

# Submission to the Transport Select Committee Inquiry on High Speed Rail

(Accepted 2 June 2011)

16 May 2011

## 1. Context and aims of the submission

- 1.1. Wendover HS2<sup>1</sup> (WHS2) welcomes the opportunity to present evidence to the Transport Committee. We focus on the HS2 business case, regional impacts and the effect on the conventional rail network.
- 1.2. The case for HS2 is presented by the Government as: “**When not If**” - although the demand to support the new line has receded from 2033 to 2043. The rail report by Sir Roy McNulty suggests greater existing capacity utilisation and efficiency; a new line provides neither without network rationalisation.
- 1.3. Analysis of actual numbers in the business case (given in spreadsheets released only on 13 April) indicates that we should be asking instead: “**Where and How?**” There might be a strong national case for new high speed lines integrated into the rail network rather than superseding it. The current route design seems to be about supporting airports rather than delivering UK-wide regional benefits.
- 1.4. The rhetoric around HS2 has now shifted to the concept of “**transformational**” benefits and “**once in a generation**” opportunities. Analysis shows that HS2 delivers 88% of its benefits after 2043, so it offers in practice a **once in a next but one or two generation opportunity**. Can we bring forward the benefits of any new high speed/capacity lines? How certain can we be about the growth impact?

## 2. Detailed conclusions

- 2.1. **£60.25bn (2009 prices) will be required to construct and renew the HS2 Y-network.**
  - 2.1.1. In the peak construction years, the average annual cost will be £3.3bn in 2009 money.
  - 2.1.2. The Y-arm costs look low compared to Stage 1, despite their longer length and need for 4-6 stations.
- 2.2. **Under the current proposal, major regions with 76% of demand will not be properly served till 2033.**
  - 2.2.1. Serving more population centres minimises demand risk since the route is available to more cities.
  - 2.2.2. Stage 1 deliberately avoids major population centres – possibly to maximise speed.
  - 2.2.3. Alternative route options, which deliver greater national benefits sooner, have been discarded.
  - 2.2.4. Benefits north of Preston and Leeds may be negative, due to more crowding and slower services.
- 2.3. **The route seems to favour private airport operators at the expense of regional development.**
  - 2.3.1. Only 0.8% of HS2 Y-stage passengers use Heathrow (2,000 daily).
  - 2.3.2. Air shift to HS2 (on an unconstrained model) at best moves 88 domestic to long-haul flights per day.
- 2.4. **Move of base year to 2043 from 2033 is dictated by the need to have a doubling of passengers.**
  - 2.4.1. The sophisticated forecast predicts that there was no rail travel outside London before 1975.
  - 2.4.2. An extra 70,000 new rail passengers need to travel over the inflated base demand of 170,000.
  - 2.4.3. An obsolete long-distance demand elasticity continues to be used. This overstates demand by 34%.
  - 2.4.4. Impact on road demand is minimal, e.g. 1,300 per day fewer cars between Manchester and London.
- 2.5. **Most passenger benefits are not gained till after 2043.**
  - 2.5.1. Only 12% of business passenger benefits occur before 2043.
  - 2.5.2. Even in Present Value terms, only 26% of benefits are gained before 2043.
  - 2.5.3. Most Regions see little benefit till 2033 – this delays any transformational benefits for 76% of users.
  - 2.5.4. Business travellers in 2092 need to be nearly four times richer than their 2009 ancestors.
- 2.6. **HS2 will drain the UK conventional network of £5.8bn per year**
  - 2.6.1. Cuts of up to £1bn per year (2009 money) are planned once the Y-arms open.
  - 2.6.2. A 2030’s Treasury may further cut residual conventional networks (Beeching 2.0?) to pay off debt.
  - 2.6.3. A pension fund buying the annual HS2 surplus in 2043 might pay £8bn - requiring a £76bn write off.
- 2.7. **Transformational impact is claimed but not substantiated**
  - 2.7.1. Many projections confuse cause and effect in estimating the benefits from rail on local productivity.
  - 2.7.2. The majority of transformational gains will occur after 2043, as they are linked to passenger benefits.
  - 2.7.3. Identifiable additional benefits are rising land prices next to stations and housing developments.

