Thank you for your letter of 26th January regarding the House of Lords Economic Affairs Committee inquiry into the economic case for High Speed 2. I have set out the answers to your questions under the individual headings.

In providing these answers, I would like to set them in context of the extensive work done by the Department and HS2 Ltd to understand the strength of the HS2 Economic Case. We have conducted a wide range of sensitivity tests and quantified risk assessment that demonstrate our analysis is robust to a wide range of scenarios. We are confident our methodology is world-class – a view shared by a number of witnesses to the Committee – and it demonstrates that HS2 is high value for money.

(1) When you gave evidence to the Committee in January, you told us that the values of time used in the cost-benefit analysis were re-estimated in 2013 based on a study from the Institute for Transport studies. We understand that the Department has commissioned research to collect further evidence of business travellers’ willingness-to-pay for travel time savings.
   a. Why is this further work required to update the values of time?
   b. What are the purpose and terms of reference of the research?
   c. Will the revised values of time take account of time that can be spent working on a train?
   d. Who is undertaking this work on behalf of the Department?
   e. When is it expected to report?
   f. How will this research be implemented and will the benefit-cost ratio for HS2 be updated to reflect any changes?

In 2013 the Department revised down its business values of time to take account of the latest available evidence from the National Travel Survey on the earnings of business rail travellers. At the same time, a study from the Institute for Transport Studies confirmed that the values are consistent with existing evidence, including those which show how much business travellers are willing to pay for travel time savings. These reflect the fact people work on trains.
Travel time savings are a key element of the Economic Case for HS2, the Department is therefore committed to ensuring our approach remains world-class and as such we have set ambitious plans to further develop our evidence base, including our valuation of travel time savings. The large scale project currently underway will measure values of time through directly surveying both people and businesses to understand how they value travel time savings. We have commissioned the work from a consortium which includes Arup, the Institute of Transport Studies and Accent. This work will ensure that our values continue to reflect:

- People’s willingness to pay for quicker journeys;
- Behavioural changes, including any changes in the willingness of travellers to work whilst travelling; and,
- Developments in data and analytical techniques.

This project will build on our established, robust methods to deliver fully updated values. This will give us a greater understanding of the range of values across different journey characteristics and ensure they remain robust for use in the future.

The broad objectives of this research are to:

- Produce new, robust and reliable values from new survey evidence covering a range of modes;
- Extend the use of direct survey methods, previously used for non-work travel, to business travel time savings. Using this method will implicitly take account of the fact people work on trains;
- Explore the characteristics of people and the trips they make; and,
- Generate consistent estimates for the values of other journey improvements, such as improved reliability and crowding relief.

The research project is scheduled to report later in 2015. The report will pull together an analysis of all the survey data and will make recommendations on how findings can be incorporated into refreshed WebTAG guidance. Our intention is to consult widely on the findings of this research and on the appropriate changes to WebTAG over the rest of 2015, with the aim of incorporating changes in updates to WebTAG during 2016. We will continue to keep the Economic Case for HS2 under review and update as appropriate to take account of the latest evidence as it becomes available.

(2) The Department for Transport’s guidance says that a confidence interval of +/-25 per cent of the value of non-work travel time should be applied as a sensitivity analysis. In the analysis carried out for a lower non-work travel time value, why does the 2013 Economic Case not appear to apply a -25 per cent sensitivity analysis to the outcomes for non-work values of time?

Given the transformational and long-term impact of HS2, HS2 Ltd have undertaken detailed analysis of risk and uncertainty which included a quantified risk analysis as well as more simplified sensitivity analysis.

The data used for the HS2 risk analysis includes survey data on the distribution of potential values of time from which the Department derived the +/-25% recommendation. This means that the -25% sensitivity was implicit in the risk analysis conducted as part of the 2013 Case.

The risk analysis analysed the impact of many factors – including the non-work value of time – acting together on the returns to investment. This method guards against excessive
weight being placed on extreme outcomes and is considered a robust way of representing uncertainty in key variables such as the non-work value of time.

(3) In its assessment of the alternatives to HS2, the Strategic Case states that the “substantial disruption of the necessary infrastructure works counts heavily against these options.” How does the Department assess the disruption caused by different options, has the disruption expected from HS2 and the alternatives assessed in the Strategic Case been monetised and what was the result of any such comparison of the disruption? Does the Department make any use of the method developed by the Office of Rail Regulation for estimating the costs of planned disruption of services under the performance regime?

