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# THE ECONOMIC CONTRIBUTION OF UK RAIL 2018



## Railway Industry Association

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The Railway Industry Association (RIA) is the trade association for UK-based suppliers to the UK and world-wide railways. It has more than 200 companies in membership, in a growing industry with the number of rail journeys expected to double over the next 25 years and freight set to grow significantly too. RIA's membership is active across the whole of railway supply, covering a diverse range of products and services and including both multi-national companies and SMEs (60% by number). RIA works to promote the importance of the rail system to UK plc, to help export UK expertise around the globe and to share best practice and innovation across the industry.

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# EXECUTIVE SUMMARY

**Over £36 bn**

Annual GVA supported  
by rail-related demand

This report examines the contribution of railway-related activity to the UK economy. Its focus is on the activity supported, directly and indirectly, by the demand for rail-related goods and services, which is put at £36.4 billion in terms of the contribution to GDP (technically 'gross value added', or GVA). This activity is associated with nearly 600,000 jobs.

Together with other benefits provided to the UK economy and society—not captured by this analysis—these figures show the importance of the rail sector for UK industrial growth, jobs and innovation, and its contribution to the achievement of the Government's Industrial Strategy. They help to explain the government's support of, and public funding for, the major investment programme being undertaken in the sector.

Fig. 1. Overview of the UK rail-related industries' economic footprint

Values in 2016	Railway system (A)	Rail supply sector (B)	Station retailers and their supply chain (C)	Total of all rail-related industries (A)-(C)	Total induced impacts (D)	Total of all rail-related impacts (A)-(D)
<b>Output or sales (£ billion)</b>	<b>22.9</b>	<b>31.6</b>	<b>4.0</b>	<b>58.5</b>	<b>17.6</b>	<b>76.1</b>
<b>GVA (£ billion)</b>	<b>11.3</b>	<b>15.1</b>	<b>1.5</b>	<b>27.9</b>	<b>8.5</b>	<b>36.4</b>
<b>Employment (thousands)</b>	<b>114.5</b>	<b>248.9</b>	<b>41.6</b>	<b>405.0</b>	<b>192.1</b>	<b>597.1</b>
<b>Tax revenues (£ billion)</b>	<b>3.6</b>	<b>4.3</b>	<b>0.6</b>	<b>8.4</b>	<b>2.6</b>	<b>11.0</b>

Source: Oxford Economics

This study covers the activities of three industry groups: the railway system, comprising passenger and freight train operators and infrastructure providers; the rail supply sector, comprising SMEs and larger companies in the multi-product supply chains of UK and overseas rail networks; and retailers and caterers operating at UK railway stations, and their domestic supply chain. We also add the 'induced' UK economic activity supported by the wage-funded spending of workers employed in these industries. The study covers a wider range of demand-side impacts than previous work, such as that by Oxera.<sup>1</sup>

Taking all of these impacts together, the total value of sales or output, before deducting supply chain transactions and import content, is estimated to have been £76.1 billion in 2016. After deducting those elements, the GVA measure of production, of £36.4 billion, supported 597,100 jobs and £11 billion in tax revenues. The industries can therefore be said to support 2.3 percent of UK-wide GVA, 1.7 percent of UK jobs, and 1.7 percent of all UK tax revenues.

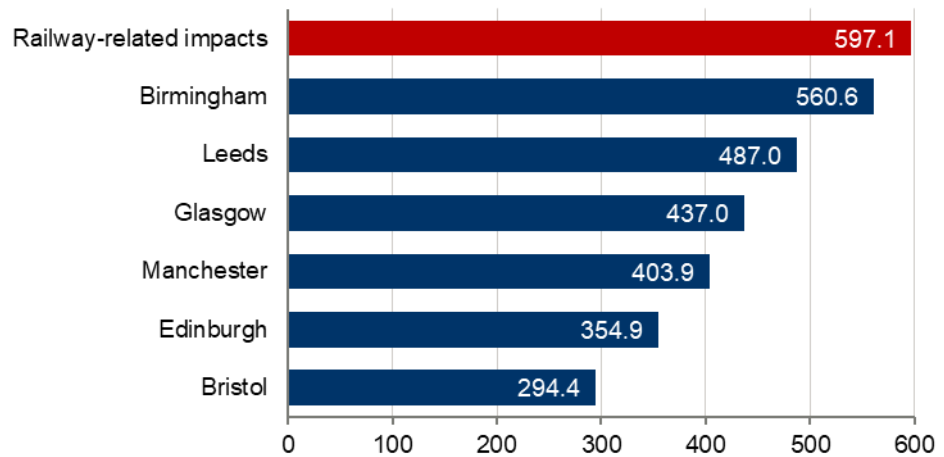
The near-600,000 jobs supported by railway-related demand amount to more than the total number of employed workers in any UK local authority area outside of London. This includes the local authority areas of major cities including Birmingham. The £11 billion annual tax contribution, meanwhile, can be compared favourably with the £15.2 billion of total public sector spending on the railways, as the latter includes capital expenditure that should generate future revenue streams, as well as wider economic and social benefits. And this tax take exceeds total non-capital public spending, of £10.1 billion, across all rail and non-rail transport functions.

**600,000**

Approximate number of  
jobs supported across  
these rail and rail-  
supported activities

Fig. 2. Total jobs supported compared with job numbers in major cities

Thousands of jobs, 2016



Source: Oxford Economics; ONS Business Register Employment Survey

Of the total values, the railway system itself accounts for 31 percent of GVA and for 19 percent of employment. So for every £1 of productive activity on the network, a further £2.20 of income is generated in associated industries, their suppliers, and firms supported by railway workers' wage-funded spending. And for every individual working on the rail system, a further four jobs are supported in other rail-related sectors and in the wider UK economy.

For the rail-related industries themselves, excluding induced impacts, total GVA amounts to £27.9 billion, equivalent to 1.8 percent of economy-wide GVA, supporting 405,000 jobs. The GVA of these industries is therefore close to that of the UK telecommunications sector and electricity and gas supply industry, and greater than that of other significant industries including food, drink and tobacco manufacturing, and chemical and pharmaceutical manufacturing.

Across these industries altogether, GVA per job averages £68,900, some 50 percent above the UK average. While the use of skilled labour and/or advanced technology will make important contributions to this measure in some instances, high levels of investment also provide a key explanation.

The study also looks at the geographical distribution of activity. The sector accounts for a disproportionate share of GVA and jobs in London. It is therefore under-represented in a majority of the other regions, most notably in Northern Ireland and the South West, and to a lesser extent in Scotland, Wales, and the East of England. But while the railway system itself is also clearly under-represented in the East Midlands and North East, these regions nevertheless benefit from the strong presence of rail supply sector activities.

Benefits not captured by this study include net benefits for rail users, reduced road congestion, and positive impacts on the UK economy's long-term productive potential. The Oxera work puts these benefits at up to £16.7 billion, £11.8 billion, and £11.6 billion per annum, respectively.

£11 bn

Annual tax revenue generated by this rail and rail-supported work

£69,000

Average GVA per job across the rail-related industries, some 50% above the UK average

<sup>1</sup> This report differs from the Oxera 2015 and 2017 reports, by also including the impact of capital projects, induced effects, London Underground, station retailers, and rail-related exports. (Oxera for the Rail Delivery Group, *How does rail contribute to the UK economy?*, July 2017.) Chapter 7 sets out more on this issue.

# 1. INTRODUCTION

The UK rail industry, and the rail supply sector supporting it, provide a wide range of benefits to the UK economy. As well as being a significant provider of activity, jobs, tax revenues, and employee spending power every year, they provide additional net benefits to rail users and (through reduced congestion) road users. Their activities also help to contain transport-related pollution and curb road accidents, and, over the longer term, enhance the nation's overall productive potential by making it easier for other businesses to trade, co-operate, and compete.

Reflecting the importance of the sector, as a result of these benefits, the UK government is supportive of the significant programme of ongoing investment aimed at further improving the nation's rail network. This includes backing with public funds, with the Department for Transport's latest 'Statement of Funds Available' announcing a direct grant worth up to £34.7 billion to Network Rail, for England and Wales only and for the five years to March 2024. Together with track access charges and other income, this would take the infrastructure provider's total funding in that period to around £47.9 billion.<sup>2</sup>

This main purpose of this study is to examine one dimension of the many benefits provided by the rail-related industries, namely the contribution made to the UK economy by generating demand, and thereby supporting jobs and tax revenues, in the railway network and supplier businesses, and through the spending power provided to these sectors' employees. However, as set of case studies is also included, in order to illustrate some of the wider economic and social benefits provided by the sector's activities.

Figure 3 illustrates the range of activities and impacts covered by the numerical analysis. These fall into four broad groups:

- The railway system, comprising the activities of Network Rail, the passenger and freight train operating companies in Great Britain, London Underground and other metro-type systems, and Northern Ireland Railways.
- The rail supply sector, comprising all UK-based activity of SMEs and larger firms in the supply chain to the UK railway system, and (as far as the data allow) in the supply chains to overseas rail networks.
- Retailers and caterers located on UK railway stations, and their UK-based supply chain.
- So-called 'induced' activity, i.e. activity in other UK industries supported by the wage-funded expenditure of workers in the railway-related industries, as defined by the three categories above.

The economic impacts assessed include the total value of sales or output, the GVA measure of net production, employment, and tax revenues generated.<sup>3</sup>

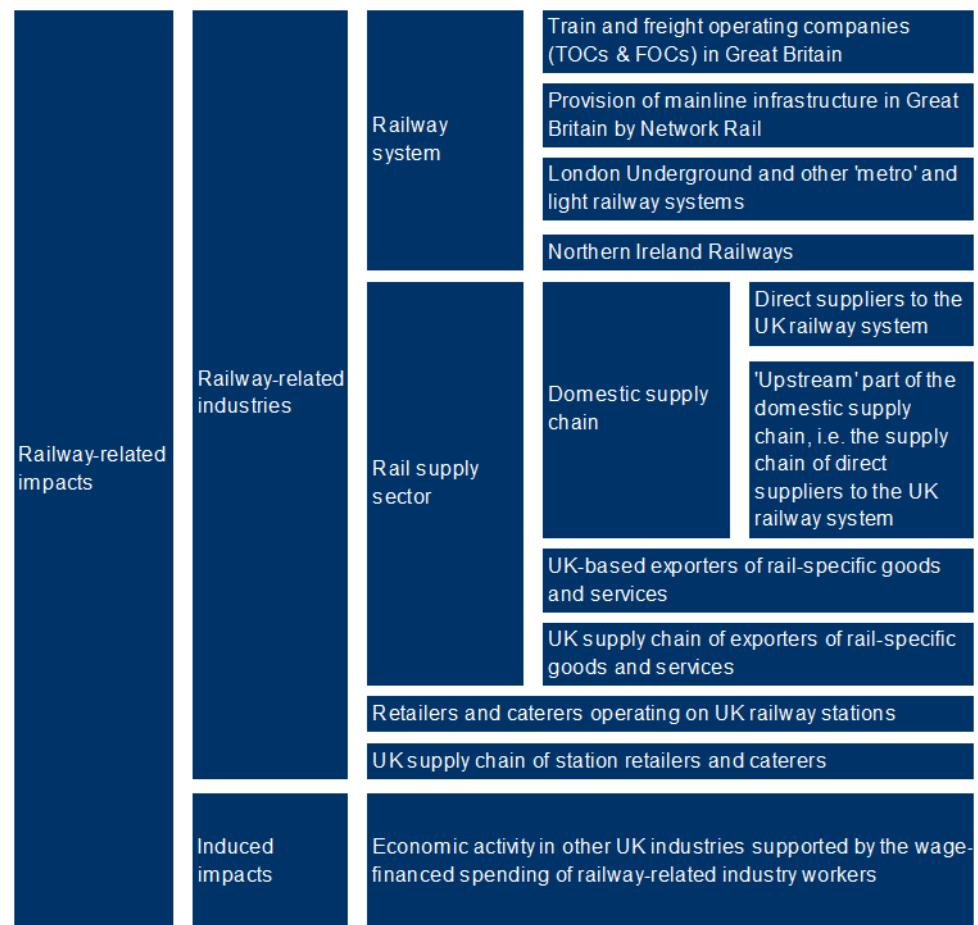
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<sup>2</sup> Department for Transport, Railways Act 2005 Statement: Statement of Funds Available, October 2017.

<sup>3</sup> Gross value added (GVA) is the main measure of an industry's contribution to UK economic activity. It is equal to the industry's sales or output, net of its purchases of goods and services from other industries.

The value of the rail supply sector captured here is not based on a simple view that some businesses, or business divisions, form part of the sector, while others do not. Rather, it is based on the value of the content ultimately destined for use by a railway system at home or abroad. For some businesses, including the typical RIA member, a high proportion of output will be supplied directly or indirectly to a railway network, and it is this share of activity that is counted in the study results. At the other end of the scale, a very small proportion of some firms' output will ultimately be used by a railway network, and it is this small proportion that is captured by our analysis. More detail on how RIA members fit into the wider picture, in terms of the study results, is set out in chapter 4.

Fig. 3. UK 'railway-related' impacts and industry sectors in this report



The scope of the impacts captured by this study is wider than that of other work looking at demand-side impacts alone, so the headline results are not comparable. Some comparisons with other studies are set out in chapter 7.<sup>4</sup>

The box below describes the approach taken in principle, starting with an illustration of a 'standard' economic impact assessment, which formed the starting point for this analysis. A description of the detailed methodology and data sources can be found in appendix 2.

<sup>4</sup> In particular, the estimates in this report differ from the contribution cited in Oxera's 2015 and 2017 reports, by also including the impact of capital projects, induced effects, London Underground, station retailers, and rail-related exports. (Oxera for the Rail Delivery Group, *How does rail contribute to the UK economy?*, July 2017.)



### THE 'IN PRINCIPLE' APPROACH TAKEN BY THIS STUDY

The starting point for this study was to carry out a 'standard economic impact assessment' for the UK train operating sector.

#### A standard economic impact assessment, covering 'day-to-day' activities

To illustrate this, imagine a hypothetical train operating company (TOC) taking in £100 million in fare revenues during a given time period. These revenues might then be then put to use—again, hypothetically—as follows:

- £35 million for total employment costs.
- £15 million track access charges paid to Network Rail.
- £15 million paid to lease trains from a UK-based rolling stock leasing company.
- £30 million paid to a UK-based company providing other maintenance and transport logistics services.

The £5 million left over is termed the 'gross operating surplus' by economists. This must be used to cover the cost of capital equipment purchased in the past, and any interest costs associated with past borrowing, before arriving at any surplus for the shareholders.<sup>5</sup>

Imagine then that Network Rail's £15 million of revenues are used to cover £5 million of employment costs, and £5 million of payments to the UK-based maintenance and logistics company, leaving £5 million to cover the cost of past capital outlays.

The rolling stock leasing company might then pay £3 million in employment costs, and £5 million to the UK-based maintenance company, leaving £7 million to cover the significant cost of past capital investment, as well as any net profit.

Finally, imagine that the maintenance company spends £10 million on its staff, and purchases £25 million of materials from a UK wholesaler. The wholesaler imports those materials from abroad for £22 million and spends £2 million on its employees. The 'gross operating surplus' of the maintenance company is therefore £5 million, and that of the wholesaler, £1 million. The table below shows the resulting impacts for gross value added (GVA).

UK GVA is the sum of UK employment costs and the UK gross operating surplus, and amounts to £78 million in this example. The original £100 million of train operator sales revenues breaks down between this £78 million of UK GVA content, and £22 million of imported content.<sup>6</sup> Here, the train operating company's own GVA—its 'direct' GVA—is £40 million, while the GVA of its complex UK supply chain amounts to £38 million. The latter figure is the 'indirect' GVA of the train operating company. Each of these GVA impacts will have an associated employment and tax impact.

The total direct and indirect UK 'output or sales' impact here is the £195 million total for UK sales receipts. However, it should be noted that this is a somewhat arbitrary figure, reflecting the complexity of the supply chain. The net value of output sold to the final consumer is £100 million, and the share of UK producers in that value is £78 million, as measured by UK GVA.

<sup>5</sup> The capital costs deemed to be covered by day-to-day revenues relate to capital outlays made in the past, not new up-front capital expenditure. The portion of past capital outlays deemed to be met in a given year relates to the portion of the original capital value 'written off' during the year, i.e. the 'capital depreciation'.

<sup>6</sup> In practice, receipts will be split between UK GVA, imports, and taxes levied on supply chain transactions.

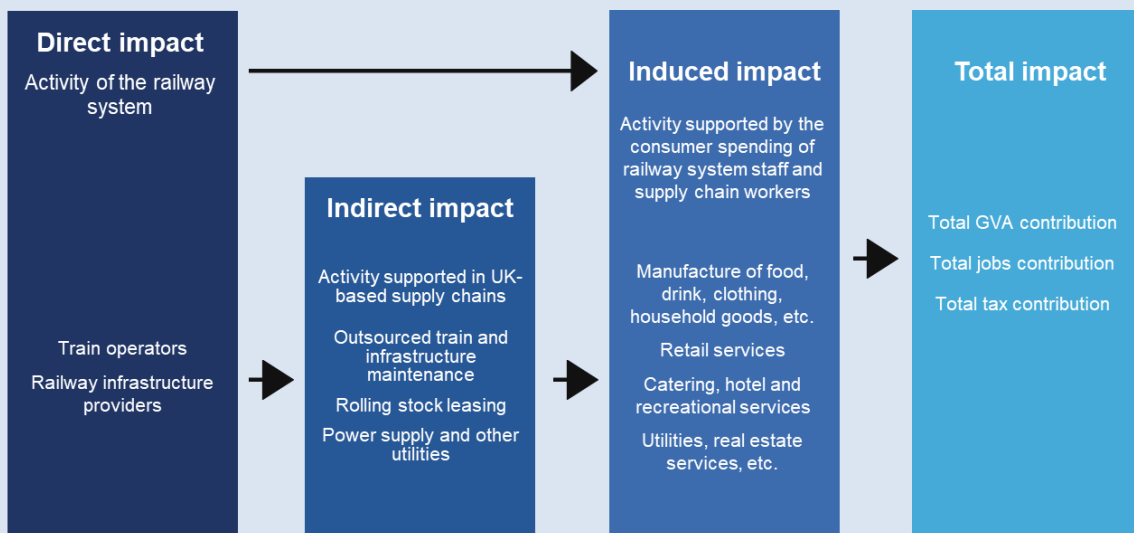
Fig. 4. Hypothetical economic impact of £100 million of fare revenue

Hypothetical £ million	Sales receipts	Employment costs	Gross operating surplus	Total gross value added	Purchase of day-to-day inputs
<b>Train operating company (TOC)</b>	<b>100</b>	<b>35</b>	<b>5</b>	<b>40</b>	<b>60</b>
Network Rail	15	5	5	10	5
Rolling stock leasing company	15	5	5	10	5
Maintenance and logistics company	40	10	5	15	25
Wholesaler	25	2	1	3	22
<b>UK total</b>	<b>195</b>	<b>57</b>	<b>21</b>	<b>78</b>	<b>117</b>
Import content				22	
<b>Total</b>				<b>100</b>	
<b>Of which: TOC's direct impact</b>	<b>100</b>			<b>40</b>	
<b>TOC's indirect impact in the UK</b>	<b>95</b>			<b>38</b>	

Of the £78 million of UK direct and indirect GVA, £57 million covers employment costs. After employer and employee pension and national insurance contributions, and employee income tax, this will be available for staff to spend on household goods and services. That in turn will support further UK GVA, and associated jobs and tax, in sectors completely outside of the TOC's own supply chain. These impacts are known as 'induced impacts'.

A standard economic impact assessment for a company or industry comprises the direct, indirect and induced channels of impact. The total contribution to the nation's GVA, jobs and tax is simply the sum of these three channels.

Fig. 5. A standard economic impact assessment for the railway system



For this study, the 'direct' impact was then redefined to cover the entire 'railway system'. This covers all UK train operating companies, including 'metro' operators, with Network Rail also included in the 'direct' rather than 'indirect' results. On this basis, the 'direct' GVA impact in the

above example would be £50 million, and the indirect GVA impact, £28 million. The diagram above illustrates a standard economic impact study on that basis.

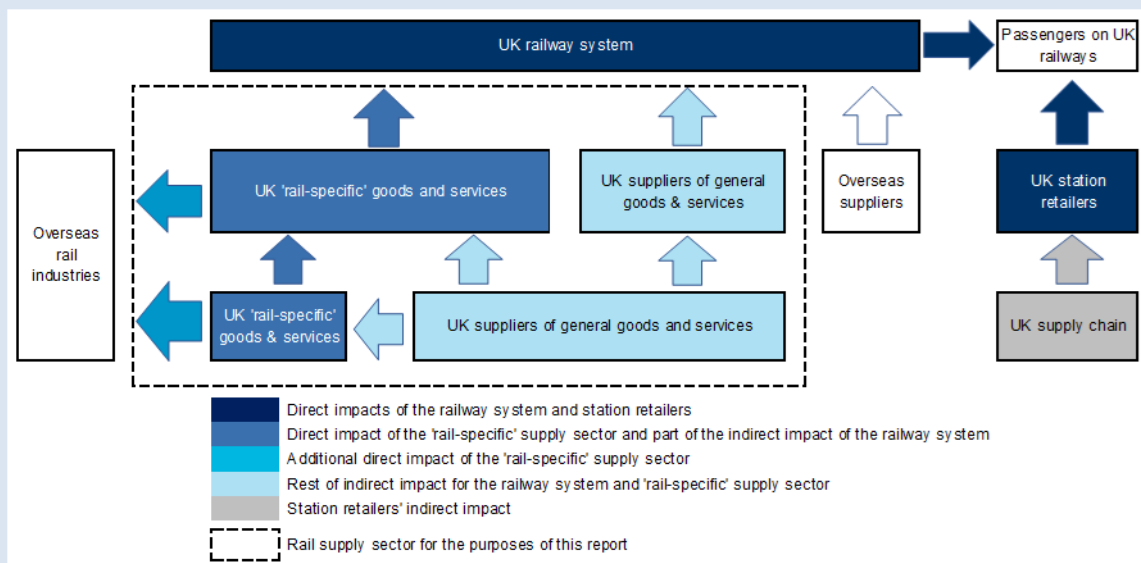
**Adjustments to the standard approach for this study: ‘day-to-day’ activities**

For the purposes of this broader-ranging, multi-sector study, the analysis was then adjusted as follows:

- The ‘direct’ and ‘indirect’ labels were dropped, and replaced with ‘UK railway system’ and ‘domestic supply chain to the UK railway system’, respectively.
- Results for the latter were split between direct suppliers to the railway system (i.e. the ‘first round’ of suppliers), and the ‘upstream’ part of the supply chain. In the example above, the rolling stock leasing company would be part of the ‘first round’ of suppliers, while the wholesaler is further ‘upstream’.
- Exports of rail-related supplies were estimated, as far as possible, with the ‘direct’, ‘indirect’ and ‘induced’ impacts supported by those sales estimated in turn.
- The ‘direct’ and ‘indirect’ export-related impacts were added to the values for the domestic supply chain, to arrive at the total value for the ‘rail supply sector’.
- Sales by retail and catering outlets operating at UK railway stations were estimated, with the ‘direct’, ‘indirect’ and ‘induced’ impacts supported by those sales estimated in turn.
- The total value for the ‘rail-related industries’ was taken to be the value of the railway system, plus the total value of the rail supply sector, plus the direct and indirect impacts of the station retailers and caterers. This is equal to the sum of all direct and indirect impacts in the study.

Defined in this way, the rail supply sector will include activities that could be described as clearly ‘rail-specific’, together with some that are more generic in nature. However, it is difficult to draw a clear boundary between the two, either in principle, or in any way that aligns with the available industry datasets. The diagram below illustrates all of the ‘direct’ and ‘indirect’ activities included in the ‘rail supply sector’, together with other parts of the ‘rail-related industries’.

Fig. 6. Study coverage with direct and indirect channels of impact



Finally:

- The induced impact initially calculated for the railway system was split between that relating to railway system’s own staff, and that relating to staff working in the domestic supply chain. The induced impact relating to rail-related exports was added to the latter to arrive at the induced impact of the rail supply sector.
- The ‘total of all rail-related impacts’ is taken to be the sum of the values for the rail-related industries, plus the sum of all induced impacts, including induced impacts relating to station retailers and their supply chain.

**Adjustments to the standard approach for this study: capital expenditure**

As described above, in a standard impact assessment the ‘indirect’ impact is driven only by the purchases of day-to-day inputs by the subject of the assessment—in this case the UK train operators and Network Rail. The impact for the rail supply chain of new capital expenditure—as opposed to day-to-day spending—is therefore missed out, however it is funded.

Capital spending impacts were therefore added into the study. As an example, imagine a £100 million railway construction programme. Suppose that—hypothetically—£90 million of this related to construction activity, involving a single contract won by a main contractor. The remaining £10 million is spent on machinery and other capital equipment which we can assume (for the sake of simplicity) is imported from abroad. The main contractor spends £30 million on its staff, pays £40 million to a specialist construction sub-contractor, and has £20 million left over as the ‘gross operating surplus’. The sub-contractor pays £20 million to its staff, imports £10 million of materials, and retains £10 million as the ‘gross operating surplus’.

The result is total supply chain GVA of £80 billion, which will have associated jobs and tax impacts. The £50 million of employment costs will, in turn, support an additional induced impact. Note that capital expenditure itself (however financed) has no immediate impact—either positive or negative—on the GVA of the railway system. However, it will have implications for that industry’s costs, and, potentially, revenues, in subsequent years.

**Fig. 7. Hypothetical economic impact of a £100 million railway construction project**

Hypothetical £ million	Sales receipts	Employment costs	Gross operating surplus	Total gross value added	Purchase of day-to-day inputs
<b>Main construction contractor</b>	<b>90</b>	<b>30</b>	<b>20</b>	<b>50</b>	<b>40</b>
<b>Construction sub-contractor</b>	<b>40</b>	<b>20</b>	<b>10</b>	<b>30</b>	<b>10</b>
<b>UK total</b>	<b>130</b>	<b>50</b>	<b>30</b>	<b>80</b>	<b>50</b>
<b>Import content</b>				<b>20</b>	
<b>Total</b>				<b>100</b>	

As well as adding in the impact for the rail supply sector of new capital investment in the rail network, the results were also adjusted to capture the impact of purchases of rolling stock by the leasing companies, which also count as capital rather than day-to-day spending. Taking all of this into account, construction activity, and manufacture of rolling stock and signalling equipment, can be added to the examples of supply chain activity shown in figure 6.

The report includes charts showing comparisons with other industries, aimed at putting the value of the sector's activity's in context. Employment is put into context by reference to total jobs across various localities. The comparators are chosen on the basis that their values are reasonably close to that of the sector of study, and the likelihood that they will have some resonance with the reader. They need not have any significant connection with rail-related activities.

The rest of this report is structured as follows:

- Chapter 2 sets out an overview of the results for all railway-related impacts, including induced impacts, and for the rail-related industries in aggregate.
- Chapters 3, 4, 5 and 6 cover the respective results in more depth for the railway system, rail supply sector, station retailers and caterers and their supply chain, and induced impacts.
- Chapter 7 puts the results in context by setting out other types of economic benefit provided by the railway system, and comparing the results in this study with those of other work in this field.
- Chapters 8, 9 and 10 provide some analysis of the results by UK region, Local Enterprise Partnership, and parliamentary constituency, respectively.
- Appendix 1 sets out the key results in tabular form while appendix 2 provides a detailed methodology.

Excel versions of the appendix 1 tables are available here:

<https://d1iydh3qrygeij.cloudfront.net/Media/Default/landing-pages/recent-releases/2018/OE UK rail 2018 - Appendix 1 tables.xlsx>

The results for the UK parliamentary constituencies can be found here:

<https://d1iydh3qrygeij.cloudfront.net/Media/Default/landing-pages/recent-releases/2018/OE UK rail 2018 - UK parliamentary constituencies.xlsx>

It should be noted that the 'economic footprint' that is the main focus of this report, and the other benefits described in chapter 7, are based on different frameworks and concepts and between them involve a mix of short-term demand-side and long-term supply-side effects. We would therefore caution against simply adding all of these benefits together to arrive at a figure for the sector's 'overall total contribution to the economy'.

## 2. INDUSTRY OVERVIEW

As set out in the introduction, this report covers four groups of industries and impacts, namely:

- A. The UK railway system, comprising train and metro system operators and the activities of Network Rail.
- B. The UK rail supply sector, covering all activity in the supply chains to the UK railway system, and to systems overseas.
- C. Retailers and caterers operating on UK railway stations, and their UK-based supply chain.
- D. Induced activity supported in the UK economy by the wage-funded expenditure of workers engaged in the above industries.

The first section of this chapter looks at the results for all of these impacts taken together, and puts them in a wider context. The second section analyses the contribution of the rail-related industries themselves, taken as a whole but excluding induced impacts. An overview of the results, split into the broad industry and impact groups, is shown in figure 6.

Fig. 8. Overview of results

Values in 2016	Railway system (A)	Rail supply sector (B)	Station retailers and their supply chain (C)	Total of all rail-related industries (A)-(C)	Total induced impacts (D)	Total of all rail-related impacts (A)-(D)
<b>Output or sales (£ billion)</b>	22.9	31.6	4.0	58.5	17.6	76.1
<b>GVA (£ billion)</b>	11.3	15.1	1.5	27.9	8.5	36.4
<b>Employment (thousands)</b>	114.5	248.9	41.6	405.0	192.1	597.1
<b>Tax revenues (£ billion)</b>	3.6	4.3	0.6	8.4	2.6	11.0

Source: Oxford Economics

### 2.1 TOTAL OF ALL IMPACTS INCLUDING INDUCED IMPACTS

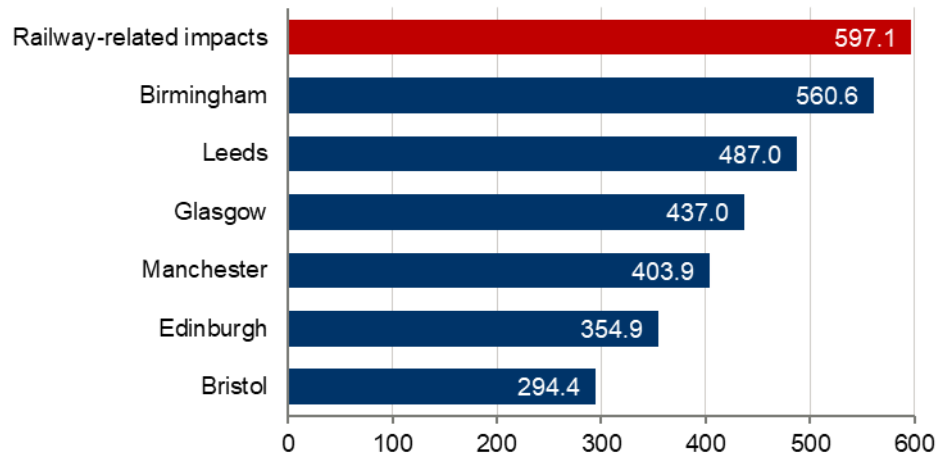
In 2016, the total of all rail-related impacts, including induced impacts as well as activity across the rail-related industries themselves, amounted to £76.1 billion in output or sales. After deducting the value of transactions within the UK supply chain, as well as imports, from that figure, the resulting contribution to UK GVA can be put at £36.4 billion. This in turn supported 597,100 jobs and generated £11 billion in tax revenues. On this basis, the sector could be said to account for 2.3 percent of total UK GVA, 1.7 percent of total UK jobs, and 1.7 percent of total UK tax revenues.<sup>7</sup>

<sup>7</sup> The UK GVA figure used in this calculation excludes the 'imputed rent' of housing owner-occupiers. The share of UK-wide GVA including that notional value is 2.1 percent. The taxes captured by this analysis are those paid by business (including taxes on supply chain purchases), income tax and national insurance contributions paid by workers, and taxes on sales to consumers. But some other taxes paid by households, such as council tax, will

To put this contribution in context, the total number of jobs supported is greater than total employment across major UK cities including Birmingham, Leeds, Glasgow, Manchester, Edinburgh, and Bristol, but excluding London.<sup>8</sup>

Fig. 9. Total jobs supported compared with job numbers in major cities

Thousands of jobs, 2016



Source: Oxford Economics; ONS Business Register Employment Survey

The total annual tax contribution of £11 billion, meanwhile, can be compared favourably with the total amount of public funding for the UK’s rail network, of some £15.2 billion in the 2016-17 financial year. This is because the latter figure includes a great deal of expenditure on major capital projects likely to generate extra fare and other revenues in future, not to mention wider economic and social benefits of the kind discussed in chapter 7 of this report.<sup>9</sup> And the sector’s tax contribution is greater than total government spending on the entire transport function—non-rail as well as rail—if capital outlays are excluded. Government non-capital spending on transport stood at £10.1 billion in 2016-17.

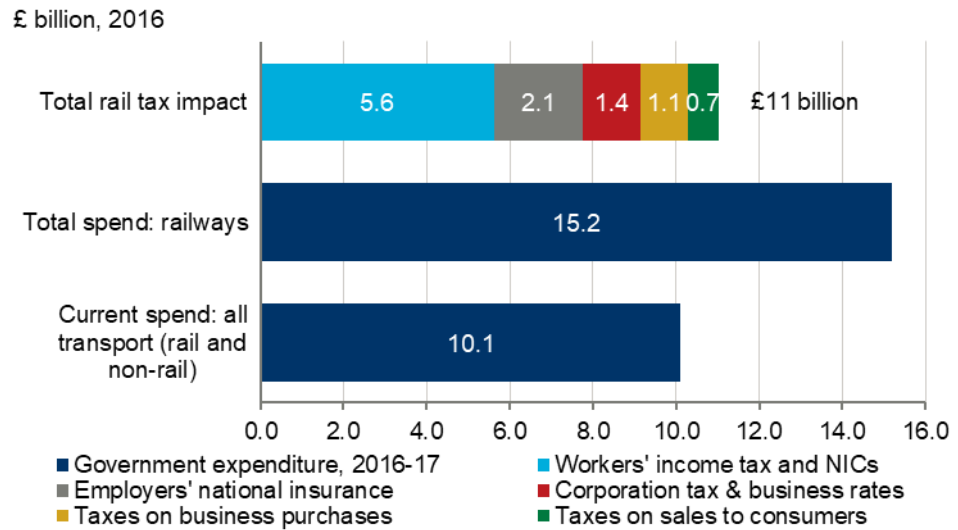
Of the total tax contribution, employers’ national insurance accounts for £2.2 billion (19 percent), corporation tax and business rates for £1.4 billion (12 percent), taxes (such as fuel duty) levied in the business supply chain for £1.1 billion (10 percent), income tax and national insurance contributions paid by employees and self-employed individuals for £5.8 billion (52 percent), and taxes on sales to consumers for £0.7 billion (seven percent).

not be attributable to any industry. The share of total UK tax revenues potentially within the scope of this analysis is estimated to be around 1.9 percent.

