



HOUSE OF LORDS

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Inquiry on

THE ECONOMIC CASE FOR HS2

Evidence Session No. 2

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Questions 13 – 23

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Witnesses: Professor Dan Graham and Professor Tony Venables

Members present

Lord Hollick (Chairman)
 Baroness Blackstone
 Lord Carrington of Fulham
 Lord Griffiths of Fforestfach
 Lord Lawson of Blaby
 Lord McFall of Alcluith
 Lord Rowe-Beddoe
 Lord Shipley

Examination of Witnesses

Professor Dan Graham, Professor of Statistical Modelling and Research Director of the Railway and Transport Strategy Centre, Imperial College, and **Professor Tony Venables**, BP Professor of Economics, University of Oxford

Q13 The Chairman: Professor Venables and Professor Graham, welcome to this the first meeting but the second witness session of our inquiry into the economic case for HS2. We are being televised, so I would be grateful if you could speak loudly and clearly for the viewers and for the stenographer. Would either of you like to make an opening statement or shall we go straight into questions?

Professor Graham: Straight into questions.

The Chairman: Perhaps I could start. Professor Bannister has told the Committee that it is likely that economic growth leads to the need for investment in transport infrastructure and not the other way around. Do you agree?

Professor Graham: I do not agree entirely. The first thing to note here is this issue of growth. The way in which the academic literature tends to think of transport affecting the economy is mainly via productivity. The argument here is if we think of productivity in terms of the efficiency with which we produce our economic outputs, so we use inputs and we produce outputs, and those inputs would be people, labour, machines, materials and transport, transport from input to production. The way the academic literature conventionally has thought about it is if we lower the cost of transport, the time taken to travel between places that should lead to a productivity improvement, because you have improved one of the inputs that we use to produce our outputs. I am not sure about growth, but there is quite a lot of empirical evidence on the impact that transport has had on productivity and it is a bit mixed, so I do not think the picture is definitely yes it does or not it does not. It is very much scheme-dependent. There is some evidence showing small or negligible effects; there is other evidence showing quite big effects. I think the relationship is more symbiotic than one-directional, so I do not entirely agree with Professor Bannister's comment. I think that transport can be important for productivity and then, potentially, for growth.

Professor Venables: I had two comments when I saw that quote. One is that, yes, there are circumstances where transport can be a real driver of growth, something that sparks growth. Historically, when you think about canals or opening up new regions of the world, worldwide now, bringing developing countries into the world trading system, connectivity, transport can really be a spark for growth closer to home. If you look at the M4 Heathrow corridor, it is richer than it otherwise would have been because of the presence of Heathrow. So there are circumstances where transport can be a spark and a leader—some circumstances. More importantly and more generally, there is a symbiotic relationship, as Professor Graham said. There, the point is, of course, if the fundamental drivers of growth are the accumulation of skills, technology, capital input, if one element lags behind it constrains overall growth; it is important that things march forward together. Therefore, transport certainly can be a constraining factor. If you look at some of the rather old but well established estimates of the effects of public infrastructure on income, the sorts of numbers you can back out are something like this: suppose that technology and skills and all these others things increased 10%, so you would expect 10% growth, but public infrastructure stayed still, then you would get 9%. That is a very rough, back-of-the-envelope number, but coming out of estimates that people have made. Therefore, most importantly, it can be a brake. It needs to move along in line with those other generally more fundamental drivers of growth.

Q14 The Chairman: The Department for Transport has told us that they have appointed you, Professor Venables, to undertake a study of mechanisms through which transport investment affects economic performance. Can you tell us what that study found?

Professor Venables: I am not sure; it has not been published yet.

The Chairman: Can you give us a sneak preview?

Professor Venables: Yes. Certainly the answer to some of the questions that we are going to deal with later will de facto give you the sneak preview. I could give it to you now or maybe,

as I say, if you ask that again at the end perhaps, I think you will get a pretty clear drift of the thinking that went into that report without my summarising a report that I believe has been cleared by the Department, but it is not yet published.

The Chairman: That is a good suggestion.

Q15 Baroness Blackstone: Do you think the cost-benefit analysis presented in the October 2013 economic case is persuasive?

