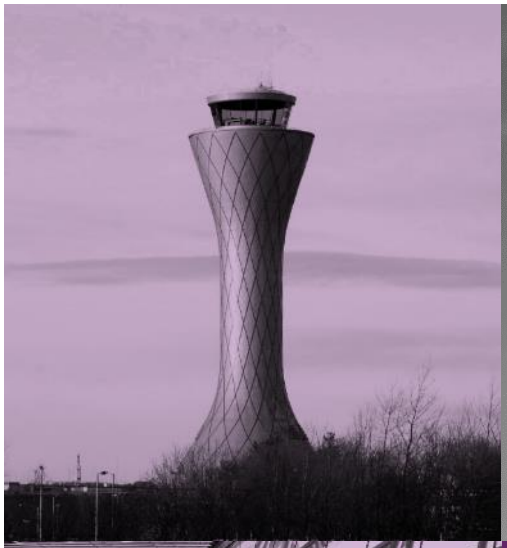
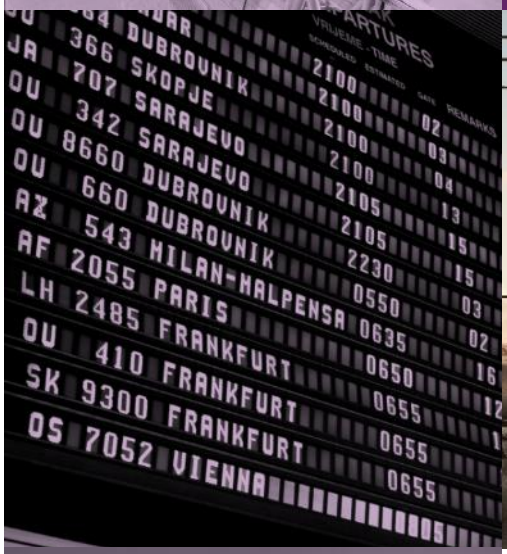


International Trade and Connectivity in the North



Transport for the North

Final Report

April 2019

OXFORD ECONOMICS

York Aviation

York Aviation

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March 2019

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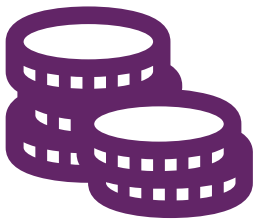
Contents

0. Executive Summary

0.1. Transport for the North (TfN) commissioned York Aviation and Oxford Economics to analyse trade and connectivity across the North. The study focuses its attention on volumes and patterns of trade and how these are reflected in the region's current international connectivity position. It then moves on to consider how trade will support growth in the future and, in particular, how trading volumes and patterns will need to evolve if the aspiration for transformational growth set out in the Northern Powerhouse Independent Economic Review (NPIER) are to be achieved. Finally, it considers the implications of these trade developments in terms of the North's international connectivity requirements and how these in turn can be influenced by investment in domestic connectivity.

0.2. **International trade has an important role to play in enabling the North to realise its growth ambitions**. It allows highly productive and competitive firms to gain access to new consumers, and to thereby expand by exporting their goods. And these benefits are often reinforcing: productive firms can attract greater investment to a region, further boosting its competitive advantages.



£85 billion

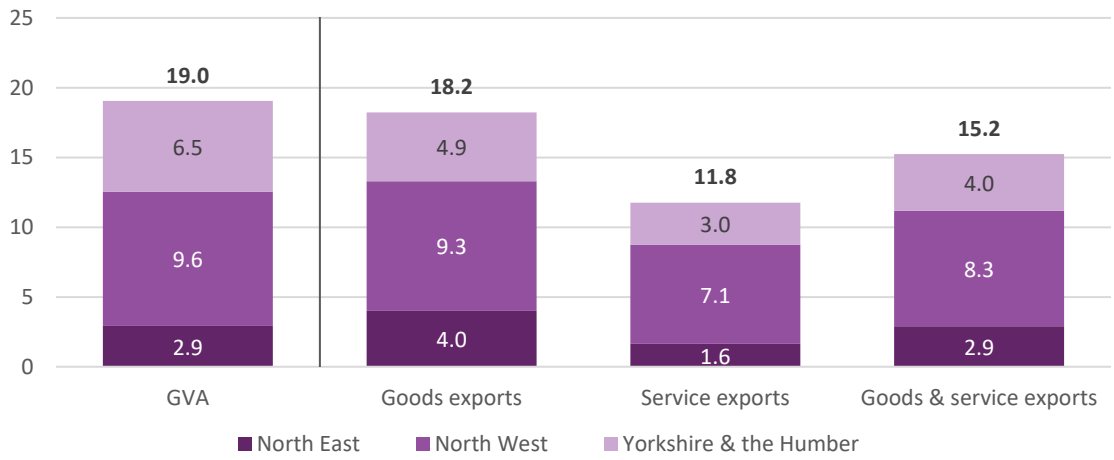
Value of the North's Goods & Services Exports in 2016

0.3. **This report explores the importance of international trade to the Northern economy** — defined as the North East, North West, and Yorkshire & the Humber. Our analysis covers a range of key factors, including the current the composition of the North's exports, how they have changed over time, and the overall contribution of exports to the economy. Looking forward, we also estimate how the scale and profile of the North's exports would change under two different future-growth scenarios.

0.4. **The North's exports have historically underperformed the rest of the UK**. Despite contributing almost a fifth of the UK's economic activity, the three Northern regions represent just 15 percent of national exports. The North has a relative concentration of exports in goods (two-thirds of its annual export total, compared to just over a half for the UK as a whole), indicating a relative shortfall in service exports. But in recent years, the share of goods exports in the North has fallen, primarily due to a real-terms contraction in the value of goods exports since 2011. The United States and nearby western European nations are the North's primary goods export markets, while Asia is the largest purchaser of its service exports, driven primarily by exports to Saudi Arabia.

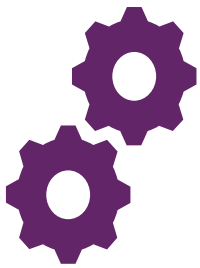
Figure 0.1: Share of UK GVA and exports, the North, 2016

Share of the UK (%)



Source: ONS, HMRC, Oxford Economics

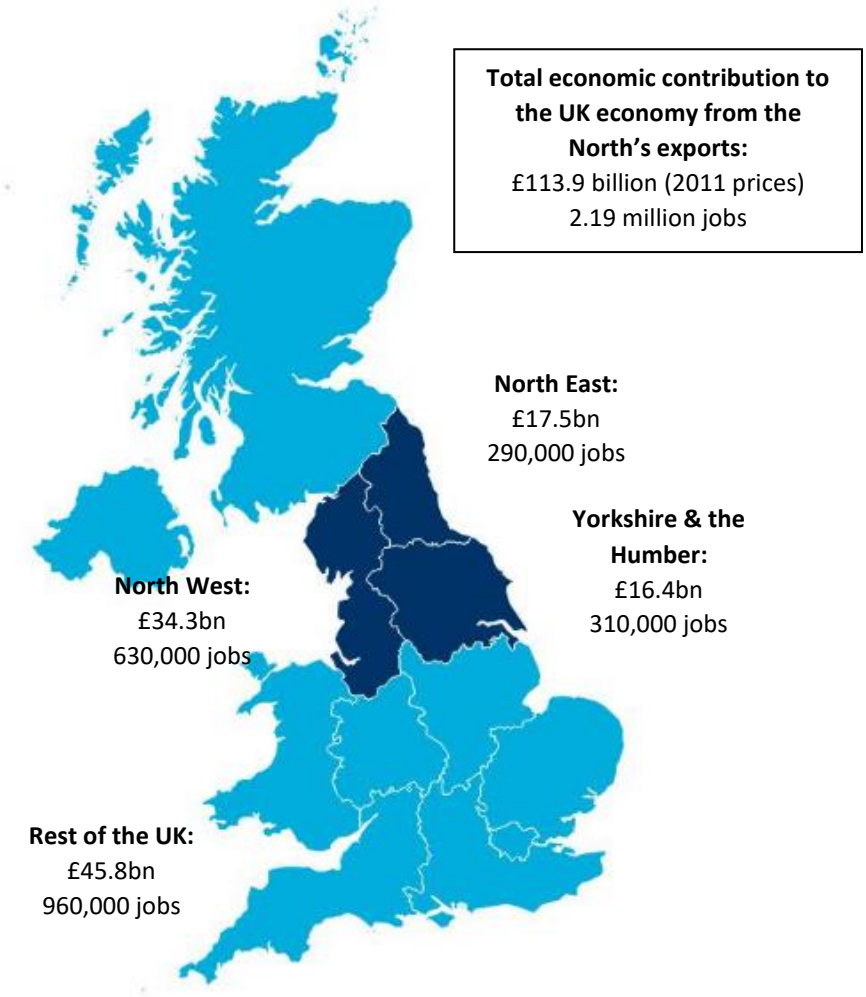
0.5. **The North's seven "capabilities" –– defined as subsectors with high productivity in which the region specialises to some degree — contribute over half of its total exports**. Yet these capabilities only represent around a third of the North's overall economic activity. A majority of their exports come in the form of goods, with advanced manufacturing alone representing around a quarter of the North's total exports. However, services are also better represented across the seven capabilities than in the North as a whole, with financial & professional services and logistics the two next-largest exporting capabilities.



The North's capabilities account for ½ of its exports but 1/3 of its GVA

0.6. **The North's exports make a significant contribution to both regional and national economies**. Overall, around a fifth of all economic activity across the North is linked to its exports—either directly through the goods and services that are sold, or via their indirect (supply chain) and induced (employee spending) economic impacts. In all, we find that **the North's exports support over 1.2 million, or around 17 percent of all jobs** across the region each year, with more than 600,000 of these directly linked to producing exports. Furthermore, we calculate that the North's exports support nearly one million jobs elsewhere in the UK economy. Workers generating the North's exports are found to be approximately 40 percent more productive than those serving the domestic market.

Figure 0.2: Annual economic contribution of the North's exports, 2013



Source: ONS, HMRC, Oxford Economics

0.7. **In the future, we expect the North to become increasingly export-intensive under both business-as-usual and transformational scenarios**. These export growth forecasts are for a "business-as-usual" scenario, based on our baseline macroeconomic, industry, regional and bilateral trade forecasts, and a "transformational" scenario, linked to the growth ambitions set out in the Northern Powerhouse Independent Economic Review. In the business-as-usual forecast, without further intervention, we forecast the North's annual exports to increase by 71 percent in real terms by 2050, compared with current levels. In contrast, we expect the region's overall economic activity to increase by just over half. However, exports will continue to underperform the rest of the UK under this scenario, with the North's annual exports falling slightly as a share of the national total.

71% Increase

Growth in the value of the North's exports by 2050 with business as usual growth

0.8. **The North will require a greater concentration of exports to achieve our transformational scenario**. We estimate that exports would have to almost double from current levels by 2050 under this scenario; an 18 percent increase on the level of exports under the business-as-usual scenario at 2050. Export growth will therefore need to outstrip the region's equivalent projected increase in economic activity of 15 percent, highlighting an increasing reliance on exports to achieve the stated growth ambitions. Were UK levels of export growth to remain in line with the business-as-usual scenario, this implies that the North would retain the same share of national exports under this scenario as today (15 percent).

0.9. **Our trade forecasts also provide an indication of the North's future international export markets**. Although we cannot accurately forecast service exports between countries, our analysis of future goods flows indicates that the United States will continue to be the largest purchaser of UK goods exports. However, China is projected to make the largest contribution to export growth, moving from the UK's sixth-largest export market currently to its second-largest by 2050. Nearby European nations including Germany, Ireland, France, the Netherlands and Belgium are also all forecast to continue to be large export markets for UK goods.

Further 18% Increase

Additional growth in exports associated with transformational growth

0.10. **However, Brexit represents a significant downside risk to this forecast**. Our business-as-usual forecast assumes that the UK will struggle to formulate a plan to supersede the UK-EU withdrawal agreement at time of writing (March 2019) and will consequently remain in the Customs Union for a prolonged period. In the longer term, however, the UK's prospects — both in terms of trade and overall economic performance — are heavily dependent on future negotiations over its relationship with the EU. Leaving the Customs Union will adversely affect exports from the UK to the EU through the imposition of both tariff and non-tariff barriers to trade, harming its levels of exports to EU nations.

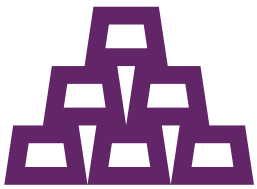
0.11. **International connectivity is an essential facilitator of trade and other international economic linkages**. There is a substantial body of evidence that links the ability to trade effectively with air passenger and freight connectivity. Ultimately, goods exports rely on international connectivity to efficiently and quickly move products to market or to customers. Passenger travel is also often required to facilitate goods exports via deal making, sales support or after sales care. The exporting of services very often requires passenger travel to enable the delivery of the services themselves or to facilitate their sale. Service exports also generate some demand for freight movements via the movement of contract documents and similar.

4.1 Million

Number of business passengers travelling to/from the North in 2017

0.12. **Currently, there are around 4.1 million air passengers travelling for business to / from the North of England each year**. The largest market is in the North West, but all the North's regions have significant numbers of business passengers. Europe is by some margin the largest market for business travel, reflecting the pattern within the North's trading relationships, followed by North America. However, Asia and the Middle East are also significant and growing markets.

0.13. **Manchester Airport is the North's largest gateway for business passenger travel**, offering a wide range of short and long connections. Manchester's influence extends across the North and beyond. It is the largest provider of business connectivity in the North West and Yorkshire & the Humber. Given the distance involved, its influence in the North East is less, but it is still a factor. **The North's other major airports operate primarily within their 'home' regions and are generally more focussed on European connectivity.**



101 Million Tonnes

Export volume produced by the North in 2017

0.14. **Business passenger leakage to airports outside of the North is still a factor in the market but it is becoming more limited**. Heathrow remains important in terms of long haul connectivity given the breadth and frequency of connections it offers. The breadth of the short haul networks at Gatwick and Stansted mean that these airports attract some business passengers even for European travel.

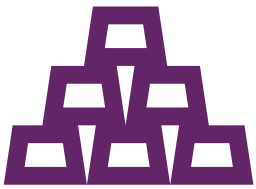
0.15. **Currently, the North's economy produces around 101 million tonnes of exports but only around 39% of this is shipped via the North's ports and airports**. The great majority is shipped via sea, with the Humber Ports being the largest gateway. Manchester Airport is the largest air freight gateway in the North but previous research for TfN has estimated that 70% of the North's air freight is flown from airports outside the North.

1.1 Million Business Passengers

Additional requirement for transformational growth

0.16. **Future economic growth in the North, and with it, the increase in trade, will result in additional demand for international passenger and freight transport**. Business air passenger demand is forecast to grow to around 8.0 million passengers per annum in the Business as Usual scenario and around 9.1 million passengers per annum in the Transformational Scenario by 2050. This establishes **a requirement for additional international connectivity of around 1.1 million business passengers** in 2050.

0.17. **International freight demand is also expected to grow significantly**. The Business as Usual scenario sees the volume of exports generated by the North's economy grow from around 101 million tonnes in 2017 to 180 million tonnes by 2050. If the Transformational Scenario is achieved, our analysis suggests that the volume of goods exports in 2050 would increase to around 197 million tonnes; **an additional requirement of around 17.5 million tonnes**.



17.5 Million Tonnes

Additional export volumes required for transformational growth

0.18. **Future trade patterns are likely to result in some rebalancing of international connectivity requirements away from Europe towards long haul destinations**. However, Europe will remain the UK's most significant trading partner and demand for connectivity to Europe will drive significant increases in the volume requirement for international connectivity.

0.19. **TfN's major schemes investments could assist in bringing forward a significant number of new routes to the region's airports through improving catchment penetration and broadening catchment areas**, including a mixture of long haul and short haul destinations. This improved **direct connectivity might result in around 100,000 additional business passengers per year in 2050**. The additional value from TfN's full investment programme in terms of new direct routes is less clear based on our analysis.

0.20. **By improving accessibility to airports generally, the major schemes programme might stimulate a further 210,000 business travellers per year in 2050**. The added value from the completion of the full investment programme is again relatively limited. These additional surface access improvements result in around a further 20,000 additional business travellers per year by 2050 .

30%

Potential contribution of TfN's investment programme to business passenger requirement

0.21. **In total, TfN's domestic connectivity investments could contribute around 30% towards meeting the additional business travel requirement associated with transformational growth**. The gap will need to be filled through other interventions, potentially around reform of air passenger duty or coordinated route development support for the region's airports, or through broader economic development policies that stimulate growth and business travel demand.

0.22. The potential value of TfN's domestic connectivity investments in meeting the additional requirement to support 17.5 million tonnes of exports is less clear. It should also be recognised that speed of access is not as strong a driver for freight as it is for passenger travel and as a consequence the question is perhaps more about ensuring capacity rather than improving speed. In the context of the known development plans for the region's ports, these investments should facilitate sufficient capacity to ensure that the North's additional export requirements are not constrained.

1. Introduction

1.1. Transport for the North (TfN) commissioned York Aviation and Oxford Economics to analyse trade and connectivity across the North. The study focuses its attention on volumes and patterns of trade and how these are reflected in the region's current international connectivity position. It then moves on to consider how trade will support growth in the future and, in particular, how trading volumes and patterns will evolve if the ambitions for transformational growth set out in the Northern Powerhouse Independent Economic Review (NPIER 2016) are to be achieved. Finally, it considers the implications of these trade developments in terms of the North's international connectivity requirements and how these in turn can be influenced by investment in domestic connectivity.

1.2. TfN has undertaken a body of work seeking to consider the economic benefits of narrowing the region's productivity gap with the rest of the UK, and the interventions required to do so. Its evidence base is primarily contained in the Northern Powerhouse Independent Economic Review (NPIER). While refinements have been provided by the subsequent Strategic Transport Plan and Connectivity and Labour Markets in the Northern Powerhouse studies, no work to date has considered how international trade can underpin the North's growth ambitions. Previous detailed research has been undertaken into the international connectivity needs of the Northern Powerhouse and a number of the themes identified within this work are revisited here. However, this work represents a fresh analysis focussing particularly on the symbiosis with the North's trading relationships.

Scope of the Study

1.3. The scope for this work, as defined within the original invitation to tender, has three parts:

- Part 1: To undertake a review of existing data on international trade patterns across the North – this establishes the baseline position in terms of international trade in the North and provides additional evidence on the 'value' of transport gateways and their connectivity currently in enabling access to international markets and in attracting FDI;
- Part 2: To develop forecasts of the impact of growth in the IER "prime" and "enabling" capabilities on international trade – this provides a picture moving forward of how transformational growth will affect international trade volumes and patterns in the North;
- Part 3: Analysis of the impact of 2050 forecasts on domestic transport and international connectivity requirements – this element of the work examines the influence that trading patterns will have on the region's international connectivity requirements and consider these impacts on domestic connectivity.

Key Questions for the Study

1.4. At the outset, it is important to set out brief answers to three fundamental questions. We explore three questions throughout this report but understanding the basic arguments at the beginning helps to provide vital context for our work.

Why is International Trade Important?

1.5. The expansion of global trade has helped to support economic development across the world, enabling highly productive and competitive firms to gain access to new consumers and expand. These benefits can also be reinforcing: productive firms can draw inward investment to a given region, further boosting its competitive advantages. While consumers benefit from purchasing imported products, the direct

economic benefits of trade in the productive side of the economy are mainly realised by the seller rather than the buyer: our analysis therefore focuses solely on the exports of firms operating in the North.

Why is International Connectivity Important to Trade?

1.6. Essentially, in many cases trade involves moving either goods or people around the world. In relation to goods, the importance of international connectivity is largely self-evident. Firms have to be able to move their goods to the market in which they are trading. From a UK perspective, this is most often by sea but for some high value and / or time critical items air freight is the preferred option. However, trade also requires the movement of people. This might be individuals delivering services to overseas markets or providing after sales services to goods products. However, it also includes people travelling to make the deals that enable international trade. This could be sales trips, visiting potential suppliers, contract negotiations or many other purposes. Air travel is by far the dominant mode for this type of travel from the UK and from the North specifically. It provides a fast and efficient means of reaching destinations around the world. However, clearly, air services need to provide access to the right destinations, at convenient times and at the right price. The quality of air service connections is therefore a key competitive factor for globally competitive regions.

Why is Domestic Connectivity Important for International Connectivity?

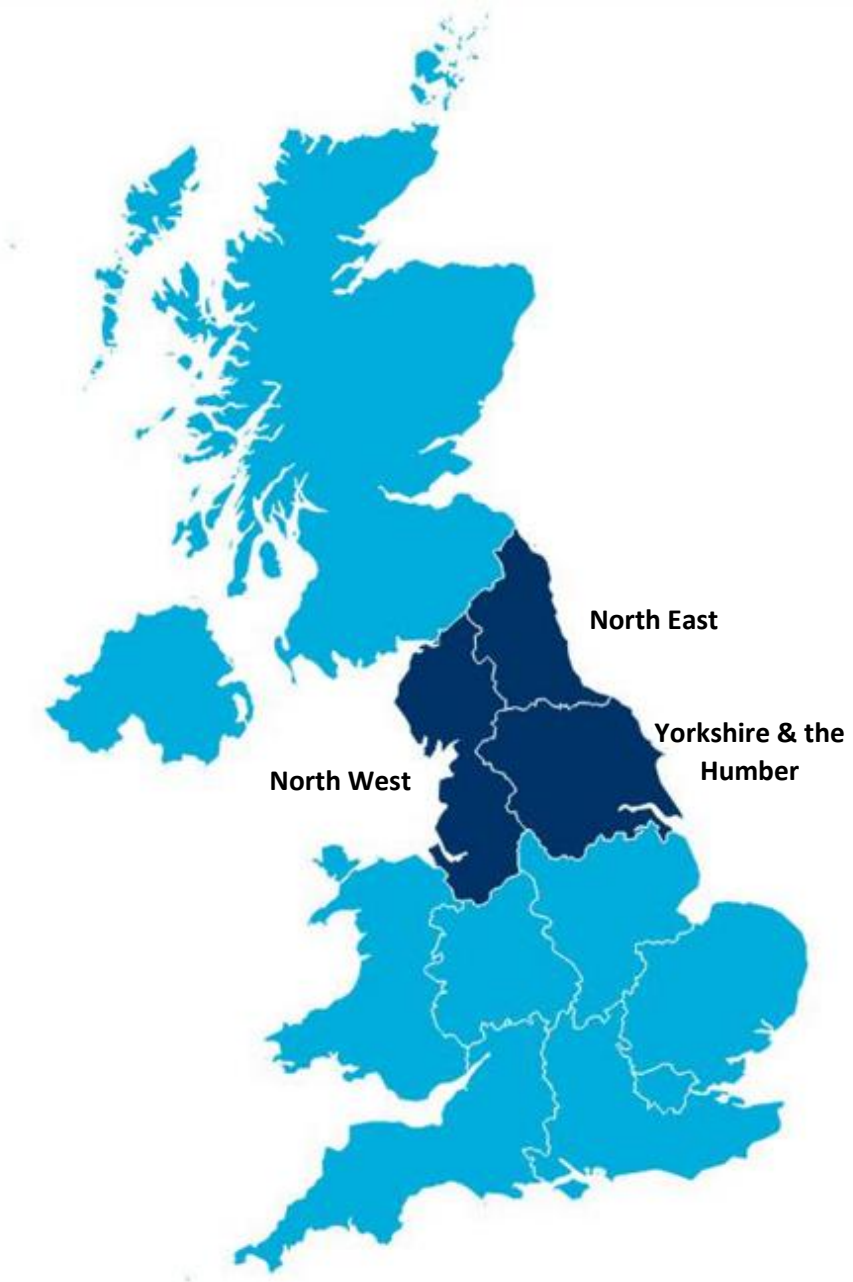
1.7. The answer to this question is again largely self-evident. International journeys, either for people or goods, do not start at a region's airports or ports. For people, they start at homes, offices, hotels or any other possible locations. For goods, they start at factories or other production facilities. Moving people or goods from their start point to the region's international gateways is an essential part of any international journey. Hence, the quality of domestic connections is vitally important to overall international connectivity. Good surface access connections make journeys faster, more efficient, easier and more reliable. This ultimately lowers the generalised cost of travel, stimulating demand and helping to secure the economic benefits that come from international connectivity.

Study Area

1.8. We define the North as comprising three of the UK's 12 regions: the North East, North West, and Yorkshire & the Humber (see Figure 1.1). In combination, our definition of the North is broadly similar to that considered by the NPIER, which aggregated 11 Local Enterprise Partnership areas.[1] However, as export data is only sufficiently detailed at a regional level, we use this broader geographic definition.

[1] Our study does not therefore include the local authorities in Derbyshire and Nottinghamshire that are within the Sheffield City Region.

Figure 1.1: The three regions comprising 'the North' in our study



1.9. In summary, this study contributes to the ongoing development of the NPIER evidence base, which will in turn help to shape the next stages of Transport for the North's policy development.

1.10. All values quoted in this report are in 2016 prices unless otherwise stated.

The Structure of this Report

1.11. This report explores the current and future importance of international trade to the Northern economy and the link between trade and international connectivity.

1.12. First, we profile the North's exports in terms of their composition of goods and services, and how this has changed over time. Then we quantify the contribution that exports make to the North, in terms of supporting the region's economic activity and employment.

1.13. Our analysis also considers the role of the North's four "prime" and three "enabling" capability subsectors in supporting international trade. These capabilities are defined by the NPIER as subsectors with high productivity in which the North specialises to some degree. Using detailed product and sector level export data, we analyse the role these capabilities play in the North's international trade and calculate the value of their exports' contribution to the North's economy.

1.14. The next component of this report is forward-looking. We set out two scenarios for the North's exports up to 2050, as set out in the NPIER:

- our "business-as-usual" scenario draws upon Oxford Economics' baseline economic forecasts at a macroeconomic, industrial, and regional level;
- we also estimate the levels of exports required to unlock the magnitude of additional growth outlined in the NPIER's "transformational" scenario.

1.15. Our forecasts inform the extent to which the North may rely on boosting its exports to achieve the levels of growth the NPIER has estimated under each scenario.

1.16. The report then switches focus. It considers how trade is supported by international connectivity and the mechanisms by which the economic benefits of trade and other external economic relationships are captured.

1.17. We then consider the North's existing international connectivity position in some detail, focussing on the business air passenger, sea freight and air freight markets. We examine volumes and the distribution of the North's international connectivity and the role that the North's key international gateways, its airports and ports, play in meeting the current requirement for international connectivity.

1.18. Finally, we estimate the future international connectivity requirements implied by achieving transformational growth in terms of the volume of international business passengers and tonnage of goods exports in 2050. We then consider the extent to which TfN's investment programme will support these requirements.

1.19. This report contains the following sections:

- Section 2 provides an overview of the scale of and trends in exports across the North and the UK, including a consideration of the key export destinations;
- Section 3 quantifies the exports across the North's four "prime" and three "enabling" capabilities;
- Section 4 provides an estimate of the total economic contribution of exports to the North's economy;
- Section 5 presents trade forecasts across the North, estimating the levels of future exports by capability under both the "business-as-usual" and "transformational" scenarios;
- Section 6 considers why trade and international connectivity are intrinsically linked and why, ultimately, if the North is to be a successful trading economy developing international connectivity will be central to this;
- Section 7 examines the North's international connectivity now and the role of the North's key international gateways in meeting its international connectivity requirements;

- Section 8 sets out our forecasts of future business air passenger and freight demand;
- Section 9 examines the potential for TfN's investment programme to contribute to meeting the North's international connectivity requirements for transformational growth;
- Section 10 presents our conclusions.

2. Profile of the North's International Exports Now

KEY FINDINGS

- Exports from the three regions of the North equalled £85 billion in 2016. The North's exports underperform the rest of the UK: despite representing 19 percent of the UK's total economic footprint, the North contributes just 15 percent of its exports.
- The North has a relative concentration of exports in goods, which make up two-thirds of its exports, compared to just over a half nationally. However, this share has fallen in recent years, primarily due to a real-terms contraction in the value of goods exports since 2011.
- Half of the North's goods exports go to the EU, which are mostly concentrated in nearby western European nations, while the United States is both the North's largest purchaser of goods exports, and its fastest-growing market.
- Asia is the North's largest service export market, driven primarily by exports to Saudi Arabia. The United States and nearby European nations also form a large share of its international service purchases.

2.1. In this chapter, we compare the regional performance of the North's exports against those of the UK. We consider the scale of exports from the North and provide a profile of its key trade partners. This analysis helps to provide a baseline for our work from which consideration of the impacts of future growth can be considered. Further detail on the data sources used in this analysis are presented in Appendix 2.

UK Exports

2.2. **Across the UK, the value of exports exceeds a quarter of its annual GDP.** According to Oxford Economics data, in 2016 the total sum of goods and services exported from the UK reached £557 billion, equivalent to 28 percent of the nation's GDP. Goods form the dominant share of exports, representing 54 percent or £299 billion, while services account for the remaining £258 billion.[2]

£557 billion

Total value of all UK goods and services that were exported in 2016.

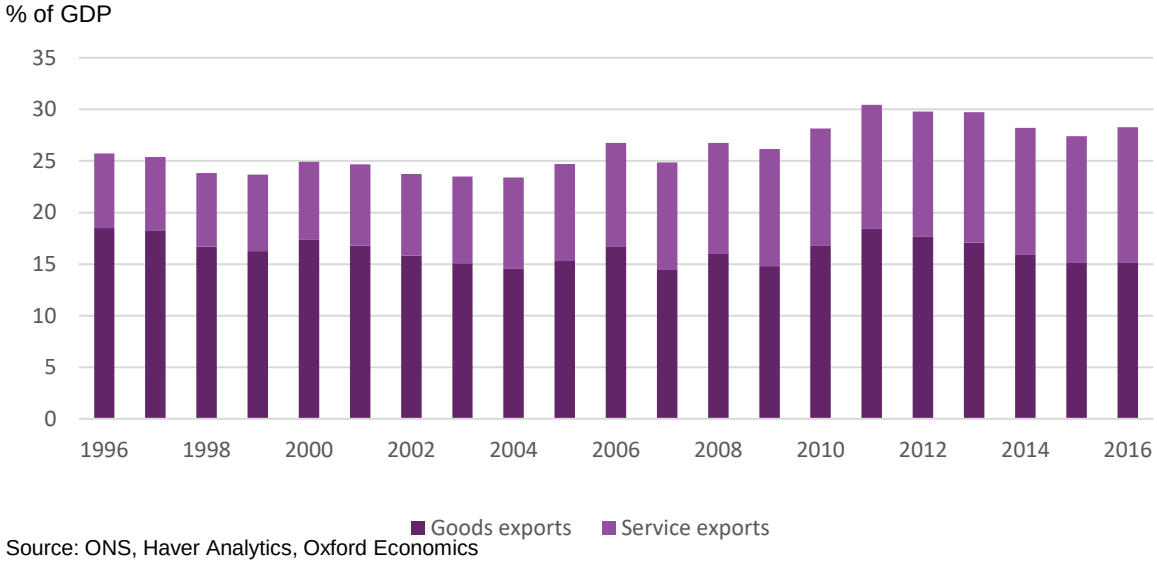
This equates to 28 percent of the UK's total GDP that year.

2.3. Over the past two decades, the UK's economy has become more internationally open, with exports' share of total annual GDP increasing by around 2.5 percentage points. The composition of these exports has changed more dramatically: the UK's service exports have more than doubled in real terms since 1996, and now make up twice the share of total GDP that they did two decades ago.

2.4. However, convergence between the two forms of exports has been partially offset by the positive performance of goods exports over the same period (see Figure 2.1). Despite lagging growth across the overall economy, the value of goods exported by the UK each year has also increased—by around 47 percent, in real terms, since 1996.

[2] Further detail on the data sources included in this analysis are presented in Appendix 2.

Figure 2.1: Goods and services as a share of GDP, UK, 1996 to 2016



Source: ONS, Haver Analytics, Oxford Economics

The North's Exports

2.5. **The North's economy is less export-intensive than elsewhere in the UK.** In 2016, the three Northern regions — the North East, North West, and Yorkshire & the Humber — collectively generated £84.8 billion of exports, equivalent to 15 percent of the UK total for that year. This share lags the North's contribution of gross value added (GVA)[3] to the UK economy — 19 percent in 2016 — meaning that the Northern economy is less reliant on exports than elsewhere in the UK.

£85 billion

Total value of the North's exports in 2016, comprising all goods and services exported from the North East, North West, and Yorkshire & the Humber.

In all, the North contributed 15 percent of UK exports.

[3] Gross value added (GVA) is the headline indicator for economic activity at a sub-national level. It is measured as the value of output less the value of intermediate consumption.

Figure 2.2: Goods and services exports for all UK regions, 2016

Source: ONS, HMRC, Oxford Economics

2.6. **The North West is the largest exporter of the three Northern regions.** Its exports in 2016 totalled £46.1 billion, or 54 percent of the North's total. Relative to economic size, however, the North East is the most export-orientated of the three regions; its exports in 2016 equated to £16.2 billion, broadly in line with its national share of GVA. This reflects a higher concentration of goods exports, equivalent to four percent of the UK total (£12 billion), offset by a proportionately lower share of service exports. The North West and Yorkshire & the Humber regions, by contrast, have lower shares of both goods and service exports, relative to their share of national GVA.

Figure 2.3: Share of UK GVA and exports, the North, 2016

Share of the UK (%)

Source: ONS, HMRC, Oxford Economics

2.7. **The North has a higher concentration of goods exports than the national economy.** In 2016, almost two-thirds (64 percent) of the North's exports came in the form of goods, compared to 55 percent nationally. Goods exports equated to £55 billion in 2016, 18 percent of the UK total. The remaining £30 billion of service exports, by contrast, represents just 12 percent of the UK total.

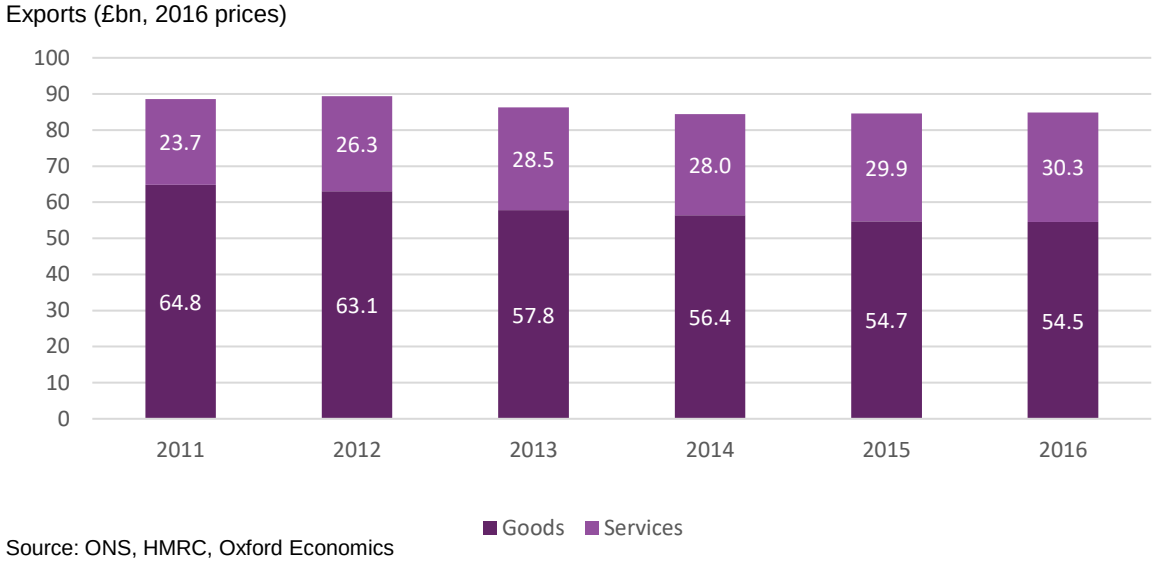
2.8. Recent trends, however, indicate that the composition of the North's exports is increasingly shifting towards services. This reflects a pattern observed nationally and is partly a function of the changing sectoral structure of the UK economy, where growth is increasingly concentrated in sectors such as professional services, which have a greater propensity to export services than other sectors in the economy. This shift towards services has implications in relation to the nature of international connectivity, placing even more emphasis on the importance of passenger travel.

The North's Exports are Declining

2.9. **In a reversal of national trends, exports from the North have contracted in real terms over recent years.** From 2011 to 2016 — where regional data is available for both goods and service exports — we observe that goods exports have contracted by £10.3 billion (in 2016 prices), or 16 percent, on 2011 levels in the Northern regions (see Figure 2.4, overleaf). The rest of the UK also saw goods exports increase slightly in real terms over this period by 7 percent. Analysis of exports-by-destination data suggests that this is largely due to a contraction in exports to the EU from this period onwards, linked to the appreciation of the Pound relative to the Euro over this period.

2.10. Although partially offset by growth in service exports, equivalent to 28 percent (or an additional £6.6 billion), this has resulted in an overall net reduction in real-terms exports from the North over that period.

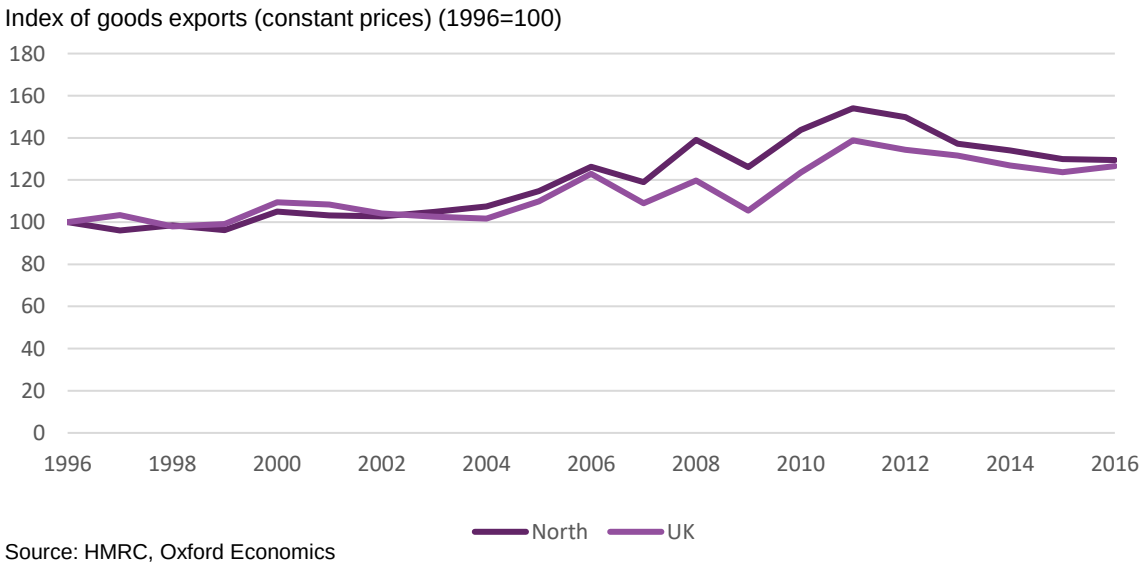
Figure 2.4: Goods and service exports, the North, 2011 to 2016



Source: ONS, HMRC, Oxford Economics

2.11. The decline would appear to be a recent trend. Since 1996, the North's goods exports have outperformed those across the UK. The annual value of goods exports has increased by £18.2 billion (in 2016 prices), or 29.5 percent, exceeding the UK equivalent by 2.8 percentage points (see Figure 2.5). Despite a mixed performance through the late 2000s, the North's exports peaked at £64.8 billion in 2012, before declining from this period onwards.

Figure 2.5: Goods exports, the North and the UK, 1996 to 2016



Source: HMRC, Oxford Economics

The North's Main International Markets

53 percent

Share of goods among the North's exports to the EU in 2016.

The North's goods exports to the EU that year were worth £28.8 billion.

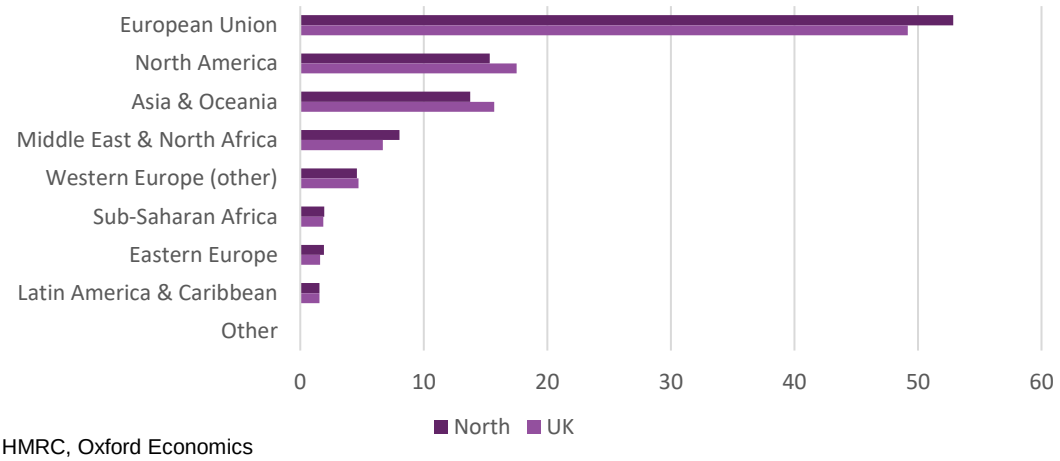
2.12. As regional export data is provided separately for goods and services, and applies different international groupings and definitions, we consider the international markets for the North's goods and service exports separately.