<sup>8</sup> All of these figures relate to local authority areas—for example, the metropolitan borough covered by Manchester City Council, as opposed to either the smaller, historic city of Manchester, or the wider Greater Manchester metropolitan county.

<sup>9</sup> Source: HM Treasury Public Expenditure Statistical Analysis 2017. This is the amount included in the official ‘total managed expenditure’ measure of government spending. It includes all spending by Network Rail (net of commercial receipts), as well as that of bodies such as Crossrail and Transport for London, as these are classified to the central and local government sector. This includes all capital expenditure by these organisations.

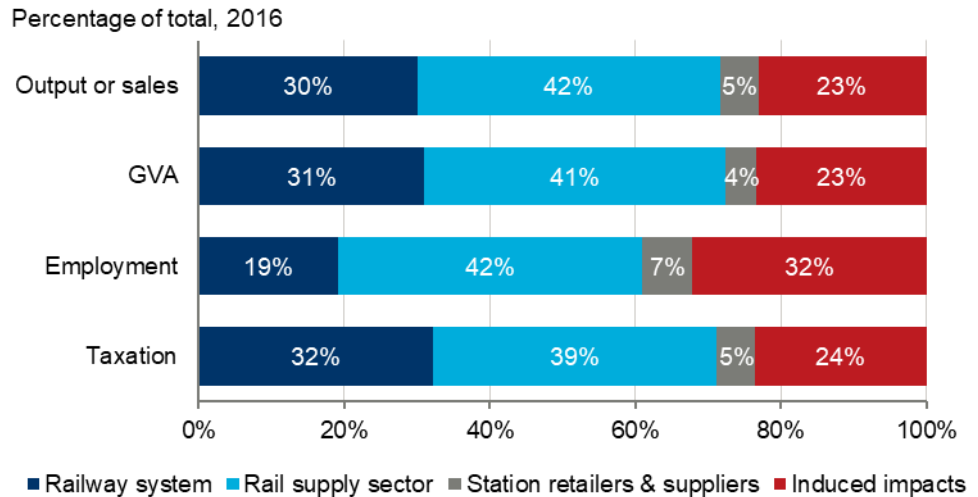
Fig. 10. Rail-related tax impacts and public spending on transport



Source: Oxford Economics; HM Treasury.

Looking at the pattern of total activity by channel, the railway system itself accounts for 31 percent of GVA and for 19 percent of jobs, the rail supply sector for 41 percent of GVA and 42 percent of jobs, station retailers and caterers and their supply chain for four percent of GVA and seven percent of jobs, and induced impacts for 23 percent of GVA and 32 percent of jobs.

Fig. 11. Rail-related activity by channel



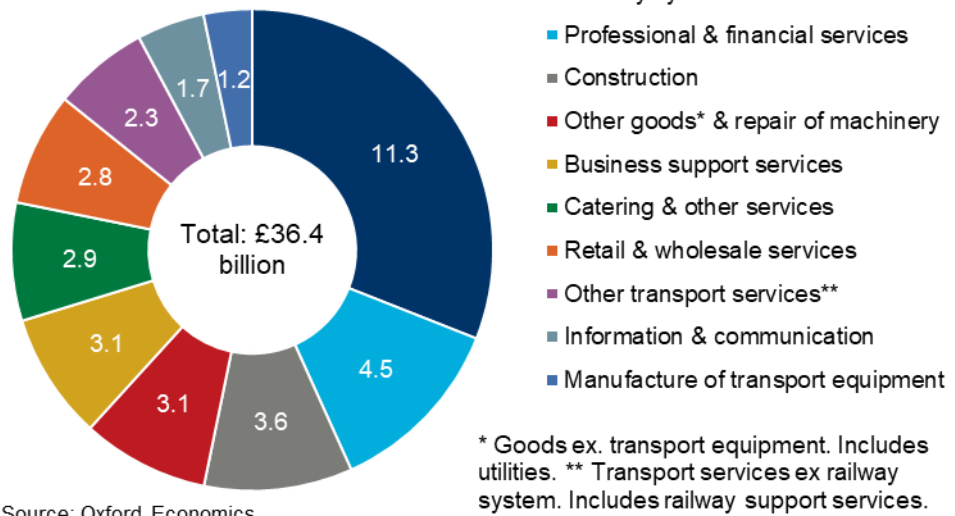
Source: Oxford Economics

Of the total GVA impact of £36.4 billion, £11.3 billion is accounted for by the UK railway system itself, and £25.1 billion, i.e. 69 percent, by the production of other goods and services supported by rail-related demand. So in broad terms, for every £1 of activity in the UK railway system, £2.20 of production takes place in the UK in associated industries, suppliers to those industries, and suppliers to rail-related workers.



Fig. 12. Total of all rail-related impacts, including induced: GVA

£ billion, 2016



Source: Oxford Economics

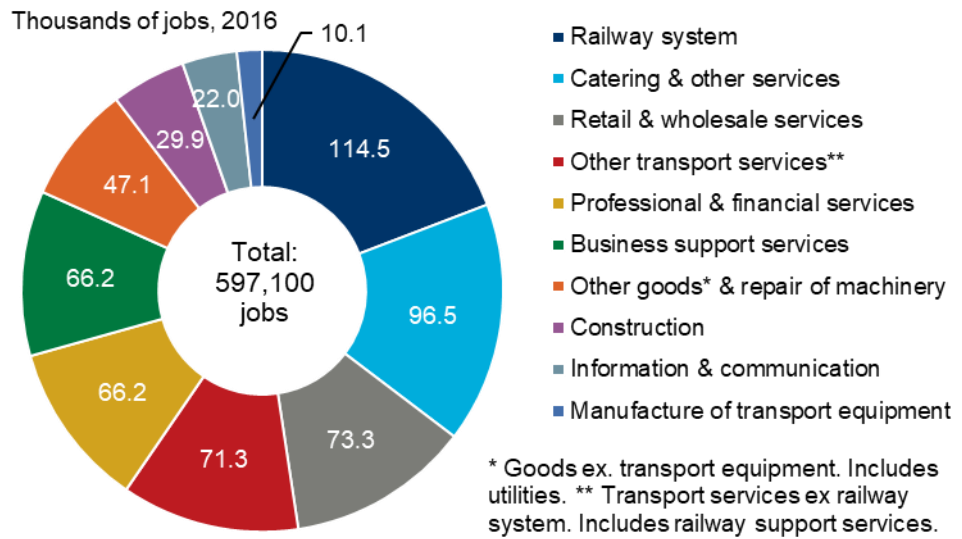
Outside of the railway system, five of the nine broad industrial sectors shown in the chart above are dominated by activities that are clearly rail-related in nature. These are construction (10 percent), which includes railway construction; the general goods category (nine percent), which includes repair and overhaul of locomotives and rolling stock, as well as parts such as tracks and sleepers; business support services (eight percent), which includes the leasing of locomotives and rolling stock; transport services (six percent), which include outsourced services for the railway system such as train maintenance and platform logistics; and manufacture of transport equipment (three percent), which includes rolling stock and railway signalling equipment.

But the remainder is spread across a wide range of other services provided to both businesses and consumers, including professional and financial services (12 percent), wholesale and retail services (eight percent), catering and other—mainly personal—services (eight percent); and information and communication services (five percent).

The pattern of total jobs supported by rail-related activities differs somewhat, with the railway system itself system employing 114,500 staff, or just 19 percent of the total. This means that for every person working for a train operator or Network Rail, four individuals are engaged in other activities supported by rail-related demand.

Of the remainder, catering and other services (16 percent of total jobs), and retail and wholesale (12 percent) are the next most important sectors for employment, reflecting their labour-intensive nature. By contrast, construction (five percent), and transport equipment manufacturing (two percent), employ comparatively few workers for each £1 of value added production.

Fig. 13. Total of all rail-related impacts, including induced: jobs

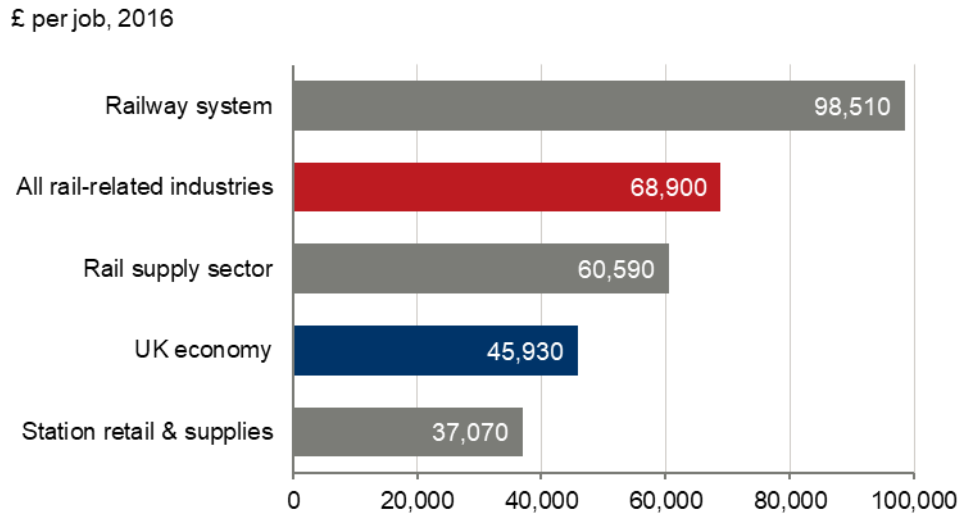


Source: Oxford Economics

## 2.2 ACTIVITY OF THE RAIL-RELATED INDUSTRIES

Across the railway system, rail supply sector, station retailers and caterers, and their supply chain, but excluding induced impacts, total sales or output amounted to £58.5 billion in 2016. This supported £27.9 billion of GVA, 405,000 jobs, and £8.4 billion in tax revenues. The industries therefore accounted for 1.8 percent of UK-wide GVA, 1.2 percent of UK jobs, and 1.3 percent of all UK tax revenues.<sup>10</sup>

Fig. 14. GVA per job



Source: Oxford Economics; ONS

<sup>10</sup> The UK GVA figure used in this calculation excludes imputed rent. The share of UK-wide GVA including that notional value is 1.6 percent.

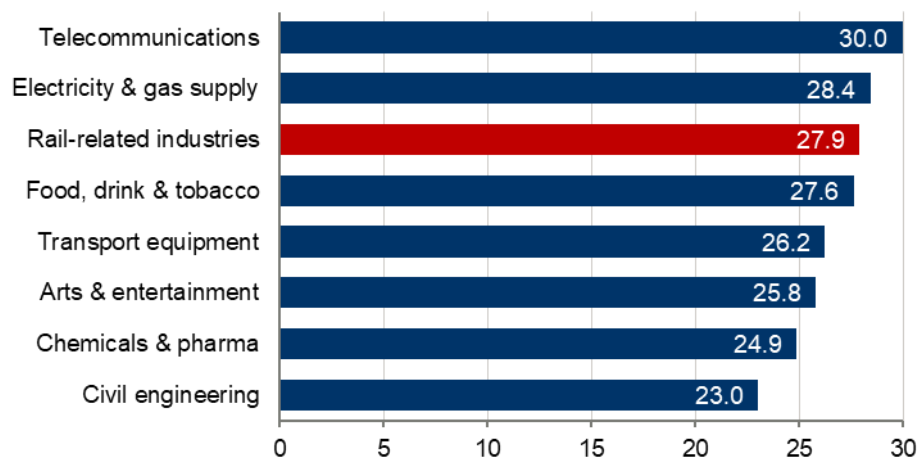
The comparatively low share of UK jobs, compared with the share of UK GVA, reflects the fact that, on average, GVA per job is 50 percent higher than the average across all UK industries.<sup>11</sup>

The apparently low share of tax mainly reflects taxes not classified as borne by any industry in this analysis (something which would affect the results for any sector studied).<sup>12</sup> But in addition, an above-average share of GVA is accounted for by capital depreciation, rather than tax-generating wages or net profits, for some key sub-sectors, and no VAT is charged on passenger rail travel.

The total GVA of the rail-related industries was therefore higher in 2016 than that of UK-wide food, drink and tobacco manufacturing sector; the entire UK transport equipment industry including motor vehicles and aerospace; the arts, entertainment and recreation sector; and the combined total of chemicals and pharmaceuticals manufacture. It was 21 percent higher than the total GVA of civil engineering activity of all kinds, and close to the GVA of the electricity and gas supply industry and telecommunications sector.

Fig. 15. **GVA of selected UK industries**

£ billion, 2016



Source: Oxford Economics; ONS

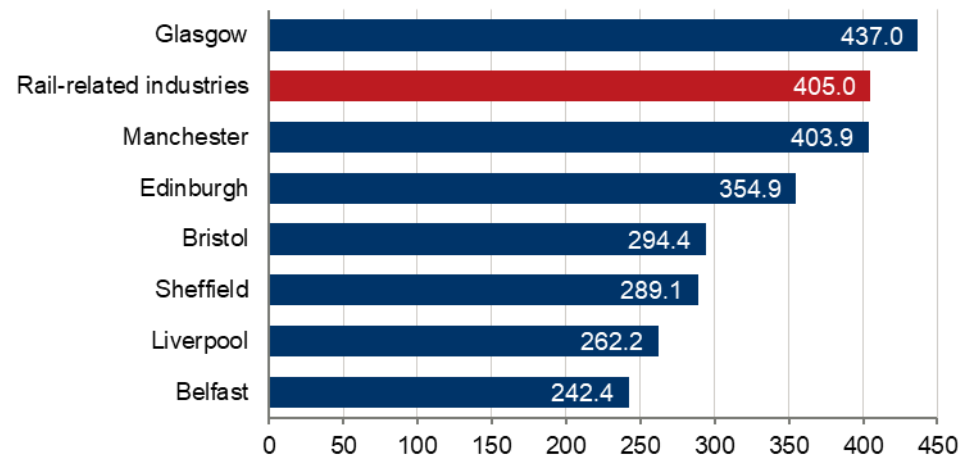
Despite the sector's comparatively high productivity, it can still be regarded as a major employer. The total number of jobs in the sector—some 405,000—is more than the total employed workforce in each of Manchester, Edinburgh, Bristol, Sheffield, Liverpool and Belfast, and not much lower than total employment across Glasgow. For every job found in the UK railway system, a further 2.2 jobs are found in the UK rail supply sector—or 2.5 jobs including those of station retailers and caterers and their UK-based suppliers.

<sup>11</sup> The 'all industries' figure excludes imputed rent. GVA per job for station retailers is depressed by the above-average share of part-time jobs in the retail sector. The issue of GVA per job in the rail supply sector is examined in more detail in a box in section 4.6.

<sup>12</sup> As well as missing out taxes such as council tax, the only taxes on sales to consumers captured here are those on sales by station retailers and caterers. The share of UK taxes potentially within the scope of this analysis is estimated to be around 1.9 percent.

Fig. 16. Industry employment compared with jobs in major UK cities

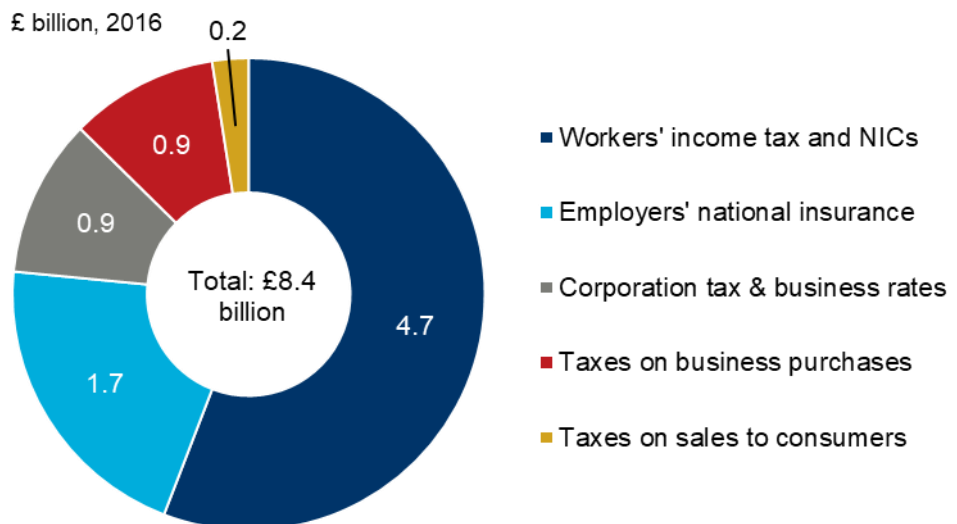
Thousands of jobs, 2016



Source: Oxford Economics; ONS Business Register Employment Survey

In terms of the total tax contribution of £8.4 billion, income tax and national insurance paid by employees and self-employed individuals account for £4.7 billion (56 percent), employers' national insurance contributions for £1.7 billion (21 percent), corporation tax and business rates for £0.9 billion (11 percent), taxes levied in the business supply chain for £0.9 billion (10 percent), and taxes on sales to consumers for £0.2 billion (two percent). However, it should be noted that the only taxes on sales to consumers included here are those of the station retailers and caterers.

Fig. 17. Total of all rail-related industries: tax revenues by type



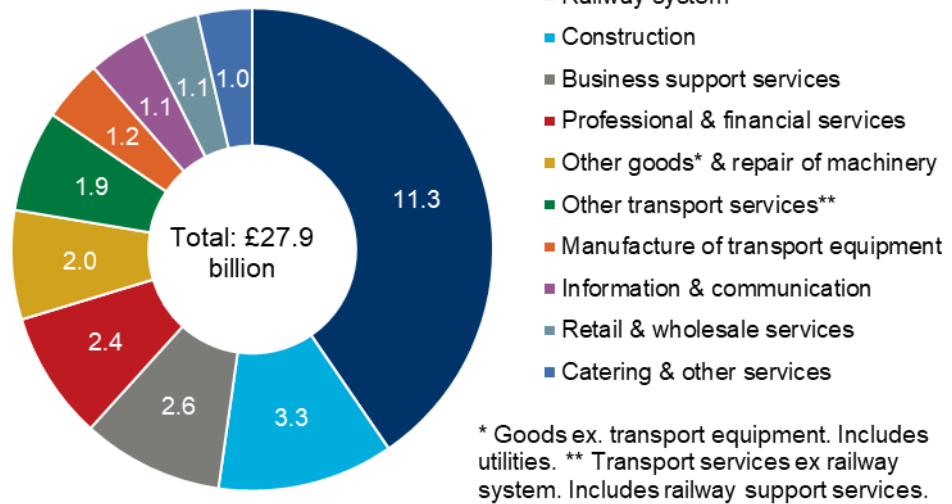
Source: Oxford Economics

Looking at the pattern of GVA by industry, the railway system itself accounts for 40 percent, and other activities for 60 percent. Within the latter, construction (12 percent), business support services (nine percent), general goods production and repair of machinery (seven percent), transport services (seven

percent), and manufacture of transport equipment (four percent), are dominated by activities that are clearly rail-related in nature. But professional and financial services (nine percent), as well as information and communication, retail and wholesale, and catering and other services (four percent each), are also supported.

Fig. 18. Total of all rail-related industries: GVA

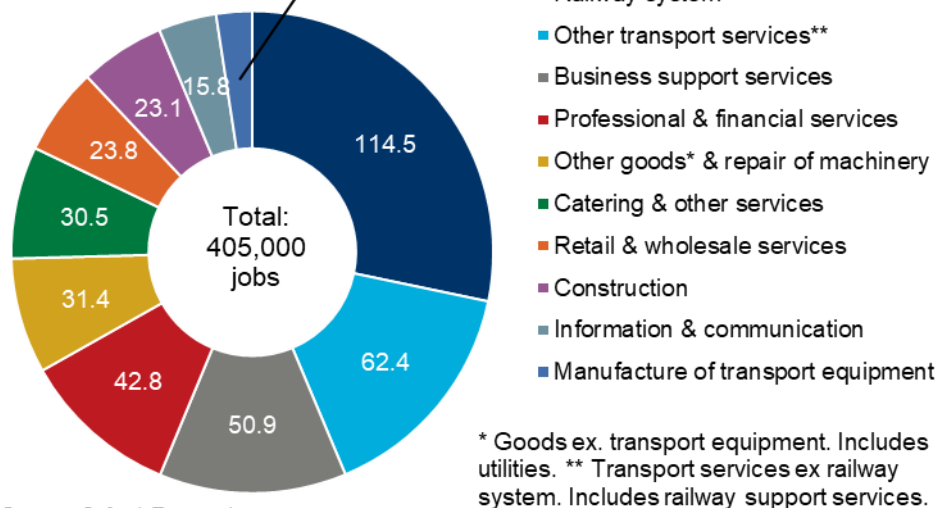
£ billion, 2016



Source: Oxford Economics

Fig. 19. Total of all rail-related industries: jobs

Thousands of jobs, 2016



Source: Oxford Economics

The pattern of jobs by industry is related to that, but with differences reflecting variations in GVA per job, with the railway system itself accounting for only 28 percent of total sector-wide jobs. Other transport services, including support services for rail, account for 15 percent of this employment, business support services for 13 percent, and professional and financial services for 11 percent.

# BOMBARDIER

## CASE STUDY: TRAINING THE NEXT GENERATION, BOMBARDIER TRANSPORTATION

**Bombardier Transportation is leading the way in boosting skills with their well-established apprenticeship and graduate schemes.**

### Apprentices

The Bombardier apprentice scheme includes Level 2 and 3 Apprentices on the Elizabeth Line and London Overground Train Contracts. Working with several leading colleges in London, Derby and Crewe, Bombardier have achieved outstanding success rates, with apprentices having the opportunity to move locations, including to London depots at Battersea, East Ham, Ilford, New Cross Gate, Seven Kings, Willesden and soon Old Oak Common.

In 2017, Bombardier took on 36 new apprentices with 15 of these working in London on maintenance, 10 at production facilities at Derby, and 11 working on component overhaul at Crewe. Bombardier are currently recruiting a further 10 Manufacturing Staff Advanced Apprentices to join the Company in March 2018, and who will work in welding.

Bombardier's focus is on equipping its apprentices with the skills, knowledge and behaviour to progress. Typically they facilitate one third of each cohort taking HNC & HND courses, and around 40% of employees who have recently completed apprenticeships have progressed into other roles and functions, including as team leaders, production managers and test managers. Their new level 2 trailblazer qualification, being delivered in partnership with NTAR / Conel College sets a new standard for the apprentice to be occupationally competent to complete planned preventative train maintenance. Social well-being and personal development is centred on a 4-way partnership between Bombardier, the apprentice, their family and their college.

Community engagement is vital. Bombardier takes part in Rail Week including site tours for local schools, supports campaigns such as Women in Rail, World Skills Competition, Young Rail Professionals, London STEM and Big Bang. They organise an Enthuse and Inspire campaign for young people, from which a number of apprentices have originated, plus specific outreach to schools such as business breakfasts and, from this year, including around Old Oak Common.

### Graduates

Bombardier recruited 35 Graduates in 2017 and plan to recruit 39 in 2018, as part of a two year programme aimed at chartership of respective vocations.

All graduates are employed in direct positions, with the aim for each to be a supervised practitioner in two years. Each is allocated a functional mentor to support with securing chartership, and provided with training modules. Each graduate engages in community STEM activity in the areas in which Bombardier operate, including from this year the new depot at Old Oak Common. There is also an annual Graduate Leadership Conference and an Innovation Forum which enables graduates to propose new innovations and has led to current live projects.



### 3. THE UK RAILWAY SYSTEM

For the purposes of this report, the UK railway system comprises the activities of Network Rail, all mainline passenger and freight train operating companies in Great Britain, Northern Ireland Railways, London Underground, and all other metro and light railway systems.

In 2016 the total output of this system is estimated to have been £22.9 billion, with this supporting £11.3 billion of GVA, 114,500 jobs and £3.6 billion in total tax revenues. This mainly reflects above-average employment costs per employee across the sector. In the case of Network Rail, the figure is also boosted by the high share of capital depreciation in measured GVA.<sup>13</sup> For the mainline passenger train operators, capital costs are kept down by the system of leasing trains from the rolling stock leasing companies. This sector's gross operating surplus accounts for a modest-to-average share of GVA by the standards of the wider private non-financial corporate sector.

Fig. 20. Overview of railway system income, jobs, and outlays

Values in 2016	Total output (£ billion)	GVA (£ billion)	Jobs (thousands)	Total procurement (£ billion)	Of which: domestic, excluding intra-sector	Total capital outlays (£ billion)	Of which: domestic, excluding own work
Interurban passenger rail	12.3	4.9	51.2	7.4	5.5	0.5	0.3
Freight rail	0.9	0.3	6.3	0.6	0.4	0.0	0.0
Urban passenger rail	4.4	2.4	19.5	2.1	1.9	3.1	2.4
Network Rail	5.3	3.7	37.5	1.6	1.5	6.8	4.7
<b>Total rail operators</b>	<b>22.9</b>	<b>11.3</b>	<b>114.5</b>	<b>11.6</b>	<b>9.3</b>	<b>10.5</b>	<b>7.4</b>

Total procurement, outlays and spending include taxes levied on sales as well as imports. The 'domestic' counterparts relate to amounts received by the 'first round' of UK-based suppliers and so exclude these taxes and imports.

Source: Oxford Economics estimates based on data and reports in the public domain - see appendix 2 for details.

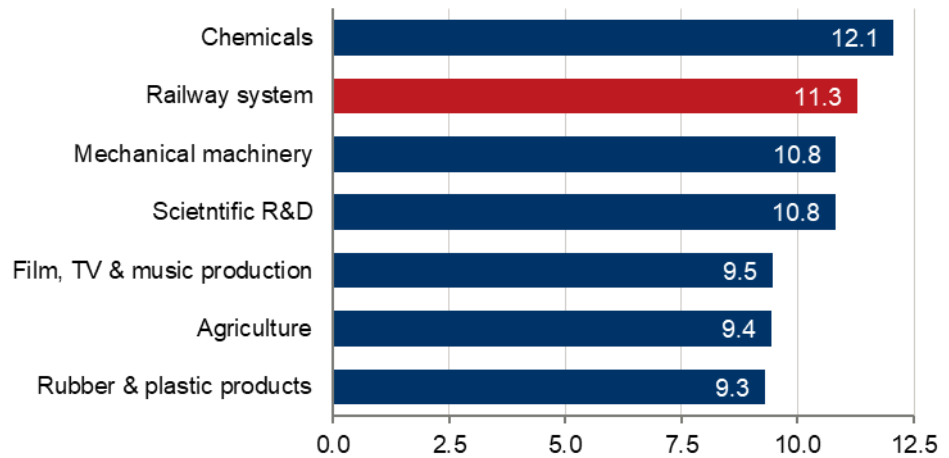
The sector's total GVA is therefore greater than that of the UK-wide mechanical machinery manufacturing sector, as well as each of scientific research and development; film, TV and music production; agricultural activity; and rubber and plastics products manufacturing. It is only seven percent smaller than the GVA of the chemicals manufacturing sector.

Although the number of employees is low relative to GVA, the sector is a significant employer in absolute terms. The 114,500 jobs offered by the train, metro and infrastructure companies is almost the same as the entire employed workforce of York, and higher than that of Reading, Cambridge, Luton, Wolverhampton and Exeter.

<sup>13</sup> As Network Rail is classified to the general government sector for statistical purposes, its GVA is taken to be the sum of total employment costs and capital depreciation. No net operating surplus or deficit is counted.

Fig. 21. **GVA of selected UK industries**

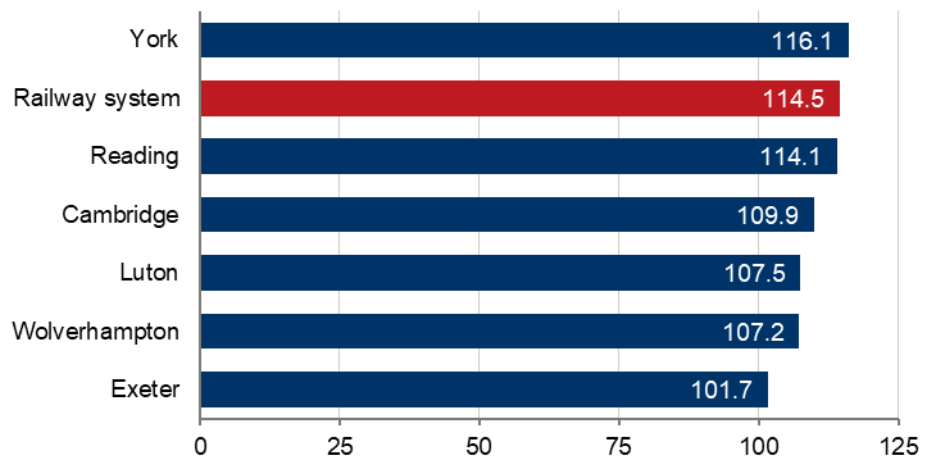
£ billion, 2016



Source: Oxford Economics; ONS

Fig. 22. **Industry employment compared with job numbers in UK cities**

Thousands of jobs, 2016



Source: Oxford Economics; ONS Business Register Employment Survey

The £11.6 billion difference between total output and GVA reflects the amount spent on purchases of non-capital goods and services from other businesses. The majority of this—some £9.4 billion after deducting imports, sales taxes and intra-sector transactions—is received by other UK-based suppliers to the railway system.<sup>14</sup>

On top of that, railway system businesses spent some £10.5 billion in capital outlays in 2016. Again, the majority of that—some £7.4 billion after deducting imports, taxes and work of a capital nature carried out by Network Rail for

<sup>14</sup> Intra-sector transactions mainly relate to train operators' payments to Network Rail.



itself—benefited UK-based firms in the construction, engineering, information technology and intellectual property-related industries.

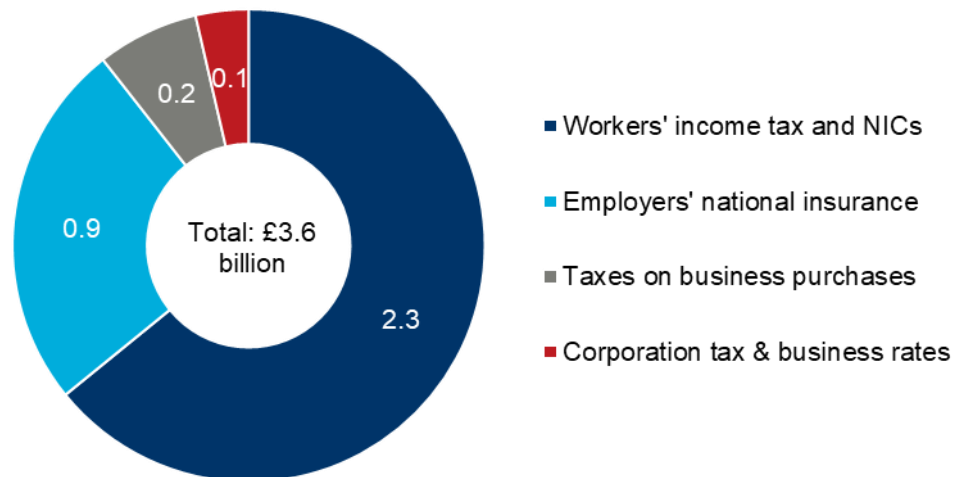
The total net domestic procurement and capital spending of the railway system, some £16.8 billion, provides the vast majority of the demand underpinning activity in rail supply sector, as discussed in chapter 4.

In addition, we estimate that the total spending power of railway system employees amounted to £3.5 billion in 2016, of which some £2.6 billion would have been received by UK-based suppliers after taxes and imports. This spending supports part of the so-called ‘induced’ impact, as discussed in chapter 5.

Of the £3.6 billion of tax revenues assigned to the sector, employees’ income tax and national insurance contributions account for around £2.3 billion (64 percent); employers’ national insurance for £0.9 billion (25 percent), corporation tax and business rates for £0.1 billion (four percent), and taxes on supply chain purchases for £0.2 billion (seven percent).<sup>15</sup>

Fig. 23. UK railway system: taxation by type

£ billion, 2016



Source: Oxford Economics

Taxable profits are depressed by the fact that Network Rail and other public sector entities in this sector do not seek to run any net surplus, after depreciation, other operating costs and finance costs. On the other hand, taxes on employment are boosted by the industry’s above-average wage levels. We do not allocate any taxes on sales to consumers to the industry, noting that domestic passenger transport is zero-rated for VAT purposes.

<sup>15</sup> These Oxford Economics estimates are mainly based on tax-to-income ratios, for sectors of industry and for individuals with a given income, sourced from ONS, HM Treasury and HM Revenue and Customs. They are not, for the most part, sourced from company-specific information and should not, therefore, be taken as a definitive statement of taxes actually paid by the businesses and their staff.



## CASE STUDY: INNOVATION IN ROLLING STOCK WITH THE TRAINSCANNER, ALSTOM

**Alstom's TrainScanner and HealthHub technology provides a new, innovative way of checking the 'health' of rolling stock, providing more reliable, more efficient trains for less cost whilst reducing waste.**

To respond to the growing demands for capacity on the UK rail network greater availability of rolling stock is required. Alstom has used innovation to deliver improved reliability through 'predictive maintenance' solutions to keep trains running reliably.

In 2014, Alstom installed the first ever TrainScanner at our Longsight facility in Manchester. Using technology soon to be exported around the world, the diagnostic portal hosts laser scanners and cameras that enable real time 'health checks' of the West Coast Pendolino fleet as they glide through an arch at the depot on their way into the facility.

TrainScanner has an ID reader that identifies the train as it approaches and will only let the laser shutters open if it detects a Pendolino. It then runs a scanner and high speed cameras to measure the components of the train. It is capable of complex automatic assessments of the wheel profile and dimensions, the brake pad thickness and the pantograph carbon profile.

This new TrainScanner is part of Alstom's HealthHub solution. HealthHub integrates and analyses the data gathered by TrainScanner and other on-board monitoring systems to provide a real-time assessment of the train. Using algorithms, it can assess and predict the remaining useful life of these components, and a user-friendly interface provides actionable predictive maintenance and diagnostic information directly to staff at the facility.

Before the train leaves the facility, the scanner can also run a final confidence check on the body and shell. It converts the data into 2D and 3D images which staff can use to give the train the all-clear to return to service.

Innovations like TrainScanner and HealthHub will deliver more reliable and more efficient trains, reducing component waste and reducing the whole life cost of a train, as well as providing more efficient maintenance regimes and increased safety.

This delivers better availability of trains with improved reliability and fewer delays for passengers.



## 4. THE UK RAIL SUPPLY SECTOR

For the purposes of this report, the UK rail supply sector comprises four elements:

- Direct UK suppliers to the UK railway system.
- Their UK-based supply chain.
- Exports of rail-specific goods and services.
- The UK supply chain of those exporters.

The total activity of UK suppliers to the UK railway system, and their UK-based supply chain, represents the 'indirect' economic impact of the UK railway system. The table below summarises the results.