Professor Graham: Yes, I do. There are two bits of evidence in the 2013 case. There is a standard cost-benefit analysis, which is done according to the usual theory of cost-benefit and calculated in a very standard way, and I do not think there are any major problems with that. It is quite nicely done. I like the fact that in the cost-benefit, rather than just reporting a single cost-benefit ratio, they do some sensitivity testing. They look at different demand forecasts, they look at different cost forecasts and they present the distribution. I thought that was good. I also like the fact that they acknowledge that a scheme of this size, which involves a real step-change in travel markets, is difficult to predict and that it pushes cost-benefit to its limits. So I think the standard approach is quite good.

Where that report is weaker is the work that was done on gross value added or the output work. They tried to look at how connectivity relates to productivity. That is a good approach. It is an approach that is really promising that you can take further. However, the consultants who did the work did not have enough time to do it justice, I do not think, so that side of the case is weak. To be fair, though, in the report it does say that they are not relying too much on that evidence, but they did end up quoting a number of £15 billion per annum that I think is a tricky number. However, the basic cost-benefit is sound, as far as I can tell.

Baroness Blackstone: Do you think the number they quote is one that you could defend, if you had to?

Professor Graham: The £15 billion I would not attempt to defend, no.

Baroness Blackstone: You could not.

Professor Graham: No.

Baroness Blackstone: Can you say a bit more why you could not?

Professor Graham: Why would I not defend that number? The £15 billion number that is in this report is from the consultants who worked at looking at how connectivity affects productivity. There were several statistical problems with the analysis that they undertook—methodological difficulties that lead me to believe that that number is not reliable.

Professor Venables: I take the view about the basic cost-benefit analysis done by the Department rather than the additional consultants' report that the £15 billion came out of, so if we can park that to one side and just talk about the main cost-benefit. A cost-benefit appraisal of a big project like this needs to have three elements. The first is user benefits, which is obviously in the Department's cost-benefit. The second is wider impacts and, in particular, the productivity and agglomeration stuff. For both of those, the Department has world best practice and, agreeing with Professor Graham, they are done very well and very professionally. Obviously one can debate, there are uncertainties about all the numbers, but I regard that as basically a very sound cost-benefit analysis.

The third potential element, though, that is not in a cost-benefit of this type is taking into account what transport economists call "land use change", which is a terrible term; it sounds like you stop planting beans and plant peas instead or something. I prefer to use "investment and employment effects", so what is the private sector response in terms of a big scheme generating new private investment, potentially moving economic activity around the country? The big issue in HS2 is to do with rebalancing and northern cities, so you need to think through how it is going to change private investment. Is it going to move the location centre of gravity and change the economic geography of the country? That is much, much easier said than done. These things are incredibly hard to get hold of, incredibly hard to predict and

it is not clear they necessarily bring benefits. Additional private investment may bring benefit, it may not; you can construct examples where the opposite case will be true. However, I do think that for a scheme this large more attention should be paid to these induced private investments, these location effects and all that and you probably should end up doing scenarios of, “Here is one possibility; there is another possibility.” We really do not know, but let us at least take the arguments seriously and test them a little bit further than the user benefits and the wider benefits do. Therefore, I would quite like to see a third element, and my expectation would be that that third element would be a positive number on top of the first two, with a very low margin of confidence around that.

Baroness Blackstone: What is the basis for that prediction? Why do you say that?

Professor Venables: Due to the potential for that geographical rebalancing, which again perhaps we will come on to a little more, because private investment induced in city centres in relatively poor parts of the country might be particularly valuable, even if it is displaced from London. Nevertheless, if you think it is more valuable in one region than another, there is the net effect. There is a huge amount of uncertainty, but there is that third element that is very uncertain but rather important. It is the essence of the case to me.

Q16 Lord Shipley: Professor Venables, I would just like to pursue the wider economic benefits, because you have talked a bit about those. The economic case estimates those at £13.3 billion. Do I interpret you right as saying that you think that that is a robust number?

Professor Venables: By “wider economic benefits” we mean that second layer that I was just talking about. The methodologies to establish those numbers are pretty well established. There is a lot of statistical evidence on the parameters that are used to generate that number. Professor Graham has been a producer of some of that evidence, so he can speak to that. I think it is a good central estimate, with confidence intervals around it, naturally.

Lord Shipley: Professor Graham, do you want to respond to that, because I want to ask a follow-up question that you might answer at the same time? That is, whether additional investment would be needed, particularly in those places that do not have city centre stations and, if that investment has to be made, should it be included as a cost in the economic case, because there is an impression that it has not, so far, when it should have been. Is that right?