Key International Goods Markets

2.13. **In 2016, the largest destination for the North's goods exports was the EU, worth £28.8 billion (in 2016 prices).** North America was the next largest region, receiving around 15 percent of goods exports, followed by Asia & Oceania. The international profile of exports is broadly in line with the UK as a whole, with a slightly higher concentration of exports to the EU and Middle East & North Africa offset by smaller shares of exports to both North America and Asia & Oceania. As we will see later on, this pattern is reflected in the North's current international connectivity.

Figure 2.6: Goods exports by international region, the North and the UK, 2016

Share of goods exports, 2016 (%)



Source: HMRC, Oxford Economics

£7.5 billion

The total value of goods exported from the North to the United States in 2016.

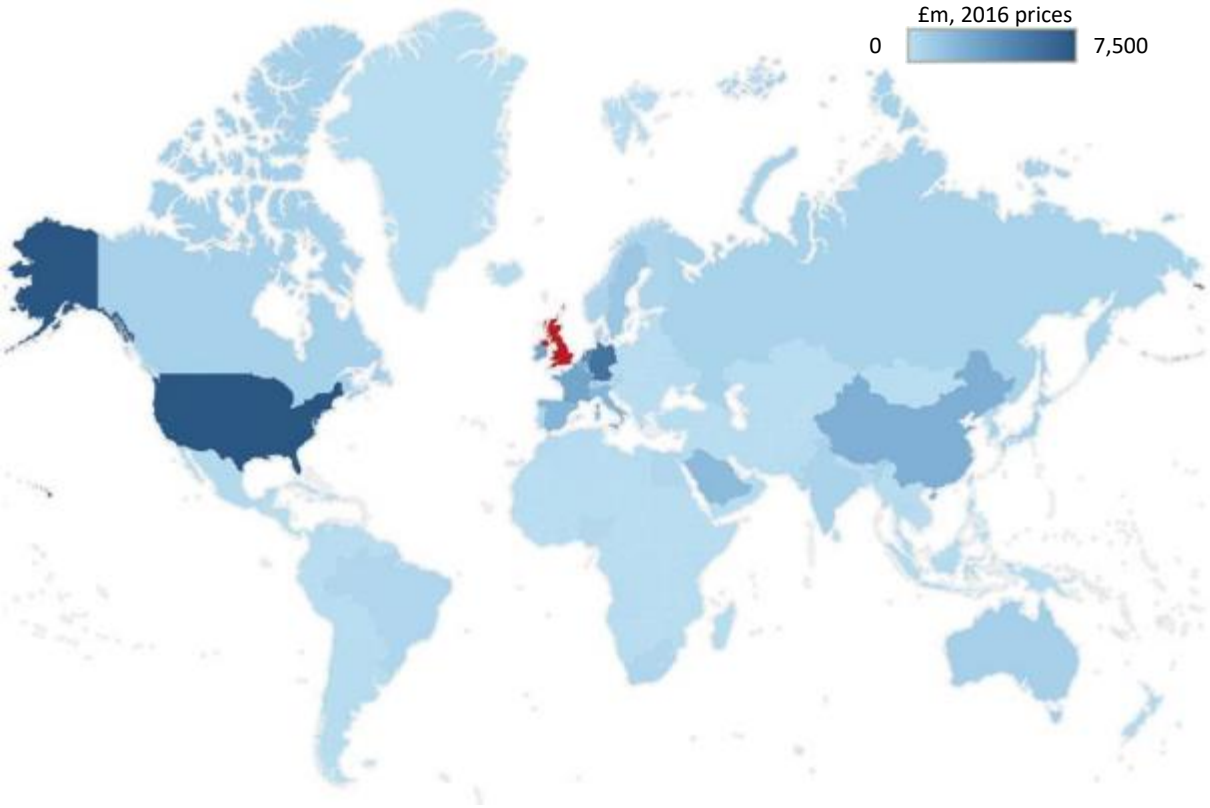
The USA is the North's largest goods export partner.

2.14. **The United States is the North's largest single goods export market.** In 2016, goods exports to the US equalled £7.5 billion, equivalent to almost 14 percent of the North's total, although this share is slightly lower than the rate observed nationally (15 percent).

2.15. The dominance of trade to the EU is also borne out in the most common exports by country: seven of the North's 10 largest export markets are in the EU. The North sells a comparatively high share of goods exports to nearby European neighbours, including Germany, the Netherlands, Belgium, Spain and Italy, although exports to France and Ireland form a lower share than elsewhere in the UK.[4] Collectively, these 10 countries account for over 60 percent of the North's goods exports each year, highlighting the concentration of its exports to a small number of key destinations.

[4] It is recognised that estimates of goods exports to the Netherlands may be affected by the 'Rotterdam effect'. This posits that exports from the UK to the Netherlands are artificially inflated by goods arriving in Rotterdam, a major European and global port, but where the ultimate destination is not correctly identified. This can result in the Netherlands appearing to receive a disproportionately high share of UK goods exports. A similar factor may affect estimates of goods exports to Belgium (the 'Antwerp effect').

Figure 2.7: Goods export destinations by country, the North, 2016



Source: HMRC, Oxford Economics

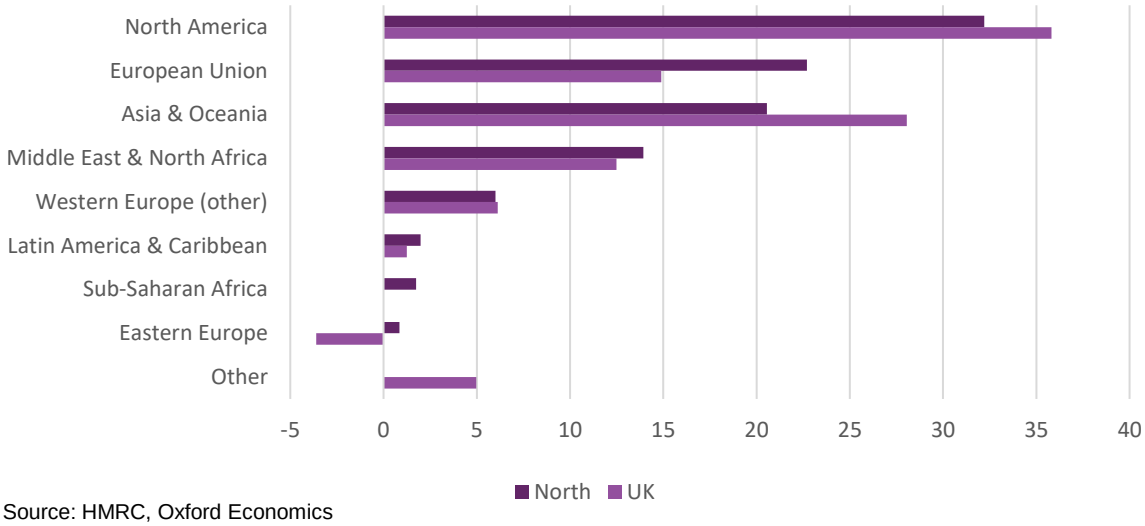
2.16. An important consideration for the North's future potential markets is to examine the export destinations which are growing and are therefore well placed to capture an increasing share of any potential future export growth.

2.17. Although representing only 15 percent of the North's goods exports in 2016, **North America has made the largest net contribution to the region's export growth over the past two decades**. Since 1996, North America has accounted for almost a third of the North's overall increase in goods exports, equivalent to £4 billion (in 2016 prices). Its contribution to regional export growth is, however, proportionately greater elsewhere in the UK. The US alone accounted for the large majority (£3.7 billion) of the North's additional exports to North America over this period.

2.18. The next-largest contributions to the North's export growth came from the EU, with key growth markets including the Netherlands (£1.2 billion) and Poland (£1 billion), while Asia & Oceania also made a large contribution—mainly due to a £2.3 billion increase in the North's annual goods exports to China.

Figure 2.8: Goods export growth by international region, the North and the UK, 1996 to 2016

Contribution to goods export growth, 1996 to 2016 (%)



Source: HMRC, Oxford Economics

Key International Services Markets

2.19. Service exports are, by their nature, inherently more mobile than goods exports, which is reflected in the wider geographic distribution of their key international markets.

2.20. According to ONS data covering the regions of Great Britain,[5] **Asia is the North's largest service export market.** In 2015, Asia accounted for £4.5 billion (in 2016 prices) of service exports, equivalent to over a third of the North's total. By contrast, Asia represents only Great Britain's third-largest export market, behind the EU and the Americas. The North therefore represents almost a third of Great Britain's service exports to Asia, compared to just 11 percent of exports to other international markets.

£4.5 billion

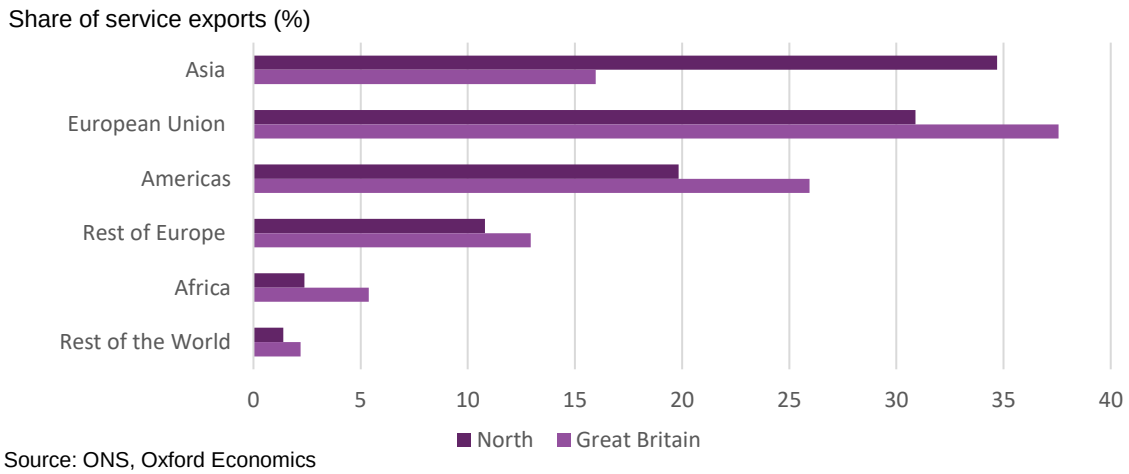
The value of the North's service exports to Asia in 2016, its largest service export market.

The North contributed 32 percent of British exports to Asia in 2016.

2.21. The North's share of service exports is lower for each of the remaining international markets. The EU is its second-largest service export market, generating £4 billion (in 2016 prices) of exports, followed by the Americas (£2.6 billion).

[5] Equivalent data is not available for Northern Ireland.

Figure 2.9: Service exports by international region, the North and the UK, 2015

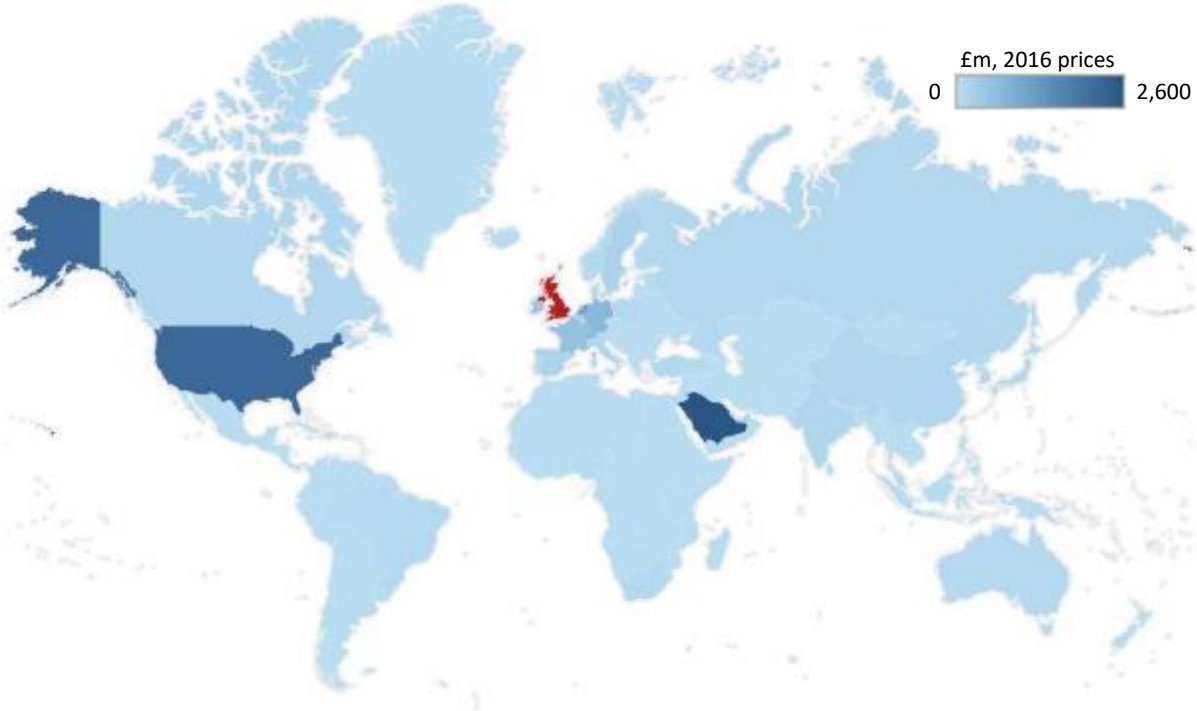


Source: ONS, Oxford Economics

2.22. Country-level data provides further detail on the North's key destinations for service exports. This source indicates that **Saudi Arabia is the North's largest service export destination**. While the specific total is not known due to disclosures in the data, our minimum estimate of exports equates to £2.6 billion (in 2016 prices), around 20 percent of the North's total, of which at least £2.3 billion originates from the North West.

2.23. The US is the North's next-largest service export destination, accounting for £2.2 billion of exports (in 2016 prices), while other key destinations include the Netherlands (£1.2 billion), Switzerland, and Germany (both £700 million).

Figure 2.10: Service export destinations by country, the North, 2015



Source: ONS, Oxford Economics

Foreign Direct Investment in the North

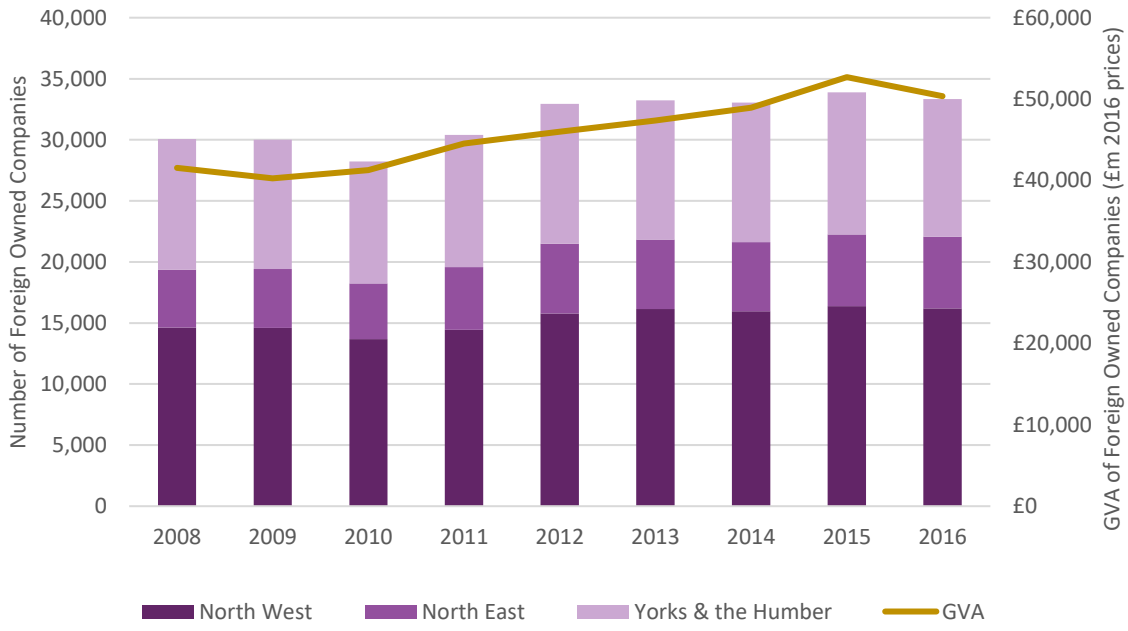
2.24. In addition to considering export patterns from the North, we have also examined the data available in relation to foreign direct investment (FDI). It should be recognised at the outset that data in this area is more limited and it is difficult to develop a robust and accurate picture of FDI trends and stocks. The data set out below provides an insight but given the quality of data we have not focussed significant attention on this area and have not produced forward forecasts.

Data on Foreign Owned Companies

2.25. The ONS Annual Business Survey does collect information on the nationality of the immediate owner of companies. The data goes back to 2008 and provides information on the number of businesses owned by overseas entities, the world region in which the owner is based and the estimated contribution to GVA. There are, however, a number of weaknesses in relation to the data:

- it only covers the non-financial business economy, which accounts for approximately two-thirds of UK GVA;
- it is based solely on the nationality of the immediate owner. Complex corporate ownership structures mean that this will present a distorted picture of the true ownership;
- sectoral level data is not available at a regional level, which means no assessment of the capabilities can be made effectively.

Figure 2.11: Foreign Owned Companies in the North of England



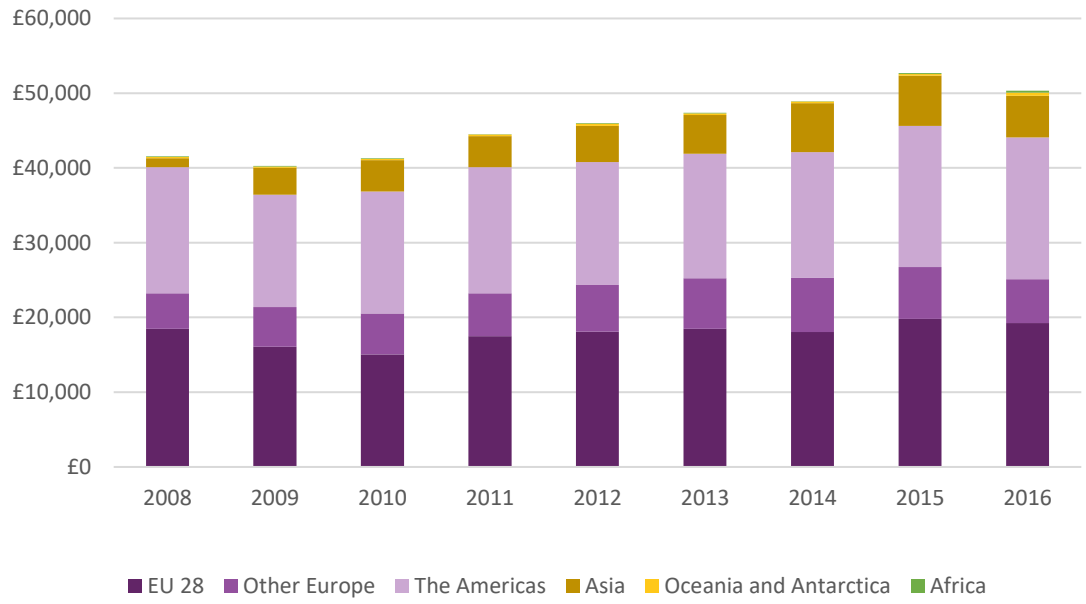
Source: ONS.

2.26. In 2016, there were estimated to be around 33,000 foreign owned companies in the North. This number has been on an upward trend since 2008, albeit with a noticeable dip following the global financial crisis. The GVA associated with these companies has also grown from £42 billion in 2008 to £50 billion in 2016.

2.27. The largest number of foreign owned companies has been in the North West throughout the period. The North West's share of foreign owned companies in the North has remained steady at around 48%. Yorkshire and the Humber has the next largest share, with around 34% in 2016, although this is down

from around 36% in 2008. The North East has the smallest share of foreign owned companies, but this share has been increasing.

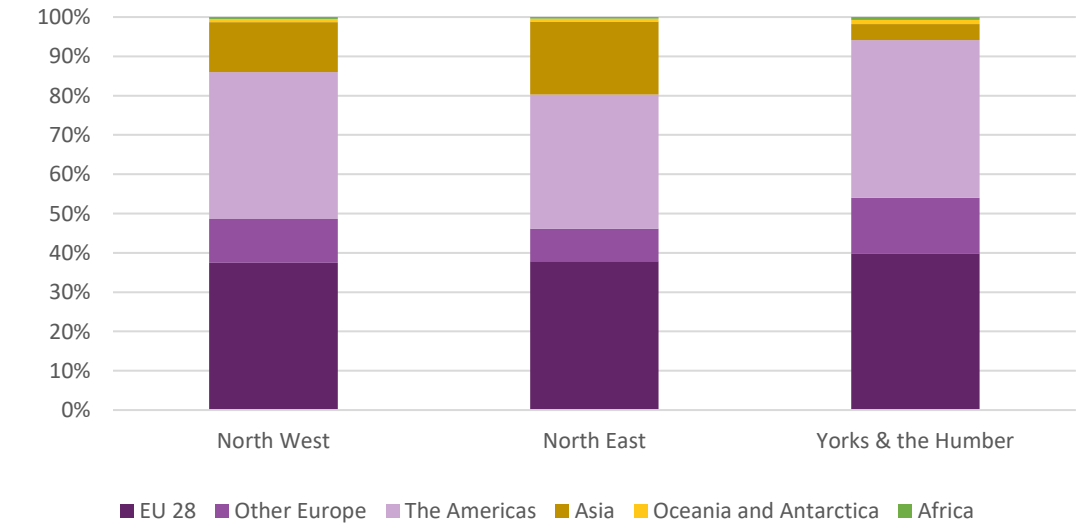
Figure 2.12: GVA Supported by Foreign Owned Companies in the North by Region of Ownership (£ million at 2016 prices)



Source: ONS.

2.28. GVA supported by companies owned by European entities has grown slightly over the period and Europe represents by some margin the largest share (around 50% in 2016). GVA from the Americas owned companies is the next largest source at around 38% of the total in 2016. This market has again been growing slowly. The main growth markets for foreign ownership have been the traditionally smaller sources for the North, notably Asia. The Asian market has grown by 359% since 2008.

Figure 2.13: GVA from Foreign Owned Companies by World Region of Ownership and Northern Region in 2016



Source: ONS.

2.29. The geographic balance in terms of world region of origin is similar across the three Northern regions. The EU and the Americas are broadly equal in terms of their share at the upper end of the scale and all regions have significant contributions from other European countries. The only real difference is the balance between investment from Asia. The proportion of GVA supported by Asian owned companies is substantially higher in the North West and the North East than it is in Yorkshire & the Humber.

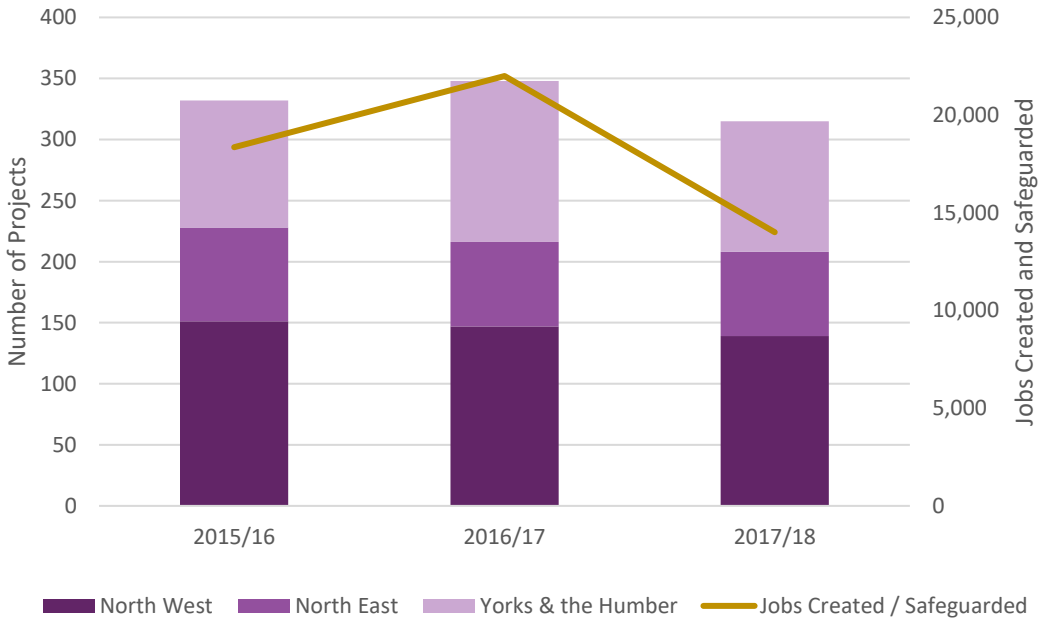
Inward Investment Projects

2.30. The Department for International Trade (DIT) also collects some information on inward investment projects. However, this again has significant limitations. It only provides a view of activity in a given year, rather than any visibility on the stock of FDI, and that view is likely to be partial in that it may not include investments that are less visible. The time series available is also very limited. This does also not include any information on the source of the investment.

2.31. The largest numbers of projects have been recorded in the North West in recent years, followed by Yorkshire & the Humber. Numbers of projects in the North East are lower.

2.32. Around 22,000 jobs were created or safeguarded in the financial year 2016/17, the high point for the data available. In 2017/18, the figure was around 14,000.

Figure 2.14: Inward Investment Projects



Source: DIT.

Conclusions

2.33. The North is a significant trading economy, with around £85 billion in exports in 2016. However, its trade performance does lag behind the rest of the UK currently.

2.34. The North's exports are more focussed on goods trade than services currently, which is slightly different to the UK as a whole which is essentially balanced. Services are, however, an increasing share of exports. This seems to be being driven mainly by a decline in the real value of goods exports in recent years.

2.35. The EU is by some margin the largest market for the North's goods exports, with a particular focus on near European countries. The largest single country market is the USA, which is also the fastest growing market.

2.36. Asia is the largest market for services, followed by the EU. This is unusual compared to the UK as a whole where the EU and the Americas are the two largest markets. The largest country market by some margin is Saudi Arabia.

2.37. Data on FDI in the North is patchy but suggests an increasing influence from foreign owned companies. The key source markets for FDI are Europe and the Americas but there has been in investment from Asia in recent years.

3. The Contribution of the North's Capabilities Exports

KEY FINDINGS

- The North's seven NPIER capabilities contributed over half of its exports in 2016, totalling £44 billion in value.
- Goods form a slight majority of the capabilities' exports, although services (45 percent) form a larger share than for the North as a whole (36 percent).
- Advanced manufacturing is the largest capability, with exports equalling £20 billion, or almost a quarter of the annual total.
- Financial & professional services (£9.7 billion) and logistics (£7.4 billion) form the two next-largest shares of exports.

Introduction

3.1. The NPIER defines four "prime" capabilities in which the North holds a strategic advantage:

- Advanced manufacturing;
- Energy;
- Health innovation; and
- Digital.

3.2. Across these sectors, the NPIER argues that the North is "home to international-class assets, expertise, research and businesses that are genuinely distinctive for the North, are highly productive, and can compete at national and international scales".

3.3. In addition, the NPIER identifies three "enabling" capabilities which are required to support growth across the prime capabilities:

- Financial & professional services;
- Logistics; and
- Education (primarily, higher education).

3.4. The NPIER estimates that these seven capabilities form 35 percent of GVA across the North. Following our profile of the region's export trade overall, we now seek to understand the contribution that these seven capabilities make to the North's exports. (Full sectoral definitions of the seven capabilities are presented in Appendix 1.)

3.5. While all capabilities have some form of service export, only four (advanced manufacturing, energy, health innovation, and logistics) are also engaged in goods exports. The data that underpins this analysis, and an outline of our approach to estimating each capability's share of exports, are presented in Appendix 2.

Capability exports

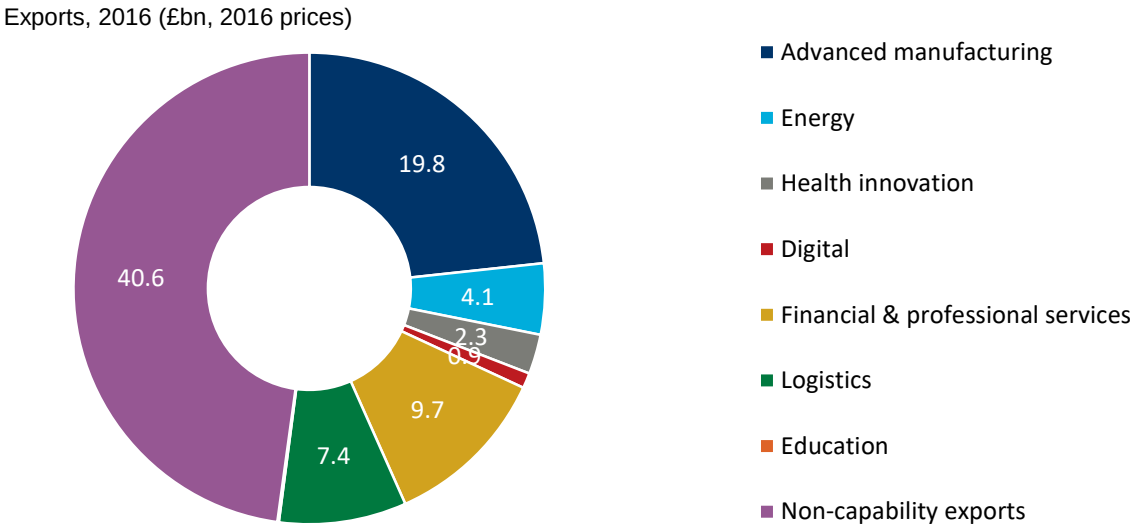
£44 billion

Combined value of exports in goods and services related to the North's seven NPIER capabilities in 2016.

Equivalent to 52 percent of the North's total exports.

3.6. **Collectively, we find that the seven NPIER capabilities account for over half of the North's annual exports.** In 2016, we estimate their exports totalled £44.3 billion, or 52 percent of the North's total. Advanced manufacturing was the largest single capability, accounting for £19.8 billion of exports, followed by financial & professional services (£9.7 billion), and logistics (£7.4 billion).

Figure 3.1: Exports by NPIER capability, the North, 2016

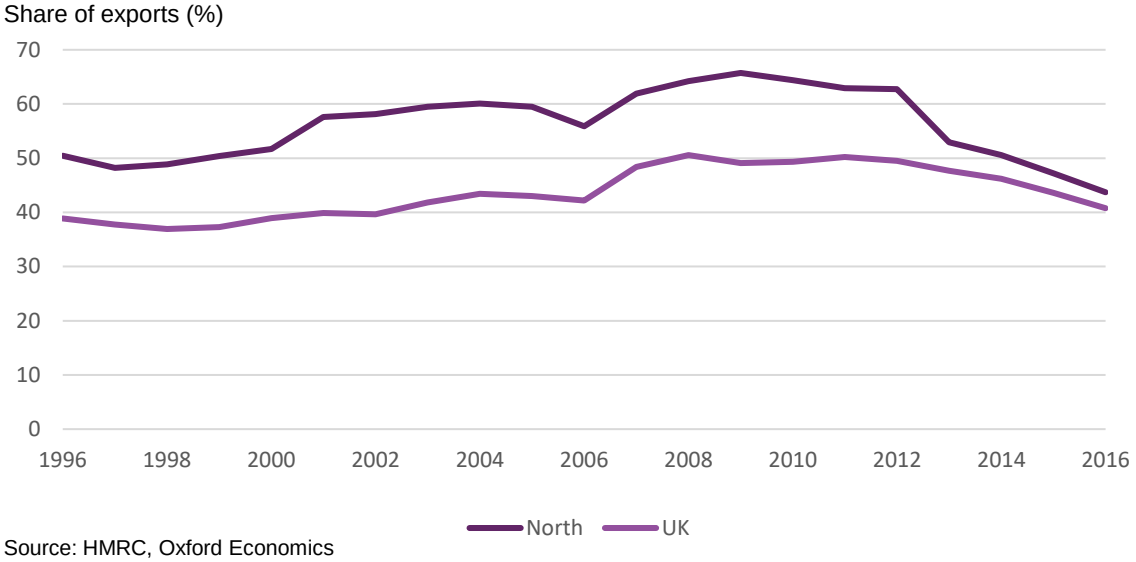


Source: ONS, HMRC, Oxford Economics

3.7. Goods represent a majority of the capabilities' combined exports, although their share of total exports is lower than for non-capability goods. Goods exports across the capabilities equalled £24.4 billion in 2016, or 55 percent – lower than for the North as a whole, wherein 64 percent of exports come in the form of goods. The capabilities are therefore more service-orientated than non-capability exports: in all, they represent under half of the North's total goods exports (45 percent), but nearly two-thirds of its service exports (66 percent).

3.8. **Despite a recent dip, the capabilities' share of goods exports continues to outperform the UK as a whole.** As the capabilities are defined as activities within which the North specialises, it is unsurprising that they form a larger share of the North's goods exports than the UK equivalent (41 percent). However, the performance of the capabilities as a share of the North's overall goods exports has demonstrated some recent convergence with the same subsectors for the whole of the UK (see fig 3.2, overleaf). The capabilities' share of goods exports has fallen to its lowest share over the period for which data is available, with a particularly sharp contraction observed from 2012 onwards. In absolute terms, the capabilities' goods exports have fallen by £13.9 billion (in 2016 prices), or 35 percent, since this point. As we will go on to see, this is largely attributable to contracting values of advanced manufacturing goods exports.

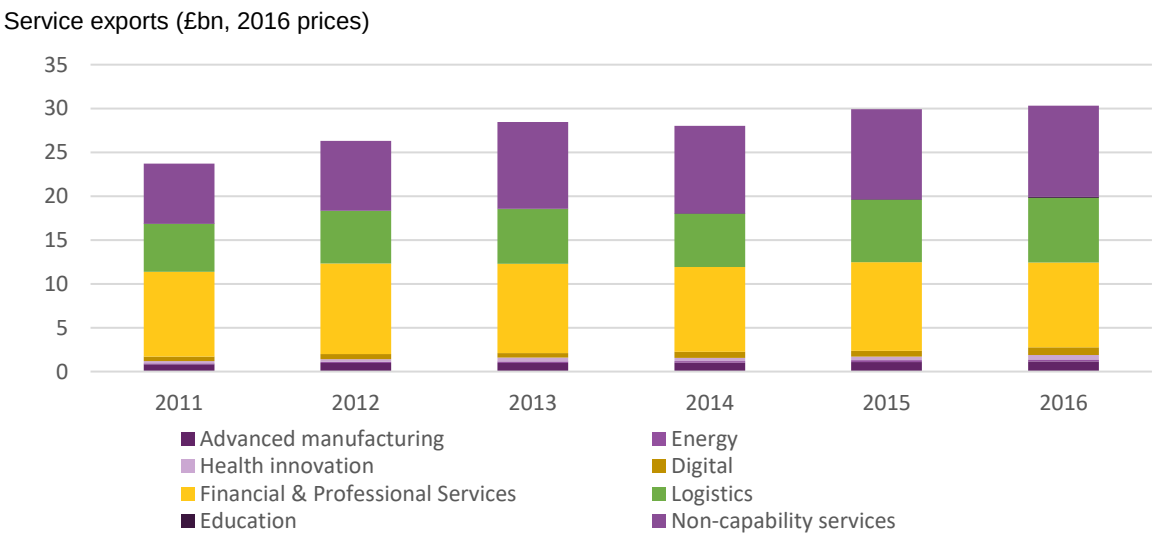
Figure 3.2: Capabilities as a share of goods exports, the North and the UK, 1996 to 2016



Source: HMRC, Oxford Economics

3.9. Growth across the capabilities' service exports have slightly offset the contraction of goods exports, although they have underperformed growth across non-capability services. Since 2011, service exports across the capabilities have grown by £3 billion (in 2016 prices), or 18 percent. However, non-capability service exports have experienced particularly strong growth, increasing by £3.6 billion, or 52 percent, over this period. The capabilities' overall share of service exports has consequently fallen by five percentage points, from 71 percent in 2011.

Figure 3.3: Service exports by NPIER capability, the North, 2011 to 2016



Source: ONS, Oxford Economics

How much does each capability contribute?

3.10. We now consider the contribution of each NPIER capability in turn; including analysis of the key and growing international markets for those capabilities that export goods.[6]

Advanced manufacturing

3.11. The North's NPIER capability exports are dominated by advanced manufacturing, which alone contributed £19.8 billion of exports in 2016. This equates to over a third of the North's overall goods exports, and a fifth of the UK total for this capability. Advanced manufacturing exports are largely dominated by goods; approximately £1.2 billion (or 5.9 percent) of exports come in the form of services.

£20 billion

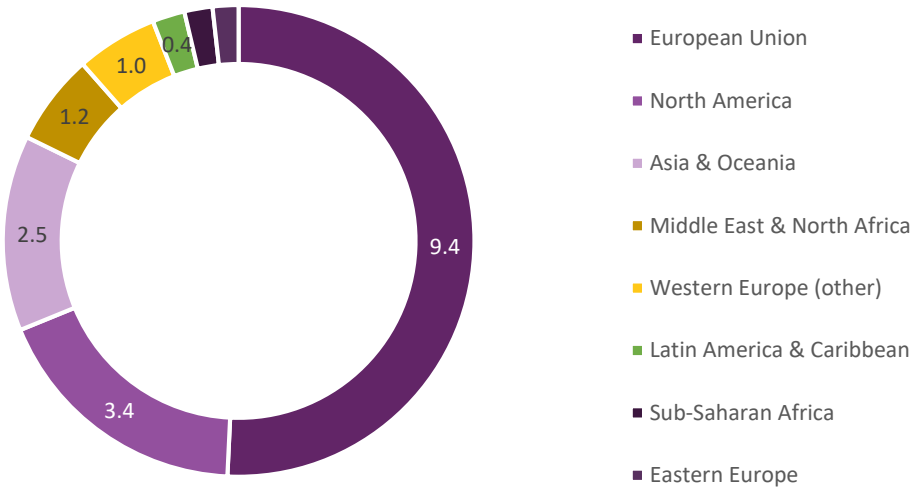
The value of advanced manufacturing exports from the North in 2016.

Equivalent to 23 percent of the North's total exports.

3.12. The geographic profile of advanced manufacturing goods exports destination is broadly reflective of the North's overall goods exports. **The EU is the main destination for advanced manufacturing goods exports**, capturing over half of all purchases. The North also has an advantage in exporting advanced manufacturing goods to nearby European nations. Germany (£2 billion), the Netherlands (£1.3 billion), France (£1.2 billion), Belgium (£900 million) and Ireland (£800 million) are key markets for the North's manufacturing goods, with the North capturing a relatively high share of the UK's exports to these nations.

Figure 3.4: Advanced manufacturing goods exports by international region, the North, 2016

Advanced manufacturing goods exports (£bn, 2016 prices)



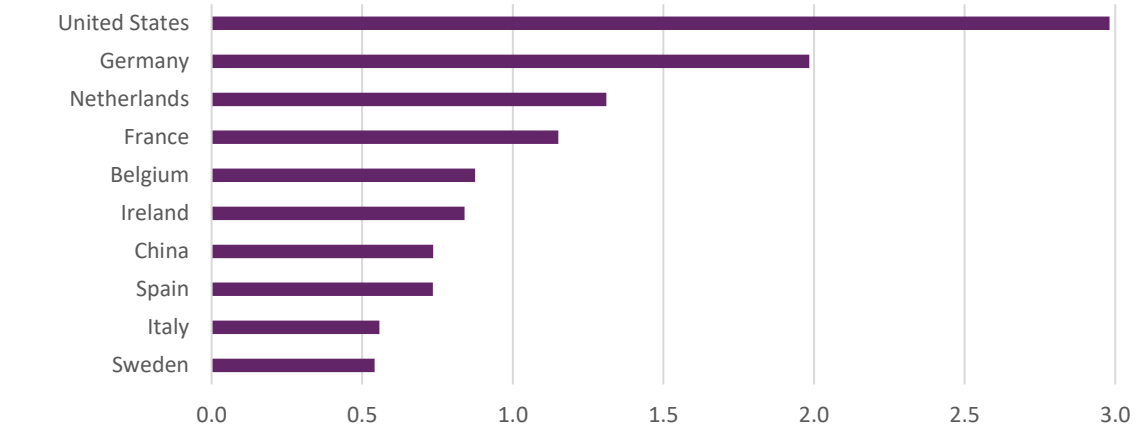
Source: HMRC, Oxford Economics

3.13. North America is the second-largest international region for the North's advanced manufacturing goods exports. In 2016, it formed 18 percent of the total, a share slightly higher than for non-advanced manufacturing goods exports from the North. This largely reflects the observation that the **US is the largest single destination for the North's exports for this set of products, with purchases totalling £3 billion in 2016, or 16 percent of the total**. Across the region, this rate is highest in the North West, where exports to the United States equated to £1.9 billion in 2016, or almost a quarter of its total advanced manufacturing goods exports.

[6] Data is not available at a sufficiently detailed level to allow estimates of the capabilities' regional service exports by destination.

Figure 3.5: Ten largest advanced manufacturing goods exports by country, the North, 2016

Goods exports by country, 2016 (£bn, 2016 prices)



Source: HMRC, Oxford Economics

3.14. **Advanced manufacturing alone has accounted for almost all the recent contraction of the North's goods exports.** Following gradual real-terms growth up to 2011, when goods exports peaked at £28.8 billion (in 2016 prices), the North's advanced manufacturing goods have experienced a sharp contraction in recent years. Since 2011, their annual value has fallen by just over a third, or £10.2 billion. This reflects the contraction in advanced manufacturing goods exports across the UK as a whole, albeit by a lesser magnitude (17 percent). Particular contractions in export values are noted across goods such as chemical materials, plastics and fertilisers. This capability alone accounts for almost all the net contraction in the North's goods exports observed since 2011.