Fig. 24. Overview of the UK rail supply sector's economic impact

Values in 2016	Direct UK suppliers to the UK railway system	Their UK supply chain <sup>1</sup>	Total UK supply chain of the UK railway system <sup>2</sup>	Exports of rail-related goods and services <sup>3</sup>	UK supply chain for rail-related exports	Total UK rail supply sector
<b>Output (£ billion)</b>	<b>16.8</b>	<b>13.4</b>	<b>30.2</b>	<b>0.8</b>	<b>0.6</b>	<b>31.6</b>
<b>GVA (£ billion)</b>	<b>8.0</b>	<b>6.4</b>	<b>14.4</b>	<b>0.4</b>	<b>0.3</b>	<b>15.1</b>
<b>Jobs (thousands)</b>	<b>114.1</b>	<b>120.6</b>	<b>234.7</b>	<b>7.6</b>	<b>6.6</b>	<b>248.9</b>
<b>Tax revenues (£ billion)</b>	<b>2.5</b>	<b>1.7</b>	<b>4.1</b>	<b>0.1</b>	<b>0.1</b>	<b>4.3</b>

<sup>1</sup> This is the 'indirect impact' of the direct suppliers to UK railway operators. <sup>2</sup> This is the total 'indirect impact' of the UK railway system. <sup>3</sup> The output figure shown for exports comprises known goods exports of just under £0.4 billion, and an allowance for the share of rail-related services in exports of transport support services more broadly.

Source: Oxford Economics - see appendix 2 for details.

Defined in this way, the sector covers the kind of 'rail-specific' activities carried out by members and potential members of the RIA. These activities encompass the manufacture of rolling stock, track, electrification, signalling and telecommunication equipment, and consultancy services, as well as maintenance and parts services. The sector is made up of both large multinational companies and many SMEs, and is characterised by:

- its high capital intensity;
- the manufacture of rolling stock and equipment with a lifespan of up to 50 years;
- a significant dependence on public procurement; and
- the need to comply with rigorous safety standards.

However, it is difficult to draw a precise boundary between 'rail-specific' activities such as these, and other activities which just happen to feed into the supply chain of the railway network. The distinction is not clear in principle, but even if it were, it would only be possible to identify a sub-set of such 'rail-specific' supplies in the available datasets.<sup>16</sup> The approach taken therefore

<sup>16</sup> Appendix 2 includes more details on this issue.

captures the railway system’s entire supply chain, i.e. its ‘indirect impact’, with a distinction made between direct suppliers to the system, and their suppliers.

The contribution of ‘rail-specific’ activities within the supply sector total can be gauged reasonably accurately for some sub-sectors, but only in very broad terms for others. This contribution is described in a box in section 4.1.

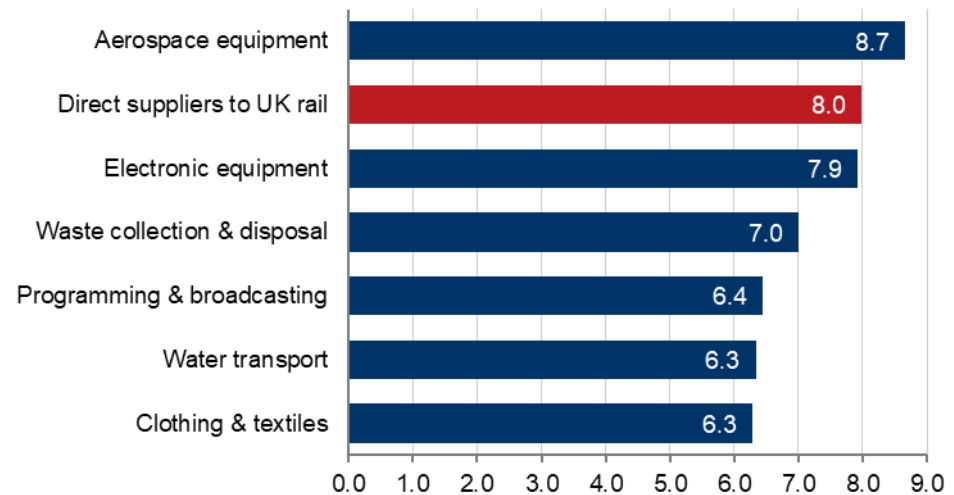
#### 4.1 DIRECT UK SUPPLIERS TO THE UK RAILWAY SYSTEM

As set out in the previous chapter, the procurement and capital spending of the UK railway system—adjusted to exclude imports, sales taxes, intra-sector transactions, and capitalised work undertaken by the firms themselves—amounted to £16.8 billion. This is the value of sales, or output, of direct UK suppliers to the UK railway system. This in turn supports £8.0 billion of GVA, 114,100 jobs, and £2.5 billion in tax revenues for those suppliers.

The GVA of these direct UK-based suppliers to the UK railway system is therefore greater than the GVA of UK manufacturers of computer, electronic and optical equipment. It is notably higher than the GVA of the waste collection and disposal sector, the TV and radio programming and broadcasting sector, the shipping and other water transport services sector, and the clothing, textile and leather products manufacturing industry. The GVA of UK-based aerospace equipment manufacturers is only eight percent higher.

Fig. 25. **GVA of selected UK industries**

£ billion, 2016

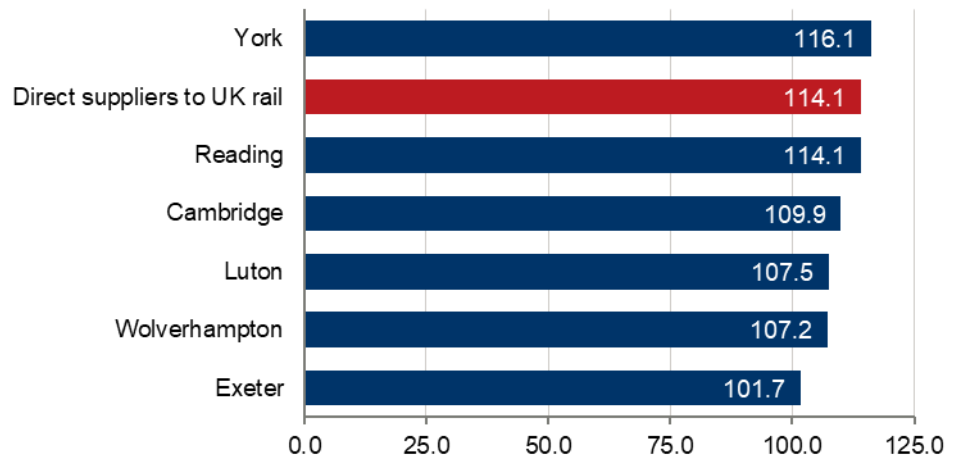


Source: Oxford Economics; ONS

These suppliers provide a very similar number of jobs to the railway operators themselves, i.e. more than found in Reading, Cambridge, Luton, Wolverhampton and Exeter, and only slightly fewer than in York.

Fig. 26. Sector employment compared with job numbers in UK localities

Thousands of jobs, 2016

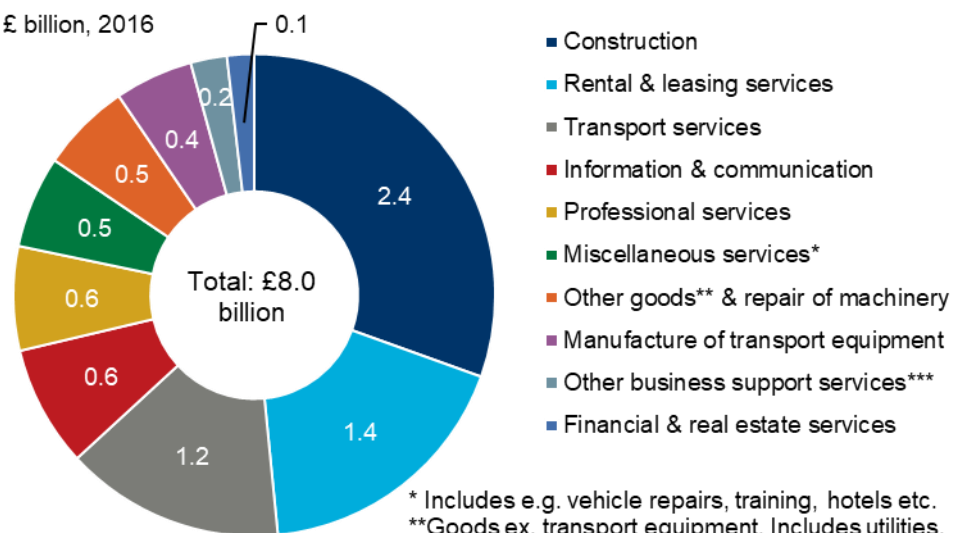


Source: Oxford Economics; ONS Business Register Employment Survey

For this 'first round' of suppliers, three sectors dominate in terms of GVA, namely construction (30 percent), rental and leasing services (18 percent), and transport services (such as outsourced maintenance services, 15 percent). However, transport services account for a much larger share of jobs (35 percent), and construction and rental services for a much smaller share (15 percent and five percent respectively).

Fig. 27. Direct UK suppliers to the UK railway system: GVA

£ billion, 2016

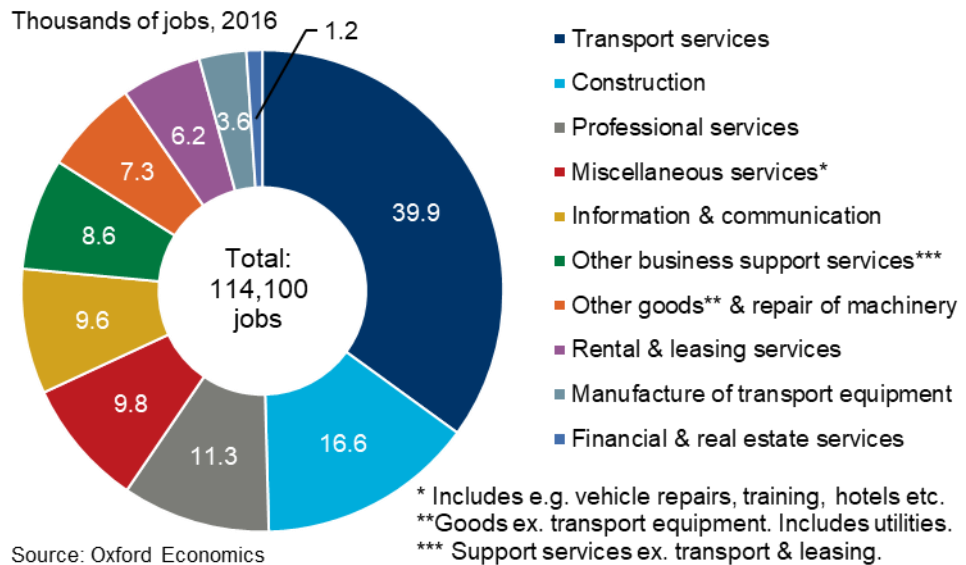


Source: Oxford Economics

\* Includes e.g. vehicle repairs, training, hotels etc.  
 \*\* Goods ex. transport equipment. Includes utilities.  
 \*\*\* Support services ex. transport & leasing.

The rental and leasing sector includes the rolling stock leasing companies, who have a major role in the supply of locomotives and rolling stock to the train operators, by purchasing these assets from manufacturers of that equipment and leasing it on. This explains the modest value of transport equipment manufacturing activity amongst this 'first round' of supplies to the railway system, as opposed to the 'upstream' supplies discussed further below..

Fig. 28. Direct UK suppliers to the UK railway system: jobs



Total construction output for the UK railway network, meanwhile, is estimated to have been some £6.0 billion in 2016, taking into account a range of major ongoing projects including the Elizabeth Line (Crossrail) in London. This supported £2.4 billion of GVA amongst the ‘first round’ of contractors, and an associated 16,600 jobs.

#### WHERE DO MEMBERS OF THE RAILWAY INDUSTRY ASSOCIATION FIT IN?

There is a large degree of overlap between the activities of UK suppliers to the UK railway system, as described in this section, and the activities of Railway Industry Association members and potential members. The majority of work undertaken for the UK railway system will be of a kind typically undertaken by RIA members, i.e. products and services specifically tailored for use by the sector. But some, such as power and water supply, banking services, and miscellaneous manufacturing (e.g. of office furniture), will be of a more general nature.

At the same time, most work undertaken by RIA members will be captured in this section. But some other work, such as rolling stock manufactured and sold to the leasing companies, will appear in the ‘upstream’ part of the supply chain, which is also captured by this analysis and described in section 4.2 below. In addition, all exports identified by this analysis, and set out in section 4.3, will fall within the scope of RIA members’ work.

Looking at the GVA of specific activities, we estimate that manufacture of railway rolling stock, mechanical parts and signalling equipment will have totalled broadly £1.0 billion in 2016. This includes virtually all of the £0.4 billion of the GVA of the direct suppliers of transport equipment to the UK railway system, the £0.1 billion of railway machinery exports, and the vast majority of the £0.6 billion of transport equipment in the ‘upstream’ part of the supply chain—much of which will relate to production of stock for the leasing companies.

The ‘other goods and machinery repair’ category shown in the charts will include the manufacture of miscellaneous parts for the railway sector, such as tracks, sleepers, and plastic and rubber parts for train carriages, and repair and overhaul of locomotives and rolling stock. The data available suggest that the GVA of the former category totals at least £0.4 billion,

including the small amount of exports identified, with non-export production split fairly evenly between direct suppliers to the UK railway system and the 'upstream' part of the supply chain.

Rail-specific repair and overhaul activity, meanwhile, is estimated to account for around £0.1 billion of the GVA of direct suppliers to the railway system. In addition, these activities are likely to take place further 'upstream' too, such as where services are contracted out by the rolling stock leasing companies. We are unable to put a precise figure on the GVA of the latter, but it is likely to be between £0.1 and £0.2 billion.

Railway construction, meanwhile, will account for just about all of the £2.4 billion of GVA of construction companies contracted directly to the railway system. A fair proportion of the £0.8 billion of upstream GVA is also likely to be rail-specific—for example, sub-contractors undertaking specialist activities on rail construction projects—although some will be non-rail construction work for companies in the supply chain.

Transport services meanwhile include a wide range of activities in addition to rail transport itself, including bus, freight, taxi, aviation, shipping, and postal services. But £1.1 billion out of the £1.2 billion of GVA of direct suppliers to the railway system falls into the 'support services for land transport' sub-sector. This will take in various outsourced services such as regular maintenance of trains and tracks, station portering services and other logistics, ticketing services, goods handling at freight terminals, and station car parking services. We also estimate that an additional £0.2 billion of railway support services are exported. And up to half of the £0.5 billion of transport services in the upstream part of the supply chain could be rail-specific in nature.

Of the £1.4 billion of GVA of firms providing rental and leasing services to the railway system, at least £0.9 billion—and possibly more—relates to the rolling stock companies.

Most of the remaining services shown in the charts will be a mix of those tailored specifically to the railway system, those of a more general nature, and those that could plausibly be classified as either. Looking just at services provided directly to the railway system, the majority of the £0.2 billion of 'other business support services' GVA is accounted for by employment agency services and office administrative and similar services. Some £0.5 out of the £0.6 billion of information and communication services GVA is accounted for by computer programming, computer consultancy and related services, while most of the £0.1 billion of financial and real estate services is accounted for by banking activities. Of the 'miscellaneous services' GVA of £0.5 billion, £0.3 billion relates to motor vehicle traders and repairers, and £0.1 billion to education services—which will include training activities of all kinds.

Finally, the £0.6 billion GVA of professional services suppliers to the railway system comprises broadly £0.1 billion each of legal services, accountancy services, management consultancy services, technical consultancy and testing services (including engineering and architectural consultancy), scientific research services, and advertising and market research services.

## 4.2 THE 'UPSTREAM' PART OF THE DOMESTIC UK SUPPLY CHAIN

With total output of direct suppliers to the UK railway system valued at £16.8 billion, and their own GVA worth some £8.0 billion, those firms' total purchases of goods and services would have been worth some £8.8 billion in 2016. We estimate that this procurement in turn supported £5.6 billion of UK GVA, with the remaining £3.2 billion accounted for by content that is ultimately imported,

together with some taxes on transactions levied in the supply chain. The value of output or sales associated with that GVA—including the value of transactions between these UK firms—is around £11.7 billion.

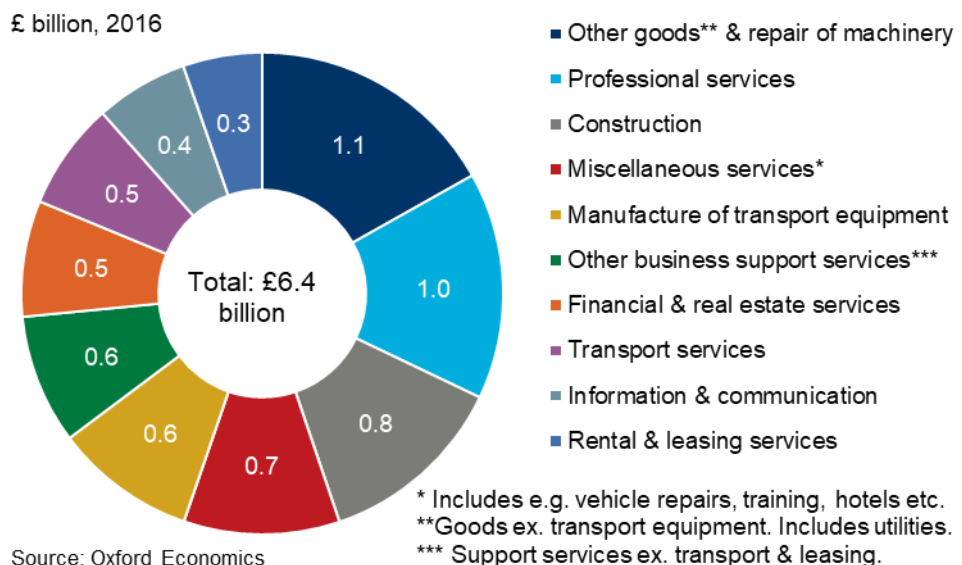
On top of that, we estimate that capital spending by supply chain firms (mainly the rolling stock leasing companies)—on UK-produced rolling stock, train parts, and railway signalling equipment—must have amounted to around £1.0 billion. This in turn generated £1.7 billion in total transactions throughout the supply chain, supporting a further £0.9 billion of UK-based GVA.

In total, output or sales of these UK goods and services therefore amounted to £13.4 billion, associated with £6.4 billion of GVA. This supported £120,600 jobs and £1.7 billion in tax revenues.

As a general rule, the industrial make-up of this ‘upstream’ part of the UK domestic supply chain is more diverse and less obviously rail-specific than that of the UK railway system’s direct suppliers. Service providers other than transport and leasing services account for 48 percent of GVA, and for 62 percent of jobs, with these including a wide range of information and communication services, professional services, financial services, and other business support services. Construction accounts for 13 percent of GVA and five percent of jobs, transport services for seven percent of GVA and 11 percent of jobs, and rental and leasing services for five percent of GVA and three percent of jobs.

However, goods production and machinery repair are more important when compared with the direct suppliers, accounting for 26 percent of GVA and 19 percent of jobs. Within that, manufacture of transport equipment accounts for nine percent of GVA and four percent of jobs, with much of this accounted for by production of rolling stock, train parts and railway signalling equipment, including train carriages sold to the rolling stock leasing companies.

Fig. 29. 'Upstream' part of the UK domestic supply chain: GVA

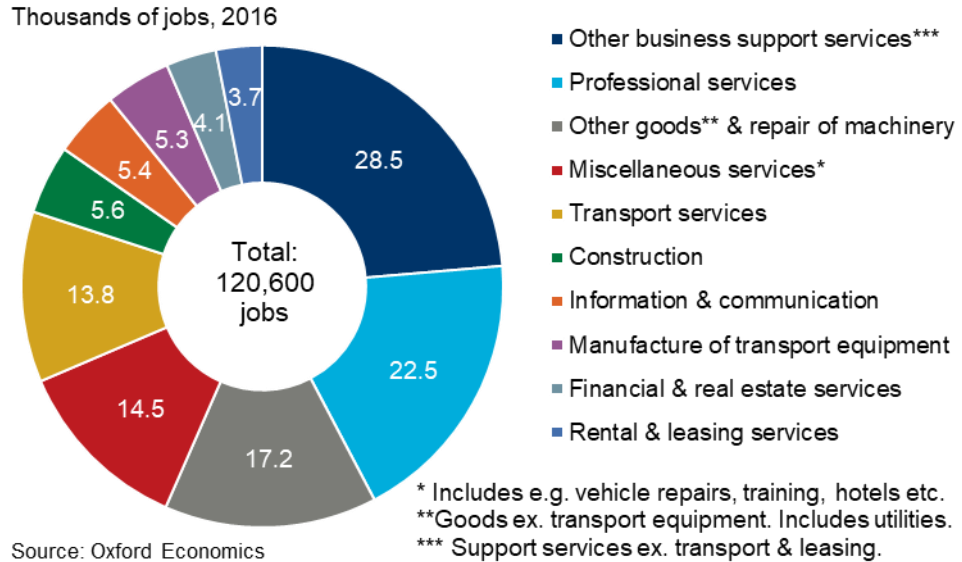


The remaining ‘other goods and repair category’ will include repair and overhaul of trains and railway equipment, and manufacture of other rail-related



goods, as well as more general manufactures. Energy-related production and supply are also included in this category. (A slightly more detailed breakdown of the results by industry can be found in appendix 1.)

Fig. 30. 'Upstream' part of the UK domestic supply chain: jobs



### 4.3 TOTAL DOMESTIC UK RAILWAY SUPPLY CHAIN

In total, this means that the domestic UK railway supply chain—the UK railway system’s ‘indirect’ channel—generated output or sales of £30.2 billion in 2016, supporting £14.4 billion in GVA, 234,700 jobs and £4.1 billion in tax revenues.

The supply chain leading to the UK railway system therefore accounts for the vast bulk of the total UK rail supply sector’s activity uncovered by this exercise—96 percent of output, GVA and tax, and 94 percent of jobs. Its comparative importance, and industrial make-up, will therefore be very similar to that of the total rail supply sector, which also includes exports and associated supplies, as described in section 4.6 below.

### 4.4 RAIL-RELATED EXPORTS

Total exports of rail-related goods amounted to just under £0.4 billion in 2016. In addition, there will have been some exports of rail-related services and we have allowed for £0.4 billion of those.<sup>17</sup> The total of £0.8 billion of sales would have supported £0.4 billion of GVA and 7,500 jobs in the exporting businesses themselves, generating £0.1 billion in tax revenue.

<sup>17</sup> This allowance is based on a share of exports of total transport support services, which are in the region of £4 billion per annum in total. The share assumed is in line with the UK railway system’s share of all purchases of transport support services by domestic industries. In practice, rail-related exports will include some services classified to the ‘professional services’ rather than ‘transport support services’ sector, and the extra £0.4 billion could be regarded as allowing for that too. An amount is included in this study for the sake of completeness, but it is not based on actual data and is not therefore reliable as the basis for further statistical or policy analysis specifically relating to exports.

Exports of goods relate to manufacture of railway machinery (i.e. rolling stock, mechanical parts, and signalling equipment), and manufacture of other rail-specific goods such as tracks, sleepers, and rubber and plastic parts for train carriages. Exports of services will include a range of professional services such as architecture, design and engineering consultancy, as well as transport support services relating to operations and planning.

**Fig. 31. Rail-related export activity**

Values in 2016	Sales (£ billion)	GVA (£ billion)	Jobs (thousands)	Tax (£ billion)
<b>Manufacture of railway machinery</b>	<b>0.23</b>	<b>0.12</b>	<b>0.79</b>	<b>0.03</b>
<b>Other manufactures</b>	<b>0.16</b>	<b>0.07</b>	<b>0.57</b>	<b>0.02</b>
<b>Known exports of goods</b>	<b>0.39</b>	<b>0.19</b>	<b>1.36</b>	<b>0.05</b>
<b>Rail-related services</b>	<b>0.42</b>	<b>0.19</b>	<b>6.22</b>	<b>0.04</b>
<b>Total including assumed services</b>	<b>0.80</b>	<b>0.38</b>	<b>7.58</b>	<b>0.09</b>

Source: Oxford Economics estimates and assumptions - see appendix 2 for details.

#### 4.5 THE EXPORT SUPPLY CHAIN

The total value placed on exports of goods and services, of £0.8 billion, splits between £0.4 billion of GVA for the exporters themselves, and £0.4 billion of total procurement of goods and services by them from other businesses. To complete the estimation of the total UK rail supply sector, Oxford Economics calculated the activity supported in the UK supply chain as a result of this procurement. This worked out at £0.6 billion in total sales or output, and £0.3 billion in GVA, supporting 6,600 jobs and £0.1 billion of tax revenues.

For these activities, goods, utilities and machinery repair account for 20 percent of GVA and 14 percent of jobs; transport services for 18 percent of GVA and 25 percent of jobs; leasing services for five percent of GVA and two percent of jobs; and construction for four percent of both GVA and jobs. The remaining 53 percent of GVA and 55 percent of jobs is accounted for by a wide range of other services.

#### 4.6 TOTAL UK RAIL SUPPLY SECTOR

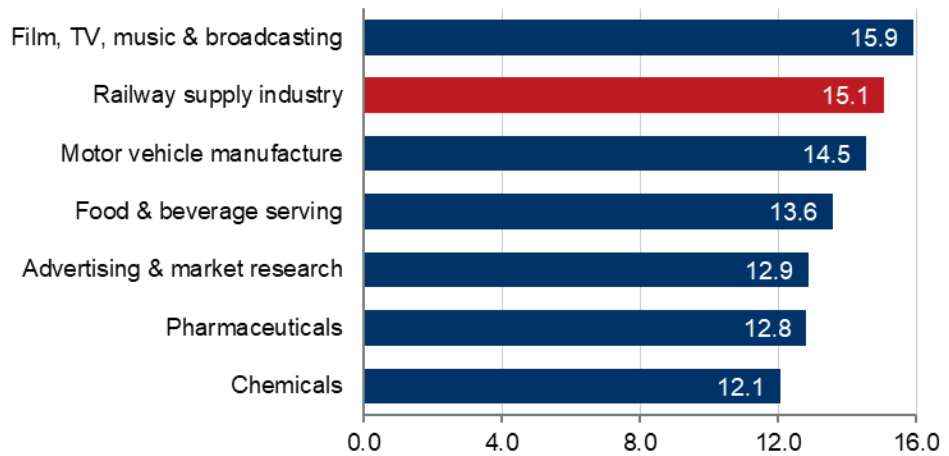
Total activity for the UK rail supply sector is the sum of activity across the whole of the supply chain to the UK railway system, plus exports, plus the UK supply chain related to those exports. This is estimated at £31.6 billion of output or sales, £15.1 billion of GVA, 248,900 jobs, and £4.3 billion in tax revenues.

The GVA of the industry is therefore higher than that of motor vehicle manufacturing, food and beverage serving, advertising and market research services, and each of the chemical and pharmaceutical manufacturing industries separately. It is close to the GVA of the entire film, TV and music industry, including both production and broadcasting.

The sector's employment of 248,900 is slightly more than the total number of jobs in Belfast, Cardiff, Nottingham, Leicester, and Newcastle Upon Tyne, and not that far short of employment in Liverpool.

Fig. 32. **GVA of selected UK industries**

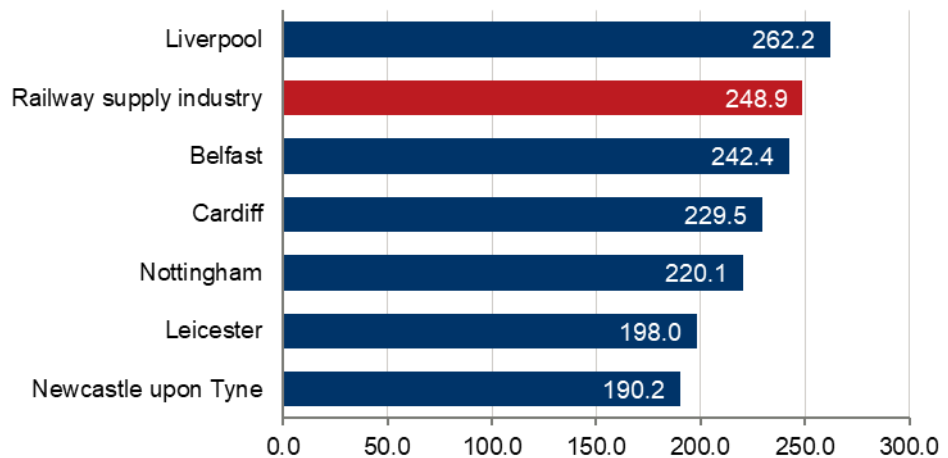
£ billion, 2016



Source: Oxford Economics; ONS

Fig. 33. **Sector employment compared with job numbers in UK localities**

Thousands of jobs, 2016

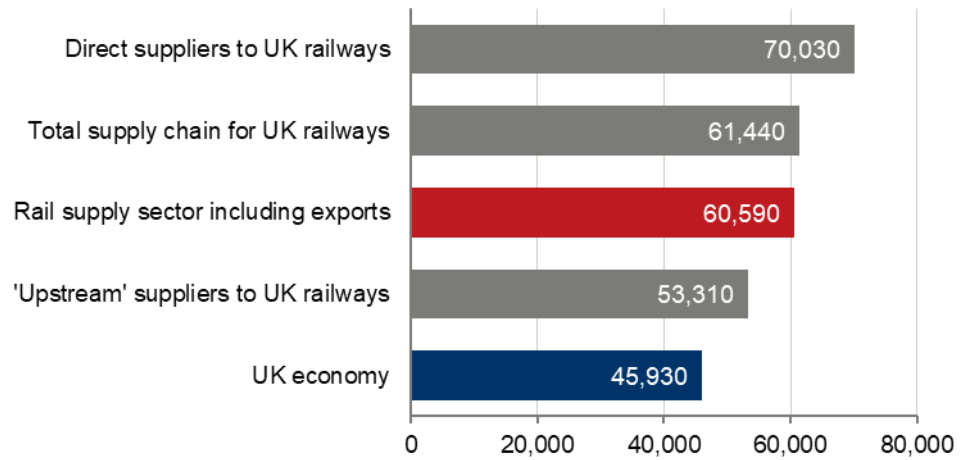


Source: Oxford Economics; ONS Business Register Employment Survey

Across the rail supply sector, GVA per job, at £61,000 is 32 percent higher than the UK average. Within the domestic supply chain, leading to the UK railway system, this ratio is highest amongst the direct suppliers to the network, being £70,000, or some 52 percent higher than the national average. The box further below examines why this is so in more detail. In addition, GVA per job is around 16 percent above the national average in the 'upstream' part of this supply chain, at £53,000.

Fig. 34. **GVA per job**

£ per job, 2016

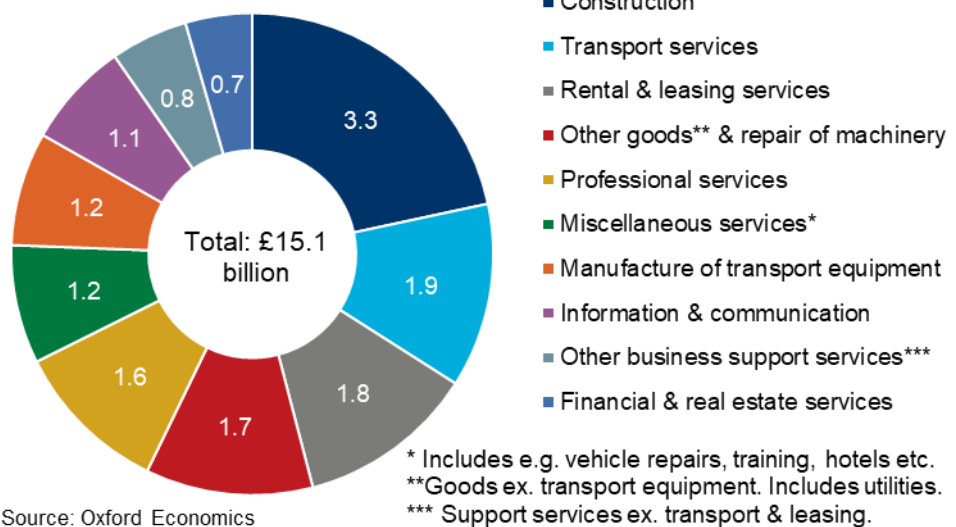


Source: Oxford Economics; ONS

Concerning the pattern of GVA by industry, construction work accounted for 22 percent of the £15.1 billion total, but—as railway-related construction has a high GVA per head—for only nine percent of the 248,900 jobs. Other specific industries that are important for GVA, but less so for jobs, include leasing (12 percent and four percent respectively), and manufacture of transport equipment (eight percent and four percent). By contrast, support activities classified to 'transport services' accounted for 12 percent of GVA but for 25 percent of jobs.

Fig. 35. **Rail supply sector: GVA**

£ billion, 2016



Source: Oxford Economics

### WHY IS GVA PER JOB FOR SUPPLIERS TO THE RAILWAY SYSTEM ABOVE AVERAGE?

The high GVA per job achieved on average across the direct suppliers to the railway system reflects the particular make-up of that sector. By detailed industry of supplier, just five industries account for 74 percent of the sector's GVA, namely:

- Construction (mainly railway construction) (30%).
- Rental and leasing (the rolling stock leasing companies and some others) (18%).
- Support services for transport (13%).
- Computer programming and computer consultancy services (7%).
- rail transport machinery (supplied directly by the manufacturers) (5%).

Four of these five sectors (i.e. all except transport services) have GVA-per-job ratios that are well above average. Across the five sectors together (weighted by employment), GVA per job averages £82,000. It is £50,000 across the remaining suppliers, but that still leaves the overall weighted average at £70,000. It should be noted here that the estimates take into account the fact that GVA per job is higher for railway construction activity than for construction overall, and higher for the rolling stock leasing companies than for rental and leasing overall.

