR PADILLA: But if I may, on this.

PROFESSOR MASON: Briefly.

DR PADILLA: Very briefly. I understand we don't have variation in the royalty, and I'm not asking the impossible. All I'm saying is that, instead of assimilating the pass-on rate of the average cost change to the pass-on rate of the royalty, perhaps, on the basis of information obtained from Apple and Samsung, we've reached the conclusion that the pass-on rate for the royalty, given that it's small, corresponds to changes in prices of components that are also -- that represent a small percentage of the total cost and changes that are of a small percentage magnitude, and that would be a better proxy than assimilating the pass-on on the royalty to the average pass-on of all costs, including those that are large cost components with large cost increases.

PROFESSOR MASON: Okay. Thank you.

One more question. You will need to be exceedingly brief because we have two minutes left to us for this part of the hot tub. So I'd like one minute each from both of you, please,

which is your view on how the Tribunal should approach the inherent uncertainty there's going to be in a quantitative exercise to come up with this pass-through estimate. It could be within a particular specification, the uncertainty on a coefficient, although actually that may be quite small given some of the data sets, but there's always going to be uncertainty across which model specification, whether there is endogeneity omitted variables. How should we address the inherent uncertainty? Mr Noble first.

MR NOBLE: I think ideally you want to identify a preferred model based on the facts on the evidence that you have available to you, and that preferred model should be well specified and it should pass the standard statistical tests et cetera. And I think you're then going to be -- you're going to have a number in front of you, a central estimate, from that model. It's going to be -- well, it should be statistically significant and I think in that situation in a sense the best available estimate you have is that central estimate, and I think that's the number that one should focus on. If one wants to be more cautious than that, then you can obviously start getting into the world of should we start using error bands et cetera around that. But of course you'll be able to get that from the model itself and make any adjustments without having to change the model itself. You know, you'll have the Gauss-Markov assumptions or which whenever one's applied, depending on the precise specifications, you'll be able to in a sense infer what the accuracy is of that parameter.

PROFESSOR MASON: Thank you. Dr Padilla.

DR PADILLA: In my view, the court is going to have the challenge to choose not within a model but across models, and is likely to find that these models are radically different and one produces large and statistically significant pass-on rates and the other is a small, possibly zero or non-statistically significant. My view is to disentangle between those models what we have to go is to reality and we need to see if the pricing policy says there is pass-on and somebody claim zero or non-statistically significant, that means there is something off in that model. And I'm not talking about what people say

in public, I'm saying what the pricing documents of companies say is that there is no pass-on and then you find an 88 per cent that doesn't pass the test. So we're going to have to confront eventually models with reality.

I think that the models would help us quantify, but I think that you need to rely on the qualitative evidence to get a sense of which model is correct if in the end the models diverge so significantly.

If I'm wrong and the divergence is much smaller, it's only a question of magnitude, then I would recommend model averaging, which I think is the kind of the standard technique of day. But that is only the two models are just differing as to, you know, the particular magnitude of the pass-on rate within some, you know, reasonable range.

PROFESSOR MASON: Thank you.

MRS JUSTICE BACON: Thank you very much. Now, before you leave your notional hot tub, can I ask counsel for both parties if they've got any brief further questions, and I will start with counsel for Which?

MR TURNER: Thank you, my Lady. I have just one question for Mr Noble and then a small number of questions for Dr Padilla.

So Mr Noble, this afternoon one of the issues that was covered in some detail was the issue of testing for endogeneity variables and, as I heard the conversation, two instruments were suggested, one was lags, which were discussed, the other was competitor specifications. Is that right?

MR NOBLE: Yes.

MR TURNER: So my simple question is, to clarify, would data be available on those?

MR NOBLE: Yes, it would.

MR TURNER: Could you explain?

MR NOBLE: Well, because we -- I think as I explained earlier, so on lags, well, you've already got the data and I think, as I was asked earlier, the cost of that is you lose one T because you have to shift one of the data sets back one.

On the competitor information, public information is available about the specifications of Huawei, HTC, et cetera, phones just as much as it's available for Apple and Samsung phones from the same sources.

MR TURNER: Thank you. My Lady, I've just got a very small number of clarificatory questions for Dr Padilla. Dr Padilla, your first comment in the hot tub was to outline a list of things you said were missing from Mr Noble's proposed approach. You remember that?

DR PADILLA: Correct.

MR TURNER: And that included, having looked at that transcript, understanding what competitors are doing, what they pay, what other costs they are paying and the extent of competition in the market.

DR PADILLA: That's correct.

MR TURNER: And a little bit later on you mentioned the challenges in getting cost data because so much of it is confidential.

DR PADILLA: That's correct.

MR TURNER: Is your thinking that an indirect claimant like the Consumers' Association in this case needs to gather information, including on costs, from across the industry before a robust pass-on rate can be determined?

DR PADILLA: That's not for me to answer, all that I can tell you as an economist is whether the methodology that is being proposed is likely to produce a possible estimate of the pass-on rate or not. If those variables are not available, then, you know, we need to control for things like the strength of the competition through other statistics or statistics that are publicly available, or we may learn to leave with ambiguity and then it's for the court to decide according to who has the burden of proof and what is the standard of proof, how to decide, that's beyond my abilities.

MR TURNER: Yes, so you're not saying it's the necessary implication of what you were saying at the outset.

DR PADILLA: All I would say is that if you don't have that information, the number you could use may be totally unreliable and then you need to work very hard to see how you're going to substitute for that information with other statistics.

MR TURNER: Thank you very much.

The second question is this. You said that royalty rates tend to be idiosyncratic despite the ND portion of the FRAND component. What is ND?

DR PADILLA: Non-discrimination.

MR TURNER: And what do you understand the non-discrimination portion of the FRAND commitment to mean as respects Qualcomm's freedom to charge different rates to different people for the same technology?