Figure 3.6: Advanced manufacturing goods exports and share of the goods total, the North, 1996 to 2016

Source: HMRC, Oxford Economics

Energy

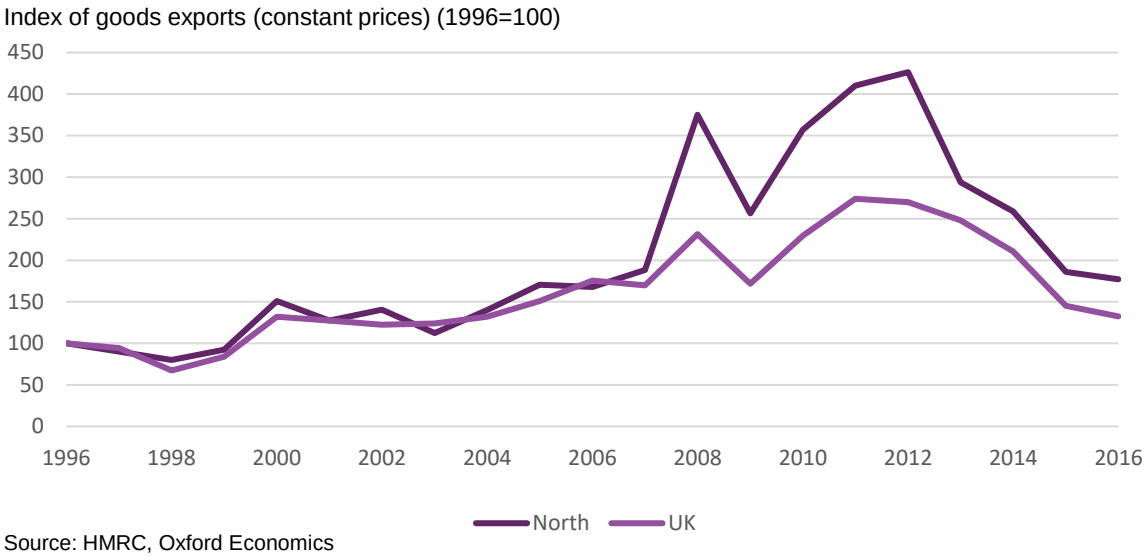
3.15. **The North's exports related to the energy capability equalled £5.4 billion in 2016**. Energy exports are almost entirely made up of goods, with services forming just £200 million, or 1.2 percent, of the total. The North makes up over a fifth of UK energy exports, although many of the specialisms the North holds in this capability, as set out in the NPIER, relate to aspects that tend not to lend themselves to direct exports, such as nuclear research and design, or offshore wind energy.[7] Similarly, multi-national firms

[7] NPIER Workstream 3.

operating in this capability may benefit from technologies developed in the North, which is not formally recognised as an export.

3.16. Energy exports have more than doubled over the preceding 20 years, albeit from a relatively low base. While growth in this capability has been particularly volatile over the past decade (a partial reflection of the fluctuations in oil prices over this period), it has continued to outperform the UK. In absolute terms, **exports of energy goods increased by £2.1 billion (in 2016 prices), or by more than three-quarters, over the period 1996 to 2016.**

Figure 3.7: Index of energy goods exports, the North and the UK, 1996 to 2016

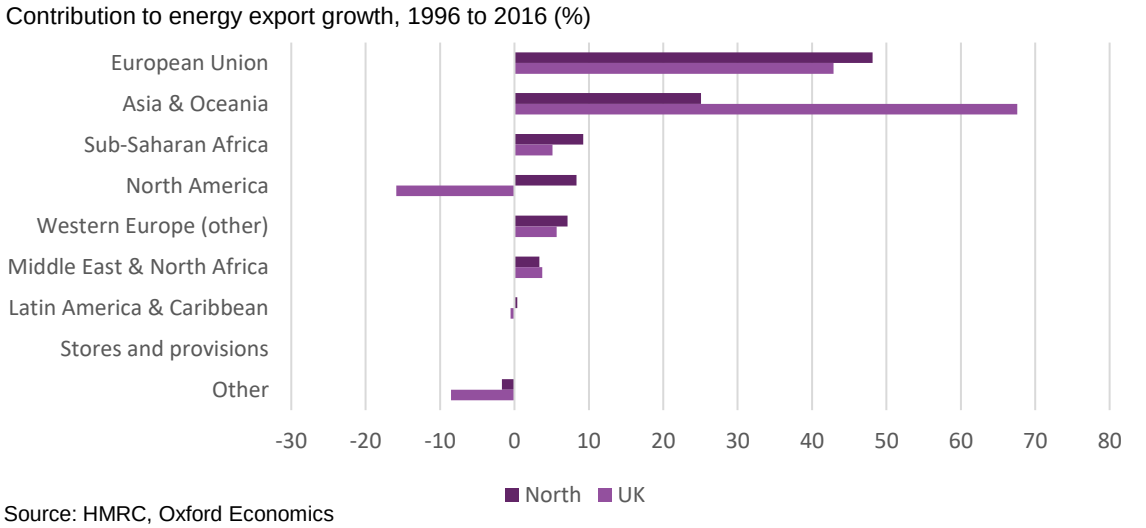


Source: HMRC, Oxford Economics

3.17. The geographic profile of energy goods exports by destination is broadly similar for the North and the UK as a whole. **The EU is the largest purchaser of energy goods, representing 56 percent of the North's goods exports in 2016 (£2.6 billion)**, followed by Asia & Oceania (16 percent), and North America (12 percent).

3.18. The geographic destination profile of growth, however, differs somewhat. While Asia & Oceania represents over two-thirds of net growth in energy exports nationally from 1996, across the North this share is just 21 percent. By contrast, the EU made the largest contribution to the region's energy goods export growth, equating to £900 million (in 2016 prices), or 48 percent of the total.

Figure 3.8: Energy export growth by international region, the North and the UK, 1996 to 2016

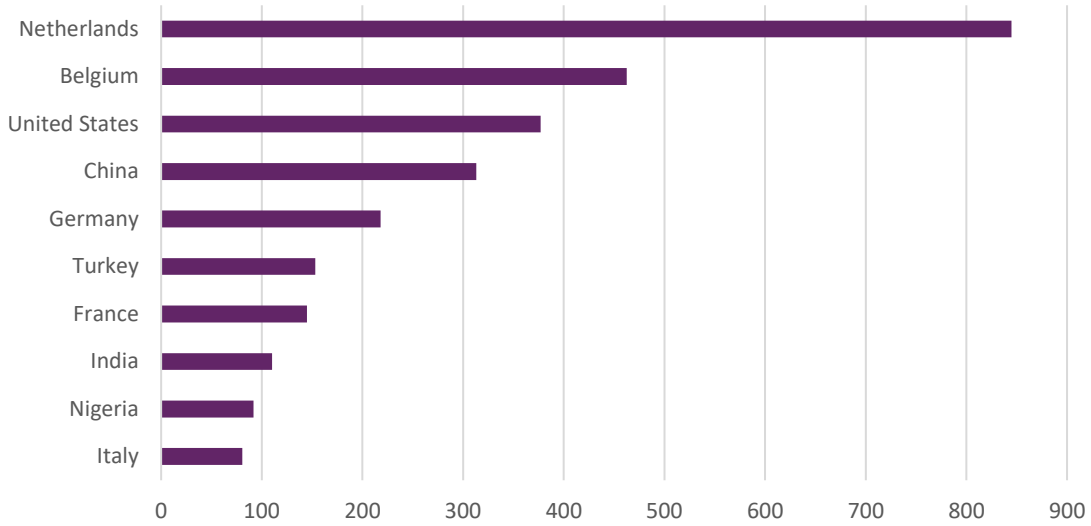


Source: HMRC, Oxford Economics

3.19. The Netherlands (£800 million) and Belgium (£500 million) are the north's key energy destinations, together forming over a third of exports (although these estimates may be inflated by the "Rotterdam effect", as discussed in Chapter 2). Despite the EU forming a dominant share of the North's energy goods exports, only three other EU nations — Germany, France, and Italy — appear in the top 10 countries (see Figure 3.9). Alongside China and the US, other key international markets include Turkey, Nigeria, and India.

Figure 3.9: Ten largest energy goods exports by country, the North, 2016

Goods exports by country, 2016 (£m, 2016 prices)



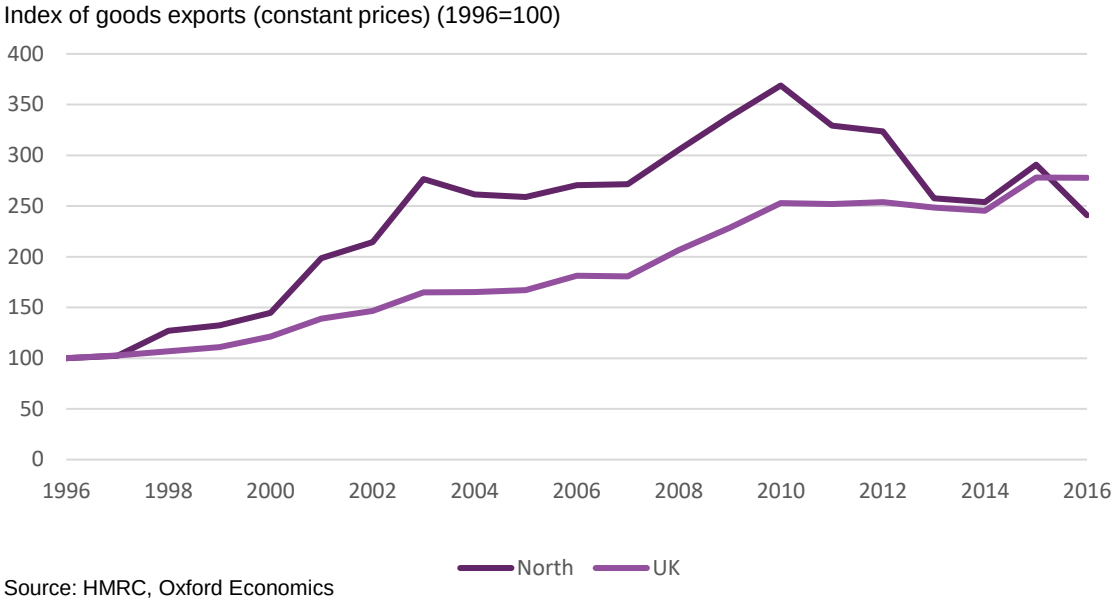
Source: HMRC, Oxford Economics

Health innovation

3.20. **Health innovation exports equalled £2.5 billion in 2016, of which goods exports accounted for the dominant share (£2 billion).** The North, however, accounts for a larger share of the UK's health innovation service exports — 28 percent in 2016 — than the equivalent for goods exports (16 percent). Many of the North's specialisms identified in the NPIER, particularly in relation to life sciences and R&D, may be undertaken by multi-national firms to support similar activities abroad and therefore may not be formally recognised as an export. The data we present on exports in this capability may therefore underplay the true value of this capability internationally.

3.21. Historically, goods exports from the North in this capability outgrew the national equivalent throughout the 2000s, reaching an annual high of £2.5 billion (in 2016 prices) in 2010, around a third of the UK total. However, the region's annual goods exports have subsequently contracted substantially (in real terms), falling by around a quarter (or £600 million) from 2010 to 2016. Further analysis of the data at a more detailed product-level indicates that this is largely driven by a contraction in medicinal and pharmaceutical products, which form the dominant share of health innovation goods.

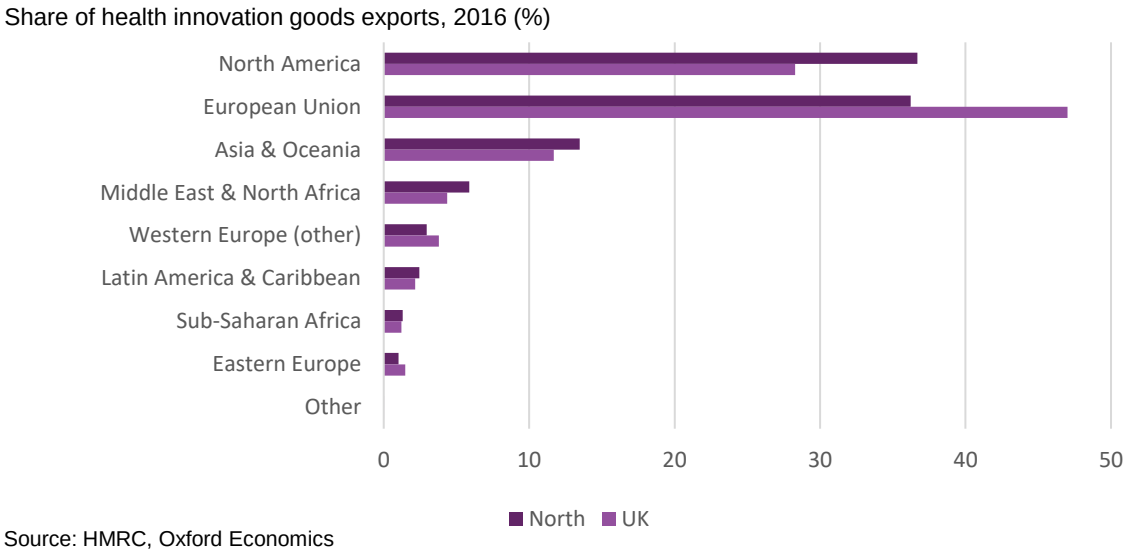
Figure 3.10: Index of health innovation goods exports, the North and the UK, 1996 to 2016



Source: HMRC, Oxford Economics

3.22. North America is the North's main international market for health innovation goods exports, accounting for over a third of the total (37 percent). This share is around nine percentage points higher than the UK equivalent, and indicates that the North's share of UK exports of health innovation goods to North America is over twice as high as share of UK exports across all goods (15 percent). The EU is the next-largest purchaser of health innovation exports, equalling £600 million or 36 percent of the annual total (see Figure 3.11).

Figure 3.11: Health innovation goods exports by international region, the North and the UK, 2016

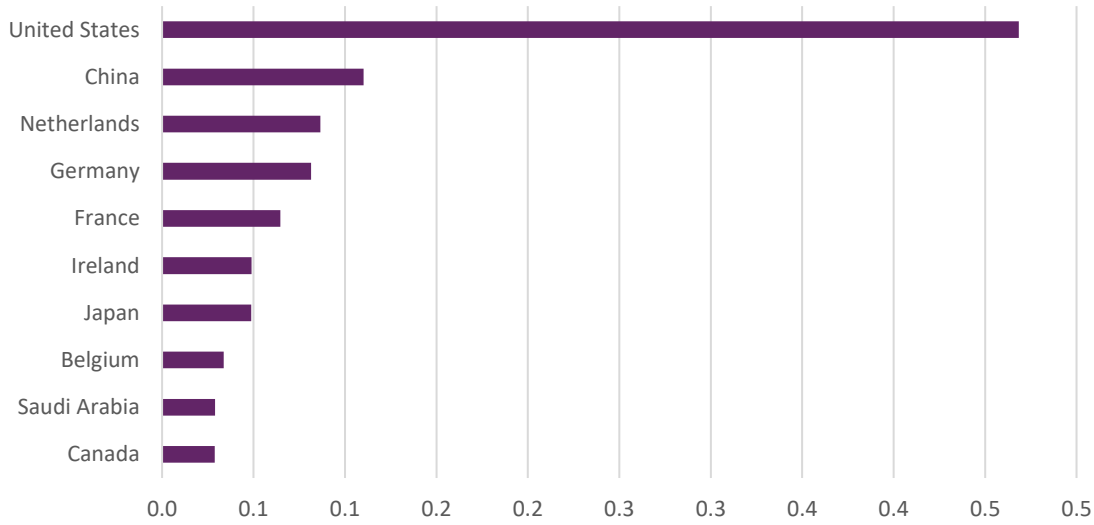


Source: HMRC, Oxford Economics

3.23. North American exports are almost wholly reliant on the United States, which alone accounts for £500 million or 28 percent of the annual total. Exports to the US are over four times larger than the second-largest destination country, China (7.6 percent). Five of the six next-largest purchasers are located in the EU.

Figure 3.12: Ten largest health innovation goods exports by country, the North, 2016

Goods exports by country, 2016 (£bn, 2016 prices)



Source: HMRC, Oxford Economics

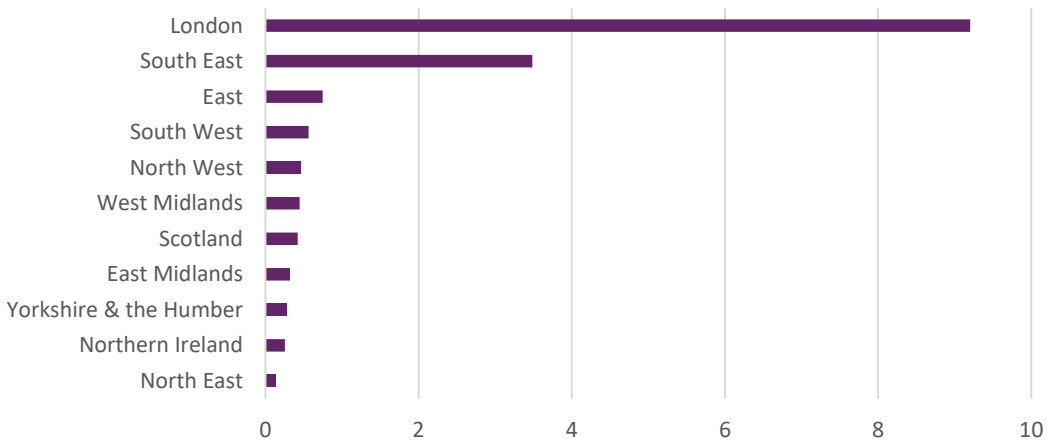
Digital

3.24. **Digital exports from the North equated to £900 million in 2016, making it the second-smallest capability behind education**. Digital services are a growing export service for the North: since 2011, exports increased by around two-thirds in real terms, or £400 million (in 2016 prices). Owing to its relatively small base, however, digital exports accounted for just five percent of service export growth across the North over this period. As with health innovation, the operations of research and innovation institutions across the North may not directly generate an international transaction, and therefore be identified in this estimate, but their operations can support 'downstream' exports from firms benefitting from these technologies in other sectors, both across the North and elsewhere in the UK.

3.25. The North accounts for a relatively small share of the UK's digital exports, which are dominated by London and the South East. The North East and Yorkshire & the Humber are the smallest and third-smallest exporters respectively, meaning that **the North accounted for just 5.4 percent of the UK's total digital exports in 2016**.

Figure 3.13: Digital service exports by region, UK, 2016

Digital exports (£bn, 2016 prices)



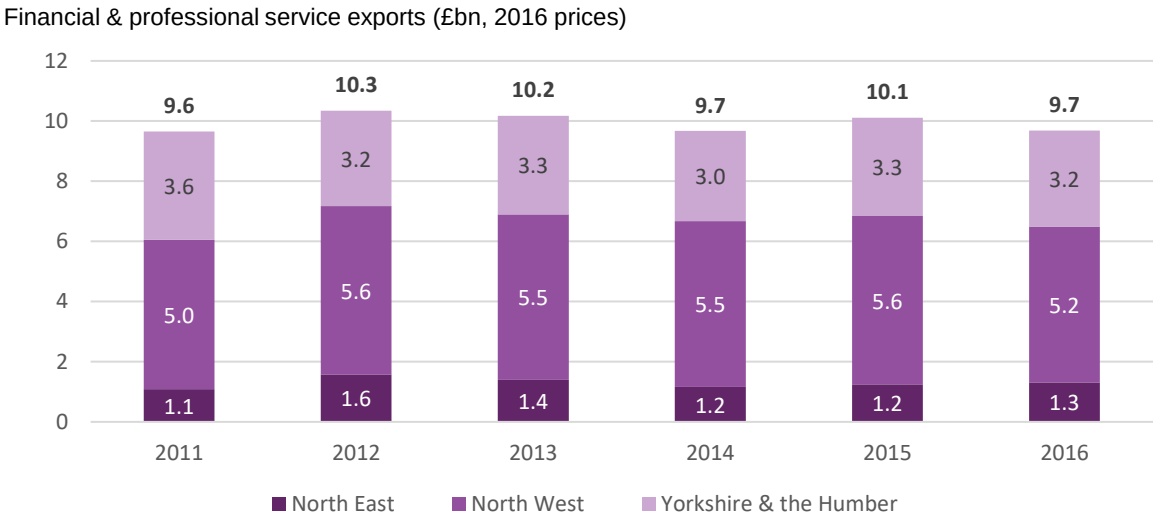
Source: ONS, Oxford Economics

Financial & professional services

3.26. Financial & professional services is the North's second-largest capability exporter, and its largest exporter of services. In 2016, the North exported £9.7 billion of services in this capability, forming 13 percent of the UK total.

3.27. The North's financial & professional service exports have remained relatively static in real terms over recent years, while the UK as a whole grew by £5.1 billion (in 2016 prices), meaning that the North's share of the national total has fallen by one percentage point over this period. The North West is the largest exporter of this capability, equivalent to £3.2 billion in 2016 – over half of the North's total exports in this capability.

Figure 3.14: Financial & professional services exports, the North's regions, 2011 to 2016

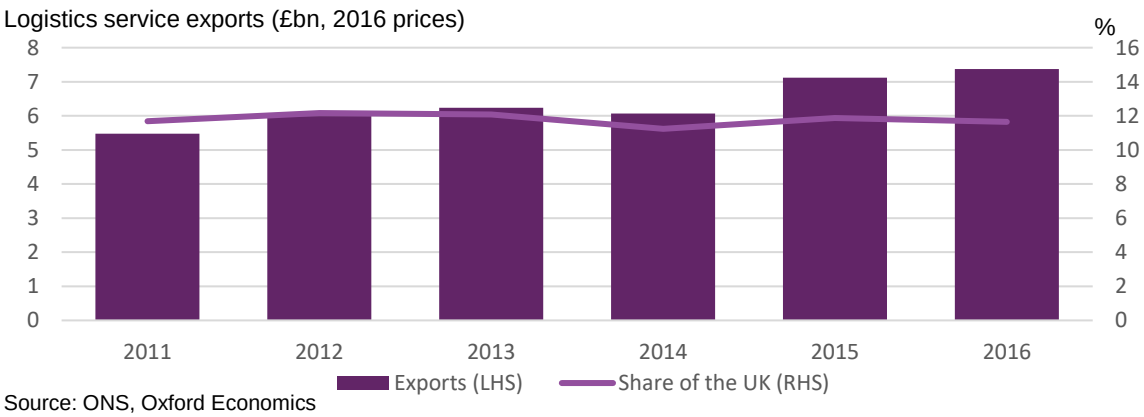


Source: ONS, Oxford Economics

Logistics

3.28. The £7.4 billion of logistics exports from the North in 2016 are almost wholly in services. We estimate that logistics goods exports equated to only £43 million in 2016, or under one percent of the capability's total exports, with a similar profile of international destinations to the North's overall goods exports. Logistics services is a growing export market across the North: from 2011, exports have increased by £1.9 billion, or just over a third – broadly in line with national trends. However, the North's share of UK logistics exports (12 percent) continues to lag its share of overall service exports (15 percent).

Figure 3.15: Logistics service exports and their share of the UK, the North, 2011 to 2016



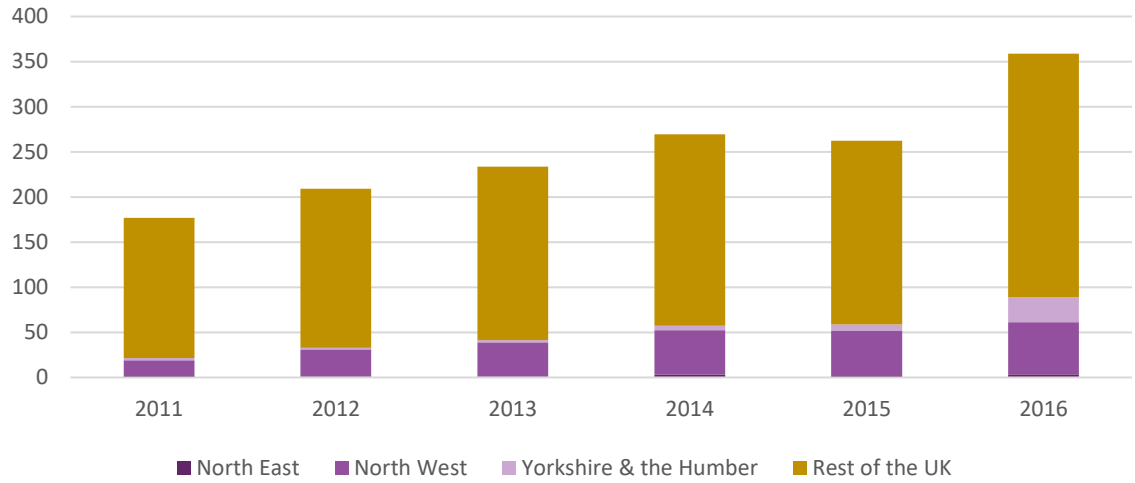
Source: ONS, Oxford Economics

Education

3.29. Education is the smallest of the North's capabilities in terms of exports, equating to just £89 million in 2016.[8] Although small in magnitude, the North's education exports have more than tripled since 2011, increasing from 12 percent in 2011 to a quarter of the UK's total by 2016. The North West is the region's key exporter, accounting for £58 million of exports in 2016, or 65 percent of the North's total.

Figure 3.16: Education service exports, the UK, 2011 to 2016

Education service exports (£bn, 2016 prices)



Source: ONS, Oxford Economics

Conclusions

3.30. Given that the NPIER has identified the seven capabilities sectors as being sector's in which the North specialises and as being central to the delivery of future growth, including achievement of transformational growth, it is perhaps not surprising that these sectors are over-represented in terms of their contribution to the North's export economy. In total, the North's seven NPIER capabilities contributed over half of its exports in 2016, totalling £44 billion in value.

3.31. It is also noticeable that the capabilities are more focussed on services exports than the North's economy as a whole. This is more in line with the export economy in the rest of the UK and is also reflective of the recent trend towards service exports from the North. Currently, goods account for around 55% of the capabilities exports compared to 64% for the North as a whole.

3.32. Advanced manufacturing is the largest capability, with exports equalling £20 billion, or almost a quarter of the annual total. Financial & professional services (£9.7 billion) and logistics (£7.4 billion) form the two next-largest shares of exports.

3.33. The dominant geographic markets are broadly in line with the North's exports overall export markets as a whole, with the main focus on the EU and North America, with Asia emerging in some areas.

[8] This education figure captures the international trade of services related to the education capability, but not the flow of money into the UK through domestic-based education activities (e.g. through foreign-based students attending UK universities), or the operation of UK universities in other countries.

4. Total Economic Contribution of the North's Exports

KEY FINDINGS

- The total economic contribution of the North's exports equated to £68 billion of GVA in 2013 (in 2011 prices), or a fifth of the region's overall economic activity. Exports also supported over 1.2 million jobs across the North.
- We calculate that an additional £46 billion of GVA was generated across the rest of the UK from Northern exports that year, supporting almost one million further jobs.
- Exports across the North's seven NPIER capabilities contributed £40 billion of GVA in 2013, or 12 percent of the region's total economic activity, and supported over 700,000 jobs.
- The direct impact of the North's exports totalled £41 billion (in 2011 prices) of GVA, equivalent to 12 percent of all economic activity across the three regions.
- Exports also directly supported over 600,000 jobs, or nine percent of the regional total. Workers producing the North's exports were, on average, 40 percent more productive than those serving the domestic market.
- The direct impact of the NPIER capabilities' exports equalled £24 billion of GVA in 2013, or around a quarter of the total GVA generated by these sectors. Energy, advanced manufacturing, financial & professional services, and logistics were all relatively export-orientated, while outputs across the remaining capabilities were mainly focused on serving domestic consumers.

How we Calculate the Total Economic Impact

4.1. The level of exports originating from the North does not, in itself, capture the extent to which exports contribute to the North's economy. There is a "direct impact" through the activity of exporters, the jobs this activity sustains, and the associated wages. But there is also an "indirect impact", generated by exporters' spending to UK firms in their supply chains, and an "induced impact", as those employed by the exporting companies, and by companies in their supply chains, spend their income in the UK consumer economy.

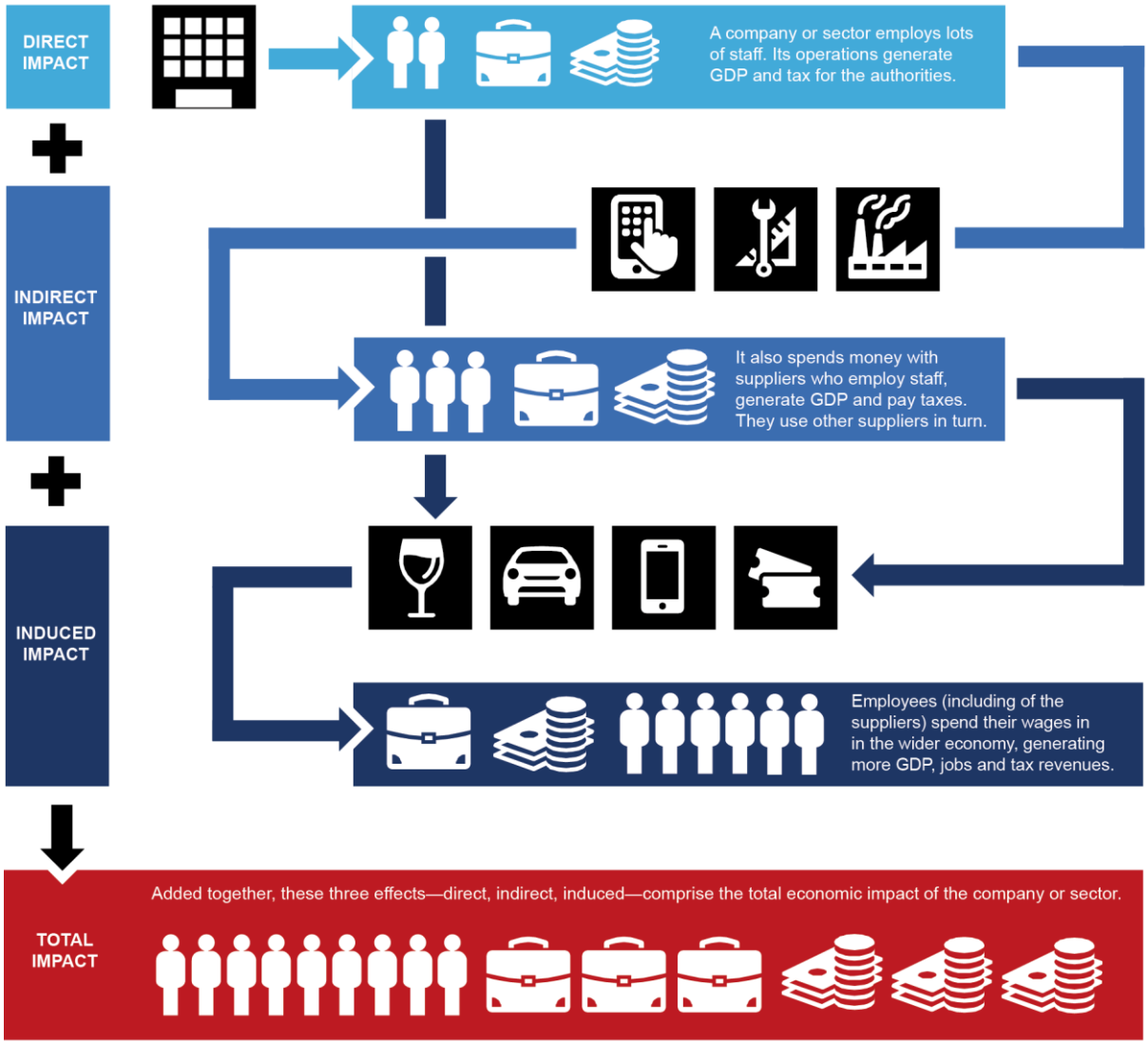
4.2. Therefore, to calculate the total impact of the North's exports on the UK economy, we must combine all three channels of impact, as follows:

- **Direct impact:** the GVA generated, and jobs supported, by the ongoing operation of firms exporting goods and services from the North;
- **Indirect impact:** the GVA generated, and jobs supported, as a result of expenditure by those firms on inputs required to generate their goods and service exports (the supply chain); and
- **Induced impact:** the GVA generated, and jobs supported, as a result of the spending of those employed both directly and indirectly in the creation of the export goods. This spending then generates further activity in its own supply chains.

4.3. **Notes:** in addition to the three standard channels of economic impact outlined above, the exporters also have "catalytic" impacts on both the Northern and wider UK economy. These may include the productivity benefits of competing in the international marketplace, and improved confidence in the local economy. Catalytic impacts are, however, difficult to collect data on, as many of these effects are intangible. We therefore do not seek to quantify the catalytic impact of the North's exports in this analysis.

4.4. Furthermore, to enable a direct comparison with the outputs of the NPIER, we estimate the economic contribution of exports in 2013, with all values presented in 2011 prices.[9]

Figure 4.1: Illustration of our economic impact modelling framework



Source: Oxford Economics

[9] While it is acknowledged that the three NPIER 'enabler' capabilities are required to support growth in the 'prime' NPIER capabilities, the inclusion of the former within our economic impact analysis does not constitute a double-counting of the supply chain impacts, as we only capture the exports from 'enabler' capabilities which by definition service purchasers in foreign markets.

The Direct Impact of Exports

Total Exports

4.5. Overall, the North's exports generated an estimated £41 billion (in 2011 prices) of direct GVA[10] for its economy in 2013, equivalent to 12.1 percent of the North's total economic activity that year. Those exports also directly supported 632,000 jobs across the North, or 8.9 percent of the total.

4.6. The disparity between the two proportions — with exports' share of the North's GVA somewhat higher than that of employment — reflects the relatively high levels of productivity across the North's exporting firms. The average productivity associated with the North's exports equated to £64,800 per worker in 2013 (in 2011 prices), £18,900 higher than the remainder of the North's economy. This indicates that workers generating the North's international exports are, on average, 40 percent more productive than those serving the domestic market. While the scale of the differences in productivity levels is notable, this itself is an expected finding, as exporting firms by their very nature are competitive in more competitive international markets.[11]

The North's Capabilities

4.7. **Overall, international exports accounted for a quarter of GVA generated across the North's seven NPIER capabilities in 2013.** The capabilities' exports are collectively estimated to have generated £23.7 billion (in 2011 prices) of direct GVA – equivalent to seven percent of the North's total economic activity that year – and to have directly supported 358,000 jobs.

4.8. Comparisons between the direct GVA generated by exports and the total direct GVA for each Northern capability give an indication of how export-orientated each one is.[12] **Overall, exports represent just under a quarter of the direct economic activity across the seven capabilities.** The remaining three-quarters services the domestic market, in the North and across the rest of the UK.

4.9. There is, however, considerable variation in the balance between domestic and foreign purchasers across each of the capabilities (see Figure 4.2). Exports form a majority (55 percent) of direct GVA in the energy capability, meaning that more output is generated to service foreign purchasers than for the domestic market. Exports also generate a third of advanced manufacturing GVA, a quarter of financial & professional services GVA, and around a fifth of logistics GVA.

4.10. In contrast, the remaining three capabilities are much less export-orientated. The exporting share of direct GVA ranges from four percent for the digital sector, to under one percent for both health innovation and education. These capabilities are therefore almost entirely focused on serving the domestic market.

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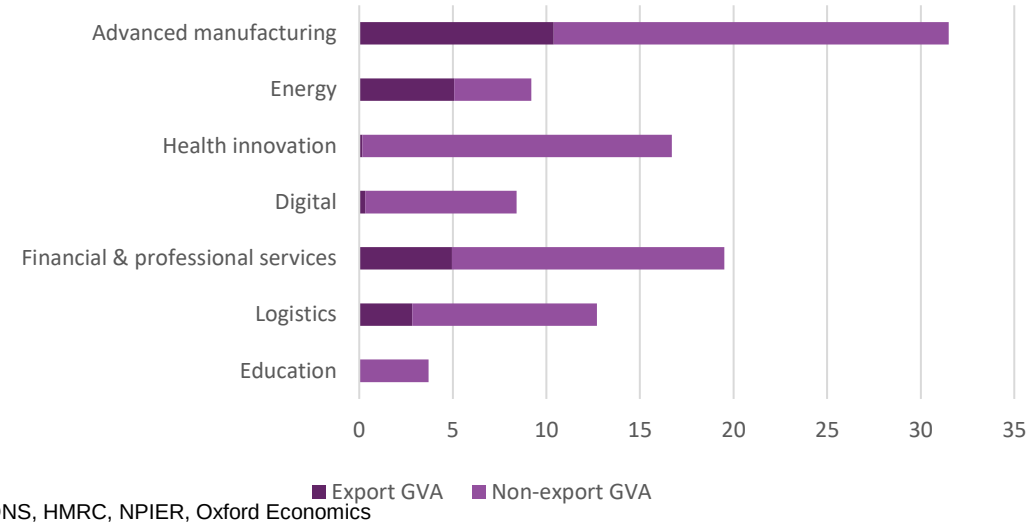
[10] The GVA generated, and jobs supported, by the ongoing operation of firms exporting goods and services from the North.
[11] This analysis is based on total employment—as outlined in the NPIER—rather than a per hour or per unit measure of labour. Part of the distinction in productivity levels between domestic and foreign producers may therefore be result from differing working patterns across different sectors.
[12] Provided by Workstream 3 of the NPIER.

Figure 4.2: Exports as a share of direct GVA by capability, the North, 2013

GVA (£bn, 2011 prices)



Source: ONS, HMRC, NPIER, Oxford Economics

The Indirect and Induced Impacts of Exports

Total exports

4.11. A majority of the supply chain activity required to support the North's exports is retained within the region's economy. We calculate that the overall indirect impact of the North's exports generated £31.6 billion of GVA in 2013 (in 2011 prices), of which £18.6 billion (59 percent) was retained within the North.

4.12. However, the induced impact is mainly felt by the rest of the UK. Of the £41.4 billion (in 2011 prices) of GVA generated by wage-related spending linked to the North's export activity in 2013, almost four-fifths (£32.8 billion) occurred elsewhere in the UK.

Figure 4.3: Indirect and induced impacts, the North and rest of UK, 2013

£bn, 2011 prices

Source: Oxford Economics

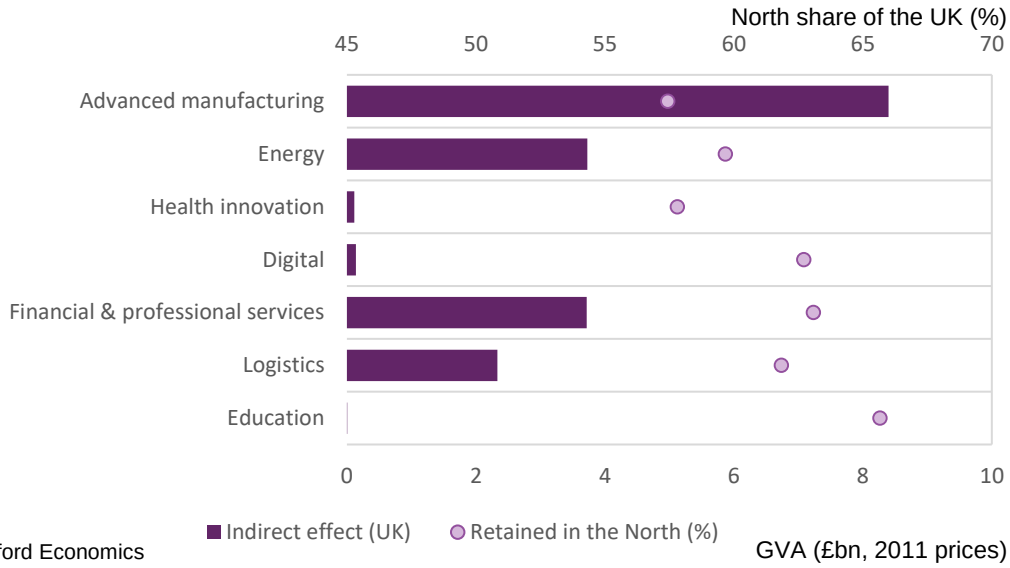
The North's Capabilities

4.13. As the spending profile of consumers tends not to vary by their sector of employment, the North's share of induced impacts across the seven NPIER capabilities is in line with this share for the North's exports in total. In estimating the supply chain effects, we consider both the 'multiplier' effect associated with each capability — which tends to vary by economic sector — and the extent to which sectors identified within each capability's supply chain are present across the Northern economy.

4.14. However, there is some variation in the proportion of indirect GVA retained across the North between the seven capabilities. As the largest exporter, advanced manufacturing also generates the largest indirect impact throughout its supply chain, supporting £8.4 billion (in 2011 prices) of GVA in 2013 across the UK. However, the share of supply chain activity retained in the North (57 percent) is the lowest of the seven capabilities (see Figure 4.4). This suggests improvements which promote linkages between Northern businesses and increase the supply chain capacity for this capability may enable the Northern economy to further retain the benefits of advanced manufacturing exports. The importance of ensuring a sufficiently large supply chain capacity to support advanced manufacturing exports is identified as a priority in the UK Industrial Strategy.[13]

4.15. Financial & professional services and energy (both £3.7 billion) have the second-largest indirect impacts across the UK, with the former also retaining a relatively large share (62 percent) across the North.

