OXFORD ECONOMICS

THE ECONOMIC CONTRIBUTION OF UK RAIL

PUBLISHED 2021

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ABOUT RAILWAY INDUSTRY ASSOCIATION

Railway Industry Association
The voice of the UK rail supply community

Railway Industry Association is the national trade body for some 300 UK rail suppliers, with members representing a large proportion of the rail industry by turnover and reflecting a great diversity of disciplines within the rail sector. Membership comprises both large multinational companies and SMEs (around 60% of the membership), based right across the UK.

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TABLE OF CONTENTS

FOREWORD

DARREN CAPLAN, CHIEF EXECUTIVE, RAILWAY INDUSTRY ASSOCIATION (RIA)

The railway sector has always been a source of economic growth, jobs and investment for the UK. Not only does the railway network support passengers and freight users to get where they need to be, but it is the backbone of the economy, with a strong rail supply sector behind it.

This report shows that rail's impact grew even stronger in the year before the Coronavirus pandemic hit: in 2016, for every £1 worth of work on the railway system itself, £2.20 of income was generated elsewhere in the economy, whereas by 2019 this had grown to £2.50 of income generated. This means that not only is rail an important sector in its own right, but it is also crucial for UK plc more widely; and, pandemic notwithstanding, this importance was growing.

This study, The Economic Contribution of UK Rail, commissioned by the Railway Industry Association (RIA), provides independent analysis by Oxford Economics on the state of the sector in 2019. It is the second such study, the first one published in 2018 following evaluation of UK rail's economic contribution in 2016.

Of course, much has changed in the UK since 2019. The Coronavirus pandemic impacted almost all aspects of the economy. In rail, the various restrictions and lockdowns since March 2020 saw passenger numbers significantly reduce on the rail network, as Government guidance urged the public not to travel. Although, at the time of writing, passenger numbers had started to return significantly.

During the various lockdowns, rail played an essential role, helping key workers and goods travel around the country at a critical time, and supporting the economy when other sectors, through no fault of their own, were unable to function. 2020/2021 also saw the railway network being renewed, rail projects progressed, and new and refurbished rolling stock fleets built and developed, supported by strong leasing and asset management. The railway industry welcomed the support the UK Government and rail clients like Network Rail, HS2 and Transport for London provided the sector during those first 18 months since March 2020.

With restrictions, at the time of writing, easing and as more of the population are vaccinated against the virus, RIA is confident passenger numbers will return back to their long-term upwards trend. DfT figures in August 2021 show the number of journeys being made by train recovered to 60% of pre-pandemic levels, and this was before the expected autumn 'return to the workplace'. Even with the advent of flexible working, it is likely the majority of people who have the option to work remotely will still spend a significant amount of time in workplaces, meaning the return of commuting; and early indications are that very many more leisure journeys than previously are taking place in the evenings and at the country.

The indications are that rail will still be a vibrant transport mode, and historically, there is little actual evidence that – as with previous pandemics, wars, and economic crises – passenger numbers will not return to previously high and increasing levels. Indeed, both the 2021 Williams-Shapps Plan for Rail and the Government's Transport Decarbonisation Plan describe rail as the backbone of the transport system, the important role rail will play in reaching zero carbon emissions, and the potential for rail growth.

Given the data of this study is from 2019 – the latest date where detailed economic data is available – the impact of Coronavirus is not captured. This report instead shows a growing, vibrant sector before the pandemic hit in 2020 – one that had grown considerably since 2016 and which is supporting £43 billion in economic production (GVA), compared to £36.4 billion in 2016, 710,000 jobs, compared to

600,000, and £14 billion in tax revenue, compared to £11 billion. Vitally, this report demonstrates how, post-Coronavirus, the sector can play a similarly important role, particularly as the Government looks to catalyse an economic recovery as part of its 'Build Back Better' agenda.

Looking to the future, the final section of the report considers various scenarios by the National Infrastructure Commission for rail investment in the future. The report examines how these scenarios could boost jobs and investment in the sector too, showing that the more the Government invests in rail, the more UK plc gets out.

We hope this report is a useful contribution to the discussion on how rail can support the UK economy, providing not just railway jobs, investment and growth across the country, but also boosting UK plc more widely as we all seek to Build Back Better after the pandemic.

Yours sincerely,

Darren Caplan

Chief Executive, Railway Industry Association

EXECUTIVE SUMMARY

£42.9 billion

GVA contribution of the rail sector to the UK economy in 2019, taking the knock-on effects of wage payments and purchases of business supplies into account.

710,000

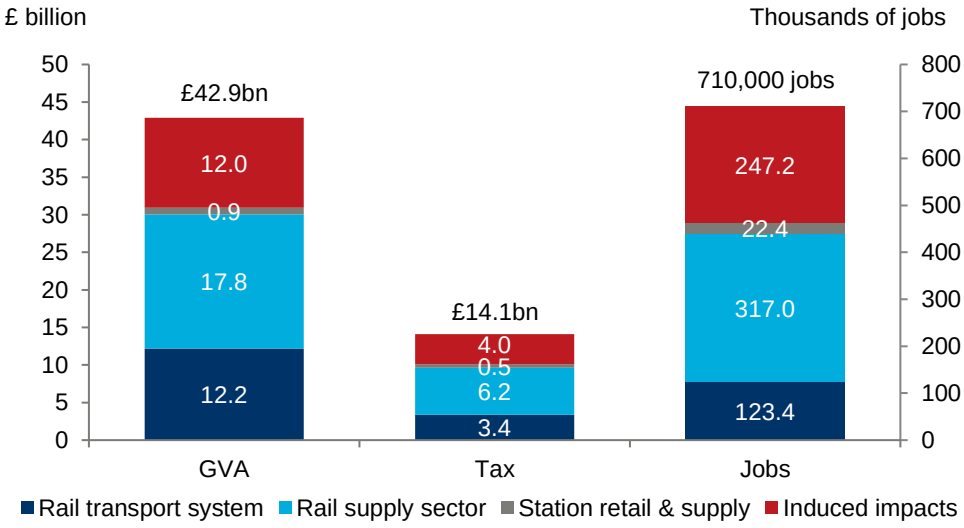
Total number of employee and self-employed jobs supported across the UK economy by this work.

This report sets out the economic 'footprint' of the UK rail sector in 2019, the most recent year of 'normal' economic conditions, unaffected by Covid-19. For these purposes, the sector includes the rail transport system, rail supply sector, and on-station retail activity. The footprint includes the activity of the sector itself, plus knock-on impacts on the economy due to the wage-funded spending of sector workers (the 'induced' impact), and purchases of supplies by the on-station outlets. The study updates a previous report concerned with the same economic footprint, published in 2018 and relating to 2016.

THE OVERALL ECONOMIC FOOTPRINT IN 2019

It is now estimated that, in 2019, the sector contributed £42.9 billion to the UK economy in terms of GVA, taking all of these activities and impacts together (see Fig. 1).[1] This was associated with 710,000 (employee and self-employed) jobs, and £14.1 billion in taxation. As the £42.9 billion total footprint is 3.5 times the £12.2 billion GVA of the railway system itself, we can say that, for every £1 worth of work on the network itself, a further £2.50 of income is generated in associated industries, their suppliers, and firms supported by railway workers' wage-funded spending.

Fig. 1. Total GVA, jobs and tax footprint by sector and channel of impact



Source: Oxford Economics

These key figures are higher than in the previous study, when the total GVA footprint was put at £36.4 billion, and the total jobs footprint at 600,000, with every £1 of GVA on the railways supporting £2.20 of GVA elsewhere. This reflects a combination of real (inflation-adjusted) growth between 2016 and 2019, modest increases in prices and costs, and the use of a more refined methodology suggesting that the previous results were under-estimates.

[1] GVA, or Gross Value Added, is the standard measure of a sector's contribution to an economy's output of goods and services. It is similar to Gross Domestic Product (GDP), except that GVA is measured net of taxes on products (such as VAT and excise duties), while GDP is valued at purchasers' prices, including those taxes.

£2.50

GVA supported elsewhere, in the rail supply sector and wider UK economy, by every £1 of GVA in the UK railway system itself.

However, some of the elements contributing to the overall picture have been revised downwards, with rail-related exports put at £600 million for 2019, versus the previous estimate of £800 million for 2016.

The **rail transport system** comprises Network Rail, mainline passenger and freight train operations in Great Britain, Northern Ireland Railways, and the London Underground and other urban 'metro' systems. This sector contributed £12.2 billion to the GVA total, which was sufficient to support just over 123,000 jobs, and some 3.4 billion of tax revenues.

The **rail supply sector** includes all supplies of goods, services, and construction work to the UK rail transport system, exports of rail-related goods and services, and the entire UK-based supply chain helping to support that output. In 2019, this sector is estimated to have made a £17.8 billion GVA contribution, associated with 317,000 jobs, and £6.2 billion of tax revenues.

On-station retailers and caterers, and their UK-based supply chain, are now estimated to have had a £0.9 billion GVA contribution in 2019, supporting more than 22,000 jobs, and £0.5 billion in taxes. Finally, **induced impacts** contributed £12.0 billion of GVA, 247,000 jobs, and £4.0 billion of taxes.

To put these figures in context, the total number of jobs supported in these ways is greater than the number of individuals employed in any of the UK's local authority areas, with the single exception of the City of Westminster. The overall tax contribution would be sufficient to cover almost 80% of total public expenditure on the railways. And the GVA of the rail transport system and rail supply sector (excluding retail and induced impacts) is greater than that generated by the legal sector, the transport machinery manufacturing sector, and the electricity and gas supply industry.

£14.1bn

Total tax revenues generated for the UK authorities as a result of activity in, and spending by, the UK rail sector.

Equivalent to nearly 80% of total public spending on rail transport in the same year.

The results have once again been estimated on a region-by-region and constituency-by-constituency basis. Compared to the geographical distribution of economy-wide GVA and jobs, rail transport system activity is more focused on London, reflecting the importance of several major rail terminals located in the capital, and the heavy use of the London Underground and other local rail services by commuters. But GVA and employment in the rail supply sector, and induced channel, are distributed much more evenly around the country.

ADDITIONAL BENEFITS OF RAIL NOT CAPTURED IN THIS STUDY

It should be noted that, while the economic 'footprint' defined in this way captures an important dimension of the railways' contribution to the UK's economy and society, it does not provide the full picture by any means. The total value of rail services to rail travellers will be greater than the monetary cost to them (partly as a result of time savings compared with alternative travel means), but this so-called 'consumer surplus' is not reflected in these results.

Nor does the study attempt to value the benefits to the environment from the way in which rail travel draws individuals away from higher-polluting travel by road or air. And it does not extend to the potential impact of the railways' 'connectivity' on the UK economy's longer-term productivity growth potential.

+38%

GVA per job across the UK rail transport system and rail supply chain was £62,000 in 2019, some 38% above the national average.

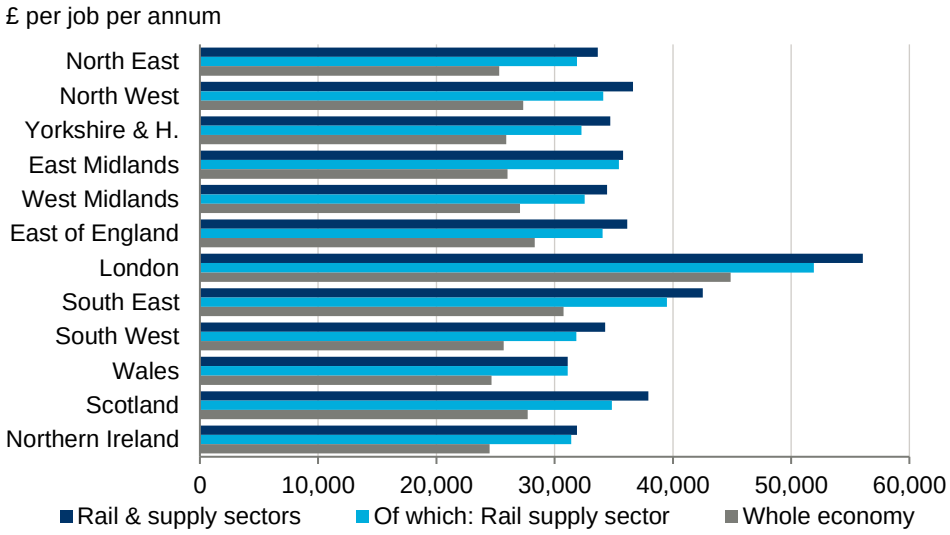
PRODUCTIVITY AND WAGES IN THE RAIL AND SUPPLY INDUSTRIES

The more refined methodology used this time has allowed us to make robust estimates of GVA per job (labour productivity), and wages per employee job, on a region-by-region basis. A key finding here is that productivity in each of the rail transport system and rail supply sectors is higher than the economy-wide average, in every one of the UK's 12 regions and countries. Nationally, across the rail and supply sectors together, the average GVA of £62,000 per job was 38% above the average across activities of all kinds.

For the rail transport system, above-average productivity partly reflects the London-focused regional pattern of activity, as well as the capital-intensive nature of the sector. But the skills and knowledge of the workforce must also be part of the explanation. For the rail supply sector, the regional pattern of activity, and overall capital intensity, are not that different to the UK average, leaving workforce skills as the only significant explanatory factor.

Associated with this, wages are also above the average, for both the rail transport system and rail supply sector, in every single region (see Fig. 2). Across the UK, the average wage of £41,200 was 36% above the average.

Fig. 2. Rail and supply sectors: Wages per employee job by region



Source: Oxford Economics

For both the rail transport system and rail supply sector, GVA per job and wages per employee job are higher than the economy-wide average in every one of the 12 UK regions and countries.

FUTURE SCENARIOS

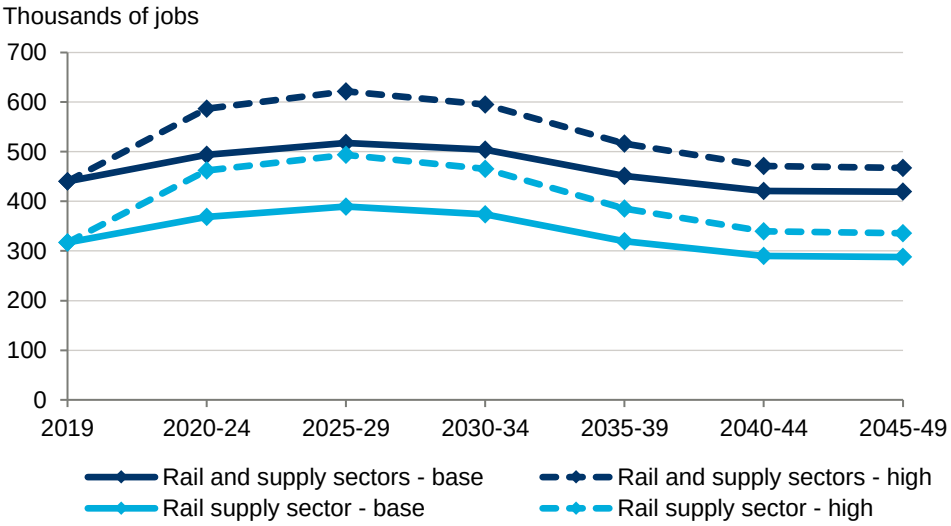
This report also looks at the future path of GVA and jobs in the rail and supply sectors (i.e. excluding retail and induced impacts), under two alternative scenarios: a base scenario consistent with the National Infrastructure Commission's fiscal remit, and an alternative possible scenario in which spending on rail infrastructure is 50% higher than in the base, consistent with the NIC Rail Needs Assessment assumptions.[2]

Looking at the longer term first, GVA in the rail supply sector would be £5.6 billion per annum higher than otherwise in the high scenario (at 2019 prices), in

[2] National Infrastructure Commission, *National Infrastructure Assessment*, 2018, and *Rail Needs Assessment for the Midlands and North*, 2020.

2025-29, supporting an extra 104,000 jobs in that sector. And it would be £3.4 billion per annum higher than otherwise on that basis, in 2045-49, associated with an extra 48,000 rail supply industry jobs (as indicated in Fig. 3). While these jobs would mostly substitute for work elsewhere in the economy, rather than being genuinely additional, the UK economy could still benefit as this work is of a higher-productivity, higher-wage nature than the average.

Fig. 3. Rail and supply sector employment in the alternative scenarios



Source: Oxford Economics

+ 2,100

Number of additional UK jobs created for every extra £100 million of spending on rail infrastructure. Of these, 1,400 would be relatively well-paid jobs in the rail supply sector itself.

More immediately, before 2025, the UK economy will still be operating below full capacity as it recovers from the effects of the Covid-19 pandemic. There is therefore a strong case for stepping up rail investment during that time. In this case, many of the extra jobs created in the rail supply industry, under the high scenario, would be genuinely additional jobs, rather than merely displacing (typically less well-paid) work in other parts of the economy. And further additional employment would be supported, in these circumstances, as a result of consequent induced impacts.

Here, our modelling suggests that every extra £100 million per annum spent by the UK Government on rail infrastructure in the early-to-mid-2020s would support an additional 1,400 jobs in the rail supply sector. These new jobs would typically be of a high-productivity, high-wage nature, in line with the finding for existing jobs in 2019. This in turn would support a further 700 jobs in the wider consumer-related economy, due to induced effects. That takes the total number of extra jobs supported, by each £100 million per annum of additional rail infrastructure investment, in the near term, to 2,100.

1. INTRODUCTION

This report sets out the 'economic footprint' of the UK rail sector in 2019, including that of the train operators and rail infrastructure providers ('railway system'), suppliers of assets, goods, and services to railway systems at home and overseas ('rail supply sector'), and on-station retailers catering for railway passengers. It follows on from a similar report, *The Economic Contribution of UK Rail 2018*, concerned with the economic footprint in 2016.

The results relate to calendar year 2019, rather than 2020. Although a range of 'headline' data is now available for the later year, there is insufficient data of a robust nature at the level of industrial detail required for this study. This also means that the analysis relates to the latest year in which the economy, and its industries, were operating at 'normal' capacity levels, uninterrupted by the Covid-19 pandemic. This report is therefore a snapshot of rail's economic footprint before the pandemic.

While it is not yet clear how passenger demand will change as restrictions are lifted, travel did return to prior trends in the wake of previous shocks, such as the 2009 financial crisis and Spanish flu. We also note that the Government's Williams-Shapps' Plan for Rail, and Transport Decarbonisation Plan, both support rail growth (subject to delivering appropriate cost efficiencies), and recognise the need for policies to incentivise rail travel given its important role in decarbonising the transport sector. Innovate UK, the official UK innovation agency, similarly assumes rail growth in its Transport Vision 2050.[3] This report therefore considers the impact of this planned future growth on the economy.

The measures of economic impact covered include output or sales, the sector's gross value added or GVA, the employment headcount, and the value of taxes paid, as explained in the box below. As also explained there, the effects captured include not only the 'direct' contribution of these businesses, but also the support provided to other parts of the UK economy as a result of their spending on assets, goods, services, and wages ─ the so-called 'indirect' (supply chain) and 'induced' (wage-funded expenditure) contributions.

For the railway system and rail supply sector, there is also an in-depth analysis of labour productivity (GVA per job), and average wages, to show how these industries contribute to the development of a high-wage, high-skill economy, both nationally and in every part of the UK. However, the study does not attempt to quantify all of the many important benefits of the railways to the UK economy and society, including net user benefits, benefits to the environment, and benefits to the nation's long-term economic growth potential.

As in the previous report published in 2018, the results are presented on a UK-wide, regional, and UK parliamentary constituency basis. The main results tables can be found in Appendix 2 of this report, but a more detailed set of tables will also be made available, covering estimates on an industry-by-region basis, and key results for every constituency.

3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1008833/IUK-050821-4293_Innovate_Future_Transport_A4Portrait.pdf

SECTORS, CHANNELS OF IMPACT, AND METRICS COVERED BY THIS STUDY

This study covers the contribution to the UK economy of **three sectors**:

- **The UK rail transport system**: The activities of Network Rail, mainline passenger and freight train operating companies in Great Britain, Northern Ireland Railways, London Underground, TfL's other rail operations, and metro systems in other urban areas.
- **The UK rail supply sector:** UK-based providers of infrastructure, goods, and services to the UK railway system, and to railway systems overseas, together with their entire UK-based supply chain, including infrastructure construction, rolling stock manufacturing, and a wide range of other activity.
- **On-station retailers and caterers:** Providers of retail goods and services, and catering services, directly to the public, based in UK railway stations.

The study follows the principles of a 'standard economic impact assessment', with **three 'channels of impact'** (also illustrated in Fig. 4):

- The **direct impact** relates to the employment and capital costs borne by the businesses concerned, and the net profits generated by that work.
- The **indirect impact** refers to the economic production stimulated along the UK supply chain, by these businesses' purchases of goods and services from third party suppliers (i.e. by their 'domestic procurement').
- The **induced impact** reflects the wider economic benefits that arise in the UK due to the payment of wages by these businesses, and by firms in their supply chain, to their staff, who spend these earnings in retail, leisure, and other outlets. It also includes the economic activity stimulated in these outlets' supply chains, and that supported by further 'rounds' of wage-funded spending by workers in the consumer-facing sectors.

The total 'economic footprint' of the sector concerned is simply the sum of the direct, indirect and induced impacts.[4] However, as the indirect impact of the railway system is captured in its entirety by the direct impact of the rail supply sector, the only additional 'indirect' effects in this study relate to the on-station retailers and caterers. The 'direct' and 'indirect' terms are therefore dropped, and the sectors and channels of impact are mainly grouped as follows:

- The UK rail transport system.
- The UK rail supply sector.
- On-station retailers and caterers, and their UK supply chain.
- Total induced impacts.

The analysis focuses on four dimensions of that footprint:

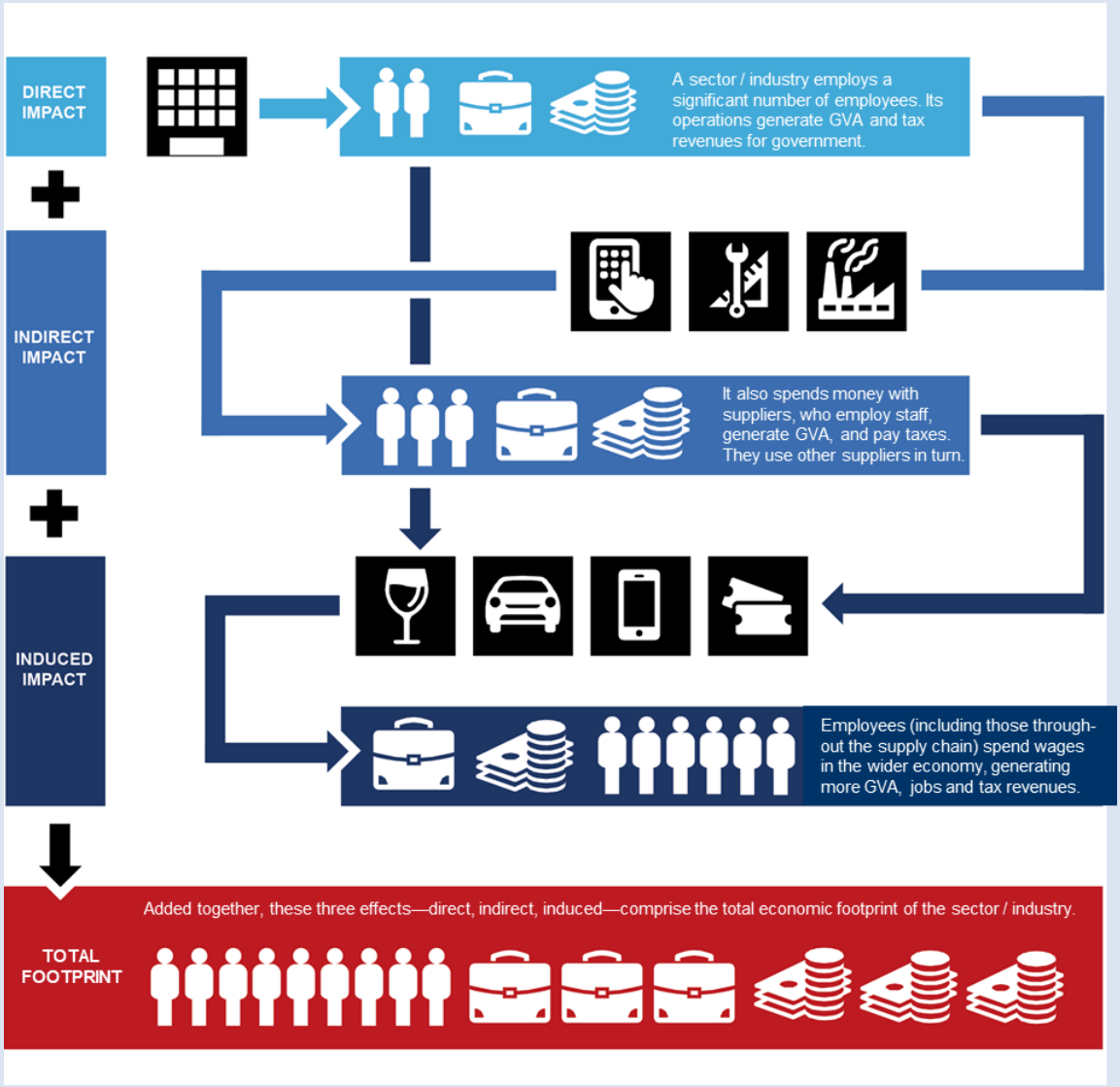
- **Output.** The net-of-tax market value of goods and services produced by the businesses, except for Network Rail where the 'non-market output' concept is used, and for on-station goods retailers where the net-of-tax value of **sales** is counted.[5]

[4] The total of these three impacts is often referred to as the 'total economic impact'. But this total does not include other dimensions of economic benefit, such as net user benefits, environmental gains, and contributions to the economy's longer-term growth prospects, which are also important in the case of the railway system.

[5] For most businesses, 'output' will be essentially equal to net-of-tax market sales. But 'output' excludes the cost of stocks for resale, so in the case of wholesalers and retailers of goods, it is equivalent to the 'gross margin' on the purchase and re-sale of stocks. For 'non-market' (government) bodies, such as Network Rail, output is measured as the sum of employment costs, the cost of capital depreciation, and the cost of external inputs into the production process, with profits, losses, and sources of finance ignored.

- **The gross value added (GVA) measure of production.** This is the standard measure of the value of goods and services produced by an industry in a given time period.[6] Unlike the output and sales measures, it avoids the 'double-counting' of value caused by multiple transactions between businesses.
- **Employment**, measured on a headcount basis and comprising employees and self-employed workers.
- **Taxes** of all kinds paid to national, devolved and local governments.

Fig. 4. Illustration of the 'economic footprint' of a sector or industry



[6] The difference between the businesses' output, and the cost of their purchases of inputs of goods and services (excluding stocks for resale) from other businesses. This is equal to the sum of their total employment costs, 'taxes on production' (mainly business rates), capital costs, and net profits. For 'non-market' Network Rail, the sum of employment costs and capital depreciation only is used. An industry's GVA is measured at 'basic prices', excluding VAT and other taxes on products, and is therefore a little different to the 'headline' or 'market price' GDP measure, used for national economies, which includes those taxes. For 'output', taxes on products are excluded where they are added by the supplier concerned, but included where they are built into the cost of that supplier's own purchases of materials and other inputs.

2. NATIONAL RESULTS OVERVIEW

2.1 OVERVIEW OF RAIL'S TOTAL 'ECONOMIC FOOTPRINT'

This chapter sets out an overview of the total economic footprint of UK rail. More detail on each individual component, i.e. the rail transport system, rail supply sector, on-station retailers and their suppliers, and the induced (wage-funded expenditure) impacts, is set out in chapters 3-6. Some context is also set out here, in terms of industries and local economies of a comparable size, as well as a brief examination of recent trends in activity over time.

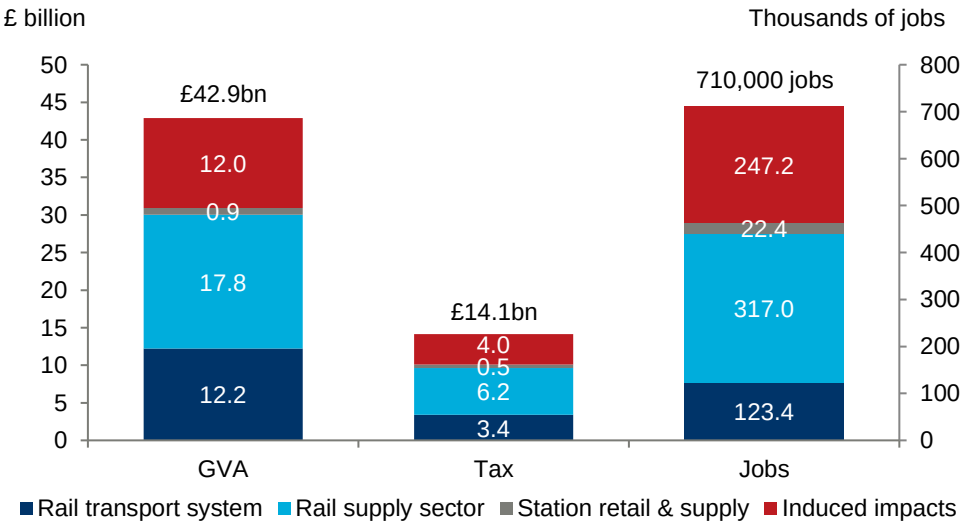
2.1.1 Overall footprint by major sector and channel of impact

We estimate that total output or sales across all of the sectors and channels of impact covered by this study (including the value of transactions between the businesses concerned) amounted to £90.1 billion in 2019. Of this total, £26 billion is accounted for by the rail transport system, £37.7 billion by the rail supply sector, £2.2 billion by on-station retailers and their suppliers, and £24.3 billion by induced impacts.

After deducting the cost of purchases of goods and services from other businesses (including stocks in the case of on-station goods retailers), this is estimated to have supported £42.9 billion in terms of GVA. And this activity, in turn, would have been associated with some 710,000 jobs, and £14.1 billion in tax payments of various kinds.

Fig. 5 shows how these economic contributions break down by major sector and channel. The rail supply sector and rail transport system account for around 70% of each of the total GVA and total tax impacts between them. But the induced effect, and station retailers and their supply chain, contribute proportionately more to the total jobs impact (at close to 40%). This reflects the fact that GVA per job (a measure of labour productivity) is above-average in the rail and supply sectors, but more reflective of the economy as a whole in the retail-related and induced channels.

Fig. 5. Total GVA, jobs and tax footprint by sector and channel of impact



Source: Oxford Economics

2.1.2 Overall footprint by industry of supplier and type of tax

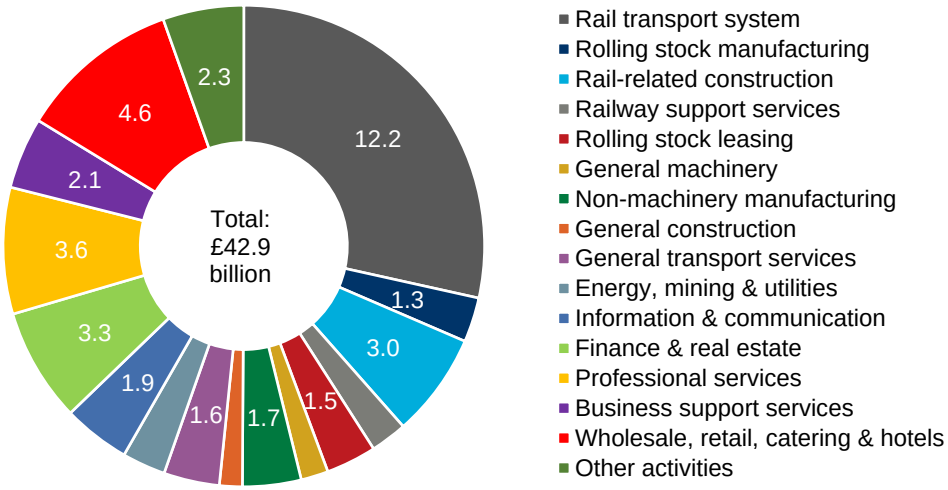
For the purposes of this analysis, the GVA and employment impacts have been broken into 16 industry groups, according to the activity of the supplier. The rail transport system itself comprises one of these groupings, while the rail supply sector includes businesses in each of the remaining 15. Four of those groups, namely rolling stock manufacturing, rail-related construction, railway support services, and rolling stock leasing, are specific to the rail supply sector and do not include any other activity.

Induced activities, and activity in the supply chain for on-station retail, are therefore spread across the remaining 11 broad sectors. Most on-station retail work will be captured in the wholesale, retail, catering and hotels grouping here, aside from a few service activities (such as dry cleaning and key-cutting) counted in the 'other activities' category here.[7]

It can be seen that the rail transport system accounts for some 28% of the overall footprint, in terms of GVA, and the four rail-specific supply sectors for a further 16% (see Fig. 6). But the remainder is spread across a very wide range of activities, with significant contributions from the wholesale, retail, catering and hotels grouping, professional services (such as technical and management consultancy work, accountancy, architecture and design, and advertising), and finance and real estate.

Fig. 6. Total GVA footprint by industry of supplier

£ billion



Source: Oxford Economics

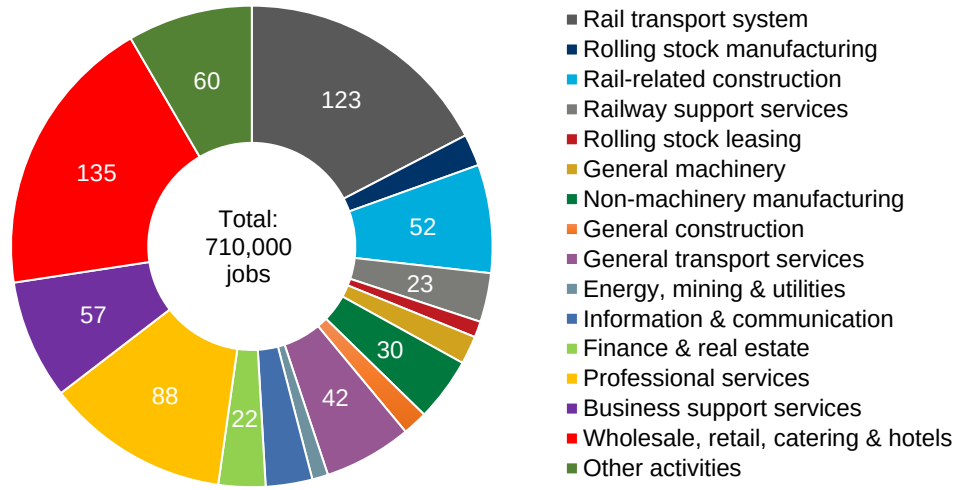
The employment footprint is also spread over a wide range of sectors. But the pattern is rather different to that of the GVA footprint, reflecting variations in productivity (see Fig. 7). Here, the contributions to rail transport (17%), and the rail-specific supply sectors (14%), are lower in proportionate terms, as is that of finance and real estate. In this case, the most important sector is wholesale,

[7] Full details of the industry categories can be found in Appendix 1, and full results including data missing from the charts, in Appendix 2. 'Other activities' comprise agriculture, private education and training, private health and care services, arts and cultural services, and miscellaneous household, personal, and community services.

retail, catering and hotels, while business support activity (which includes employment agencies, cleaning of buildings, office administrative support, and non-rail equipment leasing) also features strongly.

Fig. 7. Total employment footprint by industry of supplier

Thousands of jobs

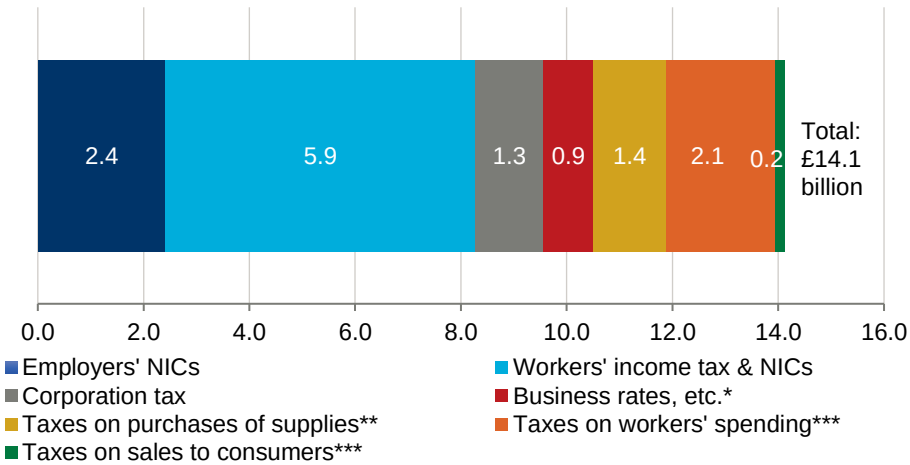


Source: Oxford Economics

Out of the total tax contribution, of £14.1 billion, income tax and NICs levied on employees and the self-employed amount to £5.9 billion (see Fig. 8). VAT, excise duties and other taxes levied on the supply of products account for £3.6 billion, taking taxes on business purchases, workers' spending, and on-station retail sales into account, with employers' NICs, corporation tax, and 'taxes on production' such as business rates accounting for the remainder.

Fig. 8. Total tax footprint by type of tax

£ billion



Source: Oxford Economics

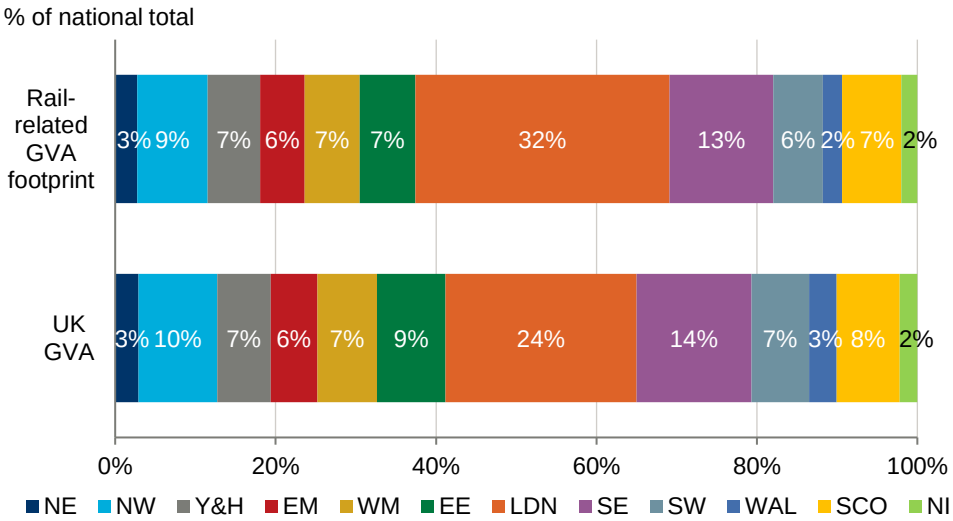
* 'Taxes on production', e.g. rates, vehicle duty, apprenticeship levy. ** E.g. road fuel duty. *** E.g. VAT and excise duties.