Similar to the approach taken for other schemes, the HS2 cost estimates include an allowance for disruption. Application of the method developed by the Office of Rail Regulation requires detailed information on the level of possessions required on the classic network, which did not exist at the time the business case was developed. Instead we have adopted an approach which approximates the ORR methodology, recognising interactions between construction of the infrastructure and the existing rail network. The alternative options assumed an uplift on scheme costs to represent revenue losses during construction. The Atkins report “Appraisal of Rail Alternatives to HS2” quantified the disruption for each alternative.

The strategic case also presents a qualitative assessment of disruption which demonstrates that the alternatives to HS2 are likely to require a significantly greater number of weekend closures.

(4) Statistics from the Office of Rail Regulation show that there were 9 million journeys from the North West to London in 2012/13. The number of journeys was derived from ticket sales data.
   a. What percentage of these journeys were made on a weekend or public holiday?
   b. What percentage of the 4.3 million journeys made between the North West and London in 1995/96 were made on a weekend or public holiday?

We do not have access to this information at the day level for 1995/96 and 2012/13. We are able to split the journeys by weekend or public holidays using the ticket sales database LENNON, which is managed by Rail Settlement Plan on behalf of train operators. However the data is only available for the last 400 days.

To provide the Committee with an indication of the split between weekdays and weekends or public holidays, we have analysed the date on which tickets were issued (which we are using as a proxy for when the journey was made) from the last 30 days for journeys between Manchester, Liverpool, Crewe and Preston and London. This showed that 80% of tickets were issued on weekdays and 20% at weekends or bank holidays.

(5) In your letter of 14 December 2014, you included a table in Annex A which showed average weekday rail trips between London and city areas. The combined 2010 demand for Birmingham to Central London, Manchester to Central London, Liverpool to Central London and Glasgow to Central London was an average of 18,700 journeys per day. In your earlier letter to me of 19 November 2014, the average number of daily passenger arrivals into London Euston on long-distance trains in the same year was 27,123. Can you explain the discrepancy between the two figures?

These two sets of figures are not directly comparable:

- The letter dated 19th November shows the actual total number of passengers on board train services arriving at and departing from London Euston.
- The letter dated 14th December 2014 shows modelled demand between London and one of seven origin or destination cities only.

The figures presented in the 19th November letter are passenger counts and include all passengers arriving on long distance services at Euston (which are operated by Virgin Trains), regardless of where or how they started their journey. This will include passengers that started their rail journeys on other operators’ services and transferred to a Virgin Trains service.

The figures in the 14th December letter show modelled demand for only journeys that began in one of seven cities\(^2\) and ended in central London or vice versa, not journeys that began or ended in any other location. For example the figure of 7,500 for journeys between Birmingham and London would exclude rail journeys between Birmingham New Street and Euston where passengers first travelled to New Street station from outside the city region using connecting rail services, other forms of public transport or a car.

Furthermore, the figures presented in the 19th November letter are designed to represent a typical weekday during school term time in the autumn whereas the statistics included in the 14th December letter represent an average weekday over the whole year. A typical autumn weekday will not necessarily be representative of passenger numbers and crowding at other times of year\(^3\).

(6) In your letter of 19 November 2014 you referred to charts in the Strategic Case for HS2 (Figure 2.17) which showed indicative passenger demand to seat ratios for 2026 on the West Coast Main Line. Does the demand in the chart for the Intercity Virgin Trains leaving Manchester Piccadilly include local traffic (for example, passengers travelling from Manchester Piccadilly to Stockport)?

The passenger demand in figure 2.17 of the strategic case document includes all passengers carried by the train operator(s) specified on the charts, so the chart for Intercity Virgin Trains will include passengers travelling from Manchester Piccadilly to Stockport on a Virgin train.

The capacity charts in figure 2.17 illustrate that with rising demand there will be a capacity challenge on both intercity and commuter services along the length of the West Coast Main Line, with freight demand also projected to rise. The West Coast Main Line is a mixed use railway and as it approaches its capacity limit, increasing one service type will involve unacceptable trade-offs against the others.