Professor Graham: On the first issue, I agree with Professor Venables; of course the methodology can be improved. Cost-benefit analysis produces a number that is not written in tablets of stone, it can be debated and there are different ways of doing things. However, the method that we have now for calculating benefits, including these so-called wider economic benefits—the nice thing is the assumptions are clear, people understand what it is about and there is good theory and good empirics to back it up. It is worth saying that when we talk about wider economic benefits here, there is quite a specific meaning of what they involve. It is not just anything; it is not just regeneration or other things. In the field of transport economics that is now defined and it is clear what it is and what it involves. In that sense, there is a level playing field across schemes and we understand it.

On this business of investment, to be honest, I am not an expert on this, so I do not want to answer too much about how much investment would be required. If I am not mistaken, a lot of the benefits from High Speed 2 come from releasing capacity around other cities and commuting into London and so on. I would imagine that is going to involve some investment to realise those benefits. The extent to which it has been taken into account I am not sure.

Professor Venables: If I could just come in on that one briefly. Here I am not completely sure, but I take it that the £13.3 billion of wider benefits there were generated by feeding in a particular set of investments that had been counted. The question is there is no extra investment needed to get the £13.3 billion. In terms of the appraisal, what they did was feed in investment numbers and get that out, but then in practical terms I do believe that to get the

maximum out of the scheme there will also be additional investments that, we hope, will yield further benefits as more is got out of the scheme, public investment and, more importantly, private investment again.

Lord Shipley: Has that level of extra investment been quantified by anybody?

Professor Venables: Not to the best of my knowledge.

Q17 Lord McFall of Alcluith: Professor Venables, you said earlier that the big thing here is about rebalancing the economic geography. The Department for Transport has said that the city regions in the Midlands and the north will derive greater benefit from HS2 than London. Does that, in the words of Professor Graham, have a specific meaning or is it just a general comment that has been made by the Department for Transport? If it has a specific meaning, could you tell me what it is?

Professor Venables: I believe it is the case that that claim came out of the KPMG work. They essentially proceeded in two steps. One was to get productivity effects, the wider economic benefits, but then map them into particular regions of the country. The argument can be made more broadly independent of that particular claim, but I think that particular claim is based on the KPMG work.

Lord McFall of Alcluith: I am still lost. Can somebody answer me then? Professor Graham, does it have a specific meaning? In other words, where is the meat here? What are we talking about?

Professor Graham: People have analysed the problem and, as Professor Venables said, they have tried to look at how connectivity affects productivity and they have then tried to say, “Okay, how might that be distributed across the UK?” To be fair to the people who conducted this work, this is an incredibly difficult issue to pin down. I do not think they really had the data that would let them pin it down, but they did an analysis that has produced interesting evidence. The problem is that there are some limitations of that analysis that mean

that these conclusions about different parts of country are speculative. Let us just say that they are speculative.

Lord McFall of Alcluith: If they are speculative and they did not have the data, as you said, to let them pin it down, there is a huge gap, Professor Venables, between what you are saying is a big thing, the rebalancing of economic geography and what we are going to get at the end of the day with this project. It needs a whole picture approach and there is something missing here.

Professor Venables: Yes. This is, very, very difficult to do with any degree of precision. My position on this is that when we think, from economic fundamentals, in qualitative, not quantitative terms, about better connecting bits of the country, north and south, my economic principles lead me in the direction of saying that there will probably be a rebalancing effect in the right direction. That is my experience and thinking about economic principles. There is also a KPMG model that is grounded out of something. I can certainly explain to you what economic reasoning it is that leads me to that conclusion.

Lord McFall of Alcluith: Could I describe your rebalancing effect as being an informed act of faith?

Professor Venables: Yes, that is fine. There are the KPMG numbers, but what I was saying is, yes, it is a judgment based on work on spatial economics and economic geography.

The Chairman: HS2 has made this claim—and it is a very important claim in the public debate—that there will be the rebalancing of the economy. It seems to me it is based on a hunch.

Professor Venables: It is based on modelling work that we have described and it is based on a set of a priori arguments and, to some limited extent, experience from other countries, but there the evidence too is mixed.