2.1.3 Overall impacts by region

Fig. 9 shows how the GVA footprint is spread around the UK by region. As shown in subsequent chapters, the impact of the rail transport system itself, as well as on-station retail activity, is disproportionately focused on London. But that effect is partly diluted by the fact that activity in the rail supply sector, and in the induced channel, is spread much more evenly around the country.

Taking all sectors and channels together, London accounts for 32% of rail-related GVA, compared with 24% of national GVA. Aside from that, the regional spread of rail-related impacts is similar to the picture for the whole economy.

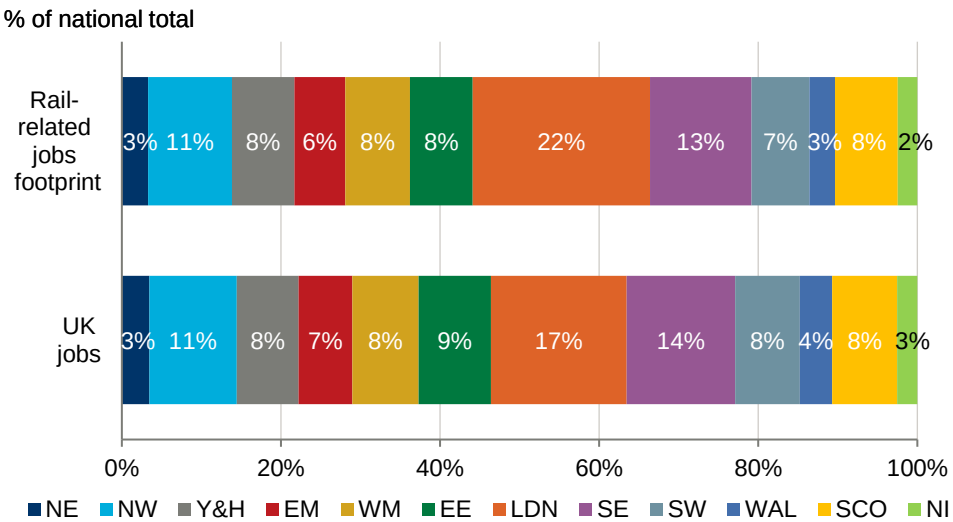
Fig. 9. UK rail-related GVA footprint in 2019, by region



Source: Oxford Economics

A broadly similar pattern can be seen in terms of the regional spread of the rail-related employment footprint (see Fig. 10). However, London stands out less in this case than in the case of GVA, accounting for 22% of rail-supported jobs, versus its 17% share of all UK jobs.

Fig. 10. UK rail-related employment footprint in 2019, by region



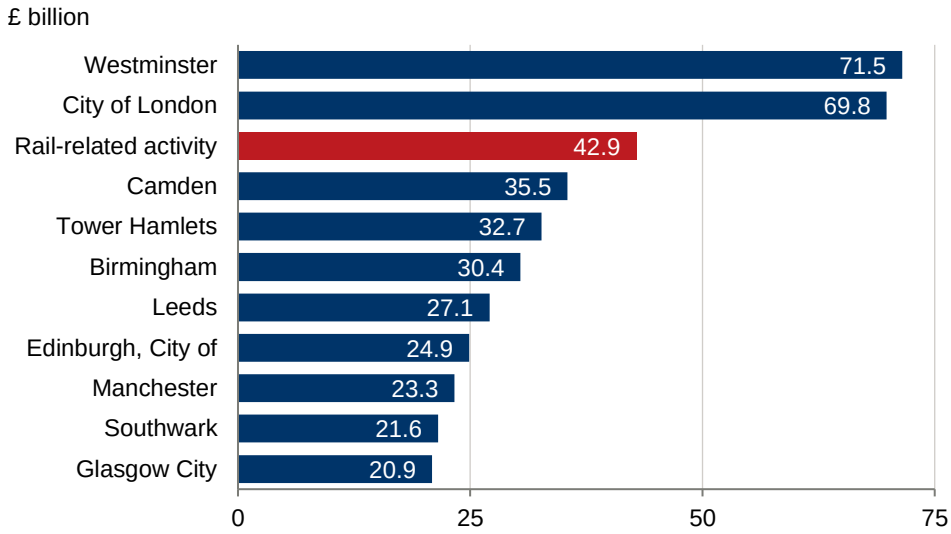
Source: Oxford Economics

2.2 RESULTS IN CONTEXT

2.2.1 Overall GVA, jobs, and tax footprints in context

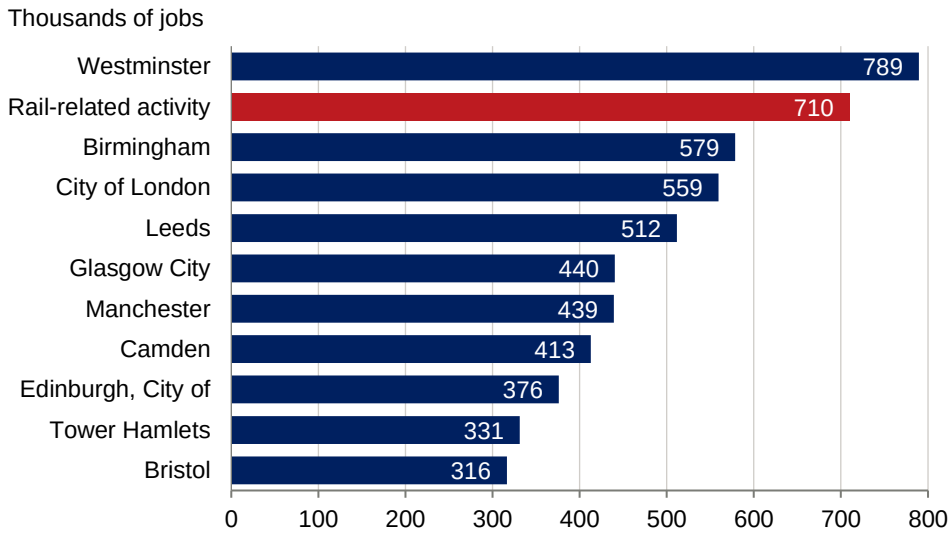
The total rail-related GVA footprint, including on-station retail and induced impacts, can be put in context by comparing it with the GVA of UK local authority areas. In fact, as Fig. 11, shows, the estimate for rail-related GVA in 2019 was higher than that of every such area in the same year, with the two exceptions of the City of Westminster and City of London. Estimated rail-related employment ranked below Westminster only, as Fig. 12 illustrates.

Fig. 11. Rail-related GVA compared with the top 10 local authority areas



Source: Oxford Economics

Fig. 12. Rail-related jobs compared with the top 10 local authority areas

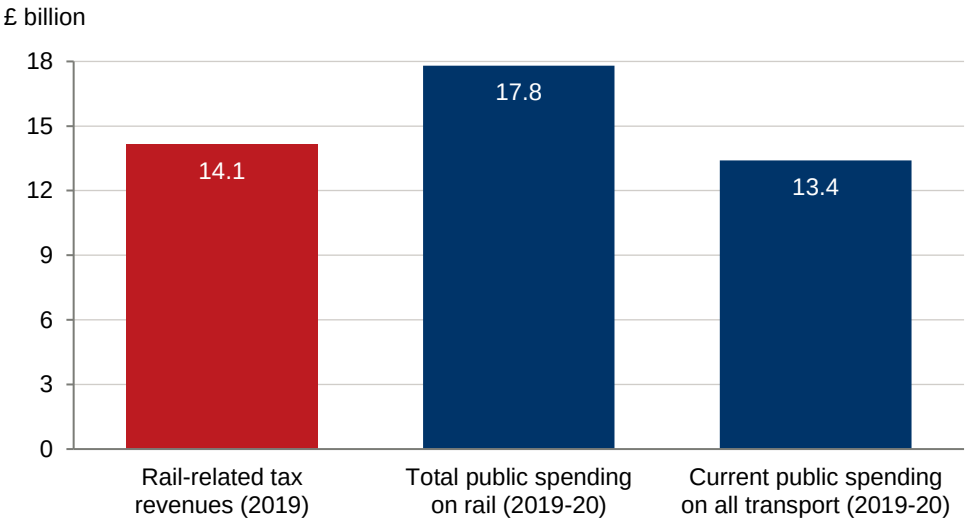


Source: Oxford Economics

Turning to taxation, the £14.1 billion of revenues supported one way or another by rail-related activity in 2019 would have covered 79% of total public spending on the railways in the corresponding financial year (2019-20). That amounted

to £17.8 billion (see Fig. 13). And it exceeded total public sector current (non-capital) spending of transport of all kinds.

Fig. 13. Rail-related tax revenues and UK public spending on transport

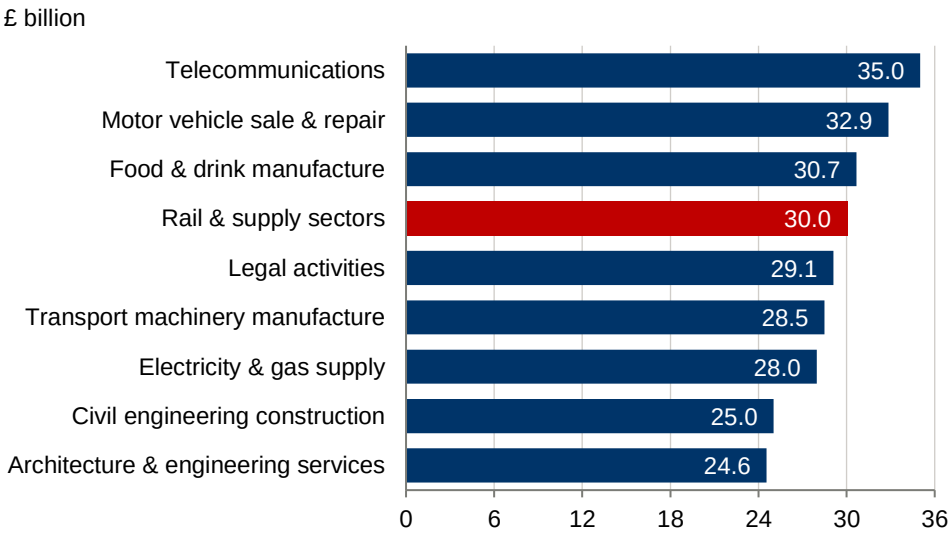


Source: Oxford Economics; HM Treasury

2.2.2 Rail and supply sectors: GVA and jobs in context

Taking the railway system and rail supply sector together (while excluding on-station retail and induced effects), aggregate GVA amounted to £30.0 billion in 2019. As Fig. 14 shows, this exceeded the GVA of, for example, the legal services sector, the transport machinery manufacturing sector (embracing motor vehicles, aerospace, shipbuilding, and more), and the production and supply of electricity and gas. It was also fairly similar in magnitude to the telecommunications industry, the motor trades sector (including wholesale, retail, maintenance and repair of all motor vehicles and parts), and the entire food and drink manufacturing industry.

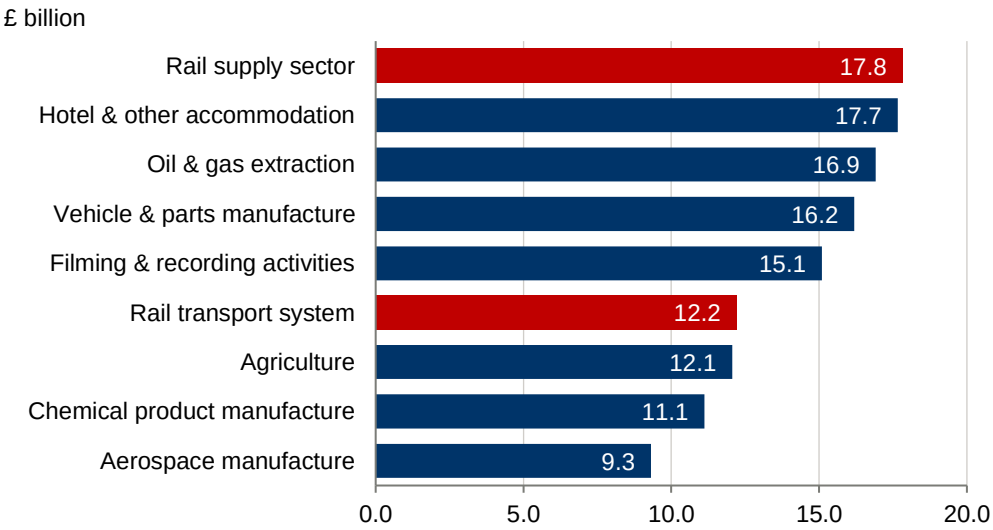
Fig. 14. Rail and supply sectors in aggregate: GVA in 2019 in context



Source: Oxford Economics; ONS

The £17.8 billion GVA contribution of the rail supply sector alone, meanwhile, was greater than that of hotel and other holiday and short-stay accommodation, oil and gas extraction, and motor vehicle manufacturing (including separate production of parts, engines, bodies, and trailers) (see Fig. 15). The GVA of the rail transport system alone was, at £12.2 billion, greater than that of agriculture, chemical product manufacture, and aerospace equipment manufacture.

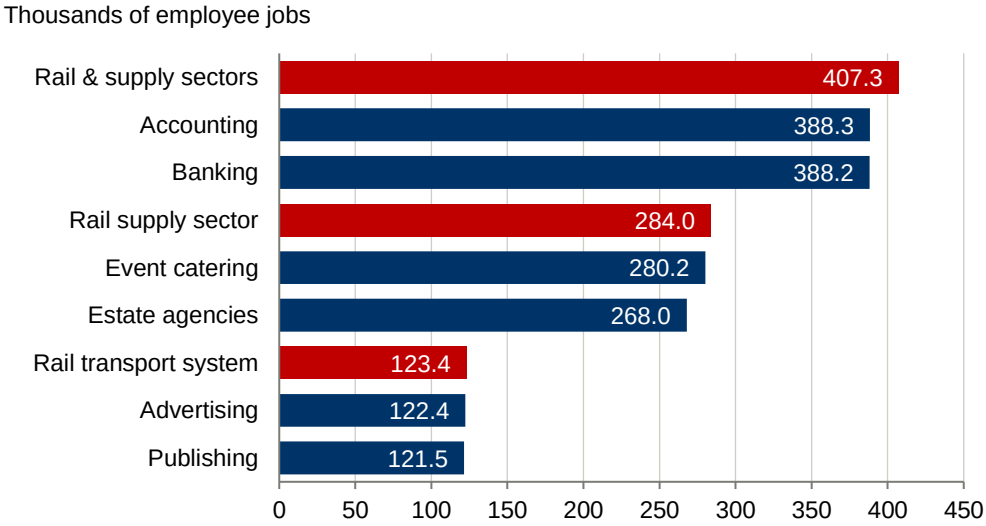
Fig. 15. Railway system and rail supply sector: GVA in 2019 in context



Source: Oxford Economics; ONS

Turning to employment, the rail and supply sectors combined provided a total of 440,000 jobs in 2019. Of these, 33,000 were accounted for self-employed individuals (all in the rail supply sector), and around 407,000 by employees. As data on total UK employment by industry (including self-employment) are not available at a detailed level, the best context here is probably provided by data for employees alone.

Fig. 16. Rail and supply sectors: Employee jobs in 2019 in context



Source: Oxford Economics, ONS

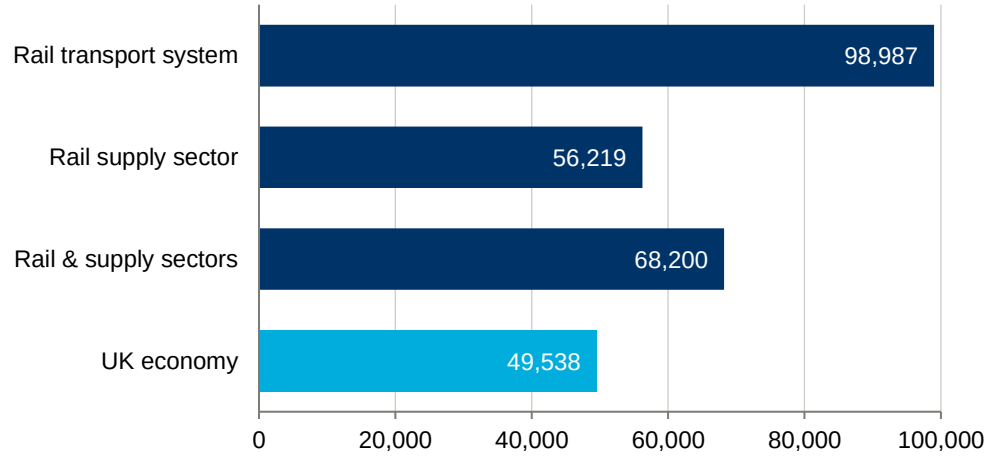
As Fig. 16 shows, on that basis the rail and supply sectors employed more staff in 2019 than each of the accounting and banking sectors. The rail supply sector alone had more employees than each of the event catering and estate agency sectors, while the rail transport system engaged more staff than each of the advertising and (online and other) publishing industries.

2.2.3 Rail and supply sectors: productivity and wages in context

Taking the data for GVA and total employment together, GVA per job ─ a measure of labour productivity ─ is higher than the UK average. More precisely, this ratio is double the national average in the case of the rail transport system, and 13% above that benchmark in the case of the rail supply sector (see Fig. 17). Taking the rail and supply industries together, average GVA per job of £68,200 is 38% higher than the UK average of just over £49,500.

Fig. 17. Rail and supply sectors: GVA per job in 2019 in context

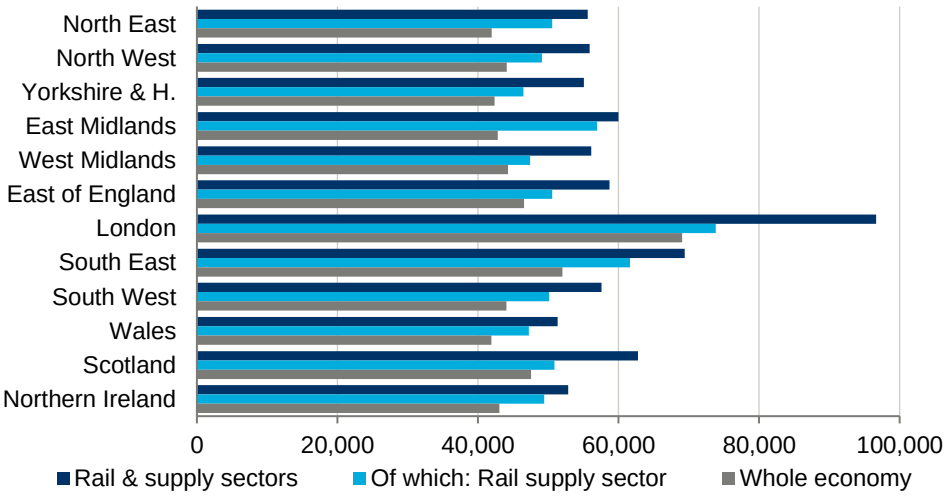
£ per job per annum



Source: Oxford Economics

Fig. 18. Rail and supply sectors: GVA per job by region

£ per job per annum



Source: Oxford Economics

Furthermore, as shown in Fig. 18, GVA per job is higher than the economy-wide average, in both the rail transport system and the rail supply sector, in each of the 12 standard UK statistical regions.

In principle, there are a number of factors that can affect the GVA per job measure. The knowledge and skills of the workforce will be important, but productivity can also be boosted by the capital intensity of the production process, and certain sector-specific factors. On the other hand, the prevalence of part-time work in some other sectors will tend to reduce measured GVA per job, while the regional distribution of the workforce will also be a factor.

Looking at the rail industry in this light, it seems reasonable to conclude that the knowledge and skills of the workforce form an important part of the high-productivity story. As set out in the box below, sector-specific factors broadly offset each other, and for the rail supply sector, capital intensity, and the regional distribution of jobs, are not that different from the UK-wide picture, leaving workforce skills as the main explanation. For the rail transport system, GVA per job is buoyed by capital intensity and the regional pattern of work, but workforce skills will also be important.

The importance of skills to the rail industry is clearly recognised by the UK authorities, and others with an interest in skills development in this field. Indeed, the Department for Transport set up a body known as the Strategic Transport Apprenticeship Taskforce. This first reported on future skill requirements, and how those needs could be met, in 2016, and the group publishes regular progress reports every two years.[8] Another example is provided by a joint investigation into potential skills gaps in the sector, by the National Skills Academy Rail (NSAR) and the City & Guilds Group (CGG).[9]

One consequence of achieving a high level of GVA per job is that it allows the businesses to pay higher-than-average wages, while still achieving the level of profitability desirable to reinvest in the business. This in turn will allow the industry to attract and retain skilled and knowledgeable individuals, thereby creating a ‘virtuous circle’. This development of knowledge and skills will benefit the wider UK economy in turn, as these assets can be transferred from one business to another. And the associated high wages will buoy both the nation’s tax base, and the living standards of the employees concerned.

As Fig. 21 shows, wages are clearly higher in these sectors than across the economy as a whole. In fact in 2019, they were around 62% higher than the UK average in the rail transport system, and 25% higher than the average in the rail supply sector. The differential for the two sectors together works out at 36%. While the regional distribution of jobs contributes to this, that can only be a relatively small part of the explanation. The average wage in both the rail transport system and the rail supply sector is higher than the corresponding regional average in every one of the 12 UK regions and countries (see Fig. 22).

[8] See, for example, Strategic Transport Apprenticeship Taskforce, *Transport Infrastructure Skills Strategy: Four years of progress*, October 2020.

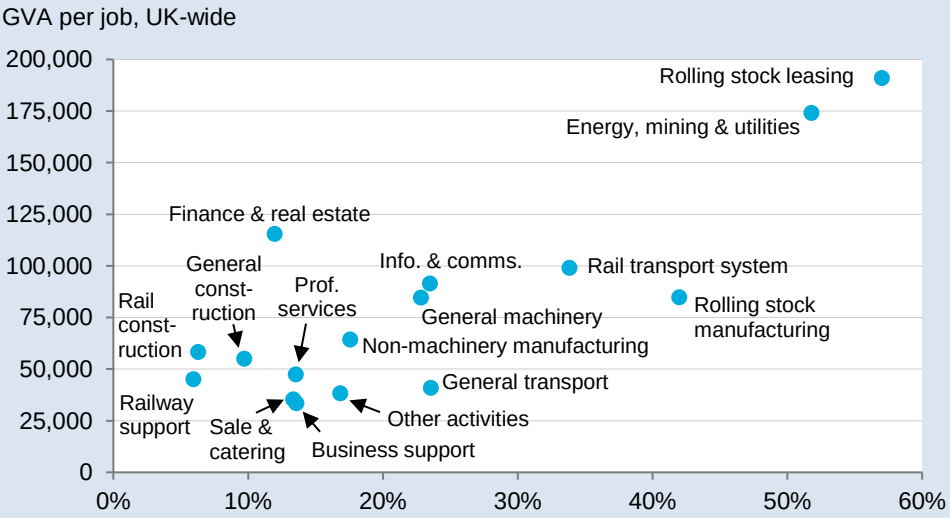
[9] National Skills Academy Rail and City & Guilds Group, *Back on Track: Gearing up to meet the increased demand for talent in the rail industry*, November 2020.

EXPLAINING ABOVE-AVERAGE GVA PER JOB IN THE RAIL AND SUPPLY SECTORS

Capital intensity. Industries that use a lot of capital equipment (such as computers or other machinery) tend to have a higher level of GVA per worker than those using little equipment. On an underlying level, if one set of workers has a greater or better amount of capital equipment to work with than another, then they should be able to produce a higher level of output per head, for the same amount of effort and skill. In addition, the way that GVA is measured boosts the GVA-per-job metric in the case of high-capital-intensity industries.[10]

If capital intensity is measured as the share of capital inputs in total labour and capital inputs[11], then intensity in the rail transport system (34%) is clearly higher than the economy-wide average (18%) (see Fig. 19). But average capital intensity across the rail supply sector is approximately 20%, which is very close to the average. Of the four rail-specific sectors within that total, reliance on capital equipment is significant for rolling stock leasing and rolling stock manufacturing, but not for rail-related construction work, or railway support services.

Fig. 19. Capital intensity and GVA per job for UK sectors in 2019



Source: Oxford Economics

Sector-specific factors. Limited commodities (such as crude oil and other mined products) and their derivatives (such as refined petroleum) can generate significant revenues, as a result of the value placed on them in the marketplace. This can boost GVA per job in the energy, mining and utilities sector, independently of either capital intensity or skill levels.

The business model for financial services, meanwhile, involves paying out large amounts in interest and other 'property income'. This is funded out of the profits made on day-to-day activities, including the normal 'margin' on financial intermediation, as well as other property income receipts. These profits (though not the other property income) are counted in the sector's GVA. For real estate services, meanwhile, most income comes from property rental, which is counted in the GVA of that sector. So, for each of the finance and real estate sectors,

[10] Equipment wears out over time and eventually needs to be replaced, forming an operating cost (capital depreciation) for the business. The firm's owners will aim to maximise profits net of depreciation, and so will wish to see an increase in *net* domestic product per worker as a result of the provision of capital equipment. But as GVA is measured gross of depreciation, the boost to GVA per worker will always be greater than that.
[11] Capital depreciation as a percentage of capital depreciation plus employee compensation.

both labour and capital inputs are modest, compared with the GVA generated. This boosts measured GVA per job.

Finally, where jobs are measured on a 'headcount' basis, then GVA per job will be suppressed in sectors with a high proportion of part-time workers, even if GVA generated per hour were no different to the average.

For the rail-related industries, these sector-specific factors broadly cancel each other out. On a per-hour rather than per-job basis, the productivity advantage would be broadly 28%, rather the 'headline' 38%, with the advantage for the rail supply sector alone around 6% rather than 13%. The reflects the preponderance of part-time jobs in the retail, wholesale, catering and hotels sector, which accounts for a fifth of all UK employment, but for only 5% of employment in the rail supply sector (and less than 4% taking the rail and supply sectors together).

However, if the energy, mining, utilities, finance, and real estate sectors are also excluded from the comparison, the gaps widen again, to 38% and 11% respectively. That is because firms in these sectors account for only 4% of jobs in the rail supply sector (and less than 3% across the rail and supply sectors), versus 6% for the economy as a whole.

The regional distribution of the workforce. GVA per job varies from one UK region to the next, being (for example) significantly higher in London than elsewhere ─ both overall but also, typically, within the same industry. This partly reflects regional variations in the general price level, but there are also some 'real terms' effects, reflecting, for example, the advantages of working in highly-connected urban areas.

As shown later in this report, a high proportion of jobs in the rail transport system are based in London, compared with the share of all UK jobs. But the geographical pattern of work in the rail supply industry is much more similar to the economy-wide pattern. And for both the rail transport system and rail supply sector, GVA per job is higher than the economy-wide average in every single region.

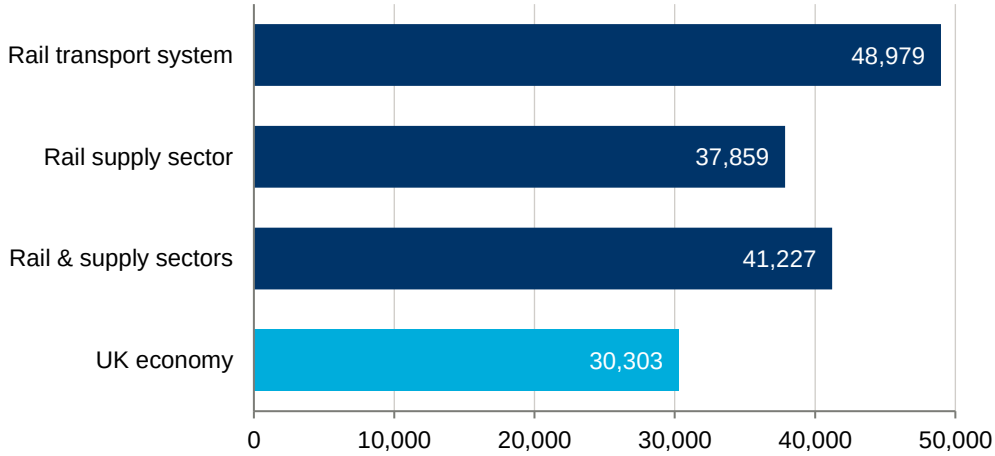
The knowledge, skills, flexibility, and ingenuity of the workforce. To the extent that above-average productivity cannot be explained by the factors set out above, then it seems reasonable to assume that it reflects the knowledge, skills, flexibility, and ingenuity of the workforce. For the rail supply sector, this must be the major explanation, as the sector-specific factors broadly cancel each other out, and as capital intensity and geographical location are not sufficiently different to the UK-wide pattern (see Fig. 20). For the rail transport sector, high capital intensity, and the concentration of jobs in London, are an important part of the story, but the level of skills required will almost certainly be a third, significant contributing factor.

Fig. 20. Impact of key factors on sector GVA per job versus the UK average

	Rail transport system	Rail supply sector
Capital intensity	Positive	Neutral
Full-time versus part-time work	Positive	Positive
Other sector-specific factors	Negative	Negative
Regional distribution of jobs	Positive	Neutral
Workforce skills	Positive	Positive

Fig. 21. Rail and supply sectors: Wages per employee job in 2019 in context

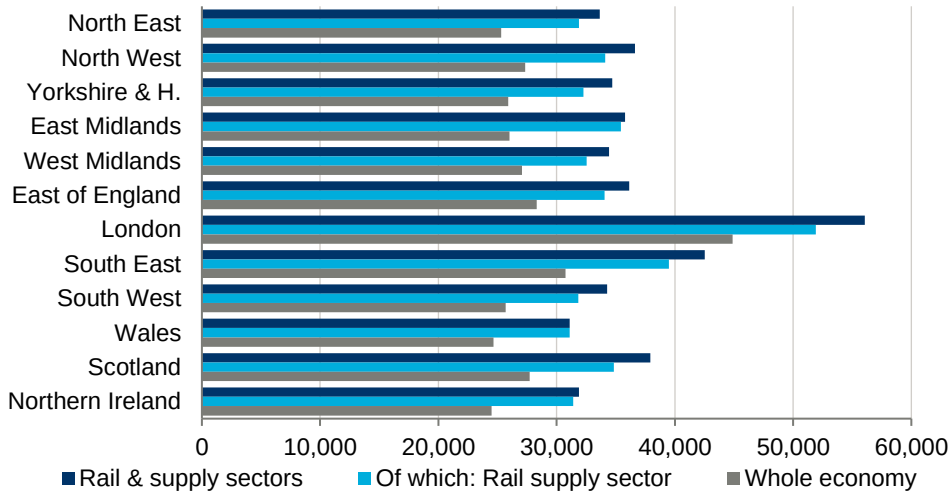
£ per job per annum



Source: Oxford Economics

Fig. 22. Rail and supply sectors: Wages per employee job by region

£ per job per annum



Source: Oxford Economics

2.2.4 Comparison with results published in the 2018 study

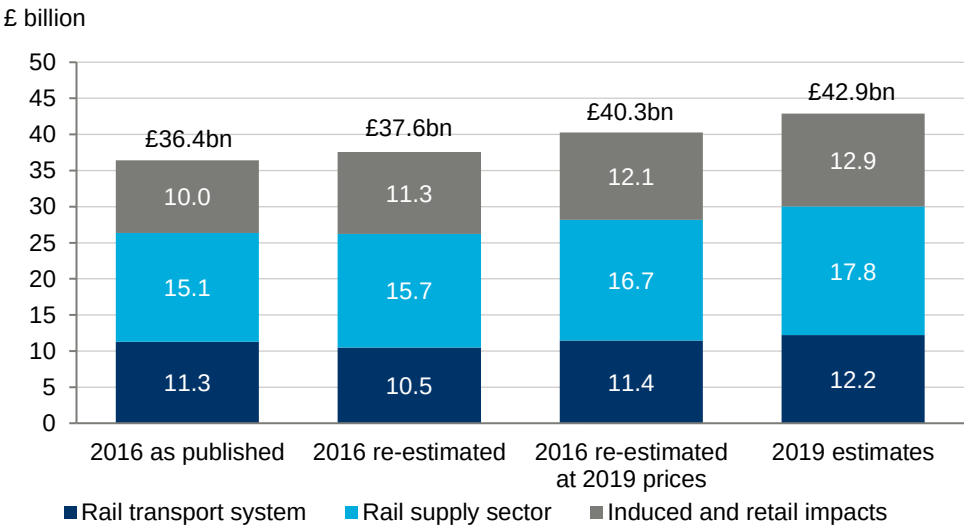
Oxford Economics would point out that, when making a comparison with the results published previously for 2016, the 'standard economic impact' approach is designed to provide a 'snapshot' of the situation in a given recent year, based on the best evidence available at the time, with the model used often tailored to suit a particular issue worth exploring. So an assessment of this kind needs further research and analysis to enable a longer-term tracking of trends over time on a consistent basis.

Since the 2016 results were published, some of the official data relied upon have been significantly revised (most notably interurban rail sector GVA), and new information been provided on the size and pattern of on-station retail and catering activity. In addition, the present study is based on an updated 'input-output table' (see Appendix 3). And the methodology used this time is more

refined, to ensure that GVA per job and wages per employee job can be more accurately assessed, for each low-level industry in each region.

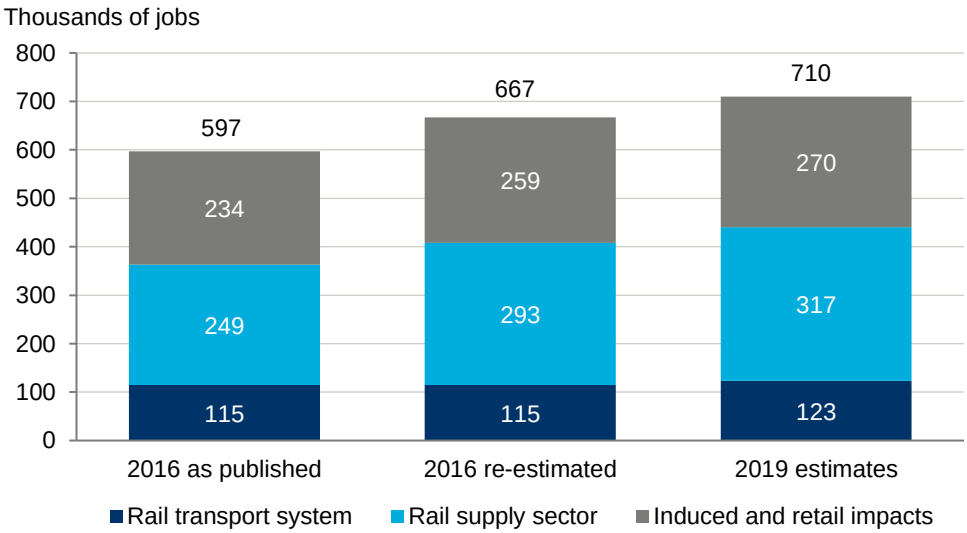
Had the 2016 exercise used the same methodology as employed for this study, and had the data revisions and new information been correctly anticipated, the results could have been somewhat different. In particular, it now appears that the GVA of the rail transport system, and the GVA and jobs of the on-station retail sector, were over-estimated, while GVA and jobs in the rail supply industry and induced channel were under-estimated. Re-estimates for 2016, consistent with newly-available information and the more refined methodology used for this study, are set out in Fig. 23 for GVA, and Fig. 24 for jobs.[12]

Fig. 23. Comparison of 2019 GVA estimates with previous 2016 estimates



Source: Oxford Economics

Fig. 24. Comparison of 2019 jobs estimates with previous 2016 estimates



Source: Oxford Economics

[12] These estimates have been made on a very approximate basis, and do not reflect a full modelling exercise.

Overall, it is now estimated that the total rail-related GVA footprint in 2016 was somewhere in the region of £37.6 billion, equivalent to very broadly £40.3 billion when re-valued to 2019 prices. On this basis, real growth of rail-related GVA, between 2016 and 2019, looks to have in the 6%-7% range, or around 2% per annum.

In the case of jobs, the re-estimated total for 2016 is quite significantly higher than originally published, at broadly 667,000. On this basis, the rail-related jobs headcount looks to have also grown by 6-7% over the three years.

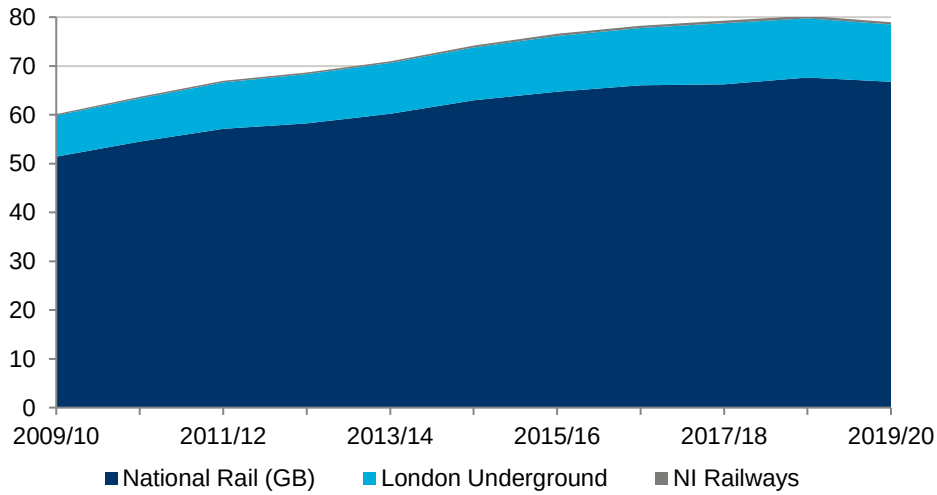
2.2.5 Other indicators of trends over time

The complex nature of the set of rail-related sectors covered by this study, and the way that they are captured in official statistics, makes it impractical to construct time series for the key metrics, except on the very approximate basis set out above for two particular years. However, we can draw on a few specific indicators in official datasets, to support the view that the economic contribution of UK rail grew at a fairly significant pace over the decade prior to 2020.