DR PADILLA: Licensing agreements have multiple dimensions and therefore the restriction not to discriminate implies that you have to treat companies that are similarly situated similarly. But some licensing agreements include non-assert, some of them are structured together with cross-licences, some of them have upfront payments, different payment structures, differences in geographic scope, differences in terms of length of period, and all those things are going to result in different variability costs and fixed costs at the point in time for the licensee. Perfectly compatible with the ND, but for the purposes of this analysis, radically different royalty structures that will need to be reflected, because if somebody has -- and by the way, I think then there are some licensees, as you know, that don't license, they just play the hold-out game, and you need to account for all that variability because, if you have a high royalty but your competitors are not paying the same high royalty, you're not going to pass on the royalty in the same way that if everybody had exactly the same agreement with the same terms and the same royalties.

MR TURNER: Thank you. We'll consider that if this case goes further.

Thirdly, you said that there are studies in answer to Mr Mason where fixed costs have been incorporated into the analysis of price-setting from the economic literature, which was

the question, and you referred to fixed costs as part of your report but you didn't there refer to any such studies.

Can you identify a particular study?

DR PADILLA: At this point in time I don't recall a particular paper. I'm happy to come back with references. I believe that you will find references to fixed costs on pass-on in the RBB reports that I've referred before, but my memory of particular paragraphs is limited.

MR TURNER: Almost done. You referred in your comments to the many possible drivers affecting pass-on.

Is your meaning that you need information on all those drivers in order to measure the pass-on rate to consumers?

DR PADILLA: Could you repeat the question? I'm not sure that I got you.

MR TURNER: You referred in your comments to all the different things that affect pass-on, the different variables that might affect that, but we're here concerned with measuring ultimately the pass-on rate to consumers. The question is: are you saying you need information on all the drivers in order to measure the pass-on rate to consumers?

DR PADILLA: Look, there would be drivers that may be of secondary importance, in particular if they are not correlated, the variables in question are not correlated with costs, that is factors that may influence prices but that are not affecting or contaminating the estimation of the pass-through rate. But that's something that you can only determine when you have thought carefully about them and you have made an attempt to incorporate them. I mean, ideally you want to be able to produce a parsimonious model, but in order to produce a parsimonious model, first you need to think about all the drivers and decide very carefully which ones you're going to exclude because of the biases that their exclusion may produce.

MR TURNER: Thank you very much. No further questions.

MRS JUSTICE BACON: Mr Howard.

MR HOWARD: Thank you very much, madam, I have no questions.

MRS JUSTICE BACON: All right. Thank you very much to both of you for your very helpful answers to the Tribunal's questions and to questions from counsel.

You're both released.

DR PADILLA: Thank you.

MRS JUSTICE BACON: And now we go into -- we should probably have a five-minute break before we start. We'll go into reply submissions.

So we'll be starting with Qualcomm for half an hour and then Which?, or a little bit less than half an hour, I think, so we should aim to be -- we might be actually slightly ahead of time. So I'm not going to be very rigorous on time. You should both have about half an hour each in terms of reply submissions.

MR HOWARD: I'm not going to be half an hour so --

MRS JUSTICE BACON: All right. We'll take a five-minute break.

(3.06 pm)

(A short break)

(3.17 pm)

Closing submissions by MR HOWARD

MRS JUSTICE BACON: Yes, Mr Howard.

MR HOWARD: Thank you. As I said before we broke, I intend to be short.

The hot tub session I think has in many respects helpfully crystallised the issues, and I hope that was also true yesterday.

The principal difference one can see between the Qualcomm position and the Which? position between Dr Padilla and Mr Noble concerns the extent to which it is necessary in order to model the pass-on to obtain information from Apple and Samsung relating to their pricing decisions and how they went about pricing things so that one can determine in the counterfactual world what they would have done.

Just stopping for a moment, Mr Noble was right in what he said, as I'm sure you all appreciate, as to what one is testing in the counterfactual world.

The counterfactual world is not a world in which the executives of Apple and Samsung, having set the price, say, 'ah ha', we've now discovered that Qualcomm have overcharged the royalty so now we reduce it, what do we do in that world. He's right, what one is looking at is what would have happened in the event that the royalties, assuming they were excessive, were at the appropriate legal rate and what price would the phones have been sold at in the light of that.

But one is still having to compare the difference between -- would they have behaved differently, is what it amounts to in the counterfactual world.

So if one thinks about it in this sense, where Apple, let's take a direct sale to market, where they have sold a phone, one of the all-singing and all-dancing phones, say at £999 and let's say their cost base, just taking notional figures, we know they make very large profits, so let's say their cost base was £300 for the sake argument and let's say that the cost base would have been £295 rather than £300, the question is, if their cost base was £295, what one's trying to test, would they have then set the price of the phone instead of at £999 at, according to Which?'s case, 88 per cent of five pounds, so roughly £996.

Now, that only is true if each cost is sought to be recovered in the same way and there is a linear relationship between all costs and the price.

Now, just as a matter of common sense, if one thinks about it for a moment, where you are dealing with one element of the costs and it's a relatively small element, it does not just as a matter of common sense follow as night follows day that if there is a change in that element alone that the price at which you will sell the phone will be different.

But what Mr Noble, and he's perfectly frank about this, he assumes that there is the same relationship between all costs and price. That's the assumption that he makes in his model and so that's what he's simply seeking to measure is the aggregate of costs against price. So if I can see on his model any statistical relationship whereby prices do change according to the aggregate of costs, then if I then take one element which is the royalty and I say that royalty should have been less, then I can infer that the price

of the phones to the consumers would have been less by that amount or whatever the percentages he says.

Now, we say that is --

MRS JUSTICE BACON: Sorry, would you mind, the transcript doesn't seem to be working for anybody.

(Discussion re transcript)

MR HOWARD: So if we just go back a stage, what we suggest is that Mr Noble's approach assumes that costs, and for this purpose all costs, drive pricing and he aggregates royalties with all other variable costs so that where you end up is he says once -- this is the case that's being put forward -- if I can show a statistical relationship between costs in the aggregate and prices then it must follow that if royalties alone are reduced, that the price would be correspondingly reduced.

