
HS2 Phase Two

Summary of key changes to the Economic Case 2015 to 2016





Department for Transport

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High Speed Two (HS2) Limited,
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.gov.uk/hs2

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1 Introduction

1.1 Overview

- 1.1.1 This report provides a summary of the key changes made to the analysis that supports the assessment of the Economic Case for HS2 since November 2015, and the effect of these on the appraisal outputs.
- 1.1.2 The aim of this document is to help readers understand the effect that individual changes in HS2 Ltd analysis and modelling have had on the Economic Case for HS2.
- 1.1.3 This document is one of a series that provides explanation and analysis of the evidence which underpins the appraisal of HS2, including the PLANET Framework Model Development Report, Assumptions Report, and Risk Analysis Technical Documentation.
- 1.1.4 The last update to the Economic Case, which was published in November 2015¹, provided a point-estimate benefit-cost ratio (BCR) of 2.5 for the Full HS2 Network.
- 1.1.5 As with any scheme, the Economic Case for HS2 will evolve over time and be influenced by many factors including:
- the design of the scheme;
 - external factors such as economic or population forecasts, and changes in rail services in the future;
 - forecasts of HS2 passenger demand, benefits and revenue; and
 - the guidance on forecasting and appraisal of transport schemes.
- 1.1.6 Since November 2015, HS2 Ltd has continued to develop and improve the modelling and economic appraisal tools, enhancing the evidence on current and future patterns of passenger demand. The design of the scheme has been further developed, with refinements to the route for the Full HS2 Network. There have also been developments in modelling and appraisal practice that have been incorporated into the Department for Transport's WebTAG2 appraisal guidance.
- 1.1.7 All of these changes have been incorporated into the analysis supporting the Economic Case, and this document provides an analysis of the impact that they have had on the point-estimate BCRs of HS2.
- 1.1.8 Care needs to be taken when interpreting the results of this analysis in two respects.
- Firstly, there is a high degree of interaction between the effect of the changes, and each step in itself needs to be viewed in the context of the changes that have been made earlier in the sequence of the analysis;
 - Secondly, the size of the change is also dependent on a number of other inputs and

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/490312/Economic_Case_report_2016.pdf

² WebTAG is the Department for Transport's guidance on appraising all transport schemes: <https://www.gov.uk/transport-analysis-guidance-webtag>

assumptions in the modelling and appraisal process. Alternative assumptions, such as those used in the risk analysis presented in the Economic Case, would of course lead to different results for this step-through analysis.

1.2 Summary of the Changes to the Economic Case

1.2.1 Since the last estimates of the Economic Case for HS2 were published, HS2 Ltd has continued to improve the methodologies, underlying assumptions and evidence base used by the economic models to assess the scheme. Additionally HS2 Ltd has responded to changing external factors, such as GDP forecasts, and internal factors, such as more detailed development of the design.

1.2.2 The current Economic Case has been assessed using a newly developed version of the PLANET Framework Model (PFM) known as version 6.13, which has updated and refined many elements of the demand forecasting process.

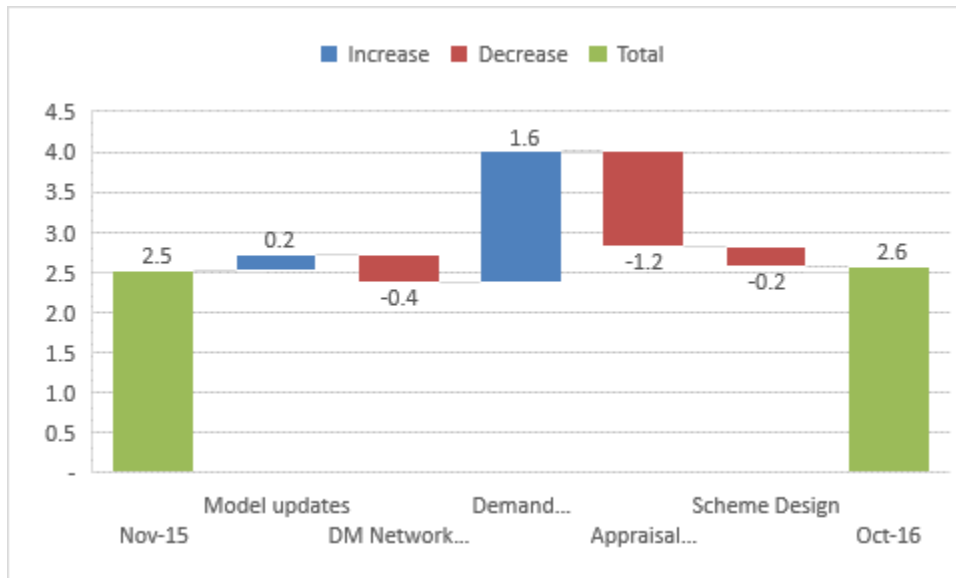
1.2.3 The key changes that have been made to the appraisal of HS2 since the BCR was last reported in November 2015 can be summarised as:

- Corrections for some minor issues identified with the previous Economic Case (Chapter 2);
- Updates to the without scheme, or 'Do-Minimum', network assumptions relating to committed transport investment that will happen regardless of HS2, and against which the HS2 scheme is compared (Chapter 3);
- Updated forecasts of the growth in travel, building on the latest evidence on current patterns of rail travel, and incorporating changes in methodology and changes to official forecasts for the growth of the UK economy and other drivers of transport demand (Chapter 4);
- Updates to the appraisal methodology, drawing on the latest guidance and valuation of benefits contained in WebTAG (Chapter 5);
- Adjustments to the scheme design, phasing and timetable assumptions for the operation of HS2. These assumptions remain as modelling assumptions and are not a future service specification (Chapter 6);
- A final summary of the results of this step-through analysis (Chapter 7).

1.2.4 Each of these refinements has affected the BCR. The graph below shows the contribution of each change to the overall change in the BCR for the Full HS2 Network. The biggest changes are the results of updates to current and forecast levels of passenger demand, and revisions to appraisal reflecting updated advice from the DfT.

³ The methodology and assumptions used by PFMv6.1 are separately reported.

Figure 1: Waterfall chart showing change in BCR with key model and appraisal changes



- 1.2.5 To ensure consistency, and to aid transparency, these changes are calculated using the Meadowhall option as a comparison. Other options developed for the scheme are described in more detail in the Economic Case. They are not included in this document which describes the impact of changes in since January 2016.
- 1.2.6 The overall effect of these changes is shown in Table 1. The BCR in November 2015 for the Full HS2 Network was 2.5 with wider economic impacts (WEIs). The table shows that the BCR has increased slightly to 2.6 including wider economic impacts.

Table 1: Overall change in quantified costs and benefits of HS2 (£bn 2011 present value prices) as presented in November 2015 and October 2016 Economic Case

Item (£bn)		Full HS2 Network				
		Nov-15	Oct-16	Change	Oct-16 in 2015/16 Prices and 2016/17 Discount Year	Impact of Price and Discount Year Change
		2011 present value prices				
1	Transport User Benefits					
	Business	43.2	48.8	5.6	62.0	13.2
	Other	18.2	16.9	-1.4	21.4	4.6
2	Other quantifiable benefits	0.2	0.3	0.1	0.4	0.1
3	Loss to Government of Indirect Taxes	-3.0	-3.3	-0.2	-4.1	-0.9
4	Net Transport Benefits (PVB)	58.6	62.7	4.1	79.6	16.9
5	Wider economic impacts (WEIs)	14.2	16.6	2.4	21.1	4.5
6	Net benefits including WEIs = (4) + (5)	72.8	79.3	6.5	100.8	21.4
7	Capital Cost	39.0	44.9	5.7	57.1	12.1
8	Operating Costs	22.9	20.0	-2.9	25.3	5.4
9	Total costs = (7) + (8)	61.9	64.9	3.0	82.4	17.5
10	Revenues	33.1	34.2	1.1	43.4	9.2
11	Net costs to Government = (9) – (10)	28.8	30.7	1.9	39.0	8.3
12	BCR without WEIs (ratio) = (4)/(11)	2.0	2.0	0.0	2.0	0.0
13	BCR with WEIs (ratio) = (6)/(11)	2.5	2.6	0.1	2.6	0.0

Note: Figures may not add due to rounding

- 1.2.7 The costs, benefits and revenues of the scheme have all increased significantly in the appraisal. However one of the main reasons for this is an accounting change – changing the price base and discount year. This increases all values in the appraisal by 27%, even if there is no change in the underlying costs or benefits.
- 1.2.8 Changes on a like-for-like basis are more modest. Total net benefits including WEIs increase by £6.5 billion, mainly due to improvements in estimates of current and future demand, as well as updates to the way benefits are valued. Costs have also increased, with revised assumptions on cost inflation driving higher estimates of construction costs. This is partly offset by lower operating costs and increases in estimates of revenues generated by HS2.
- 1.2.9 The following chapters of the report provide further information on these refinements and the impact they have had on the Economic Case. The implications for costs, benefits and expected revenues is set out, with the change in BCR being calculated for each step.