Firstly, Fig. 25 shows how total passenger kilometres travelled on the major parts of the rail network across the UK increased by 31% between 2009/10 and 2019/20, equivalent to 2.8% per annum. Volumes edged down in the very latest year, but had increased for nine consecutive years prior that. Within that total, passenger growth on the national rail network in Great Britain (i.e. the lines overseen by Network Rail) averaged 2.6% per annum, while that on the London Underground averaged 3.3% per year, and that on Northern Ireland Railways, 5.7% per year.

Fig. 25. Volume of passenger rail travel in the UK, 2009-2019

Billions of passenger kilometres per annum



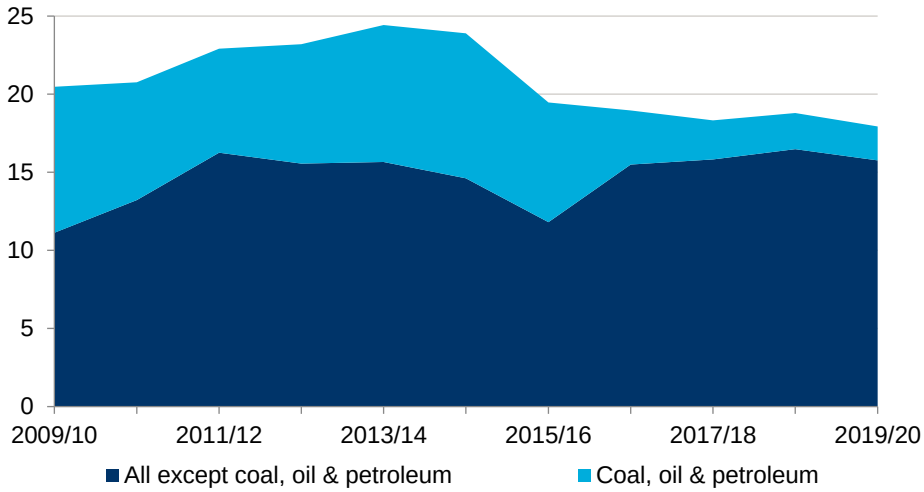
Source: Department for Transport; NI Department for Infrastructure

At the same time, the total volume of freight movement on the national rail network in Great Britain, as measured in 'tonne-kilometres', trended downwards between 2013/14 and 2019/20, following a rise over the previous four years (see Fig. 26). But this overall development was heavily influenced by a steep decline in the transport of coal, oil and petroleum – especially that of coal, which fell by 85% over the decade. Excluding those items, freight volume

movements were 42% higher in 2019/20 than in 2009/10, meaning an average growth rate of 3.5% per annum on that score.

Fig. 26. Volume of rail freight movements, GB mainline, 2009-2019

Billions of net tonne-kilometres per annum

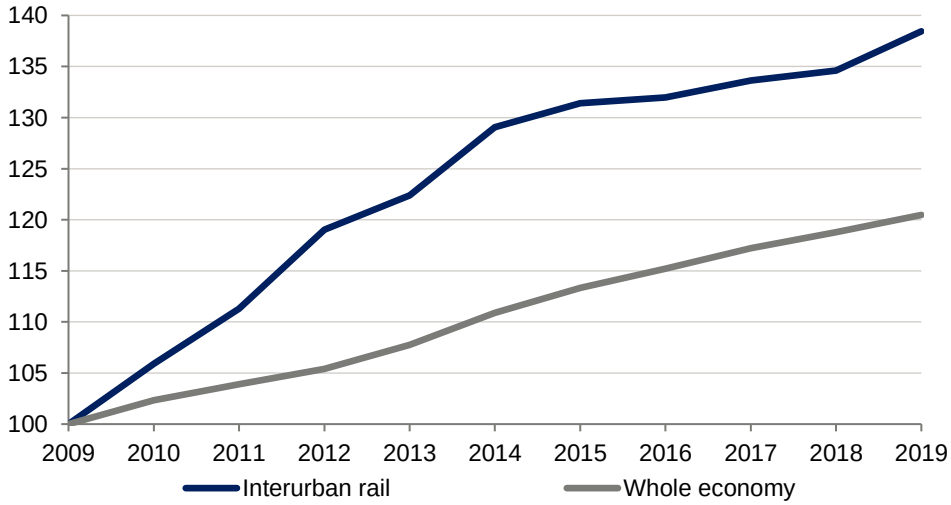


Source: Department for Transport

Turning to economic impacts, the official UK GVA-by-industry dataset includes the 'interurban rail' sector, combining interurban passenger rail with freight rail. This covers the work of the train operating companies on the national rail network in Great Britain, as well as that of Northern Ireland Railways. But it excludes activity on the London Underground and other city-based metro systems, as well as the work of Network Rail itself.[13]

Fig. 27. Real GVA of UK interurban passenger and freight rail, 2009-2019

Real-terms index, 2009 = 100



Source: ONS

As shown in Fig. 27, the GVA of the interurban rail transport sector increased by 38% in real terms (i.e. stripping out price inflation) over the decade to 2019,

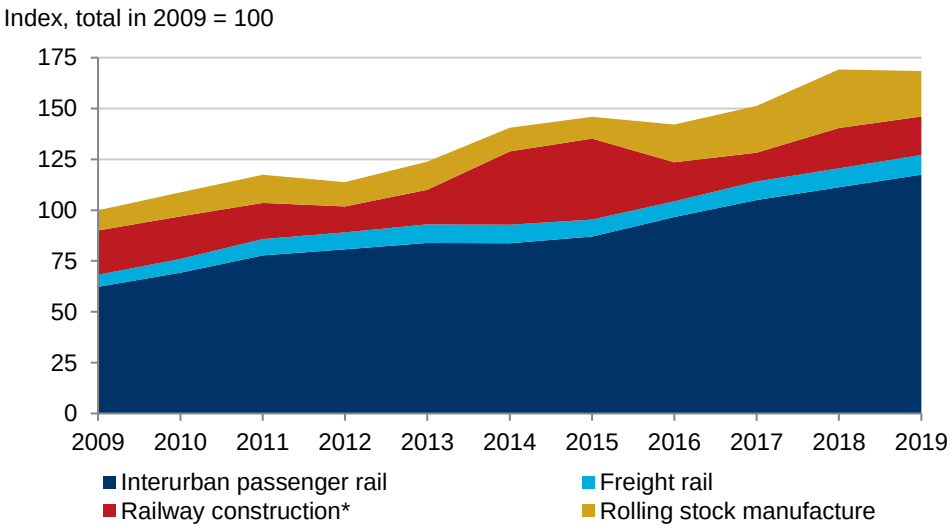
[13] In this dataset, the London Underground and other metro systems are subsumed within the 'other land transport' sector, and Network Rail within the separate 'support services for transport' sector.

meaning an average real growth rate 3.3% per annum during that time. That compares with a real average annual growth rate of 1.9% for the economy as a whole. In money terms (i.e. before price adjustment), average annual growth in interurban rail sector GVA was 4.4% over those 10 years, compared with 3.4% for the economy as a whole.

The ONS Annual Business Survey (ABS), meanwhile, includes financial data for businesses allocated to narrow sectors of industry, including interurban passenger rail transport, freight rail transport, construction of railways and underground railways, and manufacture of railway locomotives and rolling stock. It is not possible to isolate any other rail-specific activities in this dataset, and it should be noted that 'rail construction' defined in this way is only a part of the 'rail-related construction' sector referred to elsewhere in this study.

In this case, Fig. 28 shows how total sales revenues across the four sectors taken together increased by 68% (in money terms) over the decade to 2019, equivalent to 5.4% per year. This total is mainly driven by comparatively steady growth in the interurban passenger rail transport sector, averaging 7.3% per year, while revenues for the freight operating companies increased at an average annual rate of 5.5%. Sales of railway rolling stock more than doubled over that decade, while railway construction increased sharply in the early years, to peak in 2015, before easing back to just below 2009 levels.

Fig. 28. Sales revenues (turnover) of UK rail-related sectors, 2009-2019



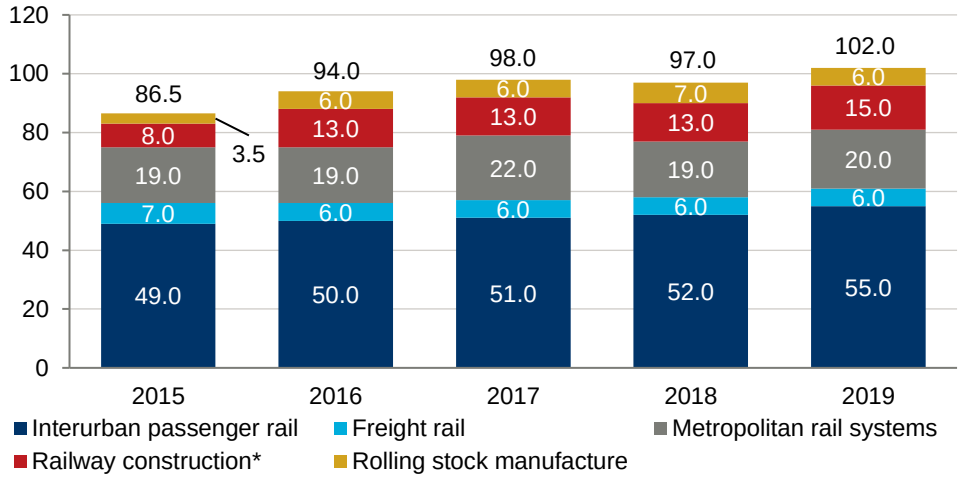
Source: ONS Annual Business Survey * Only a part of 'rail-related construction'.

Finally, the ONS Business Register Employment Survey (BRES) provides employee numbers for the same sectors, plus metropolitan railway systems, albeit on a heavily-rounded basis back to 2015 only, and with Northern Ireland excluded.[14] On this basis, employment across the five sectors increased by 18% in just four years, with employee headcount in interurban passenger rail up by 12%, and very substantial growth, in proportionate terms, in each of the rail-related construction and manufacturing industries (see Fig. 29).

[14] The employment data from BRES, and the financial data from the ABS, are not necessarily consistent with each other, due to the ways in which the separate surveys are carried out.

Fig. 29. Employment in rail-related sectors in Great Britain, 2015-2019

Thousands of employee jobs (rounded, GB only)



Source: ONS Business Register Employment Survey * Only a part of 'rail-related construction'.

CASE STUDY

VOLKERFITZPATRICK MERIDIAN WATER

VolkerFitzpatrick worked to design and construct Network Rail's new £37 million Meridian Water Station, which was part of the Meridian Water regeneration programme and is expected to accommodate up to four million passengers over the next 20 years. The construction began in November 2017 and the station was completed in 2019, replacing the Angel Road station.

This new station is also part of the £170m Lee Valley Rail Programme, which forms part of Network Rail's London Railway Upgrade Plan to create new connections and bolster capacity during peak hour by 30%.

Meridian Water is at the heart of a £6bn development of the area being led by Enfield Council. The station will service the proposed 10,000 new homes and 6,700 new jobs at Meridian Water, as well as existing residents in the area.

"This collaborative programme shows how the rail industry can work together with external partners to fund and deliver rail upgrades that will not only benefit passengers by improving their travelling experience but also benefit the communities where they live through regeneration." Meliha Duymaz, Network Rail's route Managing Director for Anglia

Collaboration partners: London Borough of Enfield, London Borough of Haringey, Network Rail, Greater Anglia, Abellio.

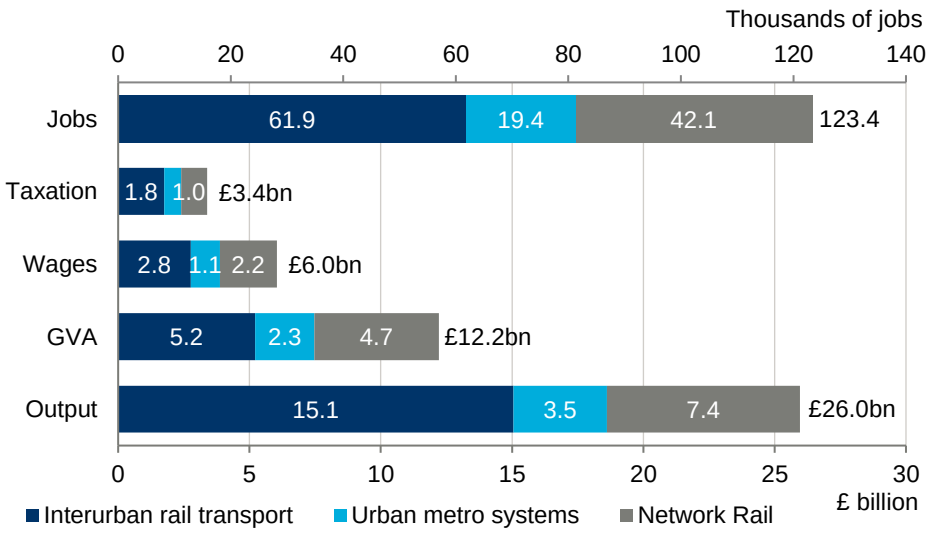
3. THE UK RAIL TRANSPORT SYSTEM

In this study, the 'UK rail transport system' comprises interurban rail transport, urban railway-based metro systems, and Network Rail.[15] Interurban rail transport covers the activities of the mainline train operating companies in Great Britain, including passenger and freight services, together with Northern Ireland Railways. Urban metro systems include the London Underground, Docklands Light Railway, and metro systems in Tyneside, Merseyside, Glasgow, and the West Midlands.[16] Network Rail is responsible for the provision of rail infrastructure in Great Britain.

3.1 RAILWAY SYSTEM IMPACTS BY TYPE OF ACTIVITY

In 2019, the railway system altogether employed some 123,400 individuals, while the sector's output – the sum of its total costs and profits – amounted to £26.0 billion.[17] After deducting the value of transactions between different parts of the railway system, and the cost of day-to-day supplies purchased from other businesses, this supported £12.2 billion of GVA, of which £6.0 billion was accounted for by the total wage bill. Taxes paid by the businesses and their employees totalled £3.4 billion in the year.[18]

Fig. 30. UK railway system activity in 2019, by sub-sector



Source: Oxford Economics

[15] This sub-sector split is partly dictated by the allocation of activities to different industries in UK economic and business statistics, as explained further in the Appendix 3.

[16] Based on the allocation of jobs by constituency in the ONS Business Register Employment Survey, the London Overground is counted in the 'interurban' sector, while TfL Rail is split between 'interurban' and 'urban'. Tram systems are counted as non-railway-based urban transport and so not included in this study.

[17] Network Rail's output is measured as the sum of production costs, with profits, losses and financing ignored. This is the standard measure of 'non-market' output, used as Network Rail is classified as a government body.

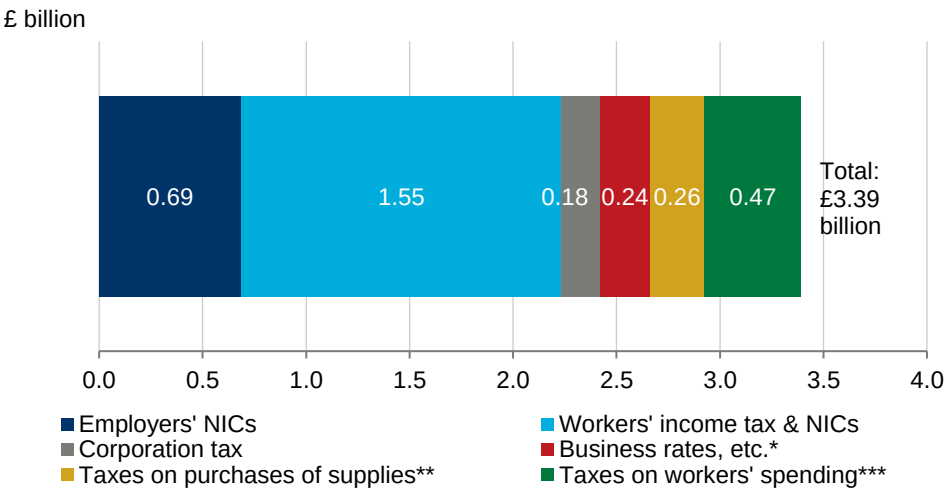
[18] All tax data in this report are Oxford Economics' estimates, based on what the sector concerned could be expected to have paid given income and spending flows, and stylised features of the UK tax system in 2019. The figures should not be interpreted as a definitive statement of actual tax payments or liabilities.

Fig. 30 shows how these values are split by sub-sector. Interurban rail accounts for 43% of the overall sector's GVA, and for 50% of the jobs. The metro systems account for 18% of the GVA and 16% of the jobs, and Network Rail for 39% of the GVA and 34% of the jobs. The higher GVA-per-job ratio in the metro systems, compared with interurban rail transport, is largely a reflection of the regional pattern of activity, with London dominating in the former's case. GVA per job is also comparatively high for Network Rail, reflecting the relatively high share of capital costs in its GVA, and the correspondingly lower share of labour inputs.

Almost uniquely for a UK sector of industry, virtually all jobs on the railway system are employee jobs, with no self-employment of any note. Within the interurban rail transport part of the sector, freight rail accounted for around 5,800 jobs in 2019, or just over 9% of the total, and interurban passenger rail services for the remaining 56,100. Associated with that, the GVA of the freight rail sector would have been in the region of £0.5 billion in that year.

Turning to the railway system's direct tax impact, of close to £3.4 billion, employment taxes accounted for the majority in 2019, with employees' income tax and national insurance contributions (NICs) amounting to some £1.5 billion (or 46% of the total), and employers' NICs for a further £0.7 billion (20%) (see Fig. 31). Other business taxes included £0.2 billion (5%) in corporation tax, a further £0.2 billion (7%) in payments of business rates and other 'taxes on production', and £0.3 billion (8%) in taxes on purchases of supplies, such as road fuel duty and 'green' levies. Taxes on workers' spending, such as VAT and excise duties, accounted for the remaining £0.5 billion (14%).[19]

Fig. 31. Rail transport system taxes by type of tax



Source: Oxford Economics

* 'Taxes on production', e.g. rates, vehicle duty, apprenticeship levy.
** E.g. road fuel duty. *** E.g. VAT and excise duties.

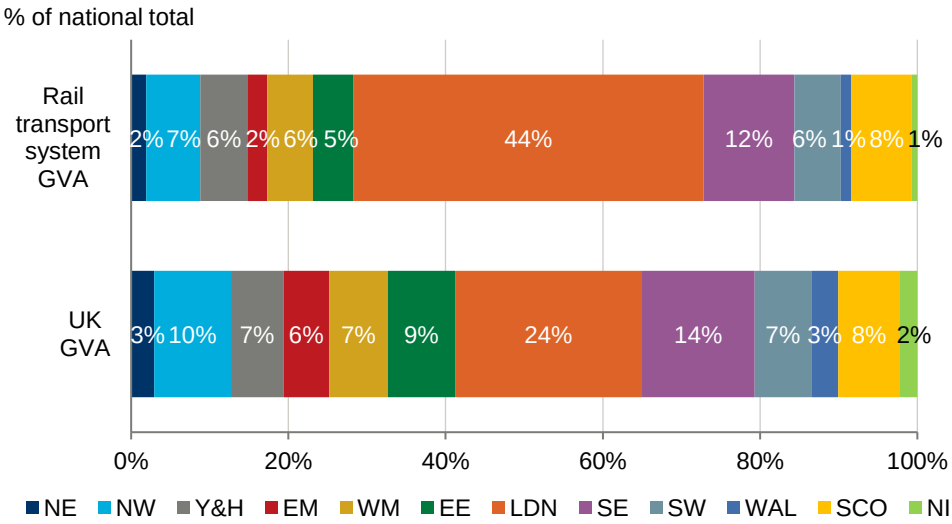
[19] In a standard 'economic impact assessment', all taxes on workers' spending are usually counted the induced impact. But for this particular study, they are allocated to the sector in which the individual works, allowing these taxes (which include taxes on imports) to be allocated to UK industries and UK constituencies.

3.2 RAIL TRANSPORT SYSTEM IMPACTS BY REGION

The impact of all UK railway-related activity by region was set out in Section 2.1.3, while impacts on an individual region-by-region basis are illustrated in Chapter 8. But the charts below show how the direct impact of the rail transport system is spread across the UK by region and country, in terms of the GVA generated (Fig. 32) and employment provided (Fig. 33).

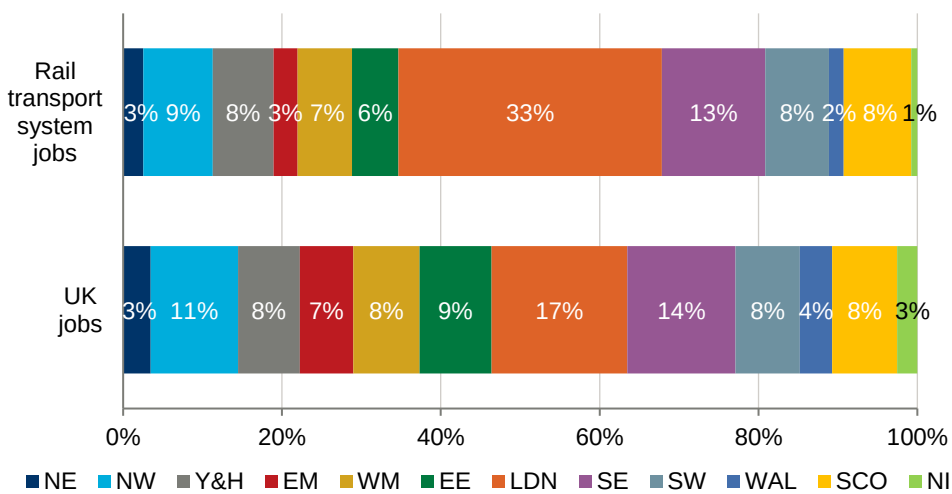
The main feature that stands out in this case is the high share of London-based activity in the total, reflecting the heavy reliance on commuter transport by mainline, underground, and light railway systems in that region, as well as the capital's role as a major rail transport hub hosting several of the most important national rail terminals. However, as shown elsewhere in this report, the knock-on benefits of expenditure associated these activities are spread much more evenly around the country.

Fig. 32. UK rail transport system GVA in 2019, by region



Source: Oxford Economics

Fig. 33. UK rail transport system employment in 2019, by region



Source: Oxford Economics

More precisely, some 33% of all UK railway system jobs are estimated to be based in London, compared with 17% of all UK jobs. The associated share of GVA accounted for by this work is higher still, for both the sector and UK economy, at 44% and 24% respectively. If London is excluded from the picture, the geographical distribution of jobs on the rail transport system is fairly similar to the distribution of jobs of all kinds, although the system is slightly 'under-represented' on that score in the East Midlands, East of England, Wales, and Northern Ireland, and slightly 'over-represented' in Scotland, the South East, South West, and Yorkshire and The Humber.

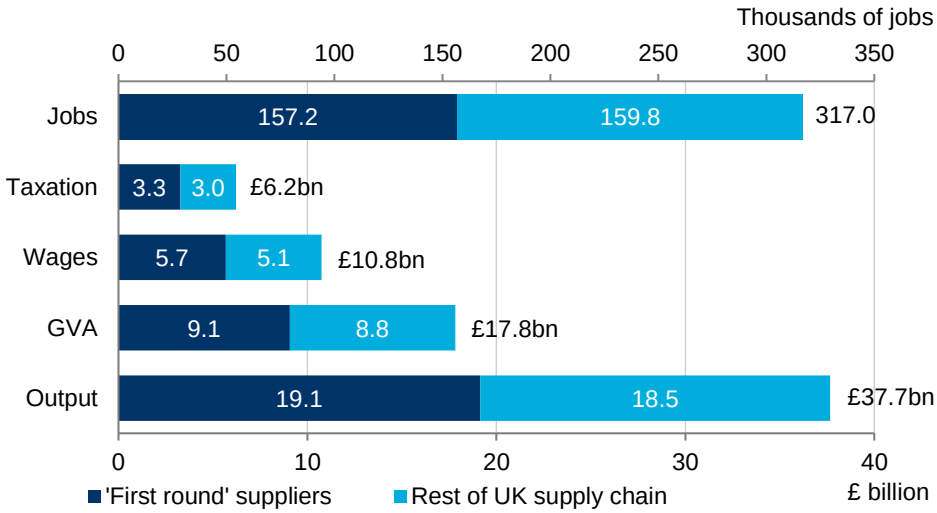
4. THE UK RAIL SUPPLY SECTOR

The UK rail supply sector is defined to include the entire national supply chain for the UK railway system, together with the production of exported rail-related goods and services, and the UK-based supply chain for those items.

4.1 RAIL SUPPLY SECTOR IMPACTS BY SOURCE OF DEMAND

Some 317,000 employees and self-employed individuals are estimated to have been working in the UK rail supply sector in 2019, generating £37.7 billion in output. This supported £17.8 billion of GVA, of which £10.8 billion was accounted for by employee wages, and generated £6.2 billion in tax payments of all kinds. These values are split fairly evenly between the 'first round' of UK suppliers to railway systems at home and abroad, and their UK-based supply chain (see Fig. 34).

Fig. 34. UK rail supply sector impacts in 2019, by 'round' of supply



Source: Oxford Economics

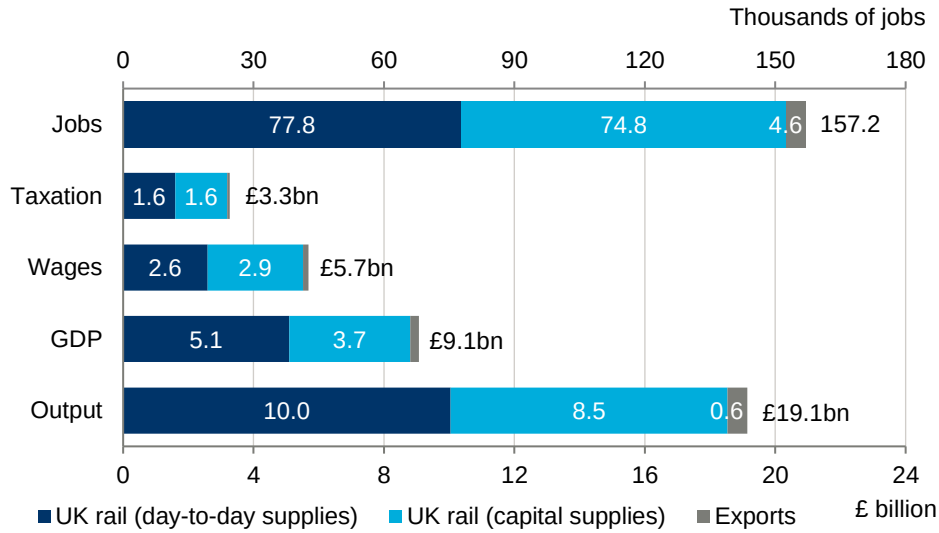
The 'first round' of supplies in turn can be broken down into three groups, reflecting the source of demand for those goods and services. The most important of these are day-to-day supplies to the UK railway system, and capital supplies to UK rail including construction work. But the total also includes exports of rail-related goods and services.

A breakdown along these lines is shown in Fig. 35. Day-to-day supplies to the UK railways include all of the inputs of goods and services required to keep the existing railway system running, other than services provided by the system's own employees and supplies imported directly from overseas.

This will include, amongst much else, replacement parts for machinery, other manufactured items, from workwear to office supplies, fuel and power supplies, property and machinery maintenance services, specialist rail support services such as freight-handling activities, telecommunications and computer services, insurance and banking services, legal and accountancy services, technical and management consultancy, and the provision of leased rolling stock. Some

£10.0 billion of these goods and services was supplied to the UK railway system in 2019, net of VAT and other sales taxes, supporting £5.1 billion of GVA and 77,800 jobs in these businesses.

Fig. 35. UK rail supply sector impacts in 2019: 'first round' detail



Source: Oxford Economics

Capital supplies to the UK railway system include construction work for Network Rail, and for other rail infrastructure projects (most notably Crossrail in 2019). It also covers rolling stock and other capital items produced in the UK and sold directly to the train operating companies, as well as the pre-construction preparatory work then being undertaken for High Speed 2 (HS2). The net-of-tax value of these UK supplies is estimated to have been £8.5 billion in 2019, supporting £3.7 billion of GVA and 74,800 jobs in those firms.

4.1.1 Rail-related exports

Rail-related exports account for a modest share of all supplies made directly to railway systems at home and abroad, and captured in this analysis, at £0.6 billion in 2019 in terms of the sales value. This is also very modest as a share of total UK exports of goods and services (some £689 billion in 2019).

However, it should be noted here that it is difficult to identify exports of products a rail-specific nature within the official data. And even if all such sales were captured by this analysis, sales of other (more generic) UK-produced goods and services to railway networks overseas will still be excluded, as will UK exports of generic products feeding into the supply chains for those networks.[20]

It should be further noted that this export figure only relates to the rail supply sector. The ('invisible') exports of the UK railway system, and those of on-station retailers - i.e. their sales to overseas residents visiting the UK - are also excluded here. But those values are captured, implicitly, in the estimates of those sectors' total output or sales.

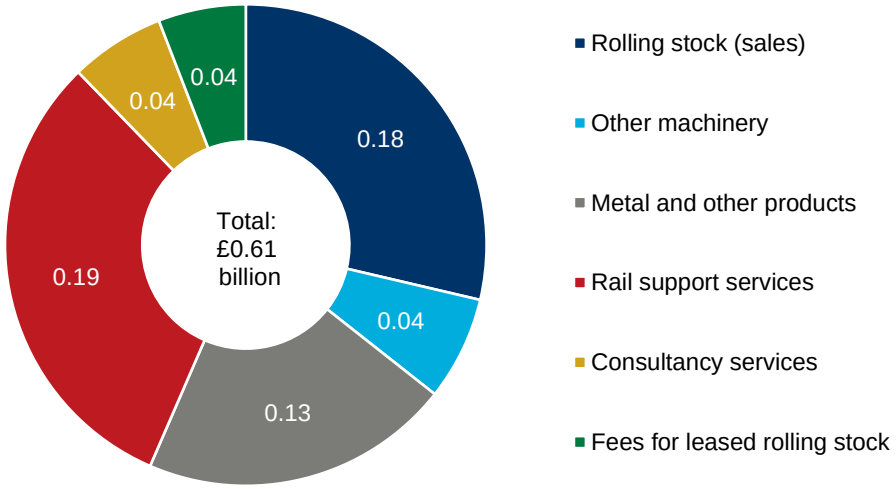
[20] To give some context here, of the total sales made directly by UK suppliers to the UK railways system, in this study, 58% is accounted for by 'rail-specific industries' (see Section 4.2), and 42% by the more 'generic' sectors. And of the rail supply sector GVA ultimately supported by those sales, the rail-specific industries' share is 38%, and the remaining 'generic' share, 62%.

Nor has it proved possible to capture the way in which the UK economy benefits from other rail-related links to the wider international economy, such as through inward investment. Here, too, the available industry-by-industry data is at an insufficiently-refined level to identify investment in rail-related activities, as opposed to that in industries defined more broadly (such as 'machinery manufacturing', or 'transport services').

Turning back to the £0.6 billion estimate for rail-related exports in 2019, Fig. 36 shows how this breaks down in terms of product type. Outright sales of railway rolling stock accounted for 29% of that value, other (mainly electronic and electrical) machinery for 7%, and metal, wooden, plastic, and mineral products for 21%.[21] Rail support services accounted for 31% of the total value, consultancy services (mainly technical consultancy work) for 6%, and fees for leased rolling stock for a further 6%. In total, these exports directly supported £0.3 billion of GVA, and some 4,600 jobs, in the exporting businesses.

Fig. 36. Exports of rail-related goods and services by product type

£ billion



Source: Oxford Economics

The exports value, of £0.6 billion, compares with a figure of £0.8 billion in the 2016 report. This apparent drop cannot be blamed on any change in methodology, but it is again worth highlighting that the availability of robust data in this area is very limited, with 'railway locomotives and rolling stock' being the only rail-specific product category separately identified in the official exports datasets. Other areas such as rail services and consultancy and design also contribute to rail exports but are hard to quantify. The estimates for each year will, therefore, be prone to a wide margin of error, so the apparent decline shown may not accurately reflect the true trend.

On the other hand, exports of railway rolling stock are shown to have fallen, from £251 million in 2018 to £175 million in 2019, taking them below the £223 million figure for 2016. Exports to both the EU and non-EU fell between 2016 and 2019, although the decline in the former was greater. It is possible that

[21] These Oxford Economics estimates take into account data from a wide range of sources, including the results underlying the Rail Supply Group's *Rail Sector Deal: Export Survey Report*, October 2020.

these figures reflect difficult conditions in overseas markets, not just for rolling stock but for rail-related products more generally.[22]

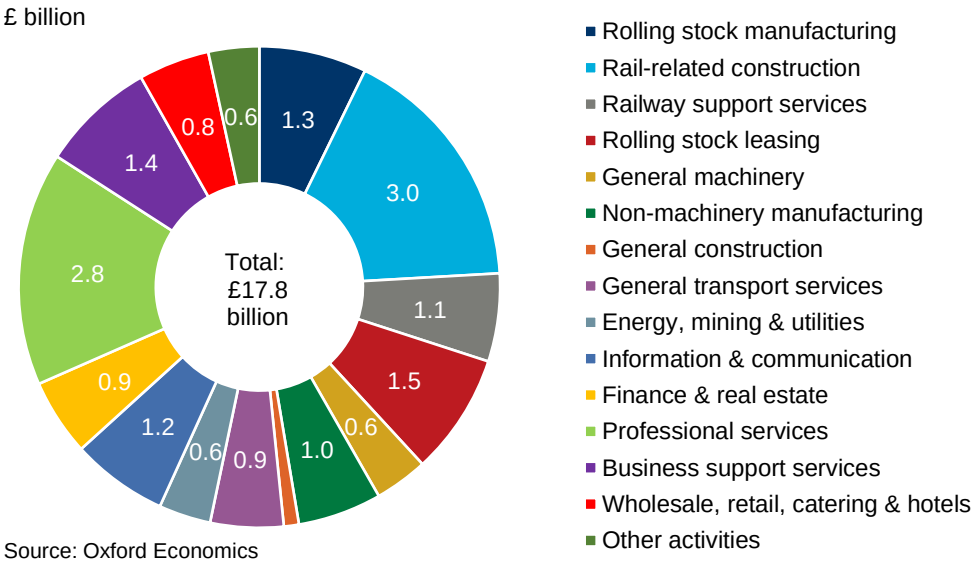
4.2 RAIL SUPPLY SECTOR IMPACTS BY TYPE OF ACTIVITY

Fig. 37 and Fig. 38 below the respective breakdowns of rail supply sector GVA and employment in 2019, by industry.[23] The charts demonstrate the very wide range of activity supported in the UK by railway-related expenditure on goods and services. It is also quite noticeable how the pattern of GVA supported differs to the pattern of employment supported, reflecting variations in GVA per job by industry.

The rail supply sector is widely-defined to include products specifically tailored for rail sector customers, and those of a more generic nature. It has been possible to identify four significant, rail-specific sectors, namely manufacture of railway rolling stock and related machinery, rail-related construction, railway support services, and rolling stock leasing.[24]

But other rail-specific services will be included in the more general categories. For example, rail consultancy work is counted in the 'professional services' sector, and outsourced railway machinery repair services in the 'general machinery' category. (The latter excludes repair work carried out by the rolling stock leasing companies, which is counted in the output of that sector, and regular maintenance work, which is counted in 'railway support services'.)

Fig. 37. Rail supply sector GVA in 2019, by industry



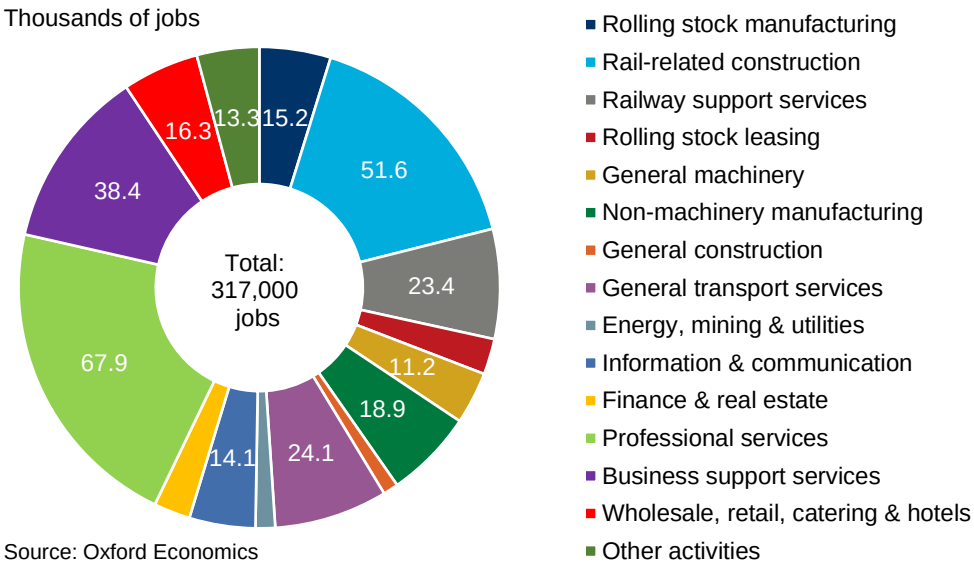
Source: Oxford Economics

[22] Source: ONS, *UK trade in goods by classification of product by activity time series,* June 2021. However, while exports of goods in total fell sharply in 2020, they did not decline between 2018 and 2019 in the same way as rolling stock exports. Between those years, exports to the EU were broadly flat, and other exports grew robustly.

[23] A description of these industries can be found in Appendix 1.

[24] Rail-related construction is defined as construction work carried out for the UK railway system, either directly or through sub-contracting. Rail support services are defined as 'transport support services' provided to the railway system, and include, for example, warehousing and storage facilities for goods in transit by rail, rail freight handling services, and maintenance services for railway rolling stock.