Now, we say that, as I say, you only have to think about that if you take one element of the costs, and it's a small element, to say, well, that element necessarily would feed through in that way is wrong.

I mean, somebody was giving an illustration to me which I think is actually quite a useful one. If one thought about -- I mean the hourly rate of a professional and the professional firm say -- it could be a firm or a barrister but a firm is probably easier to think about -- and they calculate their hourly rate in order to pass on various -- recover their costs and make a profit.

Now, if the price of some small element, for instance big pens that they use in the office, goes up or would have been slightly less, now, on one view, you can say, as Mr Noble does, well, all costs are in the costs bucket and so any change in the cost bucket necessarily feeds through in a linear way into the price. But if it's -- my example, it's obviously something that's immaterial so if in fact the amount you're spending on stationery were marginally reduced because you've been overcharged, would that necessarily feed through into the hourly rate? The answer is it may do but equally it's quite possible that it may not. And the key point I would respectfully suggest that came out of the

exchange this afternoon or before lunch and this afternoon with Dr Padilla is that what one really needs to do is look at the reality. You can't simply look at a model, and that is the big distinction between the position of Qualcomm and Which? here. We say you need to set up a model which is actually based upon reality, and reality critically requires you to interrogate the disclosure from Apple and Samsung, possibly to have evidence from them, but to see what it is that drives their prices so that you can understand when you're setting up your model the way in which -- that's what you're ultimately asking -- the way in which this change in the variable would affect prices. The danger is what is being done is just looking at the costs in the aggregate, and we say that is where this exercise is going wrong.

At one point, Mr Noble appeared to suggest in answer to the Tribunal, well, if necessary, at some point he could go in due course and get information from Apple and Samsung, but it's totally unclear at what stage of Mr Noble's approach and Which?'s approach this would ever arise. As I said to you yesterday, the question today for the Tribunal is you're being asked to certify these proceedings on the basis that Which? is going to seek to prove its case via the model and the approach that Mr Noble is currently putting forward and with a litigation plan that doesn't include going to Apple and Samsung.

Now, in our submission, that is inadequate. Now, it's up to Which? and the litigation funders, if you agree with us, whether they rethink what it is they propose to do. If you refuse to certify, that isn't necessarily the end of the matter, it would be a matter for them to decide whether they wish to then have another go with a better approach. But we suggest that the approach that is being adopted at the moment is insufficient.

MRS JUSTICE BACON: What do you say to Mr Noble's response that he hasn't actually excluded getting further information if necessary and that he will take that decision in the course of his research to specify the model?

MR HOWARD: The problem is I can only go on the model that has been put forward.

So in fact the material that's been put forward, and he's had three reports, hasn't actually included going out to get the type of information that we have been talking about.

MRS JUSTICE BACON: No, but in the course of his report he says he's not shutting his mind to further data if it should become necessary and he's expanded upon that in the way he would make his decision in his comments today.

MR HOWARD: There are two difficulties with it. The position that Mr Noble adopts is he said it isn't necessary, so it's totally unclear in what scenario adopting his approach he would ever say it is necessary.

That's the first thing.

So that it's really -- we would say it's an empty promise because his approach is: my model is sufficient, and he hasn't explained, well, this is my current view, this model works, but he hasn't explained, well, what is the circumstance in which I could see it won't work and therefore I would need to do what Qualcomm says.

MRS JUSTICE BACON: Well, he explained that at least in part in the question from Professor Mason when he was asked what would cause him to go and get further data, and he said it would be in the course of his decision as to how to specify the model, he would look at publicly available information and so on. So he wasn't making a promise, but he was saying he would need to consider further information when making the decision as to how to construct the model.

MR HOWARD: The problem is this is all circular though. We can only go on the model that he has currently put forward, and his current position is: I don't need to go to Apple and Samsung. Simply then saying -- because this is all really being said in answer to a criticism, well, I don't think it's necessary but if ever it was necessary, I don't object to going and getting the material. But in order for that to have any legs, one actually needs to understand, well what are the circumstances which you're talking about when you say the model is sufficient to prove the point, Qualcomm is saying no, it isn't, but he's rejecting that criticism. So I personally find it very difficult to understand what the circumstances are in which he would be considering going out to get this material.

MRS JUSTICE BACON: He hasn't built his model yet.

MR HOWARD: But the problem is you're being asked to certify on the basis -- I mean, that really amounts to saying, well, I am asking you to certify these proceedings, we're going to model things but I don't really know what I'm going to put into my model and the nature of the model. But that's not fair to Mr Noble because he does say what the nature of the model is.

Can I say, there are two points. I would say this is very airy fairy, "Well, if need be, I'll go out and get things", but if that is your plan, surely the litigation plan and the budget has to take account of this, and the litigation plan and the budget do not take account of taking these steps. So as things stand at the moment, I mean, as I said a moment ago, Which? could come back with an alternative plan and say, well, actually we do at least -- we either think we need to do this or we think at least it's something we need to cater for and there's a contingency and we'll put that into our litigation plan and budget. But at the moment they've turned their face against that.

So we say that at this stage, if the certification process is going to operate -- if the Tribunal is going to perform the gatekeeper role that is intended, it does need to look both at the evidence that is being put forward and the litigation plan and budget that's put forward, and you can't, as it were, just brush things aside and say, well, if need be, I'll do something more, because the whole idea of this is that you actually have a proper plan to do it.

So I suggest this has been a helpful afternoon in that it has crystallised this point, and we say it crystallises, it actually shows that one does need to go and get the real evidence which is critical. And I want to just stress this point to you. It's a point I made yesterday. But what we are asking essentially is: in the counterfactual world what would Apple and Samsung, in particular, have done as well as the MNOs? But if you focus on Apple and Samsung, I would suggest that it is obvious both as a matter of common sense and as a matter of how one proves a case of a counterfactual is to look at what Apple and Samsung actually did. And I would suggest it is actually rather remarkable to approach a case like this without getting the material from Apple and Samsung and

approaching it purely on the basis of an economic model, hedonic regression model, that -- I'm not saying there isn't a role for such a model, but I would suggest that the natural way in which one would seek to establish the facts here is by the qualitative evidence as well as the quantitative evidence. Essentially the approach that is being suggested actually cuts out the qualitative evidence, and in my submission, when one applies the Pro-Sys test, this is not an appropriate way to proceed and the Tribunal should say so at this stage.

