



The case against HS2

In a speech to the Railway Study Association, Chris Stokes put the arguments against building a new high-speed line to the North

The debate about High Speed 2 has become increasingly polarised, with emotional arguments on either side, and, in some cases, personal attacks on twitter and elsewhere. Yet there are major issues to discuss before the country commits to funding a £33 billion scheme at a time of great austerity, and it is to be hoped that transport industry professionals are able to step back and consider the pros and cons of the project objectively.

To start with the background to the project, Britain had for years only been an interested observer of high speed in Japan, France and elsewhere. One of the first people to raise its profile for Britain was the late Sir Alistair Morton when he was Chairman of the short lived Strategic Rail Authority. He initially suggested a new railway for freight; I worked at the SRA at the time, and ironically, given my fundamental doubts about HS2, we persuaded Sir Alistair that a new high speed passenger line would make more sense. The reasons were that freight flows were much more dispersed (Euston is not a major freight terminal!) and a high speed route would generate additional revenue, as well as potentially freeing up capacity for freight on the existing network.

I think this analysis remains correct – if there is a requirement for a step change in

trunk route capacity, high speed is the logical way to deliver this. But I would argue that the capacity case for 'new lines' has not been made, and the business case doesn't stack up.

Regeneration case shaky

Despite Sir Alastair Morton's advocacy, the Eddington report argued against high speed rail (HSR), on the basis that inter-city journey times in Britain were good – they generally are, to and from London – and there was a much better case for incremental improvements, particularly in congested areas. The Labour government's 2007 White Paper was also at best lukewarm about high speed, but the Liberal Democrats, and then the Conservatives, started to advocate a high speed line. This was in part related to the politics of the debate on a third runway at Heathrow. The Tories sought to argue that a high speed line would substitute for a third runway, although this doesn't stand up to even the briefest analysis.

The consensus was complete when Lord Adonis, an unashamed enthusiast for major rail investment, became Secretary of State, and all three parties went into the last election supporting HSR. It does look alluring to the politician on the Clapham omnibus (or in the standard class coach). On the face of it, high

speed delivers economic benefits, has a good business case, is green, and meets ever rising rail demand: it's a sexy, dynamic legacy project.

But increasingly the arguments don't stack up. On regeneration, I know of no serious academics who support the view that HSR will significantly reduce the North-South divide; most research indicates that the dominant 'hub' city benefits more than regional centres, and in the regions the impact is likely to be a zero sum game. A Leeds HSR station would probably be surrounded by shiny new office blocks, but investment in West Yorkshire would be focused there, and the relative decline of Bradford would accelerate.

The HS1 precedent is not encouraging. Professor Vickerman of the University of Kent told the Transport Select Committee last year: 'Obviously, if you feel that something is going to do good for you, you big it up. We saw that with HS1 in Kent as well, as to all the effects it was going to have. I have to say, they are not visible to the naked eye'. Also, do visit Stratford International – great for the Olympics, but an embarrassing desert before and since. From the statistics published by ORR for 2010/11, it was the 895th busiest station on the network, below places like Penrith and Wendover.

Evidence from other countries is unconvincing too: Spain has the largest high



Artist's impression of HS2 crossing the Birmingham and Fazeley canal. Courtesy HS2 Ltd

speed network in Europe – and the highest unemployment.

Poor BCR

The business case for Phase 1 has progressively deteriorated, from a Benefit Cost Ratio (BCR) of 2.4 at the time of HS2 Ltd's initial report, published in January 2010 to only 1.7 in the latest iteration in August 2012. This includes 'wider economic benefits,' excluded from DfT's normal evaluation of rail schemes. Without them, the current BCR is a miserable 1.4, low value for money under DfT's normal criteria, and way below the normal pass mark of around 2.0 for rail schemes.

The full scheme does better, although its BCR has deteriorated dramatically, from 4.0 to 1.9. But there are a number of major challenges to the evaluation, which DfT has not so far taken into account, even though these have been flagged for over a year in some cases

- An outdated version of the Passenger Demand Forecasting Handbook – the industry's forecasting bible – has been used, significantly overstating long distance demand growth. DfT has at last adopted the latest version, but not yet used it for evaluating HS2. As a common sense measure of the scale of this flaw, HS2 Ltd's latest service specification shows two 1,100-seat trains to Scotland every hour, dividing at Carstairs (a wonderful service for no population, in contrast to Lancaster and Carlisle, with no high speed trains at all!) This



Want to provide more capacity? Waterloo (pictured) is a good place to start. Paul Bigland

pattern gives c30,000 seats a day to Scotland, compared with c7,000 air passengers a day to both Glasgow and Edinburgh in 2011 – and with a journey time of 3.5 hours at best, rail will perhaps only capture half the business even in 2033. Has anyone at DfT carried out a reality check on their own figures?