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<sup>1</sup> **Wendover HS2** was formed in April 2010 at a public meeting held in response to HS2 proposals published on 10 March 2010. It is not specifically opposed to higher speed rail as a general concept but it is opposed to construction of high speed lines in the Chilterns Area of Outstanding Natural Beauty (AONB) as it believes that an overwhelming national interest case has not been made and alternatives have not been adequately considered. For more information, please contact Wendover HS2 at [www.wendoverhs2.org](http://www.wendoverhs2.org) or mail to [wendoverhs2@btinternet.com](mailto:wendoverhs2@btinternet.com) or call 07774 831967.

### 3. Is there really a rail demand issue?

- 3.1. Network Rail’s Route Utilisation Strategy of December 2010 stated that, with planned improvements like the new trains now arriving, the projected standing on weekday trains is as in Exhibit 1.

**Exhibit 1: forecast trains with standing passengers in 2024 on the West Coast Main Line**

|                | Glasgow | Birmingham | Manchester | Liverpool |
|----------------|---------|------------|------------|-----------|
| Crowded trains | 16.1%   | 1.0%       | 5.4%       | 2.9%      |

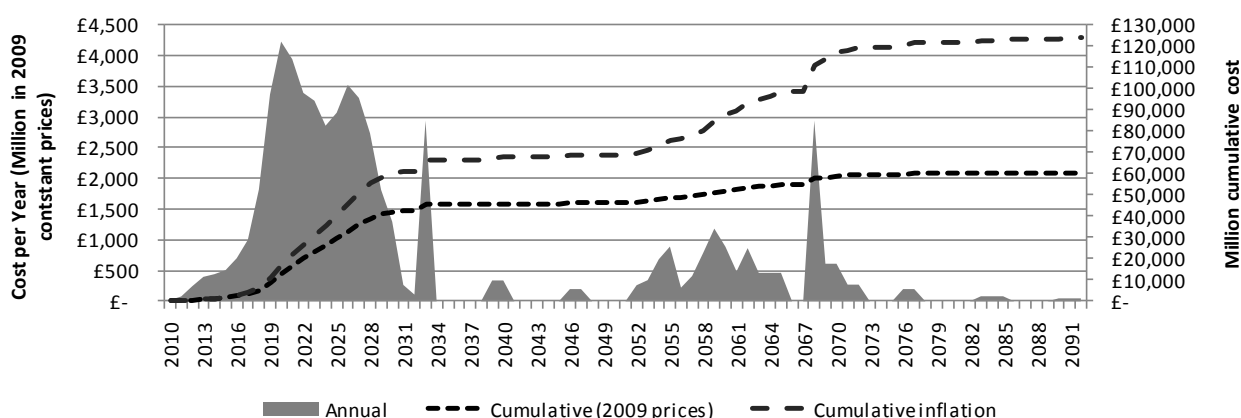
Source: Figure 4.6 Page 71 West Coast Main line Route Utilisation Strategy

- 3.2. HS2 Ltd (HS2L) say the line is at capacity and solutions other than HS2 are “extraordinarily expensive”.
- 3.3. There is clearly a commuter problem into Euston now - which will get worse medium-term even if HS2 goes ahead. This needs immediate expansion of Euston, not a new rail line in 2026.
- 3.4. We support the work on Rail Package 2 (RP2) and Scenario B done by HS2 Action Alliance (HS2AA) and support its conclusion that incremental removal of bottlenecks would be cost effective. The upgraded Chiltern Line could take more Birmingham traffic, freeing WCML train paths on the southern section.
- 3.5. However, in the event that HS2 is built as the Government proposes, what is its real national impact?

### 4. What are HS2’s real costs?

- 4.1. Building HS2 is stated to be affordable for £2bn per year. It is also claimed that it will not affect other rail investments. These are policy matters but we can look at the cash required.
- 4.2. The cost of HS2 in 2009 money (including indirect taxes) is shown in Exhibit 2. Including renewal costs, this is £60.25bn at 2009 prices, before inflation. Inflation could push costs to £66.6bn by 2033.

**Exhibit 2: cost profile of construction.**



- 4.3. The cost per Parliament is shown in Exhibit 3. This uses 2009 prices and also shows an inflation adjusted price – the Treasury budget. Note that the budget in the HS2L spreadsheets is £1.3bn for this Parliament, possibly £1.6bn with inflation; the cost announced in December 2010 was £750m.
- 4.4. The HS2 predicted expenditure will average **£3.3bn** annually from 2019 though to 2028.

