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The economic impact of the UK Maritime Services Sector in Scotland

Maritime UK
One voice for shipping, ports and maritime business

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Contents

1 Executive summary

Direct contribution to employment

- In 2013, the maritime services sector is estimated to employ 35,600 people in Scotland. Over two-thirds of these were in the ports industry, with the remainder employed mainly in the shipping industry.
- Approximately one in every four people employed by the maritime services sector in the UK was based in Scotland in 2013. In terms of the sector's relative contribution to the local economy, Scotland is the highest ranked of the UK's countries and regions, accounting for 1.5% of total employment in the country.

Direct contribution to GDP

- It is estimated that the maritime services sector made a £1.8 billion gross value-added contribution to Scottish GDP in 2013, accounting for an estimated 1.7% of the country's total economic output.
- The average level of labour productivity (gross value added per person employed) in the sector was over £49,400 per worker in 2013. This is around 10% higher than the Scottish economy-wide average.

Direct contribution to UK Exchequer

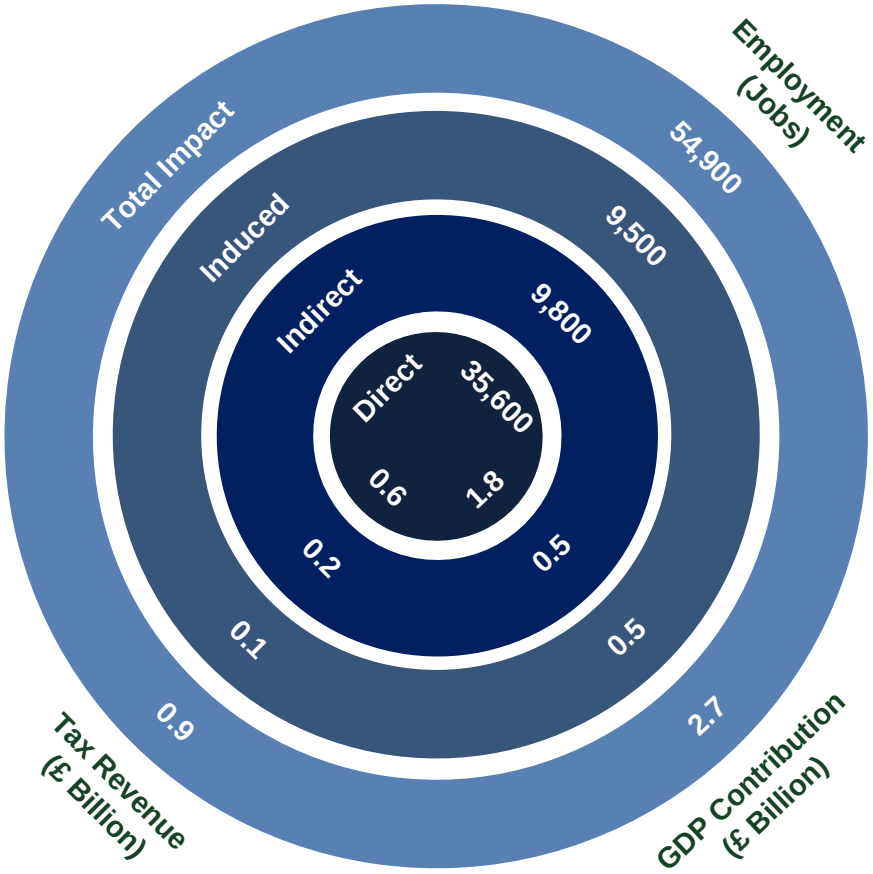
- These activities are estimated to have generated over £630 million in tax revenue, through a combination of corporation tax, employee income and NICs, and other indirect taxes such as VAT.

Multiplier effects

- Through the procurement of inputs of goods and services from Scottish-based suppliers, the maritime services sector supported a further £490 million in value added and 9,800 people in employment.
- In addition, people employed by the maritime services sector and in its direct supply chain will spend their wages at retail and leisure outlets in Scotland. This activity supported an additional £460 million of gross value added and 9,500 jobs in the Scottish economy in 2013.
- Including the direct, indirect and induced impacts, the maritime services sector in Scotland is estimated to have supported over 54,900 jobs, contributed £2.7 billion to the country's economy and generated tax revenues of £0.9 billion.

The full economic impact of the maritime services sector on Scotland, in terms of employment, GDP contribution and tax revenue generated, through each channel of impact, is summarised in Figure 1.1.

Figure 1.1: Summary of the economic contribution of the Scottish maritime services sector in 2013



2 Introduction

This report, prepared by Oxford Economics, evaluates the economic contribution of the UK maritime services sector to the Scottish economy in 2013. Here the 'maritime services sector' is defined to include the activity of UK ports, shipping and maritime business services. It therefore excludes sectors such as North Sea oil and gas extraction, the manufacture of marine equipment and the naval defence industry. As such we would consider estimates presented in this paper as conservative figures. This study was done in conjunction with separate economic impact assessments of the ports, shipping and maritime business services sectors on both the UK as a whole and its countries and regions[1].