Lord Lawson of Blaby: I think we can discount the KPMG study, because they were employed by HS2 who wanted this finding to be found, so we will park that. Looking historically, it is very odd, because over the past 100 years there has been an enormous improvement—it may not be good enough,—in transport infrastructure, both road and rail. Yet so far from there being any rebalancing, if anything it has gone the other way: London has become relatively more important. I am not saying that this is cause and effect, but it does seem to me that there is no hard evidence whatever that there will be any rebalancing. For a layman like myself, I would have thought that if you wanted to help the economy of the North by improved rail infrastructure you might think that improved connectivity within the North, something like HS3, which we are not talking about, might have more relevance than HS2.

Professor Graham: Can I just make two points here? The first thing is you would have to look at the distribution of investments in the past and where they had been made before you could really say much about rebalancing. We can look at the improvements and say that they have not done much, but where have those improvements been made, who has benefited most, has London maybe had more investment than elsewhere, and so on and so forth. However, there is an important point here, which is that the way in which High Speed 2 is being appraised is we are trying to look to the future and predict what is going to happen, so it is an ex-ante appraisal before the scheme is put into place. There is a need for more ex-post appraisal. That is, to look back at investments we have made in the past, not just in this country but borrowing evidence from other European countries and other countries more generally, and asking what impact did they really have.

What you are saying is absolutely right. We need to look back at the past. We need to do that to inform us about whether the cost-benefit numbers we have are of the right order of

magnitude and that is going to be an important area that the Government and Civil Service need to look at in the future.

Q18 Lord McFall of Alcluith: How vigorously would you disagree with the London Borough of Hillingdon's written evidence to us when they said that it is difficult to see how a scheme that attracts more people into London during the working day would help rebalance the economy?

Professor Venables: It might also attract more people into Manchester and Birmingham, so there could be increasing commuting in both those cities. I do not think anyone is saying—certainly I am not saying—that London is going to be hurt by this. Capacity in the London area will be improved and that is good for London.

Lord McFall of Alcluith: Back to your point then. If it is going to attract more people into London and it is going to attract more people into Manchester, it is the status quo and therefore we miss the big point, which you are saying is the rebalancing of the economic geography.

Professor Venables: Can I give you the reasoning that leads me to that position? Any standard economic reasoning, basic textbook reasoning here would say if you have a poorer region—the developing world or whatever; the north of England—and a richer region, improving connectivity between the two will tend to be a force for convergence. The poorer region has lower wages and that will tend to attract jobs that were locked together in the larger region. As we see it in the world economy now and as we have seen it historically, being isolated is bad; being connected is a force for convergence. That is textbook economic reasoning and we have seen it writ large across the world in different contexts.

If I could go on with this line of reasoning, once you go to transport investments inside a country, things clearly get much more nuanced. The basic economic story here, as I see it, is unfortunately there is a U-shaped relationship. That is to say, improving connectivity to some

point causes divergence and then, beyond that point, causes convergence. Can I try to explain that? Suppose you have London and Manchester—London is bigger—and really poor communications, then everyone has to have an office in both places. The only way you reach your customers is by having an office in both places. Improve transport costs a bit and you only need one office; where do you put it? It is still costly to reach your customers, so you surely put it in London—the bigger place. That is divergence. That is bringing transport costs down from a high level to a low level. That sucks stuff into London and, as it does so, it raises wages in London and makes London a really expensive place. Now take transport costs down even lower; then reaching your customers you can do from anywhere. So the only thing that determines where you locate is the relative costs of London and Manchester, and that suggests it is going to reverse. Now you can put your one office in whatever is the lower-cost place. Unfortunately, economics does give you that U shape, but if you take the power of that argument—costs in London now relative to costs in Manchester and further, better connectivity—it seems to me, as a hunch, as likely to pull in the direction of attracting inward investment of one sort or another, private investment, to those northern cities rather than to London.

Lord Griffiths of Fforestfach: Can I just continue there for a minute? The argument from the point of economics has a kind of vagueness about it, in the sense that it is saving travel time, it is increasing connectivity, it is rebalancing and then you put numbers on it and so on. However, if you look at, say, Cambridge and way it has developed, I am not sure how much it has to do with transport, but I never think of it as to do with transport. I think of it as to do with attracting a whole bunch of entrepreneurs, high technology, very skilled people. If I look at Cardiff and what it has achieved in independent television production, which is world-class, how did that happen? I do not think the train between Cardiff and London has been the cause of that. If I say to myself: what about Manchester? If we really wanted to

develop Manchester, should we not be really putting money into the educational institutions in Manchester, the research institutions and so on? Would the times of trains be that significant?