Fig. 38. Rail supply sector employment in 2019, by industry



Source: Oxford Economics

Here, direct supplies of 'architectural, engineering, and technical consultancy services' to railway systems at home and overseas, which would include rail consultancy work together with a range of other services, is put at £1.8 billion, mostly relating to preparatory work for HS2. This would support £1.0 billion of GVA and 29,000 jobs (excluding knock-on supply chain effects), and would therefore account for just over a third of the professional services GVA shown, and two-fifths of the associated jobs.

Direct supplies of 'repair and installation of machinery' services, to the rail transport system and rolling stock leasing companies, which would include repair of railway machinery amongst other activity, are put at £0.6 billion. That would have supported just under £0.3 billion of GVA and 5,000 jobs (excluding knock-on effects), and would therefore have accounted for just under half of the 'general machinery' GVA and jobs shown.

As set out earlier, average GVA per job across the rail supply sector is higher than the UK economy-wide average. But there are significant variations within that. As a result, the share of rail supply jobs accounted for by rolling stock manufacture, rolling stock leasing, energy and mining, information and communication, and finance and real estate, is lower than those industries' respective shares of GVA. The opposite is true for railway support services, general transport services (such as haulage and courier services), professional services (such as consultancy and design), and business support services (such as employment agencies and contract cleaning).[25]

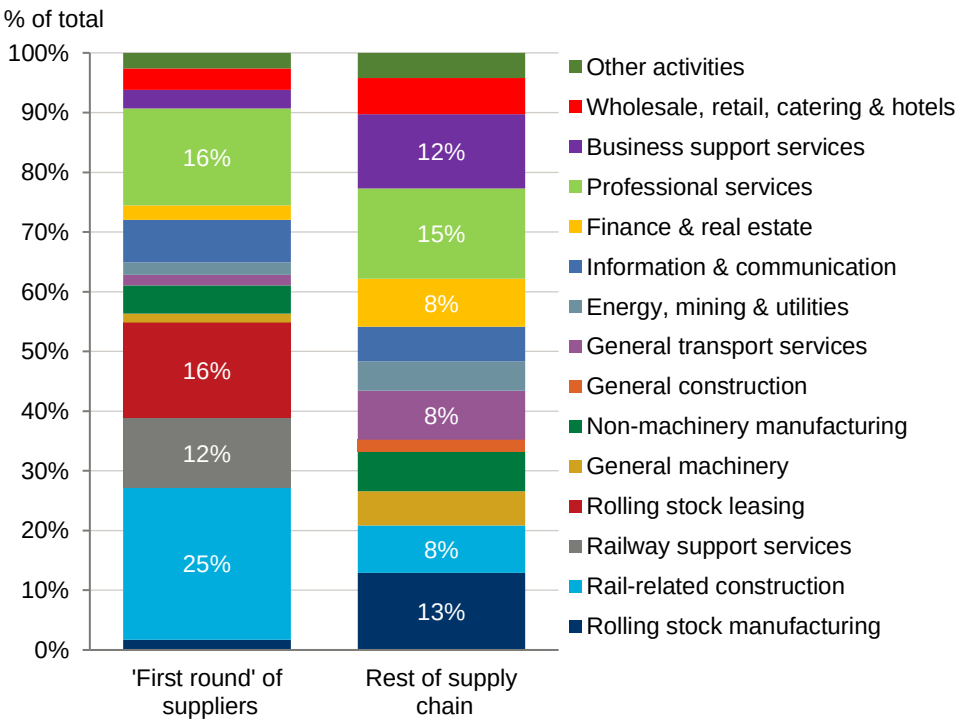
[25] GVA per job is calculated on the basis of a much more refined set of industries than the groupings shown. So, for example, most activity in the 'wholesale, retail, catering and hotels' part of the rail supply sector relates to wholesale trade, and the sale and repair of motor vehicles. This buoys GVA per job here, compared with GVA per job for the same industry group within the induced channel (see Chapter 6), where retail and catering work is much more important. The GVA per job figures also take the regional distribution of activity into account.

There are also sharp differences in the by-industry pattern of activity between the 'first round' of UK supplies to railway systems, and their UK-based supply chain in turn, as Fig. 39 (GVA) and Fig. 40 (employment) show.

Here:

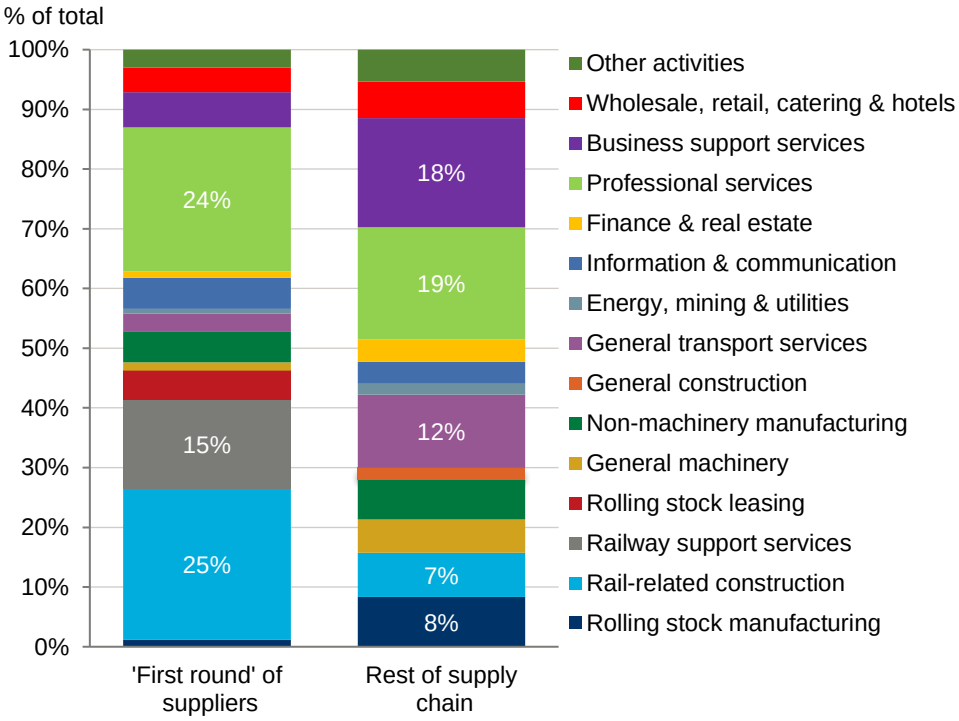
- Just over a half of the GVA of 'first round' suppliers is accounted for by rail-related construction work, railway support services, and rolling stock leasing. But these activities do not feature at all in the remainder of the UK supply chain, with the exception of some rail-related construction reflecting the work of sub-contractors.
- By contrast, most rolling stock manufacturing GVA is accounted for by the 'second round' of suppliers, reflecting the fact that most production is sold to the rolling stock leasing companies, who in turn supply the UK rail system. Just over a half of the 'first round' GVA figure here relates to exports.
- Professional services account for similar, fairly significant shares of activity in each of the 'first round' and 'rest of supply chain' segments.
- But several other sectors feature more heavily in the 'subsequent' supply chain than in the 'first round', most notably general (non-rail) transport services, finance and real estate services, and business support services (including renting and leasing of machinery other than rolling stock, amongst much else).

Fig. 39. Rail supply sector GVA in 2019, by industry and tier of supply



Source: Oxford Economics

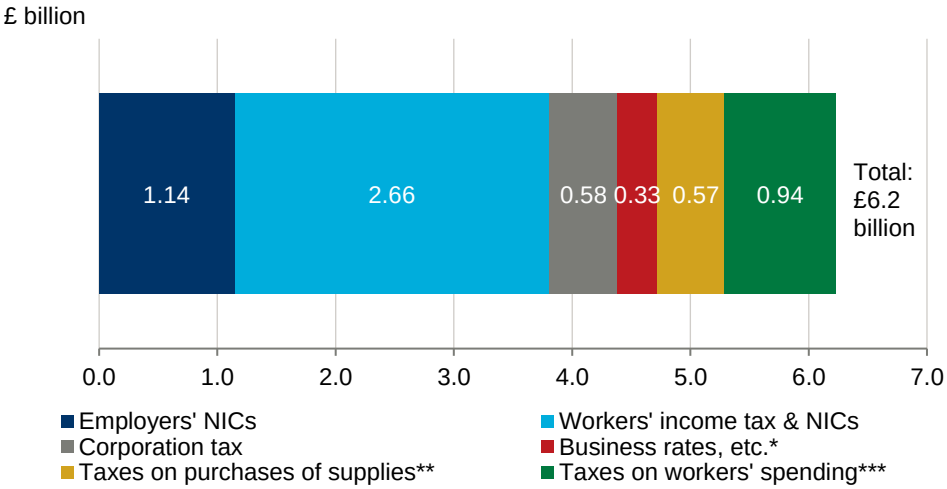
Fig. 40. Rail supply sector jobs in 2019, by industry and tier of supply



Source: Oxford Economics

Turning to taxation, Fig. 41 shows how employees' income tax and NICs account for £2.7 billion (43%) of the £6.2 billion total, with employer NICs contributing £1.1 billion (18%). Corporation tax accounts for £0.6 billion (9%), taxes on production such as business rates for £0.3 billion (5%), and taxes on business supplies for £0.6 billion (9%). The remaining £0.9 billion (15%) is accounted for by VAT and other taxes on the spending of workers in the rail supply sector (out of their earnings from working in that sector).

Fig. 41. Rail supply sector tax payments by type



Source: Oxford Economics

* 'Taxes on production', e.g. rates, vehicle duty, apprenticeship levy. ** E.g. road fuel duty. *** E.g. VAT and excise duties.

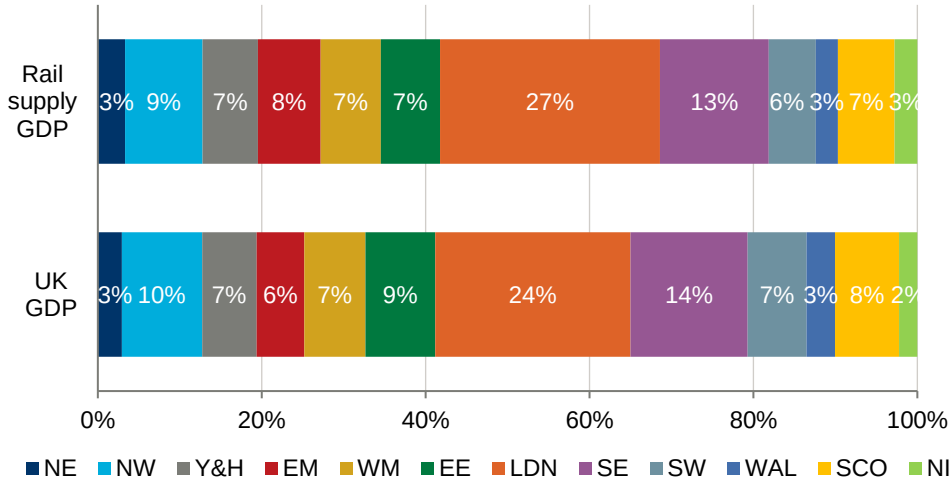
4.3 RAIL SUPPLY SECTOR IMPACTS BY REGION

The analysis in Chapter 3 showed how direct activity on the UK railway system is disproportionately focused on London. However, the benefits of the system's external expenditure on assets, goods, and services, as reflected in the make-up of the rail supply sector, is spead much more evenly around the country.

As Fig. 42 shows, London accounts for 27% of that sector's GVA, which is only modestly higher than the capital's 24% share of all UK GVA. Excluding London, the sector's pattern mirrors that of the wider economy even more closely. But it is is worth noting that this activity is 'over-represented' in the East Midlands, despite activity on the railway system itself being 'under-represented' there.

Fig. 42. UK rail supply sector GVA in 2019, by region

% of national total

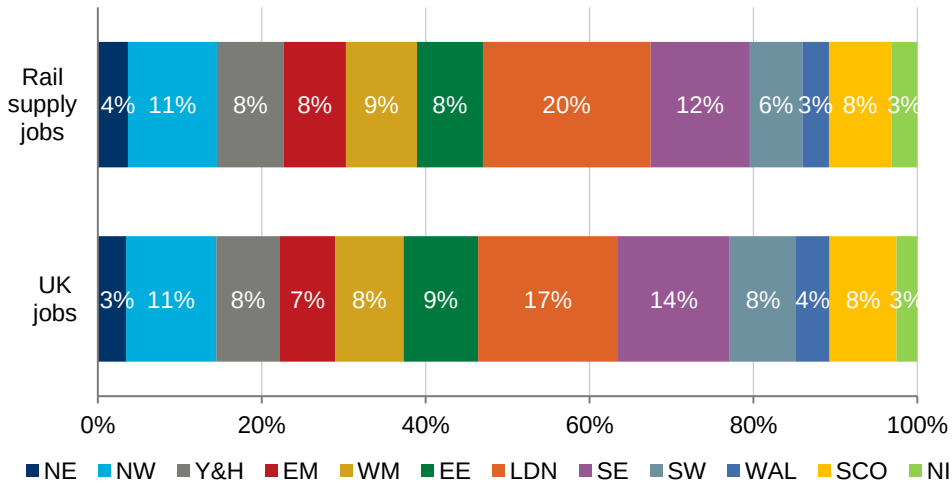


Source: Oxford Economics

In the case of employment, London accounts for 20% of all jobs in the rail supply sector, which is again only modestly higher than that region's 17% share of all UK workers (see Fig. 43). The five regions in the North of England and Midlands account for a combined 39% of rail supply sector jobs, which is also modestly higher than those regions' 37% share of the UK workforce.

Fig. 43. UK rail supply sector employment in 2019, by region

% of national total



Source: Oxford Economics

CASE STUDY

PORTERBROOK HYDROFLEX

HydroFLEX is the world's first train retrofitted to operate under hydrogen power and the first hydrogen powered train on Britain's railway. It draws power from overhead wires and where these don't exist, operates in self powered mode using hydrogen, fuel cells and batteries. HydroFLEX is the result of a collaboration between Porterbrook and the University of Birmingham.

Following successful mainline testing of the HydroFLEX in September 2020, Porterbrook has partnered with the University of Birmingham and Network Rail to build a new version of the HydroFLEX, capable of replicating the duty cycles of the diesel trains it aims to replace.

HydroFLEX represents a £7m private sector investment by Porterbrook in a zero-emission alternative to diesel powered trains. By retaining the capability of using overhead wires as a power source, HydroFLEX can extend the electrified railway to non-electrified routes but without the need for costly and disruptive infrastructure upgrades.

The design and build of the train are being undertaken by UK suppliers, protecting existing jobs and kick-starting the creation of a hydrogen rail supply chain.

"It is amazing to see Porterbrook's HydroFLEX train showcased on an international stage. Ground-breaking green technology projects like HydroFLEX are central to our plan to decarbonise the rail network by 2050." Rail Minister Chris Heaton-Harris MP

Hydrogen powered trains will support the progressive roll out of electrification schemes, as well as delivering clean train travel on routes where overhead wires cannot be economically justified.

HydroFLEX is part of a suite of Porterbrook engineering initiatives designed to improve air-quality, reduce carbon and deliver a cost-effective and sustainable railway for both passengers and taxpayers.

Long Marston Rail Innovation Centre

On the 23 June, Porterbrook added the Long Marston Rail Innovation Centre to its portfolio of managed railway assets. The Long Marston Rail Innovation Centre is a 135-acre rail connected site in Warwickshire, it offers a 2 mile circular test track and 12miles of secure sidings. Porterbrook's plans for the site will see a significant investment and upgrade in these facilities.

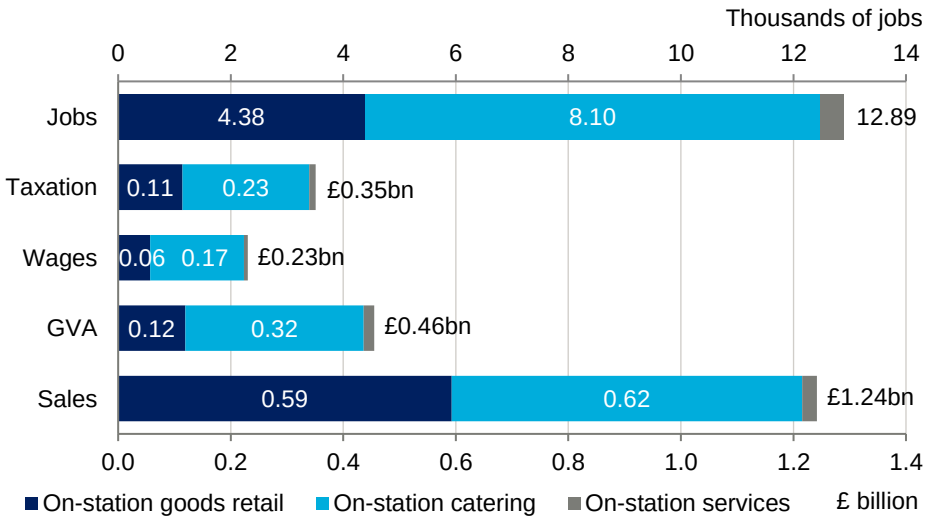
Working with the railway supply chain, including SMEs and academic bodies, Porterbrook will develop the Long Marston Rail Innovation Centre to become a leader in developing sustainable and digital technology focused on the needs of passengers, rail freight users, train operators and infrastructure owners.

5. STATION RETAIL AND SUPPLIES

Oxford Economics was provided with partial data on the turnover and employment of retailers and caterers based on UK railway stations, by the station operators (i.e. Network Rail in the case of larger stations, and some of the Train Operating Companies in the case of smaller stations). This was combined with information on the scale and geographical pattern of this activity made available for the previous report, and data on passenger entries and exits by station[26], to estimate on-station retail activity on a station-by-station basis.

Across the UK, sales by these businesses are estimated to have been around £1.24 billion in 2019, supporting £0.46 billion of GVA, £0.35 billion in taxation, and almost 13,000 jobs (see Fig. 44). The data for the Network Rail-run stations are consistent with a reasonable rate of growth in sales between 2016 and 2019. However, the overall estimates are lower than those presented last time (£2.3 billion in sales, £0.8 billion of GVA, 27,600 jobs, and £0.4 billion in taxes), as the new information available suggests that the previous results for 2016 were over-estimated in the case of the smaller stations. This may possibly suggest that there is scope to grow retail activity at smaller stations.

Fig. 44. On-station retail activity in 2019 by sub-sector



Source: Oxford Economics

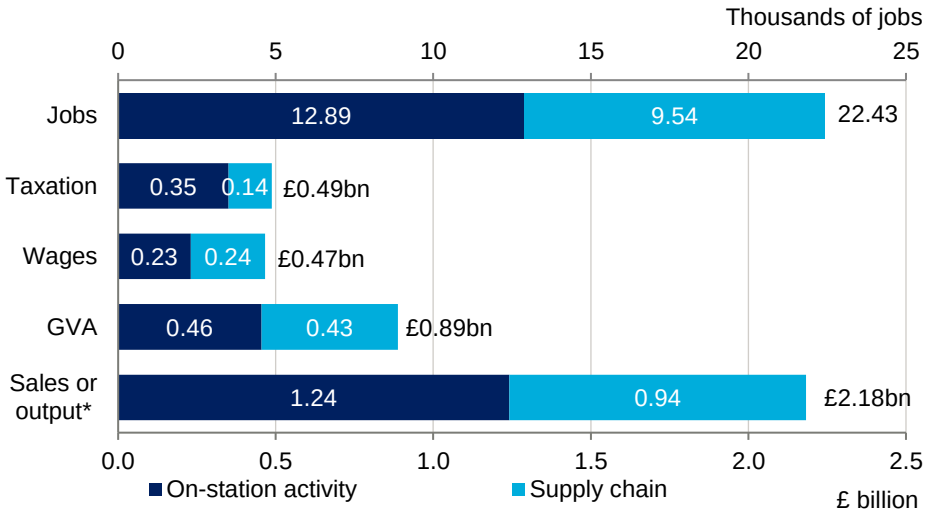
As shown in the chart, goods retailers accounted for close to half of the sales value, but for only around a quarter of the GVA, reflecting the role of purchases of stocks of goods for resale. Overall, goods retail accounts for a majority of sales in the larger, Network Rail-operated stations, but catering is significantly more important than goods retail in the case of the smaller stations. The totals also include modest amounts of services activity, such as dry-cleaning, key-cutting, and household item repairs.

If the UK supply chain is added in, then total sales or output amounted to £2.18 billion in 2018 (see Fig. 45). This includes the wholesalers' gross margin on

[26] Office of Road and Rail, *Estimates of station usage 2019-20*, December 2020.

stocks re-sold, of £0.13 billion, but is net of the cost of those stocks to the wholesalers.[27] In aggregate, taking all on-station activity and UK-based suppliers together, these transactions supported £0.89 billion of GVA, £0.49 billion of taxation, and over 22,000 jobs.

Fig. 45. On-station retail and supply chain activity in 2019

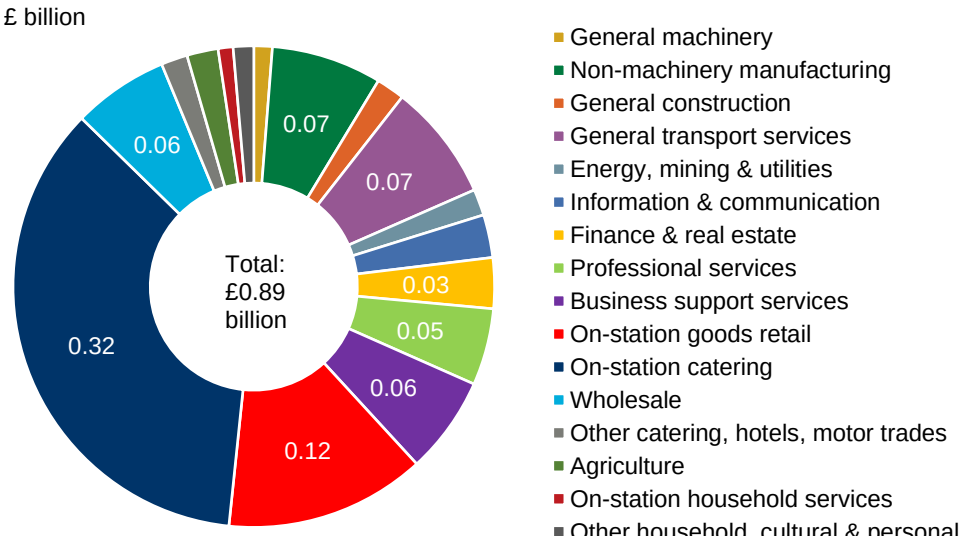


Source: Oxford Economics

* Sales for on-station retail; output for supply chain

Not surprisingly, the by-industry pattern of this GVA is dominated by the wholesale, retail, catering and hotels grouping, with most of this accounted for by on-station goods retailers and caterers (see Fig. 46). Production of manufactured items, wholesale and transport services, and professional and business support services, account for much the remainder. On-station retail and catering are even more dominant in the case of employment (see Fig. 47).

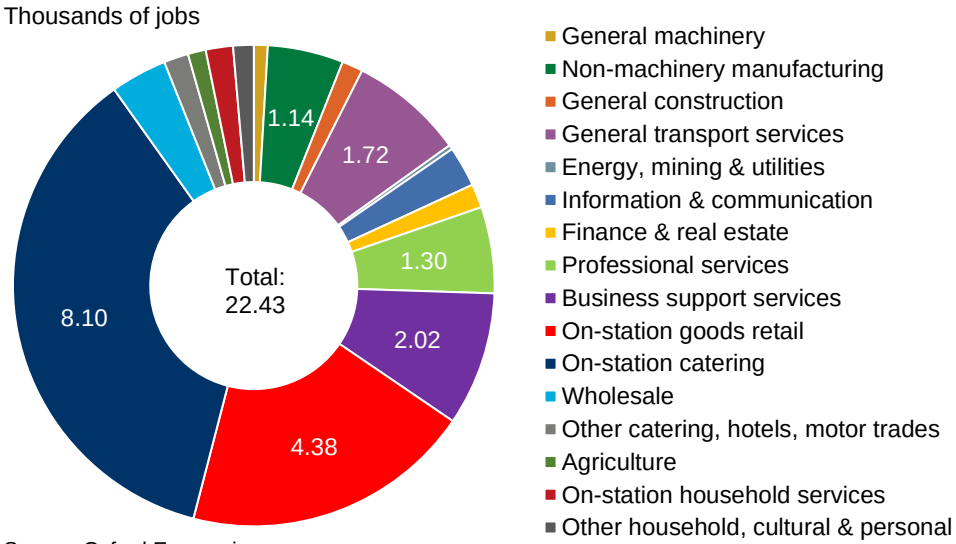
Fig. 46. On-station retail and supply chain GVA by industry



Source: Oxford Economics

[27] The limitations of the 'input-output' model mean that only output, rather than sales, can be captured in the case of the supply chain — i.e. sales net of the cost of stocks purchased. The output of wholesale suppliers is therefore equal to the 'gross margin' on stocks re-sold, rather than the full value of those sales.

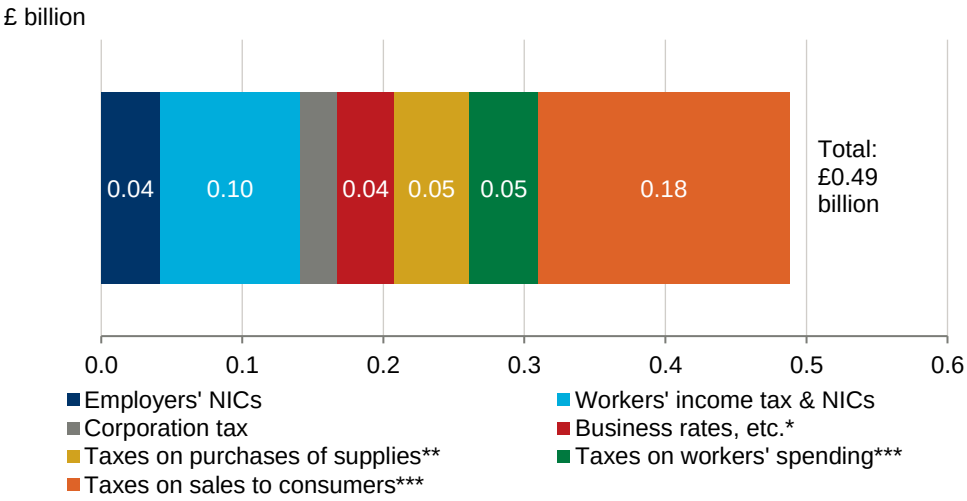
Fig. 47. On-station retail and supply chain employment by industry



Source: Oxford Economics

A significant share of the total tax contribution, of £0.49 billion, is accounted for by taxes on sales to consumers, with income tax and NICs paid by employees and the self-employed the next most important category (see Fig. 48).

Fig. 48. On-station retail and supply chain tax payments by type of tax

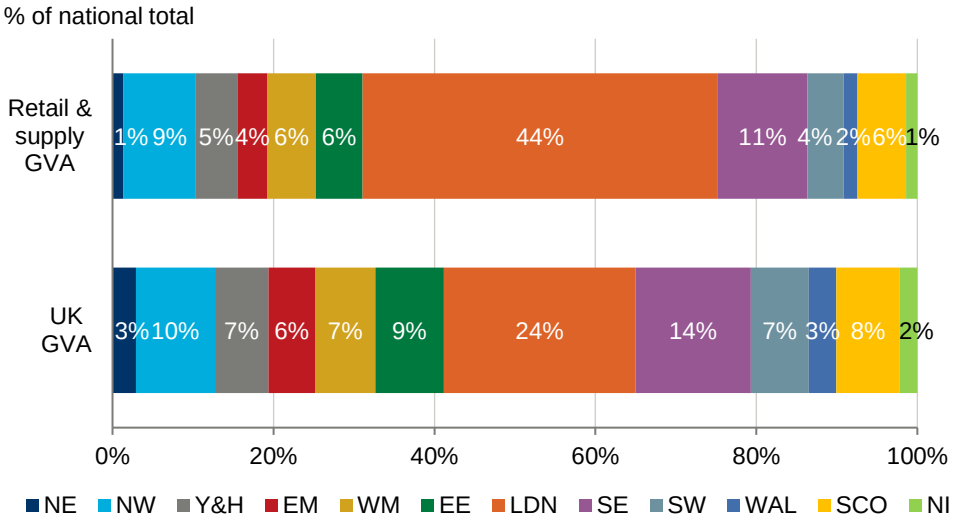


Source: Oxford Economics

* 'Taxes on production', e.g. rates, vehicle duty, apprenticeship levy.
** E.g. road fuel duty. *** E.g. VAT and excise duties.

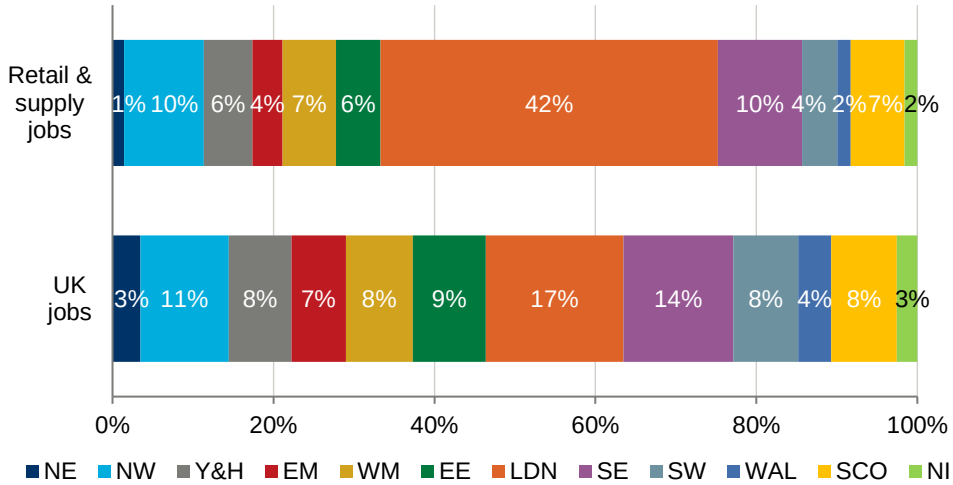
Finally, as on-station retail activity is heavily skewed towards large railway terminal stations, London dominates the geographical pattern of GVA (Fig. 49) and employment (Fig. 50).

Fig. 49. On-station retail and supply chain GVA by region



Source: Oxford Economics

Fig. 50. On-station retail and supply chain employment by region



Source: Oxford Economics

While jobs in the retail, catering, and household services fields will not typically be as well-paid as those in the rail and supply sectors, it is worth highlighting the fact that these roles can often benefit the staff concerned in other ways. The nature of the work allows young individuals to gain valuable 'soft skills' in the communications, customer relations, and team-working fields, benefiting future careers in a wide range of industries. In addition, a high proportion of the jobs are part-time, which can be optimal for some working parents, students, and individuals working beyond retirement age, amongst others.

It should also be noted that the value of rail to local economies extends well beyond on-station retail activity. The numbers captured here do not include the value created for, for example, shops and catering outlets in close proximity to the stations, but not located within them, or nearby independently-run car parks, or leisure and shopping centres attracting rail-using customers from further afield. Nor do the numbers in this report capture the way in which the proximity of a well-connected railway station can boost local property values.

CASE STUDY

UNIPART RAIL UKRRIN TECHNOLOGY & INNOVATION HUB

UK railways have complex safety-critical systems that ensure that trains are one of the safest forms of transport, however changing one minor element of these integrated systems may adversely affect others, hence the industry historically has perhaps attracted an unfair reputation as a 'laggard' with regards to adoption of digital technology.

United Kingdom Rail Research and Innovation Network (UKRRIN) was created to connect Government, Academia, Industry and SMEs in a shared endeavour to focus on driving innovation to the sector.

UKRRIN Technology & Innovation Hub

Unipart Rail is now creating 600 sqm Technology & Innovation Hub in Doncaster designed to showcase the UKRRIN Centres of Excellence, co-locate experts to facilitate cross-expertise learning and innovation, mentor and develop SMEs to help bring their innovations to market, and showcase Unipart Rail's role in driving innovation across the sector. The hub will be launched on 22nd September 2021.

"We see the Hub as a key factor in realising the aspirations of the UK rail industry. The purpose of our Hub is to ensure a route to market for the next generation of rail technologies and we are delighted to not only have the support of Network Rail's Centre of Excellence for Testing, but also an opportunity to showcase their research and development programme. This will undoubtedly be an inspiration for those of us in the supply chain to ensure we don't unnecessarily waste resources reinventing what already exists or learning lessons regarding unsuccessful endeavours elsewhere." Jake Rudham, Marketing Director, Unipart Rail

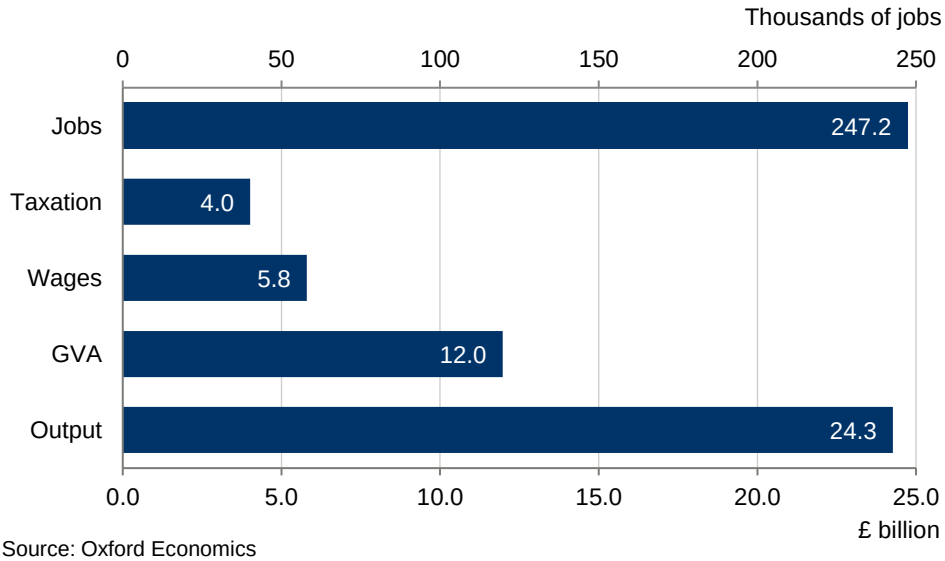
Unipart Rail is the leading specialist provider of technology and supply chain solutions to the rail industry. With a growing international presence and extensive expertise in infrastructure, signalling and traction & rolling stock products, Unipart Rail is a major partner to the rail industry. Unipart Group is headquartered in Oxford, has a £786m annual turnover, and provides services to a growing range of blue-chip clients including Jaguar Land Rover, Vodafone, Sky, and many other household names.

6. INDUCED IMPACTS

Individuals employed in the UK railway system, rail supply sector, on-station retail sector, and retail supply chain, will spend their earnings on household goods and services, thereby supporting activity in shops, restaurants, theatres, and other outlets of all kinds. Those businesses and their workers in turn will also purchase supplies, again supporting economic activity and employment in the UK. All of the activity supported in this way is referred to as the 'induced impact' of the rail-related industries, and is analysed in this chapter.

In total, induced output in 2019 is estimated to have been some £24.3 billion (see Fig. 51). This was associated with £12.0 billion of GVA, £4.0 billion of taxation, and approaching 250,000 jobs. This GVA contribution is equivalent to just under 40% of the combined GVA of the rail transport system, rail supply sector, and retail and supply activity.

Fig. 51. Rail-related induced activity in 2019



Source: Oxford Economics

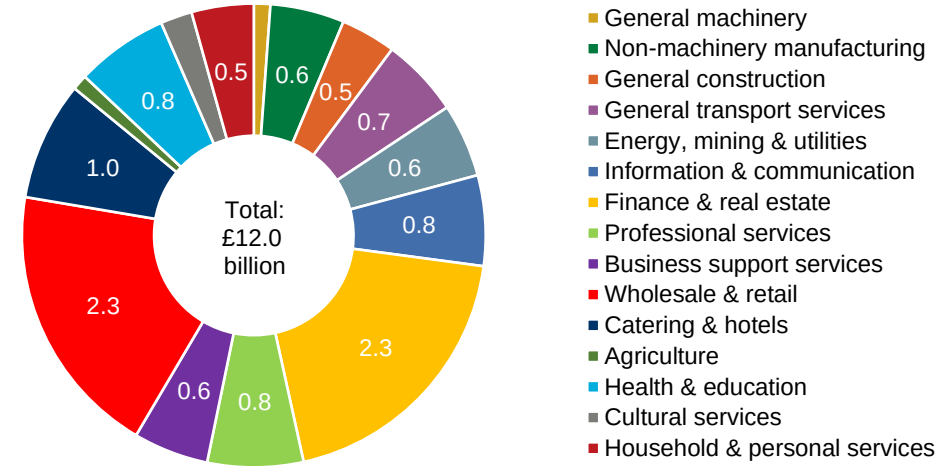
Although the induced impact is influenced by business-to-business transactions further along the supply chain, it is driven in the first instance by business-to-consumer trade, so the by-industry pattern of GVA and jobs is very different to that of the rail supply sector. Finance and real estate (which includes property rental), and retail and wholesale activity, each account for some 19% of the total induced impact, and catering and hotels for 8% (see Fig. 52). The remainder is spread across a wide range of mainly consumer-facing activities.

In the case of employment, retail and wholesale services account for 25% of the total, and catering and hotels for 18% (see Fig. 53). Finance and real estate account for only 6% of these jobs.

Income tax and NICs paid by employees and the self-employed account for the largest slice of the induced tax contribution (see Fig. 54). But each of the other tax categories is also quite significant in size.