2 Correction of issues in PFMv5.2

2.1 Summary of key changes

2.1.1 In the final stages of audit and quality assurance of the PFM v5.2 model, a number of minor issues were identified with the modelling to support the *HS2 Phase 2 West Midlands to Crewe Economic Case* November 2015. There was insufficient time to incorporate these changes prior to publication, although HS2 Ltd undertook sensitivity analysis to understand the impact on the published information. As summarised in this chapter, the impact of these changes is not significant enough to change any value for money assessments of the scheme.

2.1.2 The changes made to the model included:

- updates to service patterns and train capacities (number of seats) for some services on the classic network, including strengthening of peak services on the Midland Mainline;
- revisions to the connectivity assumptions around Toton station and classic rail services; and
- changes to the way the model (not appraisal) handled fares growth over time.

2.2 Impact of changes

2.2.1 The impact of the changes is outlined in Table 2. Overall these changes would have led to an increase in the benefits of the HS2 network. Much of these benefits are from changes in the East Coast Mainline capacity and connectivity of East Midland Train services which means the benefits of HS2 to commuters and shorter distance passengers in the South and Midlands were understated in the previous Economic Case.

2.2.2 Changes in capacity on the East Coast Mainline also increase benefits to long distance passengers along this route. Whilst this is partially offset by new assumptions on the strength of peak services on the Midland Mainline, overall benefits to long distance rail passengers increases slightly.

2.2.3 Estimated operating costs also fall slightly, reflecting the fact that some services should not have been included in the November 2015 modelling. The increase in benefits have been driven by changes to the modelling of capacity on some services, which affects modelling but has smaller impacts on costs.

2.2.4 Overall these changes have increased benefits by 2%. The appraised cost to government falls by 8%, as revenues increase and costs fall slightly. This drives an increase in the BCR including WEIs of 0.2.

Table 2: Change in quantified costs and benefits following corrections to October 2013 Economic Case

Item		Full HS2 Network		
		Change (£bn 2011 present value prices)	% Change	
1	Transport User Benefits	Business	0.5	1%
		Other	0.7	4%
2	Other quantifiable benefits		0.0	8%
3	Loss to Government of Indirect Taxes		-0.1	3%
4	Net Transport Benefits (PVB)		1.1	2%
5	Wider economic impacts (WEIs)		0.4	3%
6	Net benefits including WEIs = (4) + (5)		1.5	2%
7	Capital Cost		0.0	0%
8	Operating Costs		-1.2	-5%
9	Total costs = (7) + (8)		-1.2	-2%
10	Revenues		0.8	2%
11	Net costs to Government = (9) – (10)		-2.0	-7%
12	BCR without WEIs (ratio) = (4)/(11)		0.2	7%
13	BCR with WEIs (ratio) = (6)/(11)		0.2	8%

Note: Figures may not add due to rounding.

3 Updated Do-Minimum Networks

3.1 Summary of key changes

3.1.1 HS2 Ltd has updated the representation of future rail services in the Do-Minimum (or 'without scheme') drawing on advice from the DfT on future service patterns and updated evidence from the rail franchising process.

3.1.2 The main changes to the Do-Minimum can be summarised as:

- Incorporation of commitments made by DfT and following the franchising of TransPennine Express and Northern Trains services;
- Revisions to the capacity, journey times and stopping patterns of trains on Crossrail, the Heathrow Express and Great Western Mainline;
- Updated journey times and increases in capacity on the Cross Country network;
- Addition of a new open access operator on the WCML;
- Improvements in the connectivity within Birmingham City Centre, reflecting extensions to the Midland Metro;
- Updated assumptions on the connectivity of stations in Leeds city centre.

3.1.3 These changes have been implemented without any significant re-optimisation of service patterns with the introduction of HS2. It is likely that further work may identify opportunities to improve the value for money of classic line services with HS2 in the future.