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\(^2\) Birmingham, Manchester, Leeds, Glasgow, Liverpool, Glasgow and Edinburgh

By moving long distance passengers on to the new high speed services, HS2 will free up capacity on the existing that can be used for commuter or freight services. Upgrades to the existing railway can only provide incremental benefits, and we are approaching the limit of how much additional capacity they can provide. Only HS2 can provide a step change in both intercity and commuter capacity that we will need to meet future demand.

(7) What flexibility do train operators have to implement dynamic pricing on trains as used by airline operators?

Train operators have the flexibility to introduce rail fares in a way similar to how airlines offer airfares. Advance fares are offered by train companies using yield management systems. Advance fares are a key rail success of recent years where we have seen huge growth. The sales of Advance tickets have increased from 8% of revenue in 2007/8 to 14% of revenue in 2012/13. Of all ticket sales in the UK, 15% of these in 2013 were on Advance Purchase fares.

As well as providing operators with the flexibility to introduce dynamic pricing, the Government regulates the price of certain types of rail fares, to protect passengers from fare rises and preserve the walk-up railway. These regulated fares include commuter fares, certain season tickets, day singles and returns. The Government sets the average maximum amount that the specified “basket” of regulated fares can increase year-on-year for each franchise. Operators can choose to raise their fares by a lower amount, although most operators will have assumed when bidding for their franchises that they will make full use of this headroom.

(8) The total cost of construction of HS2 in 2011 prices including contingency is expected to be £50 billion. What is the total budgeted cost in 2015 prices, taking into account relevant inflation between 2011 and 2014?

As David Prout highlighted when he appeared in front of the Committee, in order to ensure consistency across the programme, we are maintaining the prices for programme delivery in 2011 prices.

(9) The sensitivity analysis of the effect of lower demand growth on the cost-benefit analysis for HS2 applied a 20 per cent reduction to the demand cap. To what level is the benefit cost ratio reduced if there is a 20 per cent reduction in demand? Has the Department undertaken any sensitivity analysis of the effect of applying a reduction of greater than 20 per cent to the demand cap?

The Economic Case for HS2 represents variability in demand in two ways:
- Estimating the statistical uncertainty in key variables which influence demand growth such as GDP and the responsiveness of demand to changes in GDP and fares; and
- Varying the level of demand.

Our assessment of the statistical uncertainty demonstrates that the value for money of the scheme is resilient to a range of low demand growth outcomes. For example, in over 78% of scenarios modelled the Y-Network represents high value for money, with a benefit cost ratio of over 2.0.
When the level of demand is lowered by 20% (implying the demand cap is reached in 2027, only 1 year after the opening of Phase 1 of the scheme) the expected Benefit Cost Ratio for the full Y-Network would still be just under 1.5.

(10) Page 164 of the PLANET framework model report which accompanied the Economic Case for HS2 has a table which shows the average proportion of total weekly rail demand over 50 miles by journey purpose between 2006 and 2010. Tables ‘nts0407’ and ‘nts0317’, released alongside the National Travel Survey 2013, indicate that the Department holds the data required to calculate the average proportion of total weekly rail demand over 50 miles by journey purpose for 2009 to 2013.

a. Can you provide the Committee with this information?

The table below provides data from the National Travel Survey on the proportion of weekly rail travel by purpose for 2009-2013 for trips over 50 miles. Please note that to enable easier comparison with other data, particularly Question 11, we have represented the data in a comparable format in the table below:

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Weekday proportion (%)</th>
<th>Weekend proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>45</td>
<td>93</td>
</tr>
<tr>
<td>Commuting</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>Proportion of all journeys</td>
<td>78</td>
<td>22</td>
</tr>
</tbody>
</table>

Note: Table may not add due to rounding
Source: National Travel Survey

b. Using the same data, it should also be possible to provide the average proportion of total weekly rail demand over 100 miles by journey purpose for the period 2009 to 2013 and the period 2006 to 2010. Can you provide the Committee with this information?