Fig. 52. Induced GVA impact by industry

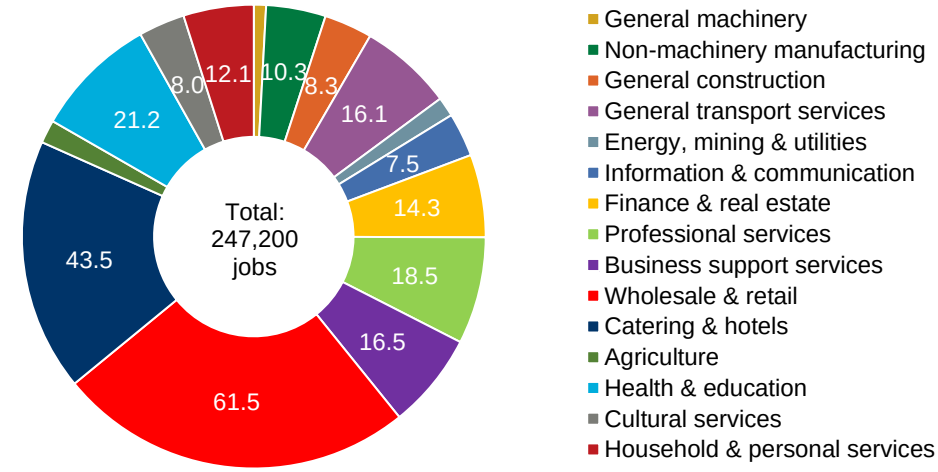
£ billion



Source: Oxford Economics

Fig. 53. Induced employment impact by industry

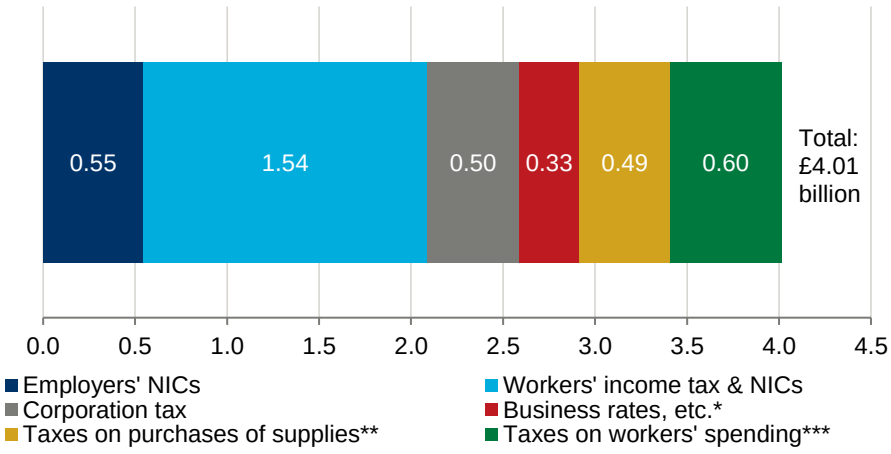
£ billion



Source: Oxford Economics

Fig. 54. Induced tax payments by type of tax

£ billion

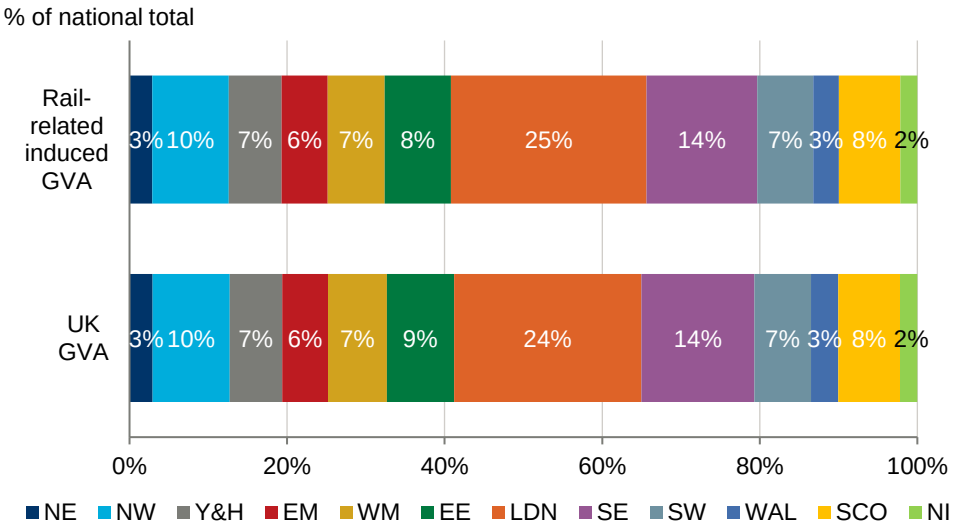


Source: Oxford Economics

* 'Taxes on production', e.g. rates, vehicle duty, apprenticeship levy. ** E.g. road fuel duty. *** E.g. VAT and excise duties.

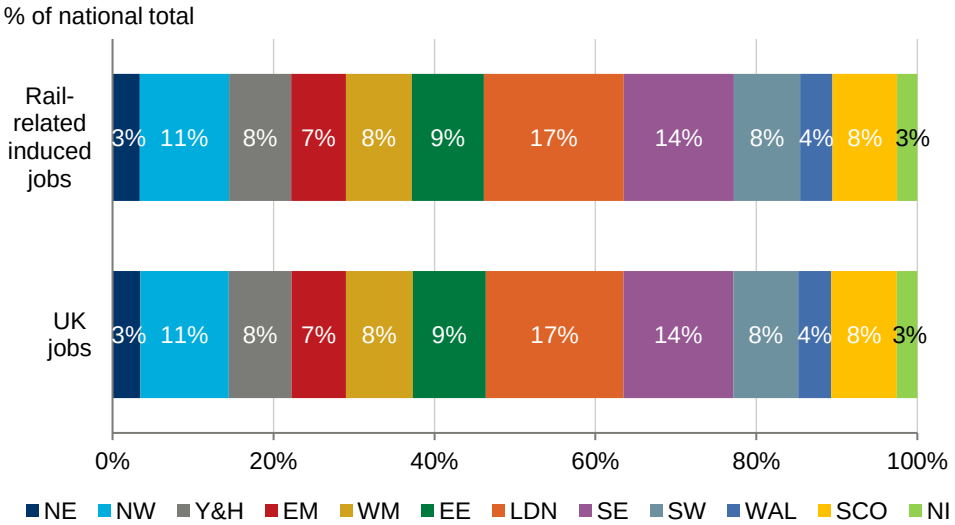
The regional pattern of the induced GVA impact (Fig. 55) and induced employment impact (Fig. 56) is very much in line with the pattern of activity for the whole UK economy.

Fig. 55. Induced GVA impact by region



Source: Oxford Economics

Fig. 56. Induced employment impact by region



Source: Oxford Economics

As in the case of on-station retail activity, jobs supported in the induced channel will not be as highly-paid, on average, as those in the rail and supply sectors. But many are in consumer-facing roles in sectors such as retail, catering, hotels, cultural activities, and household and personal services, offering other benefits to staff such as flexible work patterns and the chance to develop 'soft skills' of the kind desirable in many jobs across the wider economy.

CASE STUDY

THE CENTRAL RAIL SYSTEMS ALLIANCE

The Central Rail Systems Alliance (CRSA) comprises of Network Rail (the owner), Balfour Beatty, TSO, and Atkins working together over a ten-year programme to deliver track renewals in the North West & Central as well as Eastern Regions of England. The CRSA is helping Network Rail and the Department for Transport (DfT) to deliver work quicker with collaborative engagement between client, designer and construction teams. The alliance is responsible for the development, design and delivery of all track renewals and crossings, providing a full range of services from conception through to construction and handover.

The CSRA is also investing in digital strategy capable of delivering some of the UK's most high-profile projects. Ten innovation workstreams are being developed, split into surveying, engineering and design, delivery, and business managements. Each of these workstreams are innovating for efficiency and safety.

The alliance is successfully delivering key renewal projects, such as the design and installation of a crossover at Cricklewood South Junction, located near London St Pancras, critical track renewal and drainage works at Kilsby Tunnel, and simplifying the track layout at Kings Cross.

Atkins is the Designer partner in the alliance, providing all the multidisciplinary design in track, signalling, overhead line, electrical and power, civils, environmental and drainage works.

7. IMPACTS BY REGION

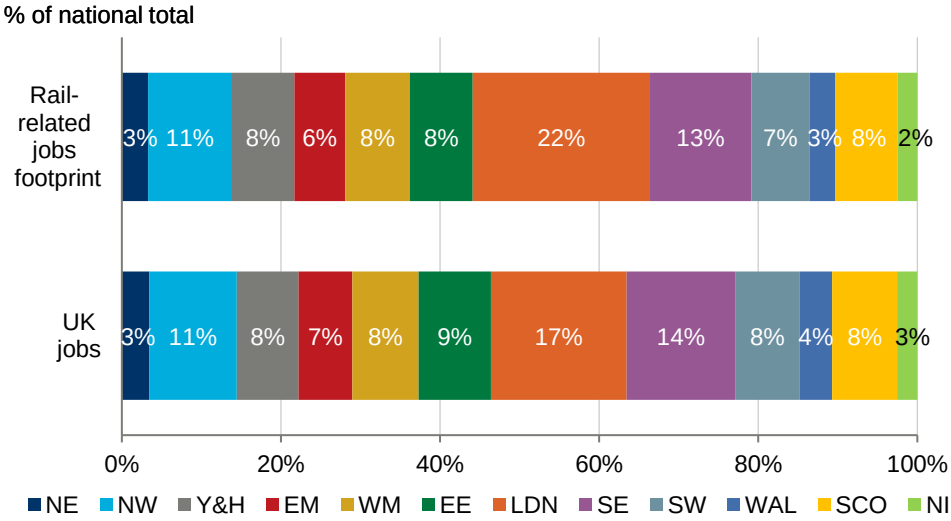
The following pages illustrate key results on a region-by-region basis. The first page shows results for the UK as a whole, to act as a point of comparison. Results then follow for each of the nine English regions, followed by Wales, Scotland, and Northern Ireland.

It should be noted that the figures are 'central' estimates, largely modelled by Oxford Economics based on the available economic data as described in Appendix 3. For the most part, the estimates are not based on any data sourced directly from the businesses concerned, so they will be subject to a margin of error and should be treated with a degree of caution.

Some key points on the regional distribution of activity are as follows:

- London's share of national GVA and employment is higher in the rail transport system, and in on-station retail, than in the case of the economy as a whole (see Chapters 3 and 5).
- But this is not true for either the rail supply sector, or rail-related induced (wage-funded expenditure) impacts (see Chapters 4 and 6).
- Taking all rail-related impacts together, the regional pattern of GVA and jobs supported is fairly similar to that for the economy as a whole (see Chapter 2, and Fig. 57 below).
- For each of the rail transport system and rail supply sector, GVA per job and wages per employee job are above the equivalent economy-wide averages in every one of the 12 regions and countries (see Chapter 2).

Fig. 57. UK rail-related employment footprint in 2019, by region

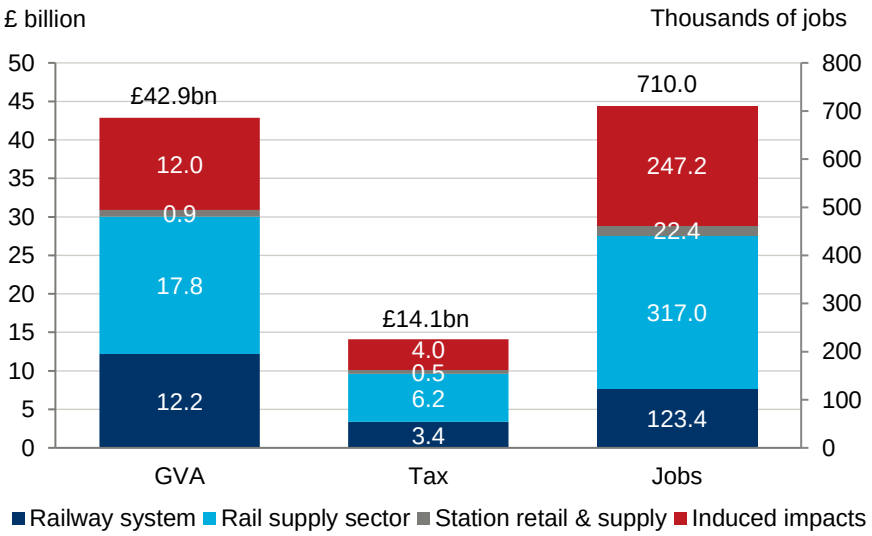


Source: Oxford Economics

In addition to the main results tables provide in Appendix 2, a separate set of detailed results is also available. This includes estimates for each region on an industry-by-industry basis.

UK TOTAL

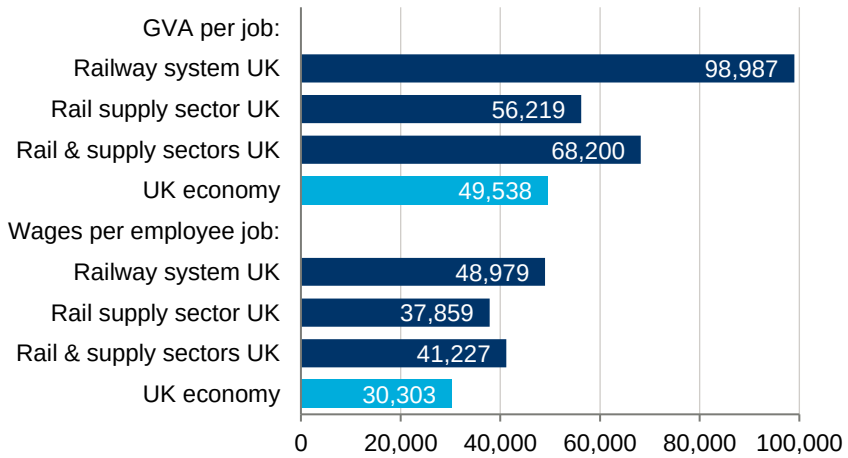
Values for the UK	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	26.0	12.2	6.0	3.4	123.4	123.4
Rail supply sector	37.7	17.8	10.8	6.2	317.0	284.0
Total rail & supply sectors	63.6	30.0	16.8	9.6	440.3	407.3
Station retail & supply	2.2	0.9	0.5	0.5	22.4	19.0
Induced impacts	24.3	12.0	5.8	4.0	247.2	213.9
All rail-related impacts	90.1	42.9	23.1	14.1	710.0	640.2



Source: Oxford Economics

GVA as % of UK total	
Railway system	100.0%
Rail supply	100.0%
Rail & supply	100.0%
Retail & supply	100.0%
Induced impacts	100.0%
All rail-related	100.0%
Jobs as % of UK total	
Railway system	100.0%
Rail supply	100.0%
Rail & supply	100.0%
Retail & supply	100.0%
Induced impacts	100.0%
All rail-related	100.0%

£ per job per annum

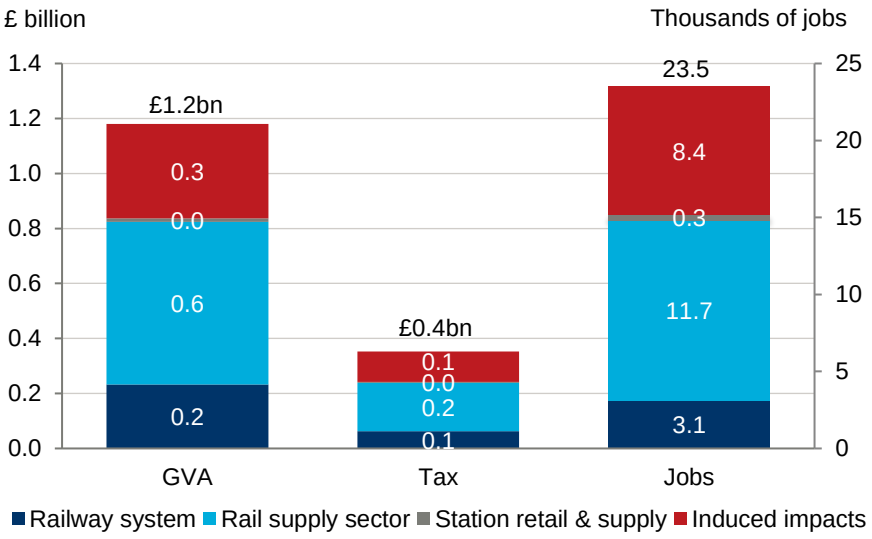


Source: Oxford Economics

GVA per job as % of UK average	
Railway system	200%
Rail supply	113%
Rail & supply	138%
Wages per employee job as % of UK average	
Railway system	162%
Rail supply	125%
Rail & supply	136%

NORTH EAST

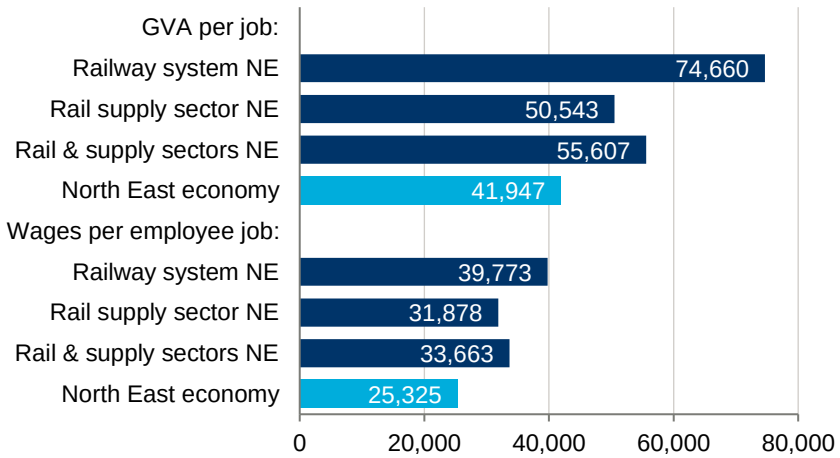
Values for the North East	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	0.6	0.2	0.1	0.1	3.1	3.1
Rail supply sector	1.3	0.6	0.3	0.2	11.7	10.7
Total rail & supply sectors	2.0	0.8	0.5	0.2	14.8	13.8
Station retail & supply	0.0	0.0	0.0	0.0	0.3	0.3
Induced impacts	0.7	0.3	0.2	0.1	8.4	7.3
All rail-related impacts	2.7	1.2	0.6	0.4	23.5	21.3



Source: Oxford Economics

GVA as % of UK total	
Railway system	1.9%
Rail supply	3.3%
Rail & supply	2.7%
Retail & supply	1.4%
Induced impacts	2.9%
All rail-related	2.8%
Jobs as % of UK total	
Railway system	2.5%
Rail supply	3.7%
Rail & supply	3.4%
Retail & supply	1.4%
Induced impacts	3.4%
All rail-related	3.3%

£ per job per annum

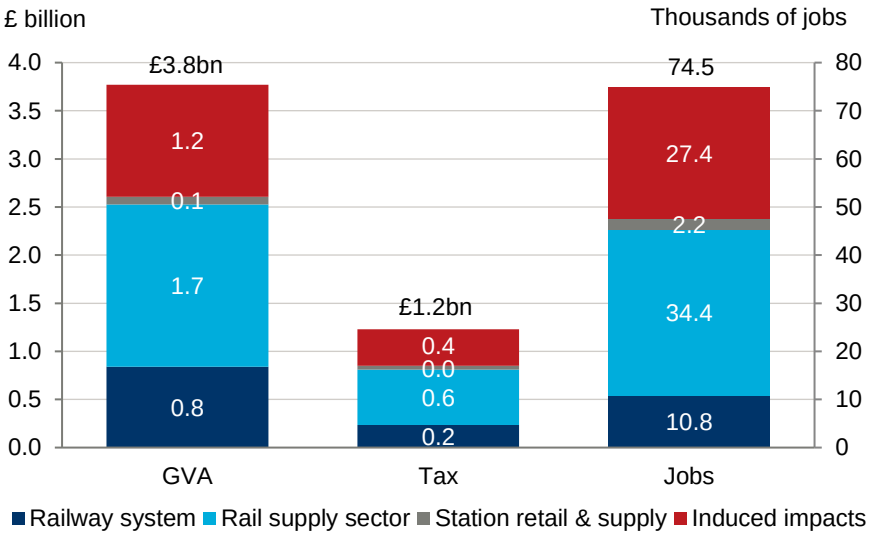


Source: Oxford Economics

GVA per job as % of NE average	
Railway system	178%
Rail supply	120%
Rail & supply	133%
Wages per employee job as % of NE average	
Railway system	157%
Rail supply	126%
Rail & supply	133%

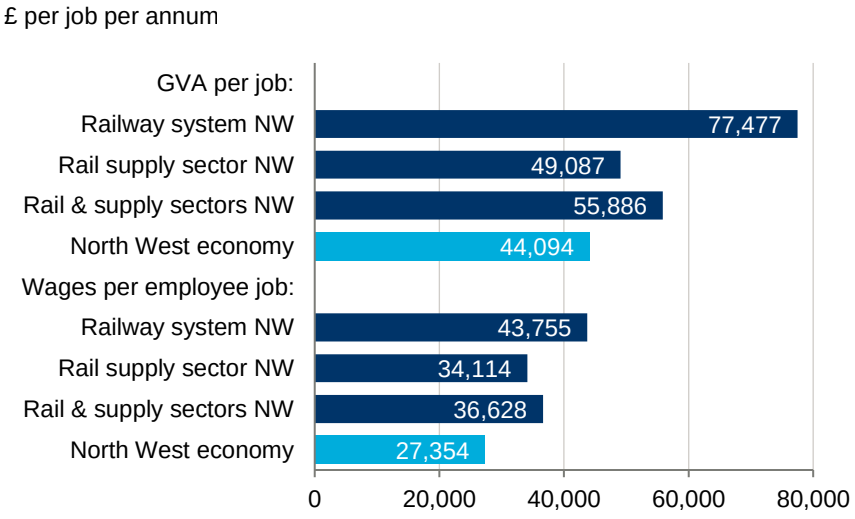
NORTH WEST

Values for the North West	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	1.8	0.8	0.5	0.2	10.8	10.8
Rail supply sector	3.6	1.7	1.0	0.6	34.4	30.7
Total rail & supply	5.4	2.5	1.5	0.8	45.2	41.5
Station retail & supply	0.2	0.1	0.0	0.0	2.2	1.9
Induced impacts	2.4	1.2	0.6	0.4	27.4	23.8
All rail-related impacts	7.9	3.8	2.1	1.2	74.9	67.2



Source: Oxford Economi

GVA as % of UK total	
Railway system	6.9%
Rail supply	9.5%
Rail & supply	8.4%
Retail & supply	8.9%
Induced impacts	9.7%
All rail-related	8.8%
Jobs as % of UK total	
Railway system	8.8%
Rail supply	10.8%
Rail & supply	10.3%
Retail & supply	9.9%
Induced impacts	11.1%
All rail-related	10.5%

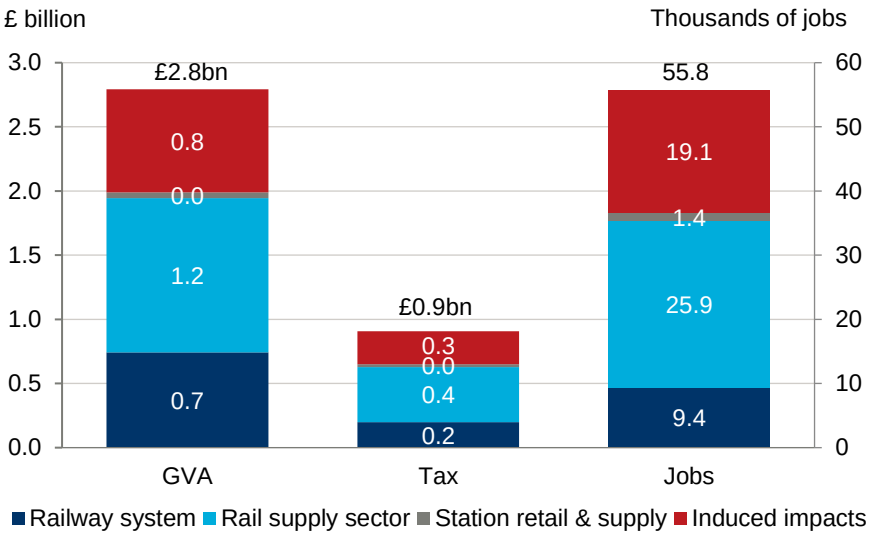


Source: Oxford Economics

GVA per job as % of NW average	
Railway system	176%
Rail supply	111%
Rail & supply	127%
Wages per employee job as % of NW average	
Railway system	160%
Rail supply	125%
Rail & supply	134%

YORKSHIRE & THE HUMBER

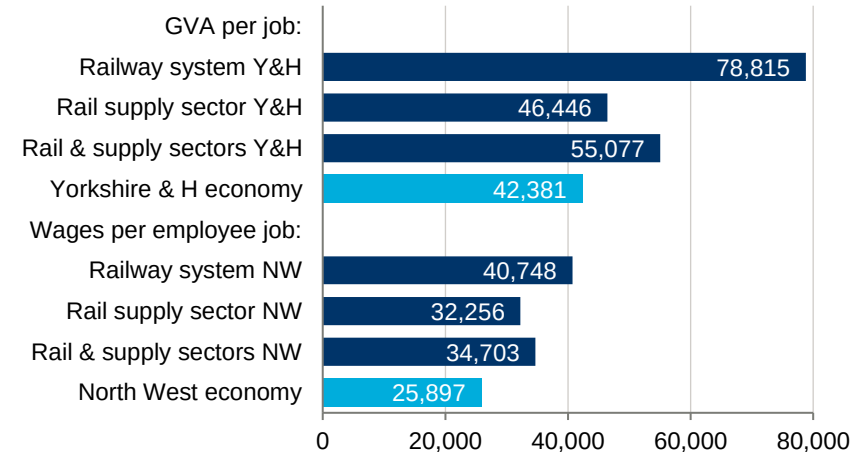
Values for Yorkshire and The Humber	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	1.7	0.7	0.4	0.2	9.4	9.4
Rail supply sector	2.7	1.2	0.8	0.4	25.9	23.3
Total rail & supply	4.3	1.9	1.1	0.6	35.3	32.7
Station retail & supply	0.1	0.0	0.0	0.0	1.4	1.2
Induced impacts	1.7	0.8	0.4	0.3	19.1	16.5
All rail-related impacts	6.1	2.8	1.5	0.9	55.8	50.3



Source: Oxford Economics

GVA as % of UK total	
Railway system	6.1%
Rail supply	6.7%
Rail & supply	6.5%
Retail & supply	5.2%
Induced impacts	6.7%
All rail-related	6.5%
Jobs as % of UK total	
Railway system	7.6%
Rail supply	8.2%
Rail & supply	8.0%
Retail & supply	6.1%
Induced impacts	7.7%
All rail-related	7.9%

£ per job per annum

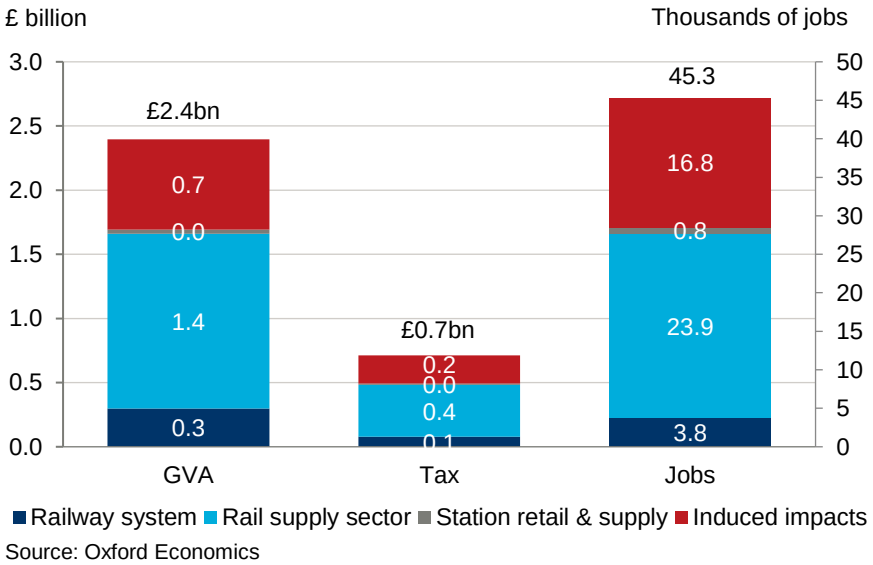


Source: Oxford Economics

GVA per job as % of Y&H average	
Railway system	186%
Rail supply	110%
Rail & supply	130%
Wages per employee job as % of Y&H average	
Railway system	157%
Rail supply	125%
Rail & supply	134%

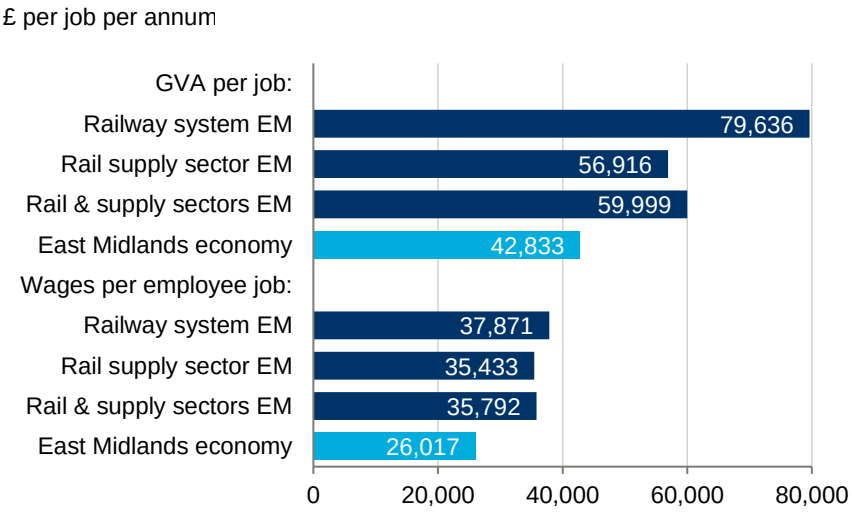
EAST MIDLANDS

Values for East Midlands	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	0.8	0.3	0.1	0.1	3.8	3.8
Rail supply sector	3.0	1.4	0.8	0.4	23.9	21.7
Total rail & supply	3.9	1.7	0.9	0.5	27.7	25.5
Station retail & supply	0.1	0.0	0.0	0.0	0.8	0.7
Induced impacts	1.5	0.7	0.3	0.2	16.8	14.5
All rail-related impacts	5.4	2.4	1.3	0.7	45.3	40.7



Source: Oxford Economics

GVA as % of UK total	
Railway system	2.4%
Rail supply	7.6%
Rail & supply	5.5%
Retail & supply	3.7%
Induced impacts	5.9%
All rail-related	5.6%
Jobs as % of UK total	
Railway system	3.0%
Rail supply	7.5%
Rail & supply	6.3%
Retail & supply	3.7%
Induced impacts	6.8%
All rail-related	6.4%

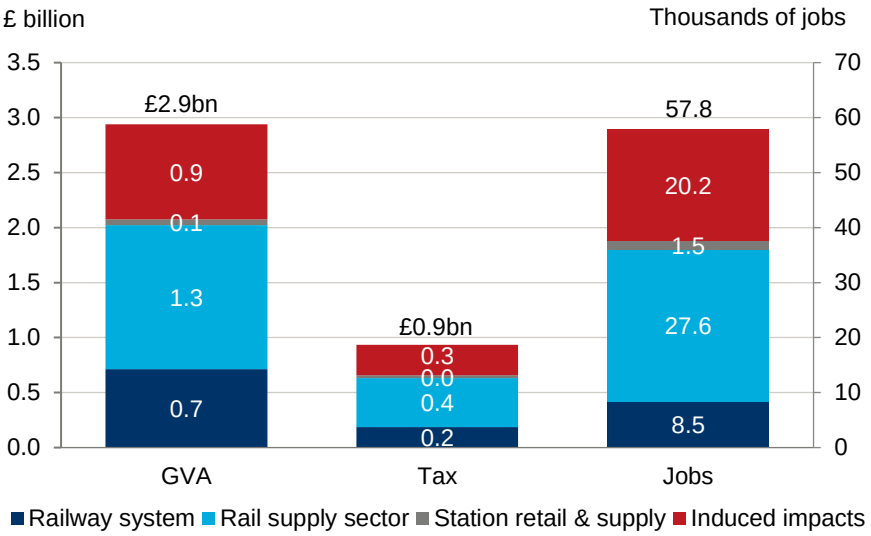


GVA per job as % of EM average	
Railway system	186%
Rail supply	133%
Rail & supply	140%
Wages per employee job as % of EM average	
Railway system	146%
Rail supply	136%
Rail & supply	138%

Source: Oxford Economics

WEST MIDLANDS

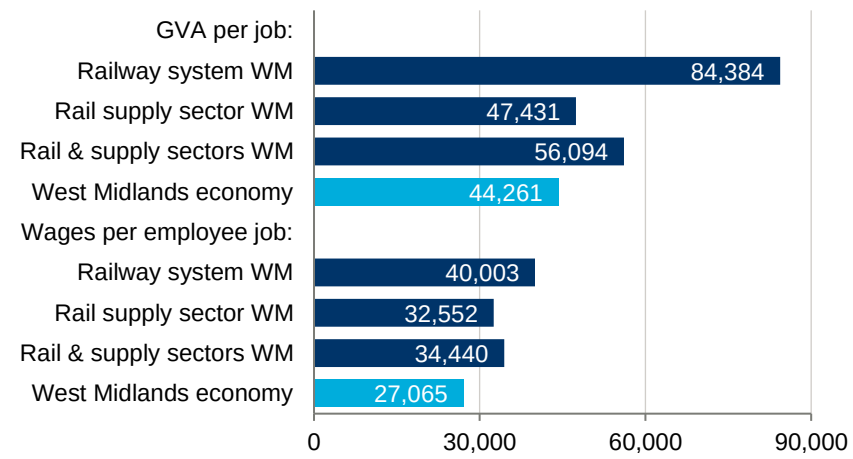
Values for West Midlands	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	1.7	0.7	0.3	0.2	8.5	8.5
Rail supply sector	2.9	1.3	0.8	0.4	27.6	24.9
Total rail & supply	4.5	2.0	1.1	0.6	36.1	33.4
Station retail & supply	0.1	0.1	0.0	0.0	1.5	1.3
Induced impacts	1.8	0.9	0.4	0.3	20.2	17.6
All rail-related impacts	6.5	2.9	1.6	0.9	57.8	52.2



Source: Oxford Economics

GVA as % of UK total	
Railway system	5.8%
Rail supply	7.3%
Rail & supply	6.7%
Retail & supply	6.0%
Induced impacts	7.2%
All rail-related	6.9%
Jobs as % of UK total	
Railway system	6.9%
Rail supply	8.7%
Rail & supply	8.2%
Retail & supply	6.6%
Induced impacts	8.2%
All rail-related	8.1%

£ per job per annum

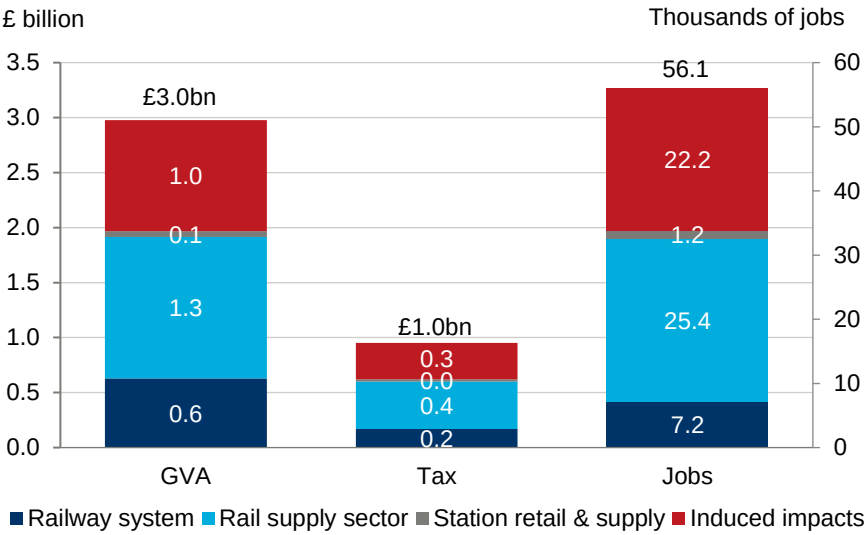


Source: Oxford Economics

GVA per job as % of WM average	
Railway system	191%
Rail supply	107%
Rail & supply	127%
Wages per employee job as % of WM average	
Railway system	148%
Rail supply	120%
Rail & supply	127%

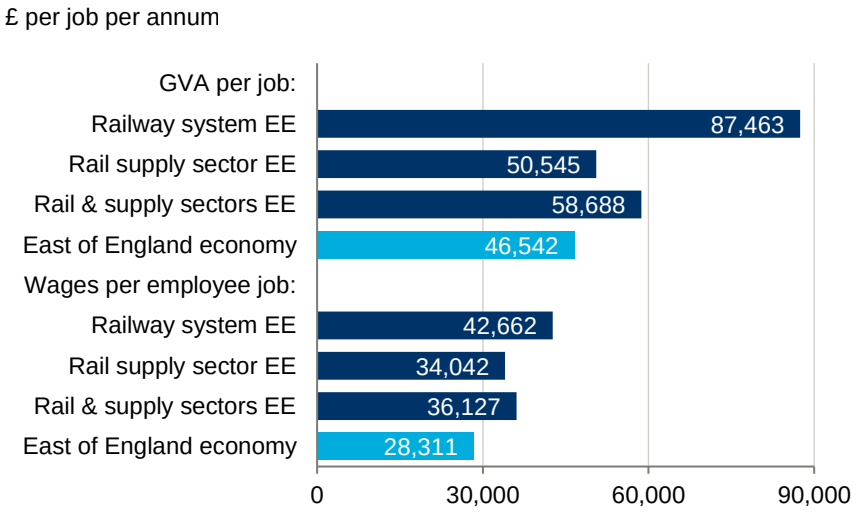
EAST OF ENGLAND

Values for East of England	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	1.5	0.6	0.3	0.2	7.2	7.2
Rail supply sector	2.6	1.3	0.8	0.4	25.4	22.6
Total rail & supply	4.1	1.9	1.1	0.6	32.6	29.8
Station retail & supply	0.1	0.1	0.0	0.0	1.2	1.1
Induced impacts	2.0	1.0	0.5	0.3	22.2	19.0
All rail-related impacts	6.2	3.0	1.6	1.0	56.1	49.9