3.2 Impact of changes

3.2.1 The overall impact of this change is a reduction in benefits and revenues. Benefits for the Full HS2 Network fall by 8%. Whilst there are some benefits to a few areas across the North, with improvements in TransPennine and Northern Trains services resulting in improved access to HS2 services and onwards to London, these are outweighed by a reduction in benefits as there is now assumed to be more capacity in the case without HS2. There is also a reduction in benefits along the WCML as a result of the Open Access services, which increase the frequency and capacity of services to and from London.

3.2.2 In Birmingham and Leeds there are reductions in benefits due to the changes in the connections between stations. This means that the benefits to HS2 passengers of shorter walk times are reduced between stations in these cities.

3.2.3 The majority of the reduction in benefits is driven by lower crowding benefits, which fall by almost a third. This reflects the increased capacity offered by future non-HS2 services, which means that the additional capacity provided by HS2 offers a proportionally smaller reduction in crowding.

3.2.4 Overall these reduce benefits and revenues. Costs are also estimated to increase slightly as a result of changes in the released capacity services required to ensure consistency with the modelling. This reduces the BCR (including WEIs) of the scheme by around 13%.

Table 3: Change in quantified costs and benefits following revised do-minimum

Item		Full HS2 Network		
		Change (£bn 2011 present value prices)	% Change	
1	Transport User Benefits	Business	-2.9	-7%
		Other	-1.5	-8%
2	Other quantifiable benefits		0.0	-14%
3	Loss to Government of Indirect Taxes		0.2	-7%
4	Net Transport Benefits (PVB)		-4.2	-7%
5	Wider economic impacts (WEIs)		-1.3	-9%
6	Net benefits including WEIs = (4) + (5)		-5.6	-7%
7	Capital Cost		0.0	0%
8	Operating Costs		0.2	1%
9	Total costs = (7) + (8)		0.2	0%
10	Revenues		-2.0	-6%
11	Net costs to Government = (9) – (10)		2.2	8%
12	BCR without WEIs (ratio) = (4)/(11)		-0.3	-12%
13	BCR with WEIs (ratio) = (6)/(11)		-0.4	-13%

Note: Figures may not add due to rounding

4 Updated forecasts of demand and economic growth

4.1 Summary of key changes

4.1.1 HS2 Ltd has substantially updated estimates of current levels of demand, and the growth in travel on rail, air and highway. These changes reflect the latest evidence as well as updating the methodology to reflect the latest guidance and best practice. This includes:

- Estimates of the current level of rail demand in Great Britain have been updated, drawing on the latest available evidence from ticket sales data and improved approaches to processing this data. Our previous estimates of demand were from 2010/11, which have now been updated to 2014/15;
- The methodology used to forecast rail demand has been updated using the latest forecasting software (EDGE) allowing the application of variable elasticities in rail forecasting;
- Forecasts of drivers of demand for all modes have been updated. GDP growth and employment forecasts have been updated in line with data published by the Office for Budget Responsibility in March and July 2015;
- We have aligned our approach with the standard rail forecasting method and fixed our forecasts at 20 years in the future (i.e. 2036); and
- Minor updates to highway and air passenger demand have been made to ensure consistency with other assumptions.

4.1.2 The biggest impact has been as a result of updates to our estimates of current rail demand, along with changes to the way demand growth is capped in the future. Rail growth has been significant over the past few years. The Office of Road and Rail (ORR) estimates that the number of rail passenger journeys has increased by 22% between 2010/11 and 2014/15.

4.1.3 Our estimates of current demand have been updated using the rail industry's LENNON database of ticket sales to calculate patterns of rail trips. In line with the findings of the ORR, we find rail trips have increased significantly. In the PLD model – representing primarily long distance and regional operators – we see an increase of 13%. This is consistent with data from the ORR showing that long-distance and regional train operating companies have seen growth of 14% and 15% respectively (see Figure 2).