I understand cost-benefit analysis, have done some 30 years ago, but it just seems to me it is slightly airy-fairy as opposed to something that is tangible and the idea of clusters and of economic development being built around clusters.

Professor Venables: I have a couple of points in reaction to that. Clearly, a railway line is not sufficient for anything. It is only part of a package. It is no magic wand that is going to make stuff happen. I do not think anyone believes that. It is part of a package of stuff. When you look at the research literature on firms' investment decisions and location decisions, access to a skilled labour force always comes as number one on the list and not that far down is transport stuff, access to markets and other places. Clearly, the railway line is not sufficient for anything; other stuff, like education, matters more.

The point about cluster formation is really important and really interesting. That is what drives a lot of growth, but these are now often very, very specialised clusters. To give my favourite example, 250,000 kilometres of zips get made in Qiaotou in China every year in enormously specialised clusters that, because they are so specialised, are clearly trading very, very heavily with the rest of the world. You have to be linked in. If all you are doing is zips, you have to get in with the other stuff from other places. In Cambridge, people need access to the science stuff, which tends to cluster very strongly, but they also need access to venture capital, to advertising, to law, to things that they buy from London, so I do not dismiss the railway line between Cambridge and London.

Professor Graham: The question is about whether high speed is the best way to achieve growth or productivity. There was a report in 2006 by Eddington, an independent inquiry into the effect that transport would have on the economy, and the report argued against things like

high-speed rail. It said you do not need big transformational schemes to get good economic returns; you could do it by focusing investment on what they called “strategic priorities”—cities, ports, inter-urban routes—and trying to target pinch points in the network. It said to not do these big grand schemes and that you can get a lot of benefits in other ways, so, yes, it is perfectly legitimate to ask whether it is the best way of doing it. I do not think the answer is necessarily yes and maybe more work should be done on that sort of thing.

Q19 Lord Griffiths of Fforestfach: My second question is to do with when you are looking at the wider economic benefits. Professor Vickerman told us they were not automatic and the question is what can the UK learn from other countries? Here, frankly, I am rather confused by it, because, for example, it is said that between 1995 and 2011 rail usage increased by 60% in France, decreased by 7% in Italy, but both countries invested heavily in high-speed rail. The HS2 Action Alliance said, “It is very difficult to substantiate the argument that high-speed rail is likely to have a positive impact on regional inequalities”. Transport Watch said, “International comparisons confirm that such schemes benefits capital cities rather than regions”. What are we, as lay people, meant to conclude from what I would think to be conflicting judgments by professionals?

Professor Venables: I have not read all the evidence of all the case studies of high-speed rail around the world, but insofar as I have read them and read other people’s surveys on them the picture is very, very mixed. Lille did well, Lyon probably did well, and other places did badly, and so it goes on. It would be great if one could have a clear message from international experiences, but it is just very mixed. The lessons to be learned from it tend to be rather blindingly obvious ones: if you build railway lines where nobody lives and no one wants to use them, they are probably not going to be very successful. If you put stations in stupid places where nothing is going to happen, they are not going to be very successful. If you really set them up so that you have the planning regime, the education, and the skills

around the neighbourhood such that they can attract private investment and have a strategy for doing this, then they can be rather positive. It is an awfully mixed picture and certainly I agree with Professor Vickerman's statement that it is not automatic; it takes other stuff.

Q20 Lord Rowe-Beddoe: In the economic case—I do not know whether I should put that in quotations or not—do you consider that the estimates of the amount businesses are willing to pay for quicker travel are justified, because the benefits are being indicated at some 84% of the total benefit?

Professor Venables: There are a lot of experts out there on the value of time and I am not one of them, sorry.

Professor Graham: No, it is not really my area either.

Lord Rowe-Beddoe: Not your area. It is not my area at all, but my gut tells me that if I am building a case to do something on 84% of the benefit arising from “the value of time”, I think it is a bit worrisome. Anyway, let us move on. I have something else here; it is about time; it is something Lord Lawson dealt with in the previous session. Again, time: is it station to station or is it connectivity door to door, and has that been taken appropriately into account, in your opinion?

Professor Venables: Obviously, what matters is door to door, not station to station. I believe that the transport models do take that into account.

Lord Rowe-Beddoe: Yes, but it is largely dependent upon the anticipated speed that the train is going to run.

Professor Venables: Yes, that is clearly the middle bit.

Lord Rowe-Beddoe: Do you have anything to add?