Source: Oxford Economics

GVA as % of UK total	
Railway system	5.2%
Rail supply	7.2%
Rail & supply	6.4%
Retail & supply	5.8%
Induced impacts	8.4%
All rail-related	6.9%
Jobs as % of UK total	
Railway system	5.8%
Rail supply	8.0%
Rail & supply	7.4%
Retail & supply	5.6%
Induced impacts	9.0%
All rail-related	7.9%

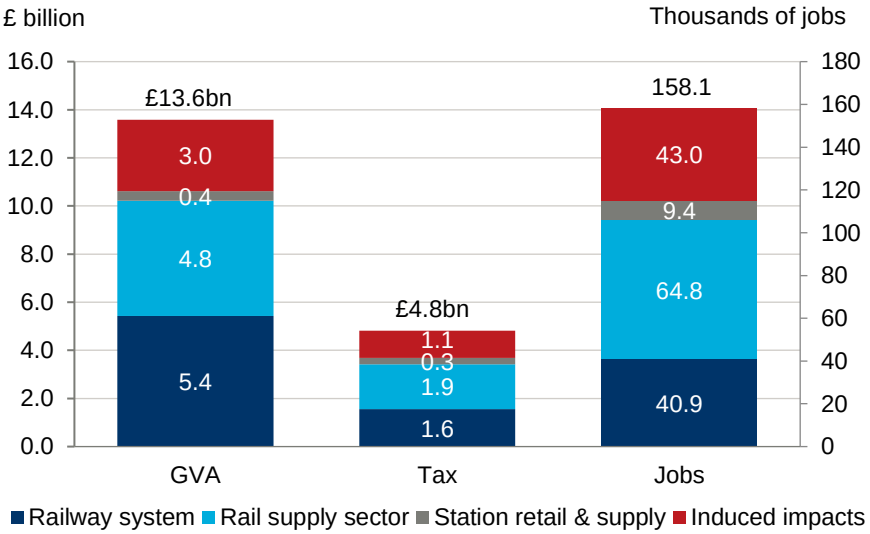


Source: Oxford Economics

GVA per job as % of EE average	
Railway system	188%
Rail supply	109%
Rail & supply	126%
Wages per employee job as % of EE average	
Railway system	151%
Rail supply	120%
Rail & supply	128%

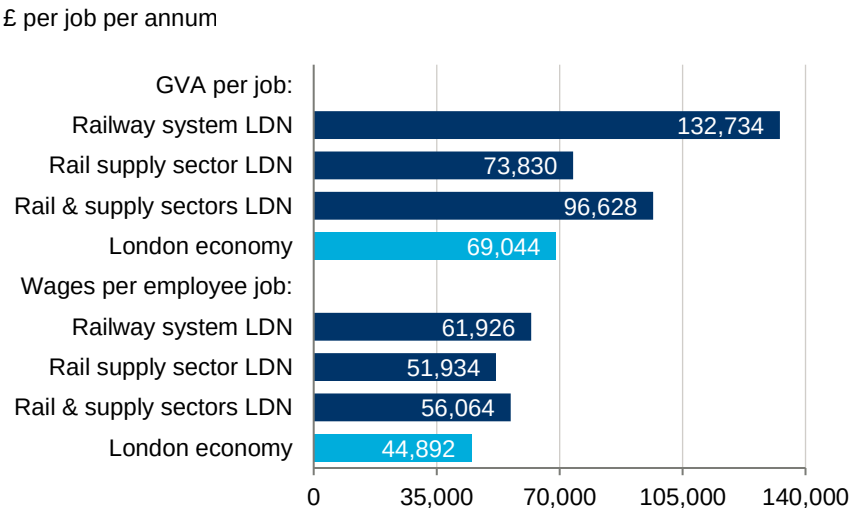
LONDON

Values for London	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	10.6	5.4	2.5	1.6	40.9	40.9
Rail supply sector	9.7	4.8	3.0	1.9	64.8	58.1
Total rail & supply	20.3	10.2	5.6	3.4	105.8	99.0
Station retail & supply	1.0	0.4	0.2	0.3	9.4	7.8
Induced impacts	5.7	3.0	1.5	1.1	43.0	37.2
All rail-related impacts	27.0	13.6	7.3	4.8	158.1	144.1



Source: Oxford Economics

GVA as % of UK total	
Railway system	44.5%
Rail supply	26.9%
Rail & supply	34.0%
Retail & supply	44.1%
Induced impacts	24.8%
All rail-related	31.7%
Jobs as % of UK total	
Railway system	33.2%
Rail supply	20.5%
Rail & supply	24.0%
Retail & supply	41.9%
Induced impacts	17.4%
All rail-related	22.3%

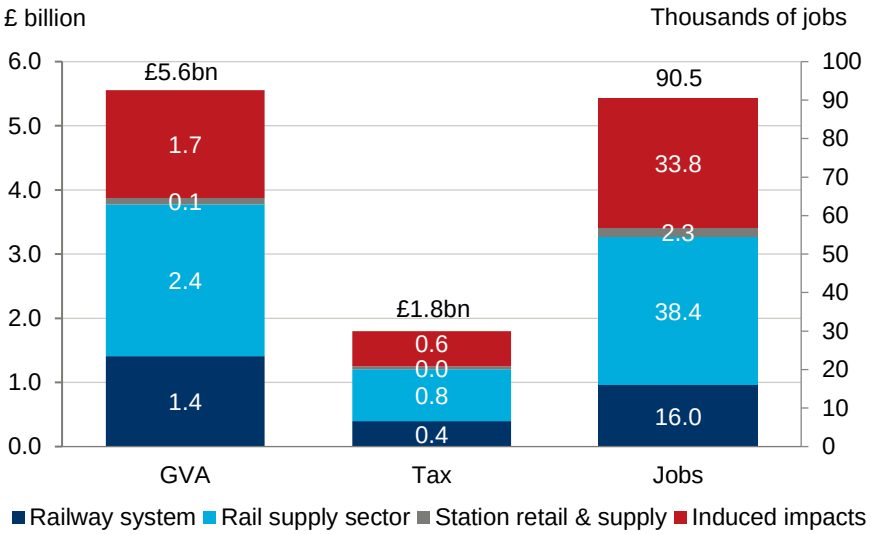


Source: Oxford Economics

GVA per job as % of LDN average	
Railway system	192%
Rail supply	107%
Rail & supply	140%
Wages per employee job as % of LDN average	
Railway system	138%
Rail supply	116%
Rail & supply	125%

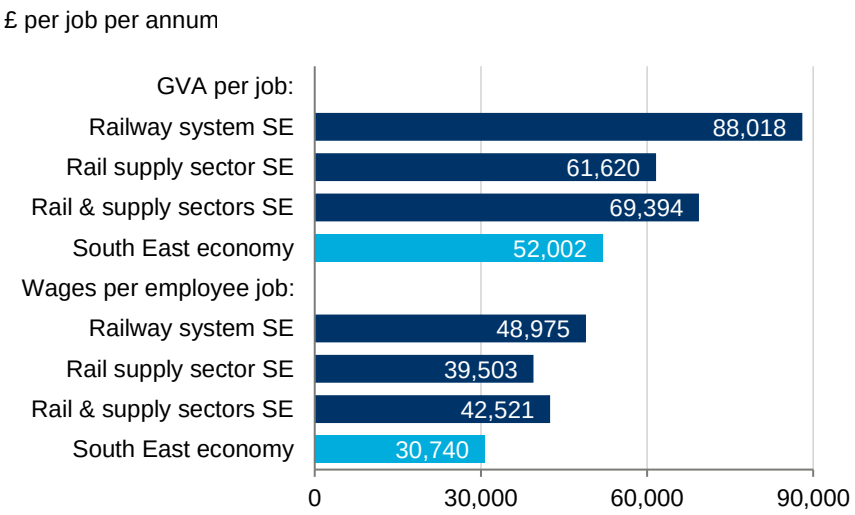
SOUTH EAST

Values for South East	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	2.9	1.4	0.8	0.4	16.0	16.0
Rail supply sector	4.8	2.4	1.4	0.8	38.4	34.3
Total rail & supply	7.7	3.8	2.1	1.2	54.4	50.3
Station retail & supply	0.2	0.1	0.1	0.0	2.3	2.0
Induced impacts	3.4	1.7	0.8	0.6	33.8	29.3
All rail-related impacts	11.4	5.6	3.0	1.8	90.5	81.6



Source: Oxford Economics

GVA as % of UK total	
Railway system	11.5%
Rail supply	13.3%
Rail & supply	12.6%
Retail & supply	11.1%
Induced impacts	14.0%
All rail-related	13.0%
Jobs as % of UK total	
Railway system	13.0%
Rail supply	12.1%
Rail & supply	12.4%
Retail & supply	10.5%
Induced impacts	13.7%
All rail-related	12.8%

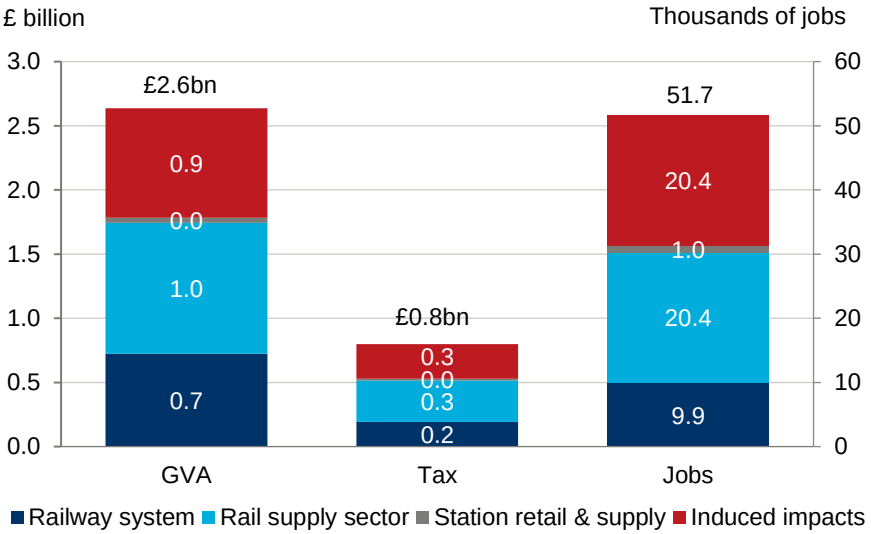


Source: Oxford Economics

GVA per job as % of SE average	
Railway system	169%
Rail supply	118%
Rail & supply	133%
Wages per employee job as % of SE average	
Railway system	159%
Rail supply	129%
Rail & supply	138%

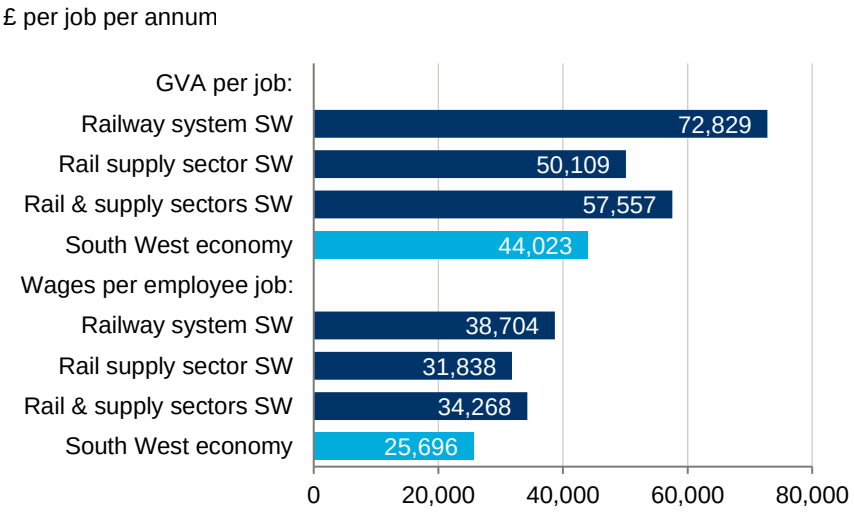
SOUTH WEST

Values for South West	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	1.6	0.7	0.4	0.2	9.9	9.9
Rail supply sector	2.1	1.0	0.6	0.3	20.4	18.1
Total rail & supply	3.7	1.7	1.0	0.5	30.3	28.1
Station retail & supply	0.1	0.0	0.0	0.0	1.0	0.8
Induced impacts	1.7	0.9	0.4	0.3	20.4	17.7
All rail-related impacts	5.5	2.6	1.4	0.8	51.7	46.6



Source: Oxford Economics

GVA as % of UK total	
Railway system	5.9%
Rail supply	5.7%
Rail & supply	5.8%
Retail & supply	4.5%
Induced impacts	7.1%
All rail-related	6.1%
Jobs as % of UK total	
Railway system	8.0%
Rail supply	6.4%
Rail & supply	6.9%
Retail & supply	4.4%
Induced impacts	8.3%
All rail-related	7.3%

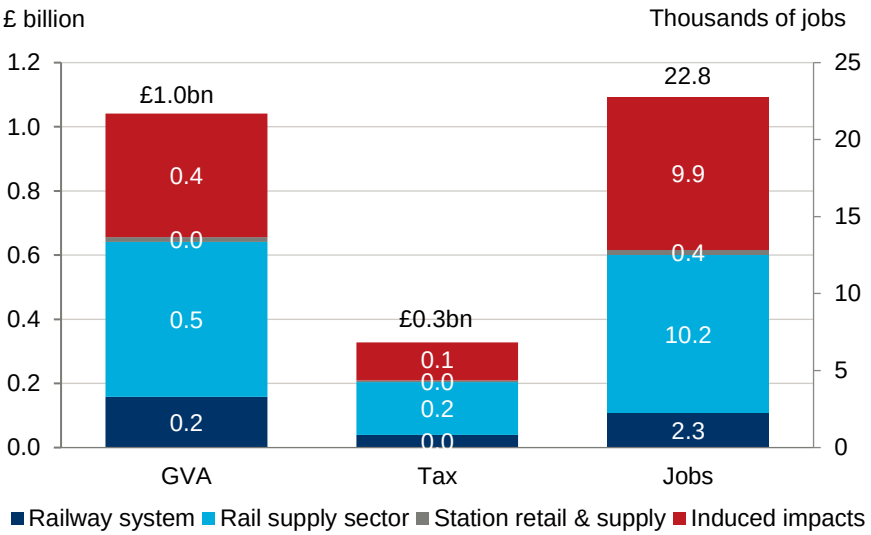


Source: Oxford Economics

GVA per job as % of SW average	
Railway system	165%
Rail supply	114%
Rail & supply	131%
Wages per employee job as % of SW average	
Railway system	151%
Rail supply	124%
Rail & supply	133%

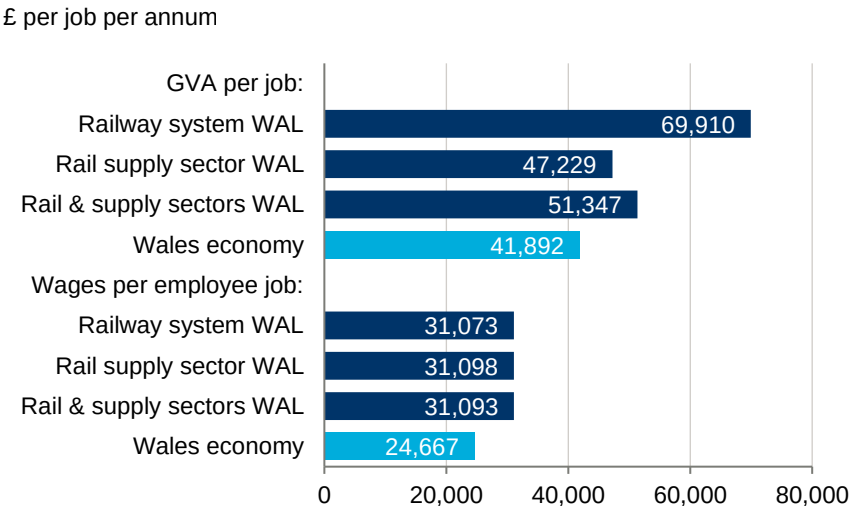
WALES

Values for Wales	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	0.5	0.2	0.1	0.0	2.3	2.3
Rail supply sector	1.1	0.5	0.3	0.2	10.2	9.2
Total rail & supply	1.6	0.6	0.4	0.2	12.5	11.4
Station retail & supply	0.0	0.0	0.0	0.0	0.4	0.3
Induced impacts	0.8	0.4	0.2	0.1	9.9	8.6
All rail-related impacts	2.5	1.0	0.5	0.3	22.8	20.4



Source: Oxford Economics

GVA as % of UK total	
Railway system	1.3%
Rail supply	2.7%
Rail & supply	2.1%
Retail & supply	1.7%
Induced impacts	3.2%
All rail-related	2.4%
Jobs as % of UK total	
Railway system	1.8%
Rail supply	3.2%
Rail & supply	2.8%
Retail & supply	1.7%
Induced impacts	4.0%
All rail-related	3.2%

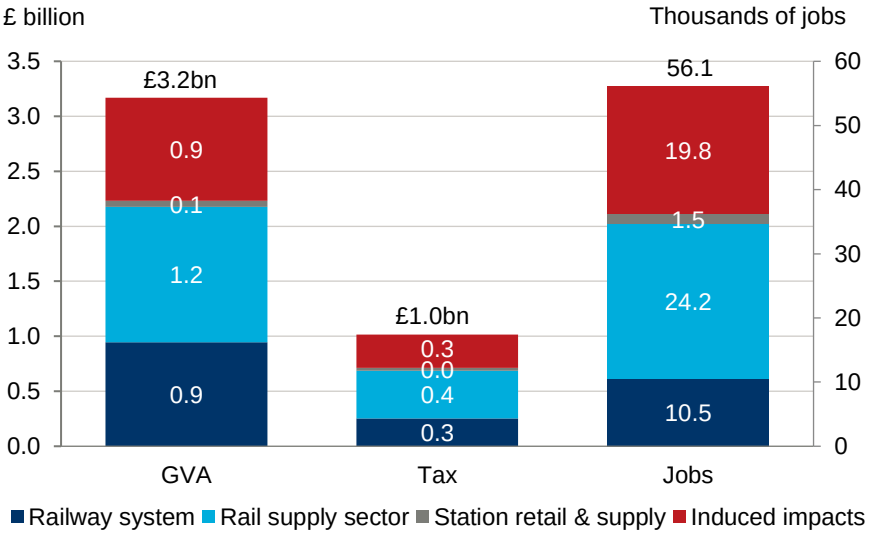


Source: Oxford Economics

GVA per job as % of WAL average	
Railway system	167%
Rail supply	113%
Rail & supply	123%
Wages per employee job as % of WAL average	
Railway system	126%
Rail supply	126%
Rail & supply	126%

SCOTLAND

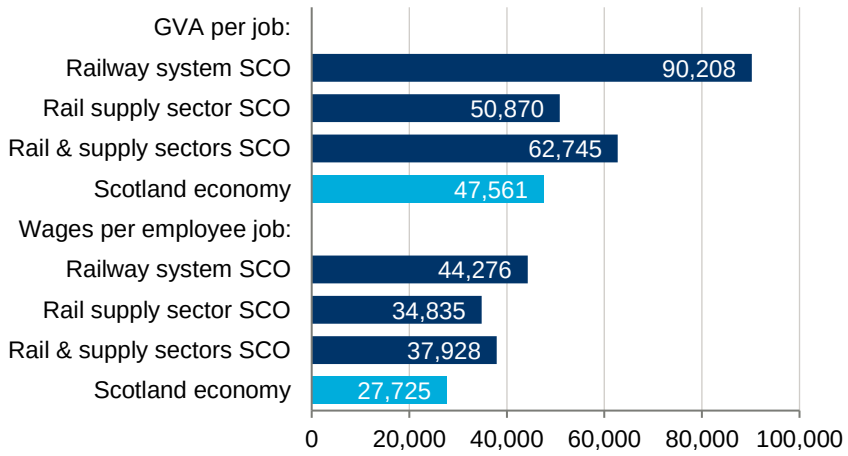
Values for Scotland	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	2.1	0.9	0.5	0.3	10.5	10.5
Rail supply sector	2.6	1.2	0.7	0.4	24.2	21.5
Total rail & supply	4.8	2.2	1.2	0.7	34.7	32.0
Station retail & supply	0.1	0.1	0.0	0.0	1.5	1.3
Induced impacts	2.0	0.9	0.4	0.3	19.8	17.1
All rail-related impacts	6.8	3.2	1.7	1.0	56.1	50.3



Source: Oxford Economics

GVA as % of UK total	
Railway system	7.7%
Rail supply	6.9%
Rail & supply	7.3%
Retail & supply	6.1%
Induced impacts	7.8%
All rail-related	7.4%
Jobs as % of UK total	
Railway system	8.5%
Rail supply	7.6%
Rail & supply	7.9%
Retail & supply	6.7%
Induced impacts	8.0%
All rail-related	7.9%

£ per job per annum

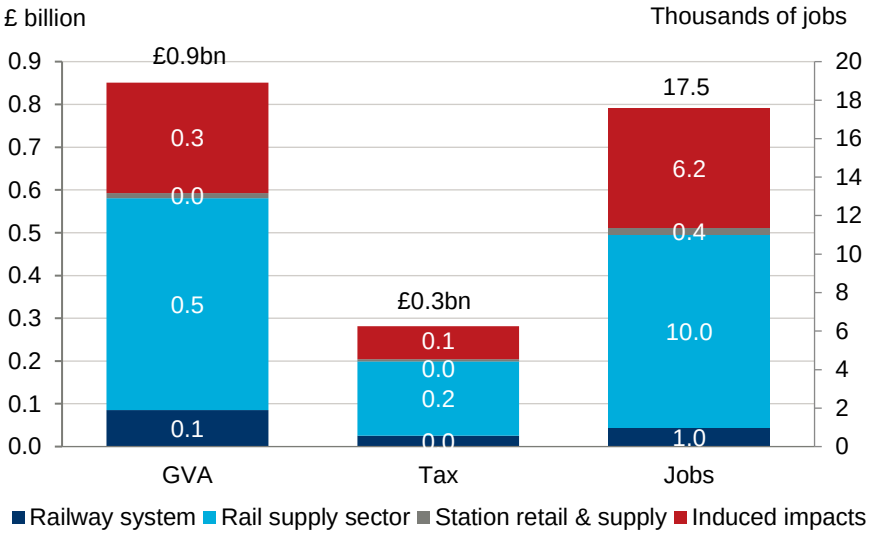


Source: Oxford Economics

GVA per job as % of SCO average	
Railway system	190%
Rail supply	107%
Rail & supply	132%
Wages per employee job as % of SCO average	
Railway system	160%
Rail supply	126%
Rail & supply	137%

NORTHERN IRELAND

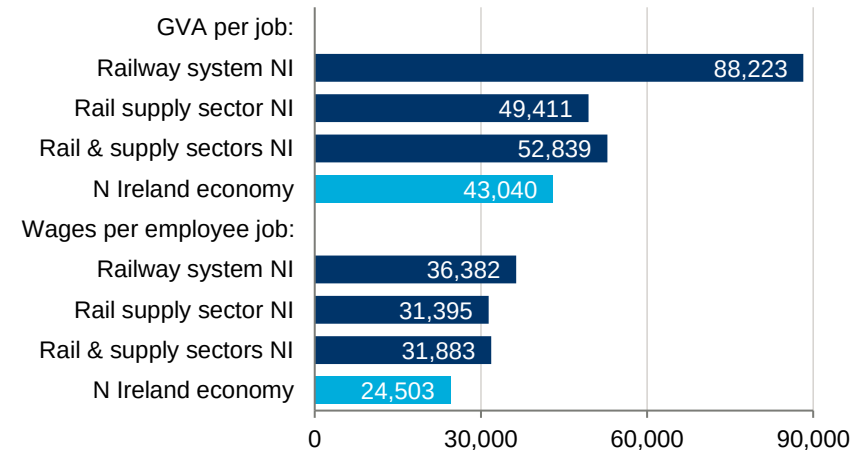
Values for Northern Ireland	Output or sales, £ billion	GVA, £ billion	Wage bill, £ billion	Tax payments, £ billion	Total jobs, thousands	Employee jobs, thousands
Railway system	0.2	0.1	0.0	0.0	1.0	1.0
Rail supply sector	1.2	0.5	0.3	0.2	10.0	9.0
Total rail & supply	1.4	0.6	0.3	0.2	11.0	9.9
Station retail & supply	0.0	0.0	0.0	0.0	0.4	0.3
Induced impacts	0.5	0.3	0.1	0.1	6.2	5.3
All rail-related impacts	2.0	0.9	0.4	0.3	17.5	15.6



Source: Oxford Economics

GVA as % of UK total	
Railway system	0.7%
Rail supply	2.8%
Rail & supply	1.9%
Retail & supply	1.4%
Induced impacts	2.2%
All rail-related	2.0%
Jobs as % of UK total	
Railway system	0.8%
Rail supply	3.2%
Rail & supply	2.5%
Retail & supply	1.6%
Induced impacts	2.5%
All rail-related	2.5%

£ per job per annum



Source: Oxford Economics

GVA per job as % of NI average	
Railway system	205%
Rail supply	115%
Rail & supply	123%
Wages per employee job as % of NI average	
Railway system	148%
Rail supply	128%
Rail & supply	130%

8. CONSTITUENCY ANALYSIS

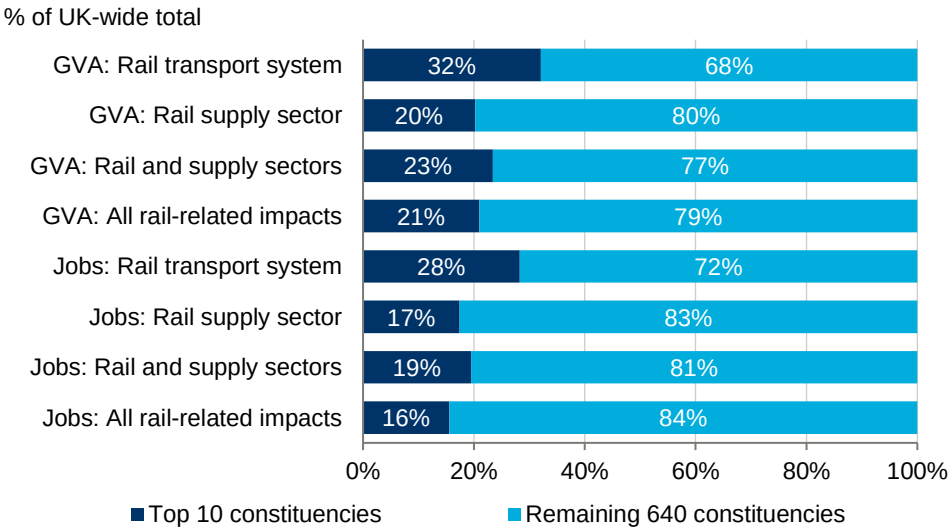
Estimates for the rail transport system, rail supply sector, on-station retail and supplies, and induced impacts, have been made for UK parliamentary constituencies, and are included in the separately-available set of detailed results tables. This chapter singles out a few highlights, drawing out those constituencies where rail-related GVA and jobs are most heavily concentrated.

It should be noted that these results have been modelled by Oxford Economics on the 'top-down' basis described in Appendix 3, and should therefore be seen as approximations of the true picture.

8.1 'TOP 10' CONSTITUENCIES IN CONTEXT

The sections further below set out the 'top 10' UK constituencies in terms of rail-related GVA and total jobs (including self-employed as well as employee jobs). To put those figures in context, Fig. 58 shows the share of activity accounted for by the constituencies concerned.

Fig. 58. Share of the 'top 10' constituencies in UK-wide GVA and jobs



Source: Oxford Economics

It can be seen that activity on the rail transport system itself is fairly heavily concentrated geographically, on this measure, with 28% of jobs, and 32% of associated GVA, accounted for by just 10 of the 650 constituencies. However, these figures will reflect the recorded workplace of the workers concerned, which might typically be a rail station, or depot where on-board train staff members sign on and off. These figures should not, therefore, be seen as a reflection of the geographical spread of the benefits of the rail transport system, in terms of either the residence of the workers themselves, or the residence of the railway network's users.

The rail supply sector is less concentrated geographically, on the same basis, with 17% of employment, and 20% of associated GVA, found in the top 10 constituencies in this case. (These are not the same as the railway system top 10.) This reflects the fact that some rail supply activities, such as rail-related construction work and rail support services, need to be located on, or close to,

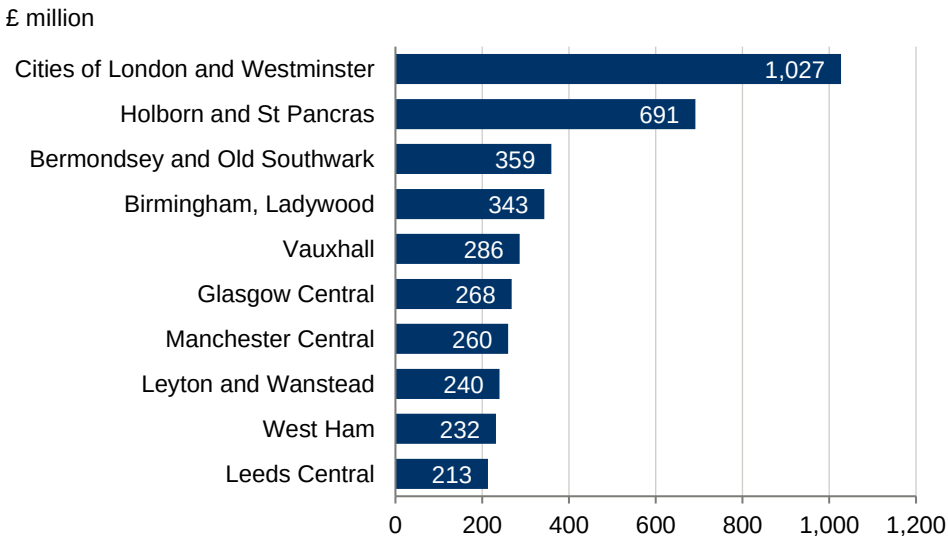
the railway system itself, but that many others are spread more evenly around the country.

Taking the railway system and rail supply sector together, the top 10 constituencies account for 19% of jobs and 23% of GVA. If induced impacts, and on-station retail and supply, are counted too, 16% of rail-related jobs, and 21% of rail-related GVA, are accounted for by the relevant top 10.

8.2 CONSTITUENCY ANALYSIS OF RAIL-RELATED GVA IMPACTS

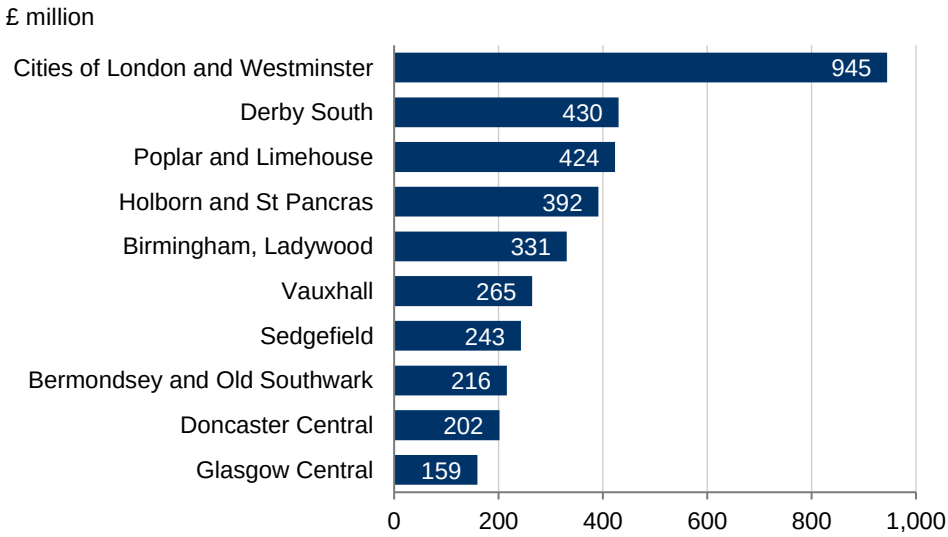
Fig. 59 shows how six of the top 10 constituencies for rail transport system GVA, based on workplace location, are in London, reflecting the location of major mainline terminals, and the importance of the London Underground. Constituencies in Birmingham, Glasgow, Manchester, and Leeds, which are also home to important railway terminals, account for the remainder.

Fig. 59. Top 10 constituencies for rail transport system GVA



Source: Oxford Economics

Fig. 60. Top 10 constituencies for rail supply sector GVA

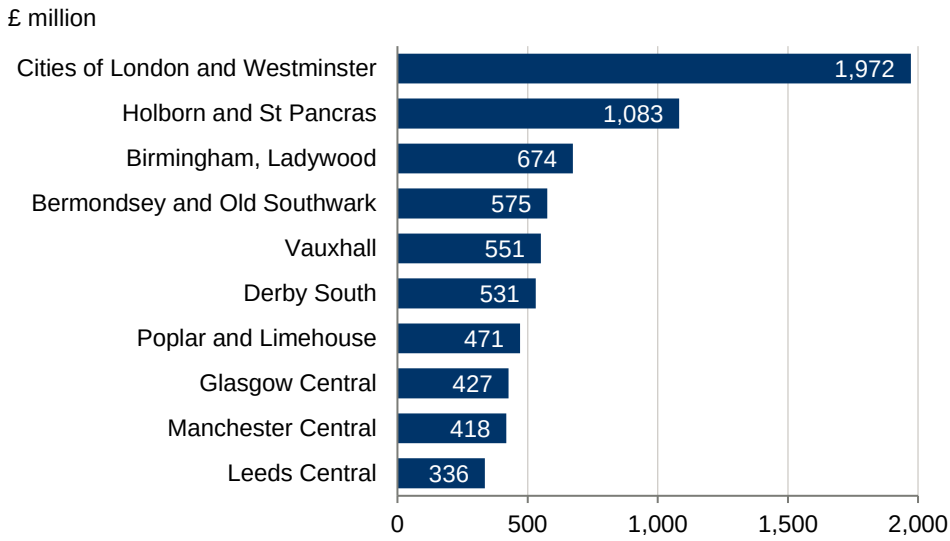


Source: Oxford Economics

Six of those constituencies also feature in the top 10 for rail supply sector GVA (see Fig. 60). This partly reflects the role of rail-related construction and rail support services, but also the importance of these city-centre locations as providers of high numbers of well-paid jobs more generally, in activities of many kinds in the rail supply chain. Of the four other constituencies, Derby and Sedgefield host major rolling stock manufacturing activities (with Sedgefield including the factory at Newton Aycliffe). Doncaster Central, and Limehouse and Poplar, hosted a significant amount of railway construction work in 2019.

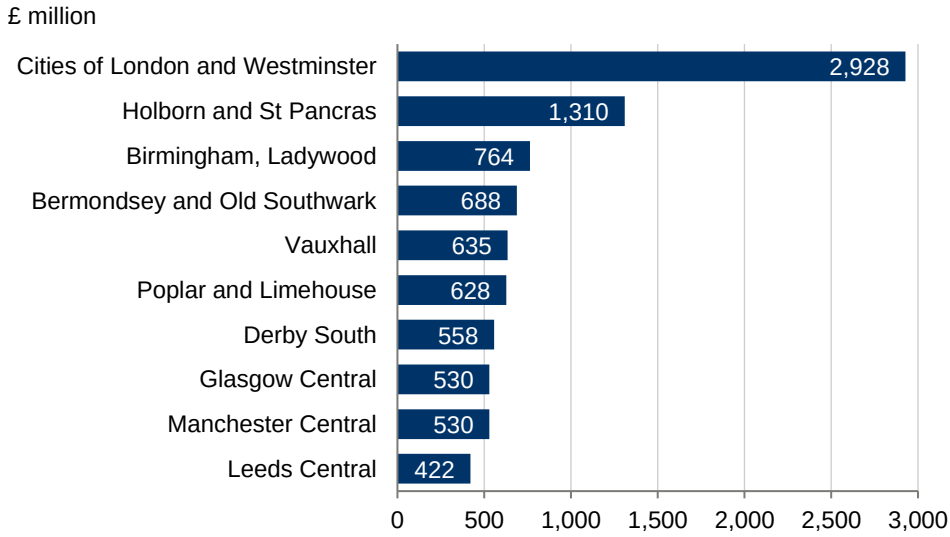
Fig. 61 shows the top 10 constituencies in the case of the rail and supply sectors combined, and Fig. 62 the top 10 for all rail-related GVA impacts. These constituencies are the same, in almost the same order, reflecting the way that the induced impacts, which are included in the latter but not the former, are spread more evenly around the country. All of these constituencies feature in one or both of the separate sector top 10 rankings set out above.

Fig. 61. Top 10 constituencies for rail and supply sector GVA



Source: Oxford Economics

Fig. 62. Top 10 constituencies for all rail-related GVA

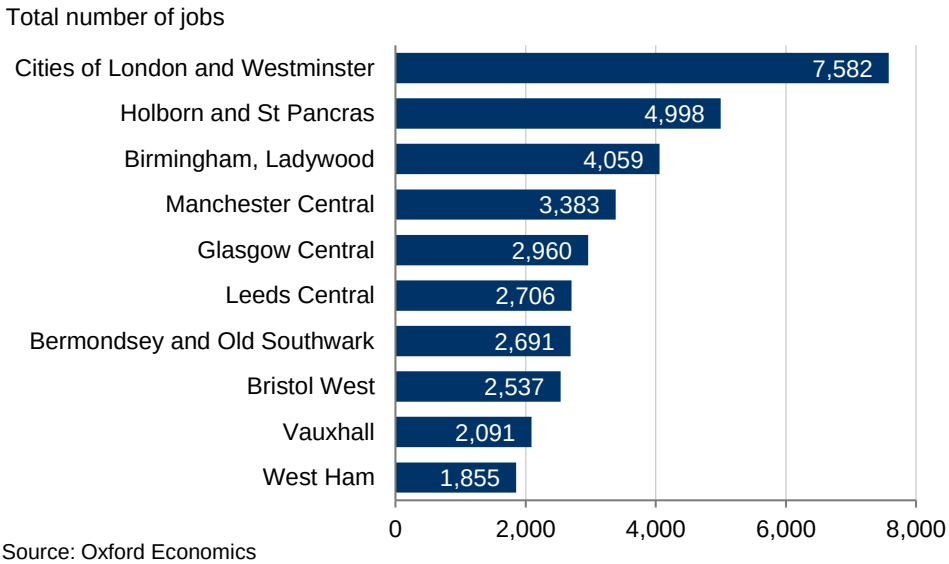


Source: Oxford Economics

8.3 CONSTITUENCY ANALYSIS OF RAIL-RELATED JOBS IMPACTS

Turning to employment by constituency, as a general rule London is a little less important than in the case of GVA. In the case of the rail transport system, this pushes the Birmingham, Manchester, Glasgow and Leeds constituencies up the rankings, compared with those for GVA, while Bristol West features in the top 10 in place of Leyton and Wanstead (see Fig. 63).