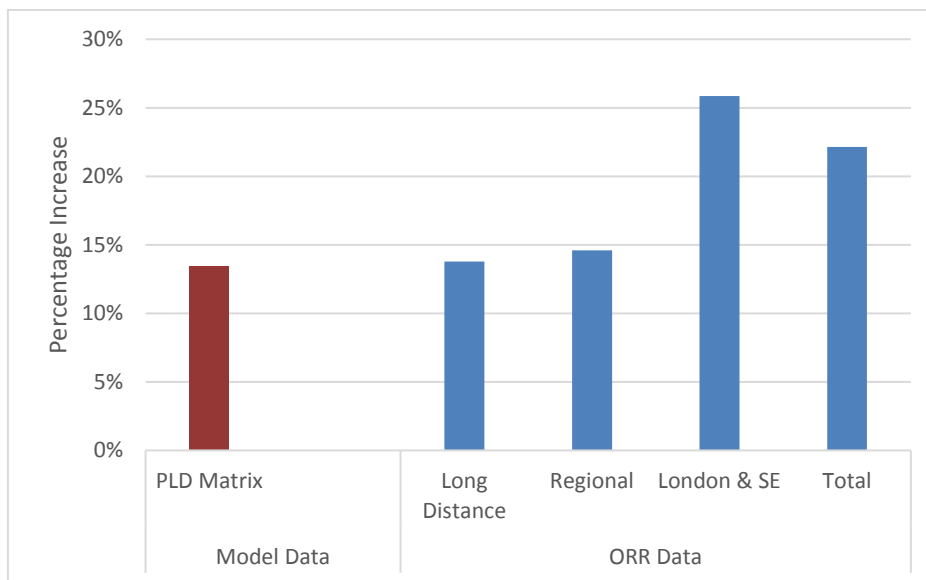


Figure 2: Increase in Rail Journeys between 2010/11 and 2014/15 (PLD Model estimates compared to ORR published data)

- 4.1.4 As part of this update, HS2 Ltd has also implemented several refinements to the process estimating current patterns of demand. These changes are designed to make the process more transparent, robust and auditable; as well as improving several of the underlying assumptions in the calculations. More details of this process are outlined in Model Development Report, PFMv5.2 to PFM6.1c, Updating the exogenous forecast.
- 4.1.5 Whilst these refinements have little impact at a national level on our estimates of demand, they have had some impacts at a more disaggregate level. Most notably they suggest that the proportion of business journeys in our previous estimates of rail trips was too low for some key HS2 flows.
- 4.1.6 Our forecasts build on these revised estimates of current demand using industry recognised approaches set out in the Passenger Demand Forecasting Handbook and WebTAG. In previous Economic Cases, the impact of this increase in forecasts of demand would have been relatively modest, as the effect would have been to just bring forward the cap year – defined by a future level of demand - by around 7 years to 2030/31. However HS2 Ltd have now aligned the approach with standard rail forecasting practice. This fixes the forecast at 20 years in the future, rather than on a particular level of demand. This means demand is assumed to continue to grow until 2036/7 in the latest Economic Case.
- 4.1.7 Combined with the higher estimates of current demand, this means that demand is forecast to be around 13% higher in PLD than our previous forecasts. Indeed on key HS2 flows into and out of London the increase can be even higher; with demand between the North East and London increasing by almost a quarter.

4.2 Impact of changes

- 4.2.1 The increases in demand up to 2036/7 drive an increase in the benefits and revenues from the HS2 scheme. More passengers means more benefits because:
- More people will benefit from the time savings and improvements in frequency offered by HS2;

- There would be greater crowding without HS2, therefore the additional capacity offered by the scheme, and the re-use of capacity on the classic network freed up by HS2, delivers additional benefits to passengers across the network.

4.2.2 Both of these impacts are evident in the increases in benefits (Table 4). There are more passengers on HS2, with an increase of around 18% in the number of passengers boarding HS2 services. This drives an increase of slightly over 20% in time saving benefits, with the larger proportion of business passengers on HS2 services leading to slightly greater increase in benefits than demand.

4.2.3 Crowding benefits more than double, with HS2 and the re-use of capacity on the classic network providing significantly greater relief for passengers across the network. There is also a significant increase in benefits for passengers on shorter distance trips (represented by the regional PLANET models). This is particularly evident in the Midlands and the North where benefits increase by 56% (Table 5).

Table 4: Change in rail benefits by component of benefits (PV £m, 2011/12 price and discount year)

	Change in Benefits	% change
In vehicle time	8,518	22%
Walk Time	100	23%
Wait Time	1,744	21%
Board/Interchange	1373	42%
Crowding	5,705	118%
Access/Egress	123	12%

4.2.4 The London market remains a key part of the HS2 Economic Case. Increased benefits on trips to and from London account for almost 84% of the overall increase in benefits. The changes on these flows are significant (see Table 5). Benefits between Scotland and London increase by over 50% compared to November 2015, reflecting strong growth in demand, as well as the higher proportion of business passengers estimated to be using these routes. Crowding relief adds to the benefits to passengers between London and the North East, West Midlands and East Midlands.