- The business case does not include HS1 services – these will reduce frequency for services from the North to Euston and significantly worsen overall financial

performance. It is clear from the report prepared by HS2 Ltd for the Labour government, published in March 2010, that the report's authors' conclusion at that time was that there was no business case for a direct link to HS1:

'Running direct services to Paris or Brussels... would bring Birmingham within three hours and attract a significant market share, but the market would not be big enough to fill a 400-metre train a day in

2033. Direct services to destinations north of Birmingham would attract a smaller market share but are competing in a bigger market and might fill another train a day.

Existing travel between the English regions and the near continent (Paris and Brussels) is overwhelmingly by air at present, so Civil Aviation Authority data gives a basis for assessing the existing market. Comparing air volumes in 2000 and 2010, air traffic on the key potential flows has generally declined, in some cases dramatically. The airlines have reacted to this very effectively, maintaining or increasing frequencies by using smaller planes with low operating costs. There are typically six daily flights each way between key city pairs such as Birmingham and Brussels, and Manchester and Paris. Fares are also cheap, £50-70 for Birmingham to Paris if booked three or four weeks in advance. These routes meet market demand, and are not subsidised. In contrast, operation of through services would require significant subsidy and reduce the BCR for HS2 as a whole. The link would also increase HS2's capital costs, and reduce its capacity into Euston.

- An unrealistic value of time has been used for business passengers – DfT has continued to base its evaluation on assumptions that business travellers do no productive work on trains, and are paid on average £70,000 a year!
- Price competition on the 'classic' network is not included. Yet between London and the West Midlands, both Chiltern and London Midland already carry large numbers of passengers at cheaper fares than Virgin; Chiltern's revenue on this flow went up by 45% in the first year after completion of the 'Evergreen 3' upgrade.
- The impact of both Midland main line electrification and East Coast main line High Level Output Specification (HLOS) improvements have not been modelled – these will both significantly reduce the incremental benefits of Phase 2 of HS2.
- Journey time savings on HS2 have been overstated for East Coast destinations: the improvements promised with the Inter-city Express Programme (IEP) and the infrastructure investment announced as part of HLOS will increase capacity and cut journey times on this historic route. Furthermore, the published HS2 documentation claims a 51-min reduction

Can HS2 really win much traffic from other modes? The West Coast already has an impressive market share. A Pendolino streaks past motorway traffic at Watford Gap. Martyn Fordham



from King's Cross to Newcastle (from 3hr 9min to 2hr 18min), despite most trains on the current hourly fast services having 2hr 50 min journey times.

- HS2 Ltd increased the operating cost savings as a result of reductions to 'classic' services from a Net Present Value of £5.1 billion to £7.1 billion by applying 41% optimism bias to increase 'classic' operating cost savings. Optimism bias is supposed to discount over-optimism, not encourage it!
- The impact on existing Great Western passengers of stopping additionally at Old Oak Common has not been modelled, despite the disbenefit of a longer journey time to Paddington for the great majority of passengers. At face value, the Old Oak Common interchange looks attractive, but for most major flows from the West of England and South Wales, direct cross country trains will still be faster, and certainly cheaper, than changing to use HS2.

Taken together, these will have a major impact, certainly reducing the BCR below 1.0.

No environmental benefit

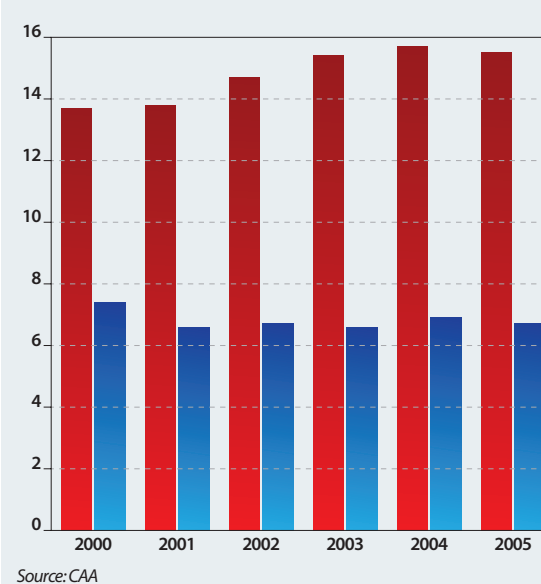
HS2 isn't green, either. HS2 Ltd itself claims that it is at best neutral in environmental terms. Only a small proportion of HS2 passengers are forecast to transfer from air (3%) and car (8%); in contrast 24% of journeys are forecast to be new, generated travel. And high speed drives up energy consumption and infrastructure maintenance costs dramatically – the Chinese