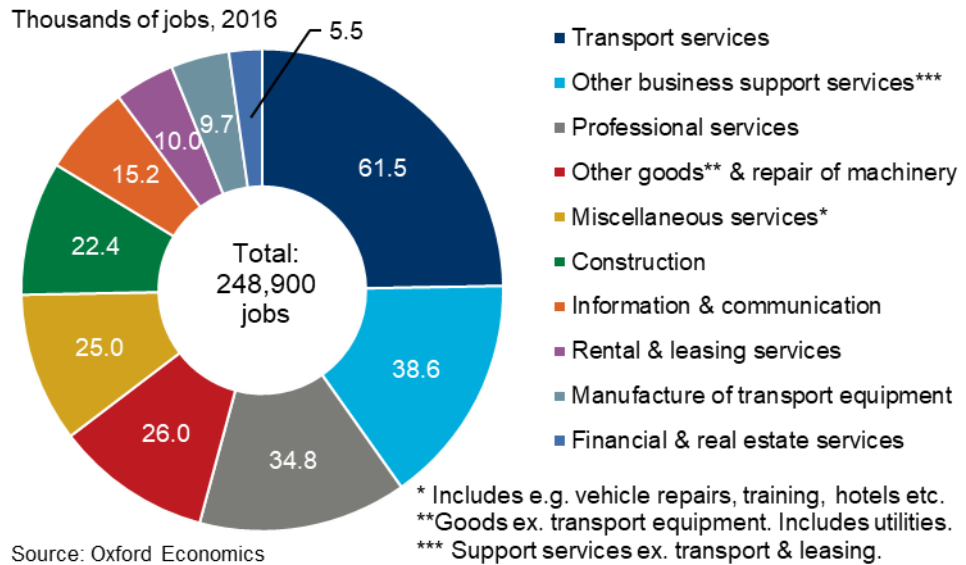
The rolling stock companies are exceptional, with few individuals employed but significant GVA. Virtually all of this GVA is accounted for by the 'gross operating surplus', which is needed to cover depreciation of the capital assets owned, interest costs, and net profit for the investors—who will require returns reflecting the degree of financial risk involved. Excluding these leasing companies, GVA per job is £69,000 across the five most significant sectors (including leasing of assets other than rolling stock), and £62,000 across all direct suppliers to the railway system.

For general rental and leasing, the story of high capital costs would also seem to apply, though to a lesser degree than for rolling stock leasing specifically. However, this is not the case for rail equipment manufacturing, and even less so for computer services suppliers. Here, the key contributor in arithmetic terms is above-average employment costs per head.

Everything else being equal, high employment costs—or put another way, high-valued work—can be taken as an indicator of high skill requirements, and this is likely to be at least part of the story in these cases. But other factors can also affect the pattern, including the balance between full-time and part-time staff, and local factors including the cost of living and skills supply issues. And while capital costs are not especially significant as a share of GVA in these industries, labour productivity is still likely to benefit from the use of advanced technology and equipment, with the resulting extra returns benefiting both workers and investors.

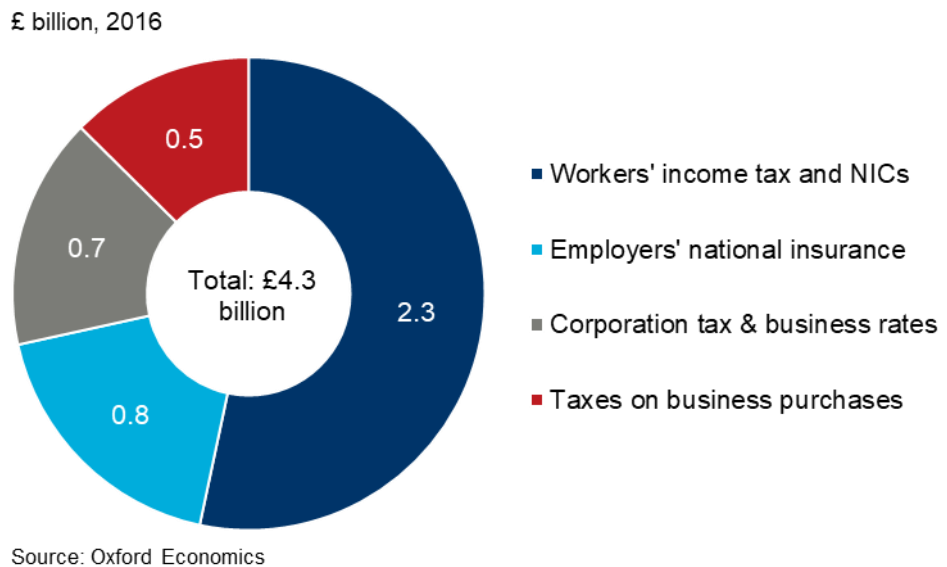
Finally, but most importantly of all, the very high GVA per head found amongst railway construction contractors reflects a combination of the two, i.e. a high gross operating surplus, potentially covering high capital costs, together well above-average employment costs per worker, potentially reflecting a high level of required skills amongst other factors.

Fig. 36. Rail supply sector: jobs



The UK rail supply sector’s total tax contribution comprises £2.3 billion in income tax and NICs paid by employed and self-employed workers (53 percent), £0.8 billion in employers’ national insurance (18 percent), £0.7 billion in corporation tax and business rates (16 percent), and £0.5 billion in taxes on purchase of business supplies (13 percent). No taxes on sales to final consumers are allocated to these industries.

Fig. 37. UK rail supply sector: taxation by type





## CASE STUDY: THE BENEFITS OF NEW INFRASTRUCTURE – CAMBRIDGE NORTH STATION, VOLKERWESSELS UK

**VolkerWessels UK is a leading multidisciplinary contractor that delivers innovative engineering solutions across the civil engineering and construction sectors. Rail infrastructure, delivered by VolkerWessels, like Cambridge North Station, helps to connect communities, drive economic growth and investment.**

### The project

In June 2017, VolkerFitzpatrick, with assistance from sister companies VolkerRail and VolkerHighways, delivered the rail systems work for Cambridge North Station. Located next to Cambridge science and business parks, the A14 and the A10, it was anticipated that the new station would undertake 3,000 passenger journeys a day.

The upgrade would involve the team constructing three new platforms, along with parking for 450 cars and 1,000 bicycles and it took two years, over 700,000 man hours and 11 successful possessions to build the station on the operational West Anglia Main Line.

### The benefits

The new modern design included building a fully accessible station building at the southern tip of the sidings site, adding retail units, a taxi pick-up point and an extension to existing footpath and cycle routes. The scheme is expected to bring new business and housing to the area – Network Rail expect around 1,000 new homes, a hotel, retail outlets and offices due to the station upgrade. The upgrade also involved the installation of solar panels, to provide up to 10 per cent of the station's power requirements.

Environmentally, the project team were careful to ensure that all of the established wild and environmentally sensitive areas around the sidings site were retained and in some cases reinforced with additional planting and informally landscaped areas. In addition, 94 per cent of the 3,875 tonnes of waste material generated by the works was recycled and a further 2 per cent reused on-site.

### Innovations

By building the platforms using prefabricated blocks, construction was up to four times quicker than traditional platforms and two to three times faster than using a modular steel frame solution. The team also commissioned a pre-fabricated bespoke fence post that allowed for a secure low level fence to fit onto the platform. This created a fenced safe system of work and allowed the platform furniture and platform finishes to be completed while trains passed by on the main Cambridge to Ely/London route. This heavily reduced disruption to train services, meaning more passengers could travel whilst works were completed.



© Network Rail

## 5. STATION RETAILERS & CATERERS

In addition to the UK railway system, and UK suppliers to railways systems at home and abroad, the scope of this study also extends to cover the economic impact of station retailers and caterers providing goods and services directly to UK rail passengers. The table below sets out the results for these activities themselves, and for the UK-based supply chain that they support.

Fig. 38. Station retailers and caterers: direct and supply chain impacts

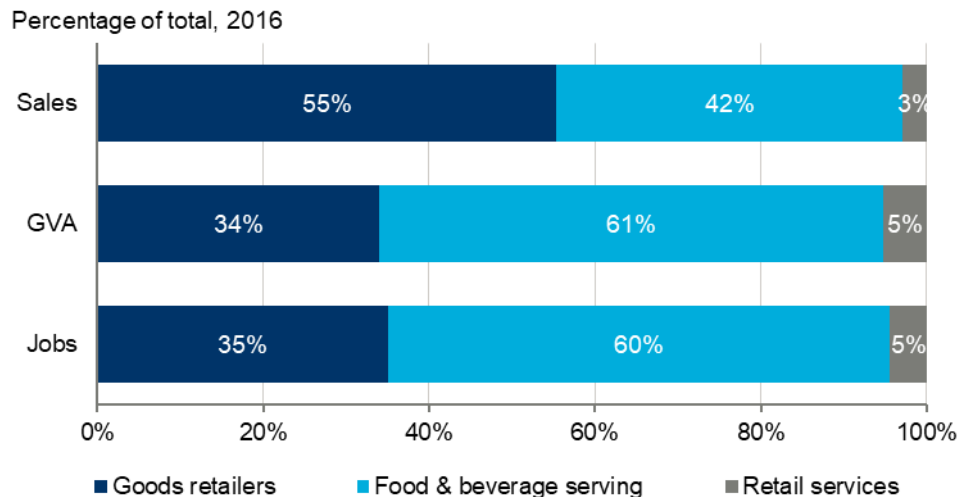
Values in 2016	Station goods retailers	Station food & beverage services	Station retail services	Total station retailers and caterers	UK supply chain for station retailers and caterers	Total for station retailers and caterers and their supply chain
Sales or output (£ billion)	1.3	1.0	0.1	2.3	1.7	4.0
GVA (£ billion)	0.3	0.5	0.0	0.8	0.7	1.5
Jobs (thousands)	9.7	16.7	1.2	27.6	13.9	41.6
Tax revenues (£ billion)	0.2	0.2	0.0	0.4	0.2	0.6

Source: Oxford Economics - see appendix 2 for details.

### 5.1 STATION RETAILERS AND CATERERS

In total, station retailers and caterers sold £2.3 billion of goods and services in 2016, which was sufficient to support £0.8 billion of GVA for those businesses, associated with 27,600 jobs and £0.4 billion of taxes revenues (including taxes on sales to consumers).

Fig. 39. Station retailers and caterers: activity by sector



Source: Oxford Economics

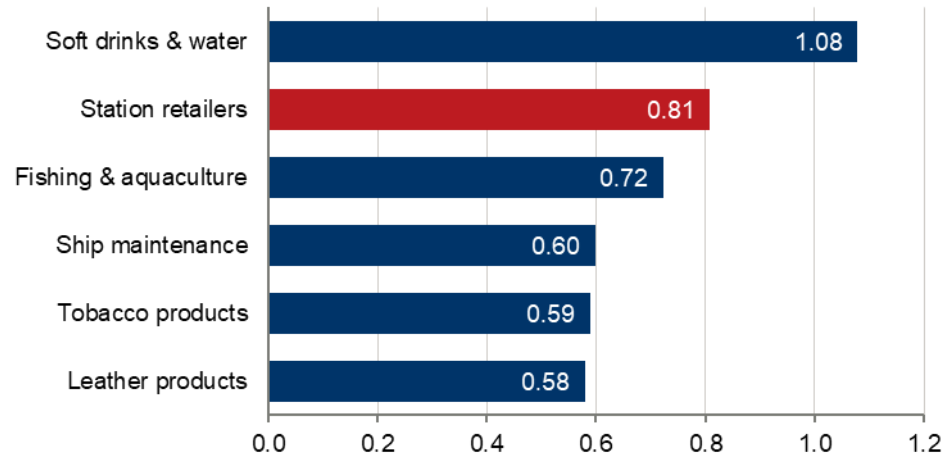
The ratio of GVA to sales is comparatively low for retailers, as their purchases include goods for straightforward resale rather than just goods and services



that they use up themselves in the course of business. So while goods retailers account for a majority of station sales, they account for only just over a third of the GVA and jobs, with catering (i.e. food and beverage serving activities) accounting for some 60 percent. The remaining five percent of GVA and jobs is accounted for by retail services, such as dry cleaning and clothing repair.

Fig. 40. **GVA of selected UK industries in 2016**

£ billion, 2016



Source: Oxford Economics; ONS

Although the total GVA of around £0.8 billion is modest relative to that of the wider railway-related sector, it is still higher than that for some of UK-wide industrial sectors, including manufacture of leather products, manufacture of tobacco products, repair and maintenance of ships and boats, and fishing and aquaculture. The value is around 75 percent of the GVA of UK manufacturers of soft drinks and bottled water.

The total of 27,600 jobs, meanwhile, accounts for seven percent of the 405,000 workers employed across the rail-related industries.

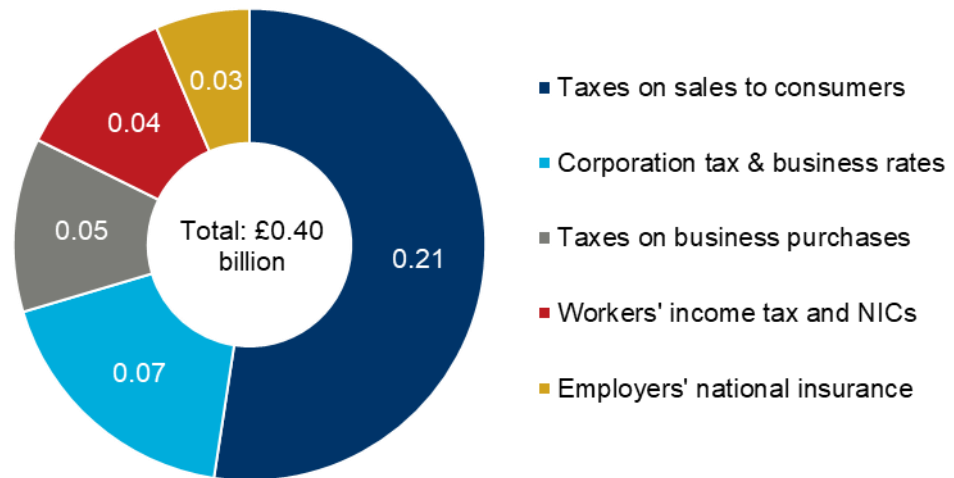
Of the £0.4 billion of tax generated by the station outlets, just over a half is accounted for by taxes on sales to consumers.<sup>18</sup> Corporation tax, business rates and taxes on firms' purchases account for 30 percent, reflecting the high share of GVA accounted for by retailers' and caterers' business rates, and the high share of transactions taxes in caterers' purchases of inputs.<sup>19</sup> Taxes on workers and employers account for 18 percent of total taxes, or just 37 percent of non-consumer taxes, reflecting the sectors' below-average wage levels.

<sup>18</sup> All sales taxes passed on to the final consumer are allocated to the station retailers and caterers here.

<sup>19</sup> This will include irrecoverable VAT, and duties and levies on inputs into the production process, such as taxes on firms' road fuel and energy use. VAT and duties levied at various points in the supply chain, but deemed in the system of national accounts to be passed through to the final consumer, are not counted here.

Fig. 41. **Station retailers and caterers: taxation by type**

£ billion, 2016



Source: Oxford Economics

## 5.2 TOTAL IMPACT OF RETAILERS, CATERERS AND THEIR SUPPLIERS

With the turnover of station retailers and caterers amounting to £2.3 billion, and their GVA to £0.8 billion, these businesses are estimated to have purchased some £1.5 billion of goods and services from other firms in 2016—including both goods for straightforward resale and business inputs. We further estimate that this supported £0.7 billion of GVA in the UK supply chain, with the remaining £0.8 billion reflecting imported retail goods, other import content in business supplies, and taxes on transactions.

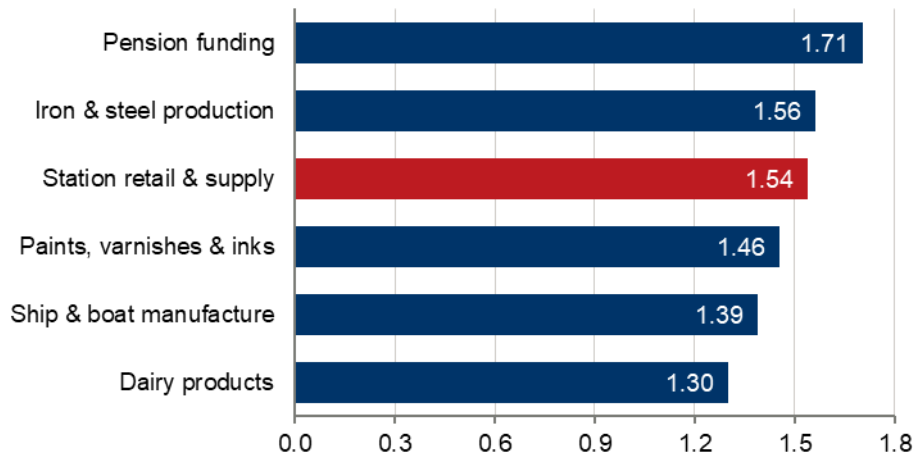
The value of sales associated with the £0.7 billion of GVA, including transactions within the supply chain, is put at £1.7 billion. The activity is estimated to support a further 13,900 jobs and £0.2 billion of tax revenues.

As a result, the combined impact of station retailers and caterers, and their UK supply chain, is put at £4.0 billion of sales, £1.5 billion of GVA, 41,600 jobs and £0.6 billion in taxation. This is again fairly modest in the context of the broader railway-related set of industries. But the combined GVA is still comparable to that of some UK-wide industrial sectors, such as the administration of pension funding, iron and steel production, manufacture of paints, varnishes and inks, manufacture of ships and boats, and processing of dairy products.

The total of 41,600 jobs, meanwhile, accounts for 10 percent of all employment across the rail-related industries.

Fig. 42. **GVA of selected UK industries in 2016**

£ billion, 2016

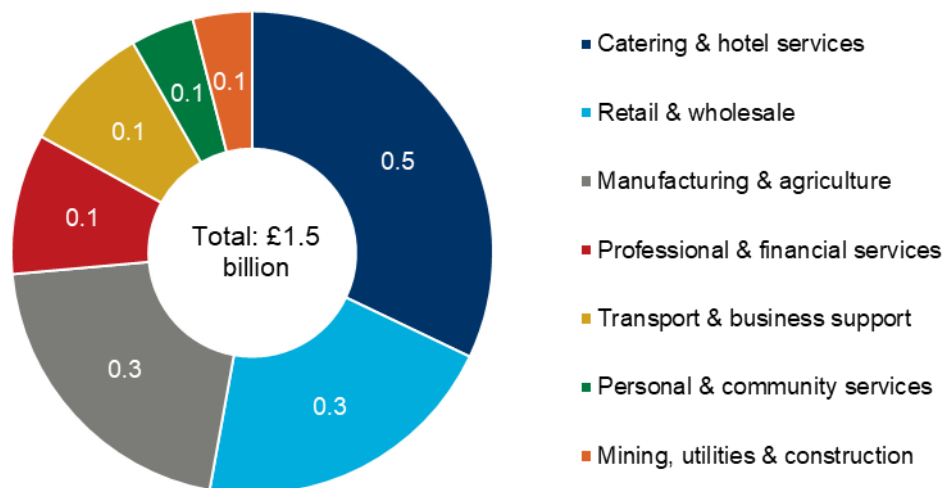


Source: Oxford Economics; ONS

By broad sector of industry, the catering and accommodation sector accounts for 32 percent of GVA and 40 percent of jobs, and retail and wholesale for 21 percent of GVA and 25 percent of jobs. Manufacturing and agriculture account for 21 percent of GVA and 12 percent of jobs, while most of the remainder is split across various parts of the services sector.<sup>20</sup>

Fig. 43. **Station retailers and caterers and their UK supply chain: GVA**

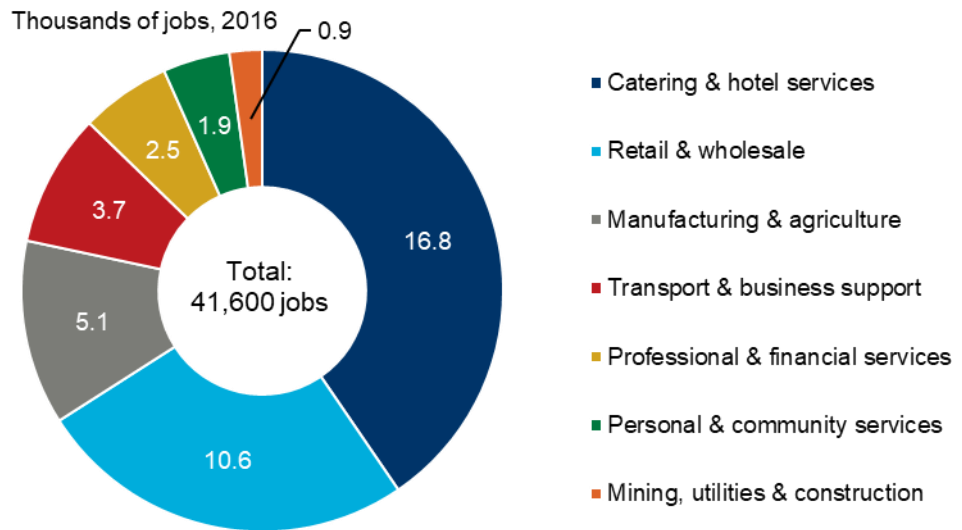
£ billion, 2016



Source: Oxford Economics

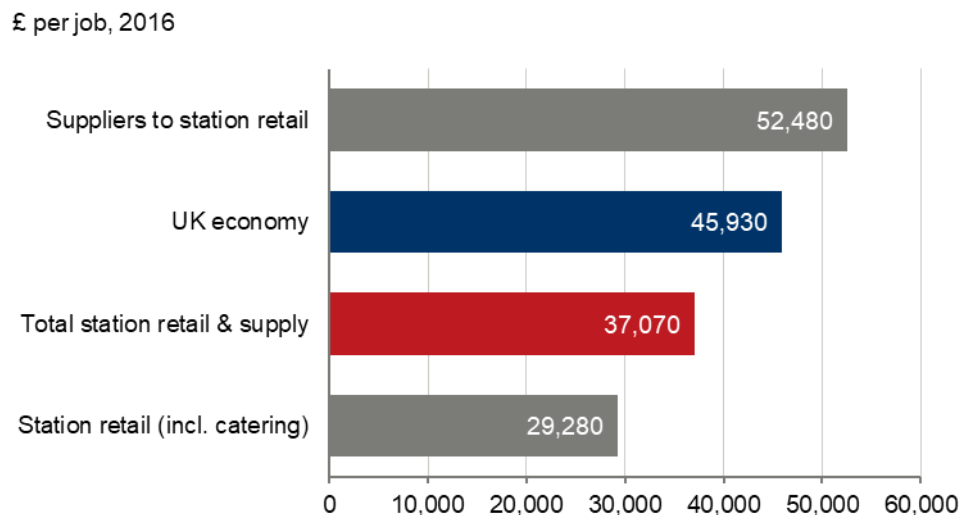
<sup>20</sup> In the charts, professional services include, for example, legal, accounting, consultancy and engineering services; and the 'professional and financial services grouping' also includes real estate services. 'Transport and business support' includes transport services, information and communication services, rental and leasing services, and other business support services such as employment agencies, security, and administrative services. 'Personal and community services' comprise repair of personal and household goods; other miscellaneous personal services; membership services; arts, entertainment, sports and cultural services; and health and education.

Fig. 44. Station retailers and caterers and their UK supply chain: jobs



GVA per job is lower than the UK average for retailers and caterers, although this in part reflects the comparatively high proportion of part-time jobs in those sectors. However, the ratio for their suppliers it is somewhat above the average, albeit not approaching the levels seen across the core railway industry supply chain. In aggregate, GVA per job for the combined retail and supplier grouping is just over 80 percent of the UK average.

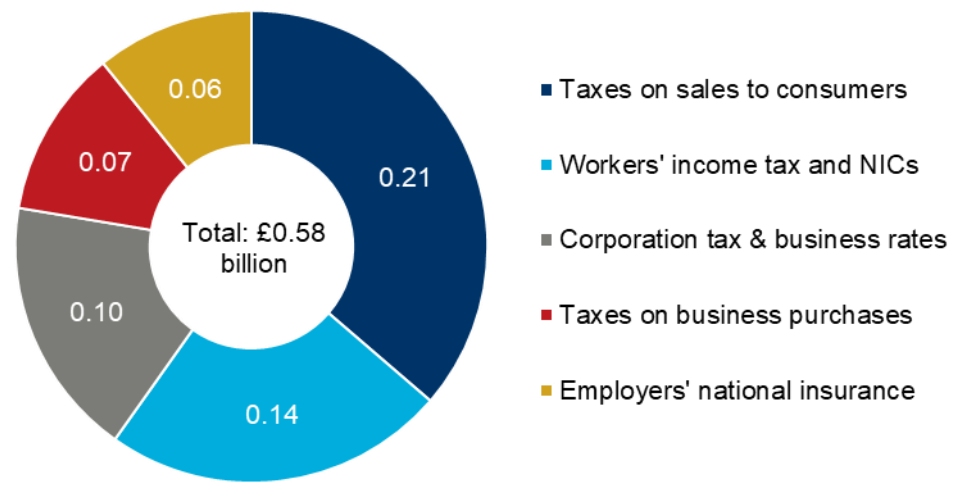
Fig. 45. GVA per job



Of the total tax contribution, those levied on sales to consumers account for 36 percent, and those levied on workers for 23 percent. Corporation tax and business rates account for 18 percent, taxes on business purchases for 12 percent and employers' national insurance for 11 percent.

Fig. 46. **Station retailers and caterers and their supply chain: tax by type**

£ billion, 2016



Source: Oxford Economics



## CASE STUDY: DRIVING THE LOW CARBON ECONOMY THROUGH INNOVATION, ABB

**ABB is a world leading independent supplier of innovative and reliable technologies for infrastructure and rolling stock projects. ABB aim to keep the world moving by developing new sustainable approaches that help our customers to use energy effectively and efficiently, to create a low-carbon railway industry.**

For traction power projects, ABB's portfolio includes the trackside substations, switchgear and transformers that feed and distribute power to the lines; FACTS (Flexible AC Transmission Systems) which improve power quality to protect the network and the surrounding grid from voltage disturbance; network management and SCADA (supervisory control and data acquisition) systems that monitor and control rail and power distribution networks; and high-end expertise like system analysis and dynamic traction power supply simulations.

### SFC technology on the East Coast Mainline

ABB is committed to the delivery of smart solutions that ensure high performance and reliability as well as reducing construction and operation costs. A typical example is a current project for Network Rail that will triple the traction power capacity at a key section of the East Coast Mainline (ECML) - at 40 percent of the cost of a new grid connection.

This section, near Doncaster, requires a 25 kilovolt (kV) traction feed with a capacity of 50 megavolt ampere (MVA) for both the main track and a new depot. However, only 15 MVA is available currently. The traditional solution is to construct a new connection to the local 132 kV grid. As well as being costly, there is also a lengthy process to obtain the necessary planning and environmental consents for a large substation.

ABB has developed a considerably more cost-effective, fast-track approach based on the innovative application of our Static Frequency Converter (SFC) technology. Generally, ABB deploys SFCs to connect equipment at different frequencies. A typical example is when a cruise liner with a 60 Hertz (Hz) on-board network needs to plug into a port's 50 Hz on-shore network.

In this case, the SFC is not converting the network frequency. Instead, we are taking a 33 kV / 50 Hz supply from the existing three-phase local distribution network and converting it to a single-phase traction power supply at 25 kV / 50 Hz. Not only is this solution simple and elegant, much of the construction work is carried out at the factory so that the equipment is delivered to site ready to plug and play. This results in a total cost saving of around 60 percent compared with building a new high voltage grid connection.

While this is a UK first, this type of SFC installation has already proved its capability in a similar project at the Wulkuraka rail depot in Brisbane, Australia. As well as delivering the power required, the SFC offers a range of additional operational benefits such as load balancing, improved power quality and supporting the reuse of regenerative train energy. A further innovation is that the Doncaster project will utilize a smart, remote predictive maintenance system based on the ABB Ability platform.



## 6. INDUCED IMPACTS

Induced impacts relate to further UK economic activity supported by the spending of workers, where that is funded by wages paid by employers in the rail-related sector. The total induced impact amounts to £17.6 billion in sales, £8.5 billion in GVA, 192,100 jobs and £2.6 billion in tax revenues. The contribution to GVA comprises £2.8 billion relating to staff of the railway system, £5.2 billion relating to staff of the rail supply sector, and £0.5 billion relating to staff of station retailers and caterers and their suppliers. The respective contributions to induced jobs are 62,300, 117,900 and 11,900.

In a single-industry study, that industry's total induced impact includes activity supported by both its own staff and staff working in the supply chain. The total induced GVA impact of the UK railway system would therefore be £7.7 billion, comprising the £2.8 billion supported by its own staff and the £5.0 billion supported by staff working in the domestic railway supply chain—i.e. most of the rail supply sector's staff, excluding those in export-driven activities.

Fig. 47. Overview of induced economic impacts

Values in 2016	Induced impacts relating to the staff of:				Total of all induced impacts (A-D)	Total induced impact of:		
	Railway system (A)	Domestic railway supply chain (B)	Rail-related exporters and their supply chain (C)	Station retailers and caterers and their supply chain (D)		Railway system (A+B)	Rail supply sector (B+C)	Station retailers and caterers (D)
<b>Sales or output (£ billion)</b>	<b>5.7</b>	<b>10.3</b>	<b>0.5</b>	<b>1.1</b>	<b>17.6</b>	<b>16.0</b>	<b>10.8</b>	<b>1.1</b>
<b>GVA (£ billion)</b>	<b>2.8</b>	<b>5.0</b>	<b>0.3</b>	<b>0.5</b>	<b>8.5</b>	<b>7.7</b>	<b>5.2</b>	<b>0.5</b>
<b>Jobs (thousands)</b>	<b>62.3</b>	<b>112.2</b>	<b>5.7</b>	<b>11.9</b>	<b>192.1</b>	<b>174.5</b>	<b>117.9</b>	<b>11.9</b>
<b>Tax (£ billion)</b>	<b>0.8</b>	<b>1.5</b>	<b>0.1</b>	<b>0.2</b>	<b>2.6</b>	<b>2.4</b>	<b>1.6</b>	<b>0.2</b>

Source: Oxford Economics - see appendix 2 for details.

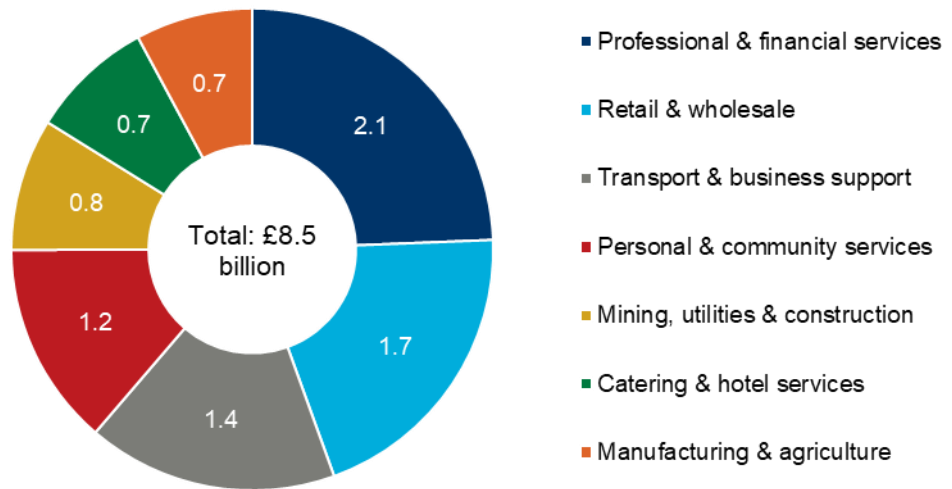
The pattern of induced activity by industry is essentially the same, regardless of the channel or industry providing the spending power. Unsurprisingly, GVA per job is not that much different to the UK average—at £44,220 versus £45,640—and does not vary by channel in any significant way.

Across these channels, professional and financial services account for 24 percent of GVA and 12 percent of jobs, retail and wholesale services for 20 percent of GVA and 26 percent of jobs, transport and business support services for 17 percent of GVA and 16 percent of jobs, personal and community services for 14 percent of GVA and 18 percent of jobs, mining, utilities and construction for nine percent of GVA and five percent of jobs, catering and hotel services for eight percent of GVA and 17 percent of jobs, and manufacturing and agriculture for eight percent of GVA and seven percent of jobs.<sup>21</sup>

<sup>21</sup> These sectors are defined in the same way as in section 5.2.

Fig. 48. Total induced impacts: GVA

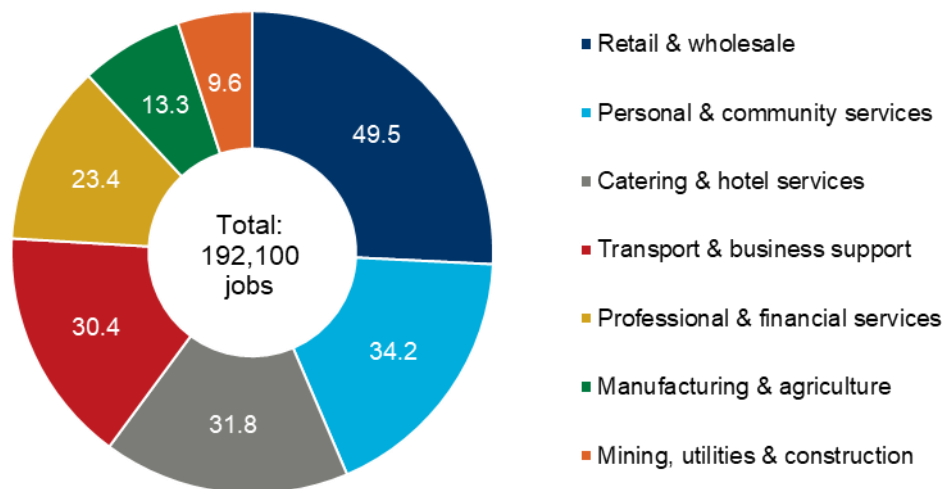
£ billion, 2016



Source: Oxford Economics

Fig. 49. Total induced impacts: jobs

Thousands of jobs, 2016



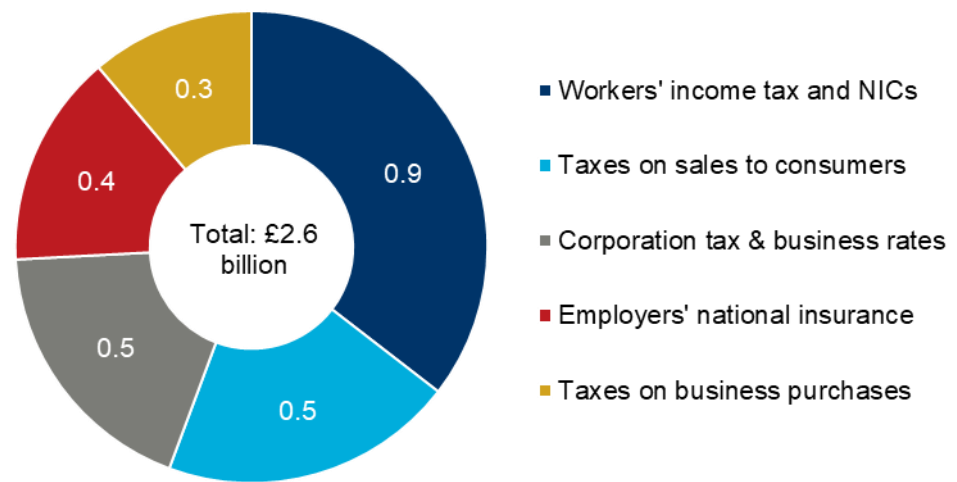
Source: Oxford Economics

For these channels of impact, taxes paid by workers account for 35 percent, those on consumers for 20 percent, corporation tax and business rates for 19 percent, employers' national insurance for 15 percent, and taxes on business purchases for 11 percent.