**Exhibit 3: potential HS2 expenditure (£ million) by Parliamentary term**

| Parliament | 2009 costs     | Inflated costs |
|------------|----------------|----------------|
| 2010-15    | £1,357         | £1,636         |
| 2015-20    | £9,866         | £12,761        |
| 2020-25    | £16,886        | £24,041        |
| 2025-30    | £13,249        | £21,214        |
| 2030-35    | £3,744         | £6,818         |
|            | <b>£45,101</b> | <b>£66,471</b> |

- 4.5. The cost to 2035 of the Y-arms may be an underestimate. The cost of Stage 1 is £20.3bn and the cost of the Y-arms is £14.7bn in 2009 money (excluding the £3.9bn Heathrow link and £6.3bn for trains).
- 4.6. The Y-arms are c 50% longer than Stage 1, yet costs are 27.5% lower. With no details of the Y-route till after the current consultation, these values cannot be scrutinised. This is a major risk.
- 4.7. The Y-arms presumably involve building at least 4 stations<sup>2</sup>, maybe 6 if external Manchester airport and Leeds-York city interchanges are built by analogy with Birmingham proposals.
- 4.8. We expect major Y items to equal the high costs of Stage 1 Euston rebuilding and London tunnels.

<sup>2</sup> Manchester, East Midlands, West Yorkshire, Leeds. A new station at Preston is also a possibility.

## 5. Why is HS2 so slow to meet the highest regional demand levels?

- 5.1. The pattern of forecast demand calls into question the current route strategy (Exhibit 4). Looking at core rail demand (ignoring modal shifts), 67% of forecast passengers (to and from London) are from the North West, Yorkshire and Humberside, North-East and East Midlands. Scotland adds a further 9%:

**Exhibit 4: potential base-load rail demand to and from London in 2043**

| Region            | 2043 demand | %   |
|-------------------|-------------|-----|
| Scotland          | 23,008      | 9%  |
| North East        | 17,794      | 7%  |
| North West        | 61,537      | 24% |
| Yorks and Humber  | 41,948      | 16% |
| West Midlands     | 60,844      | 24% |
| East Midlands     | 52,460      | 20% |
| Total rail demand | 257,591     |     |

- 5.2. This means that 76% of projected demand is not properly served till the Y is built in 2033, assuming the project runs to schedule. The West Midlands with only 24% of demand gets a 7-year head-start.
- 5.3. We note that significant parts of the East Midlands are not served by HS2 current routes. Spending on conventional services is planned to be cut by up to £1 bn per year (2009 prices) from 2033.
- 5.4. If the aim was to invest in the regions and RP2 or Scenario B was rejected, a direct M1 route with an arm to Manchester and spur to Birmingham would appear to be a more logical choice. The distances are roughly the same but any transformational economic impacts could be greater and come sooner.
- 5.5. If a new line is built, it makes sense to maximise cash fares by serving major population centres. Stage 1 deliberately avoids population centres, like Milton Keynes and Luton, which might benefit.

## 6. Is HS2 really about boosting Birmingham and London airports?

- 6.1. The Y-route air demand model for 2043 shows that 25% of air passengers might opt to take HS2: 13,155 passengers, of whom 9,199 travel direct to London, the others to and from the South East. This is using an unconstrained air demand model, so may exaggerate the likely numbers.
- 6.2. This frees only c 88 takeoff and landing slots, allowing 88 long-haul flights – which are more profitable for operators but generate much more CO<sub>2</sub>. However, only a proportion of flights saved will be at Heathrow. Most slots are freed at Gatwick, Stansted and Luton - where low-cost airlines will compete.
- 6.3. The March 2010 estimate is that only 2,000 HS2 passengers per day (0.8% of 2043 travellers) will use Heathrow, even with an HS2 Heathrow station. The HS2 link costs £3.9 bn in 2009 money.
- 6.4. However, why funnel regional demand via Heathrow rather than developing strong regional airports like Manchester? This is favouring a southern private airport over regional growth.
- 6.5. Effects on regional airports are not measured. One theory for the HS2 Stage 1 route is to boost Birmingham as the fifth London airport. If so, this needs to be explicit; it is not in the consultation.