Table 1: Plenty of capacity at Euston

Service group (long distance services into London)	Load factor (three-hour morning peak - 2010)
Paddington (main line and other fast trains)	99%
Euston (long distance)	60%
St Pancras (Midland main line)	80%
St Pancras (HS1 domestic)	41%
King's Cross (East Coast long distance)	65%
Liverpool Street (Great Eastern main line)	78%
Victoria (fast trains via East Croydon)	72%
Waterloo (South West main line)	91%

Source: Network Rail

Figure 1: Domestic air has declined
London domestic air traffic (millions of passengers)



Source: CAA



have reduced speeds on their high speed network. Furthermore, at best only a few slots would be released at Heathrow, and these will almost certainly be taken up by long haul flights.

What about capacity?

As these arguments for HS2 have proved to be so shaky, the Government and HS2's supporters have increasingly majored on capacity. But is the West Coast main line in reality the priority for major capacity enhancement? I would argue

that no objective case for this has been made. Let's test it against common sense criteria for whether a railway is 'full' or not. This is not rocket science – logically, the questions are:

- Are there any unused paths available at peak periods?
- Is the configuration of the trains used optimised (most obviously, the first/standard class mix)?
- Are peak trains operated at maximum length?
- Are the trains full?

Few who know the route would, I think, argue that the fast line services out of Waterloo did not meet this test, yet there are no firm plans for a step change to capacity on this corridor.

In contrast, the West Coast main line only gets close on the first criteria. There are few unused peak paths unless and until something is done to introduce higher performance trains on the fast Milton Keynes/Northampton commuter services and grade separate Ledburn Junction. This last is not a cheap project, but it is deliverable at a fraction of the time and cost required for HS2.

But the West Coast fails the other tests of a full railway. There is certainly too much first class accommodation, and even after the current project to lengthen some of the Pendolino fleet, many services will still be operated by nine-car sets. Additionally, on all the routes except for Liverpool, because of physical constraints at Lime Street, it would be eminently possible to operate 12-car trains. I hear HS2 supporters asking about the cost of platform extensions and depot alterations. But this would be a drop in the ocean compared with £33billion for HS2, with minimal disruption in comparison with the total reconstruction of Euston over seven or eight years needed for HS2. HS2 Ltd naively gave written evidence to the Transport Select Committee last year that: 'We believe that the redevelopment of Euston station could be accomplished while maintaining at least the current off peak service level, and there may be some minor alterations to the timetable. There would be some instances of disruption to services where, for example, the station would be closed for a few days over the holidays'. The unspoken assumption behind this statement is that there will be several years when services at Euston may be reduced to off peak level during the peaks.

The last 'full railway' test is whether the trains are full. DfT has been very coy about West Coast loading data, refusing Freedom of Information requests on the grounds of commercial

