



The Economic Case for HS2

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Preface:

1. "There has always been an assumed link between the quality of the transport infrastructure and economic growth, yet that link has been difficult to demonstrate even after more than 50 years of research"¹. It is likely that economic growth leads to the need for investment in transport infrastructure and not the other way round. Assuming that investment in transport infrastructure will lead to economic growth is therefore risky. There is agreement however that investment in transport infrastructure could facilitate economic growth and other economic benefits, where the other economic conditions are supportive. However, it should also be noted that investments in transport infrastructure may not lead to economic growth per se, but it is likely that it will only lead to a redirection of development.
2. Investment in transport infrastructure should primarily yield transport benefits. Such benefits, if taking place, will be realised through improved accessibility, or connectivity (for the purpose of this submission these can be seen as synonyms). In the case of HS2 where there is transport infrastructure in place (both rail and road) improved accessibility or connectivity will largely be a factor of increased capacity and change in travel time.
3. Investments in High-Speed Rail (HSR) are increasingly justified through economic benefits, and while there might be such benefits (usually very difficult to measure), basing for the decision for HS2 solely on these economic factors is risky.
4. With this in mind we discuss below the economic case for HS2 considering in turn: Speed, Capacity, Connectivity - the main transport benefits categories, and then the Wider Economic Benefits (WEB) and Image benefits.

¹ Banister D. and Berechman J. (2000) *Transport Investment and Economic Development*, London: UCL Press

Introduction:

5. Demand for rail in UK is rising, in part due to the HS1. But according to the latest EU statistics, rail in the UK accounted for only 7.4% of passenger-km travelled on land in 2011, slightly higher than the EU27 average at 7.0% and lagging far behind Switzerland with 17.5%.
6. The EU27 rail statistics does not provide clear evidence that increase in HSR ridership translates into an overall increase in rail ridership at the country level, and the evidence are mixed with wide variations across countries. Between 1995 and 2011, rail ridership increased 35% in Denmark and decreased 38% in Greece, but neither of these countries have invested in HSR . Over the same period, rail ridership increased 60% in France and decreased 7% in Italy, and both these countries have invested heavily in HSR.²

Speed:

7. The economic case for HS2 relies largely on time savings (about 60% of the user benefits). These savings result from increasing the *average* speed of travel – station to station, and are only partly influenced by the maximum operating speed (250mph for HS2). More important is the number of stations on the route (the main attribute of connectivity – see below), the alignment, and part of the route where maximum operating speed can be achieved. At the same time, the designed maximum operating speed is a central factor in the cost of any High-Speed Rail.
8. Passengers are not only concerned with travel time station to station, but with the travel time door-to-door in which the station-to-station time or speed is only one part. As speed increases, often by reducing the number of en-route stops, the access travel to the HSR station becomes longer for many passengers and more time consuming. Using the HSR is then either not worthwhile or less attractive. It is not only the number of stations that is important but also their location, and this again forms the main element of connectivity (discussed below).
9. There is evidence suggesting that throughout history humans devoted about one hour a day for travelling. Thus, as technology allowed faster travel, it was distance that increased and travel time did not decrease. This has resulted in modes of transport like HSR increasing the amount of travel (distance) with various economic, environmental and social consequences.
10. Furthermore, the assumptions that travel time is a 'waste of time' could always be questioned, even more so today. Given the level of comfort on board HSR services, travel time can be a 'useful time' – to work, socialize and other things. The potential to use travelling time by HSR substantially increased with developments in wireless communications and the laptop, iPhone, etc. **It is not the amount of travel time that is critical but its quality and the extent to which that travel time can be used for a range of activities.**

² TREN (2013) EU transport in Figures: Statistical Pocketbook 2013, Brussels, European Union.