Fig. 50. Induced impacts: tax by type

£ billion, 2016



Source: Oxford Economics



## CASE STUDY: INNOVATIVE PROCESS IMPROVEMENTS THROUGH SMARTSERVE, UNIPART RAIL

**Unipart Rail supports the UK rail industry through the identification and implementation of process and technological improvements that provide operational benefits to contractors, train & track operators and maintainers by optimising costs and increasing the sector's productivity levels.**

Freightliner built a new train vehicle maintenance facility in Crewe to bring the maintenance of their electric fleet of vehicles under their control in-house, with Unipart Rail as the supply chain partner. Together, using the principles of the Collaborative Working ISO 44001 Standard, the two companies developed a new set of processes, branded SmartServe, that completely outsource the supply chain operations for the new depot.

At the core of SmartServe is a system that brings together all aspects of our business - procurement, inventory, supply chain and co-ordinates the use of both the replaceable parts and consumables used to fit them. The system provides a smarter way of working by placing the fast-moving materials close to the point of use, at line-side, where they are needed quickly and also gives full traceability of where and when the material was used, by whom, and on which vehicle equipment has been fitted.

The creation of the new processes resulted in several key operational benefits to Freightliner such as higher levels of vehicle availability, cost efficiencies of up to 10% compared to previous operational methods and point of use delivery that has improved the efficiency of train maintenance teams and encouraged positive attitudes amongst the workforce.

### Productivity gains

The Freightliner example has shown that technical staff are more productive because they can spend their time focusing on repair work rather than tracking down parts, and that the ready availability of spares means there is no need to remove parts from other vehicles to keep one on the track. This eliminates wasteful double handling and helps improve whole life servicing history and keeps maintenance of the vehicle availability at the highest levels.

The effective utilisation of skilled staff is a key driver in the improvement of an organisation's productivity. Within the rail sector there are many ways in which these requirements can be satisfied and increasingly it is with the effective use of digital technology that can be used in conjunction with employee engagement programmes such as the Unipart Way that is supported and developed by Unipart Rail with clients.

### Utilising digital technology - moving to the intelligent condition based supply chain

Digital technology can be used to keep trains running for longer without disruption by minimising planned or unscheduled maintenance interventions and to massively transform maintenance regimes so that assets are in service for longer and that the correct parts are available for the skilled maintenance teams, when they are required. A significant advance to meet these requirements has been the development of vehicle maintenance programmes controlled by "condition based intelligence" and a supply chain to support the data-driven demand requirements.

The concept of an integrated Condition Based Supply Chain is the seamless management of real-time data and information, combined with multiple data sources relating to the asset, to automate large parts of the supply chain. This concept is a natural development for Unipart Rail as the company has years of historical data and this combined with the on-train CBM data can provide a number of benefits such as: proactively shipping replacement parts, improving component reliability and maintenance periodicity extensions. By using several existing and emerging technologies and capabilities into a complete Digital Eco-system, Unipart Rail is enabling the elimination of preventive maintenance in favour of targeted predictive maintenance.



## 7. THE RESULTS IN CONTEXT

This chapter looks briefly at the industries' wider contribution to the economy, over and above the 'demand-side' support which is the main focus of this study, and also at how these results compare with other studies of the sector.

### 7.1 THE INDUSTRY'S WIDER ECONOMIC AND SOCIAL CONTRIBUTION

Aside from the contributions to GVA, jobs and tax generated by the industry's sales, activity and expenditure, the railway industry impacts on the UK economy in several other positive ways.

Firstly, it provides a means of travel to and from work, and between workplaces, for commuters, and a means of transporting goods for businesses in many sectors of industry. The benefits to these customers will usually exceed the cost to them, and Oxera has recently suggested that these net user benefits could be as high as £16.7 billion per annum.<sup>22</sup> These benefits will include the value to rail users of time savings amongst other gains.

Rail also provides an alternative to the road system, offering the potential for environmental improvement, savings for the remaining road users due to lower congestion, and improved travel safety. The same Oxera study suggests that rail helps, each year, to reduce carbon dioxide emissions by up to 8.4 million tonnes, and generates time savings for road users worth up to £11.8 billion.

Rail provision also makes it easier for businesses to trade with one another and share best practice, helping to enhance the long-term productive potential of the economy by up to £11.6 billion per year, according to the Oxera study.

Going forward, ongoing and planned future investment in the rail network will add further to these benefits. Another Oxera study suggests that the £50 billion of new investment in the network set to take place by the early 2020s will deliver up to £84 billion of benefits, over the lifetime of the assets concerned, taking into account user, congestion and wider economic benefits.<sup>23</sup>

### 7.2 COMPARISON OF DEMAND-SIDE IMPACTS

In 2015, Oxera published a report stating that the rail industry contributed £10.3 billion per year to the UK economy's GVA, comprising £6.3 billion from the rail industry itself and £3.8 billion in the rail industry's UK-based supply chain.<sup>24</sup> This was estimated to support a total of 216,000 jobs, comprising 92,000 in the rail industry itself and 124,000 in the domestic supply chain. Updates published in 2017 show revised totals of £10.4 billion and 240,000 jobs.<sup>25</sup>

The £6.3 billion 'direct' GVA impact for the railway system, and associated 92,000 jobs, related to the mainline railway system in Great Britain only,

<sup>22</sup> Source: Oxera for the Rail Delivery Group, *How does rail contribute to the UK economy?*, July 2017. These values are sometimes referred to as the 'consumer surplus'.

<sup>23</sup> Source: Oxera for the Rail Delivery Group, *Investment in rail: the economic benefits*, October 2017.

<sup>24</sup> Oxera for the Rail Delivery Group, *What is the contribution of rail to the UK economy?*, September 2015.

<sup>25</sup> Oxera for the Rail Delivery Group, *How does rail contribute to the UK economy?*, July 2017.

excluding 'metro' systems and Northern Ireland, for the year 2014. The equivalent figures in this study, for 2016, would be £8.9 billion and 94,000 jobs.

Official data show the GVA of the interurban passenger and freight rail sector to have grown by 12 percent between 2014 and 2016, to reach the £5.2 billion total shown in figure 18 (in chapter 3). The remaining £3.7 billion in this study relates to Network Rail. This is taken to be the sum of total employment costs and capital depreciation, which is the standard statistical approach taken for general government activities. Network Rail was re-classified from the private sector to the government sector in September 2014.

Apparent differences for the supply chain, meanwhile, appear substantial at first sight. The Oxera study did not cover the impact of station retailers and caterers, nor export-related impacts, nor induced impacts. But even allowing for that, Oxera's £3.8 billion might be compared with our £14.4 billion of GVA for the total domestic supply chain (figure 22 in chapter 4), and their 124,000 jobs might be compared with our 235,000.

However, Oxera took the standard approach to the economic impact assessment, as part of a wider study of the rail network's economic benefits. This will have captured the knock-on effect for the rail supply sector of day-to-day expenditure by the train operators and Network Rail, but not work of a capital nature undertaken by sector.

To allow for a better comparison, the values for this Oxford Economics study would be changed to:

- £10.9 billion of GVA and 179,000 jobs, by excluding the impact of London Underground, other 'metro' systems, and Northern Ireland.
- £10.9 billion of GVA and 220,000 jobs, by also taking out the specific adjustments to the GVA-to-jobs ratios for the construction and rental and leasing industries, which were made in the Oxford Economics modelling to reflect the specific nature of that work (see box in section 4.6).
- £6.1 billion and 129,000 jobs, by further excluding the impact of capital expenditure by or behalf of the railway system, and by the rolling stock leasing companies.

The £6.1 billion GVA contribution is still somewhat higher than the £3.8 billion previously estimated. But we are confident that £6.1 billion is a reasonable indicator of the impact of day-to-day expenditure by the mainline railway system. It relates to £7.9 million of total net procurement expenditure by the system, implying import content of around £1.8 billion, or 23 percent, which is close to the average across all industries.

The figure for total net procurement in this case comprises £6.3 billion of net purchases by the train operating companies (based on purchases in the ONS Annual Business Survey but with payments to Network Rail deducted), and £1.6 billion of day-to-day spending by Network Rail, based on its recent company reports.

The 129,000 jobs figure implies an average GVA per job of around £47,000, which is close to the UK average of £46,000. This is broadly in line with what we would expect, given the way in which the rail supply sector is spread across

a wide range of professional services, support services, energy-related, and manufacturing industries, once work on capital projects is excluded. Our preferred measure here would be 121,000 jobs, arrived at by adding back the adjustment to the GVA-to-jobs ratio for the rental and leasing sector. This is still close to the Oxera figure of 124,000, but puts average GVA per job across the supply chain a little above the UK average, at around £50,000, rather than below it as suggested by the Oxera figures.

Another study, published by the National Skills Academy for Rail in 2015, puts total employment in the 'direct' railway industry at 115,000, generating £12.4 billion in GVA, with 120,000 extra jobs in the supply chain.<sup>26</sup> That study includes London Underground and other local urban network systems, but also counts railway engineering activity as part of the direct railway sector.

Our equivalent figures for the 'direct' impact, for 2016, could be around 134,000 jobs, generating £14.1 billion of GVA, if the rail engineering sector is taken to be railway construction narrowly defined, plus the manufacture of rolling stock and signalling equipment.<sup>27</sup> These results appear reasonably consistent, with both studies putting GVA per job in the 'core' railway industry at between £105,000 and £110,000.

The 120,000 supply chain jobs in the Skills Academy study relates to workers in the 'immediate' supply chain. The nearest equivalent in this study would be staff outside of the 'core' railway industry as defined above, but working in businesses directly supplying that sector. This is estimated to be in the region of 115,000 workers.

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<sup>26</sup> National Skills Academy for Rail, RSSB and Atkins, *The cost of not addressing skills issues in the rail sector*, October 2015.

<sup>27</sup> Railway construction 'narrowly defined' means jobs and GVA classified as 'railway construction' in the Business Register Employment Survey and Annual Business Survey. This excludes jobs classified to the separate 'specialised construction activities' sector, which also make an important contribution to the overall construction supply chain in this study.

## 8. REGIONAL ANALYSIS

The UK results can be broken down between Scotland, Wales, Northern Ireland, and nine standard English regions, based on workplace location.<sup>28</sup>

### 8.1 CONTRIBUTION TO GVA BY REGION

For the UK, total rail-related impacts account for 2.09 percent of all GVA.<sup>29</sup> But there is some variation by region, with London (2.69 percent) standing out. The North West (2.18 percent) Yorkshire and the Humber (2.17 percent) are the only other regions where this ratio is above the UK average. At the lower end, rail-related impacts account for 1.50 percent of all GVA in Northern Ireland, for 1.71 percent in the South West, and for 1.78 percent in Scotland.

These overall ratios include the effect of induced impacts, and of station retailers and caterers and their suppliers, but the railway system and rail supply sector are the major influences. Induced impacts vary only between 0.44 percent and 0.57 percent of regional GVA, while station retail-related impacts account for between 0.05 percent and 0.09 percent of GVA in every region except London. That ratio reaches 0.15 percent in the capital, thanks to the combination of substantial passenger numbers and the existence of several mainline terminals with dedicated shopping malls. But the difference with the rest of the nation is still modest in absolute terms.

By contrast, there are considerable and significant variations in the importance of the railway system itself. The share of the railway system in total GVA is highest in London (at 1.11 percent), reflecting the large numbers working for London Underground, as well as the large number of train operating company staff counted as being located in the capital. Yorkshire and the Humber (0.67 percent of GVA) is the only other region where this share is above the UK average of 0.65 percent. At the lower end, the contribution of the railway system is comparatively modest in Northern Ireland (0.19 percent of regional GVA), the East Midlands (0.30 percent), Wales (0.32 percent), East of England (0.46 percent), the South West (0.47 percent), and North East (0.50 percent).

The importance of the rail supply sector is less variable than in the case of the railway system, and the correlation between the importance of the railway system and the size of the rail supply sector is rather weak. Notably, the rail supply sector is important in East Midlands (1.10 percent), Wales (0.98 percent), and the North East (0.95 percent), despite the comparatively modest value of railway system activity in those regions. It is also important for the

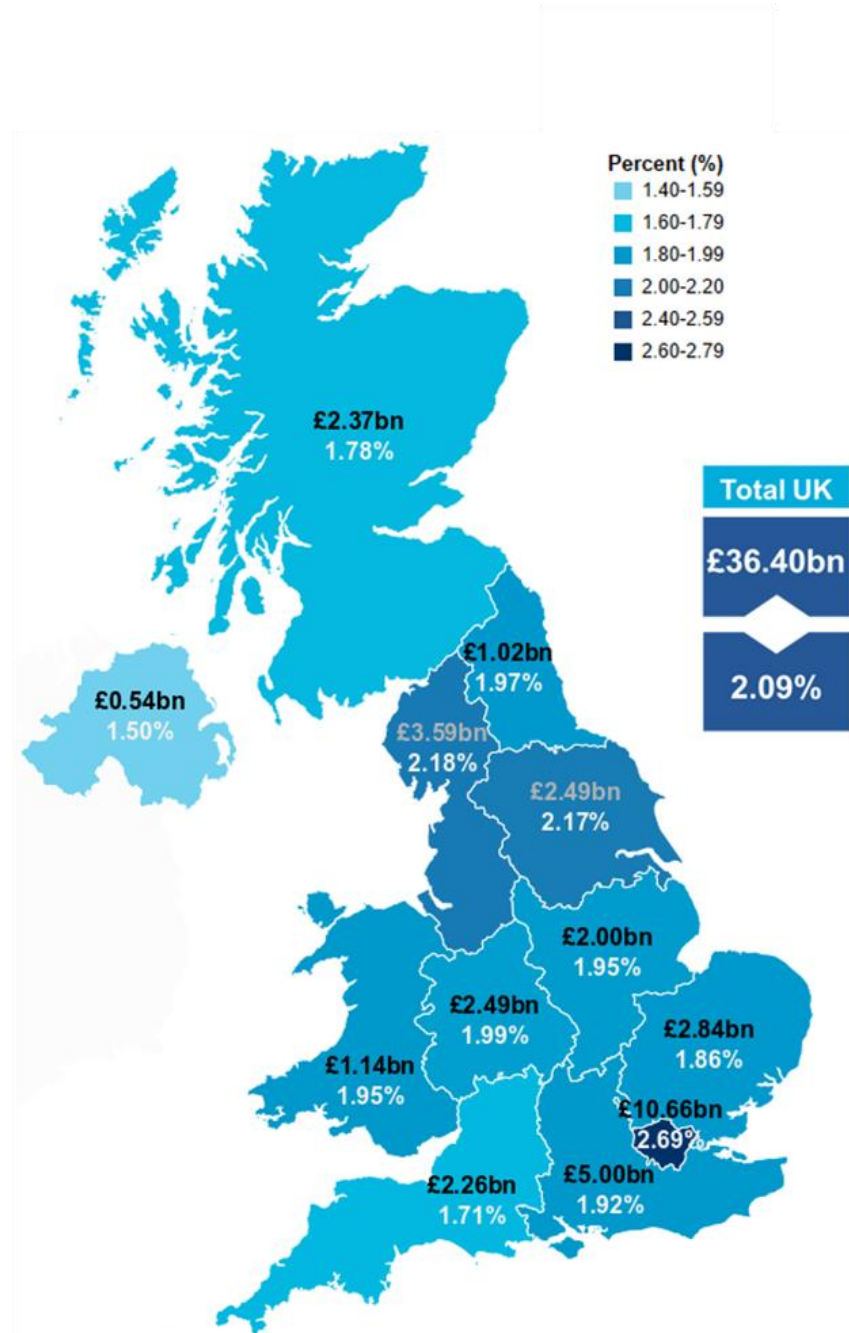
<sup>28</sup> Workplace location as recorded in the Business Register Employment Survey (BRES). In most places this relates to the actual place of work, rather than e.g. the employer's national headquarters. For workers such as train drivers it should relate to the depot where they normally start and finish work, while for construction workers it should be the construction site rather than their company's relevant administrative office. However, for some workers such as contract cleaners working at multiple client premises, the workplace location recorded in BRES may relate to a local branch office of their employer. We are confident that BRES workplace locations provide a reasonable basis for jobs estimates at the regional level. But the Local Enterprise Partnership and constituency estimates, covered in chapters 9 and 10, should be treated with a degree of caution.

<sup>29</sup> The economy-wide GVA figures in this chapter include the imputed rent of owner-occupiers.

North West (1.00 percent), where the size of the railway system is close to the national average.

The minimum regional GVA share of the rail supply system, of 0.71 percent, is well above the minimum share of 0.19 percent found in the case of the railway system, and is found in Scotland and the South West, rather than in Northern Ireland—which has the third lowest ranking here, 0.76 percent.

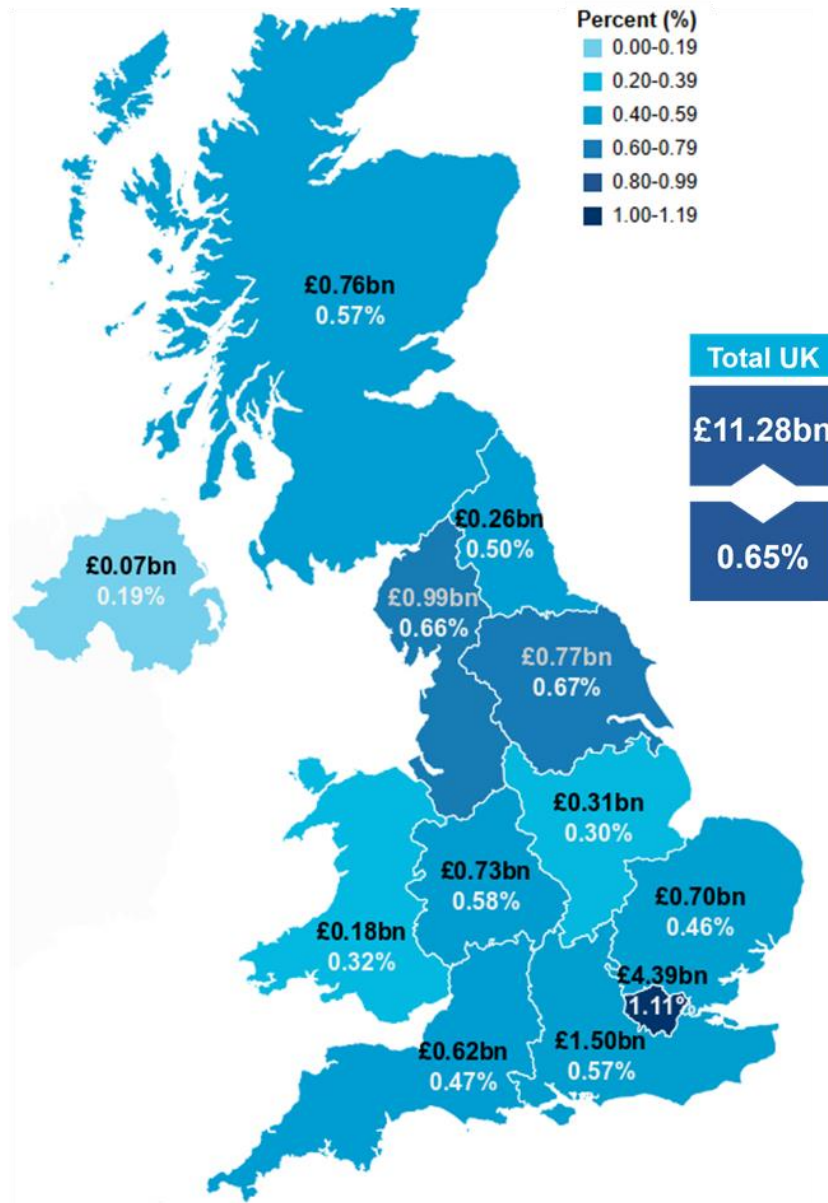
Fig. 51. Railway-related impact GVA as a share of regional GVA



Figures show sector GVA in £ billion and the sector's percentage share of total regional GVA

By summing up over the relevant regional and local results, it is possible to arrive at approximate impacts for the areas covered by the Northern Powerhouse and Midlands Connect.<sup>30</sup>

Fig. 52. Railway system GVA as a share of regional GVA



Figures show sector GVA in £ billion and the sector's percentage share of total regional GVA

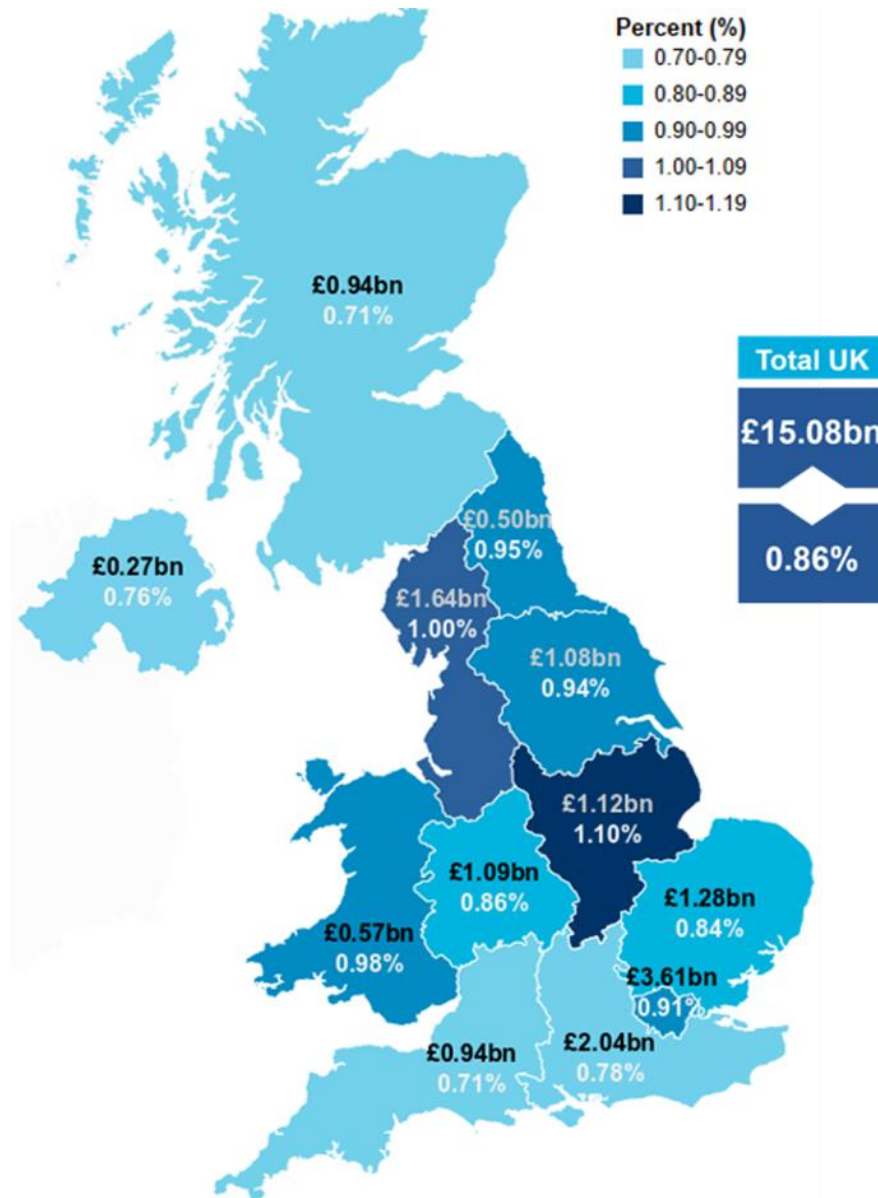
<sup>30</sup> The Northern Powerhouse covers the North East, North West and Yorkshire and the Humber regions, together with those parts of Derbyshire and Nottinghamshire included in Sheffield City Region LEP. The Midlands Connect geography covers the West Midlands and East Midlands regions, together with those parts of the historic county of Lincolnshire classified to the Yorkshire and the Humber region. There is therefore a small degree of overlap between the two regions.



The total of all GVA impacts across the Northern Powerhouse amounted to broadly £7.27 billion in 2016, of which £2.04 billion of activity occurred in the railway system, and £3.32 billion in the rail supply sector. As a share of economy-wide GVA across the region, those values equate to around 2.10 percent, 0.59 percent, and 0.96 percent, respectively.

The total of all GVA impacts across the Midlands Connect area was £4.62 billion in 2016, of which £1.07 million related to the railway system and £2.28 million to the rail supply sector. Those amounts equate to 1.98 percent, 0.46 percent, and 0.97 percent of total regional GVA, respectively.

Fig. 53. Rail supply sector GVA as a share of regional GVA



Figures show sector GVA in £ billion and the sector's percentage share of total regional GVA

## 8.2 CONTRIBUTION TO JOBS BY REGION

The pattern for the contribution to jobs follows that for the contribution to GVA in very broad terms, but with the railway system having less influence on the overall spread due to the high GVA-per-job ratio found for that sector throughout the country. In this case, rail-related impacts account for 1.73 percent of all jobs nationwide, with only London (2.29 percent) and the North West (1.79 percent) above the UK average. The ratio is lowest in Northern Ireland (1.33 percent), Wales (1.37 percent), and the South West (1.46 percent).

Although induced impacts are comparatively more important for jobs than for GVA, their influence on these overall regional disparities is extremely modest, as they vary only between 0.54 percent and 0.59 percent of total jobs. Station retail-related jobs vary between 0.06 percent and 0.12 percent of all-industry jobs outside of London, while accounting for 0.28 percent of jobs in the capital.

Within the railway system itself, the variation in the contribution to total jobs is significant, with the ratio for London (0.62 percent of all jobs) nearly double that for the next highest regions, i.e. the North West and Yorkshire and the Humber, which are each in line with the UK average of 0.33 percent. At the other end of the scale, the railway system accounts for only 0.10 percent of jobs in Northern Ireland, 0.16 percent in the East Midlands, and 0.18 percent in Wales.

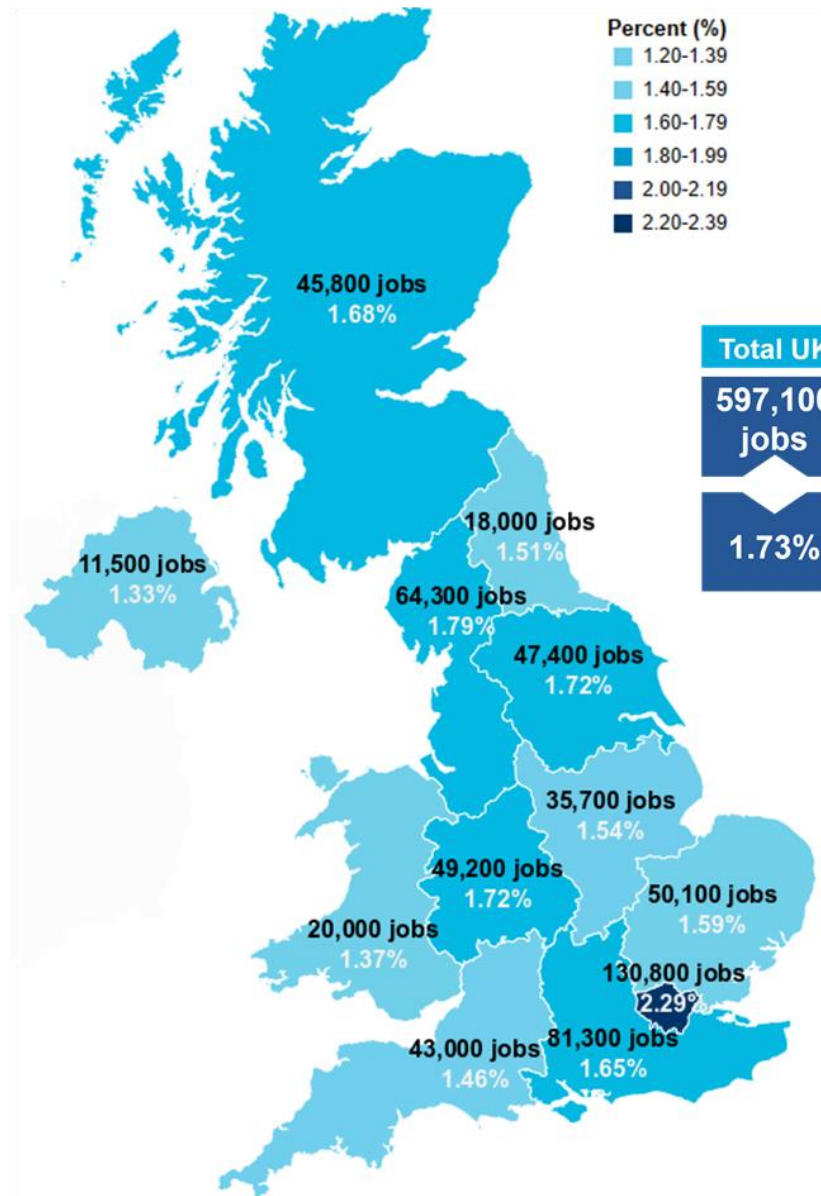
Interestingly, although London only ranks sixth in terms of the share of rail supply sector GVA in total GVA (at 0.91 percent), it ranks first in terms of the share of rail supply sector jobs in total jobs (0.83 percent). While GVA per job for this sector is above the regional average everywhere, it is only 10 percent above the average in London's case, compared with the 20 percent excess seen across the UK as a whole, and the 45 percent-plus leads seen in Wales, the North East and East Midlands. This reflects the comparatively high GVA per job across the London economy as a whole, rather than any 'underperformance' by the London rail supply sector itself.

Overall, rail supply sector jobs account for 0.72 percent of all UK jobs. As well as London, the North West (0.78 percent), Yorkshire and the Humber (0.76 percent), East Midlands (0.75 percent), and West Midlands (0.75 percent), are also above the national average in terms of the industry's contribution to employment. The industry is least important on this score in Wales (0.56 percent), Northern Ireland (0.58 percent), and the South West (0.59 percent).

For the Northern Powerhouse, some 132,700 jobs were supported by all rail-related impacts, including 24,500 workers in the railway system and 57,900 in the rail supply industry. This employment accounted for 1.68 percent, 0.31 percent, and 0.73 percent of all regional jobs, respectively.

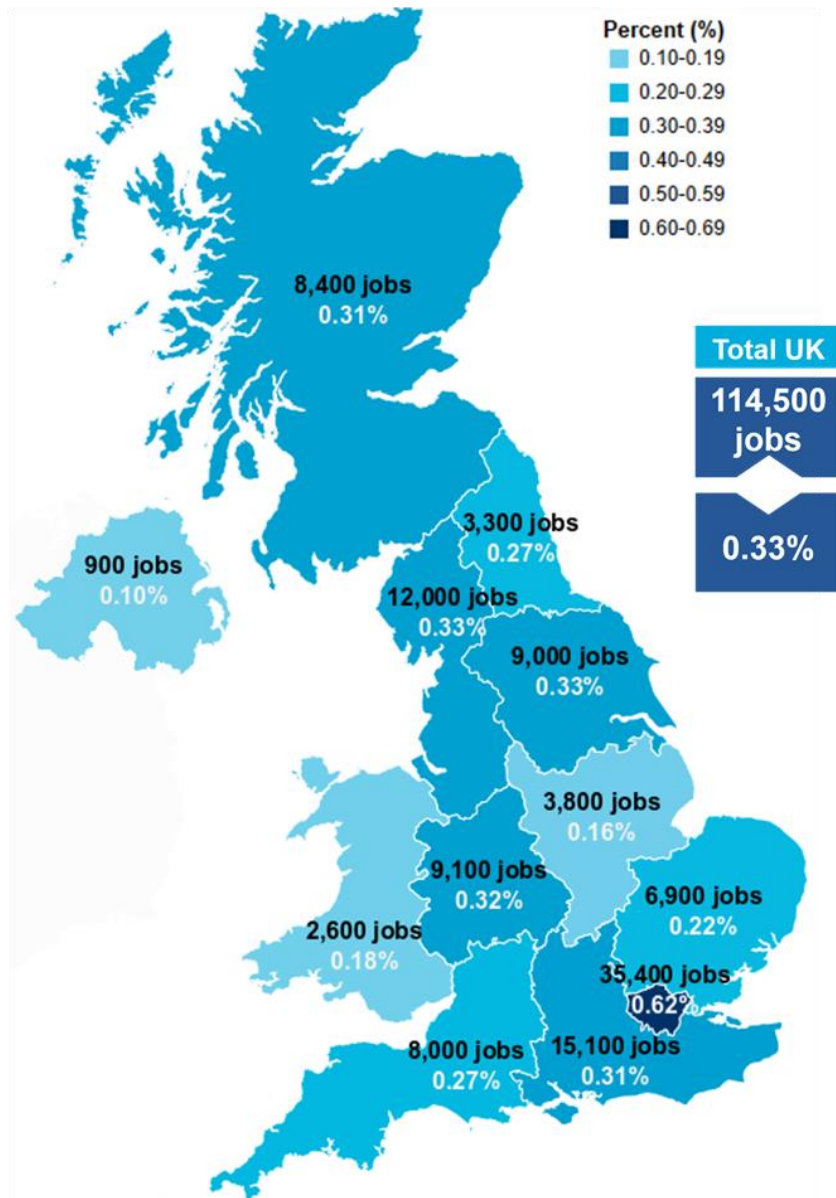
Across the area covered by Midlands Connect, around 87,200 jobs were supported in total, including 13,200 in the railway system and 40,000 in the rail supply sector. These jobs account for 1.64 percent, 0.25 percent, and 0.75 percent of all regional employment, respectively.