2.1 The channels of economic impact

A standard economic impact analysis investigates three channels of impact. These are:

- **Direct impact** – employment, output and taxes in the UK maritime services sector itself, including the ports, shipping and maritime business services sectors.
- **Indirect impact** – employment, output and taxes supported down the supply chain as a result of UK maritime companies purchasing inputs of goods and services from Scottish suppliers. This includes, for example, jobs supported through the demand for iron and steel and other raw materials; communications; and a wide variety of activity in the business services sector (accountancy, IT etc).
- **Induced impact** – employment, output and taxes supported by those directly and indirectly employed in the UK maritime services sector, spending their wages at retail and leisure outlets in Scotland. This helps to support economic activity at these outlets and the companies producing the goods and services.

When dealing with a single firm/sector the total economic impact of its activities would be defined simply as the sum of these three individual effects. However, due to the interconnections between the three industries under consideration it is important that adjustments are made to avoid the possibility of 'double counting'. This issue is explored in more depth in the Appendix[2].

2.2 Report structure

The report is structured as follows:

[1] Oxford Economics (2015), 'The economic impact of the maritime services sector: Shipping', 'The economic impact of the maritime services sector: Ports', and 'The economic impact of the maritime services sector: Business Services'

[2] All figures presented in this study include adjustments made to account for double counting

- **Chapter 3** details the maritime services sector's direct impact on the Scottish economy in terms of its contribution to GDP, employment and tax revenue generated for the government.
- **Chapter 4** explores the wider multiplier impacts of the maritime services sector on the Scottish economy, through the indirect and induced channels of impact.
- **Chapter 5** concludes.
- **The Appendix** provides the detailed methodology behind the estimates of the impact of the maritime services sector.

3 Direct impact – employment and GDP contribution

This chapter highlights the employment, gross value added contribution to GDP and tax receipts created by the maritime services sector in Scotland in 2013. The maritime services sector is defined as the combination of the ports, shipping and maritime business services industries.

KEY POINTS

- In 2013, the maritime services sector in Scotland employed **35,600 people**, primarily in the ports and shipping industries. This is equivalent to 1.5% of total employment in the country.
- The maritime services sector generated a **£1.8 billion gross value added contribution to Scottish GDP** in 2013. This was larger than the contribution to the Scottish economy of civil engineering and telecommunication sector.
- This activity paid **nearly £630 million in taxes**, through a combination of corporation taxes, employee income taxes, NICs and other indirect taxes.

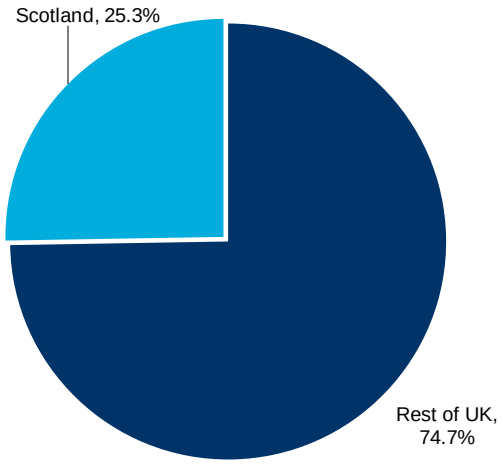
3.1 Direct impact on employment

In 2013, an estimated 35,600 people were employed in the maritime services sector in Scotland. Of these, over two-thirds were employed in the ports industry (24,400), with the majority of the remainder employed in shipping (11,200)[3]. Scotland was the largest of the UK's countries and regions in terms of employment, with approximately one in every four people employed by the maritime services sector in the UK in 2013 based in the country (Chart 3.1). In terms of the sectors relative contribution to the local economy, Scotland is again the highest ranked of the UK's countries and regions. In 2013, the maritime services sector accounted for 1.5% of total employment in the country. By comparison, the same figure was 1.3% in Northern Ireland and just 0.3% in both Wales. For the UK as a whole, the maritime services sector represented 0.5% of total employment[4].

[3] In absence of more reliable data, employment in industries such as the provision of Legal services has been attributed according to the location of the head office. Discussions with Maritime UK suggest that there is a large community of maritime lawyers operating in law firms with offices in Scotland. As such, it has not been possible to account for this level of geographical disaggregation.

[4] UK-based employees only, excluding the impact of foreign seafarers.

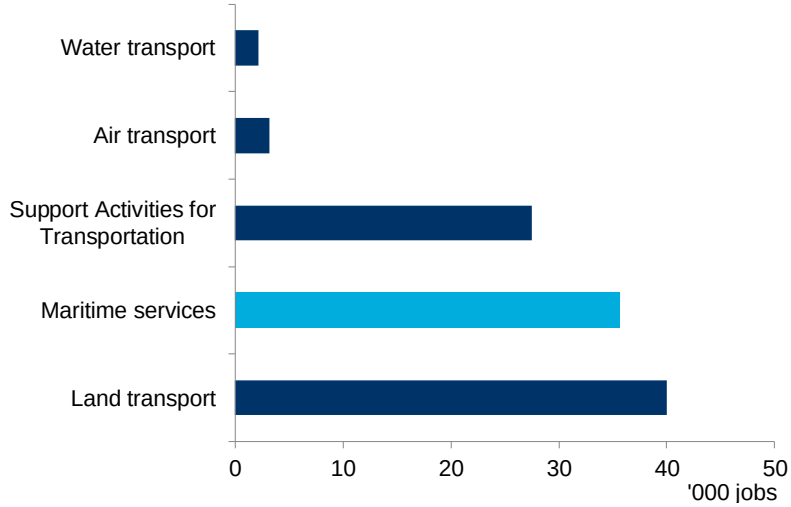
Chart 3.1: Share of UK employment in the maritime services sector in 2013



Source: Oxford Economics

To put the scale of the sector's contribution to employment in Scotland into context, it is helpful to compare the figures to employment levels in other industries[5]. This shows that the maritime services sector was a larger employer air and water transport and in warehousing and support activities for transportation[6]. The sector employs slightly fewer people than land transport activities in Scotland (Chart 3.2).