So that's all I wanted to say in light of the evidence. Unless there's anything else I can assist you on, those are my further submissions.

MRS JUSTICE BACON: Thank you very much, Mr Howard. Mr Turner.

Closing submissions by MR TURNER

MRS JUSTICE BACON: I'm sorry if I caused you undue alarm by trying to truncate your time.

MR TURNER: No, that's perfectly all right and I'll go as quickly as I can.

MRS JUSTICE BACON: If we finish around half past four, then that's fine.

MR TURNER: Well, I'll begin -- this is the reply. So I will begin with responding to Qualcomm's submissions on the expecting take up of an aggregate damages award, which you'll recall Mr Howard making yesterday at the outset, and it goes ultimately to the suitability of the matter for collective proceedings.

You'll recall that Mr Howard placed reliance on a September 2019 staff report by the US Fair Trade Commission and that referred to a general study of take-up rates in the United States of America with a medium claims rate of 9 per cent and a weighted mean, weighted by the number of the notice recipients, of 4 per cent.

Now, that was not a document which was referred to in Qualcomm's response to our CPO application to which our evidence for this hearing responded. It was referred to and deployed in their skeleton argument, paragraph 62B.

The Consumers' Association, Which?, does not accept that take up in this case, in the United Kingdom, will be limited as you see in the average results shown in that United States survey.

I adumbrated the point before but Which? has considerable expertise as the United Kingdom's foremost consumer champion in the charity sector. And it's outlined in the witness statement of Ms Averty -- I'm told I mispronounced that yesterday, it's Averty -- the reference is core bundle page 398, paragraph 17 and paragraph 37 on page 403. I don't need to turn that up now.

Which? is here bringing this claim in pursuance of charitable purposes precisely because its assessment is that this is economically meaningful and would be widely claimed.

Individually, possibly around £20 or more per individual by the time of judgment, the reasons that have been explored, and this amount of money does matter to individuals but, as my Lady you noted yesterday, claims are also likely to be on a household basis as well as an individual basis and it is a matter of record that the median pre-tax pay per hour for employees in this country last year was significantly below £20 an hour, it's £14.10, and that shows that comfortably more than half the employees in this country work for less than £17 an hour. It's a significant amount in the context of levels of spending on essential goods and it's all the more so against the background of the cost of living crisis.

So I do need to make that point.

Second, to focus on another aspect of what was said about take up, the reach of this body, Which?, is exceptional in this country. I've already referred to Ms Boyle's third statement, paragraph 9B, but it's worth recalling that again if you could perhaps bring that up.

It's tab 13 in the core bundle at page 444 at the very bottom.

MRS JUSTICE BACON: Yes, this was the point about the number of news items after this claim was announced.

MR TURNER: 131 related news items, the most-read news item that day on the BBC News website. Other class representatives have been certified by this Tribunal who have nothing like Which?'s reach.

Indeed in the case of two of them, I believe in the BT case and in the Merricks case, they even proposed to use Which? as a vehicle for notifying consumers. So in my submission, that disposes of this attack on the take-up issue.

Second, Mr Howard also said on the costs benefits issue, with which he began, that if you were firmly satisfied that Which? has passed the Pro-Sys test, cleared that hurdle, nonetheless you should still refuse to certify on the cost-benefit basis. If you have the transcript, that's page 59 from yesterday.

Now, on that submission it's necessary to recall what the Tribunal reasoned in the Gutmann case last October.

If you could perhaps pick that up. That's in authorities 24, paragraph 175 on page 1142.

You'll recall Gutmann is the rail tickets case and I believe Professor Mason was on the panel in that one.

MRS JUSTICE BACON: I'm sorry, can you just give me the reference again? It's authorities bundle --

MR TURNER: Authorities bundle, tab 24, page 1142.

MRS JUSTICE BACON: Yes.

MR TURNER: Paragraph 175, which is at the bottom of that page.

Now, in that paragraph, you had the key point on costs and benefits which was made by the respondent and it was essentially accepted by the Tribunal in that case:

"We see force in the Respondents' point that even recalling specific journeys and Travelcard details going back up to eight years for the purpose of a formal declaration of claim may be onerous and deter many from claiming, if that is ultimately the basis for distribution. We do not think that there is a meaningful parallel in the 'Delay Repay' scheme operated by the TOCs for late or cancelled train services, as Mr Moser sought to suggest. Altogether, we find it difficult to speculate in the present actions as to what the likely uptake would be and recognise the appreciable risk that it might be very low."

Then if you turn over to page 178 you see the Tribunal's conclusion on cost and benefits. Essentially despite the other considerations in this section generally being on the

benefit side of the scales, the Tribunal is concluding that the cost-benefit analysis came out slightly against, paragraph 178, the grant of a CPO.

But then cost and benefit is just one factor to weigh up in the suitability assessment, and you'll see immediately after that the Tribunal went on in paragraphs 179 and following to weigh it all up holistically, and if you look at paragraph 180 they ran through the various factors: (a) the collective proceedings are an appropriate means for dealing with the common issues; (b) cost and benefits that weighs slightly against; (c) no separate claims have been brought by members of the class nor is there any prospect of it; (d) the size of the class is large but manageable, class is largely private consumers; (e) we think it should be possible to determine whether any person is a member of the class; and (f) as regards suitability for an aggregate damages award, construe it in relative terms compared to individual claims.

And then over the page, claims can't be suitable if there's no reasonable methodology or basis on which the methodology could fairly be applied. And they said:

"Although we acknowledge that the exercise here is challenging and involves making assumptions, for the reasons set out above we find that the test is satisfied."

181, last two lines, they take account of all the factors and:

"... we consider that the balance comes down clearly in favour ... of suitability.