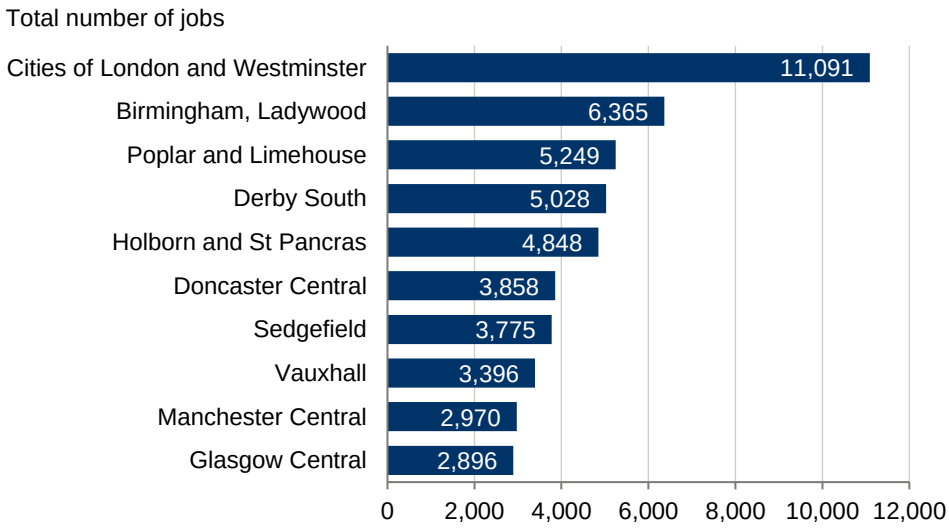
Fig. 63. Top 10 constituencies for rail transport system jobs



Source: Oxford Economics

In the case of the rail supply sector (Fig. 64), the top 10 constituencies for jobs are the same as those for GVA, but the ordering differs, reflecting productivity differentials by both industry and region.

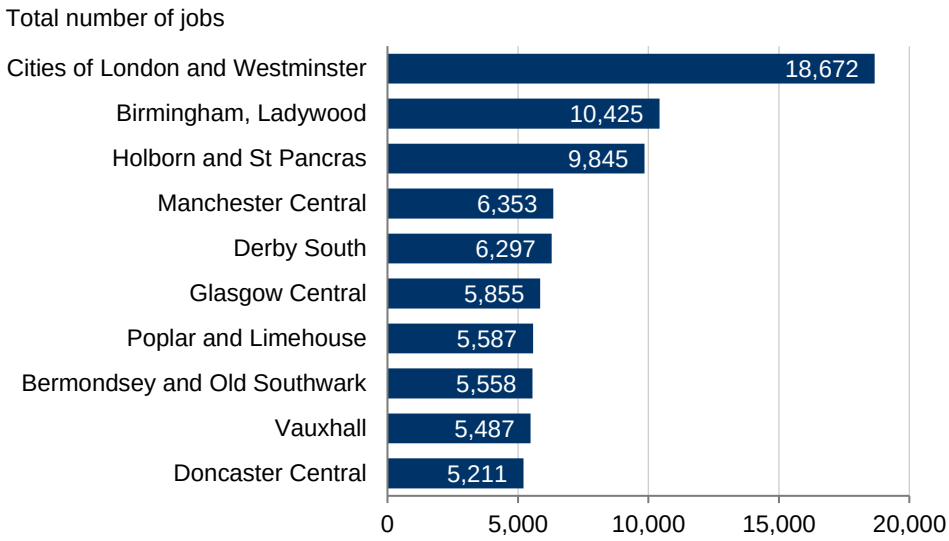
Fig. 64. Top 10 constituencies for rail supply sector jobs



Source: Oxford Economics

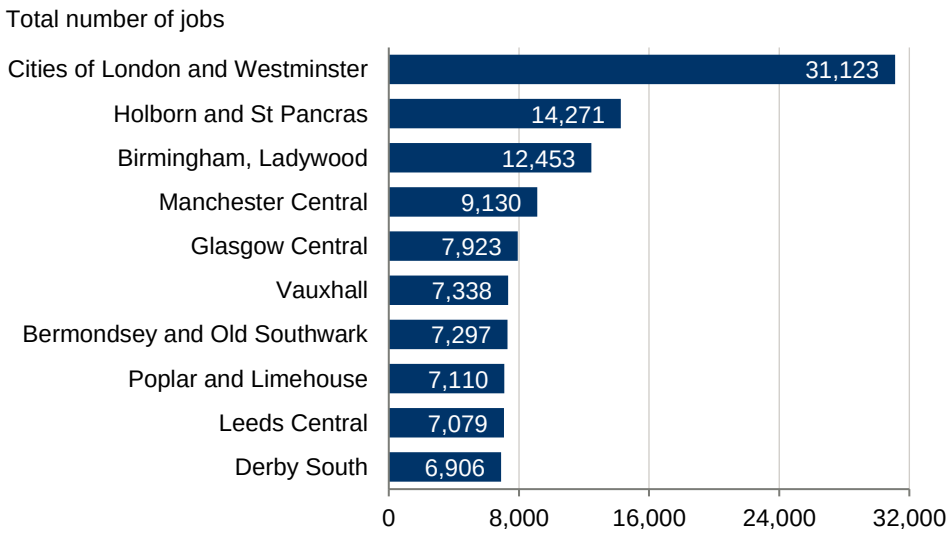
The consequent top 10 constituencies for the rail and supply sectors combined, and those for all rail-related impacts, are shown in Fig. 65 and Fig. 66, respectively.

Fig. 65. Top 10 constituencies for rail and supply sector jobs



Source: Oxford Economics

Fig. 66. Top 10 constituencies for all rail-related jobs



Source: Oxford Economics

9. FUTURE SCENARIOS

The analysis in this chapter sets out a 'base scenario' for public spending on rail infrastructure, and the implications of that for output, GVA, and employment in the UK rail and supply sectors. It also sets out an alternative, 'high scenario', in which infrastructure spending is scaled up by 50% compared with the base.

The base scenario is believed to be a reasonable, central expectation for rail infrastructure spending, based on the Government's fiscal remit for total infrastructure spending, and the National Infrastructure Commission's (NIC's) projections for infrastructure spending by major category, consistent with that remit.[28] The high scenario is consistent with the NIC Rail Needs Assessment scenarios and therefore considered to be towards the top end of the range of realistic possibilities.[29]

The NIC's main UK projections were published in 2018, before the Covid-19 pandemic, but nevertheless remain the most authoritative source of future planning for infrastructure spending. It should also be noted that the NIC has specifically recommended adhering to planned rail infrastructure expansion, in the wake of the pandemic, despite the Covid-driven dip in rail passengers[30], and that maintaining this policy would align with the most recent Government commitments in the 'transport and environmental sustainability' field.[31]

9.1 PROJECTIONS FOR RAIL INFRASTRUCTURE OUTPUT

Fig. 67 sets out the two alternative scenarios for rail infrastructure spending, output and supplies, showing five-year averages.

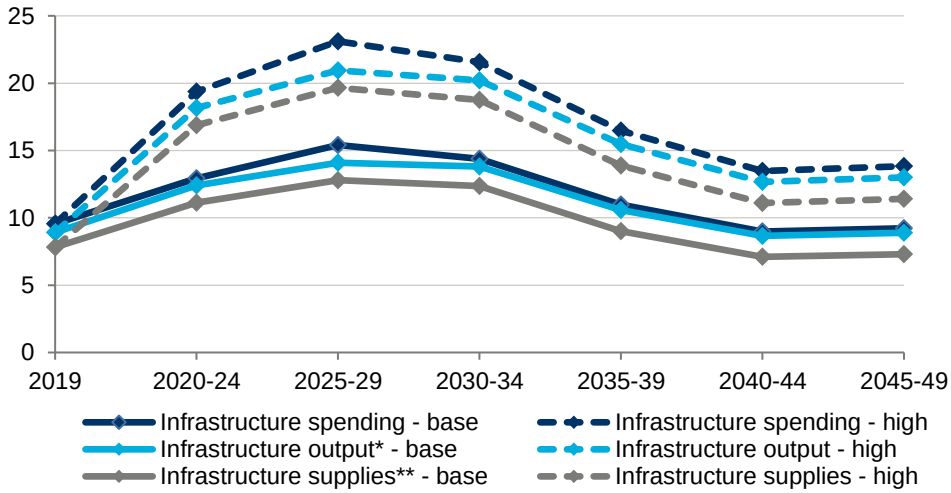
Here, infrastructure spending is defined as all public sector capital spending in the transport, energy, digital, waste, and flood risk protection fields. And for these purposes:

- Rail infrastructure spending is the share of that spending relating to rail transport, including local railway systems.
- Rail infrastructure output means the production of assets in the UK in order to meet that demand, calculated as rail infrastructure spending minus an allowance for land purchases and direct imports.
- Rail infrastructure supplies means the production of those assets by the UK rail supply sector, calculated as rail infrastructure output minus the value of Network Rail's own capitalised work.

[28] National Infrastructure Commission (NIC), *National Infrastructure Assessment*, 2018, Table 7.1, and a supplementary version of that table showing expenditure projections on a year-by-year basis.
[29] In another publication, *Rail Needs Assessment for the Midlands and North* (December 2020), the NIC sets out three scenarios for rail infrastructure spending in those regions: a baseline, a 25% uplift, and a 50% uplift.
[30] Comments by NIC Chair Sir John Armitt, as reported by the BBC, following the publication of: Steer for the NIC, *Infrastructure Demand: Quantitative Analysis for Scenarios of Behaviour Change,* April 2021..
[31] These include the 'commitment to rail' (as described in Chapter Two of: Department for Transport / Williams Rail Review, *Great British Railways, The Williams-Shapps Plan for Rail*, May 2021), the overall transport decarbonisation plan (Department for Transport, *Decarbonising Transport: A Better, Greener Britain*, July 2021), and the associated rail-specific policy position (Department for Transport, *Rail Environment Policy Statement: On Track for a Cleaner, Greener Railway*, July 2021).

Fig. 67. Base and high scenarios for rail infrastructure output

£ billion per annum at 2019 prices



Source: Oxford Economics *Spending ex. land and imports. **Output ex. Network Rail's own work.

9.1.1 Infrastructure spending and output in the base scenario

In the base scenario, the assumption about rail infrastructure spending follows the NIC's projections from 2020/21 through to 2049/50, for spending on High Speed 2 (HS2), Crossrail 2, and Northern Powerhouse Rail (NPR), and that for capital spending by Network Rail. After 2029/30, separate projections for Network Rail and Highways England are replaced, in the NIC table, by a combined 'Strategic Transport' spending category. The projections here assume that these amounts are shared out in the same proportion as shown for 2027/28 and 2028/29, with 65% allocated to Network Rail.[32]

In addition, assumptions were made about the split between rail and road expenditure in the TfL budget, and other local public transport budgets, based on the recent pattern of local transport capital spending excluding Crossrail. An allowance for the cost of completing Crossrail in 2020/21-2022/23 was then added, based on separate information published by TfL.

The cost of land purchase in the early years of the HS2 project was then ascertained from information published by the Department for Transport, HS2 Ltd, and the National Audit Office. This was used to model allowances for land purchase in the early years of the two new major projects, i.e. Crossrail 2 and NPR. The share of Network Rail capital spending accounted for that entity's own capitalised work, and the share of the remaining non-land capital spending accounted for by direct imports, are assumed to be in line with 2019 out-turns, as found in the main model built for this study.

On this basis (and valued at 2019 prices), total rail infrastructure spending would peak at £15.4 billion per annum in 2025-29, up from £9.6 billion in 2019, before easing back to £9.2 billion per annum in 2045-49. Rail infrastructure output would peak at £14.1 billion per annum in 2025-29, compared with £8.9 billion in 2019, and eventually settle back at £8.9 billion per annum in 2045-45.

[32] This is higher than the 56%-61% range projected by the NIC for 2020/21-2026/27, but lower than the 74% share shown for 2029/30, which is the final year for which a split is illustrated.

And rail infrastructure supplies would reach a high of £12.8 billion in 2025-29, up from £7.8 billion in 2019, before edging down to £7.3 billion in 2045-49.

9.1.2 Infrastructure spending and output in the high scenario

In the high scenario, total rail infrastructure spending is assumed to be 50% higher, on average for each five-year period, than in the baseline. However, all of this extra expenditure is assumed to relate to major new projects, so that:

- Land acquisition costs account for 7% of all additional spending, whereas in the base they account for 7% of spending on Crossrail 2 and the NRP only.
- Total capital supplies, including imported supplies, account for all additional spending other than land acquisition costs, with no additional capitalised work undertaken by Network Rail's own workforce.

The proportionate split in these additional capital supplies, between direct imports and output of the UK rail supply sector, is assumed to be the same as in the base.

On that basis, rail infrastructure spending would be 50% higher than otherwise throughout the future period, peaking at £23.1 billion per year in 2025-29 (at 2019 prices), and finishing at £13.8 billion per annum. Rail infrastructure output would be 46%-49% higher than otherwise, reaching £20.9 billion per year in 2025-29, and ending at £13.0 billion per year. And rail infrastructure supplies would be 52%-56% higher than in the baseline, peaking at £18.7 billion per annum in 2025-29 before easing back to £11.4 billion in 2045-49.

9.2 IMPACT ON GVA AND JOBS IN THE RAIL AND SUPPLY SECTORS

Oxford Economics then made projections for GVA and jobs in the rail and supply sectors, on the basis of those alternative scenarios.

9.2.1 GVA and employment in the base scenario

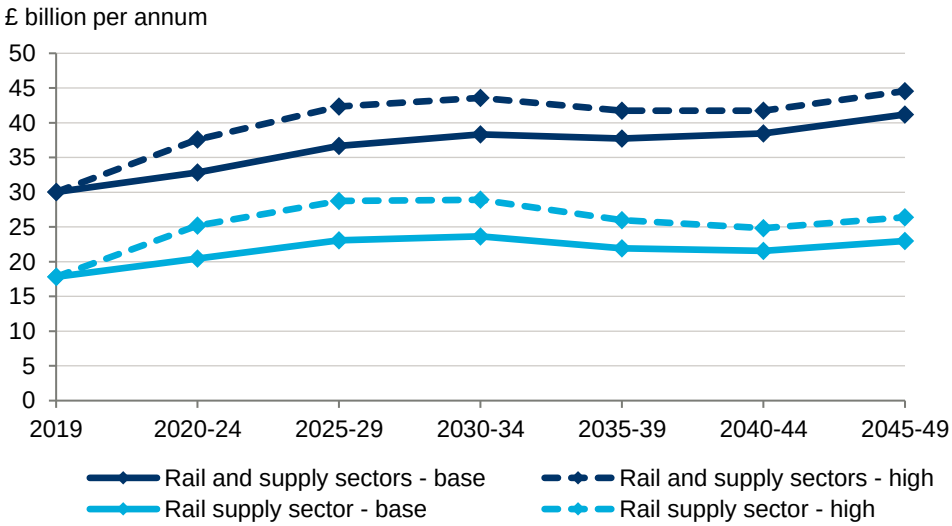
A model was built to forecast GVA and jobs on the basis of infrastructure spending, output, and supplies developing in line with the base scenario described above. In this model, the GVA of the rail and supply sectors was split into segments, dependent on different drivers of demand, as follows:

- Network Rail's own capitalised work, assumed to grow in line with that entity's total capital expenditure, as described in Section 9.1.1 above.
- The remaining GVA of the rail transport system, assumed to grow in line with total UK domestic demand (i.e. spending on goods and services by UK resident households, businesses, and government). This growth is stronger than usual prior to 2025, as the economy and rail passenger numbers recover from the Covid-19 pandemic. But after that, the economy is expected to be operating close to full capacity, so that the rate of growth eases back to its long-term norm.
- GVA in the rail supply sector ultimately supported by capital supplies to Network Rail, and other public sector bodies responsible for rail infrastructure provision, assumed to grow in line with infrastructure supplies as described in Section 9.1.1 above.

- GVA in the rail supply sector ultimately dependent on day-to-day supplies to the UK railway system, or on capital supplies to the private sector train operating companies or rolling stock leasing companies, assumed to grow in line with total UK domestic demand.
- GVA in the rail supply sector ultimately dependent on exports, assumed to grow in line with total UK exports of goods and services.

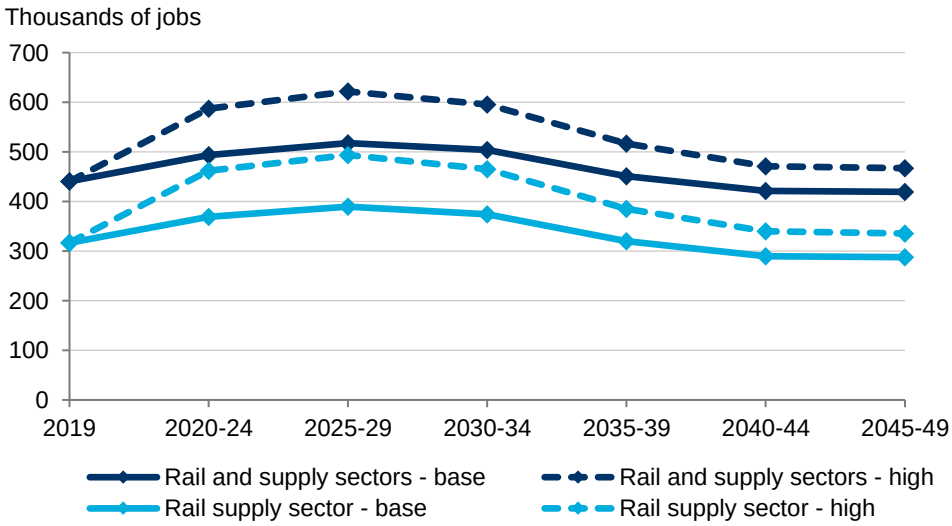
The resulting path for GVA is shown in Fig. 68 below, with the growth over time in UK domestic demand, and in total UK exports, taken from Oxford Economics' Global Economic Model. The total GVA of the rail and supply sectors together averages £36.7 billion per annum in 2025-29, and £41.2 billion in 2045-49, compared with the 2019 out-turn of £30.0 billion. Of that total, the GVA of the rail supply sector averages £23.1 billion in 2024-29, and £23.0 billion in 2045-49, up from £17.8 billion in 2019.

Fig. 68. Rail and supply sector GVA in the alternative scenarios



Source: Oxford Economics

Fig. 69. Rail and supply sector employment in the alternative scenarios



Source: Oxford Economics

The path for employment in these sectors is assumed to follow that for GVA, but with an allowance for growth over time in GVA per job, as implied by forecasts taken from the same Global Economic Model. Here, employment across the rail and supply sectors averages 518,000 in 2025-29, and 419,000 in 2045-49, compared with 440,000 in 2019 (see Fig. 69). The number of jobs in the rail supply industry alone would amount to 390,000 in 2025-29, and 288,000 in 2045-49, versus 317,000 in 2019.

9.2.2 GVA and employment in the high scenario

In the high scenario, rail supply sector GVA and jobs dependent on capital supplies to the public part of the rail system are assumed to be proportionately higher than otherwise, in line with the scaling-up of rail infrastructure supplies as described in Section 9.1.2 above. All other rail and supply sector GVA and employment levels are unchanged, compared with the base scenario.

As a result, total annual rail and supply sector GVA averages £42.3 billion in 2025-29, in the high scenario, which is 15% or £5.6 billion per annum higher than in the baseline, and £44.6 billion in 2045-49, some 8% or £3.4 billion higher than otherwise. All of this extra work would take place in the rail supply sector, and for that sector alone these figures are £28.7 billion (24% higher) and £26.4 billion (15% higher), respectively.

Employment across the two sectors averages 622,000 in 2025-29 on that basis, which is 20% or 104,000 higher than in the base, and 467,000 in 2045-49, which is 11% or 48,000 higher than expected on the central view. For the rail supply sector alone, these figures are 494,000 (27% higher) and 336,000 (17% higher), respectively.

While these jobs would mostly substitute for work elsewhere in the economy, rather than being genuinely additional (as the labour market would already be operating close to full capacity at that time), the UK economy could still benefit on a net basis, as this work is of a higher-productivity, higher-wage nature than the average.

It should be recognised that the base scenario for rail and supply sector GVA and jobs is particularly uncertain, given questions both about the precise path of the UK economy as it recovers from the Covid pandemic, and about the precise nature of the recovery in rail passenger numbers in tandem with that.

The absolute levels of sector GVA and jobs could therefore be rather different to those illustrated above, in both the baseline and high scenario, and this would also affect the quoted percentage increases between the two. However, the absolute increases in GVA and jobs, as a result of the assumed uplift in investment, would be the same, regardless of the precise starting point.

It is also worth noting here that the additional rail infrastructure spending, in the modelled high scenario, is not assumed to have any knock-on impact on day-to-day activity on the UK rail network, or on private investment by the train operating and rolling stock leasing companies.

But in practice, extra infrastructure spending in, say, the 2020s, should enhance the capacity and performance of the railway system in the 2030s. This in turn ought to attract more passengers onto the railways, allowing more farepayer-funded day-to-day activity, and encouraging more investment in

rolling stock by the private sector. And that would further boost the GVA and employment outcomes in these high-productivity, high-wage sectors.

9.2.3 Regional impacts

The analysis set out above is based on the regional pattern of activity and investment remaining the same as in 2019, with the 50% uplift in investment in the high scenario then assumed to apply equally to each region. But if the uplift were focused, for example, in the northern English regions, then the extra GVA and jobs created would benefit those regions disproportionately. And as rail supply sector jobs pay more than the economy-wide average, in each of these regions, that would, at the margin, boost the local average wage, both in absolute terms and relative to the rest of the UK.

The total number of extra rail supply sector jobs supported in that case, in the high scenario, would also be higher, reflecting regional differentials in GVA per job. So, for example, if all of the extra investment in 2025-29, in the high scenario, were confined to the North West, North East, and Yorkshire and The Humber, with all of the associated uplift in UK GVA also confined to those regions, then the number of extra jobs supported would be around 121,000, rather than the 104,000 figure quoted above.[33]

9.2.4 Conclusion on the impact of near-term rail infrastructure spending

Based on the exercise described above, we can also conclude that every extra £100 million per annum spent by the UK Government on rail infrastructure, before 2025, would support an additional 1,400 jobs in the rail supply sector.[34] These new jobs would typically be of a high-productivity, high-wage nature, in line with the finding for existing jobs in 2019.

With the UK economy likely to be operating below full capacity during that time, as it recovers from the effects of the Covid-19 pandemic, many of these jobs could be completely additional to the employment total, rather than simply the result of workers moving into the sector from other (typically less well-paid) industries.

For the same reason, more genuinely additional jobs would probably be supported in the wider consumer-facing economy, as a result of consequent induced (wage-funded expenditure) impacts. In fact, on the reasonable assumption that induced activity increased in proportion to increase in total rail sector workers' spending power, a further 700 new jobs would be supported in this way, for every £100 million of additional investment. So in total, every £100 million of additional investment in the UK's railway infrastructure, in the near term, would support 2,100 extra jobs across the UK economy.

[33] In practice, capacity constraints would probably constrain the authorities' ability to focus all of the significant uplift in investment into a few specific regions. And even if that happened, a proportion of the consequent GVA uplift would occur outside of the regions concerned. The 121,000 figure should therefore be seen as a hypothetical illustration of the kind of difference that could be made by altering the regional profile of the spending uplift, rather than as a definitive estimate of a realistic outcome.

[34] This is based on the uplift in gross rail infrastructure spending of £6.5 billion per annum in 2020-24, in the high scenario compared with the base, and the associated 93,000 additional rail supply sector jobs.

10. CONCLUSION

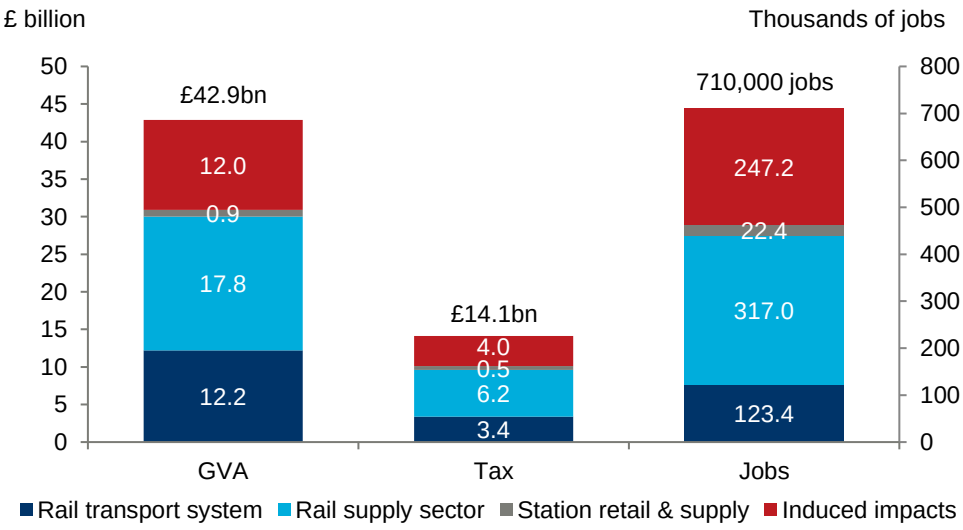
Even in the absence of the main analysis set out in this report, there would be a strong case for continued expansion of the UK railway system. Efficient and reliable transport connections can enhance the economy's underlying growth performance, with rail travel in particular offering time savings for businesses and workers, compared with other transport forms. These time savings also benefit users of the railways for non-work purposes, while individuals still needing to use the road network benefit from reduced congestion. In addition, and crucially in the light of growing awareness of climate change, rail travel is typically less polluting, on a per-mile basis, than alternative transport means.

But the case for supporting rail is strengthened further by the key findings of this report.

Firstly, the rail transport system's direct contribution to UK economy, at £12.2 billion in terms of GDP in 2019, is significant in its own right. And with every £1 worth of work on the rail network itself generating a further £2.50 of income elsewhere in the UK economy, the total rail-related GVA 'footprint' is very substantial.

In fact at £42.9 billion (see Fig. 70), this total GVA footprint supported 710,000 UK jobs in 2019, which was more than the total number of employed individuals in any UK local authority area bar the City of Westminster. The associated total tax footprint, at £14.1 billion, was sufficient to cover almost 80% of total public expenditure on the railways in that year.

Fig. 70. Total GVA, jobs and tax footprint by sector and channel of impact

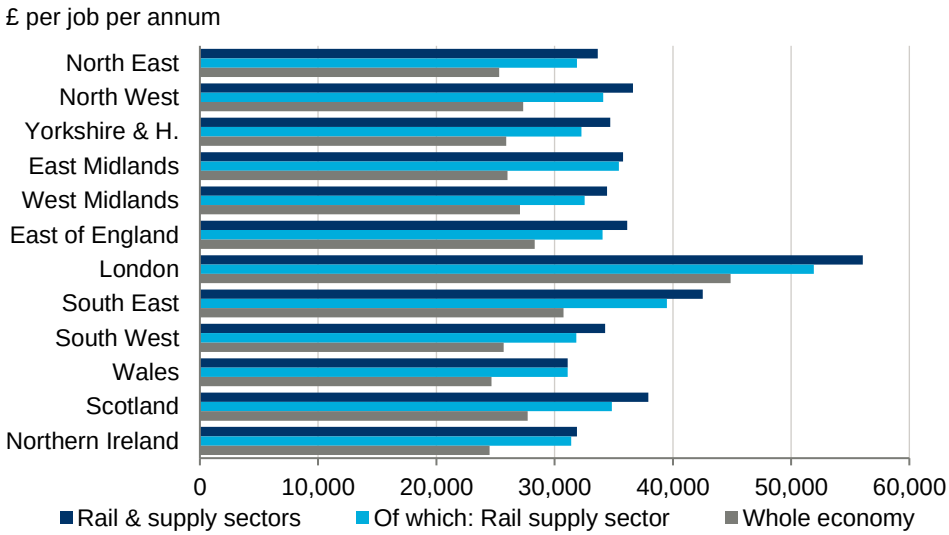


Source: Oxford Economics

Secondly, labour productivity (GVA per job) was above the economy-wide average in 2019, in both the rail transport system and rail supply sector. This was true not just across the UK as a whole, but in each of the 12 UK regions and countries separately. While this partly reflects high capital intensity in the case of the rail transport system, high skill requirements look to be the single most important explanation, especially in the case of the rail supply sector.

Associated with this, wages were also above the economy-wide average, in each of these two sectors, in every one of the 12 UK regions and countries (see Fig. 71).

Fig. 71. Rail and supply sectors: Wages per employee job by region



Source: Oxford Economics

Taking all of these findings into account, and projecting ahead on a long-term basis, we find that a 50% uplift in rail infrastructure investment, compared with the expected baseline, would boost the number of jobs in the UK rail supply sector by 104,000 in 2025-29, and by 48,000 in 2045-49. While these jobs would mostly substitute for work elsewhere in the economy, rather than being genuinely additional (as the labour market would already be operating close to full capacity at that time), the UK economy could still benefit on a net basis, as this work is of a higher-productivity, higher-wage nature than the average.

If that extra investment were focused outside of London and the South East, then that in turn would help to reduce overall regional wage differentials, at least at the margin. That policy would also result in more rail supply jobs being created in total, compared with the 104,000 'headline' finding (for 2025-29), due to regional GVA-per-job differentials.

Finally, if an uplift in rail investment were enacted prior to 2025, with the economy still recovering from the Covid pandemic and therefore operating below full capacity, then the extra jobs created in the rail supply sector could be genuinely additional. And further additional jobs could be supported, in these circumstances, by the consequent induced (wage-funded spending) impacts.

Here, we find that every £100 million of additional spending on the UK rail infrastructure would support an extra 2,100 UK jobs. Of these, around 1,400 would be typically well-paid jobs in the rail supply sector, with the remaining 700 spread across a wide range of mainly consumer-facing industries, as a result of the induced effects.

APPENDIX 1: SECTORS AND TERMS

Fig. 72. Clarification of sectors of industry

Main sector / sub-sector	Description with Standard Industry Classification (SIC 2007) codes
Rail transport system	
- Interurban rail transport	Interurban rail passenger transport (49.1) and freight rail transport (49.2). Mainline train operations in Great Britain, including London Overground, plus Northern Ireland Railways.[1]
- Metro systems	Urban, suburban or metropolitan passenger railway transport (49.31/1). London Underground, Docklands Light Railway, and systems in Tyneside, Liverpool, West Midlands, and Glasgow.[1]
- Network Rail	Part of 'service activities incidental to land transport' (52.21).
Rolling stock manufacture	Manufacture of railway locomotives and rolling stock, and related equipment (30.2).
Rail-related construction	Construction work including building, fitting and finishing (41-43), where carried out for the rail transport system, either directly or through sub-contracting.
Railway support services	Warehousing and support activities for transport (52, excluding Network Rail), where carried out directly for the railway system. Includes e.g. train maintenance services.
Rolling stock leasing	Part of 'leasing of other machinery, equipment and tangible goods' (77.39).
General machinery	Manufacture of electronic equipment (26), electrical equipment (27), mechanical machinery (28), motor vehicles (29), aerospace, shipbuilding and other non-rail transport equipment (30, except 30.2).[2] Repair and installation of machinery (33).
Non-machinery manufacturing	Manufacture of food, drink and tobacco (10-12), textiles, clothing and leather (13-15), wood and paper (16-17), chemicals and pharmaceuticals (20-21), rubber and plastics (22), building products (23), basic metals and metal products other than machinery (24-25), furniture and miscellaneous products (31-32). Printing (18).
General construction	Construction (41-43), other than rail-related construction.[2]
General transport services	Land, water and air transport (49-51), warehousing and support services for transport (52), postal and courier services (53), other than rail transport and rail support services.
Energy, mining & utilities	Mining including oil extraction (05-09), manufacture of refined petroleum and coke (19), electricity and gas supply (35), water supply and waste services (36-39).
Information & communication	Publishing (58), filming, recording and broadcasting (59-60), telecommunications services (61), computer-related and information services (62-63).
Finance & real estate	Finance and insurance (64-66), and real estate services including property rental (68).[3]
Professional services	Legal, accountancy and management consultancy services (69-70), architectural and engineering services (71), scientific R&D (72), advertising (73), design activities and other professional services (74-75).
Business support services	Renting of machinery (77) other than rolling stock, employment agencies (78), travel and reservation services (79), security services (80), cleaning and other services for buildings (81), office administrative and other business support services (82).
Wholesale, retail, catering & hotels	
- Wholesale & retail	Motor trades and repair of motor vehicles (45), other wholesale and retail trade (46-47).
- Catering & hotels	Hotels and other short-stay accommodation (55), food and beverage serving (56).
Other activities	
- Agriculture	Agriculture, forestry and fishing (01-03).
- Health & education	Public administration (85), education and training (86), health and care (87-88).[3]
- Cultural services	Arts, libraries, sports, and recreation (90-93).
- Household & personal services	Membership organisations (94), household goods repair (95), miscellaneous personal services (96), and activities of households as employers (97).

[1] The split between urban and interurban rail is based on the split in employee jobs in the ONS Business Register Employment Survey. On that basis it looks as if some parts of TfL Rail are counted in the former sector, and some in the latter. [2] Supplies of a capital nature are only captured in the analysis if they are provided to the rail transport system, or to the rolling stock leasing companies. Otherwise, supplies counted in 'general machinery' will be limited to parts and components, and machinery installation and repair. 'General construction' will be limited to minor repair and maintenance activities.
[3] Indirect and induced impacts only capture privately-funded rather than taxpayer-funded activities, although this can include some charged-for public services. In addition, while induced impacts include actual property rental, no imputed owner-occupied rent is counted.

Fig. 73. Clarification of financial and economic terms and relationships

Term[1]	Description
Market value to customers	
- VAT on sales	
= Turnover of the business	
- Other taxes on products sold (where added by the business concerned rather than being built into the cost of their purchases)	Import duties; stamp duties; duties on alcohol, tobacco, petrol, and other oils; betting, gaming and lottery duties; air passenger duty; insurance premium tax; landfill tax; aggregates levy; climate change levy; renewable energy obligations; vehicle registration tax; community infrastructure levy.
= Net-of-tax sales	
- Cost of trading stock sold on	Mainly applies to wholesalers and retailers.
= Market output	Technically 'output at basic prices', as it is net of taxes on products sold.
- Purchases of day-to-day business supplies, inclusive of taxes	Technically 'intermediate consumption'. Excludes the cost of trading stock, and purchases of capital items that do not reduce EBITDA.
* Taxes on products purchased	See 'taxes on products sold' above for list. Only includes VAT if that is not recoverable. Can include taxes paid directly by the purchaser (such as import duties and stamp duties), and taxes accounted for by the supplier and built into the product price.
* Imported supplies, net of UK tax	
* Domestic supplies, net of tax	The starting point for the 'indirect impacts' in a 'standard assessment'.
= Direct GVA contribution of the business	Technically 'gross value added at basic prices', as it is net of taxes on products sold. At the national level, 'headline' or 'market price' GDP is arrived at by adding VAT and other taxes on products to GVA.
- Total employee compensation	
* Employer NICs	
* Employer pension contributions	
* Wages and salaries	
* Employee income tax	
* Employee NICs	
* Take-home pay	The starting point for the 'induced impacts' in a 'standard assessment'.
- Taxes on production	Business rates; business vehicle excise duty; apprenticeship levy and other levies; immigration skills charge; regulator fees; emissions trading scheme; carbon reduction commitment.
= EBITDA of the business	Earnings before interest, tax, depreciation and amortisation. Known as the 'gross operating surplus' in economic accounts. Can be negative.
- Capital depreciation	
= EBIT	The 'net operating surplus' (or deficit).

[1] This breakdown relates to corporate businesses in the market sector. The total output and GVA of a sector also includes self-employed income ('mixed income'), and the starting point for the 'induced impact' takes this into account too. Subsidies on products are effectively counted as negative taxes on products, and subsidies on production as negative taxes on production. For non-market entities, GVA is calculated as employment costs plus capital depreciation, and output as the sum of employment costs, capital depreciation, and intermediate consumption. The net surplus, and taxes and subsidies on production, are ignored in this case.