Figure 4.4: Indirect GVA by capability, UK, 2013



Source: Oxford Economics

The Total Economic Contribution of Exports

Total Exports

4.16. Combining the direct, indirect and induced impacts of the North's exports on the region in 2013, we calculate that the overall economic contribution of international exports to the Northern economy was £68.2 billion (in 2011 prices), or a fifth of total GVA generated by the Northern economy.

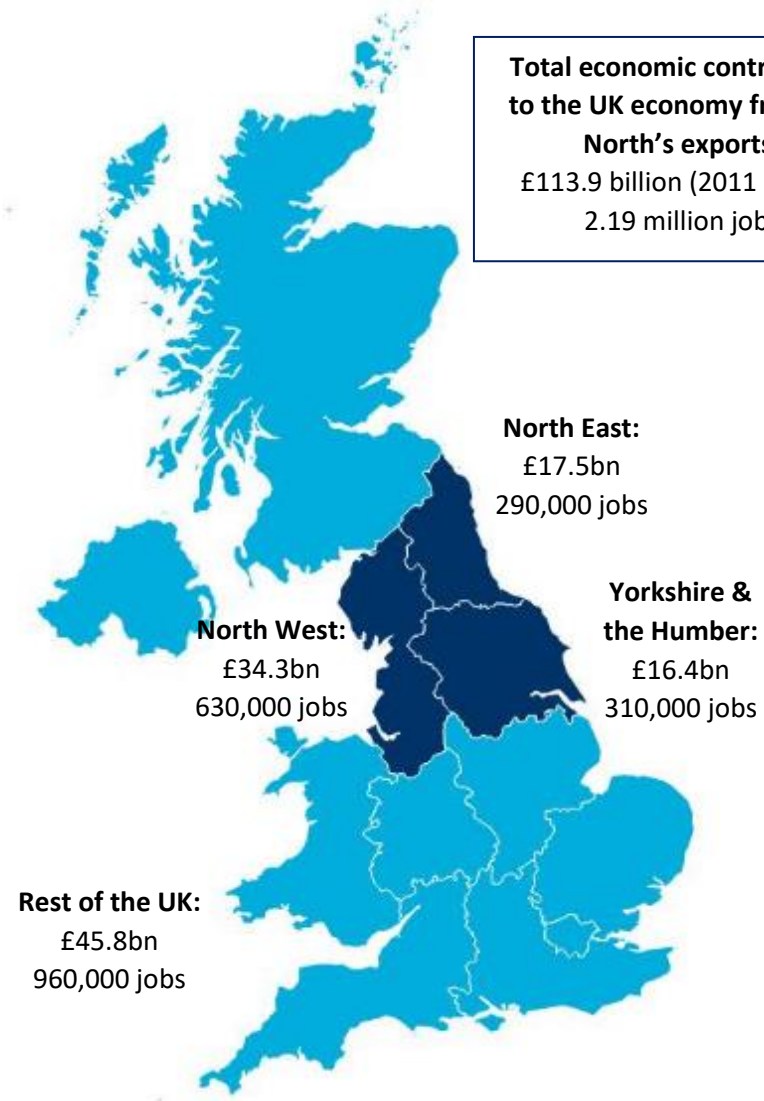
[13] HM Government, Industrial Strategy (2017). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730043/industrial-strategy-white-paper-print-ready-a4-version.pdf

4.17. In employment terms, exports contributed over 1.2 million jobs to the Northern economy in 2013, with almost half of these jobs supported along the supply chain (402,000 jobs) or generated by wage-related spending (193,000 jobs).

4.18. Of course, the economic impact of the North's exports is not confined to its three component regions. The interconnectivity of supply chains throughout the UK, coupled with the additional wage-related spending this implies, means the North's exports also have a positive impact on the rest of the UK. Our analysis indicates that in 2013, the total contribution of the North's exports to the UK economy equated to £113.9 billion (in 2011 prices). This implies that £45.8 billion of GVA — or just over 40 percent of the total impact — occurred elsewhere in the UK.[14]

4.19. Overall, the North has an implied "export multiplier" of 2.78 – meaning that, for every £1 of direct GVA linked to the North's exports, £2.78 of GVA is realised throughout the UK, of which £1.66 is generated across the Northern economy.

Figure 4.5: Total economic contribution of the North's exports, UK, 2013



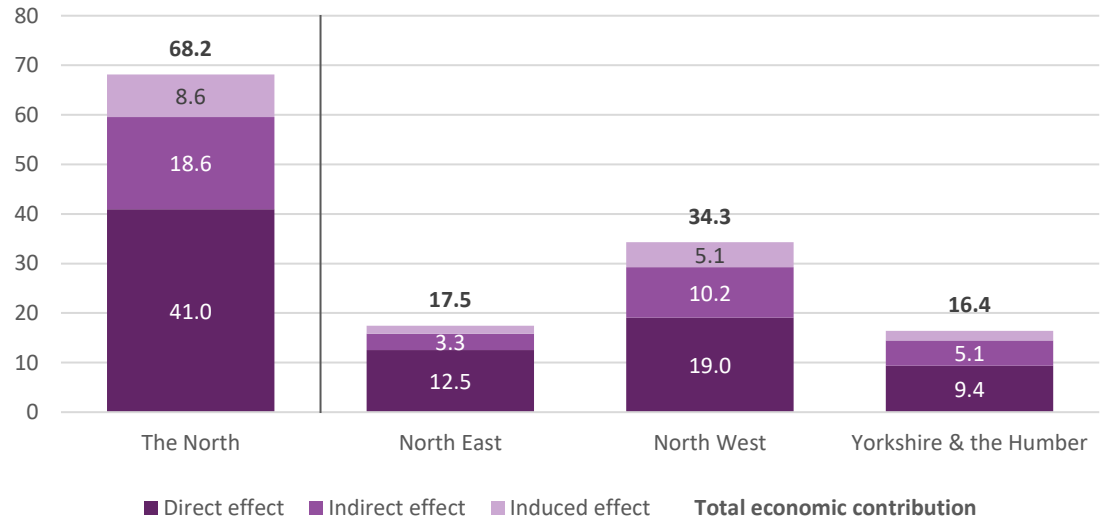
Source: ONS, HMRC, Oxford Economics

[14] Similarly (but not captured in this calculation), exports from other UK regions generated additional economic activity for the North through supply chain links to firms in the region, and associated wage-related spending.

4.20. Relative to the size of the North's three sub-regional economies, exports are estimated to have made the largest contribution in the North East, where the £17.5 billion (in 2011 prices) of GVA generated in 2013 equated to almost a third of its total economic activity. The largest contribution in absolute terms was in the North West, where exports contributed £34.3 billion of GVA, or a fifth of the regional economy. Exports made the lowest total contribution to Yorkshire & the Humber, equivalent to £16.4 billion or 14 percent of its total economic activity that year.

Figure 4.6: Total economic contribution of exports, the North, 2013

GVA (£bn, 2011 prices)



Source: ONS, HMRC, Oxford Economics

The North's NPIER Capabilities

4.21. In aggregate, the economic contribution of the seven NPIER capabilities equalled £39.6 billion (in 2011 prices) in 2013, equivalent to 11.7 percent of the North's overall GVA. The capabilities therefore accounted for 58 percent of GVA generated by exports across the North that year, while supporting 709,000 jobs––a tenth of the region's overall total.

4.22. In relative terms, the capabilities' share of export-driven GVA was highest in Yorkshire & the Humber, equivalent to two-thirds of the region's total in 2013. The share for the North West and North East were somewhat lower, at 57 and 54 percent respectively.

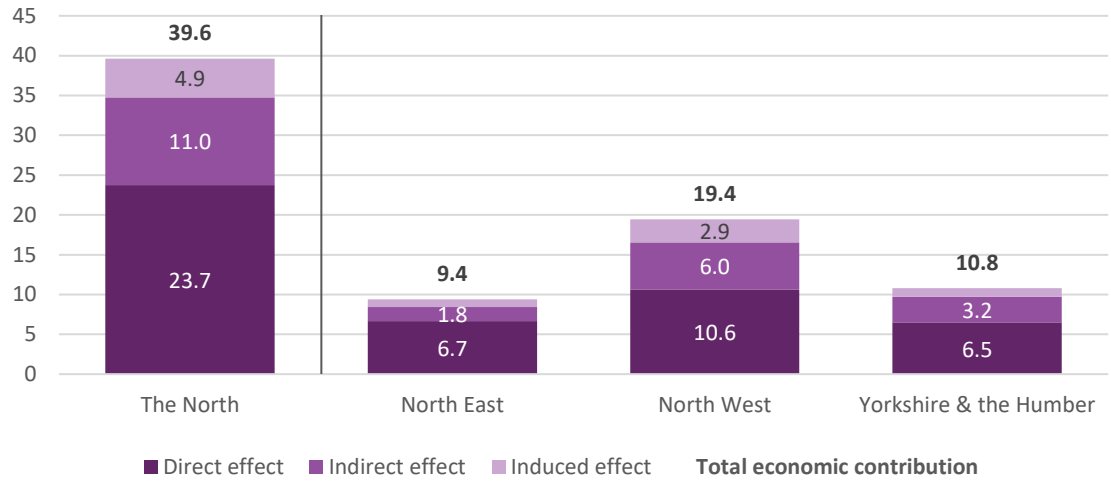
£40 billion

Total economic contribution of the Northern capabilities' exports in 2013 (in 2011 prices).

This supported one in every 10 jobs in the region.

Figure 4.7: Total economic contribution of the North's capability exports, and by sub-region, 2013

GVA (£bn, 2011 prices)



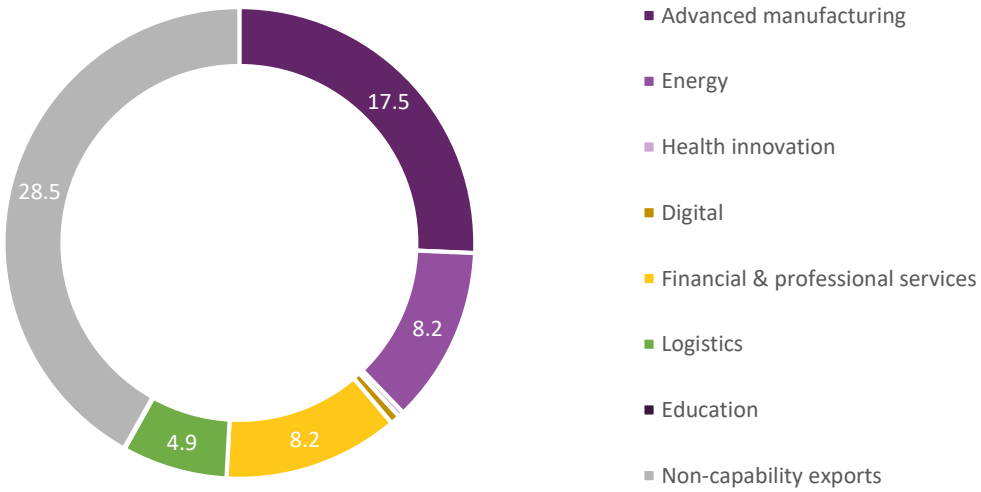
Source: ONS, HMRC, Oxford Economics

4.23. **Of the seven NPIER capabilities, exports in advanced manufacturing made the largest contribution to the North's economy** (see fig 4.8). In 2013, the total economic contribution of advanced manufacturing exports equated to £17.5 billion (in 2011 prices), equivalent to 5.2 percent of the North's overall GVA that year. These exports are also found to have supported almost 300,000 jobs across the North.

4.24. Energy and financial & professional services made the next-largest contributions in 2013, each equivalent to £8.2 billion, or 2.4 percent of the North's total GVA. The energy capability is found to have supported 158,000 jobs, while the relatively high productivity of financial & professional service firms and their suppliers meant that this capability supported 125,000 jobs.

Figure 4.8: Total economic contribution of exports by NPIER capability, the North, 2013

£bn (2011 prices)



Source: Oxford Economics

Conclusions

4.25. Exports are already an important contributor to the North's economy. The total economic contribution of the North's exports equated to £68 billion of GVA in 2013, or a fifth of the region's overall economic activity. Exports also supported over 1.2 million jobs across the North.

4.26. Exports across the North's seven NPIER capabilities contributed £40 billion of GVA in 2013, or 12 percent of the region's total economic activity, and supported over 700,000 jobs. Energy, advanced manufacturing, financial & professional services, and logistics were all relatively export-orientated, while outputs across the remaining capabilities were mainly focused on serving domestic consumers. This again shows the importance of the capabilities in supporting the international economy in the North and their potential importance for future growth.

4.27. Workers producing the North's exports were, on average, 40 percent more productive than those serving the domestic market. This again highlights the potential importance of enabling these sectors if transformational growth is to be achieved.

5. Scenario Forecasts for the North's Future Exports

KEY FINDINGS

- Our bilateral trade forecasts for the UK's goods exports present our views on future growth across the key global trading nations, informing the potential markets the North may seek to target in order to support export growth.
- While the United States is forecast to continue to be the largest purchaser of UK goods exports, China will make the largest contribution to growth, growing from the UK's sixth-largest export market currently to its second by 2050.
- Nearby European nations, including Germany, Ireland, France, the Netherlands and Belgium, are all forecast to continue to be large export markets. However, Brexit represents a significant downside risk to this forecast, should the UK permanently leave a customs union with the EU.
- The US is forecast to continue to dominate the UK's advanced manufacturing exports, forming a share almost 60 percent higher than the second-largest purchaser, Germany.
- Although the UK's energy exports are forecast to fall in real terms up to 2050, China will be the UK's best-performing energy export market, offsetting around a third of the overall projected contraction.
- Health innovation exports to the US will more than double in real terms by 2050. The US will continue to be the UK's largest purchaser of health innovation exports, alone contributing over a fifth of its growth over this period.

Introduction

5.1. **The Northern Powerhouse Independent Economic Review set out a range of scenarios for future growth across the North**. It generated a series of forecasts for the economy, detailing levels of GVA and employment up to 2050. The NPIER outlines how opportunities to address underperformance in productivity, increased agglomeration, and transport improvements can all help to unlock additional growth. It also explores how global connectivity is crucial to realising such opportunities, particularly in terms of trade.

5.2. The NPIER does not, however, consider how international trade, and exports in particular, can help to realise the North's growth ambitions. Therefore, to add to the evidence base, we have built on our analysis in previous chapters to forecast the outlook for trade across the North, focusing on:

- The changing nature of exports in the prime and enabling capabilities, and their contributions to the North's overall exports up to 2050; and
- Potential future growth markets for goods exports.

5.3. We forecast two scenarios. Firstly, the **business-as-usual scenario** presents Oxford Economics' baseline forecasts for exports. This comes in two forms:

- an overall forecast for the level of service exports across the national economy; and
- a product-by-country forecasting service for goods exports to 33 key economies, tied to our overall forecast for the level of goods exports.

5.4. The business-as-usual scenario incorporates our forecasts for future macroeconomic, industrial and trade patterns across the global economy at the time of writing. We disaggregate these forecasts to estimate future levels of exports across the regions of the UK, and for the North's seven NPIER capabilities.

5.5. Secondly, we estimate the likely export levels required for the North to achieve the **transformational scenario**, which reflects additional growth of the North's economy primarily across its seven NPIER capabilities. The NPIER puts forward a vision whereby the North's economy in 2050 is:

- 15 percent larger in GVA terms than a business-as-usual scenario;
- four percent more productive than under business-as-usual, with the productivity gap to the rest of the UK having significantly narrowed;
- benefiting from the creation of an additional 850,000 jobs.

5.6. The NPIER argues that the scale of this change, and the importance of internationalisation in driving productivity, means that international trade will be a significant part of achieving this transformational growth.

A NOTE ABOUT BREXIT

Oxford Economics' forecasts of national and regional exports are subject to a range of risks. Because of the uncertainty of future events and circumstances, there remains an inherent risk that future outcomes will not match this outlook. While there are a range of factors that could affect the future levels of trade at both a national and sub-national level, the most notable at the time of writing is Brexit.

Oxford Economics' trade forecast assumes the successful implementation of the withdrawal agreement, meaning that after the UK formally leaves the EU in March 2019, there is then a 21-month transition period where trading arrangements remain unchanged. At the time of writing, however, there remain a sizeable risk that the process is delayed due to the UK parliament voting against this deal.

In the long term, the UK's prospects are heavily dependent upon the outcome of the negotiations over its exit from the EU, and the way that it uses any additional powers that it gains in areas such as immigration policy. The withdrawal agreement includes an open-ended UK-EU Customs Union and, if the agreement is implemented, we think the UK will struggle to formulate a plan to supersede this arrangement. Therefore, the business-as-usual forecast assumes that the Customs Union remains in place for a prolonged period.

Divergence away from this outcome will impact our business-as-usual forecast. We outline the additional risk factors, both in the short and long run, that may result from a "hard" Brexit (whereby the UK leaves this Customs Union) in more detail in Appendix 3 of this report.

Business-as-Usual Scenario

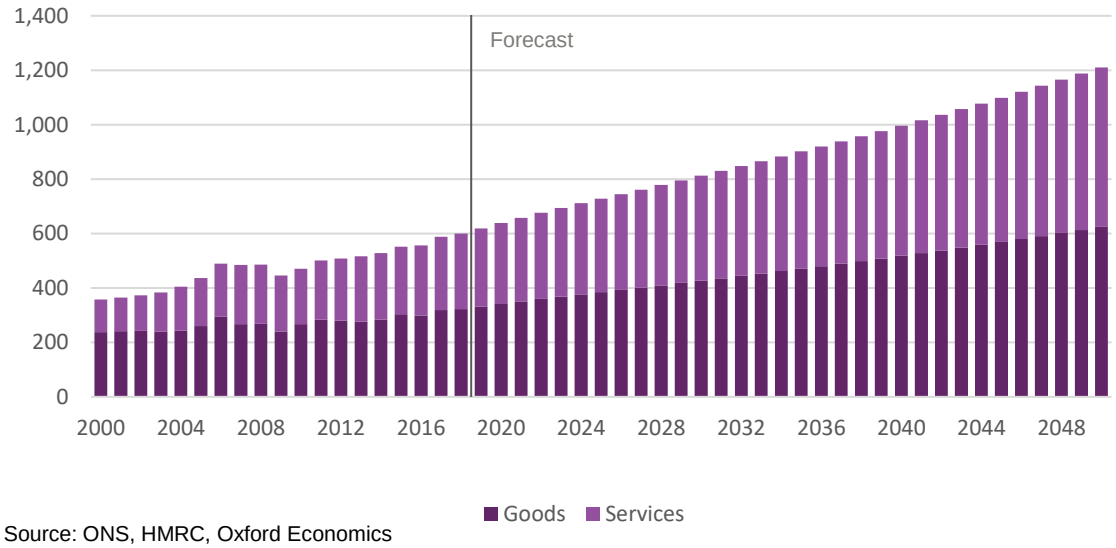
The UK's Export Forecast

5.7. Overall, we forecast that increases in UK exports will outstrip growth in the economy as a whole, indicating that the UK is expected to become increasingly trade intensive. By 2050, we forecast exports to be worth over £1.2 trillion to the UK economy (in 2016 prices), over twice their value in 2018. Exports are projected to contribute 33.1 percent of the UK's total annual GDP in 2050, 2.6 percentage points higher than in 2018.

5.8. The projected composition of exports in 2050 indicates a continuing shift towards services, whose contribution will increase by £309 billion (in 2016 prices), compared to a £302 billion increase in goods exports. Nonetheless, goods will remain the larger component of annual UK exports in 2050.

Figure 5.1: Exports, UK, 2000 to 2050

Exports (£bn, 2016 prices)



Source: ONS, HMRC, Oxford Economics

The North's Export Forecast

5.9. In the business-as-usual scenario, we forecast that the North's annual exports will be worth £150.8 billion (in 2016 prices) by 2050 – £62.8 billion, or 71 percent, higher in real terms than in 2018 (see fig 5.2, overleaf). As across the national economy, the Northern economy will become increasingly export-intensive, with the region's total annual GVA growing by only 51 percent in real terms over the same period.

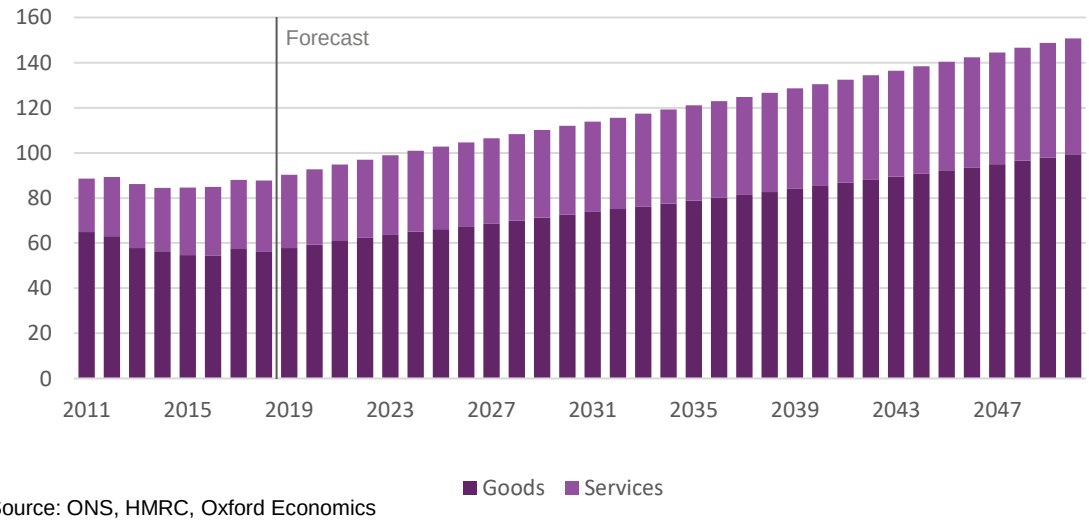
£151 billion

Forecast value of exports from the North in 2050 (in 2016 prices), an increase of 71 percent on 2018 levels.

Under the business-as-usual scenario.

Figure 5.2: Exports, the North, 2011 to 2050

Exports (£bn, 2016 prices)



Source: ONS, HMRC, Oxford Economics

5.10. However, we forecast that **the North's share of UK exports will fall**. This reflects a combination of factors. Our regional economic forecasts suggest that growth across the UK will outstrip that across the North: the region's share of national GVA is forecast to fall by 1.7 percentage points to 17.3 percent in 2050 (see 5.3). The forecast for the North is further constrained by a relatively low historic propensity to export relative to its levels of GVA in services, although this is partially offset by a relatively higher propensity to export goods.

Figure 5.3: The North's share of UK GVA, goods and service exports, 2018 and 2050

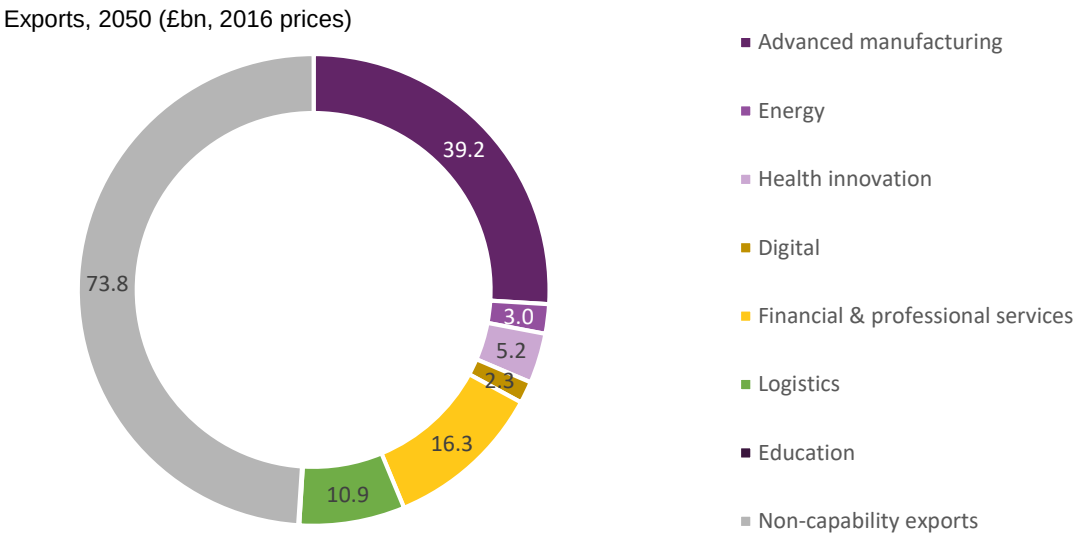
Source: Oxford Economics

5.11. **Export growth across the North will be primarily driven by goods.** Although the national economy is forecast to see greater growth in service exports, we forecast the North's goods exports to increase by £43.1 billion (77 percent) over the period 2018 to 2050, compared to growth of £19.7 billion (62 percent) in services. **Goods will therefore account for 69 percent of export growth across the North.** As a result, goods exports are forecast to constitute two-thirds of the North's exports by 2050, compared to just over half for the UK as a whole.

The North's NPIER Capabilities Forecast

5.12. **We forecast that annual exports of the North's capabilities will total £77 billion by 2050 (in 2016 prices)** – £30.2 billion (or two-thirds) higher than in 2018. Export growth across the capabilities in this scenario will therefore slightly underperform the North's exports in other goods and services. Overall, the capabilities are forecast to form 51 percent of the North's exports in 2050, compared to their 53.2 percent share in 2018.

Figure 5.4: Exports by capability in the business-as-usual scenario, the North, 2050



Source: Oxford Economics

5.13. We now look at the performance of each capability in turn under this scenario.

5.14. **Advanced manufacturing is forecast to continue to be the largest exporting capability.** Exports in 2050 are forecast to be £39.2 billion (in 2016 prices), an 81 percent increase in real terms from 2018. By 2050, advanced manufacturing is forecast to constitute 26 percent of all exports from the North, a slight increase on its current share. This capability alone is forecast to account for 28 percent of total export growth across the North.

5.15. However, advanced manufacturing exports from the rest of the UK are forecast to outperform the North, with the UK's total advanced manufacturing exports projected to grow by 110 percent in real terms over the same period. The North's annual share of UK exports is consequently forecast to contract from 20.3 percent in 2018 to 17.5 percent in 2050.

5.16. **Financial & professional services** is forecast to make the next-largest contribution to export growth. By 2050, we forecast exports in this sector to grow to £16.3 billion (in 2016 prices), an increase of £6.4 billion on 2018 levels. However, owing to even stronger export growth across the rest of the UK, we forecast the value of annual exports in this capability to fall as a share of the UK total by 2.4 percentage points, to 9.2 percent in 2050.

5.17. **Digital** exports are forecast to be the fastest-growing capability across the North, increasing by more than double from its 2018 levels to £2.3 billion (in 2016 prices) by 2050. **Health innovation** is also forecast to more than double in size, increasing by £2.8 billion over this period to £5.2 billion. Growth will be primarily concentrated in goods exports, which will account for £2.7 billion (95 percent) of the total annual increase in this capability's exports.

5.18. In contrast, exports in **energy** are forecast to decline in real terms up to 2050. We forecast that exports from the North will equate to £3 billion (in 2016 prices) by 2050, a third lower than their equivalent value in 2018. The North's performance is broadly in line with an overall contraction in energy exports across the UK as a whole.

Transformational scenario

5.19. The NPIER's transformational scenario assumes the North's GVA will be 15 percent larger than under the business-as-usual scenario. To inform our analysis of the potential impacts of this scenario on international trade, we were provided with GVA growth rates for the seven NPIER capabilities (and the rest of the Northern economy) by the NPIER, for both the business-as-usual and transformational scenarios.

5.20. However, as this analysis did not provide a regional breakdown, or imply the degree of displacement of activity from elsewhere in the UK, we were unable to replicate the same approach as under the business-as-usual scenario. Instead, our transformational scenario assumes that each capability's exports will grow in proportion to "additional" GVA between the two scenarios.

£27 billion

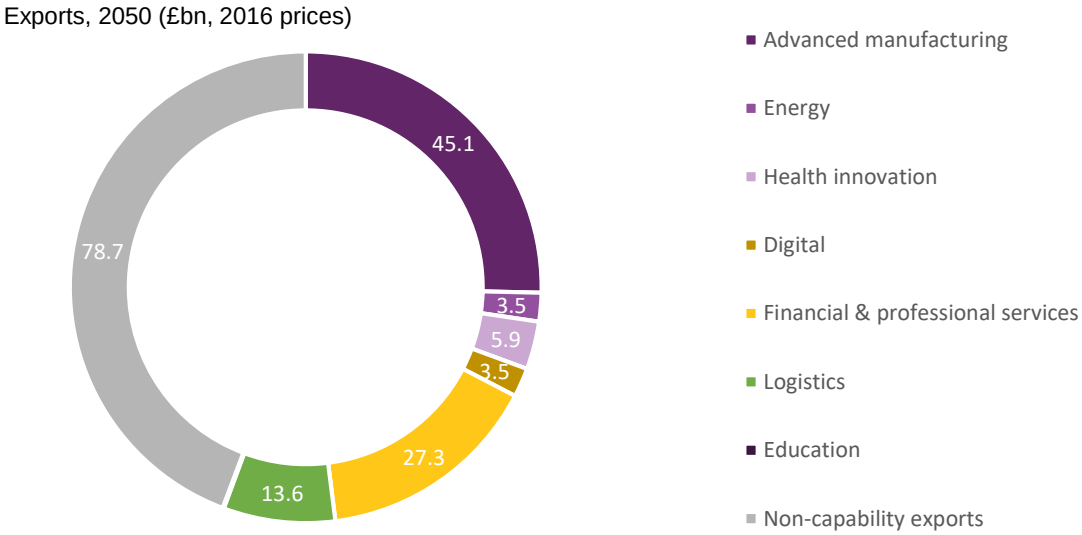
The increase in exports under the Transformational Scenario by 2050 (in 2016 prices).

The North's exports are forecast to be 18 percent higher than in the business-as-usual scenario.

5.21. The sectoral profile of growth under the transformational scenario detailed in the NPIER is skewed towards the North's seven NPIER capabilities. As demonstrated elsewhere in this report, these capabilities tend to have a greater propensity to export than other sectors of the economy.

5.22. These factors lead to our forecast that the North's annual exports under the transformational scenario will be worth £177.8 billion (in 2016 prices) by 2050 – £27 billion (18 percent) higher than under the business-as-usual scenario. The region's export growth is again forecast to outstrip overall GVA growth under this scenario, with the North becoming even more reliant on international exports under the transformational scenario than under the business-as-usual scenario. Were exports across the rest of the UK to remain unchanged as a result of the transformational scenario, we forecast that the North would retain the same share of UK exports as today (15 percent) by 2050.

Figure 5.5: Exports by NPIER capability in the transformational scenario, the North, 2050



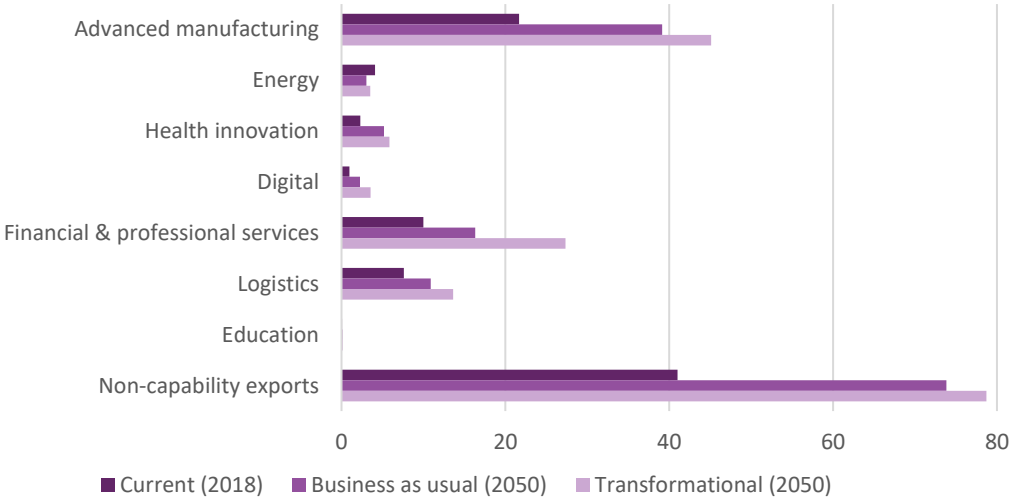
Source: Oxford Economics

5.23. Under the transformational scenario, the North's capability exports will grow as a share of the region's overall annual exports. In 2050, the capabilities are forecast to form 55.7 percent of the North's annual exports – 2.5 percentage points higher than the current level (53.2 percent). This is a reversal of the 2.2 percent contraction under the business-as-usual scenario (51 percent in 2050). The capabilities will collectively form £22.1 billion (in 2016 prices), or 82 percent, of the difference in value of annual exports between the two scenarios in 2050.

5.24. Owing to the relatively high growth rate assumed for **financial & professional services**, this capability is forecast to see an additional £11 billion (in 2016 prices) of annual export growth by 2050 under the transformational scenario, relative to the business-as-usual scenario. This capability alone accounts for 40 percent of the incremental growth in exports between these two scenarios. **Advanced manufacturing** will see the next largest increase in exports over the other scenario, equivalent to £6 billion, followed by **logistics** (£2.7 billion) and **digital** (£1.3 billion) – see Figure 5.6.

Figure 5.6: Exports by NPIER capability by scenario, the North, 2018 and 2050

Exports (£bn, 2016 prices)



Source: Oxford Economics

5.25. There are a range of additional factors which cannot be explicitly quantified, and hence are not included in our transformational scenario forecast, which may affect the North's propensity to export. These factors represent both upside and downside risks to this forecast.

5.26. First, the NPIER outlines a target for annual GVA to be 15 percent larger under the transformational scenario by 2050. Controlling for other factors, this alone implies that the North may begin to exhaust demand from domestic purchasers and become increasingly reliant on **demand from international buyers** to sustain the additional growth in output.

5.27. The extent of this is subject to the degree of **displacement** that results from this scenario. The NPIER does not explicitly discuss whether the additional growth experienced across the North will be attracted from other regions of the UK, entirely new economic activity, or some combination of these two factors. There is a strong likelihood that at least some of this growth will result from attracting economic activity that would have otherwise occurred elsewhere, thus reducing the relative size of the domestic (rest of UK) market under this scenario. This adjustment in the relative purchasing power between domestic and international purchasers may also lead the North's firms to become increasingly export-orientated to support growth.

5.28. However, this may be offset by the knock-on benefits realised in the rest of the UK thanks to the North's additional growth. As demonstrated in Chapter 4, the North's economy is interlinked to other regions of the UK, such that additional growth in the North stimulates additional economic activity across these regions through the **multiplier effect**.

5.29. Our analysis of the economic contribution of trade has shown that around 40 percent of the total economic impact of the North's exports occurs in the rest of the UK. The knock-on benefits to other regions of additional growth in the North may therefore act as a driver of **domestic demand**, offsetting part of the need for growth in exports under this scenario.

5.30. The transformational scenario also assumes that the North's firms will become increasingly **productive**. The NPIER indicates that the North will be *"four percent more productive than under the business-as-usual"* scenario, narrowing the region's productivity gap to the rest of the UK. Even excluding for the factors detailed above, as firms operating across the North become increasingly productive, they will become better placed to compete on the international marketplace.

5.31. In summary, the transformational scenario assumes a £27 billion (in 2016 prices) increase in the North's annual exports in 2050, relative to the business-as-usual scenario. Export growth (18 percent) is forecast to exceed the equivalent GVA growth (15 percent), implying that the Northern economy will become increasingly export-intensive under this scenario. However, the balance of impacts arising from the additional factors outlined above will determine the extent to which this represents an under or over-estimate of the North's reliance on international trade to realise the transformational scenario.

Figure 5.7: Exports by scenario, the North, 2018 and 2050

Capability	Current		Business-as-usual scenario		Transformational scenario	
	2018 (2016 prices £bn)	%	2050 (2016 prices £bn)	%	2050 (2016 prices £bn)	%
Prime capabilities						
Advanced manufacturing	21.7	24.7	39.2	26.0	45.1	25.4
Energy	4.1	4.7	3.0	2.0	3.5	2.0
Health innovation	2.3	3.4	5.2	3.4	5.9	3.3
Digital	1.0	1.5	2.3	1.5	3.5	2.0
Sub-total	*29.0*	*33.1*	*49.6*	*32.9*	*58.0*	*32.6*
Enabling capabilities						
Financial & professional services	10.0	11.4	16.3	10.8	27.3	15.4
Logistics	7.6	8.7	10.9	7.2	13.6	7.7
Education	0.1	0.1	0.1	0.1	0.1	0.1
Sub-total	*17.7*	*20.2*	*27.4*	*18.1*	*41.1*	*23.1*
Capabilities total	**46.7**	**53.2**	**77.0**	**51.0**	**99.1**	**55.7**
Non-capability exports	41.0	46.8	73.8	49.0	78.7	44.9
TOTAL	**87.8**	**100**	**150.8**	**100**	**177.8**	**100**

Source: Oxford Economics. Note that figures may not sum due to rounding.

Conclusions

5.32. The value of exports from the North is expected to increase significantly by 2050 in the Business as Usual scenario, growing by 71%. This compares to a growth in GVA of around 51%. The North is therefore going to become more reliant on exports to support economic growth in the future regardless of whether transformational growth is achieved or not. This clearly has implications for international connectivity in itself. It is, however, notable that the North's share of UK exports is expected to fall, suggesting that it will continue to underperform. The NPIER capabilities are also expected to decline as a share of the North's exports.

5.33. Transformational growth is expected to result in a boost in export growth of around 18%. This compares to additional GVA growth of 15%, so implies further export intensification of the North's economy. If export performance from the rest of the UK remained unchanged this would result in the North retaining its existing share of UK exports. Similarly, it is notable that achieving transformational growth is expected to result in the capabilities increasing their share of the North's exports, reiterating their importance for achieving the step change required.

5.34. In terms of geographic markets, traditional markets in Europe and North America will remain important but there is a growing influence from emerging markets, most notably China, which is expected to make the largest contribution to goods exports growth.

5.35. This analysis provides a number of important messages for our consideration of the North's international connectivity in the remainder of the report, notably that international connectivity needs are going to grow and that while there isn't expected to be a fundamental shift in the North's trading patterns, the development of access to key long haul markets in the East will be important.

6. The Relationship Between International Trade and International Connectivity

Introduction

6.1. In this section, we consider the link between international trade and international connectivity. As we have described in the introduction to this report, this link is fundamental in establishing the logic chain between the growing importance of international trade in the North's economy in the future, and particularly its potential role in supporting transformational growth, and investment in the region's connectivity to support growth.

6.2. Below, we analyse a range of evidence published regarding the role of international connectivity facilitated by air and sea in enabling businesses to access broader markets; enabling competition in supply chains; boosting productivity; making regions more attractive places to locate; and ultimately reducing prices for consumers. The value and importance of such has been studied extensively by industry, government and academics alike, and the evidence discussed herein will demonstrate the importance of international connectivity in supporting these benefits in the North. As we have discussed above, the primary focus of this report is on what has traditionally been defined as trade and particularly exports. Here we have explored the link between connectivity and trade in some detail. However, we have also considered the links to FDI and tourism. While these are not the primary focus of this work, they are ultimately forms of trade and FDI in particular has very real links to the development of trading economies.

6.3. This section also often discusses the role of aviation and maritime sectors in parallel, as relationships between connectivity and economic benefits are not always exclusive to a particular mode. However, we have recognised and discussed intrinsic differences in character between air and sea transport where they present themselves as relevant. For example, the relatively slow speed of sea freight lends itself more suitably to the transport of less-time critical goods compared to air freight. Similar points of differentiation are acknowledged throughout this section.

6.4. We should also highlight that the focus of this section is on the role of connectivity in driving wider economic growth and less on the operational/GVA direct impacts of airports and ports. These employment and GVA benefits can be significant sub-regionally and make a large direct contribution to economic growth, but this is distinct from the key themes being addressed in this study, namely the contribution of international connectivity in facilitating economic growth of the North.

Trade

6.5. We focus initially on connectivity provided by the aviation and maritime sectors and associated trade. In relation to trade in goods, sea cargo is by far the predominant mode for UK exports. It provides a cost-effective way of getting non-time critical goods to export markets and, as such, the link between connectivity and trade is largely self-evident. Air cargo is a quick and efficient means of transporting goods around the world, which makes economic sense in relation to the transport of some goods, primarily those that are high-value, low weight or time critical. In this sense, air connectivity enables UK firms to enter overseas export markets effectively. Equally, air cargo enables UK firms to access suppliers overseas that may offer lower priced or better alternative inputs to production processes and it enables UK consumers to import goods from overseas that may again be cheaper or of better quality than those available from domestic suppliers. In essence, trade allows countries to use their comparative advantage to maximise efficiency.

6.6. However, passenger connectivity is also important in terms of trade. In relation to the trade in goods, companies need staff to travel to meet potential customers, to secure deals and to provide after sales

care. This relates to both exports and imports. Trade in services is also heavily reliant on air passenger connectivity. Again, companies need staff to travel to meet potential customers and secure deals but, in contrast to the trade in goods, they may also need individuals to travel to actually deliver the services being sold.