Chart 3.2: Comparison of employment with other industries in Scotland in 2013



Source: ONS, Oxford Economics

[5] Data on the size of employment in other industries is sourced from the Scottish Annual Business Survey, 2012

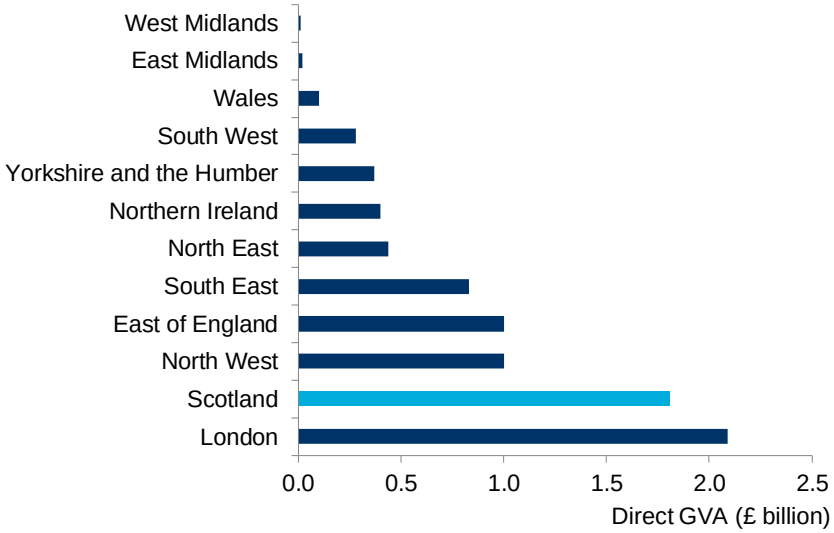
[6] Including the operation of storage facilities for water, air and land transport activities, the operation of passenger and freight terminals and facilities and cargo handling.

3.2 Contribution to GDP

Gross Domestic Product (GDP) is the main 'summary indicator' of economic activity. It is the indicator used by economists to determine the rate of growth of the economy and when it enters recession. It is estimated using the 'output approach' which measures the sum of the gross value added created through the production of goods and services within the economy[7]. Gross value added is most simply thought of as the difference between an industry's total pre-tax revenues and total brought-in costs (i.e. costs excluding wages and salaries) adjusted for any changes in stocks. An alternative method of calculating gross value added is the sum of profits and wages (before tax) generated from a sector's economic activity, known as the 'income approach'. The output and income approaches should produce the same results.

Oxford Economics estimates that in 2013 the maritime services sector generated an estimated £1.8 billion gross value added contribution to Scotland's GDP. This output was primarily generated in the ports industry (£1.6 billion) and the shipping industry (£230 million). In terms of the contribution of the maritime services sector in the UK's countries and regions, only London had a larger GDP contribution in absolute terms in 2013, with Scotland accounting for approximately 22% of the total UK-wide contribution to GDP (Chart 3.3). The strength of the Scottish maritime sector is particularly apparent in the Shipbuilding industry, where Scotland accounts for over 35% of total UK output and over one-fourth of the sector's contribution to GDP[8]. By way of comparison, Scotland accounted for approximately 6.7% of manufacturing output and 8.2% of total UK output in 2013 (in terms of value added).

Chart 3.3: GDP contribution of maritime services in the UK's countries and regions in 2013



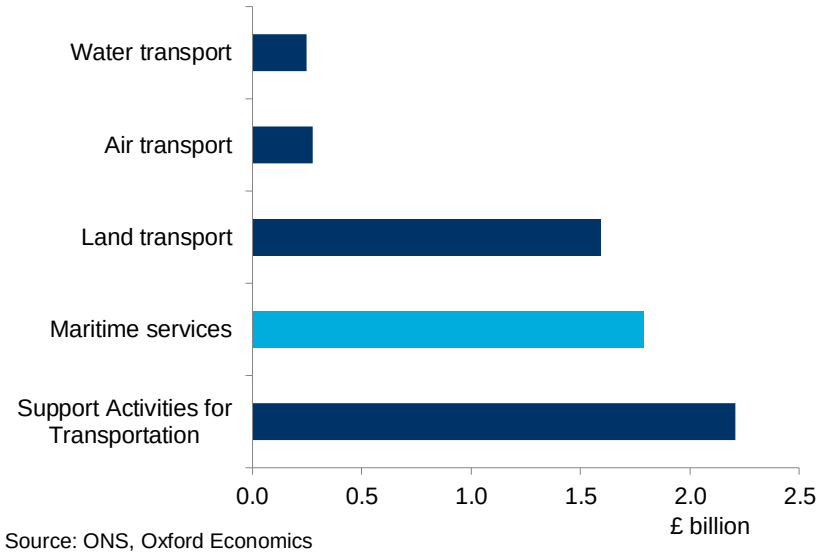
Source: Oxford Economics

[7] It is only true to an approximation that the sum of GVA equals GDP. The difference in each case, however, is small enough to proceed as if the equalities do in fact hold. GVA differs from GDP in the price used to value goods and services. GVA is measured at producer prices that reflect the price at the 'factory gate' together with cost of distribution. GDP is measured at market prices that reflect the price paid by the consumer. The two prices differ by the taxes less subsidies levied on the goods or services.