Professor Graham: There has been an attempt to model this, but the basic question is: are they reliable? I do not know the models well enough to say.

Q21 Lord Carrington of Fulham: One of the big issues around this is how many people are going to use the trains, is it not? As you were saying, if you have a small but growing city and a very large and prosperous city and you connect the two together, you hope that the traffic flows are going to switch from the small city to the big city, switch under the U from the big city back to the small city, all of which is highly speculative, inevitably. However, the modelling that they have done is based on a consistent growth of passenger traffic along HS2 to justify the fact that this is going to take traffic from other transport providers. They are talking about fairly substantial increases over the next 20 years; I think the figure is something like 2.2% per annum compounded, which is a pretty substantial change. That does not really tally with the U curve that you were suggesting, in that it does not suggest that this is uniform over time and it does not put a 20-year time limit on it, because how big is the U? From what you are saying, it is pretty hard to give any estimate of that, as I understand it. Do you find that projections of passenger growth are very speculative or do you find them convincing or do you think that that is enough to justify building a new railway line, high speed or not, to take off projected traffic that may be speculative?

Professor Venables: Again, I can react in a number of ways. First, the U to which I was alluding was to illustrate a divergence-convergence story in per capita income driven by, in part, connectivity. It was not about the number of people on the train. It was about how things relocate.

Lord Carrington of Fulham: It has an implication, though, for the number of people on the train, surely. It cannot not.

Professor Venables: It does, yes; that is right. If the cities became more balanced, then I guess you would expect more passengers between them. If they were in a place of nothing, there would be no passengers and passenger numbers would be maximised if they were of equal size, other things being equal. Again, I am really not a transport modeller. I do not

know the exact basis of the demand projections, but when I think about these things, we know that trade has grown faster than income for decades, that foreign direct investment has grown faster than trade, and that travel has grown faster than income. We know that the population of the UK will go up by 17 million people by 2050, and there is the recent evidence on increasing train travel. All of these arguments push in the direction of travel continuing to grow at least as fast or faster than income, which we hope will be more than 2.2% per annum. Now, maybe video conferencing will be perfected tomorrow and this will be a complete waste of money, but everything we know about that so far is that when I video-conference my international co-authors I travel less, but I have more international collaborations because of the possibility of video conferencing, so, in total, I travel more. That seems to be the message about the effect of technical progress on these things, so 2.2% per annum with a stop at 2036, I believe, does not seem to me to be grossly inflated at all.

Professor Graham: You could construct an argument to say it is too high, you could construct one to say it is too low, and with any cost-benefit there is always debate over demand forecasts. Again, what we could do is look back at the past and see how good our forecasts were in previous schemes. I was at a meeting in the OECD two weeks ago where the French have done this and they have looked at cost-benefits ex-post and ex-ante, so done before and after the scheme. What they found is that demand forecasts were always too high and cost forecasts were always too low, pretty much systematically. That is the case in France. I am not saying it is the case with this. I do not think 2.2% seems outrageous, but you can level these criticisms at any cost-benefit. It is not something specific to High Speed 2, I do not believe.

Lord Carrington of Fulham: I think what we are trying to get to is there are two aspects to this. One is that it has been suggested to us as part of the Hillingdon haul that the major effect of HS2 to Birmingham would be to make Birmingham so close to London that the increase in

traffic becomes commuter traffic, not business traffic. In other words, because housing is cheaper in Birmingham, people will live in the West Midlands and commute to London and that is clearly a worry for us.

The other aspect of this that is concerning is that if the numbers are so speculative, this then becomes a political project, not an economic project. It then becomes a project where people are saying, "This is a *grand projet*. We are going to build a pyramid in the middle of the Louvre regardless of the cost," and HS2 is just the British equivalent of that. If the numbers have such error factors around them, such standard deviations around them that the thing becomes economically meaningless to analyse it, we are taking a punt and it is a political punt. That is fine and perfectly legitimate, but is that a grossly unfair comment?

Professor Graham: I do not think it is grossly unfair. You are right in the sense that you get a cost-benefit ratio that does not have a standard error, so there is no way of knowing what its degree of significance is. That is clear and more work needs to be done on incorporating uncertainty into the benefit-cost ratio.

To be fair to this particular case, what they have done is they have produced a distribution of benefit-cost and they have tried to look at different assumptions on costs and demand, and I think they have done a better job than you would usually see in this kind of area.