6.7. Published evidence on the importance of air connectivity to international trade is extensive:

- Airports Commission Discussion Paper 02: Aviation Connectivity and the Economy (2013) – This paper published by the Airports Commission considered evidence for the argument that aviation connectivity supports the UK's economic growth through facilitating trade in goods and services, amongst other channels. The paper highlighted that the importance of connectivity to the trade of goods is reflected in the fact that Heathrow, the UK's best connected airport, is also by far the largest UK port in terms of exports by value to non-EU countries. It was also discussed that the fact the majority of goods sent by air are done so as belly-hold cargo in passenger aircraft is important for understanding potential impacts any changes in aviation connectivity may have on trade;

- PwC Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy (2013) – this report investigated the relationship between connectivity and the trade of goods and services between the UK and international markets. Using seat capacity as a proxy for connectivity, it was found that a 10% increase in international seat capacity is associated with a 1.7% increase in goods imports to the UK and a 3.3% increase in UK goods exports. Similarly, on the trade of services, the same increase in international seat capacity is associated 6.6% increase in imports of services to the UK and a 2.5% increase in UK exports of services;

- HM Government Aviation 2050 – The Future of UK Aviation (2018) this Green Paper published by the Government outlines the Government's strategy to support a safe, secure and sustainable aviation sector by 2050. Supporting regional growth and connectivity is discussed as key objective for the Government, and in order to allow airports to deliver connectivity that their respective regions require, the Government proposes a series of measures to enhance connectivity opportunities. One suggested method is to continue the liberalisation of bilateral air service agreements to reduce barriers for airlines wishing to connect the UK to foreign markets, thus increasing opportunities for trade and travel. In 2017, an updated air service agreement with China was signed, which supports Manchester's direct connection with Beijing. It is estimated that the service has increased export values from Manchester Airport to China to £1.29 billion;

- IATA Airline Network Benefits (2006) – this study, conducted in partnership with Oxford Economics, measured the additional benefits generated by airline networks for economic development. The methodology of the study revolved around an extensive survey of businesses and a separate statistical analysis. It was found that the air transport network played a key role in supporting and facilitating economic growth; on average, firms surveyed in the study reported that 25% of their sales were dependent on good air transport links. The accessibility to global markets was also vital to investment decisions – both outwards by domestic firms and inwards by foreign firms. 63% of firms stated that access to the global air network is vital or very important to investment decisions, with a further 24% saying it is somewhat important. On average, 18% of firms report that lack of good air transport links had affected their past investment decisions, with nearly 30% of Chinese firms reporting they had changed investment decisions because of constraints on air services;

- InterVISTAS Economic Impact of European Airports (2015) - this report attempted to quantity the economic impact of various European airports for ACI Europe. In order to estimate the catalytic economic impacts, the relationship between aviation and economic growth was analysed using data on connectivity and GDP for 40 countries in the ACI Europe study area between 2000 and

2012. The analysis found that a 10% increase in connectivity was associated with an increase in GDP per capita of 0.5%. A case study involving a small regional airport in Romania was carried out where a survey was sent to local businesses to understand the importance of the local airport on their business. 95% of businesses reported the nearby airport was absolutely essential or essential to them, and 72% of businesses reported that future development of the airport would be very important or somewhat importance to improving the growth of their business;

- CBI Trading Places (2013) – this report established a strong link between the level of air service connectivity and trade between the UK and the World's eighth largest high growth economies. It also found similar patterns for the six largest EU economies. The report estimated that an additional daily service to each of the World's largest high growth economies had the potential to deliver £1 billion in additional trade;

- Frontier Economics Connecting for Growth: the role of Britain's hub airport in economic recovery (2011) – this report also established a clear correlation between the level of trade and air connectivity in the UK, albeit causality was not established. Furthermore, the report identified that UK businesses traded 20 times as much with countries where there are at least daily flights compared to those with less frequent or no direct connections. It was estimated that UK trade could be increased by around £1.2 billion per annum if there were sufficient capacity at Heathrow to accommodate viable routes to emerging markets.

6.8. In relation to the global trade of commodities, sea freight represents a cost-effective method of sending high volumes of goods that are less time critical when compared to air cargo services. Evidence of the maritime industry in increasing levels of trade is relatively less established in published research compared to the aviation industry, however, below we summarise some key recent publications focussed on this area:

- Transport for the North Strategic Travel Plan Draft (2018) – this paper established TfN's 30-year vision for transport investment in the North, setting a series of transport objectives to achieve transformational growth in the region. It is discussed that investment in transport infrastructure will facilitate the exchange of goods, services, knowledge and skills. When outlining international connectivity goals, the relationship of greater international connectivity from ports and increases in trade and FDI is cited as a key benefit of investment in port infrastructure. In demonstrating the North's ports as national infrastructure assets, the report stated that 33% of the UK's freight is currently moved from the North's ports.

- Department for Transport infrastructure for our global future: a study of England's port connectivity (2018) – this report reviewed the suitability of domestic road and rail connections to English ports, whereby the definition of connectivity in this instance related exclusively to the quality of access between ports and their hinterland. Whilst this differs to the definition of connectivity considered in our report, the role of ports in facilitating trade and travel was discussed at some length by the DfT. For example, it was stated that 95% of all goods entering or leaving the UK are moved by sea, which in 2016 equated to 337 million tonnes of freight being handled by ports in England. In comparison, air freight carried less than 1% of and rail freight carried less than 5% under the Channel. It was highlighted that the top three commodities for both exports and imports (electrical machinery, mechanical machinery and cars) were products which were almost exclusively transported by sea, and the remainder of the top 30 traded commodities were highly likely dependent on maritime transport;

- Transport for the North Enhanced Freight and Logistics Analysis Report (2018) – this report highlighted the crucial role that ports in the North play in actively contributing to the success of important sectors such as energy, advanced manufacturing and health sciences. It is discussed that Liverpool Port has developed a strong network of short sea shipping routes and is a major sea

shipping hub for the Irish Sea area and ports on the east coast feature a significant throughput of freight to Europe.

- Department for Transport Maritime Annual Report (2018) – this annual review of the maritime sector in the UK highlights successes of the industry in the preceding year. The role of ports in supporting trade is clearly made, with headline statistics including the achievement of 1.54 million vehicle exports from UK ports in 2016, an increase of 5.5% from the previous year.

6.9. Evidence from broader research on the impact of transport connectivity generally on trade is also helpful in understanding the importance of air and sea connectivity. NERA's research for the DfT on transport and international business impacts summed up the findings of a wide range of research on the link between the sensitivity of trade to transport costs as follows:

- distance matters - the almost universal conclusion across the research is that the further away and more costly markets are to reach the less bilateral trade will occur;

- distance matters even for digitally-traded goods – even where there is no physical cost to transferring the good or service, it is harder to trade with more distant countries. NERA cites the impact on trade from unfamiliarity bred by distance;

- distance matters more than it used to – NERA cited research by Berthelon and Freund (2008) which suggested that it was becoming easier to source homogenous and high trade cost goods from nearby countries, so relative trade costs are becoming more important.

6.10. There are a number of key messages here in terms of the importance of air and sea connectivity to trade. Air connectivity in particular is exceptionally effective at reducing the perceived distance between markets. Good connectivity can dramatically reduce the time it takes to reach some markets, reducing perceived distances and offsetting the impacts of unfamiliarity. There is also the potential for air connectivity to enable firms to spread competition beyond simply price by improving customer service and support, potentially counteracting the final factor in some markets.

6.11. If, on this basis, it seems reasonable to suggest that air and sea connectivity is important in facilitating trade in both goods and services, the question then becomes whether increased trade is likely to bring about greater economic growth and prosperity. Some commentators have suggested that while increased connectivity will be beneficial in terms of UK exports there will be at least an equal impact on UK imports, which will have negative implications in terms of the UK balance of payments. This, however, ignores the fact that enabling bi-directional international trade will ultimately facilitate economic growth through enabling countries or regions to develop comparative advantage. Exporters will be able to widen the market for their goods and services, enabling them to benefit from economies of scale and increase productivity, while more broadly potentially growing to meet wider market demand and drawing in more labour and capital from economic sectors where the North does not hold a comparative advantage. This will contribute to the sort of structural change envisaged by the IER, with a focus on more productive sectors of the economy. Ultimately, this process will result in a more efficient global allocation of resources and increased productivity.

Foreign Direct Investment

6.12. We now focus on connectivity provided by the aviation and maritime sectors and associated inward investment. The importance of air and sea connectivity in supporting inward investment is again well established. Research undertaken by NERA for the Department for Transport in relation to international business impacts concluded that, in circumstances in which the investment results in higher technology or more productive approaches being brought to the host country (as opposed to multinationals seeking to exploit cheap labour in the host country or access more advanced technologies held in the host

country), there will be a boost to long run productivity. Therefore, it is relevant to consider the role in which connectivity facilitated by aviation and maritime industries play in supporting inward investment.

6.13. The role of aviation and maritime in attracting and retaining inward foreign direct investment (FDI) has long been suggested by academics and industry bodies alike, and a significant amount of evidence has been published to support the theory. A range of such documents are summarised herein, of which a large number of such were published to provide evidence to the 2015 Airports Commission. Whilst such documents were specifically written to support the expansion of Heathrow Airport, broad principles regarding the relationship of connectivity and FDI can be applied to virtually any airport or port and its respective economy.

- Cushman & Wakefield European Cities Monitor (2011) – this was an annually recurring survey between 1990 and 2011 of 500 European corporate decision makers which provided significant evidence of the importance of international connectivity in influencing company location decisions. It is still one of the most commonly cited pieces of survey evidence in this area. The survey consistently identified factors such as transport links with other cities and the ease of access to markets, clients and customers amongst the most important factors in company location decisions. There were clear linkages to the availability of air service connectivity as the cities served by Europe's major hub airports commonly featured towards the top of the list in terms of the best places to locate in Europe. In 2011, the last year the survey was published, London was ranked first, followed by Paris, Frankfurt and Amsterdam in order.

- Oxford Economics The Economic Contribution of the Aviation Industry to the UK Economy (2006) – research by Oxford Economics sought to assess the contribution of the air transport industry to the UK economy. It was found that a quarter of companies surveyed as part of the research reported that access to air services was important in determining where they locate their operations in the UK. Further research, also by Oxford Economics in 2006, attempted to quantify the link between air connectivity and business investment. The results of the study suggested a 10% increase in connectivity is associated with a 3.5% increase in the level of fixed investment in the long run.

- Deloitte The Heathrow Phenomenon (2007) – this research focussed on the economic impact of Heathrow Airport on the economy of London, with a particular focus on West London and the M4 Corridor. Research by Think London is citied, which identified around 50% of foreign owned companies located to London due to its status as an entry point to the UK and to Europe. The report concluded that connectivity offered by Heathrow is critical to this effect. Furthermore, the success of the economy in the study area is built upon access to a global gateway such as Heathrow.

- York Aviation The Social and Economic Impact of Airports in Europe (2004) for ACI Europe – this report analysed research by Ernst & young on location decisions in Europe, research by VNO-NCW on the influence of Amsterdam Schiphol Airport on location decisions and the University of Cologne on the significance of airports for firms. The analysis identified the importance of access to major airports in terms of investment decisions across a range of industry sectors.

- Bel & Fageda Getting There Fast: Globalisation, Intercontinental Flights and Location of Headquarters – Journal of Economic Geography (2008) – this research paper considered the influence of intercontinental flights on head office location. It was found that the supply of direct intercontinental flights is effectively a major determinant in the location choices of large firms' headquarters. A 10% increase in the supply of such flights involved a 4% increase in the number of headquarters of large firms located in the corresponding urban area.

- Similarly, a discussion paper by Strauss-Kahn, Vanessa and Xavier Vives Why and where do headquarters move? (2008) identified that headquarters relocate to metropolitan areas with good airport facilities, low corporate taxes, low average wages, high levels of business services and an agglomeration of headquarters in the same sector of activity.

- A London Chamber of Commerce and Industry Survey of London Business Leaders (2008) found that 94% of respondents believed that Heathrow Airport was very important or important for attracting FDI and tourism to London.

- Institute of Directors Flying into the Future (2012) identified that almost six in ten (59%) members agreed that a lack of spare capacity at Heathrow had a damaging effect on inward investment to the UK, compared to just 17% who disagreed. In all regions of the UK, more IoD members agreed than disagreed with this statement.

- PwC Econometric Analysis to Develop Evidence on the Links Between Aviation and the Economy on behalf of the Airports Commission (2013) – this comprehensive study identified that a 1% increase in international seat capacity was associate with a 0.47% increase in FDI inflows and a 0.19% increase in FDI outflows. It should be noted, however, that this finding was not ultimately used in the Airports Commission analysis due to concerns over potential double counting with trade effects. Furthermore, it was recognised that this may have resulted in wider benefits being underestimated.

- Frontier Economics Competition & Choice (2017) A Report Prepared for Heathrow – this report attempted to establish a comparative estimate of the connectivity and catalytic benefits (trade and FDI) or expanding Heathrow or Gatwick. The report draws upon evidence put forward by a large number of studies seeking to draw a relationship between connectivity, FDI and the benefits of face-to-face business meetings. It is discussed that face-to-face business meetings play a role in overcoming barriers between economies such as product market regulations; tariffs, quotas and local content requirements; exchange rates; and cultural differences; and as a consequence, FDI and trade is enhanced when connectivity exists to provide the opportunity for face-to-face meetings. The paper compared the evidence published by a variety of academic and industry sources regarding the additional trade facilitated as a result of a 1% increase in business travel. Values ranged from 0.13% to 0.7%, and based upon this, Frontier Economics selected 0.3 as the elasticity of business travel to FDI.

6.14. Similarly, previous research from a wide range of commentators helps to explain how air services influence FDI decisions and why, in this context, connectivity is important. Essentially, this research establishes a logic chain around the need for travel between corporate head offices and branch locations. This travel by air facilitates effective management and operation of central administrative functions, allows the transfer of knowledge and technology, enables specialists within the organisation to operate across the full range of locations and allows the local or central delivery of training and development activities. At a most basic level, this establishes the requirement for connectivity between the head office and the branch location.

6.15. However, increasingly, relationships are more complex than that. Major multinational companies now often organise themselves in a form of hub and spoke model. For instance, a US based multinational may have its headquarters in New York. However, its operations around the world may well then be divided in to world regions, such as Europe, Asia or Latin America. Operations in these individual regions may then be run from a regional headquarters, which in turn require not only key long haul connections but a wide range of connections across Europe. This helps to explain the need for breadth in connectivity and also the need for a balance between long and short haul services. Ultimately, it should also be recognised that the availability of connectivity may also influence the location of an organisation's global headquarters. If the connectivity from the 'home' city is not sufficient to enable effective management

of the business, the headquarters itself may well need to move so it can better serve the needs of the organisation over the long term.

6.16. The influence of air services on location of the branch site in terms of external functions also needs to be considered. This relates to the function that the site plays. Branch locations that are, for instance, regional sales offices, providing customer service or support may in themselves require air service connectivity for them to reach regional markets for which they are responsible. Again, this suggests the need for breadth in connectivity from a given location to support this type of function.

6.17. It is in the context of FDI decisions that the concept of potential connectivity is perhaps most important. In making location or investment decisions, organisations must consider not just the present but also the future. What will they need to be able to operate effectively from a given location over the coming years? In terms of connectivity, this means having knowledge of what their network of locations will look like in the future, where their markets will be and where key partners and suppliers will be. These are clearly subject to uncertainty, especially in the longer term. Location decisions often mean significant investment both in cost and time. Therefore, good general connectivity now and the potential for competitive connectivity in the future is important in providing comfort that their needs can and will be met. This also highlights the importance of flexibility to adapt to changing connectivity requirements over time.

6.18. The importance of air services in relation to outward FDI and the potential economic benefits associated with this investment is sometimes forgotten. This perhaps reflects the perception that capital outflow from the UK must be a bad thing. However, just as inward investment is only beneficial in certain circumstances, outward investment is only negative in certain circumstances. If investing outside of the UK represents a more efficient use of an organisation's capital, either by allowing it to access cheaper labour or more advanced technologies or more productive approaches, the impact on the host country or region's long run productivity will be beneficial.

6.19. Equally, in relation to air connectivity and outward FDI, the importance of connectivity remains. It is simply the direction of flow that is reversed. Outward investors need to be able to manage their investments effectively and air travel can be an important part of this process. If they cannot, the investments will not be made and associated productivity gains not achieved. It should also be remembered that an 'outward' investor could also be globally mobile and become an inward investor elsewhere. Therefore, outward investors require locations for their 'home' bases that enable this travel and, again, potential connectivity is a key factor. Investors will not have perfect knowledge of where they are going to have interests in the future. A strong and developing connectivity offer is therefore important in giving comfort that their needs can and will be met.

Tourism

6.20. The value of air connectivity in terms of tourism is in some ways self-evident. Particularly in the UK, inbound tourism is heavily reliant on air transport to enable visitors to reach the country. The aforementioned Airports Commission Discussion Paper on aviation connectivity stated that aviation is essential in supporting both inbound and outbound tourist activity to and from the UK. In 2011, 75% of the 31 million visits made to the UK by overseas residents started at an airport and 84% of the £18 billion spent by overseas visitors was spent by those arriving by air. The International Passenger Survey demonstrates that it is only in relation to the UK's closest neighbours (France, Belgium, Germany, Ireland and the Netherlands) that other modes offer any significant competition to air travel, which highlights the importance of ferry traffic in catering to tourists from these markets.

6.21. Air services make a region more accessible for potential visitors, travelling for either business or leisure purposes. The absence of direct and competitively priced air connections could be a substantial impediment to tourist visits to the North where a suitable sea connection does not exist. Expanding

connectivity has the potential to increase the number of visitors to the North as it will open new markets from which visitors may come if the tourism product is of interest to them.

6.22. Perhaps because of the clarity of the link, the evidence base around the influence of air connectivity on tourism is somewhat less extensive:

- Mayor of London A New Airport For London: Part 2, The Economic Benefits of a New Hub Airport (2011) – This report discusses that inbound tourism to the UK generates valuable revenue to the nation and supports a large number of jobs and investment. It stresses that the ultimate destination for tourism trips are far more flexible than other sub-sectors, given the extent to which holiday destinations are substitutable. Therefore, deficiencies in connectivity relative to competing destinations could have serious implications for the wider economic benefits which inbound tourism generates for the North.

- Ishutkina and Hansman Analysis of the interaction between Air Transportation and Economic Activity (2008) – their research highlighted the vital role that air connectivity plays in relation to tourism in island economies. The extreme example of Jamaica was used, where tourism activities accounted for around 20% of the country's GDP. Furthermore, the Jamaican government considered tourism so crucial to the national interest that it maintained the national carrier, Air Jamaica, before it was sold to a competitor at the start of the decade.

- Air Transport Action Group Aviation Benefits Beyond Borders (2018) – this report addresses the fact that aviation is indispensable for tourism, which is a major engine of economic growth, particularly in developing economies. The report states that in 2017, 57% of international tourists travelled by air.

- The London Chamber of Commerce and Industry survey of London Business Leaders (2008) identified that 94% of respondents believed that Heathrow was very important or important for attracting FDI and tourism to London.

6.23. It is, however, important to recognise that air connectivity works both ways. While it clearly enables inbound visitors, it also enables outbound travel, which will have a negative impact in balance of payment terms. For the UK, this is particularly pertinent as outbound travel exceeds inbound travel but the importance of easy access to holidays is an important dimension of quality of life which is relevant to the attraction and retention of skilled labour.

6.24. The net balance of tourism clearly impacts on the level of consumption in the domestic economy. Inbound tourists clearly increase the level of this expenditure, while outbound tourists reduce it. This impacts on GDP. However, again, this is a relatively unsophisticated view of the world, which fails to take account of a number of issues around outbound tourism in particular:

- it implicitly assumes that outbound passengers would spend the money they spend abroad at home. This is not necessarily true. That money could in fact be spent on another form of import or simply be saved;

- it misses the fact that there is a significant industry in the domestic economy that supports outbound tourism, which would be damaged by reduced demand for outbound travel. This includes the travel trade and indeed a proportion of the economic footprint of the air transport industry;

- the revenues generated by outbound travel are essential in making air service viable, thereby enabling the other beneficial effects from air connectivity we describe;

- it assumes that there is no economic value to outbound tourism. This is patently untrue. It has an important social function in terms of enabling travel for personal business or for visiting friends and relatives and increases our understanding of other cultures. This in turn has knock-on effects in terms of making the home country an attractive place to live and work, with implications in the modern global labour market, and in terms of counteracting unfamiliarity effects that make trade more difficult;

- in effect, tourism is simply another form of trade. Increased trade will ultimately lead to improved exploitation of comparative advantage, resulting in a more efficient allocation of resources globally with, ultimately, benefits for all in the long run.

6.25. Ultimately, the balance of these different effects on long run economic prosperity and growth is difficult to untangle. Increasing connectivity will lead to more inbound tourism and more outbound tourism. What is important is whether the combined effect, along with the other impacts described, results in an increase in productivity and economic growth.

Conclusions

6.26. In the context of this research, the above discussion firmly establishes the intrinsic link between international trade and international connectivity. At a most basic level, it is actually not possible to trade in physical goods internationally without international connectivity. There is simply no means of getting goods to market. This is, however, clearly an extreme. More generally, the evidence establishes that successful trading economies are heavily reliant on the ability to move people and goods quickly, efficiently and cheaply.

6.27. In particular, from the perspective of supporting future export growth, it is important to note the importance of passenger movement even in relation to the trade in goods. Making deals, providing support or after sales care or simply building relationships in new markets face to face is an essential part of trading in goods.

6.28. The evidence base also starts to allude to the importance of efficient domestic connectivity to support international connectivity. A lot of the research around the value of Heathrow focuses on its value to London, reflecting where it is accessible from. Similarly, it is notable that DfT's recent study into England's port connectivity focuses heavily on the interface between ports and their hinterlands, as well as recognising their role as international gateways.

7. International Connectivity and the North's Trading Economy Now

Introduction

7.1. In this section, we examine the current baseline in terms of the economy of the North's international connectivity and its linkages to existing trading patterns. We examine this both from the perspective of the movement of passengers and of freight, although it should be recognised that there is considerably less data available in relation to freight. The focus of our analysis is on air passengers and both sea and air freight.

A Note Regarding the CAA Passenger Survey

This section and the remainder of this report draws heavily on data from the CAA Passenger Survey. This survey is a highly informative and detailed piece of research undertaken by the Civil Aviation Authority (CAA) each year. In the context of this work, it provides essential detail in terms of where passengers are ultimately travelling to (as opposed to their immediate destination, which may be a hub) and the purpose of their travel. However, there are a number of points and intricacies associated with the data to be aware of when reading the analysis below.

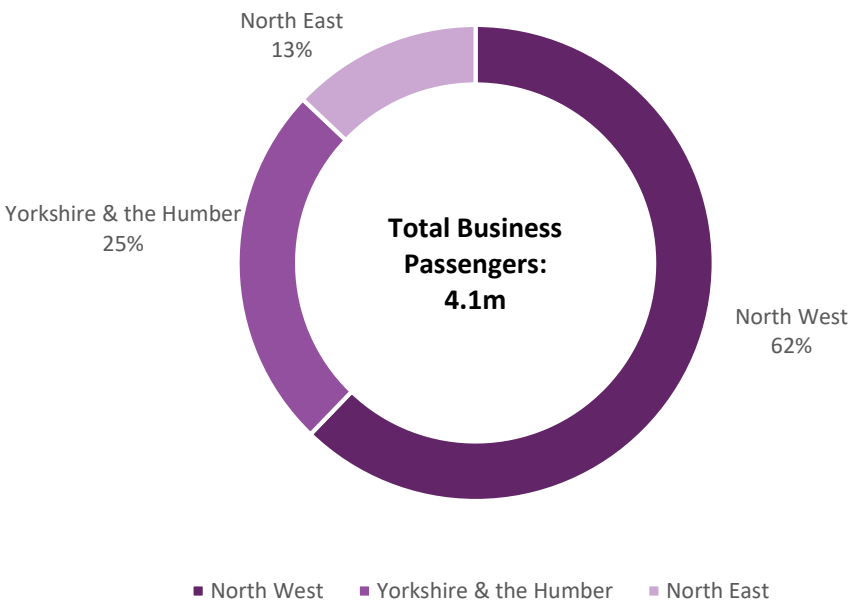
The first point to be aware of is that not every one of the North's airports is surveyed every year. Across the UK a number of airports are surveyed on a continuous basis (they are surveyed each year). These include the main London airports, Manchester, Birmingham, Liverpool and East Midlands airports. Other airports are surveyed on a rotational basis. In 2017, the reporting year for much of the analysis below, this included both Leeds Bradford and Newcastle. The other Northern airports were not surveyed. In undertaking our analysis, we have therefore adjusted previous years' survey results for Doncaster Sheffield, Humberside and Durham Tees Valley airports to 2017 demand levels using CAA Statistics. Hence, it should be recognised that results for 2017 are in some cases best estimates and not true survey results. This is also why it is not possible to examine a time-series for many analyses.

The second issue to be aware of is that the data is ultimately survey data. The sample sizes are significant, for instance in 2017 around 27,500 interviews were undertaken at Manchester, 14,700 at Newcastle, 5,400 at Liverpool and 3,800 at Leeds Bradford, and should provide statistically robust answers for most analyses. Survey data is weighted by the CAA to reflect the overall population. However, fine grain analysis should be viewed with some care as the number of records involved can be relatively low.

The Size of Markets in the North

7.2. Figure 7.1 below, shows the breakdown of business passengers making international air trips from each of the Northern Regions. Nearly two-thirds of business passengers from the North originate from the North West of England, followed by Yorkshire and the Humber at around 25%. This share of business travel reflects the relative shares of exports across the three regions. In total, the North generated around 4.1 million business passengers in 2017. A brief profile of each of the region's airports is set out in Appendix 4.

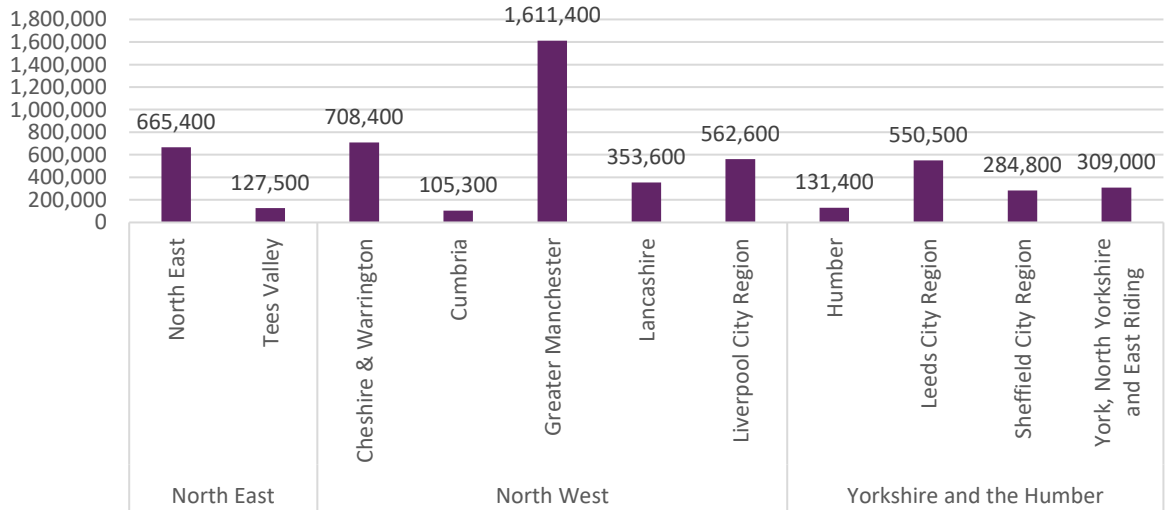
Figure 7.1: Number of International Air Passengers Travelling for Business in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

7.3. Figure 7.2 shows a further breakdown of international business passengers with a surface origin in the North, examining specifically demand by individual LEP regions. In the North West, most of the business passengers originate from Greater Manchester, followed by Cheshire and Warrington and Liverpool City Region, both within easy striking distance of Manchester and Liverpool airports. In the North East most business passengers originate from the North East LEP and only a small fraction from Tees Valley. The distribution is more balanced in the Yorkshire & the Humber with demand spread across all the LEPs. It is also interesting to note how the pattern of business travel volumes by reflects the locations of the North's largest airports. Greater Manchester, includes Manchester Airport, the largest gateway in the North, North East LEP contains Newcastle Airport, Liverpool City Region includes Liverpool Airport and Leeds City Region contains Leeds Bradford Airport. These LEPs clearly have higher levels of business travel than others.

Figure 7.2: Number of International Air Passengers Travelling for Business by LEP in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

7.4. Figure 7.3 shows the volume of exports originating from each of the Northern Regions in 2017. In total the North generated around 101 million tonnes of exports. Yorkshire and the Humber is the region with the highest volume of exports with around 60 million tonnes. The North West is the next largest region with around 29% of the total. This pattern is interesting in that it is contrary to the distribution of export value described above, where the North West is the largest trading economy.

Figure 7.3: Export Tonnage Originating in the North by Region in 2017

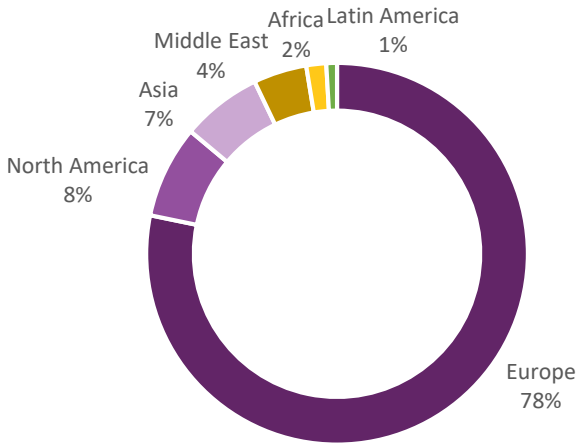
Source: Regional Trade Statistics.

Geographic Distribution of Business Travel and Export Volumes

7.5. The great majority of international air travel by business passengers is to Europe, representing around 80% of demand. This is in line with the North's existing trading patterns. The largest market outside Europe is North America, reflecting the UK's strong trading relationship with the USA particularly. Asian and Middle Eastern markets are believed to have grown rapidly[15] in recent years fuelled by economic growth in those regions and improved connectivity.

[15] It is difficult to be definitive about the size of business travel markets over time given that not all the North's airports are surveyed each year.

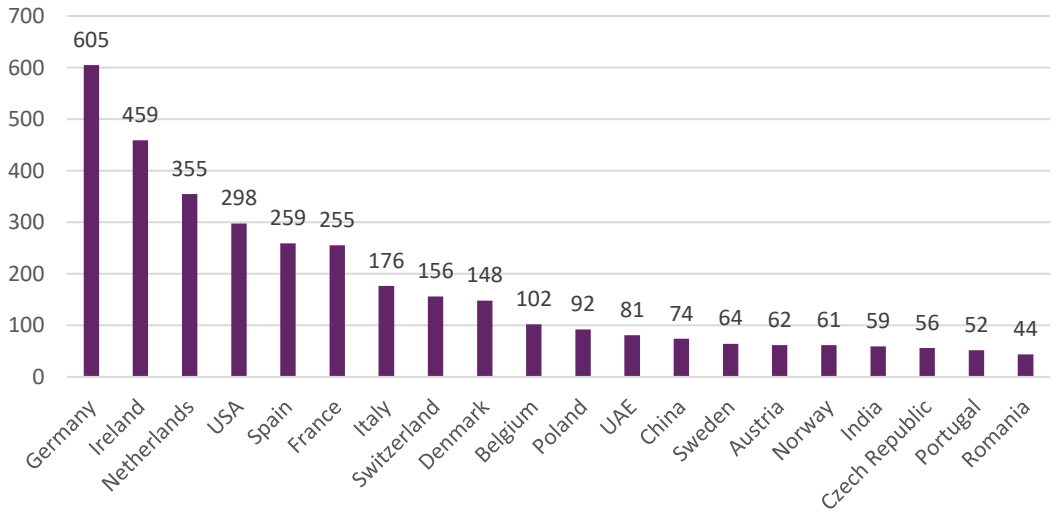
Figure 7.4: Business Travel by World Region from the North in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

7.6. Figure 7.5 shows the breakdown of the top 20 destination countries where international trips are made by business passengers from the north. Nine out of the Top ten destination countries are all in Europe, which explains the depth of the North's connectivity to Europe. It is also worth noting that the recent developments in transatlantic routes have also contributed to USA being a Top 5 destination for business passengers. However, the pattern does also demonstrate the effect of distance on levels of business travel. The USA is the North's largest individual country export market but it is only fifth largest business travel market. This perhaps reflects that business travellers make longer trips but it also highlights the potential for greater trade if connectivity becomes easier.

Figure 7.5: Business Travel by Individual Countries from the North in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

7.7. Table 7.1 shows a further breakdown of the Top 20 destination countries for business passengers by each region in the North. The results are similar to the North as a whole, with a high numbers of business passengers travelling to European nations, but it does demonstrate the importance of the USA as a single destination and the rise of countries such as China, India and the UAE.

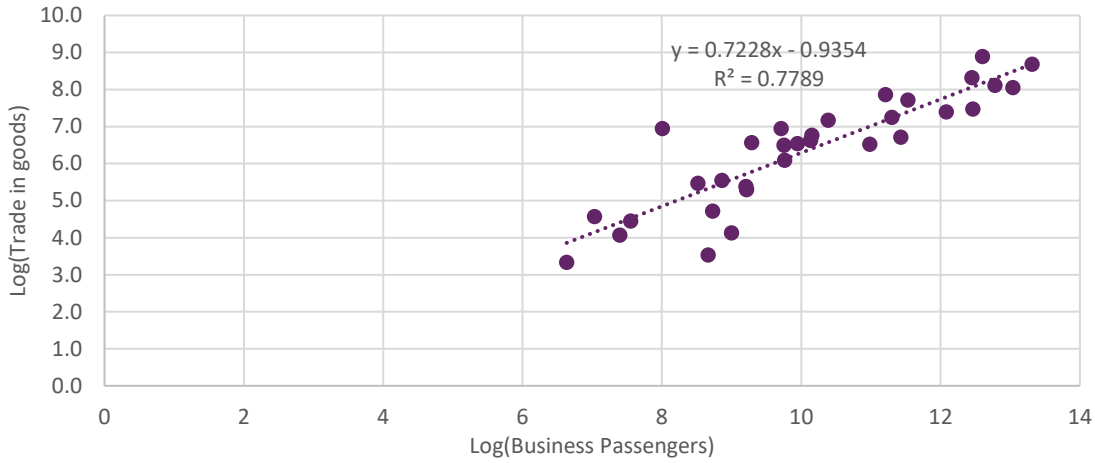
Table 7.1: Top 20 Business Travel Destinations for Each Region in 2017

North East		North West		Yorkshire and the Humber	
Country	**Business Pax**	**Country**	**Business Pax**	**Country**	**Business Pax**
Germany	64,290	Germany	396,183	Germany	144,567
Netherlands	57,935	Republic of Ireland	320,611	Netherlands	98,779
Republic of Ireland	57,273	Netherlands	198,171	Republic of Ireland	81,066
France	45,596	USA	184,797	USA	77,793
USA	35,035	Spain	170,922	France	58,482
Spain	33,609	France	151,367	Spain	54,339
Denmark	17,625	Italy	106,897	Italy	52,116
Italy	17,431	Switzerland	104,002	Switzerland	42,451
Norway	16,413	Denmark	102,729	Poland	35,879
Belgium	15,897	Belgium	68,623	Denmark	27,606
Poland	12,606	United Arab Emirates	56,463	India	25,446
Switzerland	9,725	China	43,877	China	22,386
United Arab Emirates	9,035	Poland	43,393	Sweden	21,886
Romania	8,965	Austria	34,991	Austria	21,562
Sweden	8,190	Portugal & Madeira	34,532	Czech Republic	19,454
China	7,471	Sweden	34,210	Belgium	17,258
Azerbaijan	6,189	Czech Republic	31,282	Norway	15,921
Portugal & Madeira	5,428	India	30,030	United Arab Emirates	15,344
Czech Republic	5,126	Norway	29,065	Romania	15,233
Austria	5,038	Finland	24,565	Turkey	12,946

Source: York Aviation analysis of CAA Passenger Surveys.

7.8. Figure 7.6 shows the relationship between the number of business passengers travelling to individual countries from the North and the value of the North's exports with those countries. This suggests that there is a strong positive relationship between the level of exports to a country and the extent of business air travel. This is important in that it suggests that future trade forecasts are potentially important in defining future connectivity requirements. If we trade more with a country then it is likely that business people would need to travel to / from that country more.

Figure 7.6: Relationship between Trade Value by Country and Business Passengers by Country



Source: York Aviation analysis of CAA Passenger Surveys and HMRC Regional Trade Statistics.

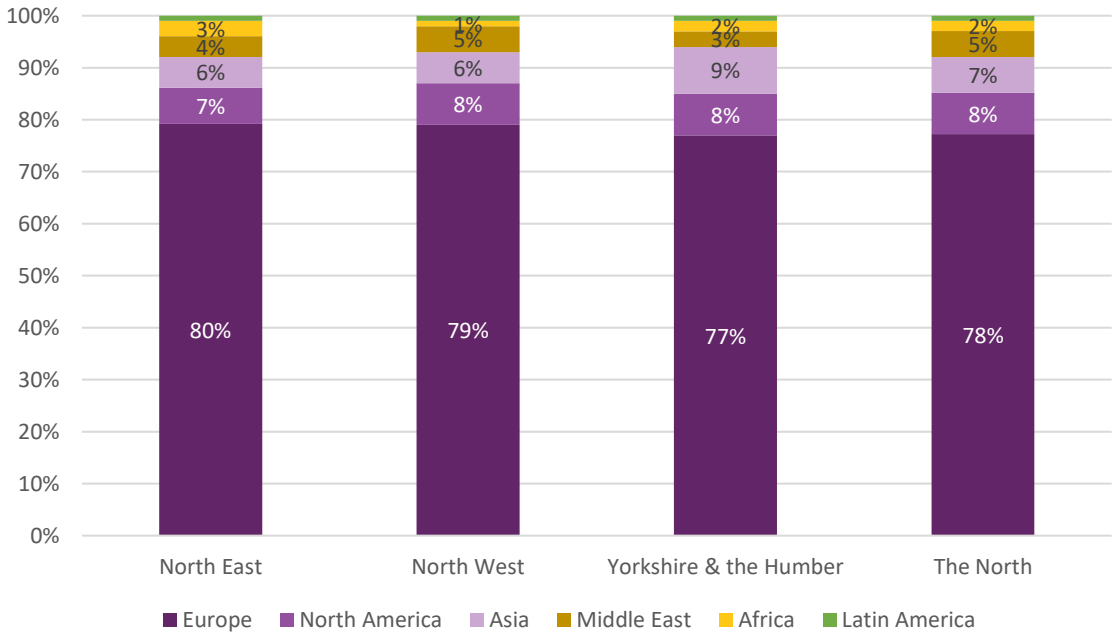
7.9. It is helpful to understand the pattern of business travel within each region in the North to identify whether the individual regions have differing connectivity patterns or needs. Our analysis suggests that while the volumes to different regions can be quite different, the patterns of demand are in the main similar (see Table 7.2).

Table 7.2: Business Travel by World Region for Each Individual Northern Region in 2017

Northern Region		Europe	North America	Asia	Middle East	Africa	Latin America
North East	Total	424,199	38,693	31,520	20,025	14,741	4,181
	%	80%	7%	6%	4%	3%	1%
	Quotient	1.0	0.9	0.9	0.8	1.6	0.9
North West	Total	2,013,405	200,554	158,961	130,725	37,287	23,485
	%	79%	8%	6%	5%	1%	1%
	Quotient	1.0	1.0	0.9	1.1	0.9	1.0
Yorkshire and the Humber	Total	787,514	84,244	90,250	35,509	17,540	9,553
	%	77%	8%	9%	3%	2%	1%
	Quotient	1.0	1.0	1.3	0.8	1.0	1.0
The North	Total	3,225,117	323,491	280,731	186,259	69,568	37,219
	%	78%	8%	7%	5%	2%	1%

Source: York Aviation analysis of CAA Passenger Surveys.

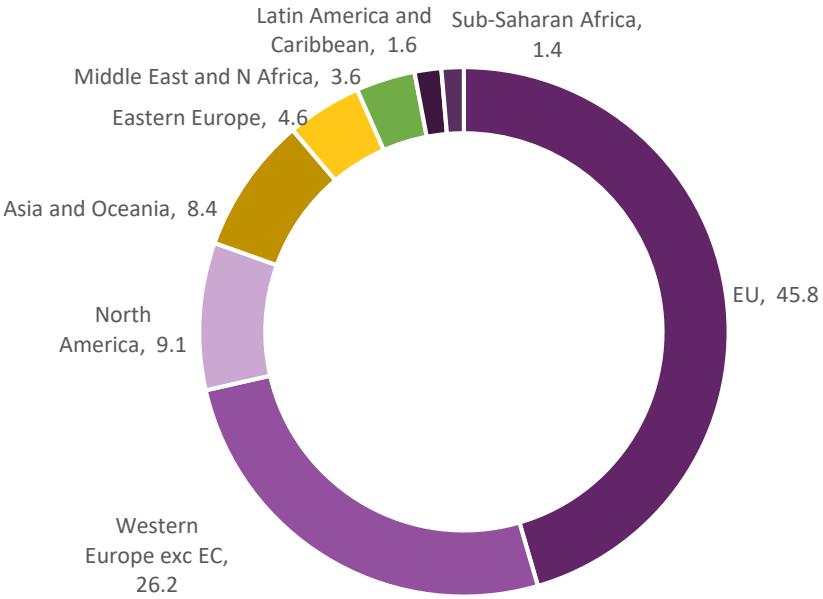
Figure 7.7: World Region Share of Business Travel by Northern Region in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

7.10. Figure 7.8 sets out the geographic pattern of export freight volumes from the North. Again, Europe is by some margin the largest market, although it is worth noting that around 23 million tonnes of exports were shipped to Norway alone. This Norwegian link is not reflected particularly in the value data seen above and the nature of this link is not clear. The next largest markets are again North America and Asia. This again emphasises the strong links between export markets and international connectivity needs.