[8] Based on 'Scottish Annual Business Statistics, 2012', a national statistics publication for Scotland. Elements of the shipbuilding sector will be included within the total estimate for the ports industry in so far as the activities are located on-site at Scottish ports.

Again, in order to provide context, it is useful to compare these results to the value-added contribution of other industries in Scotland[9]. This indicates that, in 2013, the maritime services sector's contribution to Scottish GDP was larger than the activities of the water, air and land transport sectors. Meanwhile, the sector's value added was only slightly less than in support activities for transportation (Chart 3.4).

Chart 3.4: Comparison of GVA with other industries in Scotland in 2013



Source: ONS, Oxford Economics

Combining the estimates for the value added and employment suggests that the maritime services sector's productivity was over £49,400 per worker in 2013. This is around 10% higher than the Scottish average (£44,900).

3.3 Revenue generated for the Exchequer

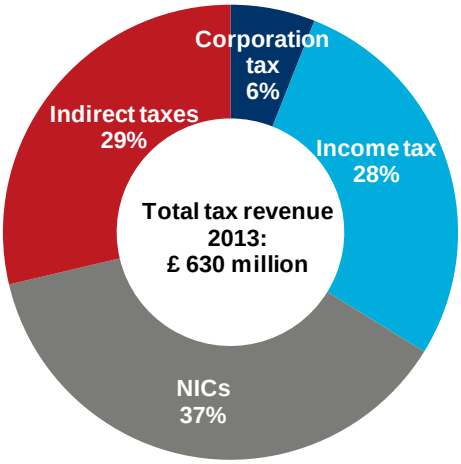
A further benefit from the maritime services sector in Scotland is that it contributes towards the tax revenue. Oxford Economics have calculated the sector's tax contribution in terms of corporation tax paid by companies, National Insurance Contributions (NICs) of both employers and employees, income tax levied on employee earnings and other indirect tax contributions generated through the spending of those directly employed by the sector (including VAT).

The results indicate that the maritime services sector in Scotland is estimated to contribute approximately £630 million in taxes through corporation, labour and indirect taxes. The highest component was that of NICs, which amounts to around £236 million, accounting for over one-third of the total tax contribution in 2013 (Chart 3.5). Contributions through indirect taxes and employee income tax followed, amounting to an estimated £180 million and £175 million, respectively. Meanwhile, corporation taxes on industry profits were an estimated £38 million. In

[9] Data on the size of other industries contribution to Scottish GDP is sourced from the ONS' (2012), 'Annual Business Survey', August 2014, representing the latest available data at a regional level.

total, nearly one in every four pounds in tax revenue generated by the maritime services sector in the UK originated from individuals and companies in Scotland.

Chart 3.5: Breakdown of tax revenue in 2013



Source: ONS, HMRC. Oxford Economics

4 Multiplier effects – indirect and induced effects

As well as the direct contribution of the maritime services sector to the Scottish economy, its procurement of inputs of goods and services and payment of wages which are also spent in Scotland stimulates economic activity. This not only includes the impact of the activity of Scottish firms and individuals within the maritime services sector, but also of those firms and individuals located outside the country. For example, a shipping firm based in Yorkshire and the Humber may source inputs from a Scottish supplier as part of their production process. As such, the impact of this expenditure on economic activity and employment in Scotland will be included within the figures presented. The remainder of this chapter will summarise the key findings focusing on the same three metrics: employment, gross value added contribution to GDP and tax receipts.

KEY POINTS

- It is estimated that **9,800 jobs** are supported in the sector's supply chain by its procurement, with a further **9,500 jobs** supported through the induced spending of both direct and indirect employees. Therefore, it is estimated that the maritime services sector supported a **total of 54,900 Scottish jobs in 2013**, equivalent to 1 in every 43 people employed in the country.
- In terms of the multiplier effects, estimates suggest that the UK maritime services sector supported a **£490 million** gross value added contribution in its Scottish based supply chain, while an additional **£460 million** was generated through the expenditure of direct and indirect employees on consumer goods and services produced in Scotland. This implies that the sector supported **an estimated £2.7 billion contribution to economic output in 2013**.
- Additional tax revenue amounting to over £306 million was generated through these multiplier impacts (through the indirect and induced channels of impact), resulting in a **total tax contribution of an estimated £0.9 billion in 2013**.