The table below provides data on the proportion of weekly rail travel by purpose for 2006-2009 and 2009-2013 for trips over 100 miles.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>2006-2009</th>
<th>2009-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekday proportion (%)</td>
<td>Weekend proportion (%)</td>
</tr>
<tr>
<td>Business</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>55</td>
<td>93</td>
</tr>
<tr>
<td>Commuting</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Proportion of all journeys</td>
<td>76</td>
<td>24</td>
</tr>
</tbody>
</table>

Note: Table may not add due to rounding
Source: National Travel Survey

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4 The committee should note this data covers trips by residents of England only - from 2013 the National Travel Survey coverage changed to residents of England only, rather than the 2006-2010 data which included Great Britain.

5 This shows the weekday proportions totalling to 100%, and the weekend proportions also totalling to 100%. The proportion of journeys made on a weekday and on a weekend are then shown in the final line.

6 The 2006-2010 data includes trips by residents of Great Britain whereas the 2009-2013 data is restricted to trips made by residents of England only.
These tables of course should be considered in the context of a rail market where there is strong growth in the overall number of trips, so a reduction in the proportion of trips does not necessarily mean a reduction in the overall number of trips being made. For example, the National Travel Survey also shows that between 2002 and 2013, the average number of rail business trips travelled per person per year increased by 53%.

These tables also cover all rail markets. HS2 is designed to link urban centres and support economic growth. We have conducted some analysis of the National Travel Survey to look specifically at areas served by HS2.

The table below shows long distance surface rail journeys\(^7\) between London and specific regions, 2002/2013 (weekdays only). This shows more trips made for business purposes than for the network as a whole.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>39%</td>
<td>38%</td>
<td>40%</td>
</tr>
<tr>
<td>Other purposes</td>
<td>40%</td>
<td>44%</td>
<td>49%</td>
</tr>
<tr>
<td>Commuting</td>
<td>20%</td>
<td>18%</td>
<td>11%</td>
</tr>
<tr>
<td>All purposes</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: National Travel Survey

(11) For the purposes of forecasting demand for HS2, a base level of demand for 2010 has been estimated.

a. What base demand level for 2010 has been assumed?

b. What proportion of the 2010 base demand does your modelling estimate to be journeys undertaken for:
   i. Business?
   ii. Commuting?
   iii. Leisure?

c. The demand model caps growth when the number of trips equals 290,146 trips on HS2. It estimates that this will happen in 2036. What proportion of these 290,146 trips in 2036 does your modelling estimate to be journeys undertaken for:
   i. Business?
   ii. Commuting?
   iii. Leisure?

The demand forecasts have been undertaken using a model known as the PLANET Framework Model (PFM). Only a certain subset of rail trips are modelled by PFM which makes comparison with other data sets problematic.

The Committee should also note that the journey purpose splits in PFM are based on the National Rail Travel Survey, not the National Travel Survey. More information about the methodology can be found in an information note the Department provided the Commons.

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\(^7\) Defined as over 50 miles, though in practice the majority of trips will be over 100 miles given the distances of the regions from London.
Transport Select Committee, which can be found here: http://data.parliament.uk/writtenevidence/WrittenEvidence.svc/EvidencePdf/4225.

With this in mind the table below shows the total number of daily weekday rail trips held within the PLANET model that are over 100 miles for 2010 are:

<table>
<thead>
<tr>
<th>Daily Weekday Trips over 100 miles within the PFM model</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>39%</td>
</tr>
<tr>
<td>Leisure</td>
<td>46%</td>
</tr>
<tr>
<td>Commuting</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>162,000</td>
</tr>
</tbody>
</table>

In answering the second part of the Committee’s question, I would like to point out that the demand model caps growth at the year nearest to when the forecast number of national rail over 100 miles reaches 290,146 without HS2. We cannot therefore answer the committee’s question as posed, as the 290,146 journeys are on the classic network, and HS2 is assumed not to exist. However, we are able to provide the committee with information about both the “with HS2” and “without HS2” scenarios.

As with the base year information, the 2036 forecast do not include every long distance rail trip in the country and thus these values should not be compared to other data sources.

<table>
<thead>
<tr>
<th>Daily Weekday Trips over 100 miles within the PFM model</th>
<th>2036 (without HS2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>40%</td>
</tr>
<tr>
<td>Leisure</td>
<td>46%</td>
</tr>
<tr>
<td>Commuting</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td>288,000</td>
</tr>
</tbody>
</table>


On HS2 itself we forecast the proportions of different journey purposes as follows. Note that these are not directly comparable to the table above as some passengers on HS2 will be making journeys that are less than 100 miles, particularly on Phase 2.