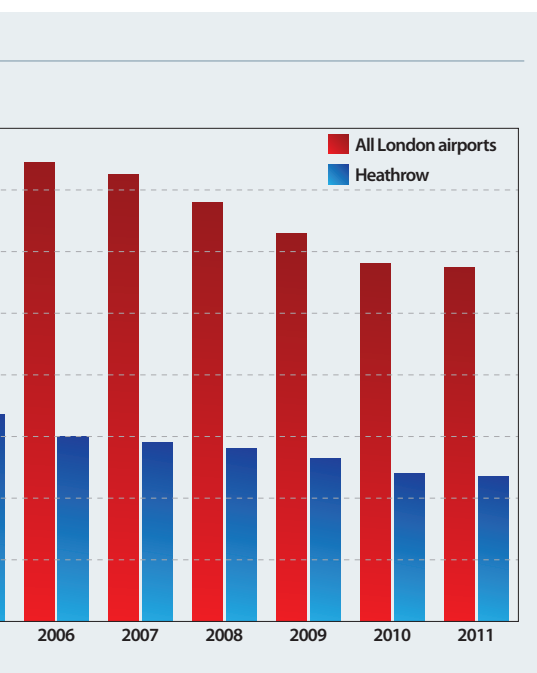
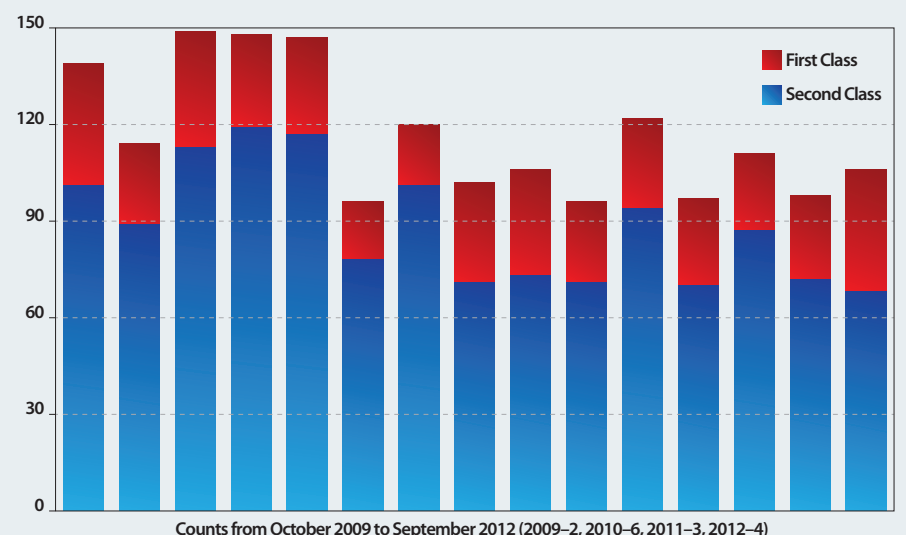


Figure 2: Where is the West Coast peak growth?

08.20 Euston – Manchester (loading from Milton Keynes)



Source: personal observation by author



Let's start with history. Rail passenger demand was broadly static for 50 years after World War 2, while car and air traffic increased inexorably. But since the mid-nineties we have seen strong, sustained growth in rail demand, with increased mode share, even though in recent years the total mileage travelled per head of population has declined. It's not really clear why this has happened; perhaps a combination of progressive service improvements, increasing road congestion, higher fuel prices and saturation in levels of car ownership?

But the past is not necessarily a reliable guide to the future, as analysis of domestic air statistics demonstrates. Looking at the numbers of domestic passengers to and from London's airports in 2004, following five years of average growth of 3.6%, it was 'obvious' that high growth would continue – but by 2010, air volumes had dropped below 2000 levels!

This is a powerful demonstration of the pitfalls of forecasting simply by projecting recent trends.

Eurostar is another relevant case. Passenger numbers are way below the forecasts developed to justify HS1. DfT has sought to explain this:

- 'Demand and forecasting for HS1 was particularly challenging as it provided a completely new international service, meaning there was less evidence on which to base passenger numbers'; and
- 'In addition services began at around the same time as changes in the aviation sector... this meant that HS1 services were unexpectedly competing with... low-cost airlines'

Neither explanation is convincing. There was a mature air market from London to Paris and Brussels which should certainly have given a solid base position for Eurostar demand forecasts, and, while the failure to anticipate the specific impact of the growth of low cost airlines is perhaps understandable, the failure

confidentiality, despite the importance of this data in assessing the case for HS2. However, there is some data available. Network Rail's July 2011 London and South East Route Utilisation Strategy gives details of morning peak load factors for all routes into London. Data for long distance services is shown in Table 1.

Euston is way down the table, only above the HS1 domestics, where the service from the Medway towns has performed very poorly, as it is more expensive than the classic route and no faster and less convenient for the majority of Medway commuters.

In the absence of official data from DfT, HS2 Action Alliance, one of the main opposition groups, carried its own independently audited survey in November last year. This showed an average load factor of only 56% for Virgin departures in the evening peak (16.30 - 18.45), before any 11-car sets entered service. This is supported by statements from First Group in relation to its abortive West Coast bid that average load factor at the start of the franchise would only be 35%.

There are exceptions. The 19.00 departure to Manchester is notoriously full, with gross overcrowding on Fridays, and Virgin now timetables a relief train, but this is a function of the pricing structure, with an enormous differential between the regulated off-peak fare and the price of 'open' tickets, which have soared way above inflation. This is an artificial peak, not a reason for building a new railway.