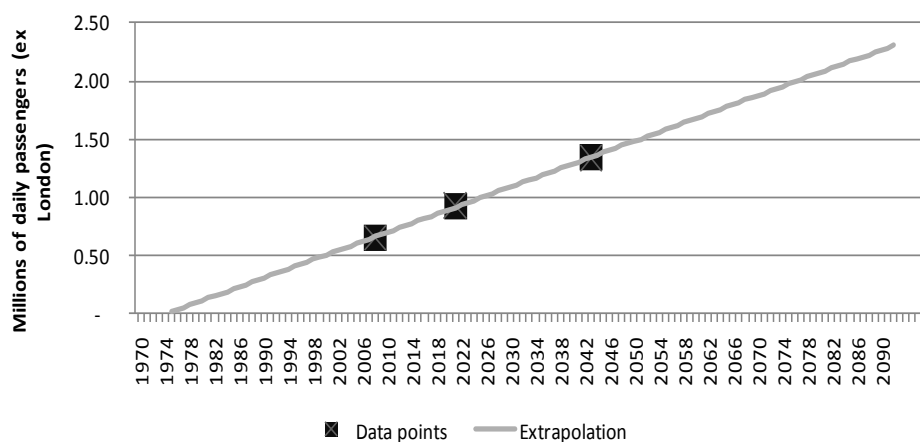
## 7. Are HS2 demand projections realistic?

- 7.1. The predicted number of HS2 passengers between London and the regions is shown in Exhibit 5. We asked for, but have been denied, specific journey forecasts from HS2L. HS2L say they do not hold the data and have no interest in it. Exhibit 5 is derived from regional demand forecasts.
- 7.2. HS2L only project forecasts for two individual years: 2021 and 2036, based on a 2008 base year. The 2036 figures were extrapolated to 2043.
- 7.3. A model should be capable of extrapolating the past to be certain of having some future relevance. Unfortunately, a linear back-extrapolation of HS2L forecasts (Exhibit 6) predicts that rail travel outside London started in 1975. Such a test is over-simplistic, but investigating the historic validity of the model is important. How can it predict 34 years of growth if it cannot replicate the previous 33?
- 7.4. HS2 chose its target forecast year, 2043, on the basis that it provides enough demand to justify the project. This requires a doubling of demand from the 2008 base year. The previous target year of 2033 was linked to WebTAG guidance designed to limit forecasting errors; these rise with duration.
- 7.5. Forecasting of large projects is complex in operation but the core idea is a simple multiplier of GDP by an elasticity (a fixed multiplication factor). With HS2, the long-term GDP per capita growth agreed with DfT (once Treasury forecasts expire), is 1.91%. GDP forecasting one year ahead is highly uncertain.

**Exhibit 5: Potential HS2 passengers regional-London HS2 use in 2043**

| Classic       |              | S1             | Y-extra        | Total          |
|---------------|--------------|----------------|----------------|----------------|
| 49,372        | London       | 83,000         | 68,666         | 151,666        |
|               | Other        | 16,270         | -              | 16,270         |
|               | New rail     | 29,929         | 26,624         | 56,553         |
|               | Air switch   | 4,990          | 4,209          | 9,199          |
|               | Car switch   | 3,811          | 2,501          | 6,312          |
| <b>49,372</b> | <b>Total</b> | <b>138,000</b> | <b>102,000</b> | <b>240,000</b> |

**Exhibit 6: Linear extrapolation of growth production to HS2L base and predicted growth years.**



- 7.6. The HS2 business case requires a steady UK GDP growth to 2092 giving £104,865 per capita (up 348%) and possibly a population of 93m.<sup>3</sup>
- 7.7. HS2L is still using an outdated elasticity measure for long-distance demand growth relative to GDP (PDFH 4.1). It has been estimated by HS2AA that this old elasticity may be overstate demand by 34%. The new standard was ready for use in April 2010 but the Secretary of State has not approved its use.
- 7.8. If demand fell by 34%, the BCR of the Y-case (excluding economic benefits) could fall to 0.81 from 1.78.
- 7.9. The method also depends on a tight relationship between GDP growth and rail use. The correlation between GDP and growth on the WCML is 0.45<sup>4</sup>. The correlation for UK rail growth was 0.26. A period of growth covering a major service upgrade is not a reliable basis for an ultra-long-term extrapolation.
- 7.10. The predicted 2043 drop in national road use (outside London) due to HS2 is 0.35%. Some bigger regional percentage falls are expected, e.g. between London and the North West an 18% fall might occur by 2043, but this is only 1,300 fewer car journeys and would be swamped by local traffic.