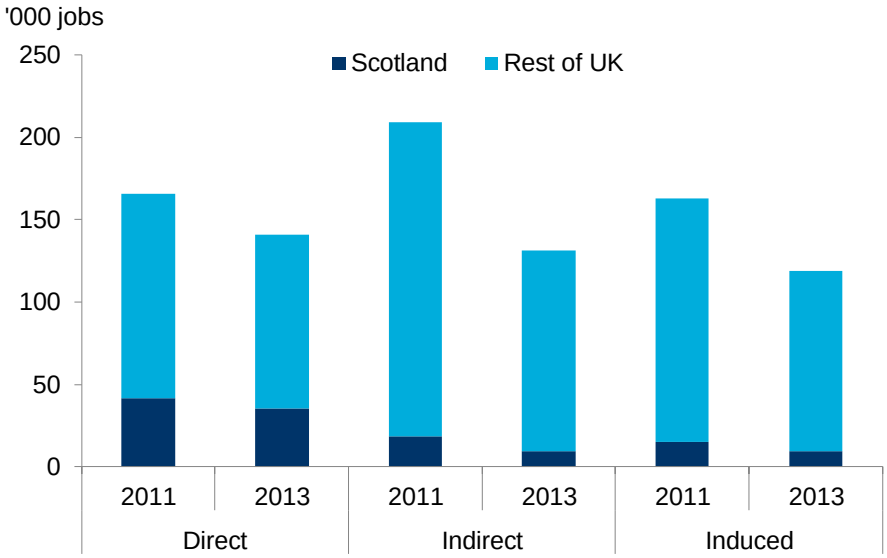
4.1 Indirect and induced impact on Scottish employment

In 2013, an estimated 9,800 jobs in Scotland were supported by the UK maritime services sector's expenditure on inputs of goods and services from local suppliers. In addition, a further 9,500 jobs were supported in Scotland through the wage-financed spending of the sector's staff and those employed in its direct supply chain. Therefore in total, the maritime services sector in Scotland supported over 54,900 jobs in 2013 or 2.3% of the country's employment (equivalent to 1 in every 43 jobs in Scotland). This relative contribution to employment was larger than any other country or region in the UK, highlighting the significant contribution of maritime services to the Scottish economy.

In total, 14% of total employment supported by the maritime services sector in 2013 was located in Scotland, despite accounting for a quarter of all direct jobs. This relationship is illustrated in

Chart 4.1, indicating how Scotland accounts for a greater share of employment through the direct channel of impact than through the indirect and induced channels. As such, there are a large number of jobs supported through supply chain activity in regions such as London and the South East of England. Despite this, only in London did the maritime services sector support more jobs than Scotland did in 2013.

Chart 4.1: Total employment breakdown of the maritime services sector in Scotland in 2011 and 2013

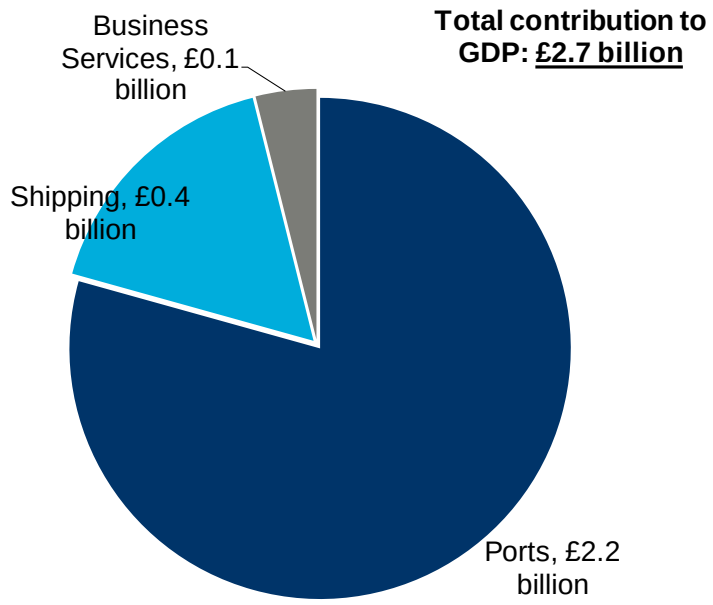


Source: Oxford Economics

4.2 Indirect and induced impact on GDP in Scotland

Estimates indicate that the UK maritime services sector's procurement of inputs generated an additional £490 million of gross value added in it Scottish supply chain, with a further £460 million generated in the country by the spending of those employed directly and indirectly as a result of the sector's activity. This implies that in total, the maritime services sector supported an estimated £2.7 billion gross value added contribution to GDP in Scotland, equivalent to 2.6% of the country's total economic output in 2013. In terms of the breakdown of this total impact, the ports industry accounted for approximately 78% of the impact, supporting nearly £2.2 billion in 2013. This was followed by the shipping industry, supporting a total impact of £0.5 billion in 2013, with business services accounting for the remaining £140 million (Chart 4.2).