Fig. 54. Railway-related impact jobs as a share of regional jobs



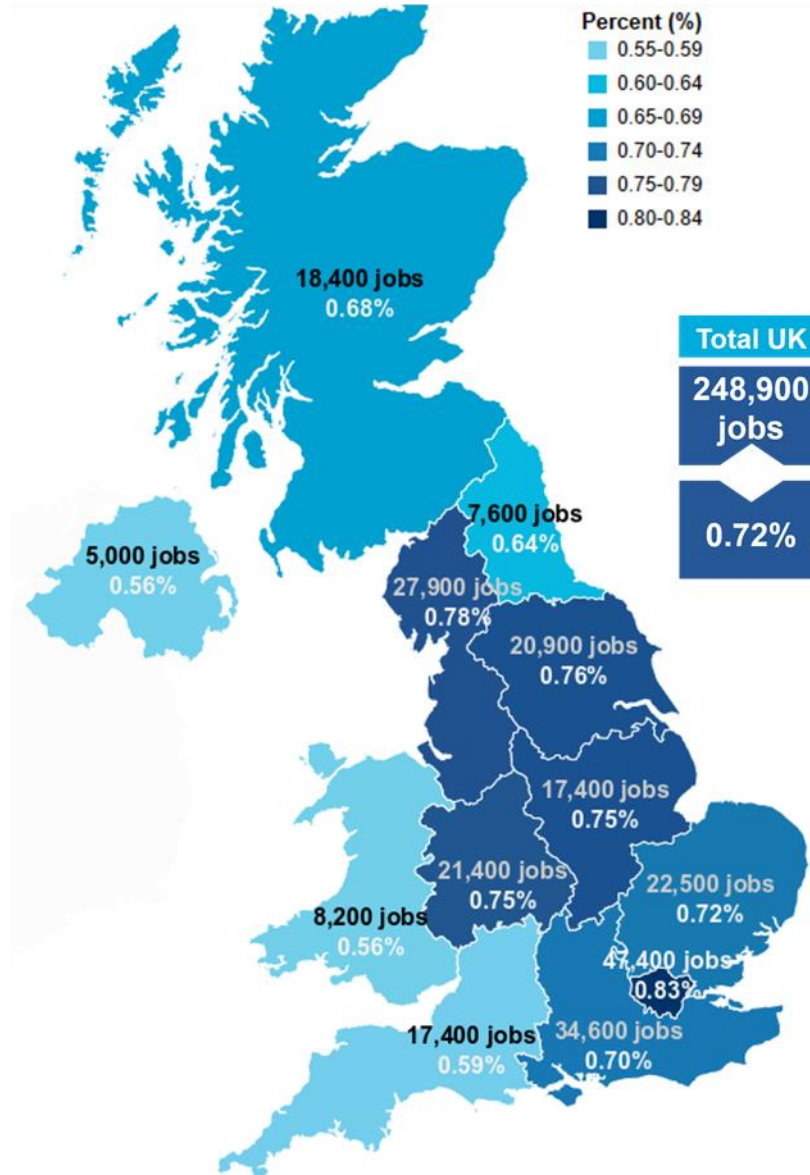
Figures show sector job headcount and the sector's percentage share of total regional jobs

Fig. 55. Railway system jobs as a share of regional jobs



Figures show sector job headcount and the sector's percentage share of total regional jobs

Fig. 56. Rail supply sector jobs as a share of regional jobs



Figures show sector job headcount and the sector's percentage share of total regional jobs

## 9. LOCAL ENTERPRISE PARTNERSHIPS

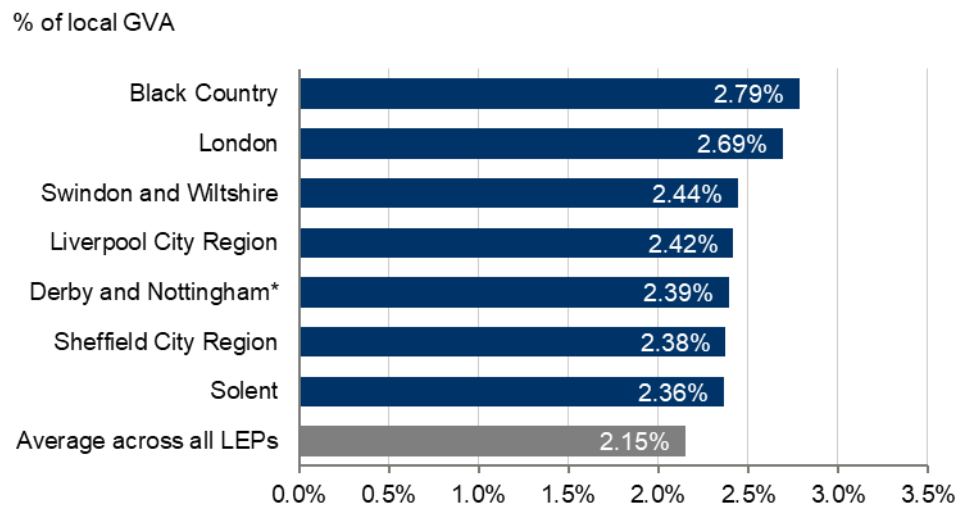
Within England, local authorities are allocated to one, or sometimes two, of 38 groupings known as Local Enterprise Partnerships, or LEPs.<sup>31</sup> In this chapter we focus on the LEPs for which railway-related impacts and industries are most important, in terms of the proportionate contribution to local GVA and jobs. Values for all of the LEPs can be found in the tables in appendix 1.<sup>32</sup>

### 9.1 CONTRIBUTION TO GVA BY LOCAL ENTERPRISE PARTNERSHIP

Across all of the LEPs, rail-related impacts account for 2.15 percent of GVA, with this ratio varying from 1.34 percent to 2.79 percent. The ratio is above average for just 12 LEPs, and below average for 26, showing how these activities can be concentrated in certain areas geographically, rather than being distributed evenly or randomly across the country.

The Black Country LEP, comprising the districts of Wolverhampton, Walsall, Sandwell, and Dudley in the West Midlands, has the largest share of total GVA accounted for by railway-related impacts. The sector is also of comparatively high importance for the LEPs centred on London, Swindon, Liverpool, Derby, Sheffield, and Southampton (the Solent LEP).

Fig. 57. Railway-related impact GVA as a share of local GVA



Source: Oxford Economics

\* Derby, Derbyshire, Nottingham and Nottinghamshire

The pattern across all of these activities is heavily influenced by the pattern seen across the railway system itself. There, the average share in total GVA across all LEPs is 0.79 percent, varying from 0.13 percent to 1.12 percent, with only 10 LEPs above the English average and 28 below it. Four of the seven

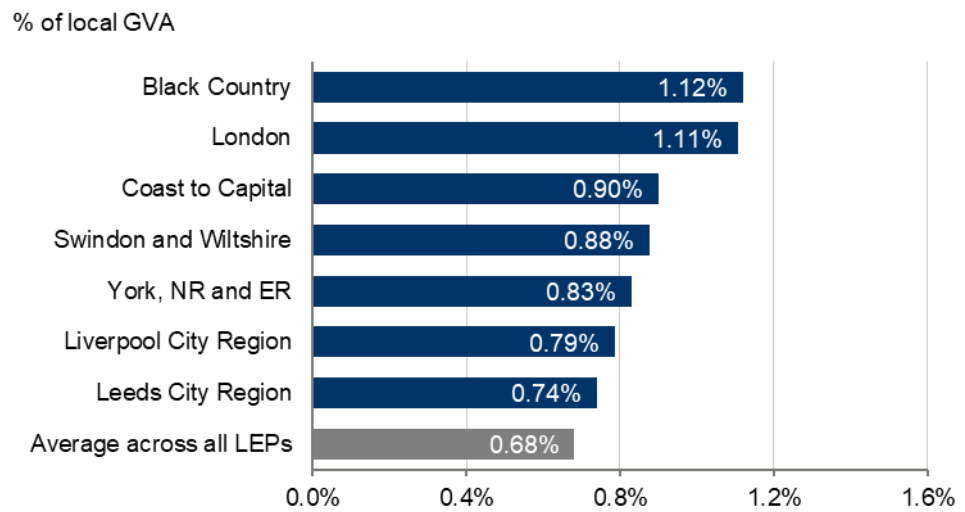
<sup>31</sup> In the official statistics, where local authorities are allocated to more than one LEP, jobs and associated monetary values are assigned to both. So, for example, some six percent of the jobs allocated to LEPs in the Business Register Employment Survey are counted in two LEPs.

<sup>32</sup> These local estimates are based on various official statistics and other information as described in appendix 2, rather than a bespoke LEP-level survey, and so should be treated with a degree of caution.

LEPs ranked highest for overall rail-related GVA do so on the back of the strong presence of railway system activity, with the Black Country leading the way in this case.

Three exceptions to this pattern are the Derby, Derbyshire, Nottingham and Nottinghamshire LEP, Sheffield City Region, and the Solent LEP. For those areas, railway system activity is of less importance than the national average, but the rail supply sector nevertheless has a strong presence. The three other exceptions are the Coast to Capital LEP, taking in much of Sussex and Surrey as well as Croydon in South London, the York, North Yorkshire and East Riding LEP, and Leeds City Region. In those instances, the railway system is of high significance, but the rail supply sector has a lower-than-average presence.

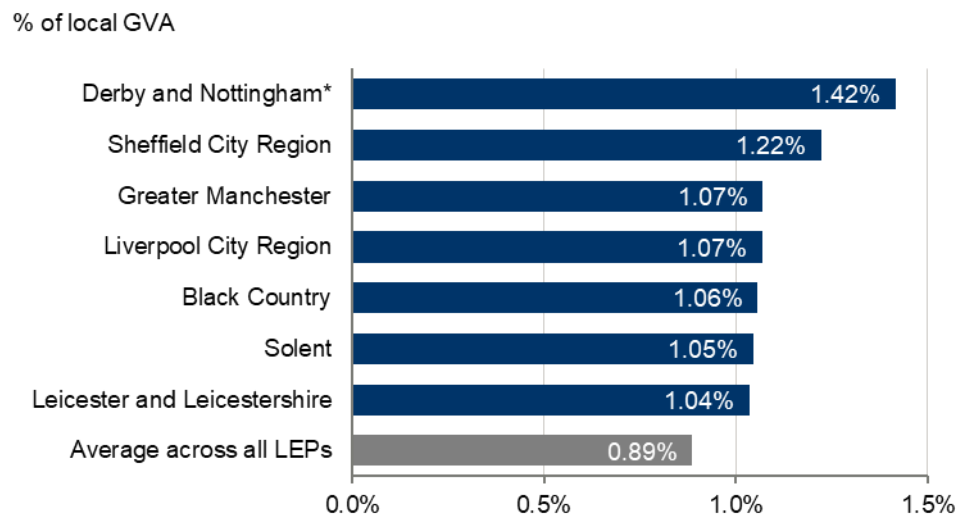
Fig. 58. Railway system GVA as a share of local GVA



Source: Oxford Economics

\* York, North Yorkshire and East Riding

Fig. 59. Rail supply sector GVA as a share of local GVA



Source: Oxford Economics

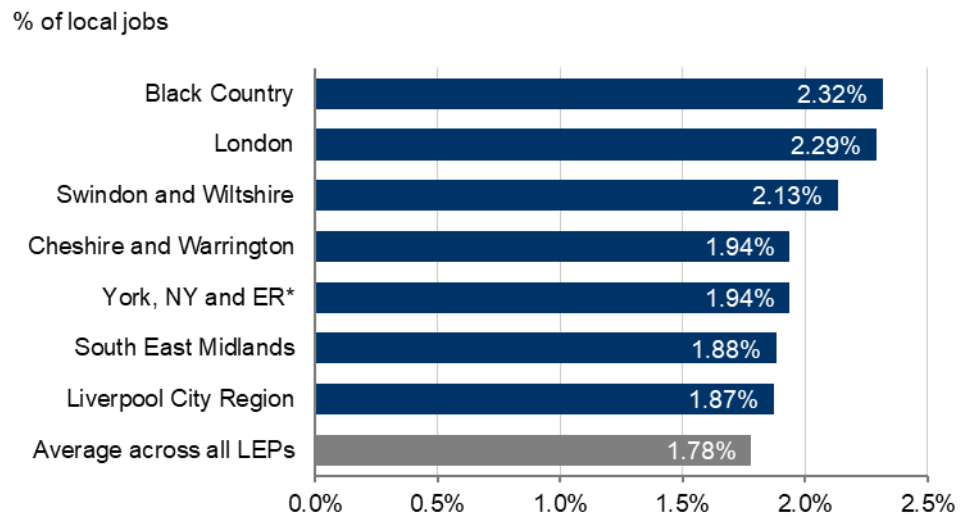
\* Derby, Derbyshire, Nottingham and Nottinghamshire

Across all LEPs, the rail supply sector accounts for 0.89 percent of total GVA, varying from 0.64 percent to 1.42 percent, with 14 Partnerships above the national average and 24 below. Here, the LEPs centred on Derby and Sheffield lead the way, followed by Manchester, Liverpool, the Black Country, Solent, and Leicester.

### 9.2 CONTRIBUTION TO JOBS BY LOCAL ENTERPRISE PARTNERSHIP

Across the LEPs, jobs supported by railway-related impacts account for 1.78 percent of all employment, ranging from 1.32 percent to 2.32 percent, with 11 LEPs above the national average and 27 below. As for GVA, the Black Country tops the rankings, followed by London and Swindon, with Liverpool also featuring highly. However, Derby, Sheffield and Solent are replaced in the 'top seven' by the Cheshire and Warrington LEP, the York, North Yorkshire and East Riding LEP, and the South East Midlands LEP covering Northamptonshire, Bedfordshire and parts of Buckinghamshire and Oxfordshire.

Fig. 60. Railway-related impact jobs as a share of local jobs



Source: Oxford Economics

\* York, North Yorkshire and East Riding

The railway system itself accounts for 0.35 percent of all LEP jobs, varying from 0.07 percent to 0.62 percent, with just nine out of the 38 LEPs having a ratio above the national average. London leads the way in this case, followed by the Black Country, and, as for the GVA contribution, Swindon, Coast to Capital, Liverpool and York all feature highly. But whereas Leeds features in the top seven in terms of GVA share, the Greater Birmingham and Solihull LEP completes the top seven for the industry's contribution to jobs.

The rail supply sector, meanwhile, accounts for 0.75 percent of all jobs across the LEPs, with this ratio varying between 0.54 percent and 1.04 percent, and 13 LEPs having an above-average share. The Black Country leads the way in this case and, as with GVA, Derby and Manchester also feature highly. However, Sheffield, Liverpool, Solent and Leicester are replaced in the top seven by the South East Midlands, Cheshire and Warrington, Swindon and Wiltshire, and London.



Fig. 61. Railway system jobs as a share of local jobs

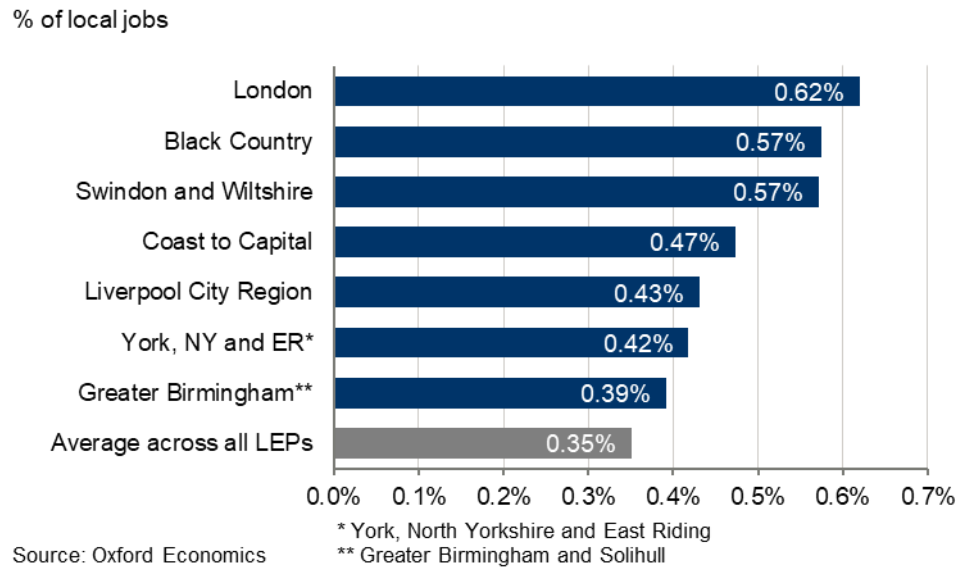
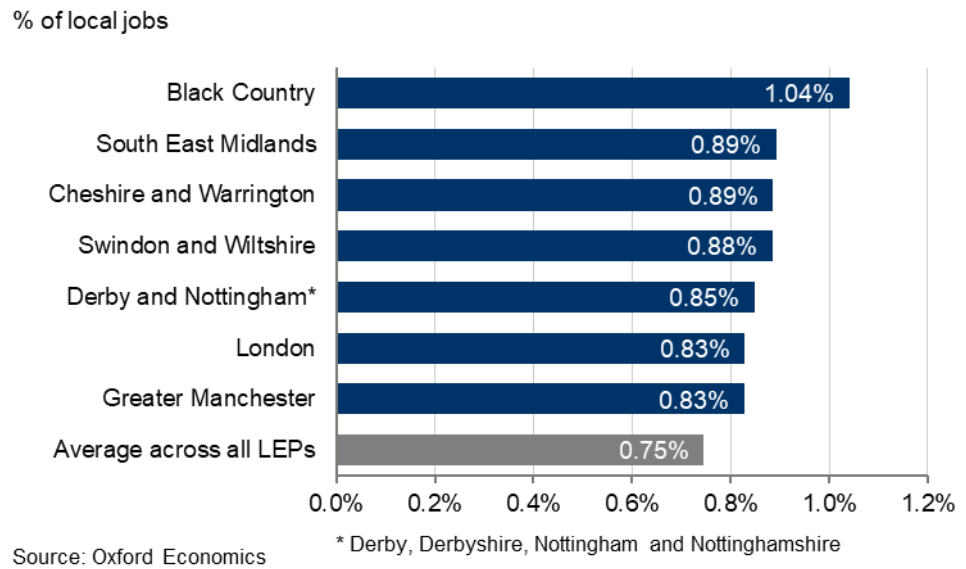


Fig. 62. Rail supply sector jobs as a share of local jobs



# 10. PARLIAMENTARY CONSTITUENCIES

The results can be further broken down by UK parliamentary constituency, again based on workplace location. In this chapter, we draw out the constituencies making the largest contributions to GVA and jobs nationally.<sup>33</sup>

The results tables can be found here:

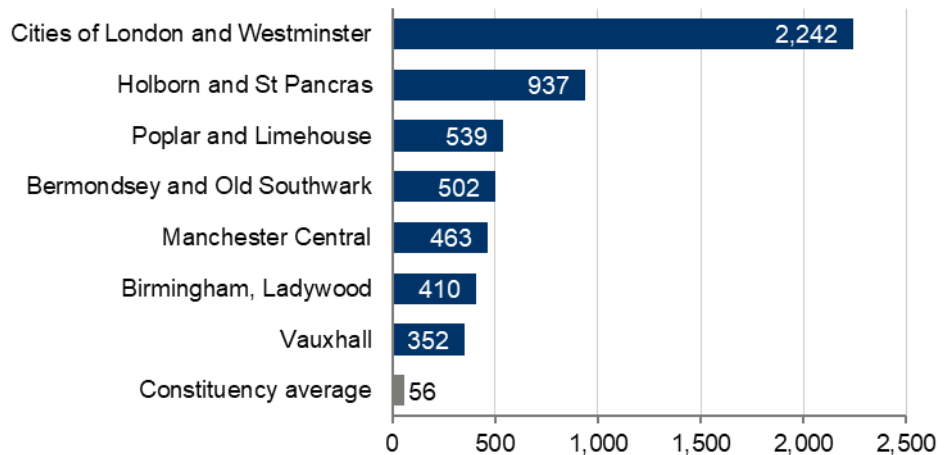
<https://d1iydh3qrygeij.cloudfront.net/Media/Default/landing-pages/recent-releases/2018/OE UK rail 2018 - UK parliamentary constituencies.xlsx>

## 10.1 CONTRIBUTION TO GVA BY UK PARLIAMENTARY CONSTITUENCY

Five of the seven constituencies making the largest contribution to the overall rail-related GVA impact are in London, with Manchester Central and Birmingham Ladywood completing this list. The main reason for this is that the rail system itself is very significant in six of the seven. The London constituencies of Cities of Westminster and London, Holborn and St Pancras, Bermondsey and Old Southwark, and Vauxhall, all benefit from the volume of activity of the Underground and other local rail transport networks, and the presence of major inter-city railway terminals. Manchester and Birmingham are also home to key inter-city terminals, as well as providing a significant amount of rail services for local commuters.

Fig. 63. GVA supported by all railway-related impacts

£ million



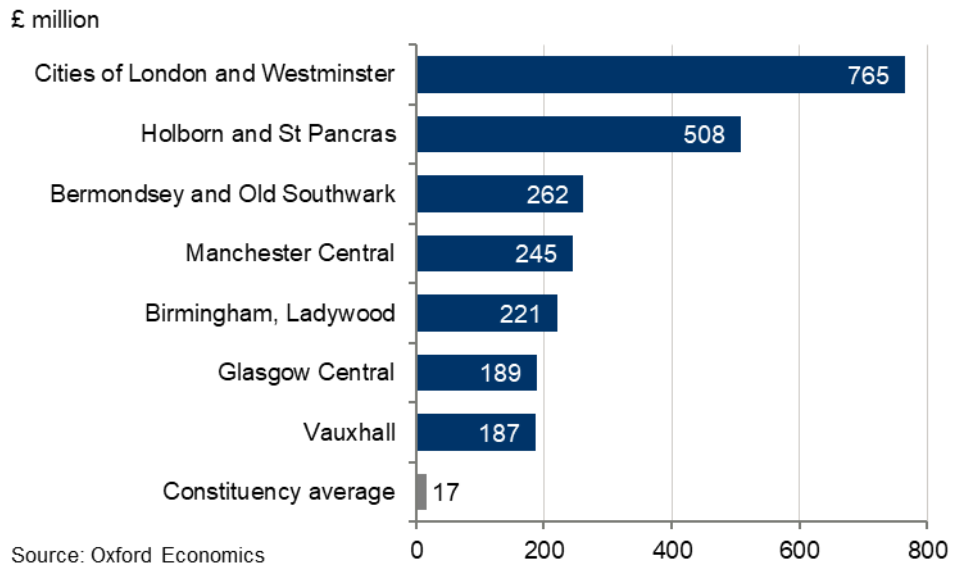
Source: Oxford Economics

The activity of the railway system itself is comparatively less important in the case of Poplar and Limehouse, and Glasgow Central completes the top seven in its place, if we look at the GVA contribution of the railway system in isolation.

The pattern for the rail supply sector is similar in some ways to the pattern for the railway system, reflecting the importance of local customer-supplier links for this industry. But there are also some differences.

<sup>33</sup> These constituency estimates are based on various official statistics and other information as described in appendix 2, rather than a bespoke constituency-level survey, and so should be treated with a degree of caution.

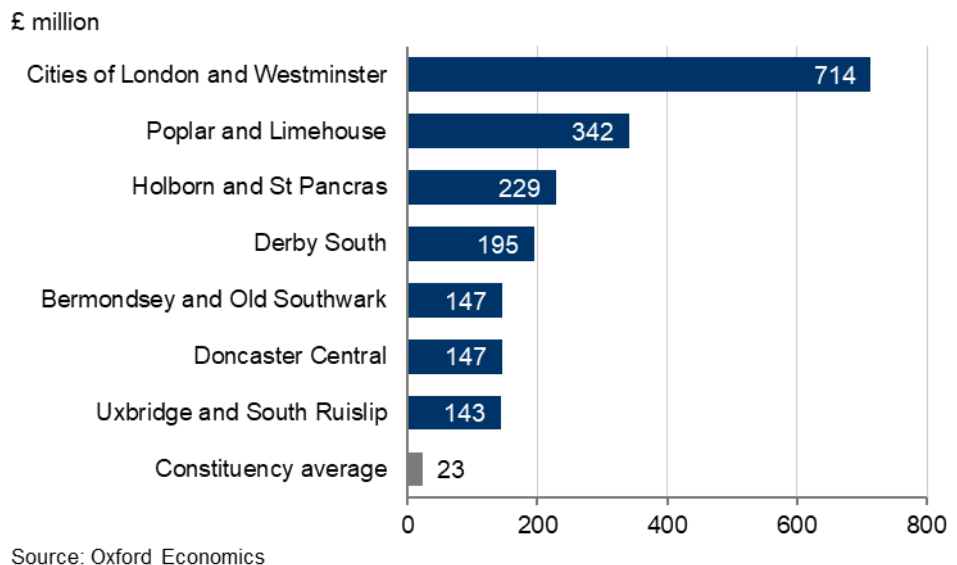
Fig. 64. **GVA of the railway system**



For the rail supply sector, Westminster is still in the lead, but in this case followed by Poplar and Limehouse, with Derby South and Doncaster Central outside of London featuring highly. These last three constituencies are boosted by the strong presence of activities that are clearly railway-specific. Poplar and Limehouse and Doncaster Central are each counted as the workplace of a large number of railway construction workers, with rail equipment manufacturing (Poplar) and transport support services for the railway system (Doncaster) also important. Derby South, meanwhile, hosts significant train manufacturing facilities.

Railway construction work also boosted the GVA of Uxbridge and Ruislip in 2016, and this constituency completes the top seven for rail supply sector GVA.

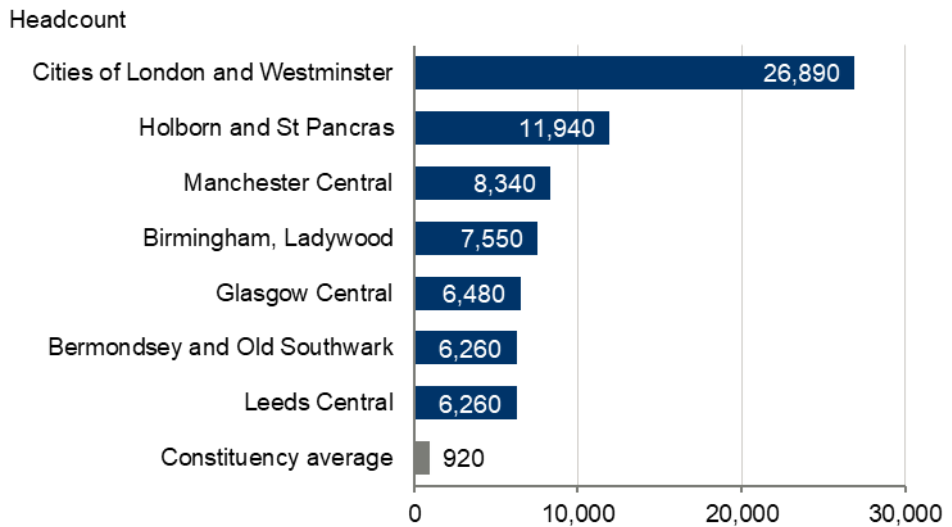
Fig. 65. **GVA of the rail supply sector**



**10.2 CONTRIBUTION TO JOBS BY UK PARLIAMENTARY CONSTITUENCY**

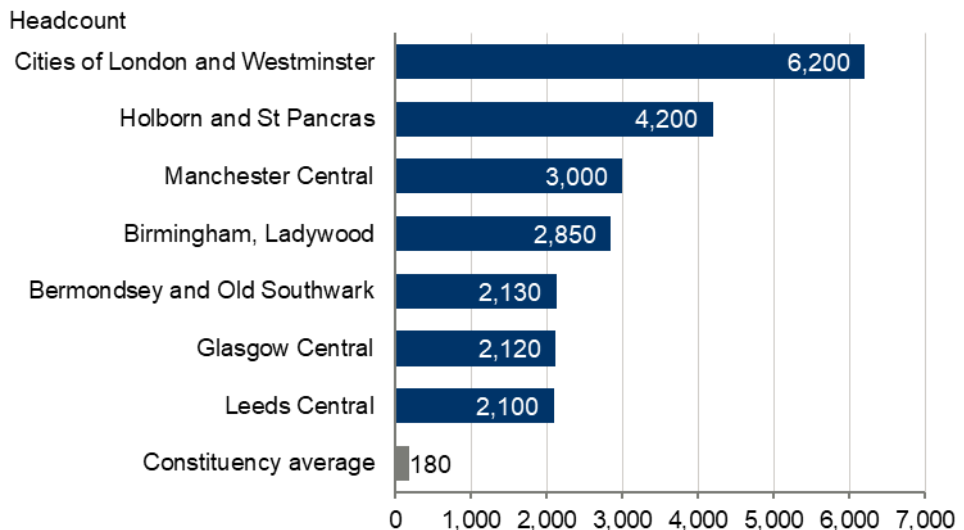
For jobs, the pattern is fairly similar to that for GVA, but the importance of London constituencies is reduced. This is because GVA-to-jobs ratios in London are typically above the national average, reflecting the kind of regional price and cost differentials that apply to most kinds of economic activity. Across all of the rail-related impacts, four non-London constituencies feature in the top seven for employment, with Manchester, Birmingham, Glasgow and Leeds each represented.

**Fig. 66. Jobs supported by all railway-related impacts**



Source: Oxford Economics

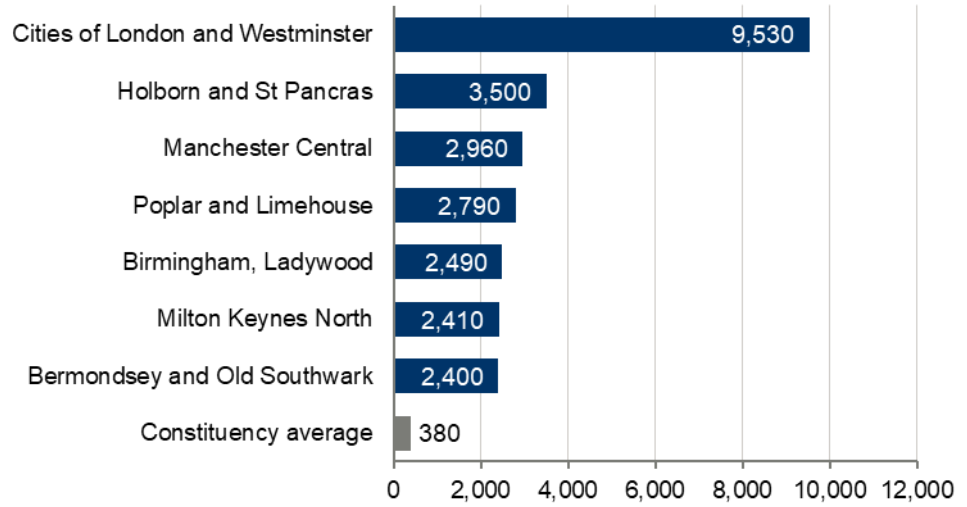
**Fig. 67. Jobs in the railway system**



Source: Oxford Economics

Fig. 68. **Jobs in the rail supply sector**

Headcount



Source: Oxford Economics

# APPENDIX 1: RESULTS TABLES

## RESULTS TABLES

Excel versions of these tables can be found here:

<https://d1iydh3qrygeij.cloudfront.net/Media/Default/landing-pages/recent-releases/2018/OE UK rail 2018 - Appendix 1 tables.xlsx>

Fig. 69. **Output or sales of the rail-related industries, by channel and industrial sector**

£ billion in 2016	UK railway system (A)	UK suppliers to the UK railway system (B)	Their UK-based supply chain (C)	UK rail-related exports (D)	UK supply chain for rail-related exports (E)	Total UK rail supply sector (B-E)	UK station retailers and caterers (F)	Their UK-based supply chain (G)	Total of all rail-related industries (A)-(G)
<b>Manufacture of transport equipment</b>	0.00	0.82	1.24	0.23	0.02	2.30	0.00	0.00	2.30
Energy-related production & utilities	0.00	0.73	1.03	0.00	0.03	1.80	0.00	0.11	1.90
All other goods production	0.00	0.74	1.52	0.16	0.05	2.47	0.00	0.86	3.33
Repair & installation of machinery	0.00	0.20	0.55	0.01	0.05	0.81	0.00	0.01	0.82
Construction	0.00	6.02	2.02	0.00	0.03	8.07	0.00	0.09	8.15
Transport services	22.92	2.65	1.03	0.40	0.12	4.20	0.00	0.07	27.19
Rental & leasing services	0.00	2.14	0.57	0.01	0.02	2.74	0.00	0.01	2.75
Other business support services	0.00	0.36	1.02	0.00	0.06	1.43	0.00	0.09	1.53
Information & communication	0.00	1.05	0.67	0.00	0.03	1.75	0.00	0.07	1.82
Financial & real estate services	0.00	0.28	0.98	0.00	0.06	1.33	0.00	0.12	1.44
Professional services	0.00	0.95	1.64	0.00	0.07	2.65	0.00	0.14	2.80
Retail & wholesale services	0.00	0.53	0.79	0.00	0.04	1.36	1.28	0.09	2.72
Food & hotel services	0.00	0.03	0.02	0.00	0.00	0.04	0.96	0.01	1.01
Other services	0.00	0.29	0.36	0.00	0.02	0.66	0.07	0.03	0.77
<b>Total</b>	<b>22.92</b>	<b>16.77</b>	<b>13.45</b>	<b>0.80</b>	<b>0.59</b>	<b>31.61</b>	<b>2.30</b>	<b>1.70</b>	<b>58.53</b>

**Fig. 70. All rail-related sales or output impacts, including induced impacts**

£ billion in 2016	Total of all rail-related industries (A)-(G)	Induced impacts, supported by the wage-financed expenditure of:				Total of all impacts			
		UK railway system staff (H)	UK rail supply sector staff (I)	Staff of station retailers and their suppliers (J)	Total	UK railway system's direct and staff impacts (A+H)	UK rail supply sector's total impact (B-E +I)	Total impact of UK station retailers and caterers (F+G+J)	Total
2.30	0.03	0.06	0.01	0.10	0.03	2.36	0.01	2.41	2.30
1.90	0.49	0.94	0.09	1.52	0.49	2.73	0.20	3.43	1.90
3.33	0.55	1.05	0.11	1.70	0.55	3.52	0.97	5.04	3.33
0.82	0.02	0.04	0.00	0.06	0.02	0.85	0.01	0.88	0.82
8.15	0.26	0.49	0.05	0.80	0.26	8.56	0.13	8.96	8.15
27.19	0.32	0.61	0.06	0.99	23.24	4.81	0.14	28.18	27.19
2.75	0.07	0.14	0.01	0.22	0.07	2.88	0.03	2.98	2.75
1.53	0.18	0.35	0.04	0.57	0.18	1.78	0.13	2.09	1.53
1.82	0.31	0.59	0.06	0.97	0.31	2.34	0.13	2.78	1.82
1.44	1.15	2.17	0.22	3.53	1.15	3.50	0.34	4.98	1.44
2.80	0.31	0.58	0.06	0.95	0.31	3.23	0.20	3.74	2.80
2.72	0.99	1.88	0.19	3.07	0.99	3.24	1.55	5.79	2.72
1.01	0.45	0.85	0.09	1.38	0.45	0.89	1.05	2.39	1.01
0.77	0.56	1.05	0.11	1.72	0.56	1.72	0.21	2.48	0.77
<b>58.53</b>	<b>5.70</b>	<b>10.79</b>	<b>1.09</b>	<b>17.59</b>	<b>28.62</b>	<b>42.40</b>	<b>5.10</b>	<b>76.12</b>	<b>58.53</b>