So in summary, and responding to Mr Howard's point, even if Qualcomm were right, which they are not, about the cost-benefit analysis in this case, it does not entail that you should refuse certification even if the Pro-Sys hurdle is cleared.

The third point is to address Qualcomm's submissions yesterday about the nature of this litigation and how it is being brought, which puzzled Which?. The Tribunal was invited by Mr Howard to infer that Mr Noble's position with respect to gathering this substantial third-party disclosure on pricing decisions and the like, managing cost efficiency and so forth, is attributable, he said, to the litigation funder's influence and direction. The funder, he said, the funder does not want to spend money to go into pass-on in what Qualcomm describes as the proper way; transcript page 57.

And he said, and I'll just quote from page 87 of the transcript:

"Why is it that Which? is so resistant to investigating these points in trying to prove its case? Why is it so resistant to investigating what Apple and Samsung did in fact? And the paradox in this case is that Which? is prepared -- not really Which?, it's the funders, if we're truthful about it, the funders are prepared to spend a large amount of time and expense investigating the first part of the case ... overcharge of royalty, but they seem to be unwilling to spend time and trouble to investigate the facts relating to pass-on, instead preferring to rely on the model."

The suggestion, which I must respond to, is profoundly misconceived because Which? is not a special purpose vehicle for this litigation, constructed to act in the interests of litigation funders, and I have to correct what was an unfortunate remark. Which? is the most respected consumer association in the United Kingdom. It's directing this litigation itself. And I should say that this is specifically reflected in the litigation funding agreement which you have in the bundle.

If I can call up perhaps on the screen supplemental page 2822. Magnify the top half, you have recital C:

"The class representative will be in sole control of the claim and will act justly and reasonably in the interests of the class members."

And then go to page 2831, clause 4.1.9, when you get there, 2831.

It's at the top of the page. Again, the class representative shall:

"Act fairly and justly in the interests of the Class Members at all times."

The reasons why Mr Noble does not think that this extra expense and complication is needed, certainly given the information available to him now about the industry, those reasons are explained candidly and straightforwardly by him in his report and then a little earlier in the hot tub. Those are his views.

The real question is the one that I flagged in my opening, why is Qualcomm raising this objection given that even if they were right about the substance, which they are not, it's fixable going forwards and Mr Noble is perfectly willing to fix any problems?

The answer emerged only yesterday in the oral submissions.

What we heard was the proposition that Which?'s litigation budget does not allow for this extra expense. So, Qualcomm says, the proceedings are going to have to be scrapped and rethought. And as a preliminary remark there was a conspicuous tension in the submissions by Qualcomm's counsel here, repeated in his address a few minutes ago, because on the one hand he refers many times to this all being about getting information from Apple and Samsung, full stop.

On a couple of occasions yesterday he checked himself and also mentioned four MNOs, mobile network operators, and then compendiously other retailers.

But the emphasis was very much on the supposed manageability of this additional exercise and the focus of the submissions was Apple and Samsung.

But on the other hand, his ultimate submission is that this additional exercise he envisages will potentially be so big that the existing litigation budget can't withstand it.

Now, in fact the existing litigation budget does allow for the possibility, if it's needed, of third-party disclosure. The litigation budget, if we call it up, is at supplemental page 1092.

This is going to be difficult to see on the screen.

The sixth column in that at the top in grey, the sixth column is a column entitled "Third-party disclosure". And when you've got it -- yes, we now can't easily see the rows to which these numbers correspond, but if you look at the third box down, that corresponds to "Experts and other" and the final row there is "Costs of third-party disclosure". You can see it about two thirds of the way down the page on the screen.

MRS JUSTICE BACON: Yes, but I think the point being made was that they thought that this was relevant for the FRAND stage of the calculation and not the pass-on stage.

MR TURNER: Yes, and I'm absolutely going to come on to that in one moment.

So what you see, just so you see what's envisaged here because of the ultimate point that it's emerged is being made is that, on a precautionary basis, we envisage a spend of up to a million pounds on obtaining third-party disclosure.

So you'll read across from cost of third-party disclosure, two thirds of the way down, all the way to the right-hand side, at least on my screen, it's a million pounds, and about another 2 million all in for processing and using that disclosure.

So it adds up.

It adds up to something around £3 million.

That is in addition to the budgeted cost for getting disclosure in this case from Qualcomm itself, which is column 5, which amounts to over £1.8 million.

Now, these figures in this budget are Which?'s considered cautious estimates, but even these are not definitive maximum amounts.

We have in support of our application a statement by the litigation funder representative, Mr Louis Young, and that's in the core bundle at tab 9, page 387 at the foot, near the foot of the page, in paragraph 24:

"[The agreement] commits the funder to fund the proceedings to an agreed claim ... commitment of £18,445,000. Should it prove necessary ... Which? may request an increase to the claim funding amount via a budget variation request, ..."

Which is set out at clause 8 of the litigation funding agreement. And then there's the reference to the provision for the deposit premium for the after the event insurance, which is very expensive, it's £3.85 million in itself.

So he's confirming that, should it prove necessary, Which? may request an increase to the budget.

There is no requirement to accede to the budget, they don't have to agree to it, but you see it's a built-in mechanism here.

And then to come to your Ladyship's point, contrary to what was said yesterday, this is not limited to third-party disclosure earmarked to addressing the FRAND question rather than pass-through. If we go to the litigation plan itself, supplemental 1015, essentially 46 was dealing with the FRAND material but then go to 47 below it at the foot of the page:

"At present the expert economists expect to be able to obtain sufficient information on the pass-on using publicly available data ..."

So this is relevant to the discussion that you have heard over the last two days.

"... from market intelligence firms combined with 'tear-down' analyses."

And so forth. And he refers to the sources that you've now heard something about.

If we can go down to the following two paragraphs, please, 48 and 49, these are not about the FRAND question:

"Should the information [this is on pass-through] require to be supplemented which may seek disclosure from selected MNOs, MVNOs or mobile handset retailers, and it may include documents, correspondence or data including pricing structure and sales data in respect of the effected products ..."