Chart 4.2: Total contribution to Scottish GDP of the maritin

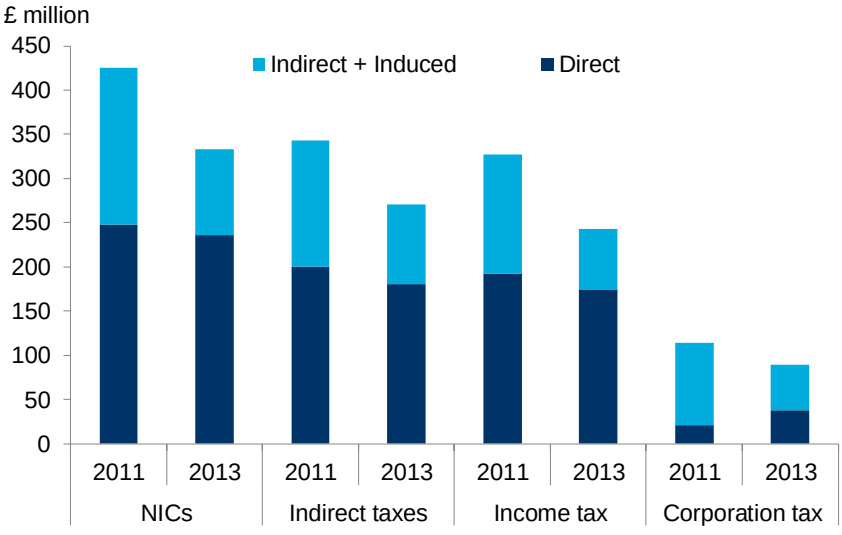


Source: Oxford Economics

4.3 Indirect and induced tax revenues

A further benefit of these indirect and induced impacts is that they generate additional tax revenue. The results indicate that in 2013, the maritime services sector supported a further £306 million in tax receipts through the indirect and induced channels of impact. Across all three channels of impact, it is therefore estimated that the sector contributed over £0.9 billion in tax revenue to the government, equivalent to 14% of the total tax revenue generated by the UK maritime services sector. Chart 4.3 illustrates the breakdown of tax receipts by the type of tax and channel of impact.

Chart 4.3: Summary of tax revenue generated by the maritime services sector in Scotland in 2011 and 2013



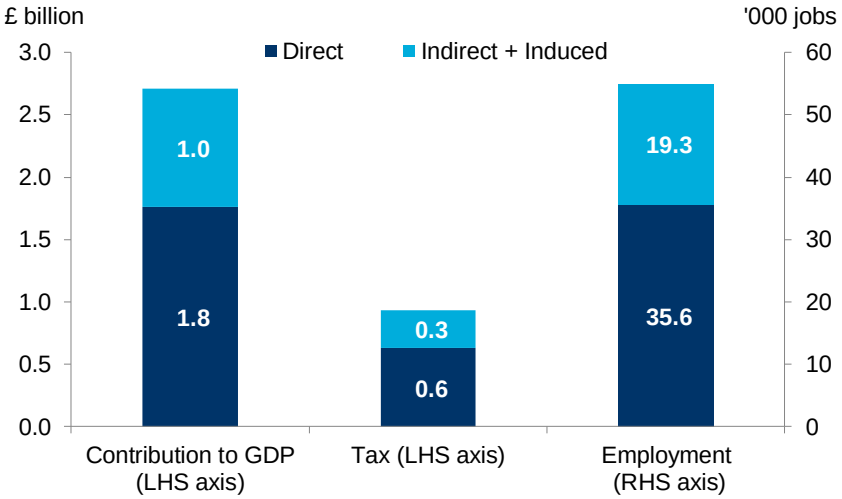
Source: Oxford Economics

5 Conclusion

This report has described and quantified the three expenditure channels through which the maritime services sector generates important economic benefits for the Scottish economy, including the contribution of the ports, shipping and maritime business services industries. Results are presented in terms of three standard metrics (employment, gross value added contribution to GDP and tax revenues). In 2013, the maritime services sector:

- contributed £2.7 billion to Scottish GDP;
- supported over 54,900 jobs in the country; and
- generated over £0.9 billion in tax receipts.

Chart 5.1: Summary of the total economic impact of the Scottish maritime services industry in 2013



Source: Baltic Exchange, Nautilus International, UK Chamber of Shipping, Oxford Economics

This study was financed through the kind support of Scottish Enterprise.

6 Appendix – Methodology

This chapter details the methodology behind the results presented in the preceding chapters.

6.1 The Ports Industry

The ports industry is defined to include a range of activities such as warehousing and storage, transport services and shipbuilding and repair, undertaken in the vicinity of the location of ports. Using the ONS Business Register and Employment Survey (BRES), Oxford Economics have selected SIC codes that reflect the type of activities that occur in ports[10]. This was mapped to wards containing ports as shown by maps on the websites of major port groups and in hard copy. From this, an estimate was derived for the employment at four major Scottish ports: Forth, Clyde, Sullom Voe and Orkney, together accounting for nearly 70% of port freight traffic (by tonnage) handled by Scottish ports in 2013. In order to account for the remainder of Scottish ports this total was then grossed up using this share.