11. If travel time is not a complete 'waste of time', the value of reducing it diminishes. The 60% benefits from travel time savings depend on the value of every 'wasted' minute of travel. But if some travel time can become 'useful time', especially for those travelling on business, travel time savings will play a reduced role in the economic justification for expensive infrastructure like HS2.
12. The value of travel time savings also depends on the level and nature of demand for travel. Without getting into details, much of the travel time savings benefits depend on the forecast of the number of passengers and whether they travel for business or leisure purposes. There is much uncertainty and a range of values in the forecast demand for HS2 have been used, as reflected in the literature.
- 13. Achieving higher speeds is costly, and when the 150mph threshold is exceeded, the economic benefits may be questionable.**

Capacity:

14. Lack of capacity was the main reason for the developing the HSR in Japan, France and recently in China. This is also the main motivation for HS2, even if the debate often focuses on cutting journey travel time by increasing speed. Speed is critical in this respect as it allows running more trains per unit of time. Providing capacity, to meet future demand for rail travel, should be the focus of assessing the economic benefits from HS2 – this is what HS2 is being built for.
15. There is a debate on whether the planned 18 trains per hour at peak period is technically feasible. In this debate the cost of building HS2 to serve peak demand is neglected (the crowding problem), and there is a risk of 'over-designing' HS2 when off-peak periods are considered. While important, the cost of addressing a problem limited to very certain periods of the operating day needs to be given more attention.
16. The lack of capacity will occur at the intermediate stops along the WCML, which HS2 (Stage 1 in particular) is intended to enhance. Milton Keynes is a prime example and is currently benefiting from a very high frequency of rail service (to London for example) due to the high demand for rail travel between Birmingham and London. Some of this demand will be shifted to HS2, and there might not be enough demand to maintain the current frequency of service from Milton Keynes to London. HS2 will release capacity on adjacent lines, but little analysis has been carried out on how this capacity will be used as part of the whole network – the low and high speed networks have been seen to be separate rather than as two parts of the same rail system.
17. The HS2 and HS1 high-speed network would require substantial share of the resources allocated to rail transport for maintenance and operation. There is a risk that these will come at the expense of the conventional network, with the consequence that the quality of service will deteriorate and in turn adversely affecting the demand for rail.
18. Since HSR in the UK will cover small part of the rail network. HS2's increased capacity and improved level of service will likely be for a relatively small share

of the rail 'cities' in the UK. It also depends on how HS2 and HS1 are integrated with the rest of the rail and transport networks (see below).

19. **If speed is not so important (as travel time savings may have a lower value), the economic case for increasing capacity through other measures should be given more attention.**
20. Service reliability becomes more important, and increased investment (in HSR) permits greater reliability provided that there is excess capacity. But, fast trains conflict with slower trains (also reducing capacity by the need to increase headway between trains), resulting in fast trains requiring a dedicated track to provide the benefits of higher speeds, and this is costly. If slow and fast trains share the same stations (platforms), the planned time table becomes more complex and more susceptible to disruption and delays, thus affecting reliability. Increased speed can affect reliability positively and negatively.

Connectivity:

21. Connectivity refers the ease of getting from origin to destination, and speed here plays a role, but the average speed door-to-door and ease (or inconvenience) of transfer between modes is more important. Furthermore, connectivity refers to the ease of getting to many destinations from a particular origin.
22. The nature of HSR, and HS2, suggests a low number of intermediate stations along the route, as each stop can 'cost' up to 15 minutes³. The downside of providing too many stations (to increase access to HSR services) is evident on HS1, where Eurostar is being forced to stop some of its services between London and the Chunnel. Two stations in London, in relatively close proximity (and where one of them is not Heathrow) and two in Birmingham are thus questionable in terms of the economic case.
23. To maximize accessibility and connectivity of HSR services, access to HS2 stations is critical. This mainly relates to station location and the integration of the station with the rest of the transport network.
24. With respect to station location the two generic options are city centre and city outskirts– the benefits a city centre location offers are the disadvantage of the outskirt station location and vice versa⁴.
25. The integration of the HSR station with the rest of the network can be considered at three levels: local/urban, regional and national/international⁵.
26. At the local level, it is the integration with the rest of urban public transport that is critical, and the lack of such integration has proved to be an obstacle in achieving the forecast demand levels at city outskirts station location (e.g. in Taiwan).