**8. Passenger Benefits - the profit gain to the employers of very rich business travellers after 2043**

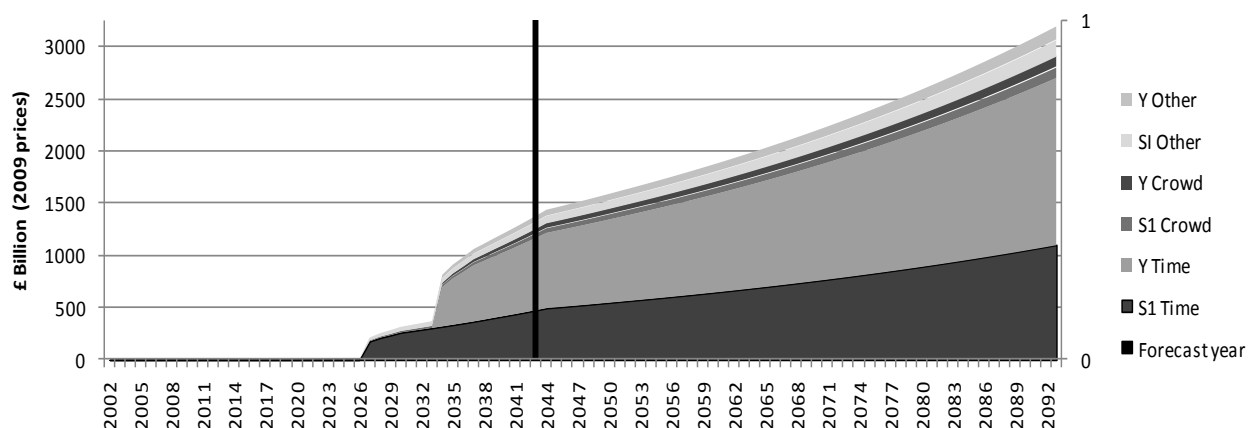
- 8.1. Passenger benefits are monetarised but have no direct relationship to actual cash. They form the biggest identified benefits, so if HS2 is transformational, these must be the main engine of change. For this section, we focus on business passenger benefits, as these feed into wider economic impacts.
- 8.2. The benefits are shown in Exhibit 7 rising to £3.2bn in 2092 (2009 money). In theory, these are direct productivity gains experienced by employers at 2009 prices. The Stage 1 (S1) and Y-arm benefits are separate rows. Although the number of Y-arm passengers is lower than in Stage 1, they travel longer distances so have a higher monetarised time gain. Leisure benefits are £1.4bn in 2092.
- 8.3. However, Y-arm passengers may get even better journey times if the route is in a direct M1 corridor. HS2L has not explored this aspect as the route option has not been assessed.
- 8.4. The distribution of benefits is heavily skewed to the years after 2043: 88% of the total. Hence, today's taxpayers are being asked to fund a scheme to meet the supposed needs of richer, post-2043 business travellers. The Present Value of the post-2043 benefits is 74% of the overall benefit PV. Some 87% of Leisure benefits are also gained after 2043. This is a high level of altruism for 2011 taxpayers.

<sup>3</sup> The population series stops in 2037 but we extrapolate to 2092 using the last 0.48% pa growth value. GDP growth per capita from 2051 is 1.91%.

<sup>4</sup> 1 is perfectly correlated and 0 is no link; the figure implies that at least half the variation is due to other factors. In other words, historic evidence shows no tight GDP-Rail growth link, yet this is the basis of HS2L's 83 year forecast.

- 8.5. There may be severe disbenefits to passengers north of Preston and Leeds who could suffer lower speeds on non-tilting classic-compatible HS2 trains with fewer seats and worse connections.