And 49 gives further definition.

Now, it is correct that these paragraphs do not specifically mention the term OEMs as well as the MNOs and MVNOs and the other mobile handset retailers. Mr Noble referred to those in his third report, as you remember, but the point is that in any event this area of pass-through is addressed.

Fourth --

MR HOWARD: Can I just say because this is now being referred to, it is actually completely plain, and you'll read these paragraphs yourself, that this is not about seeking disclosure of the documentation that we have mentioned, and that remains the position.

MR TURNER: Fourth, I now turn directly to the question whether the Pro-Sys test is met in this case, which is the essential point of substance for you raised in this challenge. And I must begin with the legal test that you're applying at this stage, which Mr Howard made submissions on by reference to the Canadian case of Jensen.

As a preliminary remark, because of an exchange yesterday, I want to clarify one thing to avoid confusion. Pass-through, the question, the issue, is inherently a common issue. It's established that it's the question and not the answer which gives rise to a common

issue in the context we're dealing with. And the correct framework for you to think about this in is succinctly distilled in the McLaren case at paragraph 67. So if you can perhaps call that up. That is if we can go first to authorities tab 26 at page 1182 you have to paragraph 64.3, and that's part of an extract where the Tribunal in McLaren is summarising what the Tribunal in Gutmann have ruled is the right approach. You see on the screen:

"The common issue does not require that all members of the class have the same interests. The commonality refers to the question not the answer and there can be a significant level of difference between the position of class members. Therefore the question may received varied and nuanced answers depending on the situation of different class members so long as the issue advanced is the litigation as a whole."

Then you go on the facing page to paragraph 67, they reason:

"All parties accepted that the issue of pass-on to the class was of principal relevance to the common issues requirement. In other words, was the question of whether loss had been suffered a common issue, such as to justify certification? Whilst in principle it is clearly a common question for PCMs, the Respondents disputed that it met the standard referred to in sub-paragraph (4) [you can look back, that is the Pro-Sys standard] such as to justify certification."

So then you come to the question whether the methodology meets the necessary standard. It is a common issue, does it meet the standard? And I return first to Lord Briggs in Merricks to anchor the point I'm going to make. That's authorities 19 at page 942. It's in paragraph 39 at the bottom of the page between letters G and H, where his Lordship said the question was whether the applicant could show there was some factual basis for thinking that the procedural requirements for a class action were satisfied so that the action was not doomed to failure at the merits stage by reason of a failure of one or more of the requirements, and it's nowhere near a balance of probabilities.

So that's the question that we're now tackling and to see how Lord Briggs addressed his -- or applied his own test to the facts in the Merricks case, where the PCR's case on pass-on

was, to put it at its highest, less developed than the one that you have now explored in this case, if you go, please, to page 952 and look at paragraph 72.

The Tribunal may recall that in that case the issue was a huge claim for interchange fee losses to consumers right across the entire retail economy. And one of the issues that the Tribunal originally had balked at is how can you possibly address pass-through to consumers in all of those various contexts right across the economy, all sorts of goods and services, and not merely where consumers are paying by card, but also, because of the interchange fees affecting the general level of prices in the shops, the extent of higher prices.

And we know that that case was certified. Lord Briggs says at A, just below letter A:

"At the risk of oversimplification it may be summarised in this way. Mr Merricks' expert team proposed to deal with the merchant pass-on issue by deriving a weighted average pass-on percentage from a review of each relevant market sector during the whole of the Infringement Period. For that purpose they proposed to divide the retail market into some 11 sectors. But the CAT reviewed a report from RBB Economics entitled 'Cost pass-through...' prepared for the [OFT] ... which concluded that, although in some sector there was reliable data, in many others the data was 'incomplete and difficult to interpret'. Further, although it might be that litigation between retailers and Mastercard [which Mr Merricks had referred to as a potential source or data point] might yield further data by way of disclosure in those proceedings, that would be unlikely to cover the earlier part of The Infringement Period and would involve a 'very burdensome and hugely expensive exercise'. But the CAT's assessment fell well short of suggesting that Mr Merricks would be unable at trial to deploy data sufficient to have a reasonable prospect of showing that the represented class [as a whole essentially] had suffered any significant loss."

So you see the very broad way in which this was addressed by Lord Briggs and the Supreme Court looking at the matter at the certification stage from the point of view of the claimants.

Now, if you open up the recent case of McLaren, you get their own discussion of the test which is at authorities 26, page 1196, paragraphs that I referred to but did not read yesterday, paragraphs 106 to 108, and it's very important to bear this in mind in this case:

"Ultimately [top of the page], if the Applicant's expert evidence can be successfully challenged at trial, the claim may fail. But the Microsoft test is not so onerous that we should reject any methodology that may break down in the face of a challenge to evidence. That is not the “low threshold” that the test is intended to present.

Instead, we need to determine whether the methodology offers a ”realistic prospect of assessing loss on a class-wide basis”.. [It] means just that. It does not mean that the Tribunal must satisfy itself that the methodology is bound to work, or will work on a balance of probabilities, whatever the evidential challenges. The Tribunal is not conducting a mini-trial.

Further, the object of the methodology is to establish loss on a class-wide basis. In assessing the methodology it is relevant to bear in mind that the power to award damages on an aggregate basis removes the need to assess loss individually, and that it is also not fatal that some class members may ultimately not be proved to have suffered loss."

So, pausing there, if you now go to Jensen, which was the case that Mr Howard referred you to, it really does not say anything different and you find that in authorities 33 at page 1881 and if you go directly to the key paragraphs that Mr Howard took you to, start at 61 at the foot of the page, there's a screening role at certification. The role includes filtering out unfounded and frivolous claims, ensuring the parties aren't being forced to defend themselves against untenable claims and devote substantial resources to it.

Over at 62 the reference is to preventing essentially baseless claims, baseless class actions, five lines up from the bottom, from monopolising the judicial system.