**Fig. 71. GVA of the rail-related industries, by channel and industrial sector**

£ billion in 2016	UK railway system (A)	UK suppliers to the UK railway system (B)	Their UK-based supply chain (C)	UK rail-related exports (D)	UK supply chain for rail-related exports (E)	Total UK rail supply sector (B-E)	UK station retailers and caterers (F)	Their UK-based supply chain (G)	Total of all rail-related industries (A)-(G)
Manufacture of transport equipment	0.00	0.42	0.61	0.12	0.01	1.15	0.00	0.00	1.15
Energy-related production & utilities	0.00	0.12	0.28	0.00	0.01	0.41	0.00	0.03	0.44
All other goods production	0.00	0.27	0.55	0.07	0.02	0.92	0.00	0.31	1.23
Repair & installation of machinery	0.00	0.09	0.25	0.00	0.02	0.37	0.00	0.00	0.37
Construction	0.00	2.44	0.82	0.00	0.01	3.27	0.00	0.03	3.30
Transport services	11.28	1.18	0.46	0.17	0.05	1.87	0.00	0.03	13.18
Rental & leasing services	0.00	1.43	0.34	0.01	0.01	1.80	0.00	0.01	1.81
Other business support services	0.00	0.19	0.56	0.00	0.03	0.78	0.00	0.05	0.84
Information & communication	0.00	0.65	0.40	0.00	0.02	1.07	0.00	0.04	1.11
Financial & real estate services	0.00	0.15	0.50	0.00	0.03	0.68	0.00	0.06	0.74
Professional services	0.00	0.56	0.98	0.00	0.04	1.58	0.00	0.08	1.66
Retail & wholesale services	0.00	0.30	0.42	0.00	0.02	0.74	0.28	0.04	1.06
Food & hotel services	0.00	0.01	0.01	0.00	0.00	0.02	0.49	0.00	0.52
Other services	0.00	0.18	0.24	0.00	0.01	0.44	0.04	0.02	0.50
<b>Total</b>	<b>11.28</b>	<b>7.99</b>	<b>6.43</b>	<b>0.38</b>	<b>0.28</b>	<b>15.08</b>	<b>0.81</b>	<b>0.73</b>	<b>27.90</b>



**Fig. 72. All rail-related GVA impacts, including induced impacts**

£ billion in 2016	Total of all rail-related industries (A)-(G)	Induced impacts, supported by the wage-financed expenditure of:				Total of all impacts			
		UK railway system staff (H)	UK rail supply sector staff (I)	Staff of station retailers and their suppliers (J)	Total	UK railway system's direct and staff impacts (A+H)	UK rail supply sector's total impact (B-E +I)	Total impact of UK station retailers and caterers (F+G+J)	Total
Manufacture of transport equipment	1.15	0.01	0.02	0.00	0.03	0.01	1.17	0.00	1.18
Energy-related production & utilities	0.44	0.14	0.27	0.03	0.44	0.14	0.68	0.06	0.88
All other goods production	1.23	0.19	0.37	0.04	0.60	0.19	1.28	0.35	1.83
Repair & installation of machinery	0.37	0.01	0.02	0.00	0.03	0.01	0.38	0.00	0.40
Construction	3.30	0.11	0.20	0.02	0.32	0.11	3.46	0.05	3.62
Transport services	13.18	0.14	0.27	0.03	0.44	11.42	2.13	0.06	13.62
Rental & leasing services	1.81	0.04	0.08	0.01	0.14	0.04	1.88	0.02	1.94
Other business support services	0.84	0.10	0.19	0.02	0.31	0.10	0.97	0.07	1.15
Information & communication	1.11	0.18	0.33	0.03	0.54	0.18	1.40	0.07	1.65
Financial & real estate services	0.74	0.49	0.92	0.09	1.50	0.49	1.60	0.15	2.24
Professional services	1.66	0.18	0.35	0.04	0.57	0.18	1.93	0.12	2.23
Retail & wholesale services	1.06	0.55	1.05	0.11	1.71	0.55	1.79	0.43	2.77
Food & hotel services	0.52	0.23	0.43	0.04	0.70	0.23	0.45	0.54	1.22
Other services	0.50	0.38	0.71	0.07	1.16	0.38	1.15	0.14	1.67
<b>Total</b>	<b>27.90</b>	<b>2.75</b>	<b>5.21</b>	<b>0.53</b>	<b>8.49</b>	<b>14.03</b>	<b>20.30</b>	<b>2.07</b>	<b>36.40</b>

**Fig. 73. Employment of the rail-related industries, by channel and industrial sector**

Thousands of jobs, 2016 average	UK railway system (A)	UK suppliers to the UK railway system (B)	Their UK-based supply chain (C)	UK rail-related exports (D)	UK supply chain for rail-related exports (E)	Total UK rail supply sector (B-E)	UK station retailers and caterers (F)	Their UK-based supply chain (G)	Total of all rail-related industries (A)-(G)
Manufacture of transport equipment	0.0	3.6	5.3	0.8	0.1	9.7	0.0	0.0	9.8
Energy-related production & utilities	0.0	0.8	1.8	0.0	0.1	2.7	0.0	0.2	2.9
All other goods production	0.0	4.4	9.6	0.6	0.3	14.9	0.0	5.1	19.9
Repair & installation of machinery	0.0	2.1	5.7	0.1	0.5	8.4	0.0	0.1	8.5
Construction	0.0	16.6	5.6	0.0	0.2	22.4	0.0	0.7	23.1
Transport services	114.5	39.9	13.8	6.2	1.6	61.5	0.0	0.9	176.9
Rental & leasing services	0.0	6.2	3.7	0.0	0.2	10.0	0.0	0.1	10.1
Other business support services	0.0	8.6	28.5	0.0	1.5	38.6	0.0	2.2	40.8
Information & communication	0.0	9.6	5.4	0.0	0.3	15.2	0.0	0.5	15.8
Financial & real estate services	0.0	1.2	4.1	0.0	0.2	5.5	0.0	0.4	6.0
Professional services	0.0	11.3	22.5	0.0	0.9	34.8	0.0	2.1	36.9
Retail & wholesale services	0.0	5.0	7.8	0.0	0.4	13.2	9.7	0.9	23.8
Food & hotel services	0.0	0.7	0.4	0.0	0.0	1.1	16.7	0.1	17.9
Other services	0.0	4.1	6.4	0.0	0.3	10.8	1.2	0.6	12.6
<b>Total</b>	<b>114.5</b>	<b>114.1</b>	<b>120.6</b>	<b>7.6</b>	<b>6.6</b>	<b>248.9</b>	<b>27.6</b>	<b>13.9</b>	<b>405.0</b>

**Fig. 74. All rail-related employment impacts, including induced impacts**

Thousands of jobs, 2016 average	Total of all rail-related industries (A)-(G)	Induced impacts, supported by the wage-financed expenditure of:				Total of all impacts			
		UK railway system staff (H)	UK rail supply sector staff (I)	Staff of station retailers and their suppliers (J)	Total	UK railway system's direct and staff impacts (A+H)	UK rail supply sector's total impact (B-E +I)	Total impact of UK station retailers and caterers (F+G+J)	Total
Manufacture of transport equipment	9.8	0.1	0.2	0.0	0.3	0.1	10.0	0.0	10.1
Energy-related production & utilities	2.9	0.9	1.8	0.2	2.9	0.9	4.5	0.4	5.8
All other goods production	19.9	4.0	7.5	0.8	12.3	4.0	22.4	5.8	32.2
Repair & installation of machinery	8.5	0.2	0.3	0.0	0.6	0.2	8.8	0.1	9.1
Construction	23.1	2.2	4.2	0.4	6.8	2.2	26.6	1.1	29.9
Transport services	176.9	2.9	5.5	0.6	8.9	117.4	67.0	1.5	185.8
Rental & leasing services	10.1	0.5	0.9	0.1	1.5	0.5	11.0	0.2	11.6
Other business support services	40.8	4.5	8.5	0.9	13.8	4.5	47.0	3.1	54.6
Information & communication	15.8	2.0	3.8	0.4	6.2	2.0	19.0	0.9	22.0
Financial & real estate services	6.0	3.1	5.9	0.6	9.6	3.1	11.4	1.0	15.6
Professional services	36.9	4.5	8.5	0.9	13.8	4.5	43.2	2.9	50.6
Retail & wholesale services	23.8	16.1	30.4	3.1	49.5	16.1	43.6	13.7	73.3
Food & hotel services	17.9	10.3	19.5	2.0	31.8	10.3	20.6	18.8	49.7
Other services	12.6	11.1	21.0	2.1	34.2	11.1	31.7	4.0	46.8
<b>Total</b>	<b>405.0</b>	<b>62.3</b>	<b>117.9</b>	<b>11.9</b>	<b>192.1</b>	<b>176.8</b>	<b>366.8</b>	<b>53.5</b>	<b>597.1</b>

**Fig. 75. Tax contribution of the rail-related industries, by channel and industrial sector**

£ billion in 2016	UK railway system (A)	UK suppliers to the UK railway system (B)	Their UK-based supply chain (C)	UK rail-related exports (D)	UK supply chain for rail-related exports (E)	Total UK rail supply sector (B-E)	UK station retailers and caterers (F)	Their UK-based supply chain (G)	Total of all rail-related industries (A)-(G)
Manufacture of transport equipment	0.00	0.12	0.17	0.03	0.00	0.32	0.00	0.00	0.32
Energy-related production & utilities	0.00	0.05	0.07	0.00	0.00	0.12	0.00	0.01	0.13
All other goods production	0.00	0.07	0.14	0.02	0.00	0.23	0.00	0.08	0.30
Repair & installation of machinery	0.00	0.02	0.05	0.00	0.01	0.08	0.00	0.00	0.08
Construction	0.00	1.10	0.35	0.00	0.00	1.46	0.00	0.01	1.48
Transport services	3.56	0.25	0.13	0.04	0.01	0.42	0.00	0.01	3.99
Rental & leasing services	0.00	0.39	0.07	0.00	0.00	0.47	0.00	0.00	0.47
Other business support services	0.00	0.02	0.07	0.00	0.00	0.09	0.00	0.01	0.10
Information & communication	0.00	0.15	0.09	0.00	0.00	0.25	0.00	0.01	0.26
Financial & real estate services	0.00	0.04	0.14	0.00	0.01	0.20	0.00	0.02	0.21
Professional services	0.00	0.12	0.22	0.00	0.01	0.35	0.00	0.02	0.37
Retail & wholesale services	0.00	0.08	0.11	0.00	0.01	0.19	0.17	0.01	0.37
Food & hotel services	0.00	0.00	0.00	0.00	0.00	0.01	0.22	0.00	0.23
Other services	0.00	0.04	0.05	0.00	0.00	0.10	0.01	0.01	0.11
<b>Total</b>	<b>3.56</b>	<b>2.46</b>	<b>1.68</b>	<b>0.09</b>	<b>0.07</b>	<b>4.30</b>	<b>0.40</b>	<b>0.18</b>	<b>8.43</b>
<b>Employers' national insurance</b>	<b>0.90</b>	<b>0.42</b>	<b>0.33</b>	<b>0.02</b>	<b>0.01</b>	<b>0.78</b>	<b>0.03</b>	<b>0.04</b>	<b>1.74</b>
<b>Corporation tax; business rates</b>	<b>0.13</b>	<b>0.36</b>	<b>0.30</b>	<b>0.01</b>	<b>0.01</b>	<b>0.68</b>	<b>0.07</b>	<b>0.03</b>	<b>0.91</b>
<b>Taxes on business purchases</b>	<b>0.25</b>	<b>0.33</b>	<b>0.19</b>	<b>0.01</b>	<b>0.01</b>	<b>0.54</b>	<b>0.05</b>	<b>0.02</b>	<b>0.86</b>
<b>Taxes on workers</b>	<b>2.28</b>	<b>1.34</b>	<b>0.87</b>	<b>0.05</b>	<b>0.03</b>	<b>2.29</b>	<b>0.04</b>	<b>0.09</b>	<b>4.71</b>
<b>Taxes on sales to consumers</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.21</b>	<b>0.00</b>	<b>0.21</b>

**Fig. 76. All rail-related tax impacts, including induced impacts**

£ billion in 2016	Total of all rail-related industries (A)-(G)	Induced impacts, supported by the wage-financed expenditure of:				Total of all impacts			
		UK railway system staff (H)	UK rail supply sector staff (I)	Staff of station retailers and their suppliers (J)	Total	UK railway system's direct and staff impacts (A+H)	UK rail supply sector's total impact (B-E +I)	Total impact of UK station retailers and caterers (F+G+J)	Total
Manufacture of transport equipment	0.32	0.00	0.01	0.00	0.01	0.00	0.33	0.00	0.33
Energy-related production & utilities	0.13	0.05	0.09	0.01	0.14	0.05	0.21	0.02	0.27
All other goods production	0.30	0.06	0.12	0.01	0.19	0.06	0.34	0.09	0.49
Repair & installation of machinery	0.08	0.00	0.01	0.00	0.01	0.00	0.09	0.00	0.09
Construction	1.48	0.05	0.10	0.01	0.17	0.05	1.56	0.03	1.64
Transport services	3.99	0.04	0.08	0.01	0.13	3.60	0.50	0.02	4.11
Rental & leasing services	0.47	0.01	0.02	0.00	0.04	0.01	0.49	0.00	0.51
Other business support services	0.10	0.02	0.04	0.00	0.06	0.02	0.13	0.01	0.16
Information & communication	0.26	0.05	0.10	0.01	0.16	0.05	0.35	0.02	0.42
Financial & real estate services	0.21	0.13	0.24	0.02	0.39	0.13	0.43	0.04	0.60
Professional services	0.37	0.05	0.09	0.01	0.15	0.05	0.44	0.03	0.51
Retail & wholesale services	0.37	0.20	0.39	0.04	0.63	0.20	0.58	0.22	1.01
Food & hotel services	0.23	0.08	0.15	0.02	0.25	0.08	0.16	0.24	0.48
Other services	0.11	0.09	0.17	0.02	0.27	0.09	0.26	0.03	0.38
<b>Total</b>	<b>8.43</b>	<b>0.84</b>	<b>1.59</b>	<b>0.16</b>	<b>2.59</b>	<b>4.40</b>	<b>5.89</b>	<b>0.74</b>	<b>11.02</b>
<b>Employers' national insurance</b>	1.74	0.12	0.23	0.02	0.38	1.02	1.02	0.09	2.12
<b>Corporation tax; business rates</b>	0.91	0.16	0.29	0.03	0.48	0.28	0.98	0.13	1.39
<b>Taxes on business purchases</b>	0.86	0.09	0.18	0.02	0.29	0.34	0.72	0.08	1.15
<b>Taxes on workers</b>	4.71	0.30	0.56	0.06	0.92	2.58	2.86	0.19	5.63
<b>Taxes on sales to consumers</b>	0.21	0.17	0.32	0.03	0.52	0.17	0.32	0.24	0.73

**Fig. 77. Sales or output by region**

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers and their supply chain	Total rail-related industries	Induced impacts	Total of all impacts
North East	0.52	1.00	0.07	1.59	0.50	2.09
North West	1.96	3.56	0.37	5.89	1.72	7.61
Yorkshire & H.	1.55	2.42	0.22	4.19	1.19	5.38
East Midlands	0.64	2.36	0.16	3.17	1.06	4.23
West Midlands	1.39	2.26	0.22	3.88	1.24	5.12
East	1.42	2.63	0.29	4.34	1.52	5.86
London	8.80	7.32	1.61	17.74	4.10	21.84
South East	3.16	4.24	0.47	7.87	2.63	10.49
South West	1.33	1.97	0.16	3.47	1.32	4.79
Wales	0.39	1.25	0.12	1.76	0.72	2.48
Scotland	1.58	2.02	0.24	3.83	1.22	5.06
Northern Ireland	0.18	0.58	0.06	0.82	0.36	1.18
UK	22.92	31.61	4.01	58.53	17.59	76.12

**Fig. 78. Gross value added by region**

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers and their supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total impact as % total regional GVA <sup>1</sup>
North East	0.26	0.50	0.03	0.79	0.24	1.02	1.97%
North West	0.99	1.64	0.14	2.78	0.81	3.59	2.18%
Yorkshire & H.	0.77	1.08	0.09	1.94	0.56	2.49	2.17%
East Midlands	0.31	1.12	0.06	1.50	0.50	2.00	1.95%
West Midlands	0.73	1.08	0.09	1.90	0.59	2.49	1.99%
East	0.70	1.28	0.12	2.09	0.74	2.84	1.86%
London	4.39	3.61	0.61	8.60	2.06	10.66	2.69%
South East	1.50	2.04	0.18	3.72	1.28	5.00	1.92%
South West	0.62	0.94	0.07	1.63	0.63	2.26	1.71%
Wales	0.18	0.57	0.05	0.81	0.33	1.14	1.95%
Scotland	0.76	0.94	0.09	1.79	0.58	2.37	1.78%
Northern Ireland	0.07	0.27	0.02	0.37	0.17	0.54	1.50%
UK	11.28	15.08	1.54	27.90	8.49	36.40	2.09%

<sup>1</sup> Share of total GVA including owner-occupied rent.

Fig. 79. Employment by region

Thousands of jobs, 2016 average	Railway system	Rail supply sector	Retailers, caterers and their supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total impact as % total regional jobs
North East	3.28	7.63	0.68	11.59	6.41	18.00	1.51%
North West	11.97	27.93	3.87	43.77	20.50	64.28	1.79%
Yorkshire & H.	9.04	20.90	2.58	32.52	14.90	47.43	1.72%
East Midlands	3.76	17.42	1.40	22.58	13.17	35.74	1.54%
West Midlands	9.11	21.41	2.94	33.46	15.70	49.15	1.72%
East	6.88	22.46	3.14	32.48	17.62	50.10	1.59%
London	35.41	47.36	15.77	98.53	32.25	130.78	2.29%
South East	15.14	34.64	4.86	54.65	26.62	81.27	1.65%
South West	8.01	17.42	1.64	27.07	15.95	43.03	1.46%
Wales	2.58	8.24	1.15	11.97	8.03	20.01	1.37%
Scotland	8.43	18.44	2.86	29.73	16.06	45.79	1.68%
Northern Ireland	0.90	5.05	0.66	6.61	4.88	11.48	1.33%
UK	114.50	248.91	41.56	404.97	192.09	597.06	1.73%

Fig. 80. Tax revenues by region

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers and their supply chain	Total rail-related industries	Induced impacts	Total of all impacts
North East	0.08	0.13	0.01	0.22	0.07	0.29
North West	0.28	0.48	0.05	0.80	0.25	1.05
Yorkshire & H.	0.21	0.32	0.03	0.56	0.16	0.72
East Midlands	0.09	0.31	0.02	0.42	0.15	0.57
West Midlands	0.19	0.28	0.03	0.49	0.18	0.67
East	0.21	0.35	0.04	0.60	0.22	0.82
London	1.56	1.12	0.28	2.96	0.67	3.62
South East	0.46	0.56	0.07	1.09	0.40	1.48
South West	0.18	0.25	0.02	0.45	0.19	0.63
Wales	0.05	0.17	0.01	0.24	0.10	0.34
Scotland	0.22	0.25	0.03	0.51	0.16	0.67
Northern Ireland	0.02	0.08	0.01	0.11	0.05	0.16
UK	3.56	4.30	0.58	8.43	2.59	11.02

Fig. 81. Sales or output by Local Enterprise Partnership

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts
Black Country	0.40	0.49	0.06	0.95	0.24	1.19
Buckinghamshire Thames Valley	0.07	0.22	0.02	0.31	0.15	0.46
Cheshire and Warrington	0.31	0.69	0.06	1.05	0.29	1.34
Coast to Capital	1.02	0.81	0.12	1.94	0.53	2.47
Cornwall and Isles of Scilly	0.10	0.15	0.01	0.27	0.12	0.38
Coventry and Warwickshire	0.14	0.46	0.03	0.63	0.22	0.85
Cumbria	0.16	0.19	0.03	0.38	0.13	0.51
Derby, Derbyshire, Nottingham and Nottinghamshire	0.44	1.37	0.08	1.89	0.47	2.35
Dorset	0.12	0.24	0.02	0.39	0.18	0.57
Enterprise M3	0.24	0.75	0.06	1.05	0.49	1.54
Gloucestershire	0.08	0.23	0.02	0.32	0.16	0.48
Greater Birmingham and Solihull	0.68	0.81	0.09	1.58	0.43	2.01
Greater Cambridge and Greater Peterborough	0.35	0.65	0.08	1.08	0.39	1.47
Greater Lincolnshire	0.15	0.38	0.04	0.57	0.23	0.80
Greater Manchester	0.74	1.39	0.14	2.27	0.68	2.95
Heart of the South West	0.36	0.48	0.05	0.89	0.38	1.27
Hertfordshire	0.34	0.56	0.06	0.96	0.33	1.30
Humber	0.16	0.39	0.04	0.60	0.22	0.82
Lancashire	0.25	0.57	0.07	0.88	0.32	1.20
Leeds City Region	0.98	1.28	0.13	2.39	0.68	3.07
Leicester and Leicestershire	0.06	0.51	0.04	0.61	0.25	0.86
Liverpool City Region	0.51	0.72	0.07	1.30	0.30	1.60
London	8.80	7.32	1.61	17.74	4.10	21.84
New Anglia	0.34	0.57	0.08	0.99	0.39	1.38
North East	0.46	0.78	0.05	1.29	0.37	1.67
Oxfordshire	0.14	0.32	0.03	0.49	0.20	0.70
Sheffield City Region	0.43	0.95	0.06	1.45	0.34	1.79
Solent	0.33	0.58	0.06	0.96	0.34	1.30
South East	1.43	1.77	0.20	3.40	0.98	4.38
South East Midlands	0.57	0.85	0.07	1.50	0.48	1.98
Stoke-on-Trent and Staffordshire	0.07	0.41	0.03	0.52	0.23	0.74
Swindon and Wiltshire	0.34	0.39	0.03	0.76	0.18	0.94
Tees Valley	0.07	0.21	0.02	0.29	0.13	0.42
Thames Valley Berkshire	0.38	0.55	0.06	0.98	0.34	1.33



Fig. 82. Sales or output by Local Enterprise Partnership (continued)

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts
The Marches	0.06	0.21	0.02	0.29	0.14	0.43
West of England	0.32	0.48	0.03	0.84	0.30	1.14
Worcestershire	0.07	0.19	0.02	0.28	0.13	0.40
York, North Yorkshire and East Riding	0.40	0.47	0.06	0.92	0.27	1.19
Total across LEPs	21.88	29.40	3.74	55.02	16.14	71.16
Of which: double-counting <sup>1</sup>	1.11	1.65	0.15	2.90	0.85	3.75
Total England	20.78	27.76	3.59	52.12	15.29	67.41
Wales	0.39	1.25	0.12	1.76	0.72	2.48
Scotland	1.58	2.02	0.24	3.83	1.22	5.06
Northern Ireland	0.18	0.58	0.06	0.82	0.36	1.18
Total UK	22.92	31.61	4.01	58.53	17.59	76.12

<sup>1</sup> Some local authority areas are allocated to two Local Enterprise Partnerships. In these cases, jobs and associated GVA are counted in both LEPs here, as they are in the official datasets.

Fig. 83. GVA by Local Enterprise Partnership

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total local impact as % total local GVA
Black Country	0.24	0.22	0.02	0.48	0.11	0.59	2.79%
Buckinghamshire Thames Valley	0.04	0.11	0.01	0.15	0.08	0.23	1.43%
Cheshire and Warrington	0.15	0.29	0.02	0.47	0.13	0.60	2.06%
Coast to Capital	0.47	0.39	0.05	0.90	0.26	1.16	2.23%
Cornwall and Isles of Scilly	0.05	0.07	0.01	0.12	0.06	0.18	1.74%
Coventry and Warwickshire	0.08	0.23	0.01	0.32	0.11	0.42	1.77%
Cumbria	0.08	0.09	0.01	0.18	0.06	0.24	2.06%
Derby, Derbyshire, Nottingham and Nottinghamshire	0.20	0.65	0.03	0.88	0.22	1.11	2.39%
Dorset	0.06	0.11	0.01	0.18	0.09	0.26	1.51%
Enterprise M3	0.12	0.37	0.02	0.51	0.24	0.75	1.34%
Gloucestershire	0.04	0.11	0.01	0.15	0.07	0.22	1.34%
Greater Birmingham and Solihull	0.32	0.40	0.03	0.75	0.21	0.97	2.08%
Greater Cambridge and Greater Peterborough	0.18	0.32	0.03	0.53	0.19	0.71	1.79%

Fig. 84. GVA by Local Enterprise Partnership (continued)

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total local impact as % total local GVA
Greater Lincolnshire	0.08	0.17	0.01	0.27	0.11	0.38	1.75%
Greater Manchester	0.39	0.67	0.05	1.11	0.32	1.43	2.29%
Heart of the South West	0.16	0.23	0.02	0.41	0.18	0.59	1.64%
Hertfordshire	0.16	0.28	0.03	0.47	0.17	0.64	1.80%
Humber	0.08	0.16	0.02	0.25	0.09	0.35	1.86%
Lancashire	0.13	0.27	0.03	0.42	0.15	0.57	1.88%
Leeds City Region	0.50	0.59	0.05	1.14	0.32	1.47	2.16%
Leicester and Leicestershire	0.03	0.25	0.01	0.29	0.12	0.41	1.72%
Liverpool City Region	0.24	0.33	0.03	0.60	0.15	0.75	2.42%
London	4.39	3.61	0.61	8.60	2.06	10.66	2.69%
New Anglia	0.16	0.28	0.03	0.47	0.19	0.66	1.77%
North East	0.23	0.39	0.02	0.64	0.18	0.82	2.11%
Oxfordshire	0.07	0.16	0.01	0.24	0.10	0.34	1.50%
Sheffield City Region	0.21	0.43	0.03	0.66	0.17	0.83	2.38%
Solent	0.15	0.26	0.02	0.43	0.16	0.59	2.36%
South East	0.64	0.83	0.08	1.55	0.48	2.03	2.26%
South East Midlands	0.32	0.41	0.03	0.76	0.24	0.99	1.88%
Stoke-on-Trent and Staffordshire	0.04	0.20	0.01	0.26	0.11	0.36	1.74%
Swindon and Wiltshire	0.16	0.19	0.01	0.36	0.09	0.44	2.44%
Tees Valley	0.03	0.10	0.01	0.14	0.06	0.20	1.54%
Thames Valley Berkshire	0.17	0.28	0.02	0.47	0.17	0.64	1.72%
The Marches	0.03	0.10	0.01	0.14	0.07	0.20	1.43%
West of England	0.16	0.24	0.01	0.41	0.15	0.56	1.67%
Worcestershire	0.03	0.09	0.01	0.13	0.06	0.19	1.56%
York, North Yorkshire and East Riding	0.21	0.21	0.02	0.45	0.13	0.58	2.25%
Total across LEPs	10.81	14.06	1.44	26.30	7.81	34.12	2.15%
Of which: double-counting	0.54	0.77	0.06	1.37	0.41	1.77	2.07%
Total England	10.27	13.29	1.38	24.94	7.41	32.35	2.16%
Wales	0.18	0.57	0.05	0.81	0.33	1.14	1.95%
Scotland	0.76	0.94	0.09	1.79	0.58	2.37	1.78%
Northern Ireland	0.07	0.27	0.02	0.37	0.17	0.54	1.50%
Total UK	11.28	15.08	1.54	27.90	8.49	36.40	2.09%

Fig. 85. Employment by Local Enterprise Partnership

Thousands of jobs, 2016 average	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total local impact as % total local GVA
Black Country	2.92	5.28	0.78	8.99	2.77	11.76	2.32%
Buckinghamshire Thames Valley	0.36	1.74	0.18	2.27	1.55	3.82	1.36%
Cheshire and Warrington	1.86	4.81	0.61	7.27	3.24	10.51	1.94%
Coast to Capital	4.76	6.99	1.32	13.07	5.41	18.48	1.84%
Cornwall and Isles of Scilly	0.62	1.30	0.14	2.07	1.60	3.67	1.53%
Coventry and Warwickshire	0.95	3.94	0.37	5.26	2.77	8.03	1.58%
Cumbria	0.97	1.73	0.33	3.03	1.65	4.68	1.79%
Derby, Derbyshire, Nottingham and Nottinghamshire	2.43	9.02	0.67	12.12	5.86	17.97	1.69%
Dorset	0.73	2.10	0.19	3.02	2.17	5.19	1.41%
Enterprise M3	1.20	5.85	0.56	7.61	4.91	12.52	1.42%
Gloucestershire	0.47	1.90	0.17	2.53	1.83	4.37	1.36%
Greater Birmingham and Solihull	4.11	7.75	1.23	13.09	5.69	18.78	1.79%
Greater Cambridge and Greater Peterborough	1.73	5.75	1.01	8.48	4.42	12.90	1.62%
Greater Lincolnshire	0.98	3.31	0.32	4.61	2.85	7.46	1.56%
Greater Manchester	4.64	11.62	1.50	17.75	7.95	25.70	1.83%
Heart of the South West	2.11	4.25	0.46	6.81	4.68	11.49	1.45%
Hertfordshire	1.62	5.36	0.73	7.72	3.98	11.69	1.66%
Humber	0.96	3.04	0.39	4.39	2.49	6.88	1.52%
Lancashire	1.55	4.54	0.61	6.69	3.90	10.60	1.52%
Leeds City Region	5.85	12.36	1.54	19.75	8.53	28.28	1.77%
Leicester and Leicestershire	0.36	3.82	0.29	4.47	3.03	7.50	1.40%
Liverpool City Region	2.95	5.24	0.83	9.02	3.77	12.80	1.87%
London	35.41	47.36	15.77	98.53	32.25	130.78	2.29%
New Anglia	1.59	4.76	0.77	7.12	4.52	11.64	1.48%
North East	2.85	5.96	0.54	9.34	4.85	14.19	1.63%
Oxfordshire	0.74	2.74	0.30	3.78	2.17	5.94	1.38%
Sheffield City Region	2.47	6.82	0.73	10.03	4.61	14.64	1.66%
Solent	1.54	4.29	0.54	6.37	3.30	9.66	1.55%
South East	6.56	12.58	2.05	21.19	10.30	31.49	1.66%
South East Midlands	3.74	9.61	0.74	14.09	6.14	20.23	1.88%
Stoke-on-Trent and Staffordshire	0.53	3.45	0.32	4.31	3.01	7.32	1.39%
Swindon and Wiltshire	2.06	3.19	0.31	5.56	2.14	7.70	2.13%

**Fig. 86. Employment by Local Enterprise Partnership (continued)**

Thousands of jobs, 2016 average	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts	Total local impact as % total local GVA
<b>Tees Valley</b>	<b>0.43</b>	<b>1.68</b>	<b>0.14</b>	<b>2.25</b>	<b>1.56</b>	<b>3.81</b>	<b>1.32%</b>
<b>Thames Valley Berkshire</b>	<b>1.75</b>	<b>4.50</b>	<b>0.60</b>	<b>6.84</b>	<b>3.32</b>	<b>10.16</b>	<b>1.67%</b>
<b>The Marches</b>	<b>0.38</b>	<b>1.82</b>	<b>0.22</b>	<b>2.41</b>	<b>1.82</b>	<b>4.24</b>	<b>1.33%</b>
<b>West of England</b>	<b>2.02</b>	<b>4.69</b>	<b>0.38</b>	<b>7.09</b>	<b>3.53</b>	<b>10.62</b>	<b>1.66%</b>
<b>Worcestershire</b>	<b>0.45</b>	<b>1.70</b>	<b>0.21</b>	<b>2.35</b>	<b>1.59</b>	<b>3.94</b>	<b>1.39%</b>
<b>York, North Yorkshire and East Riding</b>	<b>2.47</b>	<b>4.72</b>	<b>0.66</b>	<b>7.86</b>	<b>3.60</b>	<b>11.46</b>	<b>1.94%</b>
Total across LEPs	109.10	231.56	38.51	379.17	173.72	552.89	1.78%
Of which: double-counting	6.51	14.38	1.62	22.51	10.60	33.11	2.04%
<b>Total England</b>	<b>102.59</b>	<b>217.17</b>	<b>36.89</b>	<b>356.66</b>	<b>163.12</b>	<b>519.78</b>	<b>1.77%</b>
<b>Wales</b>	<b>2.58</b>	<b>8.24</b>	<b>1.15</b>	<b>11.97</b>	<b>8.03</b>	<b>20.01</b>	<b>1.37%</b>
<b>Scotland</b>	<b>8.43</b>	<b>18.44</b>	<b>2.86</b>	<b>29.73</b>	<b>16.06</b>	<b>45.79</b>	<b>1.68%</b>
<b>Northern Ireland</b>	<b>0.90</b>	<b>5.05</b>	<b>0.66</b>	<b>6.61</b>	<b>4.88</b>	<b>11.48</b>	<b>1.33%</b>
<b>Total UK</b>	<b>114.50</b>	<b>248.91</b>	<b>41.56</b>	<b>404.97</b>	<b>192.09</b>	<b>597.06</b>	<b>1.73%</b>

**Fig. 87. Tax revenues by Local Enterprise Partnership**

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts
<b>Black Country</b>	<b>0.05</b>	<b>0.05</b>	<b>0.01</b>	<b>0.11</b>	<b>0.03</b>	<b>0.15</b>
<b>Buckinghamshire Thames Valley</b>	<b>0.01</b>	<b>0.03</b>	<b>0.00</b>	<b>0.04</b>	<b>0.02</b>	<b>0.07</b>
<b>Cheshire and Warrington</b>	<b>0.04</b>	<b>0.10</b>	<b>0.01</b>	<b>0.15</b>	<b>0.04</b>	<b>0.19</b>
<b>Coast to Capital</b>	<b>0.15</b>	<b>0.11</b>	<b>0.02</b>	<b>0.27</b>	<b>0.08</b>	<b>0.35</b>
<b>Cornwall and Isles of Scilly</b>	<b>0.01</b>	<b>0.02</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.05</b>
<b>Coventry and Warwickshire</b>	<b>0.02</b>	<b>0.06</b>	<b>0.00</b>	<b>0.08</b>	<b>0.03</b>	<b>0.11</b>
<b>Cumbria</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>0.05</b>	<b>0.02</b>	<b>0.07</b>
<b>Derby, Derbyshire, Nottingham and Nottinghamshire</b>	<b>0.06</b>	<b>0.19</b>	<b>0.01</b>	<b>0.26</b>	<b>0.07</b>	<b>0.32</b>
<b>Dorset</b>	<b>0.02</b>	<b>0.03</b>	<b>0.00</b>	<b>0.05</b>	<b>0.03</b>	<b>0.08</b>
<b>Enterprise M3</b>	<b>0.03</b>	<b>0.10</b>	<b>0.01</b>	<b>0.14</b>	<b>0.07</b>	<b>0.22</b>
<b>Gloucestershire</b>	<b>0.01</b>	<b>0.03</b>	<b>0.00</b>	<b>0.04</b>	<b>0.02</b>	<b>0.06</b>
<b>Greater Birmingham and Solihull</b>	<b>0.09</b>	<b>0.10</b>	<b>0.01</b>	<b>0.21</b>	<b>0.06</b>	<b>0.27</b>
<b>Greater Cambridge and Greater Peterborough</b>	<b>0.05</b>	<b>0.08</b>	<b>0.01</b>	<b>0.15</b>	<b>0.06</b>	<b>0.20</b>