**Exhibit 7: Business Passenger benefits from HS2 travel**



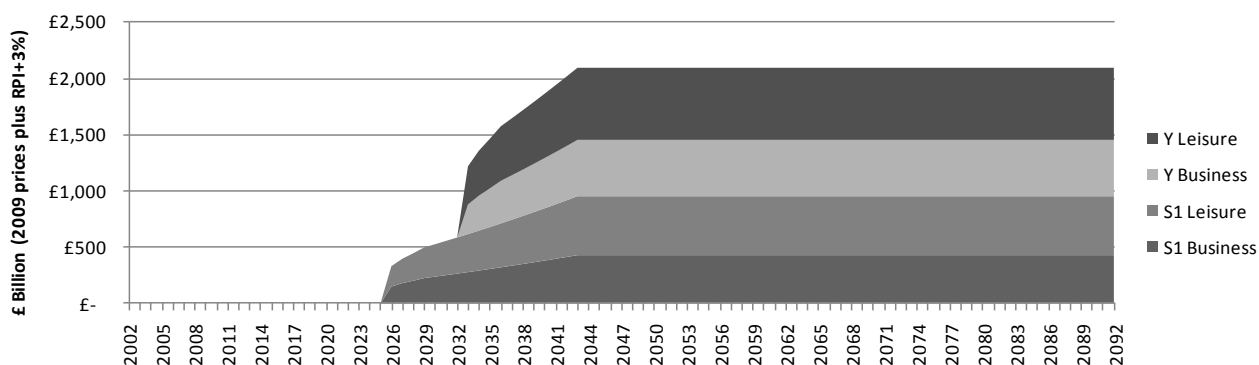
**9. Over-valuing time - should HS2 be more cautious in its very-long term GDP growth assumptions?**

- 9.1. All passenger benefits are based on the Value of Time (VoT). VoT is based on surveys from the 1990's based on 2002 prices and adjusted for both the real growth in wages to 2009 and for inflation.
- 9.2. The business VoT 2009 is £48.64 per hour, equal to an employment cost of £94,856 per year estimated as a pre-tax salary of c £62,000. This is in the top income range for the UK.
- 9.3. This value is grown in real terms based on the DfT economic forecast of GDP for the century. By 2092, the business passenger's salary has risen to maybe £240,000 (2009 money) - a 291% real pay rise.
- 9.4. These intangible passenger benefits might be mostly illusory. Many business travellers work on trains and many travel outside standard office hours to get to and from meetings. The VoT assumes that 100% of the business passenger benefit translates into improved productivity, and thereby GDP.
- 9.5. If Business VoT is only £18.48 p.h., assuming 50% of time is either productive or wasted, the business benefit PV drops from £25.6bn to £16.3 bn. The Y-route central case BCR (no economic impacts) falls to 1.34 from 1.78. The effect is mitigated by both VoT rises and the effect of discounting.
- 9.6. If VoT is constant from 2011, the BCR becomes 0.89; if passengers also fall by 34%: the BCR is 0.41.

**10. HS2 will drain the UK conventional network of £5.8bn per year in fares.**

- 10.1. Fare revenues are only recognised from new customers. Exhibit 8 shows the revenues. Fares are as in 2002, updated by inflation adjustment to 2009, and also increased by standard rail price rises, now RPI+3%. The 2043 annual revenue is £2.1bn in 2009 money.
- 10.2. As it captures most high-paying passengers, HS2 also strips £5.8bn from the WCML, ECML and MML combined. As a rough estimate, the HS2 franchise could have total fare income of £7.9 bn in 2043.

**Exhibit 8: HS2 incremental fares at 2009 prices**



**11. What effect might HS2 have on the efficiency and value of the residual network?**

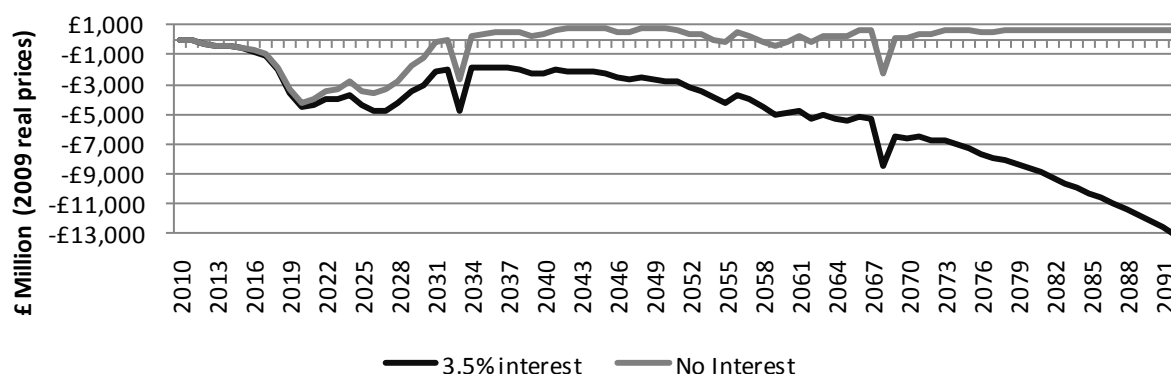
- 11.1. The simple answer is that no one knows. HS2 claims a further benefit through cuts of up to £1bn in conventional services. There are promises of improved local services.