Growth

But surely HS2 will be needed to cope with future growth? This is the most difficult issue for both supporters and opponents; the recent history of franchise bids shows the difficulty of forecasting even five or ten years ahead, let alone for a 60-year project such as this, and I hope no-one would seriously claim that the industry forecasting models are valid for this sort of time span. So the debate should be more about scenarios, not just cranking handles on the Passenger Demand Forecasting Handbook model.



Artist's impression of the rebuilt Euston station. Courtesy HS2 Ltd



Lengthening trains to 12 cars is one possibility for increasing capacity on the existing infrastructure. An 11-car Pendolino speeds north near Kenton on 27 July. Ken Brunt

to consider any scenarios which might have a major impact on demand is not. Eurostar, does however, have the major market share for travel between London and Paris and Brussels, reportedly 80% of the combined rail/air market; its failure to achieve forecast growth is therefore related to low growth in the total transport market. Rail already has a significant market share between central London and the Midlands and the North, so a similar effect is likely to occur here also.

The National Travel Survey shows that business travel is declining. Anecdotally, Virgin's growth has been concentrated in off-peak periods and weekends – not surprisingly given the poor weekend services during the West Coast upgrade – and peak load factors are not high. Again, DfT has refused to supply any data, so I have to resort to anecdote. I travel on the 08.20 from Euston to Manchester several times a year, joining at Milton Keynes, and for my own interest, normally check the loading. Despite high growth on the route since the upgrade, including a major transfer from air to rail, the loadings on this train – a typical down morning business service – have shown no growth, as Fig 2 shows.

It's now operated by an 11-car set, which presumably covers a higher loaded service later in the day, so has a load factor of around 20%! I offer a cautious hypothesis on West Coast growth, as follows.

- Recent high growth has been driven by a step change following completion of the upgrade in December 2008 – there is a parallel with electrification in the 1960s, which resulted in growth of c60% over three/four years, followed by static or declining volumes for many years.
- There has been a one-off modal shift, especially from air to rail in the Manchester – London market.

- There has been significant growth in off-peak and weekend travel, but the business market is saturated.
- Rail has a high mode share to central London, so future growth is dependent on growth in total travel demand, not mode shift.

A year ago, this would have been just a hypothesis, but there is now emerging empirical data to support it. Stagecoach plc (owner of a half share in Virgin Trains) reported growth in passenger miles of 20.4% in 2009/10, 9.3% in 2010/11, but only 4.6% in 2011/12, indicating a progressive reduction in the rate of growth.


The company's most recently reported results reveal that revenue only grew by 2.7% in the 24 weeks ending 14 October, at best tracking inflation. This shows a further significant reduction in revenue growth over previous years. Growth in passenger miles has almost certainly stalled, unless the yield (the average fare paid per journey) has reduced. Similarly, East Coast, the most directly comparable inter-city route, showed a revenue increase of only 2.8% in 2011/12, despite the significant 'Eureka' timetable improvements introduced in May 2011.

In summary, there is strong evidence to challenge the 'capacity' case for HS2. Existing West Coast services had lower load factors than other long distance routes from London even before the majority of trains were lengthened to 11 cars. There is emerging evidence that growth on the West Coast is sharply declining now the benefits of the 2008 upgrade have been captured. On top of this, there are real questions about future demand for business travel.

An alternative strategy

There are also low risk alternatives which can increase capacity on the existing route. A logical assessment of options would start with the most cost effective options first.

- Rolling stock reconfiguration, converting one first class vehicle to standard class.
- More effective demand management, including use, when appropriate, of obligatory reservations. Does anyone really believe that by 2026, when Phase 1 is supposed to open, it won't be possible to book a seat on the next departure from Euston on a smart hand held device while walking across the concourse?
- Operation of 12-car trains. With one fewer first class car, this alone increases the number of standard class seats by 150 compared with an 11-car set, or 300 more than a nine-car set.
- Targeted infrastructure investment to clear selected bottlenecks to enable frequencies to be increased, and free up additional capacity for freight. In reality, HS2 does nothing to create capacity for freight; from 2026 to 2033 it will constrain potential growth north of the connection to the 'classic' network at Lichfield, and after 2033 it will destroy freight capacity between Preston and Scotland and between York and Newcastle.

This is a more rational approach than building HS2, potentially delivering earlier benefits and freeing up resources for improvements to the 'Cinderella' networks in the North and the Midlands and enhancements to other routes which are already overcrowded and capacity constrained. Such an approach would deliver much better value for passengers, taxpayers and the North than HS2. 

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