For some of the public sector occupations in ports it is possible to obtain more accurate information from other government sources. The National Audit Office (2008) reports that in 2007, HM Revenue and Customs (HMRC) had 4,500 staff working for the UK Border Agency on detection[11]. Assigning a share of this total to UK ports using the share of imports (in volume terms) to the UK that arrive via ports suggests that there were approximately 3,375 people working as custom officers at UK ports in 2007. In order to extrapolate to 2013, this figure has been adjusted to account for the growth of freight volumes handled at UK ports, which has fallen by over 14% since 2007. This suggests there are currently 2,919 HMRC staff working on detection at UK ports. As such, the share of HMRC staff working at Scottish ports was estimated using the share of total UK freight handled at Scottish ports. Moreover, the National Audit Office (2013) reports a total of 7,600 staff were employed by the Border Force in March 2013[12]. ONS (2012) tourism data shows just under 15% of foreign visitors to the UK arrived by sea[13]. Using this proportion, it is estimated that nearly 1,100 of the Border Force's staff are employed in UK ports. Again, the share of total UK international passengers handled at Scottish ports was used to estimate the proportion of Border Force staff working in Scotland.

To calculate the gross value added contribution to GDP of the Scottish ports sector, we have multiplied the number of employees in each industry operating within the ports sector by the average productivity of employees working in that industry. The calculation is undertaken at the 4 digit SIC level[14]. The labour productivity estimates are sourced from the ONS Annual Business Survey (ABS) results for Great Britain, by dividing gross value added by employment for each industry.

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[10] The BRES covers all UK businesses registered for Value Added Tax (VAT) and/or Pay as you Earn (PAYE). Focusing on employment and financial information, its data is disaggregated by industry and geography. The Standard Industrial Classification of Economic Activities (SIC) is used by the Office for National Statistics to classify businesses by the type of economic activity in which they are engaged. It provides a framework for the collection, tabulation, presentation and analysis of data.

[11] National Audit Office, (2008), 'HM Revenue & Customs: The control and facilitation of imports', 7 November.

[12] House of Commons, (2013), 'The Border Force: securing the border', Session 2013-14, 4 September 2013.

[13] ONS, (2014), 'Travel trends 2013', 8 May.

[14] Where the ONS does not publish the information required to calculate productivity at the 4 digit SIC code level in the ABS, we use the appropriate 3 digit code.

6.2 The Shipping Industry

Data on employment in the UK shipping industry are available in the UK Chamber of Shipping's manpower survey for 2013. This survey covers all employees in UK shipping companies that are members of the UK Chamber of Shipping. In order to estimate employment in UK-based shipping companies that are not members, Oxford Economics have applied a grossing factor based on that used by the Office for National Statistics (ONS) when grossing up turnover data from UK Chamber of Shipping members. The UK Chamber of Shipping's manpower survey also estimates the number of UK shore-based employees suggesting that, after up-scaling the figure by the ONS grossing factor, there are currently over 8,700 shore-based employees in the UK[15]. These figures were combined with statistics on the geographical breakdown of employment sourced from Nautilus International[16], to estimate the numbers employed in Scotland and the UK's other countries and regions.

In order to estimate the shipping industry's direct contribution to the UK economy, Oxford Economics have made use of ONS data on turnover provided by the UK Chamber of Shipping Annual Sea Inquiry[17] and then applied estimates for total bought-in costs and changes in stocks from ONS National Accounts data. Subsequently, Oxford Economics adopted a hybrid approach to estimating the geographical distribution of the contribution to GDP to the UK's countries and regions. Typically geographical impacts can be modelled by using either a 'workplace-based' method, or a 'residence-based' method, allowing for the impact of commuting. The two methods often produce similar results, however as there often exists a disconnection between the location of seafarers and the shipping companies that employ them, it is unlikely that this will be the case for the shipping industry. As such, and partly to reflect the nature of the available data, Oxford Economics have chosen an approach that combines elements of both methods to produce a better representation of the distribution of gross value added by country and region.

Recalling that gross value added can be estimated using the 'income approach' (Section 3.2), the first step in estimating the regional impact of the shipping industry was to decompose the direct impact into the components that constitute this approach (i.e. profits and wages). This exercise was done by applying the ratio of employee compensation to GVA for the water transport sector from ONS data[18]. The resulting estimate for gross compensation of employees was split between the UK's countries and regions according to the breakdown of employment of Nautilus International members, using the 'residence-based' accounting method[19].

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[15] Here onshore employees refer to those individuals involved in the administration and management of UK-based shipping companies, such as Fleet Directors, Technical Supervisors and other Secretarial and Accounts employees, and not those ex-seafarers now employed in other industries based onshore (e.g. insurance, finance etc).

[16] Trade union for maritime professionals at sea and ashore

[17] The UK Chamber of Shipping surveys all its members annually and the data is uplifted by the ONS to account for UK sea transport companies who are not members using estimates for the gross tonnage of the UK fleet for different types of ship.

[18] ONS (2014), 'Input-Output Supply and Use Tables, 2014 Edition', 31 October.

[19] It is not possible to apportion the element of employee compensation that would accrue to foreign seafarers. As such, this element of the Shipping industry's contribution to UK GDP has not been allocated regionally.

The remaining element of gross value added, gross profits, was allocated geographically using the 'workplace-based' approach. This was based on returns to the UK Chamber of Shipping's balance of payments inquiry 2013, an annual survey of members which forms part of the ONS' balance of payments accounts, by allocating shipping revenues to countries and regions based on the location of the head offices of respondents. The breakdown of shipping revenues was subsequently applied to the estimate of gross profits to apportion this component of GVA to the UK's countries and regions.