Fig. 88. Tax revenues by Local Enterprise Partnership (continued)

£ billion in 2016	Railway system	Rail supply sector	Retailers, caterers & supply chain	Total rail-related industries	Induced impacts	Total of all impacts
Greater Lincolnshire	0.02	0.05	0.00	0.07	0.03	0.11
Greater Manchester	0.10	0.18	0.02	0.31	0.10	0.40
Heart of the South West	0.05	0.06	0.01	0.11	0.05	0.17
Hertfordshire	0.05	0.07	0.01	0.13	0.05	0.18
Humber	0.02	0.05	0.00	0.08	0.03	0.10
Lancashire	0.03	0.07	0.01	0.12	0.05	0.16
Leeds City Region	0.13	0.16	0.02	0.31	0.09	0.41
Leicester and Leicestershire	0.01	0.07	0.00	0.08	0.03	0.11
Liverpool City Region	0.07	0.10	0.01	0.18	0.04	0.23
London	1.56	1.12	0.28	2.96	0.67	3.62
New Anglia	0.05	0.08	0.01	0.14	0.06	0.19
North East	0.07	0.10	0.01	0.18	0.05	0.23
Oxfordshire	0.02	0.01	0.00	0.03	0.01	0.04
Sheffield City Region	0.06	0.14	0.01	0.20	0.05	0.25
Solent	0.05	0.08	0.01	0.13	0.05	0.18
South East	0.21	0.25	0.03	0.49	0.15	0.64
South East Midlands	0.08	0.10	0.01	0.19	0.07	0.26
Stoke-on-Trent and Staffordshire	0.01	0.05	0.00	0.07	0.03	0.10
Swindon and Wiltshire	0.05	0.05	0.00	0.10	0.03	0.12
Tees Valley	0.01	0.03	0.00	0.04	0.02	0.06
Thames Valley Berkshire	0.05	0.07	0.01	0.14	0.05	0.19
The Marches	0.01	0.03	0.00	0.04	0.02	0.06
West of England	0.04	0.06	0.00	0.11	0.04	0.15
Worcestershire	0.01	0.02	0.00	0.04	0.02	0.05
York, North Yorkshire and East Riding	0.05	0.06	0.01	0.12	0.04	0.16
Total across LEPs	3.41	3.99	0.54	7.94	2.37	10.31
Of which: double-counting	0.15	0.19	0.02	0.36	0.09	0.45
Total England	3.26	3.80	0.53	7.58	2.28	9.86
Wales	0.05	0.17	0.01	0.24	0.10	0.34
Scotland	0.22	0.25	0.03	0.51	0.16	0.67
Northern Ireland	0.02	0.08	0.01	0.11	0.05	0.16
Total UK	3.56	4.30	0.58	8.43	2.59	11.02

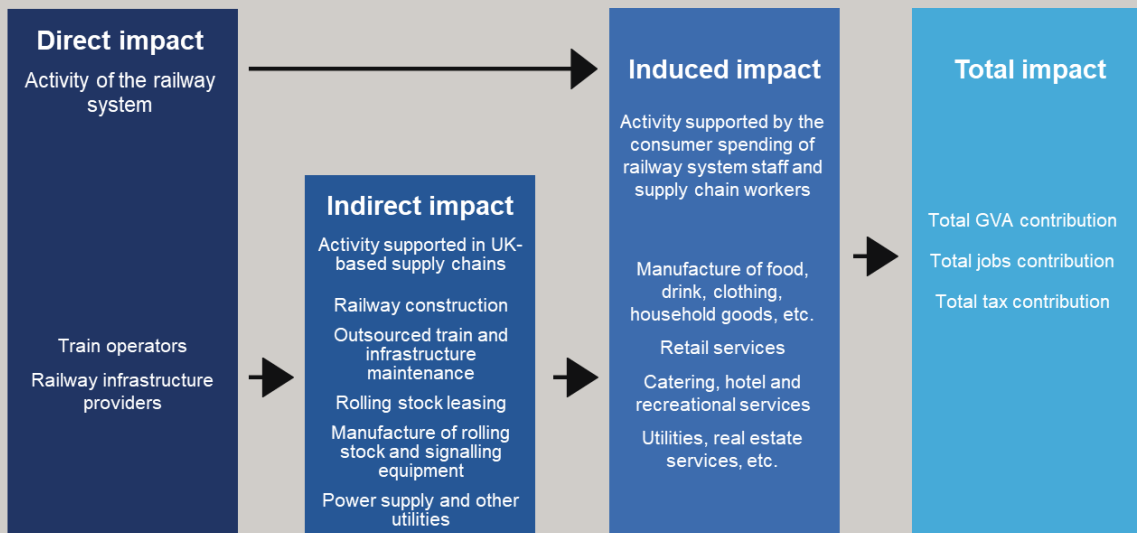
## APPENDIX 2: METHODOLOGY

### OVERALL APPROACH

This study has taken a broad approach to the economic impact of the UK rail sector. As well as train operators and infrastructure providers (which we label collectively as the ‘railway system’), it also covers the entire UK supply chain to those businesses, exports of rail-specific goods and services, the activities of retailers and caterers at railway stations, and the supply chains behind those exporting and retailing activities. The additional support provided to UK-based activity, as a result of workers in these sectors spending their wages, is also assessed.

Typically, an economic impact study considers three standard and distinct channels of impact, namely the ‘direct’ (sector’s own), ‘indirect’ (supply chain) and ‘induced’ (employee spending) channels. For example, a study focused on the total contribution to the UK economy of the UK railway system alone would be as illustrated below.

Fig. 89. A standard economic impact assessment

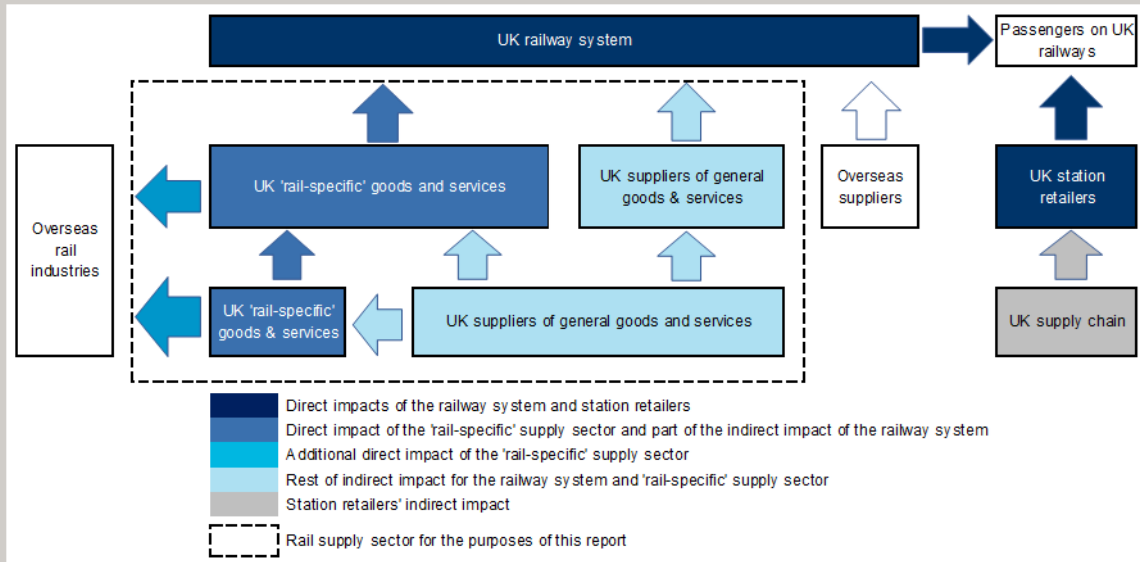


However, for this study, centring on the impact of railway operators *and* rail industry suppliers, the approach is inevitably more complicated. The diagram below illustrates the various direct and indirect impacts that need to be covered. The ‘indirect’ impact of the UK railway system is the equal to the ‘direct’ impact of the entire domestic supply chain to that system—excluding exported supplies but including goods and services of all types, whether clearly rail-related or not.

There is no clearly agreed definition of the ‘rail supply sector’. In principle, it could either be taken to include the entire UK supply chain for the UK railway system, plus rail-related exports, or instead cover only ‘rail-specific’ products, i.e. those specifically tailored for railway use. However, even if a broad definition of the latter could be agreed in principle, it would be difficult to come up with a precise definition that aligned to the ‘standard industrial classification’ underpinning official statistics. For example, rail-related consultancy work is not identified separately in official datasets on activity, and even if it were, work of this nature undertaken by firms engaged in a wider range of consultancy activities might or might not be captured as such.

Another possible definition of the direct impact of the 'rail supply sector', that it should cover only direct suppliers to the railway system (i.e. the 'first round of indirect' from the railway system's perspective), may be useful. But it is not completely satisfactory as it excludes some activities that are very clearly rail-specific. Most notably, it excludes a large part of the rolling stock manufacturing sector, as many of their sales are to the rolling stock leasing companies, who in turn lease those trains to the operating companies.

Fig. 90. Study coverage with direct and indirect channels of impact



Consequently, we have chosen to take a broad definition of the rail supply sector, to include the entire UK supply chain of the UK railway system, as well as exports of rail-related products and the UK supply chain for those activities. We do not separate out 'direct' and 'indirect' channels for the rail supply sector as such, although we do present separate results for direct suppliers to the UK railway system, and their suppliers in turn.

In total, we therefore identify seven direct and indirect channels separately, namely (a) the UK railway system's direct impact, (b) direct suppliers to that system, (c) their UK supply chain, (d) rail-related exports, (e) the UK supply chain for those exports, (f) station retailers' and caterers' direct impact, and (g) their UK supply chain. The UK 'rail supply sector' encompasses strands (b)-(e).

### MEASURES OF ECONOMIC IMPACT

Four measures of economic impact are set out in the results, namely the value of sales or output, gross value added (GVA), employment, and tax revenues generated. The diagram below shows (in a simplistic way) how sales, output and GVA relate to each other, and to other economic concepts including gross domestic product (GDP).

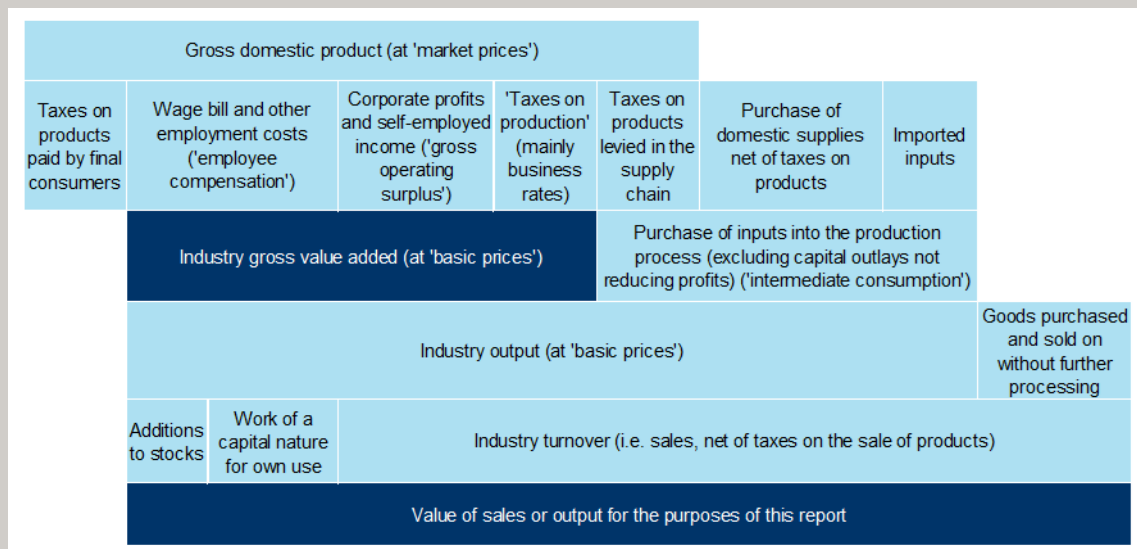
Gross value added is the key measure of an industry's contribution to the output of the wider economy. It is the sum of three components, namely:

- Employee compensation, including wages and salaries before tax, employers' national insurance and pension contributions, and other employee benefits.

- Gross operating surplus, i.e. corporate profits and self-employed income, before interest payments, taxes on that income, capital depreciation and amortisation.
- Taxes deemed to be levied on ‘production’ but not on ‘products’, comprising business rates, vehicle excise duty paid by firms, and a few other more minor levies. (This element is only of modest significance.)

GVA differs from GDP only by being measured at ‘basic prices’, i.e. excluding taxes on sales and therefore reflecting the price received by the producer, rather than being valued at the tax-inclusive ‘market price’ paid by the purchaser.

Fig. 91. **Economic concepts used**



An industry’s GVA can also be measured as the difference between its ‘output’ and its purchases of inputs, i.e. purchases of goods and services used up during the production process (‘intermediate consumption’, or ‘procurement’). Output is also measured at ‘basic prices’, though it should be noted that while this excludes taxes levied on an industry’s sales, it does not net out taxes (such as fuel duties) built into the cost of that industry’s inputs

For a typical private sector industry, net-of-VAT turnover can usually be used as a proxy for output, and total purchases as a proxy for purchases of inputs, with GVA calculated as the difference between the two. However, for the present study two nuances are significant:

- Turnover includes some receipts not reflecting output. This includes the value of goods sold on without further processing, which is significant for retailers.
- Output includes the value of some work not reflected in turnover. This includes work of a capital nature for the business’s own use, which is significant for Network Rail.

In fact as Network Rail is classified to the government sector, turnover is irrelevant. GVA is taken to be the sum of employment costs—including the cost of new capitalised work—and depreciation in the value of the pre-existing capital stock. Output is the sum of this GVA and procurement.



For the purposes of this study, references to sales or output should therefore be taken to include all sales, including of goods sold on without further processing, and all output, whether reflected in sales or not. The GVA of each sector is then equal to that value, minus the total value of all (non-capital) purchases, including purchases of goods for resale.

Employment is measured on a headcount basis, using the average for the year. Workers are allocated to regions and constituencies of the basis of their registered place of work, which will normally be their actual place of work, not, for example, their employer's national headquarters.

In principle, tax impacts include all taxes associated with the sector's activity, including taxes borne by both businesses and workers (including self-employed individuals in the supply chains), and sales taxes collected from consumers and passed on to the authorities. For presentational purposes, they are split into five groups, namely:

- Employers' national insurance.
- Corporation tax and business rates. This category also includes other, more minor taxes on production.
- Taxes on the purchase of business supplies. This includes all taxes on products allocated to 'intermediate consumption' rather than 'final consumption' in the national accounts, and will include fuel duties, green-type levies, and irrecoverable VAT built into the price of those supplies. Reclaimed VAT is excluded.
- Taxes on workers. This includes income tax and national insurance contributions paid by both employees and self-employed individuals, due to their work in the sectors covered.
- Taxes on sales to final consumers, including VAT and various excise duties.

In the industry breakdown of the results, income tax, national insurance, corporation tax and business rates are allocated to the sector of activity, and taxes on business supplies to the sector of the purchaser. Taxes on sales to consumers are estimated only for station retailers and caterers, and for the induced impacts, but not for the railway system or its suppliers, as no VAT is charged on passenger rail transport. For station retailers, the total sales tax take is allocated to the station-based business making the final sale. For induced impacts, sales taxes are allocated across the range of UK supplying industries, taking into account effective tax rates by product type and the industry's share of induced GVA.

#### **DATASETS USED**

As far as possible datasets for calendar year 2016 were used. Where that was not available—for example where the latest data related to 2015, or to financial years such as 2015-16 or 2016-17—appropriate adjustments were made to arrive at estimates for calendar year 2016. The following datasets and information sources were used in the estimation of the sales, GVA, jobs and tax impacts, where 'ONS' signifies the Office for National Statistics:

- The ONS Business Register Employment Survey (**BRES**), covering jobs by industry at a very detailed level. BRES captures employee jobs and working proprietors in registered businesses, but does not capture other self-employment. For Great Britain, jobs for each detailed industry are available on a constituency-by-constituency basis.

- The version of BRES published by the Northern Ireland Statistics and Research Agency (**NISRA**), which includes data on a constituency-by-constituency basis for Northern Ireland, for employee jobs for more broadly-defined industries.
- The ONS **low-level GDP dataset**, covering GVA by industry.
- The ONS Annual Business Survey (**ABS**), covering turnover and purchases of goods and services, and approximate measures of output and GVA, by industry.
- The ONS **Regional Accounts**, covering GVA by region and industry.
- The ONS **workforce jobs** dataset, including jobs by region and broad industrial sector. This dataset covers all employee and self-employed jobs.
- The ONS '**input-output table**'. This is a large table showing transactions between UK domestic industries in a given year, together with details of sales to final consumers and the make-up of each sector's output in terms of GVA components, domestic supplies at basic prices, taxes on products purchased, and imports purchased. These tables are published on an irregular and delayed basis. The table used is the latest, published in March 2017 but relating to the year 2013. Only ratios implicit in the table, not absolute values, are used in the estimation process.
- The ONS '**supply and use**' table, showing how the supply of each type of product is split between domestic production at basic prices, imports, and taxes on products.
- The ONS '**Blue Book**', which includes data on components of income and outlays, including tax payments, by institutional sector (households, corporations, government), amongst much else.
- The ONS Annual Survey of Hours and Earnings (**ASHE**), covering wages by industry and region.
- The ONS **capital expenditure** dataset, covering capital outlays by industry and broad asset type.
- The ONS **UK trade in goods** ('by classification of product by activity') dataset.
- '**Northern Ireland Transport Statistics 2016-17**', published by the Northern Ireland Department for Infrastructure and including data on the number of rail passenger journeys in Northern Ireland.
- **Data provided by Network Rail** on the aggregate turnover of retailers and caterers on the stations that it operates, together with employment data for the caterers
- Data on station retailers' turnover provided by **a major train operating company** in charge of a large number of smaller stations.
- **Station usage estimates** published by the Office of Rail and Road (ORR).
- **Company Reports** for Network Rail, Transport for London (TfL), and the rolling stock leasing companies.
- The **PRODCOM** dataset published by Eurostat, covering the value of production of manufactured goods, separately for domestic sale and export, by detailed product type. Values were translated by Oxford Economics from euros into sterling using the average exchange rate for 2016.
- HM Treasury 'Overview of Tax Legislation and Rates' (**OOTLAR**).
- HM Revenue and Customs '**Corporation Tax Statistics**' publication.

The GDP, workforce jobs, BRES, ABS and ASHE datasets allocate the turnover, GVA and/or jobs of each business unit to an industry, based on that unit's single most important activity. By contrast, the UK trade in goods and PRODCOM datasets are concerned with actual product types.

In many of these datasets, businesses are classified to standard industries according to the latest UK 'standard industrial classification' ('SIC 2007'). An example of part of this system is shown below.

Fig. 92. **Part of the latest UK standard industrial classification (SIC 2007)**

Section H: Transportation and storage
Division 49: Land transport and transport via pipelines
Group 49.1: Passenger rail transport, interurban
Group 49.2: Freight rail transport
Group 49.3: Other passenger land transport
Class 49.31 Urban and suburban passenger land transport
Sub-class 49.31/1: Urban, suburban or metropolitan area passenger railway transportation by underground, metro and similar systems

### RAILWAY SYSTEM'S DIRECT IMPACT

For the purposes of this report, the railway system is taken to include:

- All providers of train services, including the Train Operating Companies (TOCs) and Freight Operating Companies (FOCs) running mainline services in Great Britain, London Underground and other 'metro' systems, light railway systems, and Northern Ireland Railways. More precisely, the operations counted are those classified to SIC codes 49.1, 49.2, and 49.31/1, as shown in the figure above.
- Network Rail. For the purposes of industrial statistics, Network Rail is classified to the separate 'service activities incidental to land transport' class (SIC 52.21), which also covers a range of other rail and non-rail services.

For all train service providers, direct jobs were taken from BRES for 2016, which includes data for the three SIC categories required on a constituency-by-constituency basis.

For interurban and freight train services, the combined GVA measure was taken straight from the low-level GDP dataset. This GVA was then allocated across the UK's 12 statistical regions taking into account the known distribution of jobs, and differentials in GVA-per-job by region, with this in turn based on the Regional Accounts and workforce jobs data for the wider 'transport' sector (SIC section H). Within each region, GVA was then allocated to constituencies in proportion to the distribution of jobs.

Total purchases for these two sub-sectors were taken from the ABS, with the value of sales and other work taken to be the sum of GVA and purchases made. Sales were then allocated across the regions and constituencies on the assumption that the split in industry sales revenues, between the sector's own GVA and its purchases from other sectors, does not vary by location.

Turnover, GVA and procurement for London's urban rail networks were estimated using information in TfL's latest company report, with estimates for other metro systems based on that, taking into account the regional pattern of GVA per job.

For Network Rail, values were based on details in the company reports for the years ending March 2016 and March 2017.

### **UK SUPPLY CHAIN TO UK RAILWAY OPERATORS**

The indirect impact of the train operators and Network Rail was then worked out using the standard statistical technique for economic impact assessments, but with adjustments to take into account the knock-on impact of capital outlays which would not otherwise be captured by that process.

Firstly, the estimate of total non-capital purchases by interurban and freight train operators was taken, and split between imports, taxes on product and domestic supplies at basic prices, with the last category split by industry of supplier, in proportion to the pattern of spending found for the industry in the input-output table. Purchases by metro systems were assumed to follow the same pattern, and added in. Network Rail's procurement was then added, but assumed to follow the pattern for SIC 52 (support activities for transportation). Network Rail's income from the TOCs and FOCs was then sourced from its Company Report and deducted, to eliminate double counting and arrive at the pattern of procurement from other sectors by the railway system in aggregate.

Capital spending by the operators was then added. Capital spending by operators classified to SIC 49.1-49.2, by type of asset for 2015, was taken from the official capital spending dataset, and adjusted to 2016 based on the growth of sector GVA. Total spending by asset was adjusted to exclude imports and taxes, using ratios implicit in the input-output table, and allocated by Oxford Economics to UK industries of supplier.

Total capital spending by Network Rail was then based on the company reports, with the company's own capitalised work excluded and an allocation by asset type and UK sector of supplier assumed, based on data available for SIC 52 and input-output table ratios. Capital spending by London metro operations was estimated using the TfL Company Report as the starting point. Here, the pattern of capital spending by asset type was assumed to be the same as that for Network Rail, the mainline train operators, and rolling stock leasing companies combined.

The pattern of total net procurement and capital purchases from other UK sectors represents the output of the first round of UK suppliers to the UK railway system. This was then combined with ratios implicit in the input-output table to arrive at output by sector of supplier for all subsequent rounds of the UK-based supply chain. But one further adjustment had to be made here, to capture the impact on the manufacture of rolling stock of capital expenditure by the rolling stock leasing companies, which form part of the first round of suppliers to the rail operators. To do this, the output of the 'other transport equipment' sector (SIC 30.2 + 30.4 + 30.9) in the 'second round' of the UK supply chain was adjusted upwards, so that total output for that sector, across all rounds of the supply chain to the UK railway system, matched that for non-export output found by the 'bottom-up' statistical exercise (see 'rail-specific sectors' below).

GVA-to-output ratios from the UK input-output table were then applied to arrive at GVA by sector, separately for the first round of suppliers and remainder of the UK supply chain. GVA-to-jobs ratios were then estimated for each UK industry, based on the low-level GDP, workforce jobs and BRES datasets, allowing estimates for the number of UK supply chain jobs to be made. This will include some self-employed as well as employee jobs. A few GVA-to-

jobs and GVA-to-output ratios were adjusted to reflect the more specific nature of the work involved, based on the research into rail-specific activities.

### **RAIL-SPECIFIC SECTORS**

The research also looked at datasets relating to specific, clearly-rail related activities. This was done for two reasons: to act as a check on the initial estimates for the domestic UK supply chain, as found using the ‘top-down’ methodology described above, and to estimate values for rail-specific exports.

Four types of rail-specific activity could be estimated using available information from the ABS, low-level GDP dataset, BRES, PRODCOM, the UK trade in goods dataset, and the annual company reports of the rolling stock leasing companies, namely:

- **Rail transport equipment** (SIC 30.2), mainly comprising rolling stock, working parts for locomotives, and signalling equipment.
- **Railway construction** (SIC 42.12).
- **Manufactured goods for the railways, other than classified as rail transport equipment.** A wide range of rail-related goods classified to the ‘metal products’, ‘plastics products’, ‘wooden products’ and ‘mineral products’ parts of the manufacturing sector was identified.
- **Rolling stock leasing companies’ activities** (part of SIC 77.39).

This data turned out to be broadly consistent with the top-down approach, with the ‘rail-specific’ activity identified sitting within the total supply chain activity found for corresponding industries in the input-output table, which were generally wider than the ‘rail-specific’ activity captured. The one exception to this was, as expected, manufacture of rail transport equipment. In this case, more production was found than suggested by the initial top-down exercise, and this provided the basis for the upward adjustment required to capture the impact of purchases of rolling stock by the leasing companies.

Exports of rail transport equipment were sourced from the UK trade in goods dataset, and exports of other rail-specific goods from the EU PRODCOM dataset. An insignificant amount of exports of rolling stock leasing activity was indicated by the relevant company reports.

We also looked at two further sectors, as follows:

**Support services for rail transport (other than Network Rail)** (part of SIC 52.21). This covers a wide range of activities, such as some maintenance (although repair and reconditioning services are classified to ‘repair and installation of machinery’, SIC 33). In this case, the ‘first round’ of supplies classified to SIC 52 (transport support services), as found in the top-down estimation process, was assumed to be rail-specific in nature, and taken to represent output for domestic purposes. An allowance for exports of rail-related support services was also made, based on the ratio of exports to domestic production for the overall ‘support services for transport’ industry in the input-output table.

**Repair and reconditioning of railway rolling stock, locomotives and signalling equipment** (part of SIC 33.17). Here, we counted the ‘first round’ of repair services supplied to the UK railway system as being ‘rail-specific’ output for domestic purposes. This will, however, exclude any work of this kind outsourced by the rolling stock leasing companies. An allowance for exports was also made here, based on the relevant ratio in the input-output table, but this was not significant.

## **TOTAL UK RAIL SUPPLY SECTOR**

Activity in the total UK rail supply chain was taken to be the sum of the supply chain to the UK railway system, exports of rail-related products, and activity supported in the UK export-related supply chain. To estimate values for the last category, the overall GVA-to-output ratio found for each rail-specific sector was assumed to apply equally to production for domestic purposes and production for exports. Total procurement for each sector was taken to be the difference between exports and export-supported GVA, and this was used to derive the supply chain impacts in the same way as for the UK railway system's UK supply chain.

To arrive at the split by constituency and region, UK jobs were split into 25 industries, with the rail-specific sectors separated from more general sectors. Jobs for each of these sectors were then split between Great Britain and Northern Ireland in accordance with the split in jobs for found in BRES, with jobs for Great Britain then split by constituency in proportion to the relevant industry as identified in the detailed BRES dataset. Jobs for Northern Ireland were split into constituencies based on the split for broad industries in the NISRA BRES dataset.

These jobs were then summed up to arrive at totals for the regions. The totals for GVA for each industry were then split by region, taking into account the regional by-industry GVA-per-job differentials implicit in the Regional Accounts and workforce jobs datasets. Total output was split by region on the assumption that the GVA-to-output ratio, for each separate industry, did not vary by location. Within each region, output and GVA were then split into constituencies in proportion to the split in jobs.

## **STATION RETAILERS AND CATERERS AND THEIR SUPPLY CHAIN**

Each railway station is managed either by Network Rail (the largest 18), or by one of the TOCs. Network Rail provided details of turnover for 17 stations, on a station-by-station basis and by category of activity (goods retailers by type / food & beverage serving / retail services).

Oxford Economics allocated turnover between the goods retailers, food & beverage service providers, and (for retail services) the 'repair of personal and household goods' sector. For the second and third of these categories, turnover was then split between GVA components, imports, taxes on products, and basic price purchases from domestic suppliers, by industry of supplier, in accordance with the pattern in the input-output table. Retailers' turnover was first split between goods for resale and output, based on the ratio in the ABS, with output then split between GVA components, etc, based on the input-output table. Goods for resale were allocated to product type, taking the retail categories into account, then split between imports and domestic supplies using ratios in the supply and use table.

GVA was allocated to each station, and therefore region and constituency, on the assumption that the same turnover-to-GVA ratio applied throughout the UK (separately for each industry). For goods retailers and retail services, jobs were derived from the direct GVA estimate, based on GVA-to-jobs ratios for these UK sectors. For food and beverage services, actual employment numbers were provided by Network Rail. These jobs were then split by station, taking into account the regional differentials in GVA per job indicated by the Regional Accounts and workforce jobs datasets.

Turnover was then estimated for every other mainline station in Great Britain, taking into account the ORR passenger numbers dataset, and the positive relationship indicated by the Network Rail dataset between passenger numbers and spending per passenger at each station. These estimates were subsequently checked against datasets supplied by a major train operating company, running numerous smaller stations, and found to be reasonable. The

estimation process was then extended to Northern Ireland, taking into account total rail passenger numbers from 'Northern Ireland Transport Statistics' and approximate station size.

Each station was allocated to a constituency and region, and it was assumed that the same GVA-to-sales ratio found for stations run by Network Rail applied across the UK. Jobs were derived from GVA based on the region-by-region ratios used for Network Rail-run stations.

The value of UK-wide purchases of domestic supplies was then calculated as the difference between turnover and GVA, and allocated to sectors of supply in line with the pattern worked out for Network Rail-run stations. National totals for indirect turnover, GVA and jobs, i.e. the activity of the retailers' UK-based supply chain, on an industry-by-industry basis, were worked out from there. The allocation of jobs, GVA and turnover to constituencies and regions was worked out from there in the same way as for the rail supply industry.

### **INDUCED IMPACTS**

Average wages were taken for the employees of interurban and freight rail services from ASHE, weighted together by the number of jobs, and multiplied by the number of staff to arrive at the average wage bill for that group. The wage bill for employees of metro systems was estimated taking into account information in TfL's report and the ASHE dataset, while the wage bill for Network Rail employees was taken from that company's report. The three bills were combined, and adjusted to arrive at the total spending power of railway system employees by allowing for income tax, national insurance and pension contributions, taking into account tax rates and thresholds from OOTLAR and indicators of pension contributions in ASHE.

This estimated spending was spread across imports, product taxes and domestic industries in proportion to the pattern for UK households in aggregate in the input-output table. The spending allocated to domestic industries represents the 'first round' of induced output. This was combined with ratios implicit in the input-output table, including those relating to employee spending power and household spending, as well as transactions between industries, to arrive at total induced output across the whole UK-based supply chain. To do this the original industry-by-industry 'employee compensation' line in the input-output table was adjusted to reflect workers' spending power, with an upward adjustment to take into account self-employed income, and downward adjustments to reflect employers' and individuals' tax, NIC and pension payments. This adjustment was based on various ratios in the Blue Book.

Induced output relating to railway system's UK-based supply chain was worked out at the same time as that sector's indirect impact, by combining the industry's procurement with the appropriate ratios in the input-output table. Induced output relating to exports was calculated separately, taking into account both the exporters' UK-sourced procurement (to assess induced output supported by staff in the supply chain) and the spending power of their own staff, with the latter derived mainly from average earnings figures in ASHE. The estimates relating to the UK supply chain and to exports were added together to arrive at the induced impact of the total rail supply sector. The induced output impact relating to retailers and caterers was then worked out in the same way as that for exporters.

Induced GVA and jobs for each of the railway system, railway supply, and retailing sectors were worked out from there based on the relevant industry-by-industry ratios for the UK economy. It should be noted that the 'staff impact' attributed to the railway operators in this report relates only to spending by their own staff. The total induced impact of the rail operators also includes activity supported by the spending of staff in their UK supply chain, i.e. the vast bulk of the rail supply sector's own induced impact.

## TAX IMPACTS

For each constituency, the GVA and jobs results were gathered for:

- The train and metro operators.
- National Rail.
- Station goods retailers.
- Station food and beverage service providers.
- Station retail service providers.
- The various separate channels of supply chain and induced impacts, split into the 25 separate industries.

Using the relevant ratios in the input-output table, each sector's GVA was then split between taxes on production, employee compensation, and the gross operating surplus, with taxes levied on products in the supply chain calculated on top of that. Employee compensation was then split between employers' national insurance payments, employers' pension contributions, and the remaining wage bill, taking into account ratios in the Blue Book. Average employee wages were then calculated for each constituency-by-sector cell, by dividing the estimated wage bill by the estimated number of jobs.

Self-employed income was then estimated taking into account by-industry self-employed-to-employee jobs ratios in the workforce jobs dataset, on the assumption that self-employed income per head was in line with the average wage for each industry in each constituency. This income was deducted from the gross operating surplus to arrive at corporate profits.

Corporation tax was then calculated by multiplying corporate profits with the effective corporation tax rate for each industry, with the latter derived by Oxford Economics from information in HMRC's Corporation Tax Statistics publication. Income tax and individuals' NICs were calculated for employees and the self-employed, based on the average wage for each industry in each constituency and the applicable tax rates and thresholds.

These calculations covered four of the five groups of taxes, namely employers' national insurance; corporation tax and business rates; taxes on business supplies; and taxes on workers. The constituency tax estimates were summed to arrive at regional and UK totals.

The contribution of each sector to sales to final consumers, for the purposes of calculating consumer taxes, was then worked out. This was taken to be the turnover of retailers and caterers operating at the stations, and the contribution to total induced GVA of each of the 25 supplier industries in each of the three induced channels (i.e. those supported by railway operating staff, rail supply sector staff and retail-related staff respectively). The effective tax rates applied to each product group were then worked out, using information in the input-output and supply and use tables.

For all sectors other than station goods retailers, the effective tax rates were then applied to each sector's contribution to consumer sales, on a constituency-by-constituency basis. For station goods retailers, total turnover was allocated across the range of products sold, and the effective tax rates applied to those products.



**ALLOCATION TO LOCAL ENTERPRISE PARTNERSHIPS**

The BRES dataset was used to allocate jobs across LEPs in the same way that this dataset was used to allocate jobs to constituencies and regions, except that 'scaling up' factors were first applied to the jobs total for each industry, to reflect the 'double counting' of jobs in workplaces covered by two LEPs. Each LEP was allocated to the region deemed most appropriate, with GVA estimated using the GVA-to-jobs ratio for those regions, and sales or output estimated from there using the uniform ratios assumed to apply throughout the UK. In those instances where LEPs map onto regions in a precise manner, these estimates were adjusted as necessary. Other results were also checked for broad consistency with the regional totals. Tax impacts were then allocated, using the tax-to-GVA ratios for each industry, separately for each tax type and channel of impact.



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