- 11.2. The HS2 case relies on squeezing 240,000 passengers down one set of twin track rails into and out of London. Technically, we understand it is feasible if computer-based in-cab signalling works, if all trains are totally reliable and if enhanced braking systems are developed to allow shorter train headways.
- 11.3. This seems a fragile basis for a transformational rail link. On HS2, one failed train in rural Buckinghamshire would bring services between London and the North to a grinding halt.
- 11.4. We assume a subsidy of £5.3bn to support the residual network. This may be an underestimate as few normal businesses can survive a massive demand fall off - especially faced with high fixed costs.
- 11.5. A 2030's Treasury nursing a £66.6bn bill may ask why residual services should be supported. Kent has seen other services become slower and worse due to HS1. HS2 could trigger **Beeching 2.0**: why maintain massive over-provision in rail systems that might be 30-50 years old at that time?
- 11.6. HS2 also has a very restrictive Y- design operating service pattern, linking only favoured cities and London, with little inter-connectivity. It is designed to be separate from conventional services (other than some Scottish services). This severely restricts network effects but benefits London again.

## 12. What financial impact might HS2 have on national finances?

- 12.1. We have done a possible cashflow for HS2, Exhibit 9. The average surplus cashflow from 2043 is £425m. If a pension fund bought the revenues in 2043 (as with HS1), they might pay £8bn requiring a £76bn debt write off (assuming 3.5% debt interest).
- 12.2. HS2 cannot cover debt interest – so an interest-free subsidy is needed. Even with that, it would still “owe” c £20bn by 2092 (in 2009 money).

Exhibit 9: HS2 full project cashflows



- 12.3. Based on the fare elasticity reported in March 2010, we estimate that a revenue-maximising HS2 franchise holder would increase business fares by at least 30% and leisure fares by 10%. This maximises revenues but diminishes the implied benefits, as passenger numbers will fall.
- 12.4. The operator might expect profits of over £400m in 2009 prices even if fares are not optimised.

## 13. Where is the hard evidence that HS2 can be nationally transformational?

- 13.1. Massive regional benefits are assumed by bodies like Centro, Northern Way (now defunct) and Greengauge 21. Professor Graham (Imperial College) notes<sup>5</sup> that we cannot be certain whether rail drives productivity or if rail is built to serve areas of high productivity. Benefits claimed by regional transport lobby groups could be illusory.<sup>6</sup> Using Graham's estimates, HS2 Stage 1 might deliver £8m pa of benefits. Even scaling up and adding GDP growth, this is only £266m PV, c £19m pa in 2043.
- 13.2. Professor Banister (Oxford Transport Unit<sup>7</sup>) notes that the only extra measurable benefits are higher land prices and housing. This is very localised near new stations. Most Stage 1 jobs are in west London.
- 13.3. Greenfield development in the east Birmingham greenbelt, in Wilmslow outside Manchester (assuming an airport station), at any external Leeds-York station and between Derby and Nottingham could drive the relocation of businesses, pressurising the local infrastructure. These businesses will often relocate from local areas made less-favourable by HS2, so net job creation may be minimal.

<sup>5</sup> Graham, DJ and Kender, JV. Estimating the agglomeration benefits of transport investments: Some tests for stability. OECD discussion paper 2009-32 December 2009. This effect is termed reverse causality. Uncertainty in elasticity values is also a limiting factor and variables are often correlated.

<sup>6</sup> Laird, J. and Mackie, P. Review of Methodologies to Assess Transport's Impacts on the size of the Economy. Leeds University Institute for Transport Studies. September 2010. This was a validation study commissioned by the Northern Way.

<sup>7</sup> Banister, D. and Thurstain-Goodwin, M. Quantification of the non-transport benefits resulting from rail investment. J. Transport Geography. 2011: 19; 212-223.