Professor Venables: A lot of what I have been talking about is a punt, but remember that there is a core cost-benefit analysis in here that, as we started off saying at the beginning of the session, is done to best practice, a rather solid, standard cost-benefit that comes out with a benefit-cost ratio in excess of two. If that number was 0.8 and we were then coming up with all these other arguments, I would be extremely worried, but there is that more or less solid two-point-something underpinning it, which certainly influences the way I think about it.

Q22 Lord Lawson of Blaby: May I make one observation and ask one question? The observation is that, I think, Professor Venables, it was a false analogy that you made about

globalisation in the developing world or the emerging world, as we now call it, into the world economy. That has had a profound effect and it is a benefit that is for the whole world, but particularly for the emerging countries, but that was because they were completely cut off, a totally different system. That has not been the case in the United Kingdom. We have had a single economic system and there has always been a lot of interchange, so I do not think the two cases are remotely comparable.

My question, however, is this: you said that improved transport brings benefits. I am sure that is right. I do not think any of us would contest that. The big question is: what is the benefit-cost ratio and the opportunity costs and what are the alternatives you could do? The question I would like to ask both of you is: if you were Secretary of State for Transport, what project would you suspect is the best bang for your buck? Would it be HS2 or would it be something else and, if so, what?

Professor Venables: We know from Eddington that there are very high returns to small projects—congestion. There are lots of small projects that need to be done, but I think I would stand back and say that there are serious regional imbalances in the UK. The population of the UK will go up by 17 million people, and I do not know where they are going to live. I would therefore say we need to do something rather serious about making some of the regions more attractive places to work, to do business and to live, and that is obviously a whole raft of measures. Education, skills and things are way up at the top, but I think fairly ambitious transport comes in that set.

Professor Graham: There is definitely a case to be made for investing in cities. Cities are highly productive places. They are where a lot of the innovation and the growth come from in the economy. We have big problems with congestion in cities, so there is a strong case to be made for looking at prioritising investment now, and that is kind of what Eddington said.

Baroness Blackstone: The problems of congestion in cities are not solved by railways that connect cities. They are solved by things like driverless cars and more people riding bikes and a whole range of other things.

Professor Graham: That is what I am saying. What I am saying is, rather than have this big scheme that is connecting cities at long distances, have investment inside cities to improve congestion and relieve the costs of congestion.

Q23 The Chairman: I wonder if we might just pick up your earlier suggestion and come back to the report that you have written for the Department for Transport. Is there anything that you have not mentioned in the course of this session that you would like to draw to our attention, particularly the conclusion? As you can see, we are at an early stage in our journey here and we are struggling to find out what the mechanisms are through which transport affects economic performance. Another question that is related to that is you are spending £50 billion on one project. The Eddington report suggests that there are a number of other projects, which may add up to less than £50 billion, which might have a much greater impact on economic performance. I wonder if you could help us to work our way through those issues.

Professor Venables: To take the first of those, as I said earlier, in thinking about an appraisal you obviously think about the mechanisms through which you think the project is going to affect well-being, ultimately. The way the report is organised, there are, first, the user benefits, which we have talked about, using standard procedures pretty well. The second is productivity effects, so the core of the department's wider benefit approach, connecting people, growing agglomerations, lots of robust evidence that that raises productivity. It is important—and this is coming from that report—to be very clear that these productivity effects can be realised in quite different ways. With Crossrail, it was about getting more workers into a place. We thought that central London was constrained, was not growing as it

should as an agglomeration because of lack of commuting capacity. That was getting more people in. That is one agglomeration effect.

Another mechanism would be that you have Leeds and Manchester; let us just make the firms a little bit closer to each other in economic terms by improving communications. That is different from taking all the workers from Leeds and putting them in Manchester; it is just making the places interconnect, the businesses interconnect better between those places.

So, within the wider benefits within the productivity story there are different mechanisms going on that the department needs to disentangle a bit in some of what it does, but that is going into the detail of the report.

There are the user benefits, the wider benefits and then the broader, less precise land use change, economic geography, location effects. If you really do trigger a lot of private investment in a place, do we think that transport can do that and, if it does, do we think it is of social value? Both of those are difficult questions, but I think they are a mechanism through which transport affects the economy and they should be thought about seriously in cost-benefit analysis and it is not in the core DfT approach.

The Chairman: Fine. Thank you very much indeed. It has been a very interesting session. Thank you for coming.