Figure 7.8: Distribution of Export Volumes from the North by World Region in 2017 (million tonnes)



Source: HMRC Regional Trade Statistics.

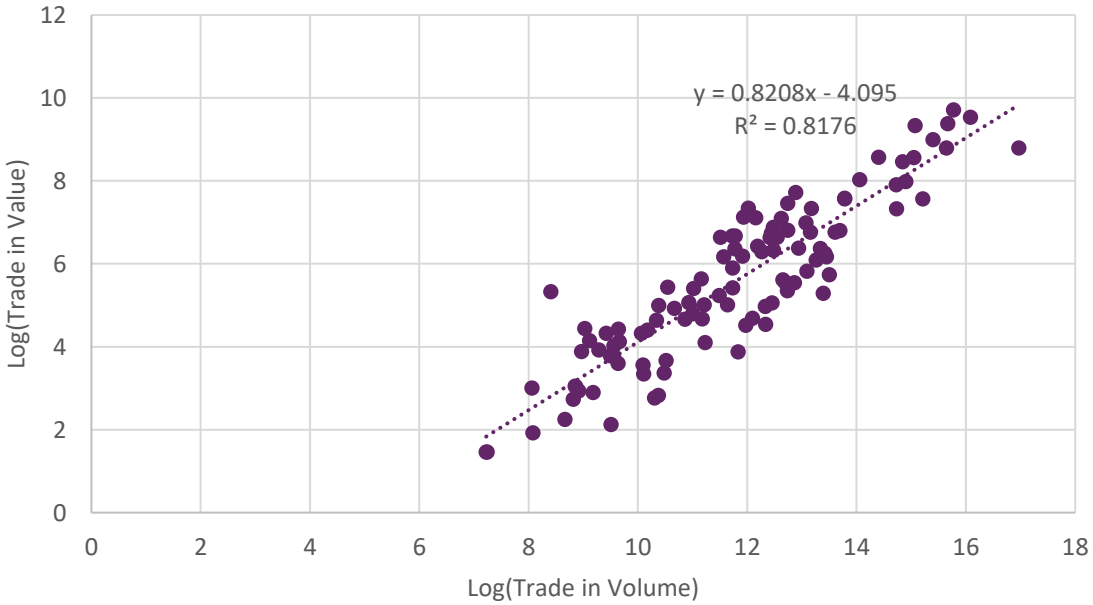
7.11. Figure 7.9 provides a country level of assessment of freight flows from the North. This shows the significance of the Norwegian market. Other major EU economies also feature heavily, but again the influence of more distant markets such as the USA and China is notable. In general, the pattern of value in goods exports identified in the early stages of this report is reflected in the volume flows identified.

Figure 7.9: Top 20 Export Markets from the North by Volume of Freight in 2017 (million tonnes)

Source: HMRC Regional Trade Statistics.

7.12. Figure 7.10 further examines the link between export volumes and their value by country. This, unsurprisingly, shows a strong link between the two. The relationship is again helpful in terms of our consideration of the implications of the future export forecasts set out in terms of the impact on international connectivity needs. It shows that as the value of trade grows in the future it is reasonable to assume that the freight volume requirement will also grow.

Figure 7.10: Relationship between Trade in Volume and Trade in Value by Country from the North



Source: HMRC Regional Trade Statistics.

7.13. Figure 7.11 outlines the breakdown of exports by each region and its relativity in comparison to the North as a whole. The North West has the highest proportion of exports to nations outside Europe with nearly 30% of exports destined to the other continents. This, to an extent, can also be correlated to the long haul offering at Manchester Airport to various intercontinental destinations. Overall, there is also considerably more variability in the structure of freight trading patterns than we saw in relation to business travel. Of particular note are the North East's links with Eastern Europe and to a lesser degree Asia, the North West's links with the Middle East and Asia, and Yorkshire & the Humber's links with non-EU Western Europe (although this is heavily influenced by trade to Norway).

Figure 7.11: Export Volumes from the North by Regions by Destination World Region (million tonnes)

	North East			North West			Yorkshire and the Humber		
	Tonnage	%	Quotient	Tonnage	%	Quotient	Tonnage	%	Quotient
EU	7.0	64%	1.4	17.8	60%	1.3	21.0	35%	0.8
Western Europe exc EC	0.7	6%	0.2	2.3	8%	0.3	23.2	38%	1.5
Eastern Europe	0.9	8%	1.8	0.9	3%	0.7	2.8	5%	1.0
Middle East and N Africa	0.2	2%	0.6	2.0	7%	1.9	1.4	2%	0.6
Sub-Saharan Africa	0.1	1%	0.7	0.3	1%	0.7	1.0	2%	1.2
Asia and Oceania	1.2	11%	1.3	3.7	13%	1.5	3.4	6%	0.7
North America	0.6	6%	0.7	1.8	6%	0.7	6.7	11%	1.2
Latin America and Caribbean	0.1	1%	0.8	0.7	2%	1.4	0.8	1%	0.8

Source: HMRC Regional Trade Statistics.

7.14. Below in Table 7.3, we examine the individual region's export volumes to individual countries. Although EU nations top the list of trading destinations in the North East and North West, it is worth noting that in Yorkshire & the Humber the list starts with two non-EU countries, Norway and the USA. Yorkshire & the Humber also has the largest number of trading partners with freight volumes in excess of 1 million tonnes per annum. Yorkshire & the Humber's exports to Norway amount to nearly a quarter of the North's total exports by volume. Again, it is interesting to consider these patterns in relation to distribution of international connectivity assets. In terms of volumes of trade the Humber ports are by some margin the largest freight gateway in the North and may ultimately be a reflection of or an influence on the trading patterns observed.

Table 7.3: Export Volume to the Top 20 Trading Partners by Northern Region

North East		North West		Yorkshire and the Humber	
Destination	Tonnage Exports	Destination	Tonnage Exports	Destination	Tonnage Exports
Netherlands	1,366,926	Netherlands	3,783,265	Norway	22,237,918
Germany	1,118,556	Germany	3,147,038	United States	4,926,281
France	1,019,885	Belgium	2,174,655	Netherlands	4,489,440
Belgium	801,193	China	1,903,940	Belgium	3,253,434
Spain	738,416	Irish Republic	1,721,250	Germany	2,826,556
Russia	619,485	France	1,284,890	Russia	2,567,996
Turkey	451,732	Turkey	1,223,762	France	2,565,544
China	450,088	Spain	1,156,829	Canada	1,616,352
Irish Republic	431,126	United States	1,065,413	Sweden	1,599,906
United States	369,805	Sweden	1,000,670	Irish Republic	1,274,754
Sweden	352,348	Norway	963,036	China	1,158,605
Italy	312,508	Russia	855,017	Spain	892,510
Ukraine	289,097	Italy	746,943	Turkey	806,823
Canada	235,280	Canada	637,872	Italy	737,383
South Korea	193,672	Qatar	625,051	Latvia	523,586
Poland	182,591	Poland	569,667	Poland	520,912
Norway	181,540	Egypt	464,080	Nigeria	515,549
Finland	166,121	Denmark	426,149	India	506,373
Portugal	154,216	Portugal	405,357	Denmark	435,060
Japan	145,000	India	346,007	Algeria	432,610

Source: HMRC Regional Trade Statistics.

The Role of Different Transport Gateways

Passenger Travel

7.15. Table 7.4Table 7.4 and Figure 7.12 examine how business passengers from the North use the UK's airports to access their final destinations. As can be seen, Europe and Middle East are well served through the North's Airports. Manchester is by far the largest provider of international connectivity for business travellers and its long haul network and excellent hub connections means that it serves all world regions. Newcastle plays a similar role in the North East but on a smaller scale. Liverpool and Leeds Bradford both act as connectors for European business travel primarily, but the latter offers global connectivity via its hub services. The North's smaller airports perform niche roles, with Humberside and Durham Tees Valley offering global connectivity via their Amsterdam services. Doncaster Sheffield is a purely European connector.

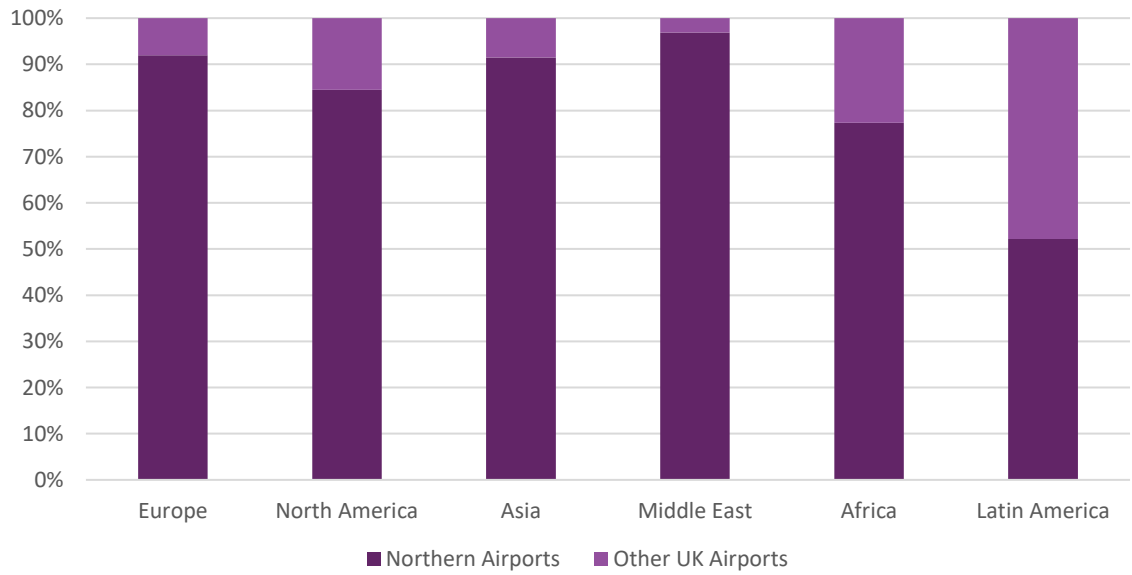
7.16. However, for travel to Asia, North America, Africa and Latin America, there remains significant leakage to airports outside the north. Ryanair and easyJet's extensive European networks at Stansted and Gatwick airports, combined with their low fare offering, attract passengers from across the UK to make European trips. Similarly, Heathrow's unsurpassed long haul offer in terms of both network and choice of airlines, has a similar effect in intercontinental markets.

Table 7.4: Business Passenger Demand from the North by Airport and World Region in 2017

Airport/ Region	Europe	North America	Asia	Middle East	Africa	Latin America
Manchester	2,136,000	223,000	206,000	155,000	35,000	15,000
Newcastle	341,000	30,000	30,000	16,000	13,000	3,000
Liverpool	235,000	0	6,000	0	0	0
Leeds Bradford	137,000	17,000	6,000	2,000	3,000	0
Humberside	43,000	0	5,000	5,000	0	0
Durham Tees Valley	40,000	3,000	3,000	3,000	2,000	0
Doncaster Sheffield	32,000	0	0	0	0	0
The North's Airports	**2,965,000**	**273,000**	**257,000**	**180,000**	**54,000**	**19,000**
London Heathrow	72,000	38,000	20,000	5,000	16,000	15,000
London Stansted	70,000	0	0	0	0	0
London Gatwick	40,000	12,000	0	0	0	3,000
London Luton	35,000	0	0	0	0	0
Birmingham	26,000	0	4,000	0	0	0
East Midlands	15,000	0	0	0	0	0
Other	3,000	0	0	0	0	0
Grand Total	**3,226,000**	**323,000**	**281,000**	**185,000**	**70,000**	**37,000**

Source: CAA Passenger Surveys.

Figure 7.12: Market Share of Northern Airports by Destination World Region



Source: York Aviation analysis of CAA Passenger Surveys.

7.17. The data can be further sub-divided into the North's three component regions. This presents an interesting picture of the roles of the North's four largest airports. Manchester clearly acts as a gateway across the North, drawing on the strength of its network and particularly its long haul connections. It is, however, noticeably less of a factor in the North East. Newcastle, Liverpool and Leeds Bradford draw traffic primarily from their 'home' regions (see Table 7.5).

Table 7.5: The North's Business Passengers by each Northern Region in 2017

North East Region	Europe	North America	Asia	Middle East	Africa	Latin America
Newcastle	323,000	29,000	28,000	15,000	13,000	3,000
Durham Tees Valley	35,000	3,000	3,000	2,000	1,000	0
Manchester	30,000	5,000	1,000	3,000	0	1,000
London Heathrow	15,000	0	0	0	0	0
London Stansted	8,000	0	0	0	0	0
Liverpool	4,000	0	0	0	0	0
London Gatwick	3,000	2,000	0	0	0	0
London Luton	3,000	0	0	0	0	0
East Midlands	1,000	0	0	0	0	0
Doncaster Sheffield	1,000	0	0	0	0	0
Birmingham	1,000	0	0	0	0	0
Leeds Bradford	0	0	0	0	0	0
North West	**Europe**	**North America**	**Asia**	**Middle East**	**Africa**	**Latin America**
Manchester	1,700,000	180,000	142,000	129,000	26,000	13,000
Liverpool	221,000	0	6,000	0	0	0
London Heathrow	26,000	17,000	7,000	1,000	11,000	10,000
London Gatwick	15,000	3,000	0	0	0	0
London Luton	15,000	0	0	0	0	0
Newcastle	12,000	1,000	1,000	0	0	0
London Stansted	10,000	0	0	0	0	0
Birmingham	5,000	0	2,000	0	0	0
Doncaster Sheffield	5,000	0	0	0	0	0
Leeds Bradford	2,000	0	0	0	0	0
Other	1,000	0	0	0	0	0
Yorkshire and the Humber	**Europe**	**North America**	**Asia**	**Middle East**	**Africa**	**Latin America**
Manchester	406,000	38,000	63,000	23,000	9,000	1,000
Leeds Bradford	135,000	17,000	6,000	2,000	3,000	0
London Stansted	53,000	0	0	0	0	0
Humberside	43,000	0	5,000	5,000	0	0
London Heathrow	31,000	21,000	12,000	4,000	4,000	5,000
Doncaster Sheffield	26,000	0	0	0	0	0
London Gatwick	21,000	8,000	0	0	0	3,000
Birmingham	20,000	0	2,000	0	0	0
London Luton	17,000	0	0	0	0	0
East Midlands	13,000	0	0	0	0	0
Liverpool	10,000	0	0	0	0	0
Newcastle	6,000	0	2,000	1,000	0	0
Durham Tees Valley	4,000	0	1,000	0	0	0
London City	3,000	0	0	0	0	0

Note: 0 represent no identified passenger flows within the survey data.
Source: York Aviation analysis of CAA Passenger Surveys.

7.18. The North East has the lowest amount of leakage to airports outside the North, most likely reflecting its relative isolation. Leakage from the North West is larger in volume terms, but it is equally a larger business travel market.

7.19. The North West has leakage to a smaller extent but only to destinations in Africa and Latin America and these are primarily driven by direct services from Heathrow. However, the North West is well served to most regions indirectly, due to the variety in hub connectivity offered at Manchester Airport. The only non-Northern airport that is a significant factor is Heathrow and this is primarily in long haul markets.

7.20. Yorkshire and the Humber has the highest leakage of business passengers to airports outside the North perhaps reflecting the relative strength of its 'local' airport compared to Manchester in the North West and its greater proximity to London compared to the North East.

7.21. The importance of direct destinations in attracting business traffic and explaining leakage away from the North's airports can be demonstrated by analysing the proportion of passengers travelling directly to their end destination by world region. Business passengers using airports outside the North will generally be travelling directly, not via a hub.

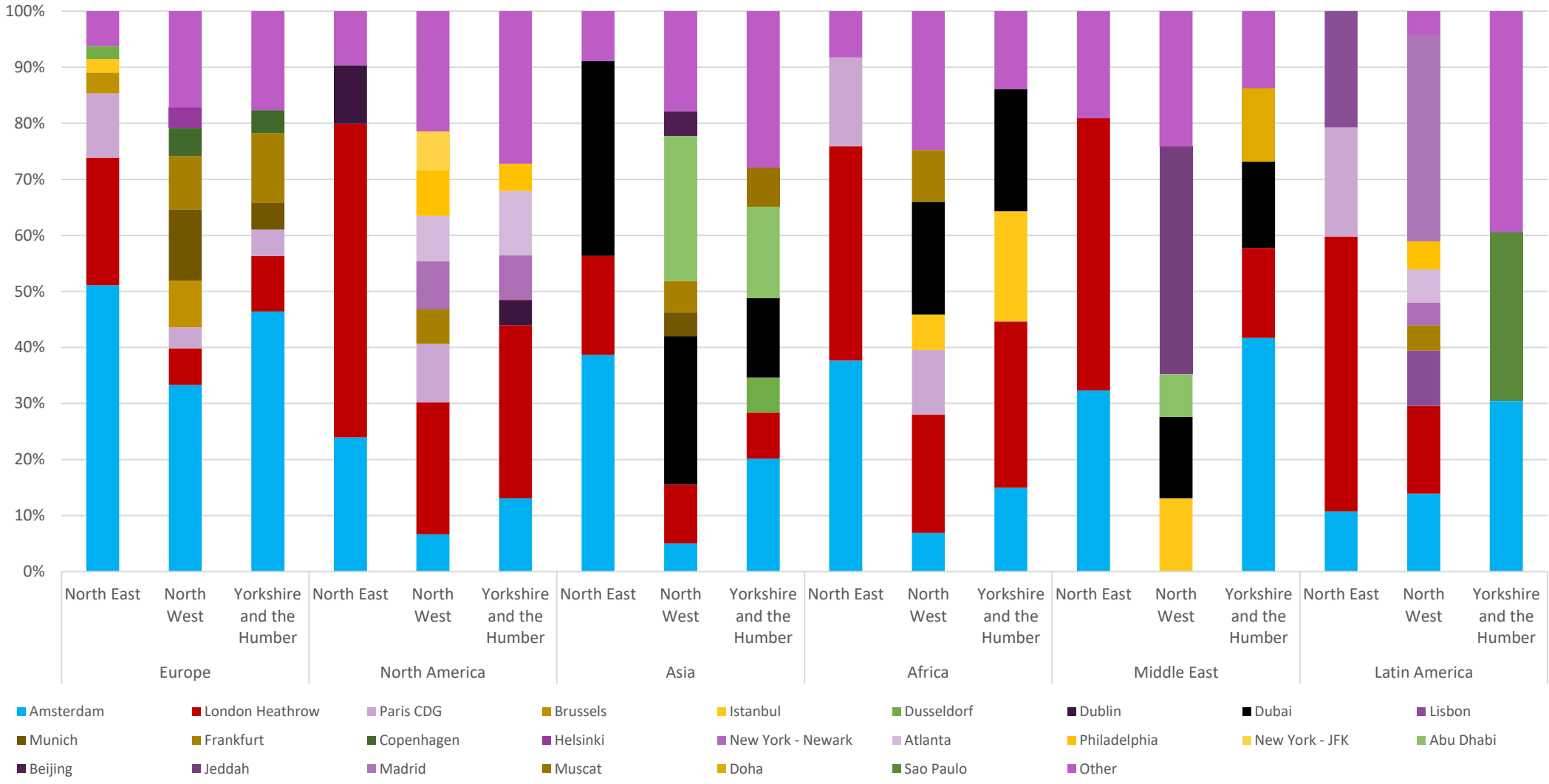
Table 7.6: Proportion of the North's Business Passengers Travelling Point to Point at Northern Airports vs Other Airports in 2017

World Regions	*Northern Airports*	*Other UK Airports*
Africa	0%	60%
Asia	13%	35%
Europe	81%	93%
Latin America	5%	49%
Middle East	54%	94%
North America	25%	78%

Source: York Aviation analysis of CAA Passenger Surveys.

7.22. Connections to hub airports are, however, vitally important to the North's international connectivity offer. They provide a breadth and frequency of connections that could not otherwise be achieved. Figure 7.13 shows how business passengers from the North use different hubs to access different world regions. The analysis emphasises the importance of Amsterdam for European connections, Heathrow for North America and Middle East hubs for connections to Asia and Africa. It also again highlights the importance of Manchester as the region's largest source of international connectivity. It is noticeable that the North West is generally less reliant on any one hub for its requirements.

Figure 7.13: Usage of Hub Airports by Each Region in the North by Destination World Region in 2017



Source: York Aviation analysis of CAA Passenger Surveys.

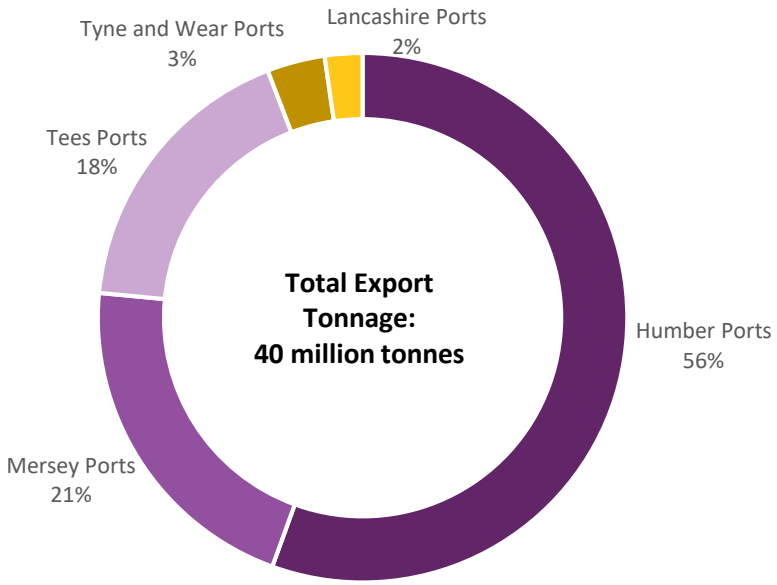
7.23. The relative merits of direct versus indirect connections in terms of international connectivity for business passengers is an important consideration in relation to the North's future international connectivity requirements. The analysis above shows a clear preference for direct services. Business passengers will travel to access a direct service. Hence, improving the number of direct connections in the future will clearly support business travel demand and ultimately help facilitate increased trade. However, the importance of hub connections is also clear. Realistically, there will always be destinations that cannot sustain direct services and trade links with these points may well be important in the future. In these circumstances, indirect connectivity is clearly still an important tool.

Freight Markets

7.24. At the outset it should be recognised that substantially less is known about how the North's export economy interacts with its key gateways in terms of freight traffic. Ultimately, there is no publicly available dataset or survey that provides the same depth of information as there is for air passengers. The essential problem is that, while the HMRC Regional Trade Statistics provide information on the volume of export goods produced in the North, there is no way of telling where these are then transported out of the UK from.

7.25. The most detailed estimates of the use of sea ports by the North's economy comes from the TfN Enhanced Freight and Logistics Analysis Report (2018). This used modelling work by MDS Transmodal to estimate how the North's economy used the North's ports. Figure 7.14 demonstrates that only around 40 million tonnes of the North's 100 million tonnes of exports were handled by the North's ports. However, significant volumes were handled at the Humber Ports, Mersey Ports and Tees Ports.

Figure 7.14: North's Export Volumes by the North's Sea Ports



Source: TfN Enhanced Freight and Logistics Analysis Report (2018).

7.26. The North's sea ports do handle significant export volumes from outside the North and these have been estimated via MDS Transmodal's work (see Table 7.7) but no information is available on which ports outside the North are handling the around 60 million tonnes of export freight that is leaking from the North.

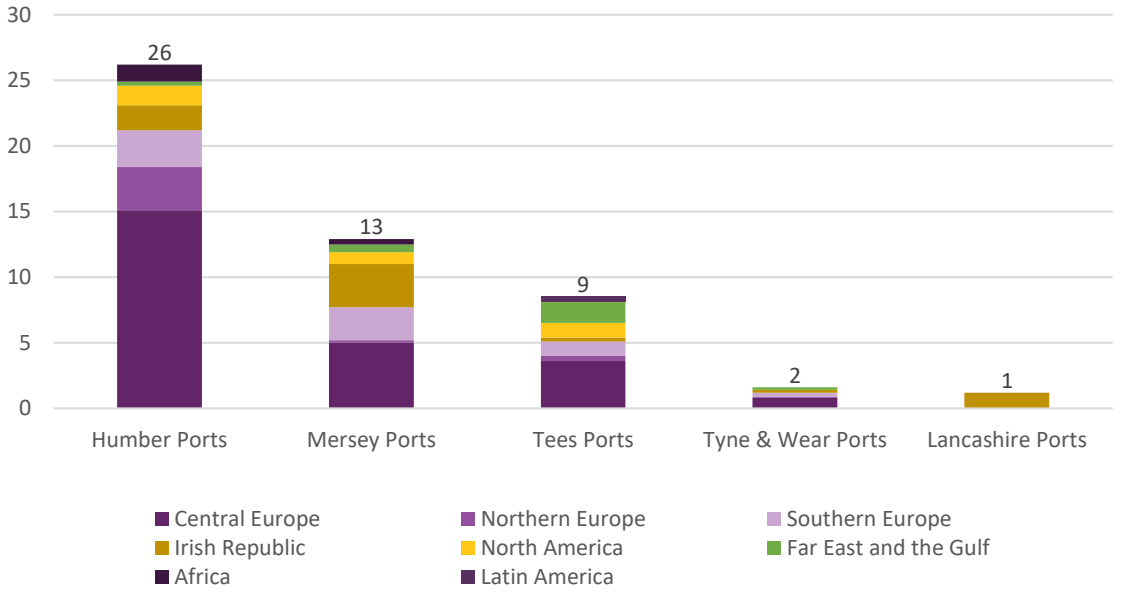
Table 7.7: Proportion of Freight volume handled by Northern Ports by Each UK Region

UK Region of Origin/Port	Tyne & Wear Ports	%	Tees Ports	%	Humber Ports	%	Mersey Ports	%	Lancash -ire Ports	%
North East	1.3	81%	3.9	46%	0.8	3%	0.3	2%	0.1	7%
North West	0.1	6%	1.3	15%	4.6	18%	5.4	39%	0.4	33%
Yorkshire & the Humber	0	0%	1.8	21%	16.6	63%	2.6	19%	0.4	36%
Scotland	0.2	13%	1.2	14%	0.3	1%	0.4	3%	0	1%
Wales	0	0%	0	0%	0.4	2%	0.3	2%	0	0%
Other England	0	0%	0.2	2%	3.6	14%	4.7	34%	0.3	23%
Total	**1.6**		**8.5**		**26.2**		**13.7**		**1.2**	

Source: TfN Enhanced Freight and Logistics Analysis Report.

7.27. Figure 7.15 shows the breakdown of exports through the North's sea ports by world regions. The figures here show a greater proportion of exports to Europe across all the ports.

Figure 7.15: Export Volumes by World Region by Port 2016



Source: TfN Enhanced Freight and Logistics Analysis Report (2018).

7.28. Information on air freight and the role the Northern airports play in shipping the North's exports is even scarcer. However, again there is some information from previous TfN research. Using findings from the TfN International Connectivity Evidence Report (2016), we have estimated the proportion of air freight tonnage originating from the North, exported and handled at Northern Airports. These estimates are shown in Table 7.8. It is worth noting that the final estimate of nearly 54,000 tonnage of exports is less than half (40%) of the air freight handled at Northern Airports. However, when we take in to account the fact air freight is made up of both exports and imports, this capture improves. CAA Statistics suggest that around 66,000 tonnes of air freight were being flown out of the North's airports. Hence, around 80% of that volume is likely to have generated in the North.

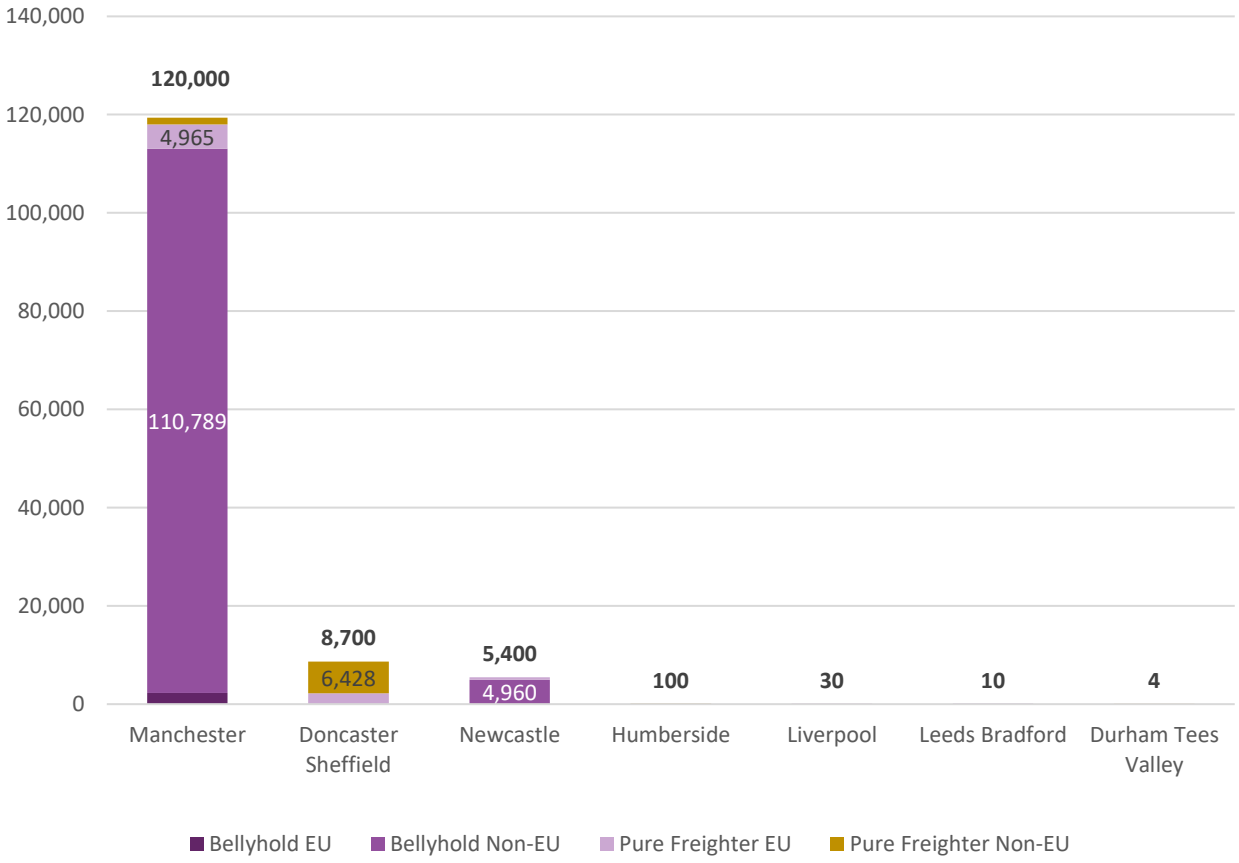
Table 7.8: Estimated Export Volumes Shipped as Air Freight from Northern Airports in 2017

	Tonnage
Total UK Air Freight (tonnes)	2,625,334
Originating from the North at 14% of the total	367,547
Of which exports at 49%	179,122
Of which handled in Northern Airports at 30%	53,737

Source: CAA Statistics and TfN Enhanced Freight and Logistics Analysis Report.

7.29. Manchester is by some margin the largest freight airport in the North, reflecting the bellyhold capacity available on its long haul network, but even its throughput is relatively small. Newcastle Airport also handles volumes of bellyhold freight, primarily using the Emirates connection to Dubai. Doncaster Sheffield Airport is also developing a significant freighter operation. Volumes at other airports are small. In all cases the dominant market is non-EU, reflecting the fact that air freight is primarily a long haul market, where its speed advantages can outweigh the additional costs associated with this mode of shipping.

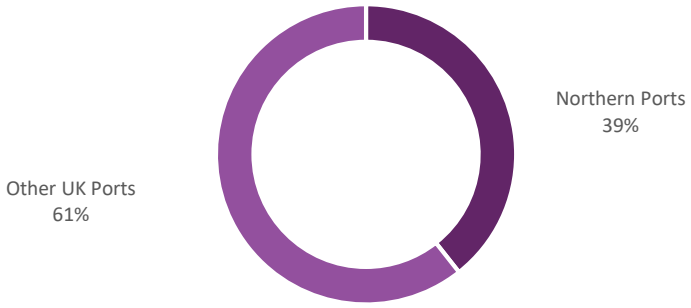
Figure 7.16: Freight Tonnage at Northern Airports by Destination and Aircraft Configuration in 2017



Source: CAA Statistics.

7.30. Overall, across sea and air freight, we estimate that currently only around 39% of the North's goods exports are shipped via a Northern port or airport.

Figure 7.17: Proportion of the North's Export Tonnage Handled by Northern Ports and Airports



Source: York Aviation analysis of HMRC Regional Trade Statistics, TfN research.

Conclusions

7.31. Currently, around 4.1 million air passengers travel to / from the North for business purposes. Around two thirds of these originate from the North West, 25% from Yorkshire and the Humber and the remainder from the North East. This pattern is broadly in line with the value of exports from each of the North's component regions. More detailed analysis shows that there is a clustering of business air travel demand around the region's largest airports.

7.32. In terms of where passengers are travelling to and from, the pattern in world region terms is similar to that for export value. The great majority are travelling to or from Europe (around 80%), with North America the next largest destination region. Regions such as Asia and the Middle East have grown rapidly in recent years.

7.33. At a country level the effect of distance on business passengers travel is evident. The largest destinations are near European countries. Despite the USA being the North's largest country export market, it is only the fifth largest travel market.

7.34. In terms of the use of airports, the great majority of business travellers from the North use airports in the North. Where there is leakage outside of the North, it is primarily for long haul destinations and in this market Heathrow remains a significant factor. However, this leakage is in the main seeking out direct connections that are unserved currently from the North. Manchester is the largest gateway for business travel by some margin and the primary intercontinental gateway. However, airports such as Newcastle, Liverpool and Leeds Bradford play significant roles within their home regions for business travel, predominantly to European destinations. The smaller airports such Doncaster Sheffield, Humberside and Durham Tees Valley play niche roles.

7.35. The North currently generates around 101 million tonnes of exports. Only around 39% of this is currently shipped through ports in the North. Conversely to the analysis of export value, the largest producer of export tonnage is Yorkshire & the Humber, followed by the North West and then the North East.

7.36. Data on the usage of the North's ports for the North's exports is limited. However, the Humber ports appear to be the largest gateway, perhaps reflecting the pattern of volume production. The Mersey ports and the Tyne ports also handle significant volumes of the North's exports.

7.37. Robust data on air freight is even harder to come by but what is available suggests that this is a relatively small part of the overall market in volume terms.

8. Implications for the North's Future Connectivity Requirements

Introduction

8.1. In this Section, we consider how the North's international connectivity will change in the future in terms of both the volumes of air passenger and freight movement and the geographic distribution of these movements. We examine how international connectivity will grow and change under the NPIER Business as Usual scenario and what would be the implications for international connectivity of achieving growth in line with the NPIER Transformational Growth Scenario. This analysis draws particularly on the trade forecasts described earlier in this report.

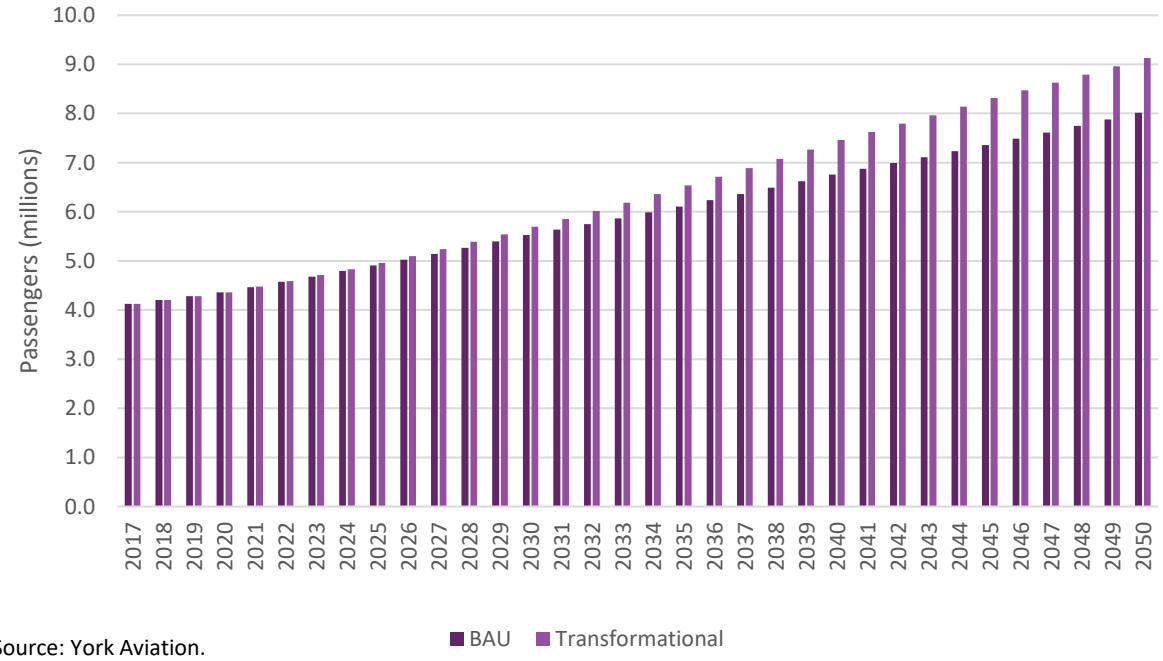
The Volume Implications of Transformational Growth

Air Passengers

8.2. As the North's economy grows in the future, it will generate more demand for air travel, including those who are travelling for business. The biggest single driver for air travel demand is growth in economic activity (typically measured via GDP or GVA), and as we have seen above, international exports will play an increasingly important part in driving the North's economic growth.

8.3. Achieving transformational growth will see the North's GVA 15% higher in 2050 than under business as usual. This will see the need for international business air travel increase significantly to facilitate this growth and the exports it entails. Figure 8.1 shows our forecast of the volume of business air travel required by the Northern economy in the Business as Usual and Transformational scenarios. These volume forecasts have been based on the income elasticities identified within the Department for Transport's Aviation Forecasts 2017[16], combined with forward forecasts for UK GDP growth based on those identified in the NPIER.

Figure 8.1: International Business Passengers from the North by Scenario

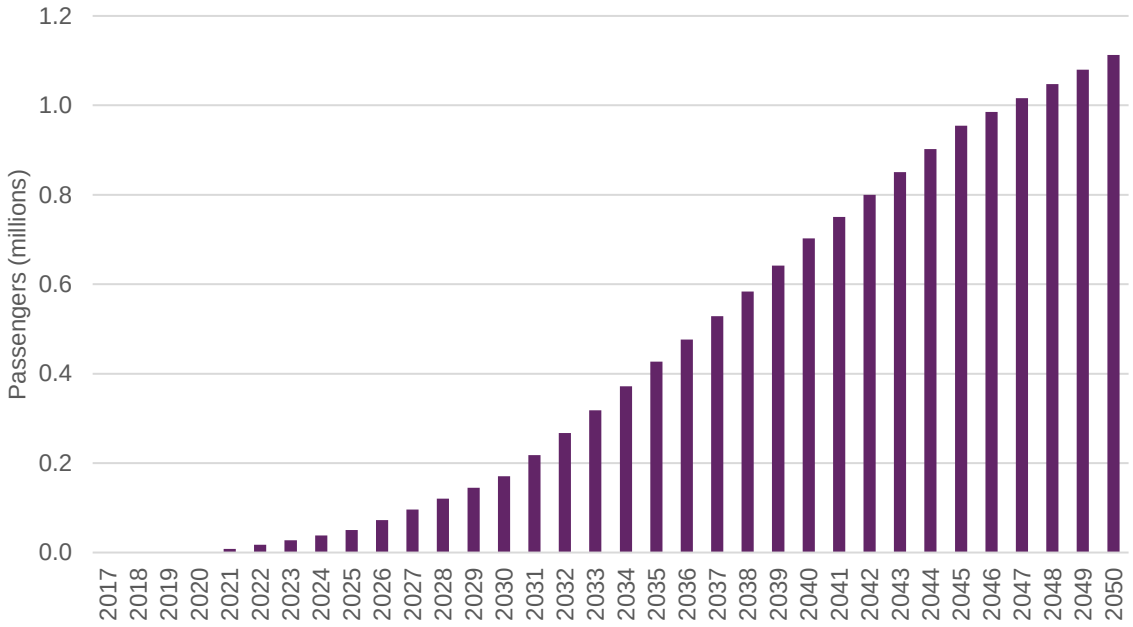


Source: York Aviation.

[16] UK Aviation Forecasts 2017 – Department for Transport (2017).

8.4. In the Business as Usual scenario, the North's requirement for international business travel nearly doubles from around 4.1 million passengers in 2017 to around 8.0 million in 2050. The additional economic growth in the Transformational Scenario accelerates the growth of this requirement, such that around 9.1 million business passengers are forecast in 2050. This creates a requirement for the North to support around 1.1 million additional business passengers by 2050 if transformational growth is achieved (see Figure 8.2). This is an increase of around 14% over the Business as Usual Scenario.