<table>
<thead>
<tr>
<th>Journey Purpose of HS2 Passengers in 2036</th>
<th>Phase 1</th>
<th>Phase 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>50%</td>
<td>45%</td>
</tr>
<tr>
<td>Leisure</td>
<td>39%</td>
<td>41%</td>
</tr>
<tr>
<td>Commuting</td>
<td>11%</td>
<td>14%</td>
</tr>
</tbody>
</table>

While not directly comparable with the other figures provided, and allowing that some journeys will be less than 100 miles, the projections do suggest there will be a higher proportion of business travellers on HS2 than on the classic network in the base year and the without HS2 scenario. I am aware that some quarters have challenged what they consider to be unrealistic increases in business travellers. However, I would suggest that an increase in business travel is precisely what is to be expected from a railway which is designed to significantly reduce travel times between major urban areas, and therefore major business centres.
Phase One directly links the Capital with the second city, slashing the journey time from 1 hour 21 minutes to only 0:49 minutes – a time comparable to crossing the capital by tube. I consider it completely credible that such a dramatic change in connectivity between two cities would stimulate more business journeys, given that the opportunity cost of the travelling time for such trips will be an important consideration for businesses.

For Phase Two, the projected proportion of business passengers is within 5 percentage points of the level of business travel already observed between London and the Midlands and North West (as set out in Question 10). With journey times to Manchester and Leeds from London nearly halved, Manchester brought closer to London in terms of journey time than Birmingham is today, and increasing the connectivity between the North and Midlands. Again I consider this uplift to be completely credible and indeed to be expected.

(12) The Office of Rail Regulation rail statistics show that journeys on franchised long-distance train operators increased from 77.2 million journeys per year in 2002/03 to 129 million journeys per year in 2013/14. These statistics are derived from ticket sales data.

  a. Would a ticket purchased for a journey from Macclesfield to Manchester Piccadilly be counted in part as a journey on Virgin Trains and therefore counted in the statistics quoted above?
  b. Would a ticket purchased for a journey from Milton Keynes to London be counted in part as a journey on Virgin Trains and thus counted in the statistics quoted above?

Where there is a choice of operator, ticket sales are allocated between operators using a model known as ORCATS (Operational Research Computerised Allocation of Tickets to Services), which is also used for allocating revenue between operators. ORCATS is a mathematical model which uses a similar logic to journey planning systems and identifies passenger ‘opportunities to travel’ between stations using timetable information and a range of other information including journey time, waiting time and sales data from the previous year.

For example, for journeys from Euston to Milton Keynes, customers can purchase a Virgin Trains only ticket, a London Midland only ticket, and a ticket valid on both services. The Virgin and London Midland only ticket sales will be allocated directly to the relevant operators. For tickets valid on both, a proportion of journeys will be allocated to Virgin Trains and a proportion to London Midland.

(13) The Economic Case for HS2 states that the average year-on-year growth rate from 1994 to 2012 on long-distance rail was 4.9 per cent. A long-distance rail journey is defined as one that is longer than 50 miles. What has the average year-on-year growth rate been for journeys greater than 100 miles over the period 1994 to 2012?

The average growth figure of 4.9% per year for long distance rail quoted in the Economic case for HS2 is for journeys made on long distance operators’ services rather than for journeys over 50 miles.

The National Travel Survey provides information on the number of rail journeys of different lengths (although these figures are from survey data regarding journeys made by people resident in England so are not directly comparable to the totals from ticket sales data).
This shows an average growth figure of 4.3% a year for trips over 50 miles between 1995-97 (the earliest data available) and 2013, and 4.8% a year for trips over 100 miles. This compares to average growth of 3.7% a year for the overall number rail trips recorded in the National Travel Survey over this period. This evidence also shows that demand for long distance rail travel has grown strongly, both for journey over 50 miles and 100 miles.

I hope that these answers have helped the Committee in their enquiry. I am confident that the Economic Case for HS2 is robust - if anything our methodology underestimates the benefits of a transformational scheme like HS2. However, the case for HS2 goes beyond a cost-benefit analysis, important though that is. This is a once in a generation opportunity to transform the rail network, driving growth and re-shaping the economic geography of the country.

THE RT. HON. PATRICK McLoughlin