Table 5: Percentage change in benefits to and from London by region (PLD only)

To/from London:	% difference in benefits
Scotland	55%
North East	39%
North West	26%
Yorkshire and The Humber	30%
West Midlands	41%
East Midlands	30%

4.2.5 However, benefit increases are not limited to the London market. Benefits on long distance rail trips increase by around 16% in non-London markets. Together with increases in benefits

for short distance trips around the Midlands and the North benefits to non-London flows increase by around £3.3bn (PV, 2011/12 prices and discount year).

4.2.6 Business benefits increase by over a third (Table 6). This is the result of the higher level of demand overall, but also the refinements to the process for estimating current rail demand. These have suggested our previous estimates of rail trips had under-estimated the number of business users on some key flows, and particularly for trips between Scotland and London.

4.2.7 Overall the increase in demand drives a 30% increase in benefits and 21% increase in revenues. This results in the BCR including wider economic impacts increasing by 1.6.

Table 6: Change in quantified costs and benefits following updated forecasts of demand and economic growth

Item		Full HS2 Network		
		Change (£bn 2011 present value prices)	% Change	
1	Transport User Benefits	Business	13.9	34%
		Other	3.8	22%
2	Other quantifiable benefits	0.1	33%	
3	Loss to Government of Indirect Taxes	-0.6	22%	
4	Net Transport Benefits (PVB)	17.1	31%	
5	Wider economic impacts (WEIs)	3.7	28%	
6	Net benefits including WEIs = (4) + (5)	20.8	30%	
7	Capital Cost	0.0	0%	
8	Operating Costs	0.0	0%	
9	Total costs = (7) + (8)	0.0	0%	
10	Revenues	6.7	21%	
11	Net costs to Government = (9) – (10)	-6.7	-23%	
12	BCR without WEIs (ratio) = (4)/(11)	1.3	70%	
13	BCR with WEIs (ratio) = (6)/(11)	1.6	69%	

Note: Figures may not add due to rounding

5 Updated Appraisal Methodology and Values

5.1 Summary of key changes

5.1.1 HS2 Ltd has updated the values and methodologies used in the appraisal of HS2 to reflect the latest evidence and best practice set out in WebTAG. These changes include:

- Minor corrections and updates to the treatment of inflation, fuel consumption parameters and assumptions relating to the external costs of car travel from WebTAG;
- Updates to ensure consistency with the changes in the model and demand forecasts, as well as WebTAG growth assumptions;
- Operating cost estimates for HS2 and classic trains have been updated to reflect the latest assumptions and WebTAG guidance;
- Incorporation of revised guidance on valuing travel time and other impacts of transport interventions described in 'Understanding and Valuing Impacts of Transport Investment' (DfT, 2015)⁴ and implemented in WebTAG A1.3 (November 2016)⁵;
- Implementation of a new technique to improve the accuracy and robustness of estimates of transport benefits in the HS2 appraisal; and,
- Accounting changes to update the price base and discount year used in the appraisal.

5.2 Impact of changes

5.2.1 These changes result in both positive and negative impacts on the Economic Case for HS2. The more routine updates, including updates to WebTAG parameters and adaptations to ensure consistency with modelling, have a small impact on benefits. The impact on revenues has a larger, negative, impact than the routine updates as changes in forecasts of RPI and the GDP deflator imply that future fares are now forecast to be lower in real terms; reducing revenues by over 10%.

5.2.2 This change also impacts on estimates of operating costs. In line with WebTAG guidance, some costs are assumed to increase in line with RPI, and are then converted to real prices using the GDP deflator. As a result, costs are now expected to be lower in real terms than in previous forecasts. In addition, updated assumptions on the operating costs of some HS2 services has further reduced costs, resulting in a 7% reduction in operating costs overall.

5.2.3 The opposite is true for capital costs. We have now adopted HS2 specific forecasts of real construction cost inflation, drawing from advice and evidence from DfT. This approach was previously used in sensitivity tests presented in November 2015, suggesting the BCR would

⁴https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/470998/Understanding_and_Valuing_Impacts_of_Transport_Investment.pdf

⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/542514/webtag-tag-unit-a1-3-user-and-provider-impacts-forthcoming-change-november-2016.pdf

have been reduced from 2.5 to 2.2. This approach has now been adopted in our central case estimate, with higher construction cost inflation between 2015 and 2020 increasing capital costs by 9% compared to the central case presented last year.