Figure 8.2: Additional International Business Passengers in the Transformational Scenario



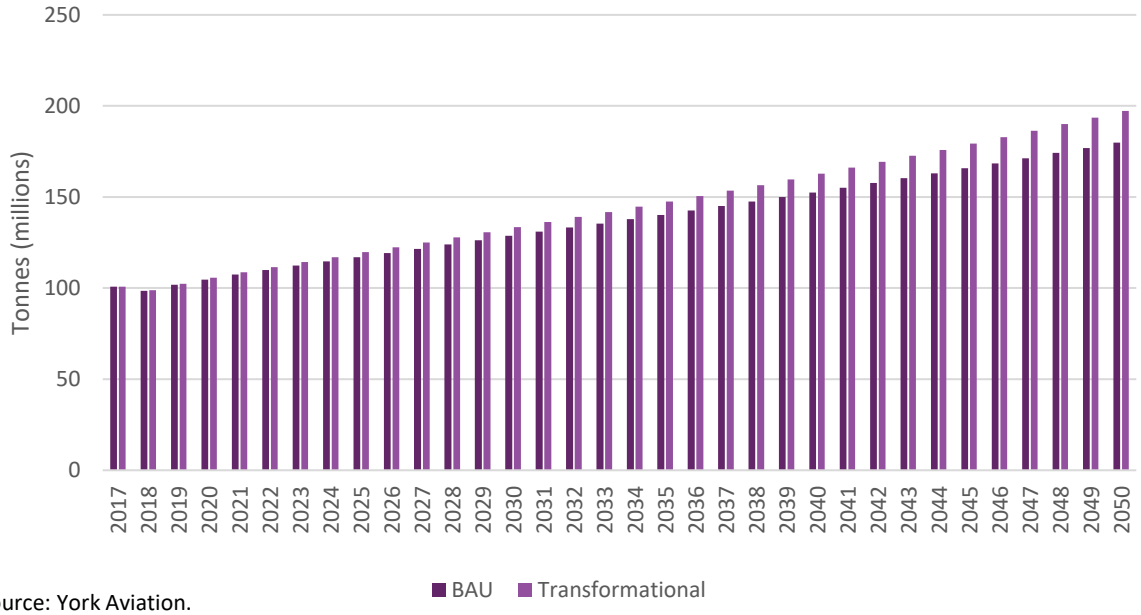
Source: York Aviation.

Freight Volumes

8.5. In addition to the additional passenger volumes that will be required under the Transformational Scenario, the growth of the Northern economy and the increasing importance of exports will increase the need to move goods through the UK's ports and airports.

8.6. Our forecasts of the volume (tonnes) of goods moved has been based on the goods exports forecasts described above and an assessment of the trends in value per tonne of the North's exports since 2006 based on HMRC RTS data. These forecasts are set out in Figure 8.3.

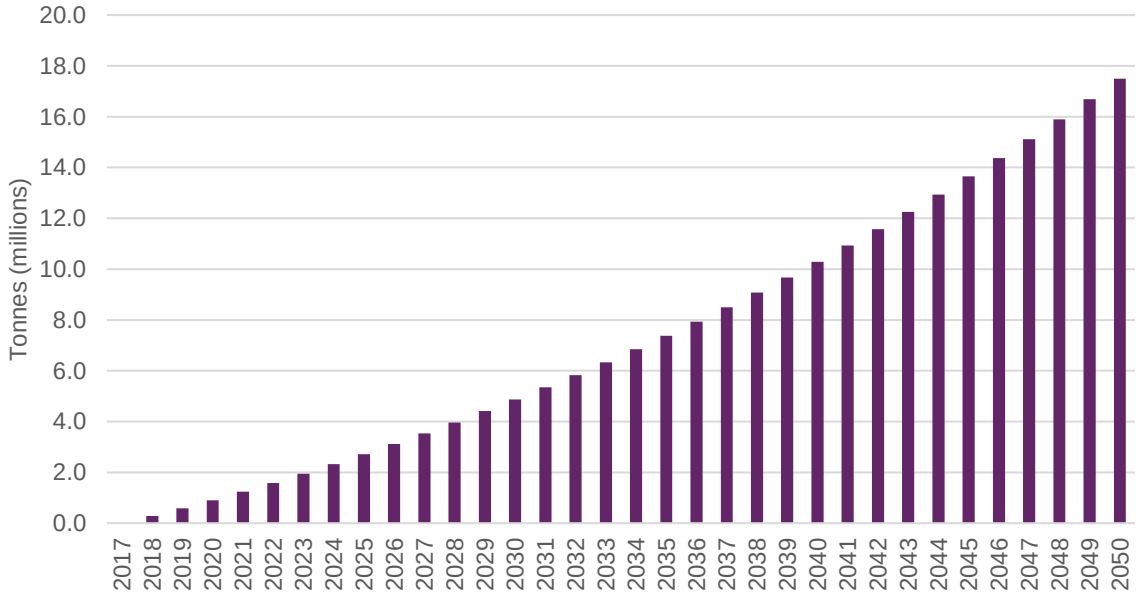
Figure 8.3: International Freight Volumes



Source: York Aviation.

8.7. The Business as Usual scenario sees the volume of exports generated by the North's economy grow from around 101 million tonnes in 2017 to 180 million tonnes by 2050. If the Transformational Scenario is achieved, our analysis suggests that the volume of goods exports in 2050 would increase to around 197 million tonnes, an increase of around 17.5 million tonnes (see Figure 8.4). Clearly, this represents a significant increase in the international freight connectivity needs of the North's economy.

Figure 8.4: Additional International Freight Volumes in the Transformational Scenario



Source: York Aviation.

8.8. As we have seen above, air freight is a relatively small part of the overall freight market and there seems to be little evidence that this might change. Air freight's share of total international goods movements from the UK has remained broadly similar over the last 10 years. We have therefore produced freight volume forecasts for sea and air based on our previous analysis of the North's share of total UK air freight (around 14%)[17], the latest CAA

[17] Study into International Connectivity Evidence Report – York Aviation and MDS Transmodal for Transport for the North (2016). Page 92.

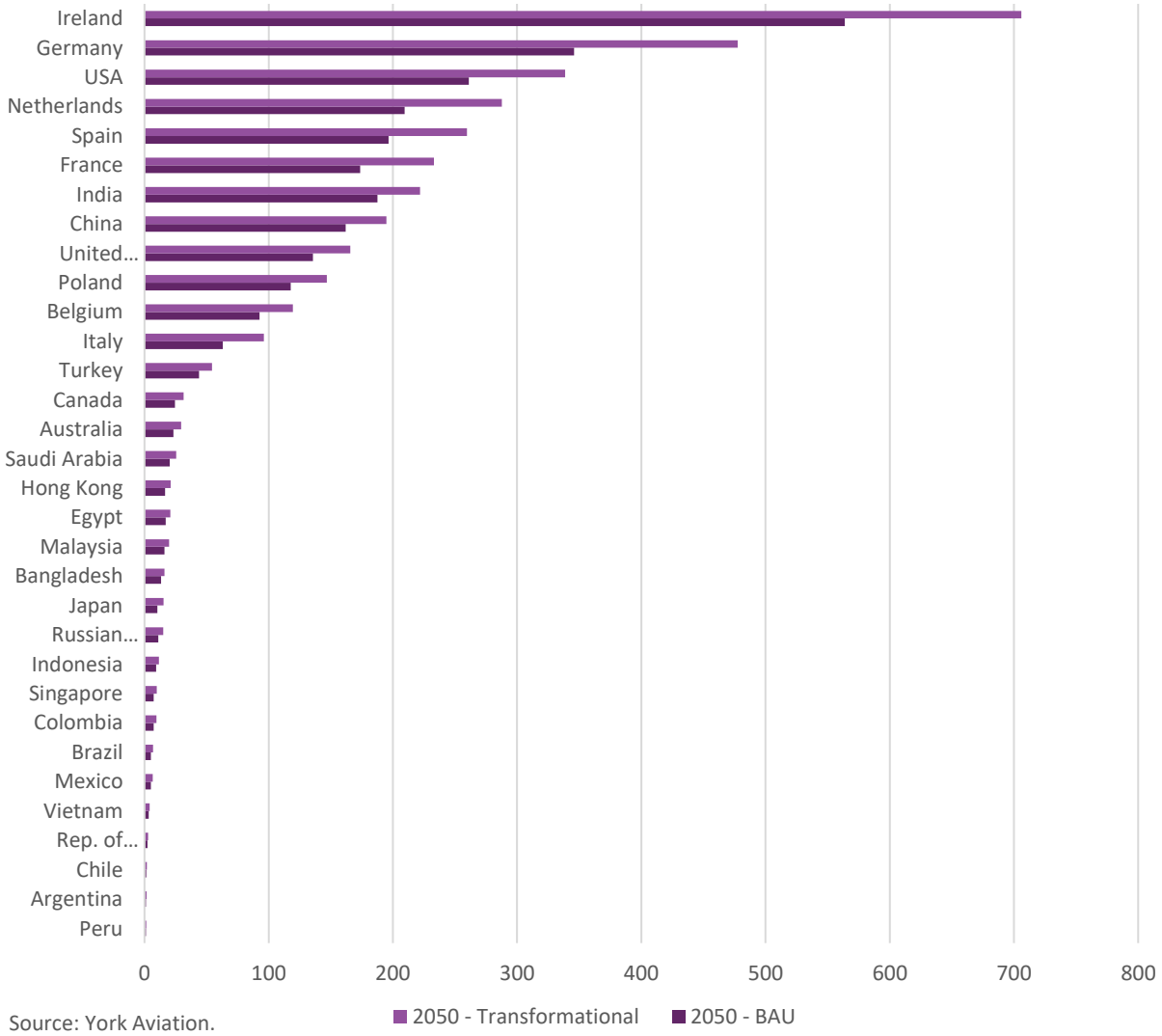
Statistics on freight picked up and set down at UK airports and relative market share of air freight for EU and non-EU freight transport. These forecasts see sea freight grow from around 100.6 million tonnes in 2017 to 179.4 million tonnes in 2050 in the Business as Usual scenario and 196.8 million tonnes in the Transformational Growth scenario, an increase of 17.4 million tonnes. Air freight exports grow from around 200,000 tonnes in 2017 to around 400,000 tonnes in both scenarios in 2050. Rounding masks around a 40,000 tonne increase in the Transformational Scenario versus the Business as Usual scenario in 2050.

Geographic Market Requirements

Air Passengers

8.9. Figure 8.5 presents our analysis of the geographic distribution of business passenger growth by 2050 in the Business as Usual and Transformational growth scenarios in terms of passenger volumes. This demonstrates that in pure volume terms, the largest increase in passenger numbers will likely be with the UK's traditional trading partners, for instance Ireland, Germany, the USA and the Netherlands. However, it should be recognised that these markets are not necessarily the fastest growing. They were large markets for business travel already. It is, however, interesting to note that there are a number of emerging market destinations towards the upper end of the scale, notably India, China, Turkey and the UAE.

Figure 8.5: Number of Additional Passengers by Trade Forecast Country – 2017 vs 2050 (000s)

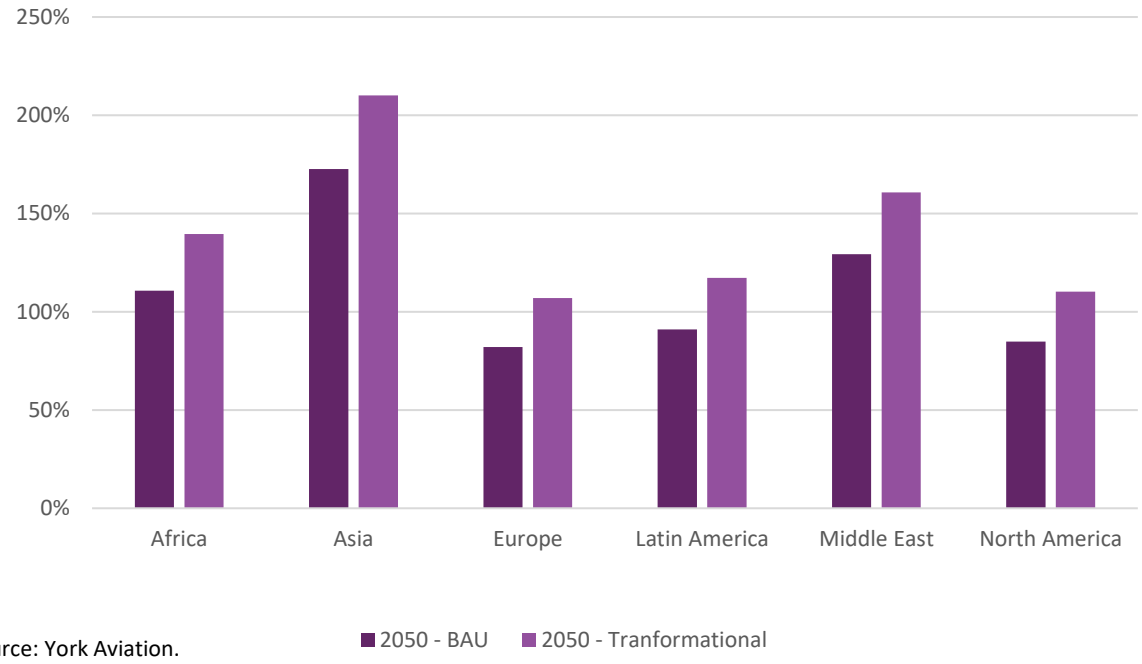


Source: York Aviation.

8.10. This distinction between lower growth in higher volume traditional markets and higher growth in emerging markets can be seen below. The UK's traditional trading markets in Europe and North America are in fact the slowest growing markets in our analysis, while Asia and the Middle East, with the fast growing emerging economies, are the fastest growing. The pattern suggests that the North's requirements for connectivity is going to change in terms of its structure, with a greater focus on long haul markets. However, continued development of capacity to existing traditional markets will also be required.

8.11. In line with the export forecasts, the Transformational Scenario is expected to simply result in faster growth in all markets, with no particular change in the geographic patterns (see Figure 8.6).

Figure 8.6: Air Passenger Growth by World Region – 2017 to 2050



Source: York Aviation.

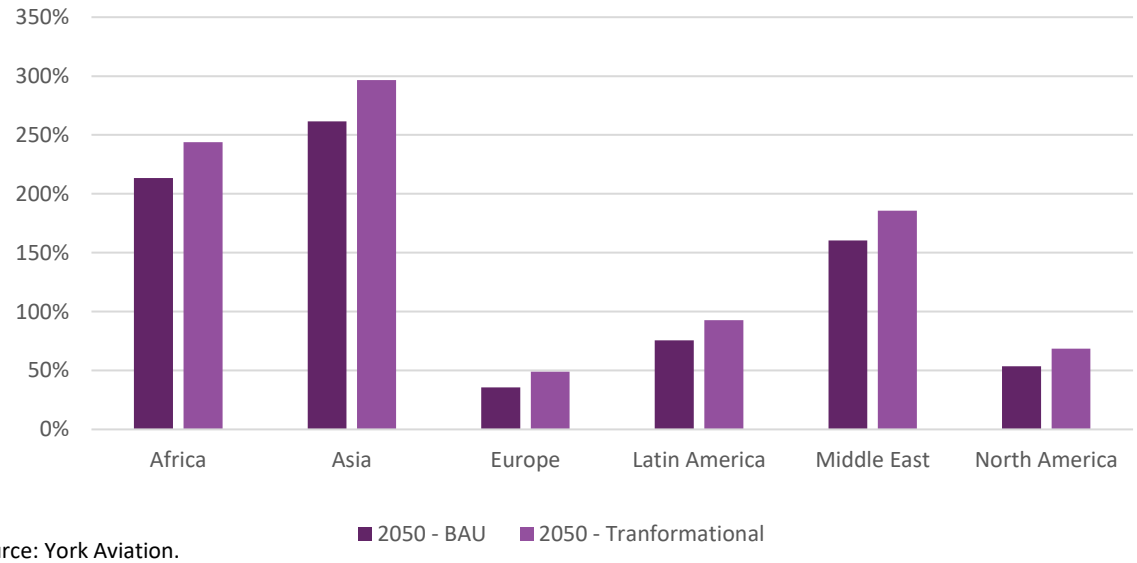
Freight

8.12. The geographic spread of sea freight markets is expected to follow a similar pattern to business air passengers, reflecting the fact that ultimately the global economy is shifting in terms of its focus and that its future growth poles are in the East (see Figure 8.7).

8.13. Europe is the slowest growing market in terms of growth in freight volumes, followed by North America. In this case, however, Asia and Africa are expected to be the fastest growing markets in terms of volumes. This suggests a shift in balance towards deep sea countries or even greater consolidation through ports such as Rotterdam.

8.14. Again, the Transformational Scenario simply sees faster growth rates across the board, with no change in the geographic structure of growth.

Figure 8.7: Sea Freight Growth by World Region – 2017 to 2050



Source: York Aviation.

8.15. With no change in air freight's share of the overall export market expected, the patterns of growth forecast are the same as those for sea freight, with Europe experiencing the lowest levels of growth and Asia and Africa the highest levels. Given that air freight is primarily a long haul market anyway, this does not reflect a particular change in focus.

Conclusions

8.16. The analysis above has identified the international connectivity requirements that come with achieving transformational growth over and above business as usual:

- an **additional 1.1 million international business passengers will travel to / from the North of England**;
- companies across the North will produce **an additional 17.5 million tonnes of exports that will need to be transported to international markets**.

8.17. The geographic distribution of future international connectivity requirements will not change markedly from the present. Europe and North America will remain the most important destinations for passengers and goods. However, markets in Asia, Africa, the Middle East and Latin America will be the fastest growing and will produce some shift in requirement towards longer haul connections.

9. The Implications for Investment in Domestic Connectivity

Introduction

9.1. In this section, we consider what the additional international connectivity requirements around transformational growth mean for domestic connectivity. Specifically, we consider the extent to which TfN's planned investment programme, as set out in the Strategic Transport Plan published in January 2019, can support the increased international connectivity requirements that sit alongside the forecast growth in exports associated with transformational growth in the future.

9.2. We have structured our analysis in terms of:

- meeting the requirement to increase business air travel;
- meeting the requirement for increased export volumes.

Meeting the Requirement for Business Air Travel

9.3. Our analysis above identifies that transformational growth in the North of England will require an additional 1.1 million business travellers to travel to / from the region in 2050. These passengers will continue to primarily be travelling to / from Europe but the share of longer haul destinations will have increased and with it the need for more connectivity to more distant world regions.

9.4. In relation to these forecasted additional business travellers, there remains an important question. Do these additional passengers drive the additional economic growth that transformational growth entails or are they a result of it? This is highly complex question and not one that we consider in depth here. In truth, the answer is probably a mixture of the two and the answer probably varies at different points in the economy's development cycle. Instead, we discuss below the extent to which TfN's actions via its investment programme can facilitate or stimulate international business travel in support of this requirement, accepting at the outset that there will clearly be other factors at play that will also help to build economic growth and facilitate / boost demand.

9.5. At the outset, it is helpful to consider how investment in domestic transport infrastructure can influence the level of international connectivity and thereby support trade. Ultimately, transport investment is about making journeys quicker, easier and cheaper to get to the right places. In the context of international business travel this means:

- more direct connections to international destinations and hence fewer interchanges, which is both faster and more convenient;
- more frequency to reduce wait times, increase ability to make return trips and to enable passengers to travel at more convenient times;
- more choice for passengers, which will increase competition and ensure competitive pricing;
- improved access to airports to make journeys quicker, easier and more reliable.

9.6. Investment in domestic connectivity can support these goals via several paths. Clearly, it can directly support reduced airport access times, reflecting the fact that all international journeys ultimately start on the ground. On the other hand, it will also potentially impact on the development of the market in ways that will support the other issues described above:

- by broadening catchment areas and allowing the North's airport to penetrate catchment markets more effectively, it will enable airports to potentially bring forward new routes that would not otherwise be viable;

- by increasing catchment area size and penetration on existing routes and by stimulating both business and leisure markets by reducing the generalised costs facing passengers in these same markets, domestic connectivity investments will potentially enable airlines to offer greater frequency on services;

- by improving accessibility to airports across the North, better domestic connectivity will help increase competition between airports and airlines, benefitting business and leisure consumers.

9.7. Therefore, we have undertaken a series of analyses to consider how TfN's investment programme will help to meet the international air passenger connectivity requirements of achieving transformational growth. This analysis has been based around the improvements in accessibility to airports achieved through two scenarios:

- TfN's major schemes investments;
- TfN's full investment programme.

9.8. The two scenarios encompass a range of investments that are intended to improve access to the North's airports, including:

- Northern Powerhouse Rail links to Manchester Airport;
- Rapid transit link between Liverpool South Parkway station and Liverpool John Lennon Airport;
- Improved rail access to Liverpool John Lennon Airport from Chester and North Wales;
- Knutsford to Manchester Airport (Western Link);
- Crewe to Manchester Airport (Southern Link);
- Windermere and Barrow to Manchester Airport (frequency and journey time improvements);
- Completion of missing link connecting Classic Rail, HS2 and Manchester Airport Terminals;
- Eastern route access package to Liverpool John Lennon Airport and associated developments;
- Improved highway access to Manchester Airport from south and west
- Rail connection and station for Doncaster Sheffield Airport;
- M18 Junction 4 connection to Doncaster Sheffield Airport;
- Newcastle International Airport highway and rail access improvements;
- New road link between the A6 to Manchester Airport Relief Road and the A523;
- Extension of Metrolink to link Manchester Airport Station to Terminal 2;
- New road link between the M60 and the Manchester Airport Relief Road;
- Capacity improvements, including at Junction 5 for Manchester Airport and the M60 Interchange;
- Leeds Bradford Airport Parkway station;
- Leeds Bradford Airport Link Road;

9.9. Specifically, we have examined how investment in domestic connectivity might:

- support the development of new direct services at the North airports;
- reduce access times and hence stimulate demand.

9.10. We have not sought to quantify the effects on frequency or on competition as the effects are potentially highly complex and methodologies to consider them would go beyond the scope of this work. We simply note that in both cases investment in improved domestic connectivity would likely be beneficial.

Increasing Direct Connectivity

9.11. The first element of our analysis of the potential impacts of investment in domestic connectivity is to examine the potential effects that TfN's investment programme might have on the new direct air services that might come forward at the North's airports.

9.12. Clearly, even in the baseline case, the North's airports will continue to grow and will deliver a wide range of new routes but transformational growth will result in a level of network development over and above that, which will help to both deliver the uplift in economic growth targeted and that will also react to the trade patterns that are expected to come with change in the future.

9.13. Our analysis is based on analysing the potential size of individual route markets (using CAA Passenger Survey data) across the North and how they might grow in the future based on our demand forecasts described above, allied with an analysis of how TfN's investment programme will impact on individual airports' ability to capture

passenger traffic from across their catchment areas. The market capture analysis uses journey time data provided by TfN. It assumes that as the journey time between the North's airports and different areas becomes shorter, an airport's ability to penetrate that market increases. Hence, new routes that were not previously viable without transport investment become viable as passenger numbers are boosted.

9.14. Our analysis considers each of the North's airport's route networks at 2050 in four different situations:

- Baseline Growth – the market grows in line with current expectations, transformational growth is not achieved and TfN's investment programme does not go ahead;
- Transformational Growth Only – this scenario purely sees the transformational scenario growth rates applied to existing markets. It assumes that there is no investment from TfN in improved accessibility to airports;
- Transformational Growth and Major Scheme Investments – this scenario sees transformational growth rates applied to existing markets and the effect of TfN's investment on journey times associated with its major schemes applied to airports' market capture rates;
- Transformational Growth and Full Investment Programme – this scenario sees transformational growth rates applied to existing markets and the effect of TfN's investment on journey times associated with its full investment programme applied to airports' market capture rates.

9.15. This analysis is therefore able to consider the role that TfN's investment in domestic connectivity has on route development at the North's airports.

9.16. Before considering the results of our analysis there are a few points to note:

- routes are assumed to come forward based on when they reach an annual passenger threshold. This is 50,000 for short haul routes and 75,000 for long haul routes. This is a generic assumption and hence any list should be seen as indicative. Over airline business models or patterns of service could mean that these thresholds could be lower in certain circumstances and more or different opportunities might come forward;

- in a small number of cases, there may be existing, low frequency services to some destinations (less than 50 departures a year). This is analysis is intended to reflect services that might come forward as regular, stable destinations rather ad hoc routes;

- the analysis considers airports individually. It does not seek to reflect changes in the competitive position and environment over time[18]. It, therefore, reports new routes that might come forward at different airports but it is unlikely that these could all be delivered as airlines will in some cases make binary decisions between airports in the North as to how to serve the market;

- the analysis does not include an allowance for potential market stimulation on new route opportunities. This reflects the fact that the extent of real stimulation (as opposed to people switching between destinations) in the future is very hard to assess. It is, therefore, likely that this analysis is conservative to some degree.

9.17. In Table 9.1 below, we present the results of this analysis for each of the North's airports.

[18] This would require the production of a detailed passenger allocation model, which is outside the scope of this work.

Table 9.1: New Direct Routes at the North's Airports in 2050

	Baseline Market Capture and Baseline Growth Rate		*Additional Routes - Baseline Market Capture and Transformational Growth Rate*	*Additional Routes - Major Schemes Market Capture and Transformational Growth*		*Additional Routes - Full Programme Market Capture and Transformational Growth*
Manchester	Auckland	Kuala Lumpur		Amritsar		
	Bali	Kuwait		Cluj		
	Bangkok	Manila		Bangalore		
	Bergerac	Melbourne		Tokyo		
	Bucharest	Miami		Nairobi		
	Cairo	Perth		Seoul		
	Calgary	Phuket		Lublin		
	Cape Town	Poznan		Chengdu		
	Chicago	Shanghai		Szechin		
	Delhi	Sydney		Bahrain		
	Guangzhou	Vilnius		Kosice		
	Johannesburg	Warsaw				
	Katowice	Washington				
Liverpool	Abu Dhabi	Keflavik		Almeria	Riga	
	Antalya	Lisbon		Basle	Rome	
	Athens	Mahon		Boston	Toronto	
	Brussels	Milan		Bratislava		
	Doha	Munich		Burgas		
	Dubai	Murcia		Cologne/Bonn		
	Dusseldorf	New York		Dubrovnik		
	Frankfurt	Oslo		Eindhoven		
	Funchal	Stockholm		Gibraltar		
	Hamburg	Stuttgart		Hurghada		
	Helsinki	Vienna		Kefalonia		
	Heraklion	Zurich		Nuremberg		
	Istanbul			Philadelphia		
Leeds Bradford	Dubai	Milan	Hamburg	Abu Dhabi	Marrakech	
	Frankfurt	Munich	Stockholm	Athens	Oslo	
	Islamabad*	New York		Brussels	Poznan	
	Istanbul	Rome		Bucharest	Sofia	
	Lisbon	Warsaw		Helsinki		
	Madrid	Zurich		Katowice		
Newcastle	Berlin	Warsaw	Keflavik	Athens	Pisa	
	Budapest			Bucharest	Rome	
	Copenhagen			Hamburg	Sofia	
	Frankfurt			Helsinki	Stockholm	
	Istanbul			Katowice	Venice	
	Madrid			Kos	Verona	
	Munich			Lisbon	Vienna	
	New York			Milan	Vilnius	
	Orlando			Murcia	Zurich	
	Toronto			Oslo		
Doncaster Sheffield	Dubai			Barcelona	Berlin	
				Fuerteventura	Frankfurt	
				Geneva		

	Baseline Market Capture and Baseline Growth Rate	*Additional Routes - Baseline Market Capture and Transformational Growth Rate*	*Additional Routes - Major Schemes Market Capture and Transformational Growth*		*Additional Routes - Full Programme Market Capture and Transformational Growth*
Durham Tees Valley	Alicante Dublin Malaga Tenerife Faro Palma		Lanzarote Barcelona Paris Geneva Ibiza Las Palmas Dalaman Paphos Berlin Fuerteventura	Madrid Dusseldorf Budapest Krakow Malta Copenhagen Larnaca Prague Rhodes Rome	
Humberside	Alicante Tenerife		Barcelona Dublin Faro	Lanzarote Malaga	

Source: York Aviation.

9.18. The analysis demonstrates that even with baseline growth, the North's airports have significant opportunities to grow their route networks:

- Manchester gains 26 new destinations. These include a range of short haul and long haul destinations but it is notable that there is a distinct balance towards long haul markets. This fits well with its role as the North's main long haul gateway but also reflects that it already has an extensive short haul network and further opportunities are relatively more limited. The long haul connections include a wide range of major world cities, notably Chicago, Shanghai, Delhi, Sydney, Kuala Lumpur, Melbourne and Guangzhou;
- Liverpool potentially gains 25 new destinations. These focus on short haul destinations and it is notable that there are a number of major European cities in the group, which would significantly enhance business connectivity. There are, however, also connections to the Middle East hubs at Abu Dhabi, Doha and Dubai and to New York. It is perhaps unlikely that all three Middle East hubs would come forward but it does suggest that there is potential in this market by 2050;
- Leeds Bradford potentially gains 12 new routes. Again, the balance is towards short haul but there are a range of major cities within the portfolio. The group also includes Dubai, Islamabad and New York in terms of long haul connections, although Islamabad would require a suitable aircraft to operate;
- Newcastle potentially gains 11 new routes, with a mixture of short haul and North American long haul connections, including New York. It is notable again that the short haul connections are again in the main major city destinations with significant potential economic value;
- Doncaster Sheffield only adds one potential additional destination through this analysis, but it is a significant one, Dubai. This reflects to some degree the fact that Doncaster Sheffield has been successful in recent years in expanding its network and many of the opportunities that were identified in previous work have been fulfilled. Doncaster Sheffield's development may now be more about consolidation and frequency build. It should also be recognised that this may be a case where the 50,000 passenger threshold is too coarse;
- Durham Tees Valley has six potential new routes in the baseline. These are all short haul and leisure orientated in their focus;
- Humberside adds only two potential new routes, both to holiday destinations.

9.19. The effect of simply increasing the speed of growth in demand to reflect transformational growth in the economy has a relatively limited effect. Most of the North's airports do not develop any new routes as a result of this change. It is only once increased demand is allied with TfN's major projects investment programme that there is a significant change in airports' route networks:

- Manchester gains a significant number of additional new routes, including a number to important long haul destinations such as Tokyo, Seoul, Bahrain, Bangalore and Chengdu;
- Liverpool potentially gains up to 16 new routes, with a mixture of short haul and long haul destinations coming forward. Notable additions include Boston, Philadelphia and Cologne;
- Leeds Bradford gains potentially 10 new routes, with notable destinations including Abu Dhabi, Brussels, Helsinki and Oslo;
- Newcastle adds potentially 19 further routes, these are all short haul services but the list includes a number of major European cities including Hamburg, Helsinki, Milan, Oslo, Rome, Stockholm, Vienna and Zurich;
- Doncaster Sheffield potentially adds five new destinations, including major cities such as Barcelona, Berlin, Frankfurt and Geneva;
- Durham Tees Valley could add up to 20 additional routes, including some major city destinations. However, it should be recognised that this is partly a function of the low base it is starting from;
- Humberside potentially adds up to 5 new routes, mainly leisure focussed destinations.

9.20. Interestingly, when TfN's full investment programme is considered, it does not result in any further route additions at the North's airports and hence does not impact on international connectivity in this form. Ultimately, this is perhaps unsurprising. Airport accessibility is ultimately dependent on major changes and requires changes that affect large areas of the North. These types of project fall within the purview of TfN's major schemes. The broader investment programme, while very important for the functioning of connectivity within the North, is not focussed on the region's airport gateways in the same way.

9.21. Overall, this analysis clearly identifies the value of TfN's investment in terms of supporting the North's international connectivity in terms of direct air routes and by extension its ability to deliver the trade forecasts set out above. The routes that come forward are of course indicative, but they do reflect the broad patterns seen within the trade forecasts. There are opportunities to significantly enhance short haul connectivity, particularly away from Manchester Airport, while the rebalancing of trade towards long haul destinations is reflected in the growth of direct long-haul connectivity from Manchester but at some others as well in terms of a core of destinations. It also clearly establishes that transformational levels of growth without accompanying investment in domestic connectivity will not deliver route development over and above the baseline to any significant degree.

9.22. Measuring the extent to which these new routes will aid in meeting the North's additional international connectivity requirements is difficult, not least because, as we describe above, we have not tried to identify 'winners and losers' amongst the North's airports in terms of which of the opportunities might come forward. However, regression analysis of trade volumes by country versus business passenger flows from the North does suggest that having a direct air connection to a country does stimulate travel. Clearly, even where routes are new to one airport, there will often be another connection in the North from another airport. However, where new routes produce genuinely new connections the relationship would suggest a significant boost in traffic. We estimate that the net new connections from the North will stimulate around 100,000 additional passengers per year to travel in 2050. This is around 9% of the 1.1 million additional international business passengers required in the transformational growth scenario.

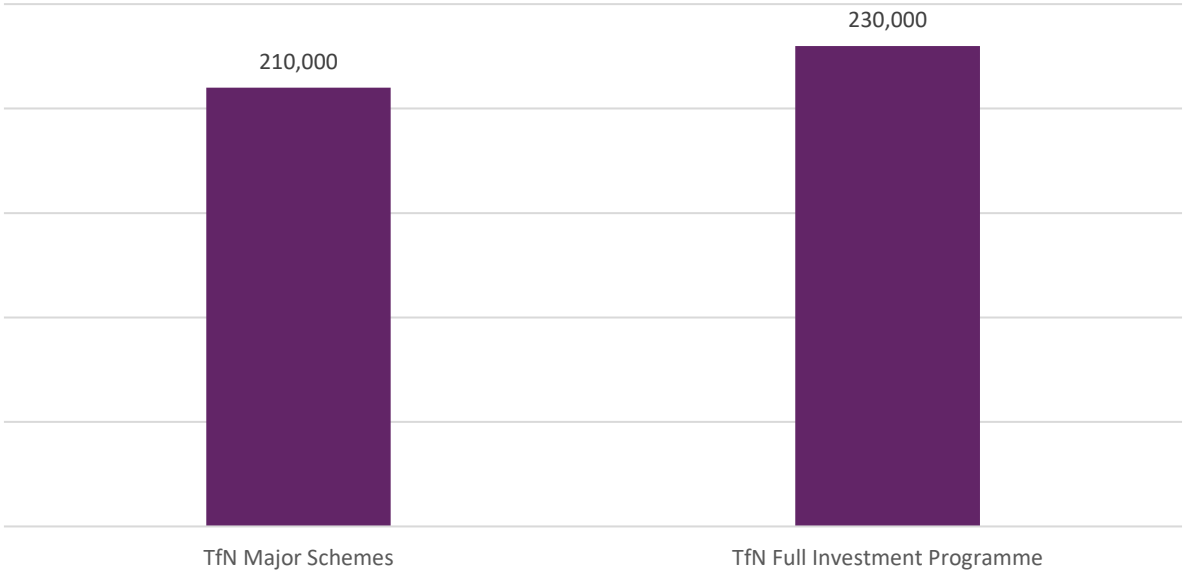
Impact of Improving Airport Accessibility on Business Demand

9.23. As we have described above, the most direct effect of TfN's investment in domestic connectivity in terms of meeting the requirement for international connectivity related to achieving transformational growth will come from directly making travel to the North's airports quicker and easier. This will ultimately stimulate growth in the business travel market that will support the achievement of the requirement.

9.24. Measuring the impact on airport accessibility from TfN's investments across the North is potentially complex. Different airports are clearly more important in different parts of the North in terms of providing connectivity, but future transport investment may change the balance between accessibility to different airports such that weighting access times according to, for instance, current market shares may not be particularly helpful. We have therefore developed a measure of airport accessibility across the North that considers the issue slightly differently. It uses a gravity model type formulation to consider the relative accessibility to airport services in each district across the North[19]. This produces a measure of accessibility for each district that can be calculated for the baseline access times to airports, the access times following investment in TfN's major schemes and as a result of TfN's full investment programme. The percentage change in these measures is then translated through to a change in business passenger numbers based on the baseline demand in each district in 2050 and an assumed price elasticity of -0.2[20].

9.25. The effects on business passenger demand from TfN's major schemes and full investment programme are shown in Figure 9.1 below.

Figure 9.1: Impact on Total Business Passenger Demand in the North from Investment in Domestic Connectivity



Source: York Aviation.

[19] The measure uses the current number of international passengers at each of the North's airports as the attraction factor in each case. The relative positions of the North's airports in terms of overall size are not expected to change significantly. The attraction factor is then divided by the mode weighted average journey time to each airport squared. This has the effect of reflecting the influence of large airports that are far away and also that of small nearby airports.

[20] This elasticity is based on the air fare elasticities for business travel observed in the Department for Transport's Aviation Forecasts 2017. As the change in accessibility is reflective of a change in generalized cost, it seems reasonable to assume that passengers will react in a similar way to a change in price.

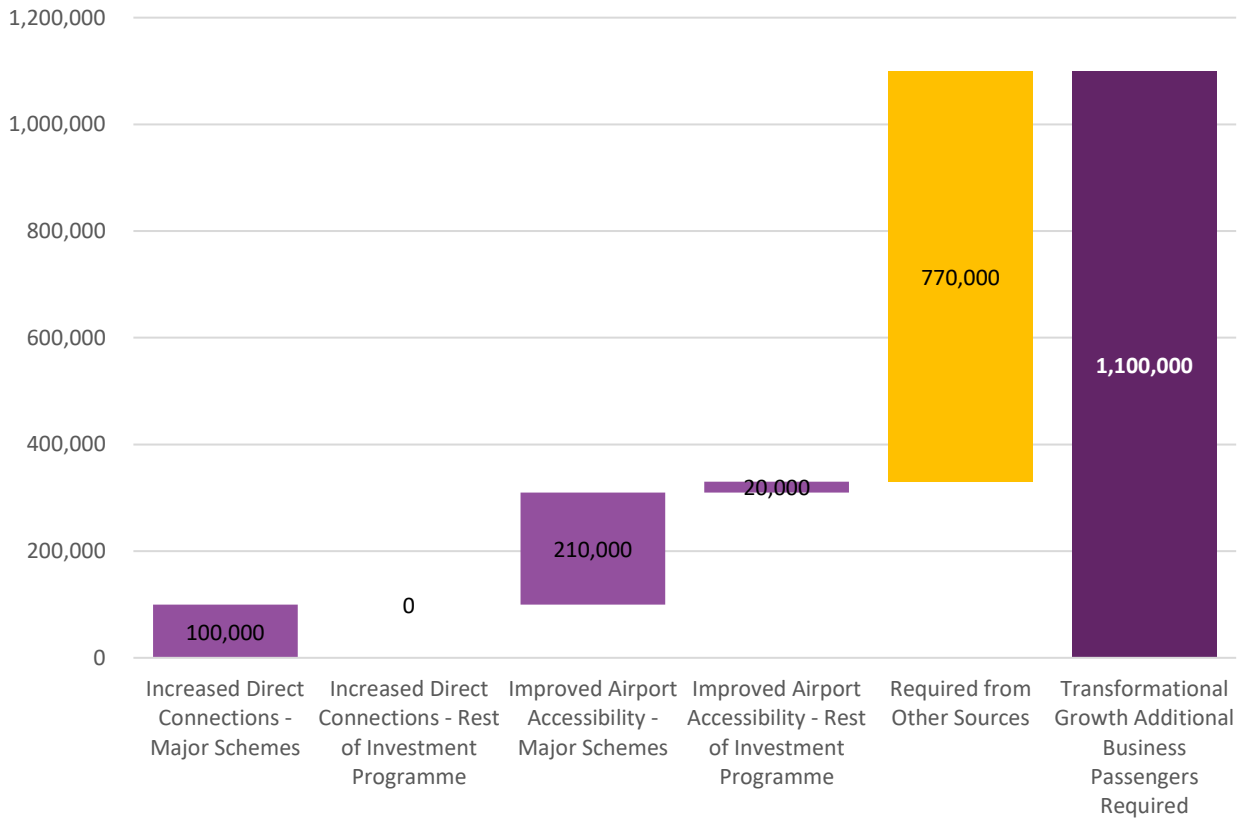
9.26. TfN's Major Scheme investments will again have by far the largest impact on the level of business travel, stimulating an estimated 210,000 business travellers per year to travel by 2050. The full investment programme increases this number to around 230,000. This equates to 19% and 21% of the total additional international business passenger requirement implied by the transformational growth scenario.

9.27. This again indicates that TfN's Major Scheme investment programme offers significant value in terms of its ability to improve accessibility to the North's airports and hence its ability to stimulate business travel. However, the additional benefit from the full investment programme is more limited.

Overall Impact of Improved Domestic Connectivity on International Air Passenger Requirements

9.28. The combined effect of new routes and improved airport accessibility in meeting the transformational growth air passenger connectivity requirements is shown in Figure 9.2. This demonstrates that TfN's major schemes programme will make significant inroads in terms of meeting the North's business travel requirements. However, it will not be enough on its own. The additional GVA growth associated with the Transformational Scenario suggests that a total of around 1.1 million additional business travellers per year will be required to support this level of economic activity. Investment in the major schemes can help to facilitate around 30% of this total. This is excluding any effect from increased frequencies from volume growth on existing routes or the impact from improved competition. The remainder will need to come either from other initiatives that reduce the overall generalised cost of flying, for instance through reform of air passenger duty or co-ordinated route development support for the North's airports, or through broader economic stimulus that helps push the North's economy towards its transformational growth targets.

Figure 9.2: Overall Contribution of TfN's Investment Programme on the International Connectivity Requirement for Business Passengers



International Freight Markets

9.29. The analysis in Section 8, establishes that achieving transformational growth is likely to result in additional export volumes of around 17.5 million tonnes from the North in 2050 compared to the baseline. The potential role that TfN's investment programme might have in facilitating this requirement is, however, much more difficult to analyse effectively than the contribution in air passenger markets.