That's the screening role. This case is manifestly not in that category and if you still have on the screen -- it's gone from the screen now -- if you go back to the McLaren case,

authorities 26, page 1196, that was what the Tribunal in McLaren expressly were accepting, that Jensen does not take matters any further.

So the last point that I make about the test in view of the exchanges in the hot tub is this. It's also been established that the Tribunal at this point is not choosing between rival approaches of two economists and what they say about how models should be developed and that is stated in terms at authorities tab 11 in the Gibson case at paragraph 106, again which I referred to briefly but did not go to yesterday. So that's at page 552 in authorities 11.

So you see 106:

"We have given only a summary of some of the key points made by the experts. While we can see some force in some of the points made by Mr Parker, and developed in argument by Mr Bates [that's counsel], it is not the role of the Tribunal at this stage of the proceedings to choose between the approaches of the two expert economists."

You'll see Mr Noble was one of the economists in that case as well.

So, so much on the test and on the submissions that you heard from Qualcomm about it.

On the application of the test, as opposed to its elaboration, I can be briefer. The suggestion from Qualcomm in effect is that Which? must spend sums investigating points essentially to eliminate all possible reasons why, contrary we say to common sense, to basic economic principles and the available evidence currently known from each of Apple and Samsung and Qualcomm itself, these increased royalties might not find their way to consumers.

Yesterday I drew attention in this connection to Qualcomm's suggestion that the costs of R&D and other fixed costs might be important in influencing the decisions on setting handset prices, so that needs to be the subject itself of third-party disclosure. It's one of the categories relied on by Qualcomm and Dr Padilla.

I took you yesterday to how Mr Noble dealt with that in his third report at paragraph 3.12. I won't go back there again but you have heard from the hot tub that Dr Padilla did not

point to any specific industry support for his proposition in response to the question asked of him about it by Professor Mason.

If it's a possibility, it is a theoretical possibility that one expert says needs to be examined in order for a methodology proposed by the claimant to get off the ground and it is a good example of proposing elements that are unnecessary and certainly not in line with Dr Padilla's own concluding remark that one is seeking to arrive at a model that is, to quote his words, parsimonious.

A different issue was raised by the clash of the experts in the hot tub as to whether it's appropriate to treat the royalty rates as akin to other unit costs, which you've now heard was the approach that Mr Noble intends to take and Mr Noble said that one should think of this problem as how the unit cost base as a whole affects prices in circumstances where we know that the royalty rate is fairly stable. There's disagreement about that. It is par excellence an issue for after certification.

Similarly, we heard a number of arguments made for the first time in the hot tub, for example that the claimant's theory of harm implies that Mr Noble's approach has a problem with endogeneity which had not been raised before. Mr Noble disagreed. It was not raised previously in the reports.

To reiterate what I mentioned a moment ago, the evidence at this stage that we have available relating to the three main players here, Apple and Samsung and Qualcomm, is that there is a common recognition that the royalty costs are passed on through to customers and consumers and, to remind you, in Apple's case you have their direct pleading in the High Court about that referenced in Ms Boyle's second statement, paragraph 41C.

We can perhaps turn that up again very briefly. It was at the core bundle, tab 12, page 431.

You'll see at the bottom of 431, with the emboldened text part of Apple's pleading that the prices were higher than they otherwise have been, and that means their prices onto the customers and consumers, and then over the page the way that they frame their

loss for a damages case, this is page 432 at the top, was a loss of volume as a result of the price of the devices being higher.

As Mr Noble points out in his second report as well, paragraph 4.22, that's not the only evidence for Apple, you also have the evidence of their position in their US claim for damages against Qualcomm and, to remind you of that, because we haven't looked at that specifically, it's core tab 6 at page 311 and at the bottom you'll see footnote 56. So this is Apple's amended complaint there, 2017:

"Qualcomm's unlawful business acts and practices significantly threaten and harm competition in the market for mobile ... handsets, tablets and other compliant products in California and elsewhere, thereby causing injuries to consumers. These threatened injuries included the inevitable passing on to consumers to improper royalties demanded by Qualcomm."

Then in Samsung's case, you have the evidence that Samsung gave in the FTC proceedings. It's the next footnote, 57. That states that Qualcomm's conduct harms end users who pay higher prices for handsets.

Then for Qualcomm you have the records of their own internal analysis of the average sales price of phones showing that Qualcomm itself considered that royalties were a cost that would be incorporated in the price to consumers and that is supplementary page 470, at the top of that page, lines 1 to 7.

This isn't merely an opinion. This is a reference to Qualcomm's own internal analysis of the average sales price of phones in those years showing that Qualcomm considered that these royalties would be incorporated in the price to retailers and then incorporated in the price to consumers.

MRS JUSTICE BACON: Is this the District Court in the FTC case?

MR TURNER: It's the District Court in the class certification case.

So you have, as you assess things at the moment at the certification stage, information relating to all three of these main players.

Finally, to remind the Tribunal of the context for Which?'s proposed claim, which is applicable during a part of the relevant period of the proposed claim, it's the Damages Directive under European law which we refer to in footnote 17 of our skeleton argument.

If you call that up, authorities tab 4 at page 31, you know that the rule relating to indirect purchasers, such as the claimants today, is at the foot of the page in article 14 and essentially article 14(2) creates the presumption of pass-on:

"In the situation referred to in paragraph 1, the indirect purchaser shall be deemed to have proven that a passing-on occurred where the indirect purchaser has shown that..."

The defendant committed an infringement; the infringement resulted in an overcharge for the direct purchaser; the indirect purchasers bought the goods or services that were the object of the infringement or purchased goods or services derived from or containing them. Then over the page, for completeness, at the top of page 32:

"This paragraph shall not apply where the defendant can demonstrate credibly to the satisfaction of the court that the overcharge was not, or not entirely, passed on."

So to that extent there is a presumption of pass-on too.

Sixth, I pass to a new point made by Qualcomm in oral submissions yesterday that Mr Noble's methodology is fatally and irremediably flawed. It can't be rescued because the third-party disclosure that Qualcomm talks of has to be used in the initial design of the econometric model and Mr Noble hasn't already gone out and got it.