6.3 The Business Services Sector

As official statistics on the number of jobs in the maritime business services sector do not exist[20], Oxford Economics have relied heavily on the findings of a Baltic Exchange report authored by Sun Wei[21]. His study employed a variety of methodological techniques to estimate the contribution of the maritime business services sector to the UK's countries and regions, in terms of employment and turnover, including an annual survey of Baltic Exchange members, interviews with major trade organisations or companies, discussion with industry experts, and reference to public information such as conference material, annual reports and industry yearbooks.

To estimate gross value added, Oxford Economics sourced data on the average earnings of staff in each industry that composes the maritime business services sector from the ONS' Annual Survey of Hours and Earnings (ASHE)[22] in 2013. The average wage for each sector was subsequently applied to Wei's (2014) employment data to generate an estimate of employee compensation. This was combined with estimates of the profitability of each industry, estimated by applying the relationship between revenue and profits, sourced from the ONS analytical input-output tables, to Wei's (2014) estimates of revenue for each industry[23]. Finally, by summing the estimates of employee compensation and industry profits, an estimate for value added of the sector is generated using the income approach. The geographical breakdown of gross value added was estimated by applying the same distribution as with employment.

6.4 Issues with 'double counting'

In order to combine the economic impacts of the three sectors together there were two key issues that needed to be addressed:

- firstly, the definitions of each sector were not mutually exclusive, implying that by simply summing the three direct impacts would lead to an over-estimation, i.e. including the impact of certain sub-sectors more than once, or 'double counting'.

[20] Employment data is available for more aggregated sectors only such as financial services or insurance.

[21] Wei, S, (2014) 'Updates on UK maritime professional services revenue and employment', the Baltic Exchange.

[22] Where ASHE does not publish the information at the appropriate level of disaggregation, broader industry definitions are used to estimate average wages.

[23] Using the ratio of Gross Operating Surplus to Gross Output for each industry. ONS (2014), 'Input-Output Supply and Use Tables, 2014 Edition', 31 October.

Indeed, the ports industry included local employment in both the 'sea and coastal transport sector' (part of the shipping industry) and the 'non-life insurance' sector (part of the maritime business services sector). To account for this, the employment and gross value added attributed to those sectors were subtracted from the direct estimate of the ports industry; and

- secondly, it is evident that, particularly in the case of shipping, the supply-chain effects (identified as part of the indirect impact) would have already been counted as part of the direct estimates of either the ports industry or the maritime business services industry. For example, some workers in UK ports and in the ship broking industry would already be captured as part of the shipping industry's supply chain. As such, Oxford Economics estimated the proportion of the shipping industry's supply chain that would have been accounted for by the ports and maritime services sector. Subsequently, the indirect and induced impacts of the shipping industry were adjusted accordingly.

6.5 Indirect and induced impacts on GDP and employment

To calculate the size of the indirect effects Oxford Economics multiply the direct gross value added of each sub-component of the industries that make up the maritime services sector (ports, shipping and business services) by a supply chain (or Type I) multiplier derived from the ONS analytical input-output tables[24]. Where there is not a direct match between a multiplier and an industrial sector, the most applicable broad industry multiplier has been used. The results for the individual industries are then aggregated to estimate the value added contribution to GDP that the maritime services sector's purchases of inputs generates in its UK-based supply chain. Meanwhile, the induced impact was calculated using consumption (Type II) multipliers derived from the ONS analytical input-output tables, in a similar procedure to that used to calculate the indirect impact[25].

In order to calculate the geographical breakdown of the indirect impact, data was sourced from the ONS' Annual Business Survey on the regional breakdown of gross value added by broad industrial sector. This was combined with the indirect contribution to GDP, calculated in section 4.2, which was then split into broad industrial sectors according to the breakdown of intermediate consumption of the relevant industries that together comprise the ports sector. The resulting model apportions the indirect impact of the ports sector to the different regions for each broad industrial sector based on the distribution of total UK output for that industry. A

[24] ONS (2014), 'Input-Output Analytical Tables, 2010 Edition', 12 February. A Type I multiplier shows the activity generated by the sectors spending on inputs of goods and services. It measures the size of the direct and indirect effects divided by directs effects. Input-output tables are designed to give a snapshot of an economy at a particular time, showing the major spending flows from 'final demand' (i.e. consumer spending, government spending and exports to the rest of the world); intermediate spending patterns (i.e. what each sector buys from every other sector – the supply chain); how much of that spending stays within the economy; and the distribution of income between employment income and other income (mainly profits). In essence an input-output model is a table which shows who buys what from whom in the economy. The latest available domestic use input-output table for the UK, published by the ONS, was for calendar year 2010.

[25] A Type II multiplier shows the activity generated by spending on inputs of goods and services and by the spending of households. It measures the size of the direct, indirect and induced effects divided by direct effects.

similar method was used to estimate the regional induced impacts, but rather the induced contribution to GDP of the UK ports sector was split into broad industrial sectors according to the distribution of household consumer expenditure, again sourced from ONS analytical input-output tables[26].

To calculate the number of people employed in the maritime services sector supply chain based in Scotland, Oxford Economics divide the estimate of indirect and induced gross value added by a figure for average whole economy productivity (£50,000 per person in 2013), again sourced from ONS data.

[26] ONS (2014), 'Input-Output Supply and Use Tables, 2014 Edition', 31 October.

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