- 5.2.4 The way that transport impacts are valued has also changed; generally with positive impacts. Since the last Economic Case, the Department for Transport has published new evidence on the valuation or impacts of transport interventions 'Understanding and Valuing Impacts of Transport Investment' (DfT, 2015)⁶. The most significant changes recommended included:
- Updated values of time savings for commuting and leisure journeys. This slightly increases the value of commuting time savings and reduces the value of leisure;
 - Revisions to business time savings, incorporating different values depending on the distance of the trip being undertaken. The evidence suggest that the value of business time savings increases for longer distance trips;
 - Revisions to the way that wait time is valued in the appraisal;
 - Updates to assumptions on the occupancy rates for cars, and how these values change over time.
- 5.2.5 Following a consultation, the Department for Transport have issued revised guidance (WebTAG A1.3 (November 2016)) which has incorporated these recommendations with some minor revisions and updates. HS2 Ltd have implemented these changes based on early drafts of this guidance. It should be noted that some subsequent amendments to this guidance were not available in time for incorporation in this version of the Economic Case.
- 5.2.6 The impact on the HS2 Economic Case is to increase the benefits overall. This is driven by an increase in the value of business time savings – reflecting the longer distances of trips which benefit from HS2. Other benefits fall due to the lower value of time for leisure trips and lower values applied to the time passengers have to wait for public transport (and therefore HS2's reductions in these wait times are valued less).
- 5.2.7 HS2 Ltd have also implemented a technique known as Numerical Integration in the appraisal. This addresses concerns that in some situations one of the fundamental principles used in appraisal – the Rule of a Half – may break down. This is discussed in more detail in Chapter 4 of the Phase 2b Economic Case. Further background information on the Rule of a Half can be found in Section 2 of WebTAG A1.3. The impact of this is to reduce benefits by almost 17%.
- 5.2.8 The impact of all of these changes would reduce the benefits and revenues of the Full HS2 Network. These impacts are shown in the first two columns of Table 7. On a like for like basis, benefits fall by £9.4bn (10%) including WEIs and revenues by £4.1bn (11%). This would result in the BCR falling by 1.1 including wider economic impacts.
- 5.2.9 However the overall impact of the appraisal update sees an increase in benefits and revenue. This is the result of an accounting change of the price base and discount years. The price base is updated to 2015/16 (previously 2010/11). This means that the estimate of benefits and

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/470998/Understanding_and_Valuing_Impacts_of_Transport_Investment.pdf

revenues are increased to reflect five years of inflation. Similarly, the discount year is updated from 2011/12 to 2016/17 (reflecting the current appraisal year). This means the impact of discounting is less, and the value of future costs and benefits is higher.

- 5.2.10 This accounting change has the same impact on costs, benefits and revenues. It does not change the underlying costs and revenues (in terms of the actual amount of money spent) and is a change to the presentation of figures in the appraisal. As a result this change has no impact on the overall BCR of the scheme.

Table 7: Change in quantified costs and benefits following changes to the appraisal approach and values

Item		2011/12 Price and Discount Year		2015/16 Price Base and 2016/17 Discount Year		
		Change	% Change	Change	% Change	
1	Transport User Benefits	Business	-5.3	-10%	13.3	27%
		Other	-4.2	-20%	4.6	27%
2	Other quantifiable benefits		0.0	17%	0.1	27%
3	Loss to Government of Indirect Taxes		0.3	-8%	-0.9	27%
4	Net Transport Benefits (PVB)		-9.2	-13%	17.1	27%
5	Wider economic impacts (WEIs)		-0.2	-1%	4.5	27%
6	Net benefits including WEIs = (4) + (5)		-9.4	-11%	21.6	27%
7	Capital Cost		3.3	9%	11.4	27%
8	Operating Costs		-1.3	-6%	5.6	27%
9	Total costs = (7) + (8)		2.1	3%	17.0	27%
10	Revenues		-4.1	-11%	9.3	27%
11	Net costs to Government = (9) – (10)		6.1	27%	7.7	27%
12	BCR without WEIs (ratio) = (4)/(11)		-1.0	-32%	0.0	0%
13	BCR with WEIs (ratio) = (6)/(11)		-1.2	-30%	0.0	0%

Note: Figures may not add due to rounding

6 Changes in Scheme Design and Benefits

6.1 Summary of key changes

6.1.1 The design of the HS2 scheme has continued to be developed over time and in the light of the consultation on Phase Two of the scheme. The Phase 2b Economic Case⁷ presents three options for serving Sheffield which will be considered as part of a further consultation on the design of Phase 2b.