9.30. As we have noted at several points above, the freight market in the UK suffers from a considerable lack of transparency in terms of the way that ports interact with their markets and what ultimately drives how the market is served. Consequently, it is difficult to assess, certainly in quantitative terms, how TfN's domestic connectivity investments might influence the region's ability to meet the additional volume requirement identified.

9.31. In the circumstances it is perhaps helpful to revisit some of the things that are known and consider their implications for the analysis:

- based on the analysis within TfN's Trade and Logistics report, it is estimated that around 60% of the North's current export volumes are shipped via ports that are outside of the North;
- at the same time, export flows through the North's ports are primarily from the North but there are significant volumes from other regions too;
- this suggests that speed of access to ports is not a primary consideration for exporters in most cases[21]. Instead, exporters (or those organising shipping for them) will seek out most cost-effective route for transporting goods to market;
- we estimate that achieving transformational growth would result in the North's exports growing from around 101 million tonnes now to around 197 million tonnes in 2050. In other words, volumes would approximately double. If current patterns of usage continued this would see around 80 million tonnes of exports being shipped through the North's ports. This compares to a total of around 50 million tonnes of UK exports that are shipped through the North's sea ports currently;
- the North's ports are planning to expand considerably over the coming years. For example, the Mersey Ports opened the Liverpool 2 deep water river terminal in 2016 and its 2011 Master Plan forecasts volume growth of around 2.5% per annum. It is planning for around a 70% increase in demand by 2030 versus 2011 and if growth rates were to continue, this would imply growth of around 125% in demand by 2050 compared to 2017. Immingham is the UK's largest port by tonnage. It is part of the Humber Ports complex, which is one of the largest port complexes in Europe. Similarly, the Port of Immingham Master Plan published in 2011 sets out its plans for growth through to 2030. These were based on expected growth in volumes of around 60%. Against this backdrop of expansion, it would seem reasonable to suggest that port capacity is not likely to be a constraint on export volumes;
- the TfN Investment Programme includes a range of interventions that will support domestic connectivity to / from the North's ports (set out below). This will help to support the growth in capacity required to enable the North's additional exports to be handled at the North's sea ports. They also potentially offer an opportunity for the North's ports to increase their competitiveness and capture more of the North's exports that are currently shipped via other UK ports and also to capture a greater share of the rest of the UK's export trade. This would increase their economic impact and ultimately the GVA that they support within the economy.

9.32. Below, we have set out some of the key interventions within the TfN Investment Programme that will support domestic connectivity to the North's ports:

- rail gauge enhancements between Doncaster and the Port of Immingham;

[21] There are of course exceptions to this rule. Air freight is generally substantially more time sensitive than sea freight and within air freight itself express services are substantially more time sensitive than general air freight.

- improved links between Western Gateway Canal Crossing, Port Salford and M60 between Junctions 10 and 11 and improvements to the M60 between Junctions 9 and 10 and 11 and 12;
- Port of Workington to A66 connectivity improvements;
- North East port highway and rail access improvements;
- A66/Tees Dock Road junction;
- M57 Junctions 4 and 5 and Switch Island (M57/M58/A5036) near Mersey Ports;
- Humber Ports access improvements (A63 relief route, A63/A1033 junction, A63 technology improvements, A180, Grimsby Western Relief Road);
- North East rail freight enhancements (passing loops and port connections);
- Gauge enhancements and journey time improvements between Selby and Port of Hull;
- Port of Liverpool to West Coast Main Line enhancements;
- Parkside enhanced connectivity;
- West Coast Main Line freight capacity enhancements;
- Port Salford rail freight access;
- Freight prioritised gauge cleared route across the Pennines;
- A69 junction improvements;
- A595 Grizebeck improvements;
- A595/A66 improvements.

9.33. These interventions represent a significant package of investments in both road and rail infrastructure which will provide essential support to achieving transformational growth.

9.34. Above, we have focussed primarily on access to sea freight for the North's exports. Air freight is in volume terms a much smaller element of the market. Based on CAA Statistics and analysis of the origins of UK air freight taken from our previous work for TfN, we estimate that, in terms of volume, air freight makes up around 0.2% of the North's exports. If the share of air freight in overall remains broadly constant, this suggests that transformational growth would result in around 30,000 tonnes of additional air freight. The majority of air freight in the UK is carried in the bellyhold of passenger aircraft and is predominantly carried on long haul services. In the context of the North, this suggests that Manchester Airport will remain the primary gateway for air freight, although if the long haul passengers opportunities identified at other airports come forward, then these airports will potentially lay niche role in a similar way to Newcastle Airport currently through its Dubai service. The implication of this pattern of development is that TfN's investment in major schemes that will support access for passengers to the North's airports will be the primary avenue for supporting this growth.

Conclusions

9.35. In this Section, we have focussed on considering the extent to which TfN's investment programme can support the additional international connectivity requirements implied by the transformational growth scenario.

9.36. Transformational growth is likely to require 1.1 million additional business air journeys in 2050. TfN can help to support this level of growth by making international business travel more efficient, faster and more convenient via improving surface access to the region's airports.

9.37. Our assessment suggests that TfN's major schemes investments could bring forward a significant number of new routes at the region's airports, including a mixture of long haul and short haul destinations. It is interesting to note that simply applying faster demand growth rates associated with greater economic growth does not in itself result in significant improvements in direct connectivity to / from the North. Improved surface access is required as well. This improved direct connectivity might result in around 100,000 additional business passengers. The additional value from TfN's full investment programme in terms of new direct routes is not obvious from our analysis. However, it should be recognised that this is perhaps not surprising given the nature of airport catchment areas.

9.38. By improving accessibility to airports generally, the major schemes programme might stimulate a further 210,000 business travellers per year in 2050. The added value from the completion of the full investment programme is

again relatively limited. These additional surface access improvements result in around a further 20,000 additional business travellers by 2050.

9.39. In total, TfN's domestic connectivity investments could contribute around 30% towards meeting the additional business travel requirement associated with transformational growth. The gap will need to be filled through other interventions, potentially around reform of air passenger duty or coordinated route development support for the region's airports, or through broader economic development policies that stimulate growth and business travel demand.

9.40. The potential value of TfN's domestic connectivity investments in meeting the additional requirement to support 17.5 million tonnes of exports is less clear. This is at least partly a function of the limited understanding currently of the dynamics within the freight market in the UK. However, it should also be recognised that speed of access is not as strong a driver for freight as it is for passenger travel and as a consequence the question is perhaps more about ensuring capacity rather than improving speed. TfN has a significant programme of investments that will provide enhanced access and capacity to the region's ports. In the context of the known development plans for the region's ports, these investments should facilitate sufficient capacity to ensure that the North's additional export requirements are not constrained.

10. Conclusions

10.1. The purpose of this report is to consider how trade in the North will develop in the future in the context of achieving transformational growth in line with the NPIER, to identify the implications of this for the North's international connectivity requirements and the extent to which TfN's domestic connectivity investment programme will support meeting these requirements.

10.2. Currently, the North is a significant trading economy, with around £85 billion in exports in 2016. However, its trade performance does lag behind the rest of the UK currently. The North's exports are more focussed on goods trade than services currently, which is slightly different to the UK as a whole which is essentially balanced. Services are, however, an increasing share of exports. The EU is by some margin the largest market for the North's goods exports, with a particular focus on near European countries. The largest single country market is the USA, which is also the fastest growing market. Asia is the largest market for services, followed by the EU. This is unusual compared to the UK as a whole where the EU and the Americas are the two largest markets.

10.3. Given that the NPIER has identified the seven capabilities sectors as being sector's in which the North specialises and as being central to the delivery of future growth, including achievement of transformational growth, it is perhaps not surprising that these sectors are over-represented in terms of their contribution to the North's export economy. In total, the North's seven capabilities contributed over half of its exports in 2016, totalling £44 billion in value.

10.4. The total economic contribution of the North's exports equated to £68 billion of GVA in 2013, or a fifth of the region's overall economic activity. Exports also supported over 1.2 million jobs across the North. Exports across the North's seven capabilities contributed £40 billion of GVA in 2013, or 12 percent of the region's total economic activity, and supported over 700,000 jobs. Energy, advanced manufacturing, financial & professional services, and logistics were all relatively export-orientated, while outputs across the remaining capabilities were mainly focused on serving domestic consumers.

10.5. The value of exports from the North is expected to increase significantly by 2050 in the Business as Usual scenario, growing by 71%. This compares to a growth in GVA of around 51%. The North is therefore going to become more reliant on exports to support economic growth in the future regardless of whether transformational growth is achieved or not.

10.6. Transformational growth is expected to result in a boost in export growth of around 18%. This compares to additional GVA growth of 15%, so implies further export intensification of the North's economy. It is notable that achieving transformational growth is expected to result in the capabilities increasing their share of the North's exports, reiterating their importance for achieving the step change required.

10.7. In terms of geographic markets, traditional markets in Europe and North America will remain important but there is a growing influence from emerging markets, most notably China, which is expected to make the largest contribution to goods exports growth.

10.8. Currently, around 4.1 million air passengers travel to / from the North for business purposes. Around two thirds of these originate from the North West, 25% from Yorkshire and the Humber and the remainder from the North East. This pattern is broadly in line with the value of exports from each of the North's component regions.

10.9. In terms of where passengers are travelling to and from, the pattern in world region terms is similar to that for export value. The great majority are travelling to or from Europe (around 80%), with North America the next largest destination region. Regions such as Asia and the Middle East have grown rapidly in recent years.

10.10. In terms of the use of airports, the great majority of business travellers from the North use airports in the North. Where there is leakage outside of the North, it is primarily for long haul destinations and in this market Heathrow remains a significant factor. However, this leakage is in the main seeking out direct connections that are unserved currently from the North. Manchester is the largest gateway for business travel by some margin and the primary intercontinental gateway. However, airports such as Newcastle, Liverpool and Leeds Bradford play significant

roles within their home regions for business travel, predominantly to European destinations. The smaller airports such Doncaster Sheffield, Humberside and Durham Tees Valley play niche roles.

10.11. The North currently generates around 101 million tonnes of exports. Only around 39% of this is currently shipped through ports in the North. Conversely to the analysis of export value, the largest producer of export tonnage is Yorkshire & the Humber, followed by the North West and then the North East. Data on the usage of the North's ports for the North's exports is limited. However, the Humber ports appear to be the largest gateway, perhaps reflecting the pattern of volume production. The Mersey ports and the Tyne ports also handle significant volumes of the North's exports.

10.12. In the Business as Usual scenario, the North's requirement for international business travel nearly doubles from around 4.1 million passengers in 2017 to around 8.0 million in 2050. The additional economic growth in the Transformational Scenario accelerates the growth of this requirement, such that around 9.1 million business passengers are forecast in 2050. This creates a requirement for the North to support around 1.1 million additional business passengers by 2050 if transformational growth is achieved.

10.13. The Business as Usual scenario sees the volume of exports generated by the North's economy grow from around 101 million tonnes in 2017 to 180 million tonnes by 2050. If the Transformational Scenario is achieved, our analysis suggests that the volume of goods exports in 2050 would increase to around 197 million tonnes, an increase of around 17.5 million tonnes.

10.14. The geographic distribution of future international connectivity requirements will not change markedly from the present. Europe and North America will remain the most important destinations for passengers and goods. However, markets in Asia, Africa, the Middle East and Latin America will be the fastest growing and will produce some shift in requirement towards longer haul connections.

10.15. TfN can help to support the achievement of these increased international connectivity requirements by making international business travel more efficient, faster and more convenient via improving surface access to the region's airports.

10.16. Our assessment suggests that TfN's major schemes investments could bring forward a significant number of new routes at the region's airports, including a mixture of long haul and short haul destinations. It is interesting to note that simply applying faster demand growth rates associated with greater economic growth does not in itself result in significant improvements in direct connectivity to / from the North. Improved surface access is required as well. This improved direct connectivity might result in around 100,000 additional business passengers. The additional value from TfN's full investment programme in terms of new direct routes is not obvious from our analysis.

10.17. By improving accessibility to airports generally, the major schemes programme might stimulate a further 210,000 business travellers. The added value from the completion of the full investment programme is again relatively limited. These additional surface access improvements result in around a further 20,000 additional business travellers by 2050.

10.18. In total, TfN's domestic connectivity investments could contribute around 30% towards meeting the additional business travel requirement associated with transformational growth. The gap will need to be filled through other interventions, potentially around reform of air passenger duty or coordinated route development support for the region's airports, or through broader economic development policies that stimulate growth and business travel demand.

10.19. The potential value of TfN's domestic connectivity investments in meeting the additional requirement to support 17.5 million tonnes of exports is less clear. It should also be recognised that speed of access is not as strong a driver for freight as it is for passenger travel and as a consequence the question is perhaps more about ensuring capacity than improving speed. TfN has a significant programme of investments that will provide enhanced access and capacity to the region's ports. In the context of the known development plans for the region's ports, these investments should facilitate sufficient capacity to ensure that the North's additional export requirements are not constrained.

11. Appendix 1: Definitions of the North's Capabilities

11.1. The table below presents the economic sectors that constitute the seven capabilities, as defined by the NPIER.

Table 11.1: Sectoral Definitions of the Capabilities

Capability	SIC 2007
Advanced Manufacturing	
Manufacture of chemicals and chemical products	20
Manufacture of basic pharmaceutical products and pharmaceutical preparations	21
Manufacture of basic metals	24
Manufacture of fabricated metal products, except machinery and equipment	25
Manufacture of machinery and equipment n.e.c.	28
Engineering activities and related technical consultancy	7112
Other research and experimental development on natural sciences and engineering	7219
Energy	
Mining of coal and lignite	05
Extraction of crude petroleum and natural gas	06
Manufacture of coke and refined petroleum products	19
Water collection, treatment and supply	36
Sewerage	37
Waste collection, treatment and disposal activities; materials recovery	38
Manufacture of batteries and accumulators	272
Electric power generation, transmission and distribution	351
Manufacture of gas; distribution of gaseous fuels through mains	352
Environmental consulting activities	74901
Health Innovation	
Manufacture of medical and dental instruments and supplies	325
Hospital activities	861
Research and experimental development on biotechnology	7211
Specialist medical practice activities	8622
Digital	
Software publishing	582
Wireless telecommunications activities	612
Satellite telecommunications activities	613
Computer programming, consultancy and related activities	620
Data processing, hosting and related activities	6311
Financial & Professional Services	
Financial service activities, except insurance and pension funding	64
Insurance, reinsurance and pension funding, except compulsory social security	65
Activities auxiliary to financial services and insurance activities	66
Real estate activities	68
Logistics	
Land transport and transport via pipelines	49
Water transport	50
Air transport	51
Warehousing and support activities for transportation	52
Postal and courier activities	53
Education	
Higher education	854

Source: NPIER.

12. Appendix 2: Trade Data Sources and Approach

HMRC Regional Trade Statistics

12.1. HMRC publish detailed estimates of regional trade by both products and destinations. The data covers 65 product types, and 108 countries/country group destinations, on a quarterly basis from 1996. The data is compiled from two main sources. For EU trade, data is gathered from an Intrastat survey, while customs systems provide the inputs for non-EU trade.

12.2. Data is apportioned to the regions based on:

1. The share of employment held by a firm across each region; and
2. Where this information is not available, data is attributed to the postcode of the VAT Registration Number, which typically relates to the head office of each firm.

12.3. Where trade data cannot be allocated to a specific region, it is gathered in an unallocated category, which is included in estimating the UK totals.

12.4. As the North's seven capabilities are defined by economic sectors rather than physical products, we estimate the relationship between regional exports by product and their associated economic sectors. The relationship between products and economic sectors is estimated at a UK level—owing to data availability issues at sub-national level—then adjusted to by detailed employment data to account for the economic structure of each region.

ONS Regionalised Estimates of Service Exports

12.5. The ONS present regionalised estimates of trade across the 12 regions of the UK over the period 2011 to 2016. This source presents export totals based on a series of 13 functional categories, covering all sectors of the economy.

12.6. While the exports of goods can be tracked on a product-specific basis, estimates of service exports offer less sectoral granularity. The main source of data comes from the ONS, which estimate regional service exports the 12 regions of the UK over the period 2011 to 2016. Service exports are disaggregated across 13 functional categories which broadly align to the economic sectors.

12.7. In order to estimate service exports for each capability, we map these functional categories to a combination of: UK Input-Output tables — which enable us to infer the propensity of each narrow sector, and thus disaggregate the functional categories to a narrower sectoral level — and detailed employment data to assign employment shares to broader sectoral definitions where required.

ONS Value of Service Exports by Destination

12.8. A one-off experimental series, published using data for 2015, that presents a combination of service exports by sector and destination. Two different components of this data release are used in this study:

1. Estimates of the value of regional service exports by six continents for nine sectors of the economy; and
2. Estimates of total regional service exports across 62 unique countries/country groups.

12.9. However, unlike goods exports, the data outlining regional profile of service export destinations is not sufficiently detailed to allow an analysis of destinations by capability.

Forecasting approach

12.10. Our method for forecasting the North's future exports, and the impact of growth in the prime and enabling capabilities on international trade, is detailed below.

Goods

12.11. Our forecast for goods exports draws upon our Global Trade Flows Service. This draws on Oxford Economics' forecasts of the global economy, analysing trade flows between 180 country pairs, with additional bilateral flows by product for 33 major economies. Our forecasts account for factors such as the growth of demand in the destination market and the exporter's competitiveness. Exports, imports, and trade balances are identified, with historical estimates and forecasts for each country relative to all other nations in the databank. For each pair of exporting and importing countries, the service shows forecasts exports, imports, and visible trade balance.

12.12. These national forecasts provide an estimate of future goods exports that are underpinned by our house view of future macroeconomic and industry-level growth worldwide. This ensures that all forecasts are consistent across countries, regions, trading blocs, and the world.

12.13. The product-level data contained in these forecasts align with the publicly available historic data detailed in Chapter 3, allowing us to apply our understanding of the capability-to-product relationship to these forecasts at a UK-level.

12.14. To forecast export growth across the North, we disaggregate the national estimates of exports by product to each of the UK's regions. As our historic analysis has shown, the distribution of trade varies by region, and is subject to geographic as well as economic factors:

- Larger and more productive economies tend to be more internationally competitive, and in turn have a greater propensity to export. We therefore disaggregate UK export growth in a given product across the regions based on their contribution to the growth of GVA in associated sectors.
- Similarly, location plays a role: regions that support convenient routes to destination markets, supported by adequate infrastructure, are likely to see a larger share of exports than elsewhere. To account for this, we adjust our regional distribution by the historic propensity of each region to export a given product.

12.15. Our regional forecasts are then constrained to the national totals to ensure continuity with our national and global view of future trade.

Services

12.16. Oxford Economics do not disaggregate our national forecast for service exports into detailed sub-sectors. This is partly due to the limited historic data, but also reflects the fact that service exports do not require the physical transfer of goods, there are typically lower barriers between trading domestically (e.g. to elsewhere in the UK) and abroad.

12.17. Our approach to forecasting regional service exports will largely replicate that for goods detailed above. We take the additional initial step of determining the future sectoral structure of the UK's exports. To do so, we disaggregate overall exports to their expected sectoral structure based on relative GVA growth, while adjusting for each sector's historic propensity to export services.

13. Appendix 3: Impact of a 'Hard' Brexit on Trade

13.1. Oxford Economics have modelled the short-run impact of a 'no-deal' scenario and found that additional trade frictions and a sizeable depreciation of sterling would cause a significant slowdown in the UK economy, even if there was some loosening of fiscal and monetary policy. Our modelling found that the level of GDP would be 2.1 percent below our baseline forecast by end-2020 and 2.7 percent lower by end-2023.

13.2. In the longer run, leaving the Customs Union would adversely affect exports from the UK to the EU through the imposition of both tariff and non-tariff barriers to trade, which acts as a significant downside risk to our forecasts presented in Chapter 5. We discuss each factor in turn below.

Tariffs

13.3. Analysis of historic data suggests that the EU accounts for just under half of UK exports in 2016. Being outside the EU would present some impediment to UK firms seeking to sell into the Single Market. A key factor in understanding how a 'hard' Brexit would affect exports to the EU is linked to the additional static costs that would be incurred: were the UK to leave the Customs Union, what levels of additional tariffs would confront UK exporters?

13.4. On a simple weighted average basis, Oxford Economics estimate that as of 2013 the trade-weighted average tariff on imports to EU member states was only 1.04 percent. However, while the trade-weighted average EU tariff is low, this disguises some sizable peaks.

Table 13.1: The UK's export shares to the EU and associated tariffs

Sector	Exports to the EU (% of exports)	EU tariff (%)
Aircraft	47.5	3.3
Chemicals	42.7	4.3
Oil & fuel	38.0	0.7
Pharmaceuticals	35.8	0.0
Vehicles	28.3	5.8
Machinery	28.2	1.8
Electrical equipment	22.7	2.8
Plastics	20.6	6.0
Optical equipment	14.1	2.2
Food & beverages	9.7	6.8

Source: WTO, ONS, Oxford Economics

13.5. The cost of tariffs is likely to diminish over time if, as is likely, UK trade continued its long-running shift away from EU markets — a process that would probably be sped up by 'hard' Brexit — and future global trade liberalisation deals resulted in further reductions in EU tariffs. Moreover, any fall in sterling triggered by leaving the EU would also provide some offset to the adverse effect of tariffs on UK competitiveness, a likely outcome given the prospect of financial markets reacting negatively to such an outcome.

13.6. That said, simply looking at the static cost of tariffs alone overlooks the dynamic price that might be paid were the UK to undertake less trade with the EU as a result of tariff barriers. The economic evidence points to openness to trade having a positive effect on total factor productivity growth, as a result of factors such as economies of scale and increased competition. Therefore, a Brexit outcome which results in the UK economy seeing trade fall as a share of GDP could exert a long-lasting drag on living standards.

Non-tariff barriers to trade

13.7. Tariffs are not the only obstacle that a UK outside of the Single Market would face in selling to the EU. For a start, no longer being inside the EU's Customs Union would result in new **administrative costs** on exports associated with border controls. Research has found that countries joining the EU in 2004 witnessed a five percent reduction

in trade costs (due to factors such as reduced customs procedures) even though they already had free trade agreements with the EU in place since the mid-1990s.[22] Establishing additional administrative costs will therefore adversely affect the viability of many current exports to the EU.

13.8. Non-tariff barriers, such as the enforcement of different **market standards and regulations**, could also make exporting to the EU more difficult and costly. Evidence quantifying the potential cost of the non-tariff barriers that a UK outside the EU may face is lacking, but analysis has been undertaken estimating the size of non-tariff barriers between the EU and the US. These estimates are presented in Table 13.2 below. This provides a useful benchmark, by quantifying the level of non-tariff barriers to trade facing an Anglo-Saxon free market economy without any formal trade agreement with the EU.

13.9. The second column of Table 13.2 shows the ad valorem[23] total non-tariff barriers facing US exports to the EU across sector. The third column shows what proportion of these non-tariff barriers are deemed "actionable", i.e. the degree to which the barrier can realistically be reduced, based on cross-checks with regulators, legislators and businesses, while the final column calculates the level of actionable non-tariff barriers facing US firms exporting to the EU. Sectors that overlap with the North's seven capabilities, and hence are of particular relevance to this study, are highlighted in bold.

Table 13.2: Estimated non-tariff barriers facing US exports to the EU

Sector	EU barriers to US exports (%)	Percent actionable	Level of actionable non-tariff barriers
Food & beverages	56.8	53.0	30.1
Cosmetics	34.6	58.0	20.0
Chemicals	**23.9**	**63.0**	**15.0**
Motor vehicles	25.5	48.0	12.2
Aerospace	18.8	59.0	11.1
Office, information & communication equipment	19.1	52.0	9.9
Professional services	**14.9**	**51.0**	**7.6**
Metals and metal products	**11.9**	**62.0**	**7.4**
Wood and paper products	11.3	60.0	6.8
Pharmaceuticals	15.3	42.0	6.4
Insurance	**10.8**	**52.0**	**5.6**
Finance	**11.3**	**49.0**	**5.5**
Maritime transport	8.0	56.0	4.5
Communication services	11.7	38.0	4.4
Electronics	6.5	41.0	2.7
Construction	4.6	38.0	1.7
Personal, cultural and recreational services	4.4	37.0	1.6
Air transport	2.0	56.0	1.1

Source: Berden et al. (2009).[24]

13.10. Admittedly, since the UK is presently part of the Single Market, UK exporters are fully compliant with EU requirements. The costs of EU non-tariff barriers to a UK departing from the Single Market are therefore likely to be lower than those faced by countries which have never been an EU member. But unlike tariffs, this cost may rise over time if the UK decided to pursue a different regulatory course to the EU (although to the extent that Brexit resulted in a regulatory regime better-geared towards the needs of UK firms, there would be some compensating benefits).

13.11. **Non-tariff barriers are particularly relevant for trade in services.** Because of their 'indivisible' nature, service exports cannot be protected by border barriers. The EU currently accounts for around half of UK service exports. Many services which are exported are not subject to EU regulatory barriers, with maritime transport and tourism providing examples of this. However, service firms in certain areas must still satisfy **EU harmonisation measures**,

[22] https://www.wiiw.ac.at/need-for-speed-is-faster-trade-in-the-eu-trade-creating--dlp-555.pdf
[23] An equivalent to the tariff rate charged as a percentage of the price of a good.
[24] http://trade.ec.europa.eu/doclib/docs/2009/december/tradoc_145613.pdf

which could potentially cause UK service providers some inconvenience post-Brexit. The extent of further deepening of the Single Market would result in the UK losing out from the opportunities in that direction provided.

13.12. But the widespread presence of non-EU services firms in EU countries demonstrates that EU membership is not necessary for the provision of service activities. Indeed, a UK-owned company which currently provides services via **local operations** in another EU member state (a necessity on economic and practical grounds for many parts of the services sector) and which is regulated by the authorities of that country will be in exactly the same position whether the UK is in or out of the EU.

13.13. Difficulties would arise in areas where services are currently provided directly from offices in the UK on the basis of home-country regulation. This is likely to apply in particular to exports of **financial and business services**. In the event of a 'hard' Brexit, such companies would have to choose a new EU 'home' in terms of a new EU regulatory authority. The risks to UK financial services activity from a loss of home-country regulation are likely to be particularly high given the number of foreign financial firms based in the UK which sell to the EU market. At the same time, regulatory changes are a fact of life for services firms. So, while inconvenient, a change of regulatory authority need not have a dramatic effect on sales of services from the UK to the EU.

14. Appendix 4: Profiles of the North's Airports

14.1. The following tables and figures provide a brief profile of each of the North's airports.

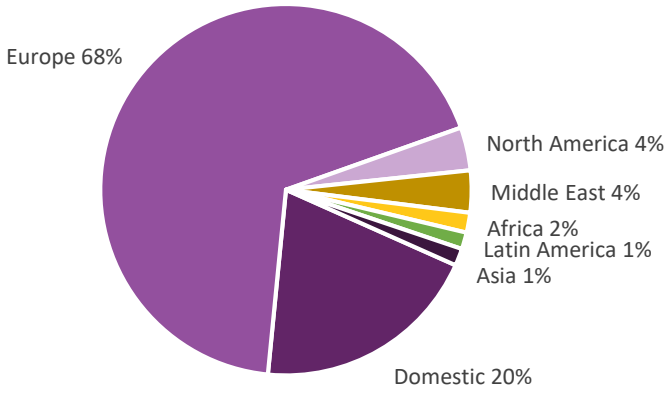
Manchester Airport

Table 14.1: Profile of Manchester Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	2,548,374	23,194,167
Charter	3,005	2,509,000
	Destinations	
	17	165
	Master Plan Passenger Forecast	
	55 million passengers per annum	

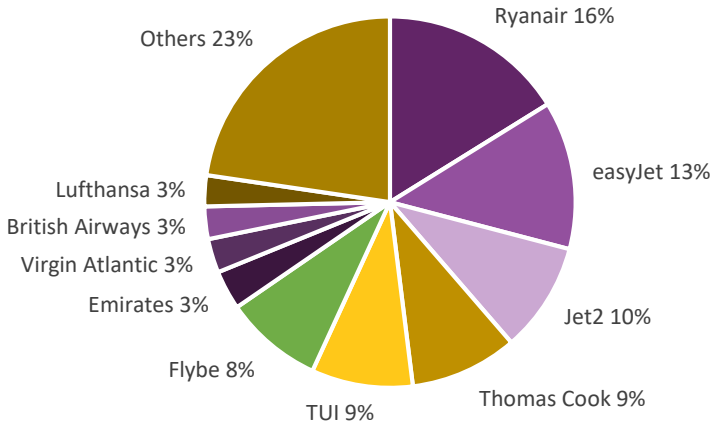
Source: CAA Statistics, OAG and Manchester Airport Sustainable Development Plan 2016.

Figure 14.1 Departures from Manchester Airport by World Region



Source: OAG.

Figure 14.2: Key Airlines Serving Manchester Airport



Source: OAG.

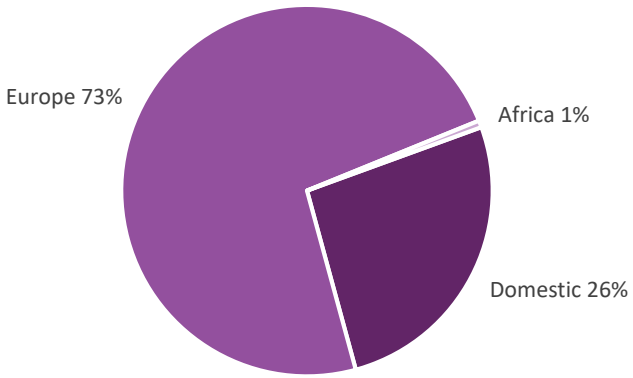
Liverpool Airport

Table 14.2: Profile of Liverpool Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	977,765	4,018,026
Charter	3,205	43,316
	Destinations	
	5	53
Horizon Year	Master Plan Passenger Forecast	
2030	7.8 million passengers per annum	

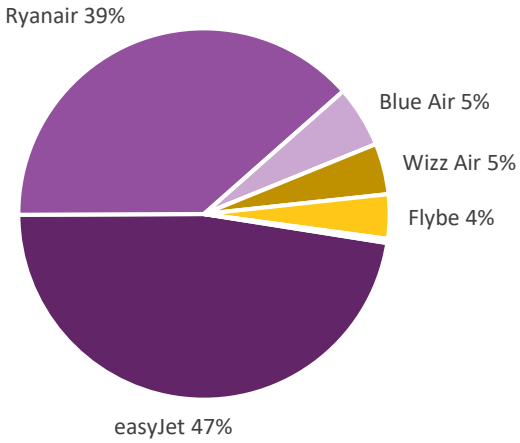
Source: CAA Statistics, OAG and Liverpool John Lennon Airport Strategic Vision 2018.

Figure 14.3: Departures from Liverpool Airport by World Region



Source: OAG.

Figure 14.4: Key Airlines Serving Liverpool Airport



Source: OAG.

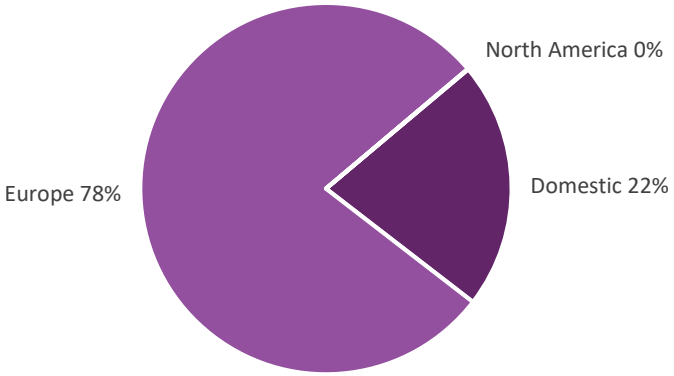
Leeds Bradford Airport

Table 14.3: Profile of Leeds Bradford Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	351,106	3,543,281
Charter	66	143,233
	Destinations	
	7	49
Horizon Year	Master Plan Passenger Forecast	
2030	7.1 million passengers per annum	

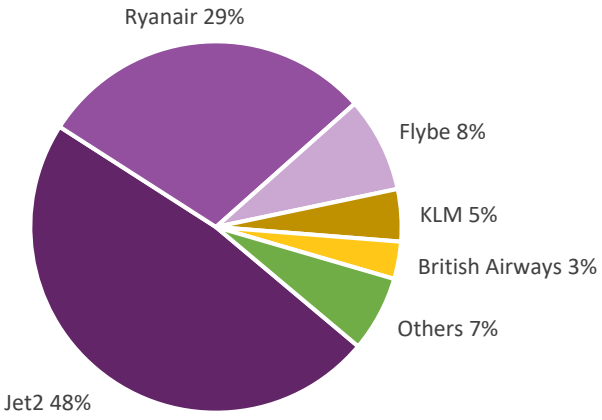
Source: CAA Statistics, OAG and Leeds Bradford Airport Strategic Development Plan 2017.

Figure 14.5: Destinations from Leeds Bradford Airport by World Region



Source: OAG.

Figure 14.6: Key Airlines Serving Leeds Bradford Airport



Source: OAG.

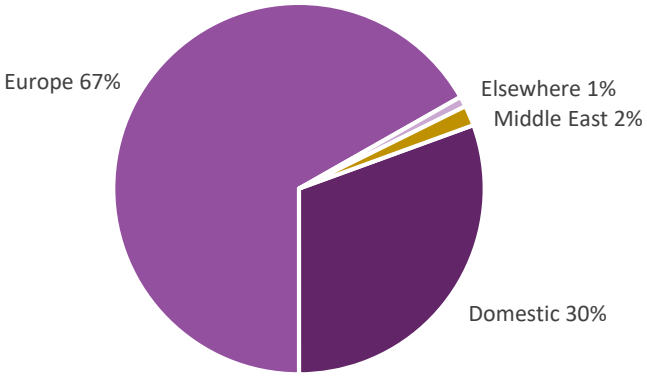
Newcastle Airport

Table 14.4: Profile of Newcastle Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	1,172,010	4,152,460
Charter	2,357	5,411
	Destinations	
	9	48
Horizon Year	Master Plan Passenger Forecast	
2035	9.4 million passengers per annum	

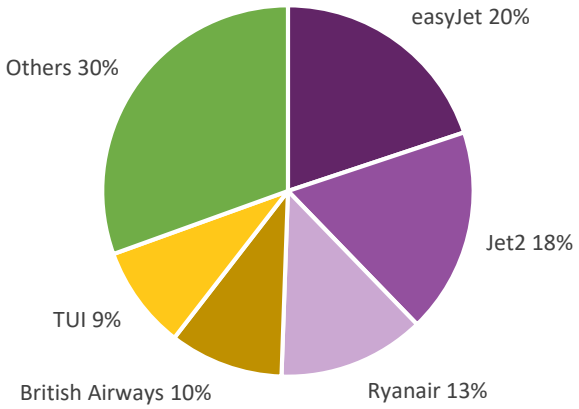
Source: CAA Statistics, OAG and Newcastle Airport Master Plan 2018.

Figure 14.7: Departures from Newcastle Airport by World Region



Source: OAG.

Figure 14.8: Key Airlines Serving Newcastle Airport



Source: OAG.

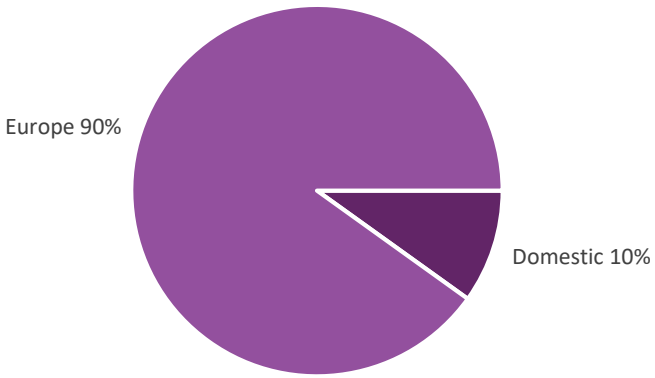
Doncaster Sheffield Airport

Table 14.5: Profile of Doncaster Sheffield Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	58,931	728,427
Charter	455	434,482
	Destinations	
	3	22
Horizon Year	Master Plan Passenger Forecast	
2037	4.7 million passengers per annum (base case)	

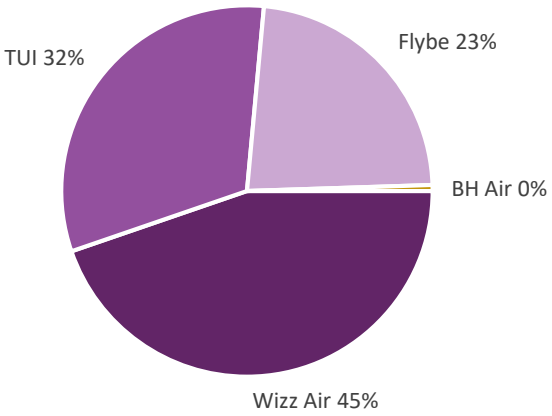
Source: CAA Statistics, OAG and Doncaster Sheffield Airport Master Plan 2018.

Figure 14.9: Departures from Doncaster Sheffield Airport by World Region



Source: OAG.

Figure 14.10: Key Airlines Serving Doncaster Sheffield Airport



Source: OAG.

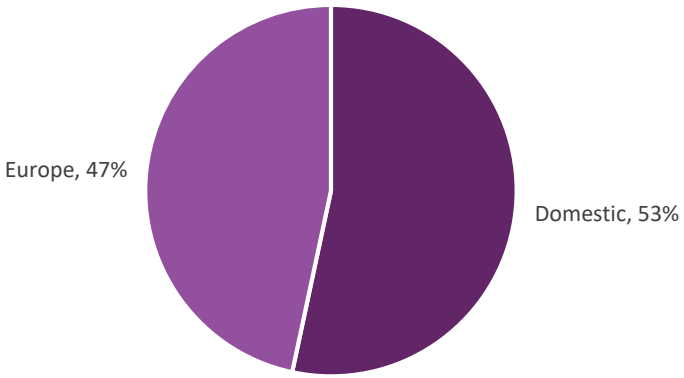
Durham Tees Valley Airport

Table 14.6: Profile of Durham Tees Valley Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	25,919	110,849
Charter	945	1,836
	Destinations	
	2	1
Horizon Year	Master Plan Passenger Forecast	
2050	0.4 million passengers per annum	

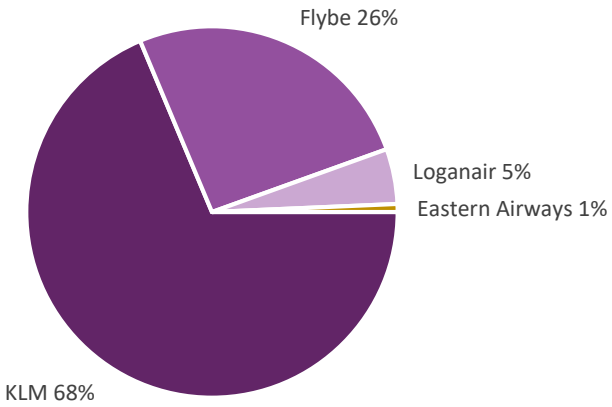
Source: CAA Statistics, OAG and Durham Tees Valley Airport Master Plan 2014.

Figure 14.11: Departures from Durham Tees Valley Airport by World Region



Source: OAG.

Figure 14.12: Key Airlines Serving Durham Tees Valley Airport



Source: OAG.

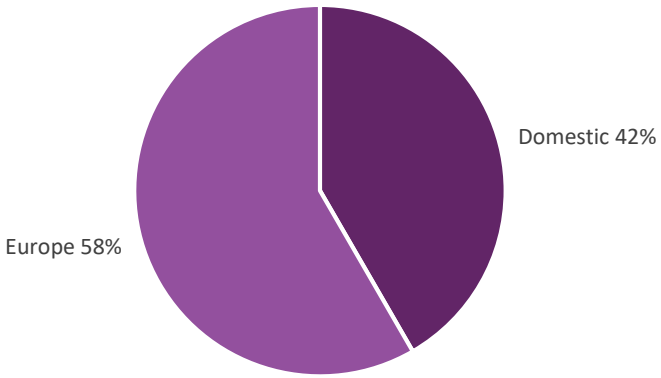
Humberside Airport

Table 14.7: Profile of Humberside Airport

	Domestic	International
	Passenger Figures (2018)	
Scheduled	25,919	110,849
Charter	945	1,836
	Destinations	
	2	1
Horizon Year	Master Plan Passenger Forecast	
2030	1.6 million passengers per annum (lower growth scenario)	

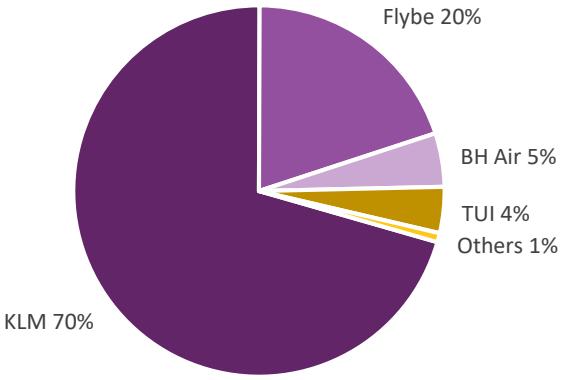
Source: CAA Statistics, OAG and Humberside Airport Master Plan 2007.

Figure 14.13: Departures from Humberside Airport by World Region



Source: OAG.

Figure 14.14: Key Airlines Serving Humberside Airport



Source: OAG.

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