³ Connor P.: Rules for High Speed Line capacity, Railway Technical Web Pages: <http://www.railway-technical.com/Infopaper%203%20High%20Speed%20Line%20Capacity%20v3.pdf>.

⁴ For a full discussion see: Banister D. and Givoni M. (2013) High-Speed Rail in the EU27: trends, time, accessibility and principles, *Built Environment* 39(3): 324-338.

⁵ Ibid.

27. At the regional level, integration with the conventional rail network is most critical, as rail will be the main feeder of traffic for HSR. An integrated rail-HSR services means that the station should be shared, otherwise the penalty of transferring between stations (even if only a few hundred metres apart) can erode most accessibility and time savings that HSR can offer. The location of the Birmingham HSR station, not at New-Street station (but next to it), will severely reduce the integration with the conventional railway and connectivity with all those places that New Street station is serving⁶. The recent suggestion to create a hub at Crewe⁷ to integrate with the rail and road network follows this logic, but it can encourage use of the car at the expense of local public transport.
28. HSR is a strategic long-distance mode of transport but is limited to distances of up to around 1000km, as long as there are no natural barriers (sea, mountain) in its way. By providing a HSR station at a large international airport, HSR can provide connectivity to the world. Building a spur line to Heathrow airport (and not making it a through station on the line) is like building Birmingham station next and not at New Street station. It will mean bearing the high cost (of connection to Heathrow, or city centre location respectively), but without getting the full benefits. An airport-station at Birmingham International is not a substitute due to the small size of the airport, and the airport station is not planned at the airport but nearby, far enough to force passengers to use another mode of transport to transfer between the station and airport.
29. Connectivity has featured in the HS2 debate very much through the objective of 'bringing the regions closer'. This reduces the geographical separation between the South (London) and the North (Newcastle, Leeds, Manchester, Liverpool, etc.), and thus the economic disparities between these regions. HS2 will bring those cities closer in terms of rail travel time, city centre to city-centre, but the effect of it might only be further strengthening the South at the expense of the North. In Paris and Madrid there seems to have been concentration of activities in the capital cities after the HSR networks in those countries opened, and this was at the expense of the secondary cities⁸. London is probably in a similar position as the dominant city. London and the South East provide the headquarters for 66 out of the FTSE 100 largest companies, while the area in England north of Birmingham host only six⁹. With improved connectivity to London there is a risk that these companies will move to London rather than companies in London moving North.

⁶ See analysis of these issues in: Martínez Sánchez-Mateos H. S. and Givoni M. (2012) The accessibility impact of a new High-Speed Rail line in the UK – a preliminary analysis of winners and losers, *Journal of Transport Geography* 25: 105-114.

⁷ Mentioned in the Higgin's report.

⁸ Warwick Business School (WBS) (2012) Warwick HS2 Forum: Final Report, Unpublished Report from the WBS for the Warwick HS2 Forum, January.

⁹ Higgins D. (2014) HS2 PLUS – A report by David Higgins. HS2 Ltd.

- 30. HS2 will improve connectivity between London and the North and this connectivity must be further enhanced by giving due attention to integrating HS2 (stations) with the rest of the transport network. This will certainly bring the South and the North closer, but there is a risk that this will only further strengthen the South and increase the South/North divide.**

Wider Economic Benefits (WEB)