6.1.2 To ensure consistency with the rest of the steps in this document, and to aid transparency, the impact of changes in scheme design and benefits has taken the Meadowhall option as a comparison. This is the same underlying scheme presented in all of the previous steps.

In this option, there is no significant change in the services that are modelled in terms of the frequency or stopping patterns of those trains compared to the full network services used for modelling purposes last year. However, the route refinements have had small impacts on journey times. For some services this has increased the journey time by between 1 and 3 minutes.

6.2 Impact of changes

6.2.1 Overall the changes in the HS2 train services have a small negative impact on the benefits of HS2. The increases in journey time result in a small reduction in benefits and revenues.

6.2.2 The estimated costs of the Full HS2 Network have also increased. This partly reflects improvements in the approach to calculating contingency in the Phase One scheme. With the development of the scheme it is now possible to use Quantified Risk Assessment techniques to provide more robust estimates of the contingency requirements of the scheme. There have also been some increases in the cost of the Phase 2b scheme associated with the route serving Meadowhall in particular.

6.2.3 Overall this has had the impact of reducing the BCR of the option for serving Meadowhall by 8%, primarily driven by the increasing cost of the scheme.

⁷ High Speed Two Phase 2b. Crewe to Manchester, West Midlands to Leeds, Economic Case.

Table 8: Change in quantified costs and benefits following revised HS2 timetables

Item		Full HS2 Network		
		Change (£bn 2015 present value prices)	% Change	
1	Transport User Benefits	Business	-0.7	-1%
		Other	-0.2	-1%
2	Other quantifiable benefits		0.0	11%
3	Loss to Government of Indirect Taxes		0.0	-1%
4	Net Transport Benefits (PVB)		-0.8	-1%
5	Wider economic impacts (WEIs)		-0.2	-1%
6	Net benefits including WEIs = (4) + (5)		-1.0	-1%
7	Capital Cost		3.3	6%
8	Operating Costs		-0.8	-3%
9	Total costs = (7) + (8)		2.5	3%
10	Revenues		-0.4	-1%
11	Net costs to Government = (9) – (10)		2.9	8%
12	BCR without WEIs (ratio) = (4)/(11)		-0.2	-8%
13	BCR with WEIs (ratio) = (6)/(11)		-0.2	-8%

Note: Figures may not add due to rounding

7 Summary

7.1 Summary of results

- 7.1.1 Since HS2 Ltd published the last estimates of the Economic Case for HS2, there has been continued focus on updating the evidence base for our models and appraisal, including a comprehensive update of our estimates of current rail passenger numbers. Changes in the scheme design have been incorporated and changing external factors, such as GDP forecasts, have updated the estimates of future demand.
- 7.1.2 Overall the estimated benefits for transport users, revenues and costs of the Full HS2 Network appear to have increased substantially. However much of this increase is due to an accounting change – shifting to 2015/16 prices and a 2016/17 discount year – which has no impact on the BCR.
- 7.1.3 When assessed on a consistent price base the changes have been more modest. Benefits rise by around 9%, while revenues increase by around 3%. This mainly reflects increases in our estimates of the number of rail passengers in the future, which in turn reflects the significant rise in passengers on the rail network over the past few years, along with changes to our forecasting methodology.
- 7.1.4 Costs increase with changes in assumptions on future construction cost inflation, and improved construction and contingency estimates offsetting reductions in operating costs. As a result, whilst benefits and revenues increase, the BCR of the scheme is only slightly higher.
- 7.1.5 The analysis in this document has focused on a single point BCR to facilitate comparison across the steps and changes that have been presented. The Economic Case presents analysis of alternative options for the design of Phase 2b, as well as analysis of risks and uncertainties (rather than the single point estimate of the BCR for one option in this document). By presenting the risks and uncertainties around the case we are better able to demonstrate the key factors and assumptions that our analysis is sensitive to and more clearly address the risks that are being considered.