He does not need to have done so. As I say, Dr Padilla told us earlier that he thinks attempts should be made to make a model parsimonious, yet he suggests a large amount of third party data and documentation is needed across the industry at the outset and in any event what he is proposing is a level of granularity that is entirely unnecessary as Mr Noble sees it for the assessment of aggregate consumer losses over the relevant period. That is something to be debated for the trial. It is moving perilously close to saying that there needs to be an individualised highly tailored measure of damages.

There are respects in which, as you have heard from Mr Noble in the hot tub, as he and his team go along, they will want to refine and no doubt improve their model. You have

heard him say that he intends to gather a large amount of pricing data across the industry to help him to do that. But the proposition that one inevitably needs to gather all this third party material, inevitably will have to do so, let alone to gather vertically segmented information on wholesale prices and costs to carry out a series of regression analyses in the layered way at each step in the supply chain is puzzling.

Mr Noble in the hot tub at one point made an interesting observation. He said take a case where on average across the class you do have pass-on at a rate of 88 per cent.

So when you get to the final consumer, you know it's only 88 per cent. 12 per cent of that overcharge has been absorbed somewhere higher up in the chain before the consumer buys the handset. But the point is that our litigation today is not concerned to discover where in the chain the 12 per cent was absorbed. The point of these claims is to ascertain the effect on the final link, the consumer.

Lastly, I'll touch on the point that Qualcomm's counsel made about the alleged fatal irremediable flaw in the intended approach based on focal pricing not being taken into account.

Mr Howard suggested essentially that if you're confronted by small modest cost increases of the order of £10 a handset, it's inherently unlikely, it's a matter of common sense, that one would not move the price from one price point such as £599 to another one, say £649, and you heard Mr Noble's response in the hot tub: it's not inherently unlikely. His expert opinion was at variance with that and his view was that on the Qualcomm side they are taking a premise that the phone's already priced as what he described as an optimal level by reference to costs. Essentially he was saying, as I understood it, that the £10 overcharge could be a tipping point which means it's sensible in certain circumstances for the OEM, Apple or Samsung, to position the phone a the higher focal point and, if that's the case, it means that, viewed in the aggregate overall, there's no reason to think that focal pricing is going to result overall in lower levels of pass-through.

He referred to the article of Alexandrov in that connection. So did Dr Padilla.

It's worth turning that up briefly. It's in the authorities bundle, tab 35, at page 2019 and I invite you just to look at two short parts of that starting on page 2020 at the bottom. So you can see his reasoning and it's expressed -- there are equations later on but this bit is expressed very simply. So at the bottom of that page he says:

"I find that if a firm is constrained to price at several price points (for example, ... a television set that it sells only in increments of 100 that end in 99.99), then on average this does not have an effect on the pass-through rate."

Does not have an effect.

MRS JUSTICE BACON: Yes, his point is that, if you aggregate everything, it comes out in the wash.

MR TURNER: That's it. So you have the point.

So that was his finding and his reasoning and this economic article suggests that the intuition is correct as a real world matter. So Qualcomm's argument that real world issues tell against this may be a significant argument. It's certainly an argument that is not to be held at this point at certification. There are plausible reasons at this stage to consider that the focal pricing point that you have heard does not undermine Mr Noble's intended methodology to assess pass-through.

A final brief point on opt-out strength, a point that was canvassed with me at the offset. You heard Mr Howard's answer on that and we agree. We both agree that, if Pro-Sys is satisfied, then these claims are of sufficient strength to be certified on an opt-out basis.

So I come to my final conclusion. In Qualcomm's skeleton at paragraph 7 they said there is a basic point of principle raised by this case, a narrow but important point of principle about whether factual evidence is required for a proposed quantum methodology.

Yesterday Mr Howard helpfully confirmed, transcript page 94, that his argument relates to this particular case, not future cases. But if Qualcomm's argument is right then on our side we say this: it has the implication that substantial third-party disclosure must be a feature of the vast majority of consumer claims where pass-through is in issue and, as

a matter of judicial policy and the policy supporting this new regime, that cannot be correct.

So, my Lady, sirs, we respectfully ask the Tribunal to grant the order that we seek.

MRS JUSTICE BACON: Thank you very much, Mr Turner. We don't have any questions.

Can I just raise one point just for completeness that you may all want to think about and I don't suggest that it needs to be dealt with at this stage but we understand that there may be a different limitation period applicable in Scotland, five years rather than six, and we wonder whether that might have an impact on the definition of the class or the defences that may be advanced at some point.

Now, at present we don't see that this needs to be dealt with immediately as in at this stage but if anyone has a different view on that then you should let us know quite quickly, I think, because then we'd need to hear further submissions on it. But we just raise it because it's a point that's been drawn to our attention and it may be that, if the case goes further and is certified, it will then be addressed then. But I just want to raise it now.

Tomorrow we have, I understand, the funding arguments and I think I said at the start we'd prefer those to be kept to about an hour, if that's possible and you were going to take instructions, Mr Turner as to whether that can be done.

MR TURNER: I believe it's been agreed, I'll be told if it's not, that we're envisaging a 30, 20, 10 split for submissions.

MRS JUSTICE BACON: All right. So about an hour then. Okay.

All right. So 10.30 start tomorrow then.

(4.32 pm)

(The Tribunal adjourned until 10.30 am on Friday, 1 April 2022)

Key to punctuation used in transcript

--	Double dashes are used at the end of a line to indicate that the person's speech was cut off by someone else speaking
…	Ellipsis is used at the end of a line to indicate that the person tailed off their speech and did not finish the sentence.
- xx xx xx -	A pair of single dashes is used to separate strong interruptions from the rest of the sentence e.g. An honest politician - if such a creature exists - would never agree to such a plan. These are unlike commas, which only separate off a weak interruption.
-	Single dashes are used when the strong interruption comes at the end of the sentence, e.g. There was no other way - or was there?