APPENDIX 2: RESULTS TABLES

TOTAL OF ALL RAIL-RELATED IMPACTS

Fig. 74. Rail-related GVA impacts by channel, industry, and region

£ billion	Rail transport system	Rail supply sector	Rail and supply sectors	On-station retail & supplies	Induced GVA impact	Total of all GVA impacts
Rail transport system	12.21	-	12.21	-	-	12.21
Rolling stock manufacture	-	1.29	1.29	-	-	1.29
Rail-related construction	-	3.00	3.00	-	-	3.00
Railway support services	-	1.05	1.05	-	-	1.05
Rolling stock leasing	-	1.45	1.45	-	-	1.45
General machinery	-	0.64	0.64	0.01	0.14	0.79
Non-machinery manufacturing	-	1.00	1.00	0.07	0.62	1.69
General construction	-	0.18	0.18	0.02	0.46	0.66
General transport services	-	0.88	0.88	0.07	0.66	1.60
Energy, mining & utilities	-	0.62	0.62	0.02	0.61	1.25
Information & communication	-	1.15	1.15	0.03	0.76	1.94
Finance & real estate	-	0.92	0.92	0.03	2.33	3.27
Professional services	-	2.80	2.80	0.05	0.80	3.64
Business support services	-	1.37	1.37	0.06	0.63	2.06
Wholesale, retail, catering & hotels	-	0.85	0.85	0.51	3.29	4.65
Other activities	-	0.61	0.61	0.04	1.68	2.33
All rail-related impacts	12.21	17.82	30.03	0.89	11.97	42.89
Of which, by region:						
North East	0.23	0.59	0.82	0.01	0.34	1.18
North West	0.84	1.69	2.53	0.08	1.16	3.77
Yorkshire & H.	0.74	1.20	1.94	0.05	0.80	2.79
East Midlands	0.30	1.36	1.66	0.03	0.70	2.39
West Midlands	0.71	1.31	2.02	0.05	0.86	2.94
East of England	0.63	1.29	1.92	0.05	1.01	2.98
London	5.43	4.79	10.22	0.39	2.97	13.58
South East	1.41	2.36	3.78	0.10	1.68	5.56
South West	0.72	1.02	1.74	0.04	0.85	2.64
Wales	0.16	0.48	0.64	0.02	0.39	1.04
Scotland	0.95	1.23	2.18	0.05	0.94	3.17
Northern Ireland	0.09	0.50	0.58	0.01	0.26	0.85

Fig. 75. Rail-related employment impacts by channel, industry, and region

Thousands of employee and self-employed jobs	Rail transport system	Rail supply sector	Rail and supply sectors	On-station retail & supplies	Induced jobs impact	Total of all jobs impacts
Rail transport system	123.36	-	123.36	-	-	123.36
Rolling stock manufacture	-	15.18	15.18	-	-	15.18
Rail-related construction	-	51.60	51.60	-	-	51.60
Railway support services	-	23.37	23.37	-	-	23.37
Rolling stock leasing	-	7.60	7.60	-	-	7.60
General machinery	-	11.15	11.15	0.21	2.11	13.47
Non-machinery manufacturing	-	18.85	18.85	1.14	10.28	30.27
General construction	-	3.24	3.24	0.32	8.30	11.86
General transport services	-	24.14	24.14	1.72	16.06	41.92
Energy, mining & utilities	-	4.17	4.17	0.07	3.38	7.61
Information & communication	-	14.07	14.07	0.61	7.55	22.23
Finance & real estate	-	7.77	7.77	0.36	14.26	22.39
Professional services	-	67.85	67.85	1.30	18.46	87.61
Business support services	-	38.41	38.41	2.02	16.53	56.95
Wholesale, retail, catering & hotels	-	16.29	16.29	13.70	105.01	135.01
Other activities	-	13.28	13.28	0.99	45.31	59.58
All rail-related impacts	123.36	316.99	440.35	22.43	247.24	710.02
Of which, by region:						
North East	3.11	11.71	14.83	0.32	8.37	23.52
North West	10.83	34.39	45.22	2.22	27.42	74.85
Yorkshire & H.	9.41	25.89	35.30	1.36	19.13	55.78
East Midlands	3.75	23.92	27.68	0.84	16.78	45.30
West Midlands	8.45	27.61	36.06	1.49	20.23	57.77
East of England	7.20	25.44	32.64	1.25	22.17	56.05
London	40.93	64.83	105.76	9.40	42.97	158.13
South East	16.02	38.38	54.40	2.35	33.79	90.54
South West	9.93	20.36	30.29	0.98	20.41	51.68
Wales	2.27	10.22	12.48	0.38	9.92	22.78
Scotland	10.48	24.23	34.70	1.50	19.85	56.05
Northern Ireland	0.97	10.02	10.99	0.36	6.20	17.55

Fig. 76. Rail-related tax impacts by channel and type of tax

£ billion	Rail transport system	Rail supply sector	Rail and supply sectors	On-station retail & supplies	Induced tax impacts	Total of all tax impacts
Employers' NICs	0.69	1.14	1.83	0.04	0.55	2.42
Workers' income tax & NICs	1.55	2.66	4.21	0.10	1.54	5.85
Corporation tax	0.18	0.58	0.76	0.03	0.50	1.29
Business rates, etc.	0.24	0.33	0.57	0.04	0.33	0.94
Taxes on purchases of supplies	0.26	0.57	0.83	0.05	0.49	1.38
Taxes on workers' spending	0.47	0.94	1.41	0.05	0.60	2.06
Taxes on sales to consumers	-	-	-	0.18	-	0.18
Total	3.39	6.23	9.62	0.49	4.01	14.12

Fig. 77. Rail-related economic impacts by industry and region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax payments	Total jobs	Of which: employee jobs
Rail transport system	25.96	12.21	6.04	3.39	123.36	123.36
Rolling stock manufacture	3.00	1.29	0.66	0.30	15.18	14.88
Rail-related construction	7.72	3.00	2.08	1.31	51.60	47.32
Railway support services	2.50	1.05	0.87	0.43	23.37	23.34
Rolling stock leasing	2.36	1.45	0.24	0.28	7.60	6.89
General machinery	2.05	0.79	0.53	0.27	13.47	13.09
Non-machinery manufacturing	4.58	1.69	0.88	0.49	30.27	28.36
General construction	1.69	0.66	0.27	0.25	11.86	7.56
General transport services	3.53	1.60	1.08	0.63	41.92	34.11
Energy, mining & utilities	4.06	1.25	0.29	0.36	7.61	7.08
Information & communication	3.21	1.94	0.99	0.56	22.23	20.29
Finance & real estate	6.82	3.27	1.07	1.34	22.39	19.88
Professional services	5.97	3.64	2.99	1.52	87.61	72.42
Business support services	3.70	2.06	1.28	0.60	56.95	50.77
Wholesale, retail, catering & hotels	9.15	4.65	2.64	1.65	135.01	124.31
Other activities	3.79	2.33	1.16	0.73	59.58	46.54
All rail-related impacts	90.08	42.89	23.06	14.12	710.02	640.20
Of which, by region:						
North East	2.73	1.18	0.63	0.35	23.52	21.31
North West	7.92	3.77	2.14	1.23	74.85	67.17
Yorkshire & H.	6.14	2.79	1.54	0.91	55.78	50.32
East Midlands	5.40	2.39	1.27	0.71	45.30	40.72
West Midlands	6.47	2.94	1.60	0.94	57.77	52.22
East of England	6.23	2.98	1.59	0.95	56.05	49.88
London	27.02	13.58	7.28	4.81	158.13	144.05
South East	11.37	5.56	3.00	1.80	90.54	81.60
South West	5.48	2.64	1.38	0.80	51.68	46.64
Wales	2.48	1.04	0.54	0.33	22.78	20.39
Scotland	6.84	3.17	1.65	1.01	56.05	50.33
Northern Ireland	2.00	0.85	0.43	0.28	17.55	15.57

RAIL TRANSPORT SYSTEM AND RAIL SUPPLY SECTOR

Fig. 78. Total rail system and rail supply sector activity by region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax payments	Total jobs	Of which: employee jobs
Total rail and supply sectors	63.63	30.03	16.79	9.62	440.35	407.32
Of which, by region:						
North East	1.97	0.82	0.46	0.24	14.83	13.77
North West	5.36	2.53	1.52	0.81	45.22	41.52
Yorkshire & H.	4.35	1.94	1.13	0.63	35.30	32.67
East Midlands	3.85	1.66	0.91	0.48	27.68	25.50
West Midlands	4.54	2.02	1.15	0.63	36.06	33.37
East of England	4.07	1.92	1.08	0.60	32.64	29.77
London	20.28	10.22	5.55	3.43	105.76	99.03
South East	7.75	3.78	2.14	1.20	54.40	50.28
South West	3.66	1.74	0.96	0.51	30.29	28.05
Wales	1.61	0.64	0.36	0.20	12.48	11.44
Scotland	4.76	2.18	1.21	0.69	34.70	31.98
Northern Ireland	1.42	0.58	0.32	0.20	10.99	9.93

Fig. 79. Rail transport system activity by sub-sector and region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax payments	Total jobs	Of which: employee jobs
Interurban rail transport	15.06	5.22	2.76	1.76	61.86	61.86
Urban metro systems	3.55	2.25	1.11	0.64	19.40	19.40
Network Rail	7.35	4.74	2.17	0.99	42.10	42.10
Rail transport system	25.96	12.21	6.04	3.39	123.36	123.36
Of which, by region:						
North East	0.64	0.23	0.12	0.06	3.11	3.11
North West	1.77	0.84	0.47	0.24	10.83	10.83
Yorkshire & H.	1.67	0.74	0.38	0.20	9.41	9.41
East Midlands	0.81	0.30	0.14	0.08	3.75	3.75
West Midlands	1.66	0.71	0.34	0.19	8.45	8.45
East of England	1.47	0.63	0.31	0.17	7.20	7.20
London	10.57	5.43	2.53	1.55	40.93	40.93
South East	2.91	1.41	0.78	0.40	16.02	16.02
South West	1.60	0.72	0.38	0.19	9.93	9.93
Wales	0.50	0.16	0.07	0.04	2.27	2.27
Scotland	2.12	0.95	0.46	0.25	10.48	10.48
Northern Ireland	0.25	0.09	0.04	0.03	0.97	0.97

Fig. 80. Rail supply sector activity by industry and region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax payments	Total jobs	Of which: employee jobs
Rolling stock manufacture	3.00	1.29	0.66	0.30	15.18	14.88
Rail-related construction	7.72	3.00	2.08	1.31	51.60	47.32
Railway support services	2.50	1.05	0.87	0.43	23.37	23.34
Rolling stock leasing	2.36	1.45	0.24	0.28	7.60	6.89
General machinery	1.62	0.64	0.44	0.22	11.15	10.84
Non-machinery manufacturing	2.61	1.00	0.57	0.31	18.85	17.73
General construction	0.46	0.18	0.07	0.07	3.24	2.07
General transport services	1.92	0.88	0.64	0.35	24.14	19.91
Energy, mining & utilities	2.14	0.62	0.16	0.19	4.17	3.85
Information & communication	1.87	1.15	0.65	0.35	14.07	13.10
Finance & real estate	1.77	0.92	0.43	0.40	7.77	7.13
Professional services	4.60	2.80	2.31	1.17	67.85	56.02
Business support services	2.49	1.37	0.87	0.41	38.41	34.36
Wholesale, retail, catering & hotels	1.61	0.85	0.45	0.26	16.29	15.43
Other activities	1.01	0.61	0.31	0.19	13.28	11.08
Rail supply sector	37.67	17.82	10.75	6.23	316.99	283.96
Of which, by region:						
North East	1.33	0.59	0.34	0.18	11.71	10.66
North West	3.59	1.69	1.05	0.57	34.39	30.69
Yorkshire & H.	2.68	1.20	0.75	0.43	25.89	23.25
East Midlands	3.04	1.36	0.77	0.40	23.92	21.75
West Midlands	2.88	1.31	0.81	0.44	27.61	24.92
East of England	2.61	1.29	0.77	0.43	25.44	22.57
London	9.71	4.79	3.02	1.87	64.83	58.10
South East	4.84	2.36	1.35	0.80	38.38	34.26
South West	2.06	1.02	0.58	0.32	20.36	18.12
Wales	1.11	0.48	0.29	0.16	10.22	9.18
Scotland	2.64	1.23	0.75	0.43	24.23	21.50
Northern Ireland	1.17	0.50	0.28	0.17	10.02	8.96

Fig. 81. Labour productivity in the rail transport system and rail supply sector

GVA per job, £ per annum	Rail transport system	Rail supply sector	Rail & supply sectors	Whole economy for comparison
Total UK	98,987	56,219	68,200	49,538
Of which, by region:				
North East	74,660	50,543	55,607	41,947
North West	77,477	49,087	55,886	44,094
Yorkshire & H.	78,815	46,446	55,077	42,381
East Midlands	79,636	56,916	59,999	42,833
West Midlands	84,384	47,431	56,094	44,261
East of England	87,463	50,545	58,688	46,542
London	132,734	73,830	96,628	69,044
South East	88,018	61,620	69,394	52,002
South West	72,829	50,109	57,557	44,023
Wales	69,910	47,229	51,347	41,892
Scotland	90,208	50,870	62,745	47,561
Northern Ireland	88,223	49,411	52,839	43,040

Fig. 82. Average wages in the rail transport system and rail supply sector

Wages per employee job, £ per annum	Rail transport system	Rail supply sector	Rail & supply sectors	Whole economy for comparison
Total UK	48,979	37,859	41,227	30,303
Of which, by region:				
North East	39,773	31,878	33,663	25,325
North West	43,755	34,114	36,628	27,354
Yorkshire & H.	40,748	32,256	34,703	25,897
East Midlands	37,871	35,433	35,792	26,017
West Midlands	40,003	32,552	34,440	27,065
East of England	42,662	34,042	36,127	28,311
London	61,926	51,934	56,064	44,892
South East	48,975	39,503	42,521	30,740
South West	38,704	31,838	34,268	25,696
Wales	31,073	31,098	31,093	24,667
Scotland	44,276	34,835	37,928	27,725
Northern Ireland	36,382	31,395	31,883	24,503

ON-STATION RETAIL AND INDUCED IMPACTS

Fig. 83. On-station retail and supplies by industry and region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax pay-ments	Total jobs	Of which: employee jobs
General machinery	0.03	0.01	0.01	0.00	0.21	0.20
Non-machinery manufacturing	0.19	0.07	0.03	0.02	1.14	0.98
General construction	0.04	0.02	0.01	0.01	0.32	0.20
General transport services	0.16	0.07	0.05	0.02	1.72	1.56
Energy, mining & utilities	0.06	0.02	0.00	0.00	0.07	0.06
Information & communication	0.04	0.03	0.02	0.01	0.61	0.57
Finance & real estate	0.06	0.03	0.01	0.01	0.36	0.32
Professional services	0.07	0.05	0.04	0.02	1.30	1.08
Business support services	0.10	0.06	0.04	0.02	2.02	1.83
Wholesale, retail, catering & hotels	1.37	0.51	0.25	0.36	13.70	11.52
Other activities	0.07	0.04	0.02	0.02	0.99	0.68
On-station retail and supplies	2.18	0.89	0.47	0.49	22.43	19.01
Of which, by region:						
North East	0.03	0.01	0.01	0.00	0.32	0.28
North West	0.19	0.08	0.04	0.04	2.22	1.89
Yorkshire & H.	0.12	0.05	0.02	0.02	1.36	1.17
East Midlands	0.08	0.03	0.02	0.01	0.84	0.73
West Midlands	0.13	0.05	0.03	0.03	1.49	1.28
East of England	0.12	0.05	0.03	0.02	1.25	1.07
London	1.00	0.39	0.21	0.27	9.40	7.83
South East	0.22	0.10	0.05	0.05	2.35	2.02
South West	0.09	0.04	0.02	0.02	0.98	0.84
Wales	0.04	0.02	0.01	0.01	0.38	0.33
Scotland	0.13	0.05	0.03	0.03	1.50	1.26
Northern Ireland	0.03	0.01	0.01	0.00	0.36	0.30
Sale, catering & hotels sub-sectors:						
On-station goods retail	0.59	0.12	0.06	0.11	4.38	3.44
On-station catering	0.62	0.32	0.17	0.23	8.10	6.89
Wholesale	0.13	0.06	0.02	0.02	0.85	0.85
Other catering, hotels & motor trades	0.03	0.02	0.01	0.00	0.37	0.35
Other activities sub-sectors:						
Agriculture	0.02	0.01	0.00	0.00	0.27	0.16
On-station household services	0.03	0.02	0.01	0.01	0.41	0.27
Other household, cultural & personal	0.02	0.01	0.01	0.00	0.31	0.26
Channel totals:						
On-station retail activity	1.24	0.46	0.23	0.35	12.89	10.60
Supply chain for on-station retail	0.94	0.43	0.24	0.14	9.54	8.42

Fig. 84. Induced impacts by industry and region

£ billion; thousands of jobs	Output or sales	GVA	Of which: wages	Tax payments	Total jobs	Of which: employee jobs
General machinery	0.40	0.14	0.08	0.04	2.11	2.05
Non-machinery manufacturing	1.79	0.62	0.29	0.17	10.28	9.65
General construction	1.18	0.46	0.19	0.18	8.30	5.29
General transport services	1.45	0.66	0.39	0.26	16.06	12.64
Energy, mining & utilities	1.86	0.61	0.13	0.17	3.38	3.17
Information & communication	1.30	0.76	0.31	0.19	7.55	6.62
Finance & real estate	5.00	2.33	0.63	0.93	14.26	12.42
Professional services	1.30	0.80	0.64	0.33	18.46	15.32
Business support services	1.11	0.63	0.37	0.18	16.53	14.59
Wholesale, retail, catering & hotels	6.16	3.29	1.94	1.04	105.01	97.35
Other activities	2.71	1.68	0.84	0.52	45.31	34.77
Rail-related induced impacts	24.27	11.97	5.80	4.01	247.24	213.87
Of which, by region:						
North East	0.73	0.34	0.16	0.11	8.37	7.25
North West	2.36	1.16	0.58	0.38	27.42	23.76
Yorkshire & H.	1.67	0.80	0.38	0.26	19.13	16.49
East Midlands	1.47	0.70	0.34	0.22	16.78	14.48
West Midlands	1.81	0.86	0.43	0.28	20.23	17.58
East of England	2.03	1.01	0.49	0.33	22.17	19.04
London	5.73	2.97	1.52	1.12	42.97	37.19
South East	3.40	1.68	0.80	0.55	33.79	29.29
South West	1.72	0.85	0.40	0.27	20.41	17.75
Wales	0.84	0.39	0.18	0.12	9.92	8.62
Scotland	1.95	0.94	0.41	0.30	19.85	17.09
Northern Ireland	0.55	0.26	0.11	0.08	6.20	5.33
Sale, catering & hotels sub-sectors:						
Wholesale & retail	4.25	2.30	1.26	0.69	61.48	56.55
Catering & hotels	1.92	0.99	0.68	0.35	43.53	40.80
Other activities sub-sectors:						
Agriculture	0.33	0.13	0.05	0.04	4.00	2.25
Health & education	1.22	0.77	0.49	0.25	21.21	19.30
Cultural services	0.47	0.26	0.13	0.09	7.98	5.48
Household & personal services	0.69	0.52	0.16	0.13	12.12	7.74

FUTURE SCENARIOS FOR RAIL INFRASTRUCTURE SPENDING AND IMPACTS

Fig. 85. Base and alternative ('high') scenarios

All values at 2019 prices, per annum	Base forecast (based on NIC remit-consistent projections)						
	2019	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Infrastructure spend, £ billion pa							
Network Rail's own capitalised work	1.1	1.3	1.3	1.5	1.6	1.6	1.6
Suppliers to the UK railway system	7.8	11.1	12.8	12.4	9.0	7.1	7.3
Total UK infrastructure output	8.9	12.4	14.1	13.8	10.6	8.7	8.9
Land purchases and imports	0.7	0.5	1.3	0.6	0.4	0.3	0.3
Total infrastructure spending	9.6	12.9	15.4	14.4	11.0	9.0	9.2
GVA, £ billion							
Rail transport system	12.2	12.4	13.6	14.7	15.8	16.9	18.2
Rail supply sector	17.8	20.5	23.1	23.7	21.9	21.6	23.0
Total rail and supply sectors	30.0	32.9	36.7	38.3	37.7	38.5	41.2
Thousands of jobs							
Rail transport system	123	125	128	130	131	131	132
Rail supply sector	317	369	390	374	320	290	288
Total rail and supply sectors	440	494	518	504	451	421	419

All values at 2019 prices, per annum	Alternative scenario (spending 50% above existing remit)						
	2019	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49
Infrastructure spend, £ billion pa							
Network Rail's own capitalised work	1.1	1.3	1.3	1.5	1.6	1.6	1.6
Suppliers to the UK railway system	7.8	16.9	19.7	18.7	13.9	11.1	11.4
Total UK infrastructure output	8.9	18.2	20.9	20.2	15.5	12.7	13.0
Land purchases and imports	0.7	1.2	2.2	1.4	1.0	0.8	0.8
Total infrastructure spending	9.6	19.4	23.1	21.6	16.5	13.5	13.8
GVA, £ billion							
Rail transport system	12.2	12.4	13.6	14.7	15.8	16.9	18.2
Rail supply sector	17.8	25.2	28.7	28.9	26.0	24.8	26.4
Total rail and supply sectors	30.0	37.6	42.3	43.6	41.8	41.8	44.6
Thousands of jobs							
Rail transport system	123	125	128	130	131	131	132
Rail supply sector	317	462	494	465	385	340	336
Total rail and supply sectors	440	587	622	595	517	471	467

APPENDIX 3: METHODOLOGY

MODELLING THE WHOLE UK ECONOMY

Oxford Economics put together a detailed model of the UK economy, initially comprising 105 industries in each of the 12 standard statistical regions. The 105 industries are those found in the most detailed version of the ONS set of UK 'input-output tables', which provide data on transactions between UK industries in a given year, as well as other details of their sales, purchases, and components of GVA.

To start with, for each industry in each region, for calendar year 2019:

1. The number of employee jobs was derived from the ONS Business Register Employment Survey (BRES).
2. Average wages were derived from the ONS Annual Survey of Hours and Earnings (ASHE).
3. The wage bill for each industry in each region was taken as the product of employee jobs and average wages.
4. Total GVA was estimated by combining data on GVA by region and broad industry from the ONS Regional Accounts, with national GVA for industries at the very refined level from the ONS Low Level GVA (Output) dataset, and the detailed pattern of employee jobs by narrow industry and region.

The components of GVA other than the wage bill were then added in, on a more stylised basis:

1. Employers' national insurance contributions (NICs) were calculated on the basis of the average wage, the UK NICs system in place in 2019, and the number of employees.
2. At the national level, the share of total employee compensation in GVA, in each industry, was estimated using ratios in the latest ONS 'input-output table' with the 105-industry split. Employers' pension contributions were taken to be employee compensation, minus wages and employers' NICs. This was spread across the regions in proportion to the wage bill.
3. The number of self-employed jobs by broad industry group, at the national level, was taken from the ONS Labour Market Statistics dataset, while the share of GVA accounted for by self-employed income, at a 64-industry level, was taken from the most recent ONS input-output table.[35] Self-employed jobs and self-employed income were then spread across the 105 industries, using the pattern of employee jobs, and relative wages, as a guide. The ratio of self-employed individuals to employees in each region was then assumed to be the same, for each industry separately.
4. The share of taxes on production in GVA was taken from the 105-industry input-output table, while capital depreciation was estimated for each of those industries, using information from the 64-industry table.
5. For each industry in each region, the net corporate operating surplus or deficit was taken as the residual, i.e. total GVA minus total employee compensation, self-employed income, taxes on production, and capital depreciation.

[35] The most recent table has only 64 industries, but includes a more detailed breakdown of GVA by component than the most detailed, 105-industry table. In particular, self-employed income and capital depreciation are split out of the gross operating surplus.

For each industry, intermediate consumption, and its three components (taxes on products purchased, imports, and net-of-tax domestic supplies), was then estimated using ratios found in the 105-industry input-output table. These ratios were assumed not to vary from one region to the next. Output is the sum of intermediate consumption and GVA.

The imputed rent of owner-occupiers was excluded from the model, so that the 'owner occupied services' sector only captures purchases of supplies, with the GVA of that sector counted as zero for the purposes of this study.[36]

The split in output into its separate components allowed tax payments to be estimated, for each industry in each region, as follows:

- Taxes on products purchased (such as road fuel duty), taxes on production (such as business rates), and employers' NICs, are themselves separate components of output.
- Income tax and NICs paid by employees and the self-employed were calculated on the basis of average earnings, the UK tax and NICs system in place in 2019, and the number of workers.
- Corporation tax was estimated by applying the standard rate applicable in 2019 to corporate profits net of capital depreciation, where those net profits were positive.
- The spending of workers engaged in each sector, in each region, was calculated by deducting their income tax and NICs from the sector's wage bill (and self-employed income). UK taxes (such as VAT and excise duties) built into the price paid for those purchases was then estimated by applying the share of taxes on products in total household consumption, as found in the input-output table.[37]

All tax estimates shown in this report are, therefore, expectations, based on income and spending flows and a stylised version of the UK tax system in 2019. They are not based on any company-specific information about actual payments or liabilities, which could vary from these estimates as a result of the wide range of nuances built into the tax system.

Finally, two key ratios could also be calculated for each industry in each region, namely GVA per job (where jobs include employee and self-employed jobs), and wages per employee job.

RAIL TRANSPORT SYSTEM

As shown in the table in Appendix 1, the rail transport system comprises three sectors found in the UK business classification system, namely interurban passenger and freight rail (SIC 49.1-2), metropolitan railway systems (part of 'other land transport services', 49.3-5), and the activities of Network Rail (part of 'warehousing and transport support services', 52).

Interurban rail is one of the 105 industries described above, so output, GVA, jobs, wages and taxes were estimated as part of the initial model-building process. Then within each region, the results were spread across the parliamentary constituencies, in line with the split in employee jobs for that sector found in BRES.[38] An implicit assumption is therefore made that all ratios, such as GVA per job, are the same in each constituency, within each region.

The metro systems impacts had to be 'carved out' of those of the wider 'other land transport' sector. Here, employee jobs are available on a region-by-region and constituency-by-constituency basis, and

[36] The measures of GVA per job used for the whole economy, and its regions, for the purposes of the comparisons, also exclude imputed owner-occupied rent.
[37] As adjusted to exclude 'spending' on imputed owner-occupied rent.
[38] Except for Northern Ireland, where the BRES constituency results are available on a less refined basis, and estimates were made based on the location and size of the train stations.

self-employment was assumed to be zero (as it was for the mainline rail sector). The components of GVA and output were estimated for London, and parts of the Underground extending beyond London, based on information in the TfL accounts. Estimates of these items were then made for the other metro systems, on the assumption that the regional productivity and wage differentials found for the mainline train operators also applied to the metro systems. Estimates of all tax payments were derived from there, on the same basis as in the main modelling exercise.

The impacts of Network Rail's activities then had to be 'carved out' of the 'warehousing and support services for transport' sector. As Network Rail is classified as a government body, rather than as a public corporation operating in the 'market sector', GVA is calculated as total employee compensation plus capital depreciation, and output as the sum of GVA and purchases of day-to-day supplies, with profits, losses, and sources of finance ignored. These elements, along with employment, were derived from the Network Rail annual report. Employment was then assumed to be spread around Great Britain, in line with the pattern of employment for the interurban rail transport sector. GVA and wages, etc, by region, were estimated from there, on the assumption that the regional productivity and wage differentials found for the mainline train operators also applied to Network Rail. Estimates of all tax payments were derived from there, on the same basis as in the main modelling exercise.

RAIL SUPPLY SECTOR

The main model was adjusted so that the 'other land transport' sector was split between metro systems and non-rail land transport services, with 'warehousing and transport support services' split between the activities of Network Rail and all other such services. This created a total of three rail industries and 104 non-rail industries in the model.

Day-to-day supplies to UK rail

Net-of-tax domestic supplies to the UK rail transport sector were calculated as part of the exercise described above. These supplies were spread across the 107 potential supplying industries in the model. For the interurban train operators, this split can be taken straight from the 105-industry UK 'input-output' table. The share of 'rail support services' purchased that was accounted for by payments to Network Rail was taken from Network Rail's accounts, and all purchases of other land transport services were assumed to be from the non-metro part of that sector.

Metro system purchases were assumed to follow the same pattern as those of the mainline train operators, with the exception that no payments were made to Network Rail. Network Rail's purchases were assumed to be spread across the supplying sectors in line with the pattern for the overall 'transport support services' sector. Transactions between the three different parts of the rail transport system were then excluded, and the remaining purchases were summed up, to arrive at total purchases of day-to-day supplies by the rail transport system, from each of the 104 non-rail sectors.

This dataset was then combined with a further set of ratios derived from the input-output table, using a standard statistical technique, to arrive at the total output of entire UK-based supply chain to the UK railway system ─ including output resulting from the second and subsequent 'rounds' of transactions. Where the rail transport system was found to be in its own supply chain, these amounts were excluded to avoid double-counting of output across the rail and supply sectors.

The output of five rail-specific supply sectors was then 'carved out' of these results, as follows:

- **Rolling stock manufacturing.** 'Other' manufactured transport machinery (SIC 30.2+30.4+30.9) provided directly to the railway system was assumed to be rolling stock (30.2), but to be other transport machinery where it was produced further up the supply chain.

- **Rail support services.** Transport support services (52, excluding Network Rail) provided directly to the railway system were assumed to be rail support services, but to be non-rail transport support services (such as road haulage or taxi services) where provided further up the supply chain.
- **Rolling stock leasing.** Machinery (77) leased to the rail transport system was assumed to be rolling stock, and that leased further up the supply chain to be non-rail equipment.
- **Railway construction.** Construction (41-43) carried out directly for the railway system was counted as railway construction for the purposes of this study.
- **Rail-associated construction.** Construction activity further up the supply chain was counted as rail-associated construction, where those supplies were linked to the railway transport system only through construction-to-construction transactions, and so likely to be sub-contracted work. Other construction work further up the supply chain was counted as general (non-rail) construction.

This created a total of three railway transport sectors, five rail-specific supply sectors, and 104 non-rail-specific sectors, in the overall model. Almost all of the non-rail-specific sectors were found to contribute to the output of the rail transport sector's supply chain, the only exceptions being sectors catering solely for households (most notably, retail distribution). The industries were grouped together for reporting purposes as set out in Appendix 1, with **rail-related construction** combining railway construction and rail-associated construction as defined above. This will include all output classified to 'construction of railways' (42.12) in the official datasets, but also some other construction activity.

For the rail-specific sectors, the components of output, and regional pattern of activity, were assumed to be in line with that of the wider sectors of which they form a part, except as follows:

- **Rolling stock manufacturing:** GVA per job was found to be higher than that of the remaining part of the 'other transport machinery' sector, based on data in the ONS Annual Business Survey (ONS). The regional spread of employees for the sector was taken directly from BRES.
- **Rail support services.** The geographical pattern of employment was assumed to follow the geographical pattern of employment on the rail transport system.
- **Railway construction.** GVA per job was found to be a little higher for railway construction than for other construction, based on data in the ABS for the sector narrowly-defined (42.12). The regional spread of employees was assumed to follow that for the narrowly-defined sector, taken directly from BRES. All workers were assumed to be employees rather than self-employed individuals.
- **Rail-associated construction.** This sector was assumed to have the same characteristics as non-rail construction, in terms of GVA per job and the preponderance of self-employment, but to follow the same geographical pattern of work as railway construction.

The output of each non-rail industry in the supply chain was then allocated across the 12 UK statistical regions, in proportion to the regional distribution of total output for that industry, as found in the model of the whole UK economy. Here, the regional distribution of output of non-rail land transport services, non-rail transport support services, leasing of machinery other than rolling stock, and general construction, was assumed to follow the regional distribution of their respective sectors, as adjusted to exclude the rail-specific elements.

Having worked out the regional distribution of output in the supply chain, for each industry, GVA and its components, employee and self-employed jobs, and tax payments, were derived by applying the set of ratios implicit for each sector, in each region, in the model of the overall UK economy.

Capital supplies to the UK railway sector

Day-to-day supplies to the UK rail system exclude supplies of a capital nature, and therefore most construction work and machinery supplied to the system. Output of these supplies was therefore estimated separately, using the same methodology as for day-to-day supplies described above. Estimates of domestic purchases of newly-produced capital assets by the mainline train companies, metro systems, and Network Rail, by type of asset, were made taking these data into account:

- Capital expenditure by asset for the land transport sector as a whole (SIC 49), from the ONS 'annual gross fixed capital formation by industry and asset' dataset.
- Total capital expenditure by the train operating companies, from the ABS.
- Capital expenditure by Network Rail, excluding the capitalised work of its own workforce, from Network Rail's annual report.
- TfL's capital expenditure on Crossrail and other rail-related projects, from the TfL accounts.

In addition, domestic supplies relating to the pre-construction preparatory work for High Speed 2 (HS2), in 2019, were included in the 'capital supplies to UK rail' modelling. The cost of land acquisition was excluded, but other spending, on newly-produced assets, other goods, and services, by industry of supplier, was based on an illustration of spending in a report by the National Audit Office.[39]

Exports

Estimates of output supported by the export of rail-related products also had to be added into the model, in the same way as output supported by capital supplies to the UK rail system. These estimates were made with the help of the following datasets:

- The ONS dataset, 'UK trade in goods by classification of product by activity', for exports of railway rolling stock.
- The Eurostat PRODCOM dataset, for exports of other rail-related goods.
- The ONS UK trade in services dataset, for exports of technical services, leasing services, and machinery repair services. The share of overseas railway customers in total exports, in each case, was assumed to be in line with the share of UK rail sector customers in total domestic supplies of these services, as indicated in the UK input-output table.
- The UK input-output table for 2018 for exports of transport services. This was updated to 2019, in line with growth of sector GVA. The proportion of these services provided to rail sector customers was assumed to be in line with the share of UK rail sector customers in total domestic supplies of these services, as indicated in the input-output table.[40]
- The data underlying a Rail Supply Group survey, to identify exports of goods and services not captured by the estimates above.[41]

Rolling stock provided via the rolling stock leasing companies

Finally, total output of railway rolling stock and related machinery was estimated for 2019, based on data in the ABS. This was far in excess of the value of rolling stock produced for export, or provided directly to the UK railway system, as expected given the system of supplying rolling stock via the leasing companies.[42] This 'missing' output, and the output supported by that activity further up the supply chain, was therefore added into the model to complete the picture.

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[39] National Audit Office, *High Speed Two: A progress update*, January 2020.

[40] As adjusted to exclude Network Rail from the supplying sector.

[41] Rail Supply Group, *Rail Sector Deal: Export Survey Report*, October 2020.

[42] As these are capital supplies, they are not captured in any of the preceding steps, unlike day-to-day supplies to the rolling stock leasing companies. Production of other rolling stock, in advance of its sale, might also contribute to the 'missing' output.

Constituency-level estimates

Estimates were made at the constituency level for the UK rail supply sector's output, GVA, wages, total jobs, employee jobs, and total tax payments. To do this, estimates at the regional level were grouped into the industries shown in the table below. Within each region, these were spread across the constituencies, in line with the split in all employee jobs in those sectors in BRES.

Fig. 86. Sectors of industry used to allocate rail supply sector activity to constituencies

Sectors in report	Sectors used for constituency allocation, with SIC 2007 codes
Rolling stock manufacturing	Rolling stock manufacturing (30.2)
Rail-related construction	Rail-related construction (part of 41-43)
Railway support services	Railway support services (part of 52)
Rolling stock leasing	Rolling stock leasing (part of 77)
General machinery	Non-rail transport machinery (rest of 29-30)
	Non-transport machinery (26-28)
	Repair of machinery (33)
Non-machinery manufacturing	Non-machinery manufacturing (10-18, 20-25, 31-32)
General construction	General construction (rest of 41-43)
General transport services	General transport services (rest of 49-53)[1]
Energy, mining & utilities	Mined products (05-09)
	Coke & petroleum (19)
	Energy, water & waste services (35-39)
Information & communication	Information & communication (58-63)
Finance & real estate	Financial services (64-66)
	Real estate services (68)
Professional services	Professional services (69-75)
Business support services	Non-rail equipment leasing (rest of 77)
	Business support other than leasing (78-82)
Wholesale, retail, catering & hotels	Retail & wholesale (45-47)
	Catering & hotels (55-56)
Other activities	Agricultural products (01-03)
	Public administration, education & health (85-88)
	Cultural services (90-93)
	Other services (94-97)

[1] Excludes the railway transport system (49.1-2, 49.31/1, part of 52), as well as railway support services.

ON-STATION RETAILERS AND CATERERS, AND THEIR SUPPLIERS

Oxford Economics was provided with some data on the turnover of on-station retailers and caterers, by Network Rail and some of the train operating companies in charge of the day-to-day running of stations. Some data were also provided on employment in these businesses, and some of the turnover data were provided on a station-by-station basis. This was combined with similar data provided for other parts of the rail network for the 2018 study, and the volume of passenger movements (entries and exits) on a station-by-station basis in 2016 and 2019, to arrive at estimates of

turnover and employment on a station-by-station basis across the UK.[43] These estimates should be seen as a broad approximation of the true picture.

The GVA of these businesses, the taxes paid by them and their employees, and the spending power of their employees, was then worked out using ratios for the relevant industries and regions in the UK economy model. These ratios were also used to work output purchases of stocks of goods, and other goods and services of all types, by the retailers, and this was fed into the UK economy model to arrive at the GVA, jobs, tax payments, wages, and workers' spending power, in the UK-based supply chain for these on-station activities. These values were allocated to regions and constituencies in the same way as those for the rail supply sector.

While the on-station sector's 'headline' production measure relates to sales, the limitations of the 'input-output' based model means that only output can be captured in the supply chain. This captures the 'gross margin' on wholesalers' transactions in stocks of goods, i.e. the gross profit before accounting for the costs of running the business, rather than the full value of all transactions including the cost of the stocks themselves. For other, non-distribution businesses in the supply chain, sales and output will be essentially the same.

INDUCED IMPACTS

The spending power of workers in the rail transport system, rail supply sector, on-station retail sector, and supply chain for on-station retailers, were worked out as part of the estimation processes described above. It is taken to be equal to wages plus self-employed income, minus income tax and national insurance contributions paid by employees and the self-employed. These amounts were assumed to be spent by these individuals in proportion to average UK household spending as found in the UK input-output table (but excluding owner-occupied imputed rent). This allowed imports, UK taxes on consumer products, and net-of-tax amounts received by UK suppliers (i.e. their output) on an industry-by-industry basis, to be worked out.

This data, on the output of the 'first round' of UK suppliers to the workers concerned, was then combined with a further set of ratios implicit in the input-output table, using a standard statistical technique, to arrive at total output across the entire induced channel. This includes the impact of further 'rounds' of spending by workers in the consumer-facing industries themselves, as well as spending by workers in the supply chain of the consumer-facing businesses. Induced GVA, jobs, and tax payments were derived from there using the relevant ratios in the model of the UK economy. These values were allocated to regions and constituencies in the same way as those for the rail supply sector.

[43] Passenger movements, and recent trends in passenger movements, were taken from Office of Road and Rail, *Estimates of station usage 2019-20*, December 2020. For Northern Ireland, the estimates took into account passenger numbers, and recent trends in passenger numbers, from Northern Ireland Statistics and Research Agency (NISRA) and Department for Infrastructure, *Northern Ireland Transport Statistics 2019-20*, October 2020.

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