31. Urban regeneration, employment, agglomeration benefits are the main wider economic impacts that might result from constructing HS2. The Department for Transport has estimated that HS2 would create 3,100 permanent jobs in operating the new railway and around 24,600 temporary jobs (excluding the supply chain) during construction. There might also be up to 400,000 jobs in additional developments in areas close to HS2 stations¹⁰. These estimates were based on a report prepared for the Core Cities Group¹¹ by consultants (Volterra/Arup, 2011, p2). These estimates raise a question arises, **as to whether investment elsewhere in the economy – in improving and developing the conventional rail network or investment outside the transport system (e.g. in education) – would provide similar or greater employment benefits.**
32. A considerable amount of research has been carried out on the agglomeration effects, mainly with respect to intra-regional changes, and the key question here is whether they are also found on an inter-regional scale (Graham and Melo, 2010). The argument here is that improved connectivity within a city or region can compound the benefits of agglomeration by making spatial economic transactions more efficient through mechanisms such as sharing, matching and learning (Duranton and Puga, 2004). The difficulties here are both in the specification of the relationships and then in measuring them, and the implied causality (including the strength of the statement – whether better connectivity causes higher output or productivity). Graham and Melo (2011) have examined long-distance travel flow in Britain to provide an indicative assessment of the potential order of magnitude of agglomeration benefits from long-distance transport improvements, namely travel time reductions. They infer from this to the likely effect of HSR, and conclude that (p:15) "even in the best case scenario for the improvement in long-distance travel times and the market share of classic and high-speed rail, the potential order of magnitude of the agglomeration benefits is expected to be small." They qualify their conclusion by saying that their analysis refers to the domestic market but "benefits could also arise from improved connections to continental Europe (e.g. Paris, Brussels, Amsterdam, etc) by linking HS2 to HS1" (ibid). However, Higgins (2014) in his recent paper suggested some changes to HS2, and he raises objections to the proposed link between HS1 and HS2, and as mentioned above the connection to Heathrow.

¹⁰ House of Commons, 2013, para 34.....

¹¹ The cities concerned are Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham, and Sheffield.

33. In contrast, Chen and Hall (2011) have put forward a case for arguing that improvements in rail travel time can result in wider economic benefits, even if these are not quantifiable. When examining the effect of introducing HSR services on some trunk routes in the UK – the entering into service of the IC125 (which meant 125mph maximum speed or 200kph) and IC225 (which meant 225kph maximum speed or 140 mph) in the late 70's and early 90's respectively – they found that "substantial and demonstrable effects in aiding the transition to knowledge economy within a 2hr travel limit of London, thus helping to generate renewed economic growth, but the effects have not been automatic or universal" (p. 703). Furthermore they conclude that "cities connected to a new HST[R] could seize opportunities which non-HST cities will not be able to seize" (ibid). The implications for HS2 are clear. First, **it cannot be assumed that HS2 will automatically bring wider economic benefits upon completion**, as Graham and Melo (2011) indicate and second, that **if it will bring such benefits it will be for a selected number of places that are probably already in the process of economic development, and thus HS2 could facilitate economic development, not create it.**

Image

34. The UK is certainly lagging behind France, Spain, Germany, Japan and China in terms of HSR development. In comparison to these countries, the UK rail network is perceived as old, crowded and unreliable (at least this is the view domestically, very much portrayed in and by the media). This could reflect, it is argued, on the whole image of the country and on its attractiveness for foreign investment and companies. The speed of the HSR is central in the image of rail, but exceeding the current standard of 350kph maximum operating speed (and even exceeding 250kph) is not likely to be paid back by the image such enhanced speed might create. **If trains run at record speed on one or two lines but the rest of the network is still 'old, crowded and unreliable' the image of Rail UK might not change at all.**

Conclusions:

35. There is a strong case to meet future demand for rail transport with more capacity including the WCML, and rail has a strategic role to play in UK inter-city transport network. However, HS2 is unlikely to provide the best value for money from the investment made, and the decision should not only be based on the economic case, as this is a high risk strategy with a very long return on investment period. Indeed, it may not even provide such an economic return.
36. There is a need to reconsider its main characteristics namely its speed, number of stations, their location and their integration with the rest of the transport network, so that a strong transport case and then an economic case can be made for it. This requires a vision for the role of the railways in the overall UK transport strategy, and within that the role for HSR needs to be established.