UK SEAFARER PROJECTIONS

NOVEMBER 2016

Oxford Economics

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November 2016

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Context for this study

In response to one of the key recommendations of the 2015 Maritime Growth Study, DfT commissioned Oxford Economics to assess the UK supply and demand for trained seafarers to fulfil roles at sea and onshore over the coming decade. A separate study reviews the Support for Maritime Training (SMarT) scheme and considers how the UK's maritime skills needs might be delivered in future.

Global demand for seafarers at sea

Global demand for seafarers reached 1.5 million in 2015, comprising 790,500 officers and 754,500 ratings. Recent years have seen stronger growth for officers than for ratings, which may reflect the increasing technical complexity of vessels in driving demand for seafarers with the highest skills, and that roles performed by ratings are more susceptible to replacement by technology.

Based on the long-term relationship between global trade growth and seafarer numbers, we forecast that that global demand for officers could increase to almost 1.1 million in 2026, and 865,000 for ratings. Trends in global economic and trade growth are likely to remain the most important influence on the demand for seafarers, although advances in ship design will also play a role as average vessel size and technological complexity continue to increase.

While automation could eventually lead to the use of autonomous ships, stakeholders felt these were unlikely to become widespread during the next 10 years. Nonetheless, the speed of technological progress is extremely uncertain and if disruptive technological changes were to occur more quickly, outcomes could differ from those suggested by our forecast.

UK demand for seafarers in roles at sea

The UK shipping fleet declined between 2009 and 2015, reflecting increasingly strong competition from emerging global maritime centres. Despite this, the number of officers and non-hospitality ratings of all nationalities working in the UK shipping industry has remained fairly stable since 2006. This apparent inconsistency appears to reflect strong growth within the relatively labour intensive cruise sector.

Under the assumption that the UK's share of global officer demand continues to decline, though at a slower rate than over the past decade, we estimate that the UK's demand for officers of all nationalities will peak at 38,700 in the early 2020s, before easing back to below 38,000 by 2026. Assuming the UK's share of global demand for non-hospitality ratings remains constant, UK demand could increase to 30,000 by 2026. Finally, if the cruise sector continues to increase its importance within the UK shipping industry, the UK's requirement for hospitality ratings could increase to 80,000 by 2026.

The main drivers of the UK shipping industry's future demand for seafarers are expected to be closely aligned with the global picture, although the relative attractiveness of the UK's policy regime will also have an important influence.

Building on the Maritime Growth Study, the Government is taking steps to support growth of the maritime industries, and the MCA has an objective to grow the UK Ship Register. While it is too early to factor the impact of these efforts into our forecasts, if they prove successful there may be scope for stronger growth than suggested by our analysis.

UK supply of seafarers for roles at sea

An important characteristic of the UK shipping industry over the last decade has been the increasing employment of non-UK seafarers. Only 40 percent of officers, 30 percent of non-hospitality ratings, and 20 percent of hospitality ratings in the UK shipping industry are now UK nationals. Moreover, more than one-third of UK officers and more than one half of UK non-hospitality ratings are aged 50 or over, suggesting that a large proportion of the workforce is likely to retire over the coming decade.

For our baseline forecast we adopt the, arguably conservative, assumption that the supply of non-UK officers to the UK shipping industry increases in line with forecast global supply. We find that the number of officers of all nationalities available to work in UK shipping could fall by three percent by 2026. Again based on conservative assumptions regarding global supply, the supply of non-hospitality ratings of all nationalities is expected to decline by one percent during the forecast period.

However, these findings are very sensitive to assumptions regarding non-UK seafarers. If the UK shipping industry were to continue to increase its employment of non-UK seafarers in line with historical rates, the supply of both officers and ratings could increase over the coming decade.

UK demand for former seafarers for roles onshore

Research published in 2003 identified that there are more than 15,000 onshore roles within the UK maritime industries for which a former seafarer is essential or advantageous. Based on survey responses obtained for this study, we estimate that the number of onshore roles requiring a former seafarer could be in the region of 4,300.

There are two important methodological differences between our results and those from the earlier study. Firstly, our focus is on roles based in the UK, whereas the previous study also included UK companies' employment of former seafarers in roles based overseas. Secondly, our estimate excludes former seafarers who are based onshore, but who work on board vessels, such as harbour pilots or tugboat crew. Such individuals are not separately identified within Official Statistics, and are already counted within estimates of seafarers active at sea. From the information available on the earlier study it is not possible to determine the extent to which these definitional differences explain the gap between the two sets of results

Over and above methodological differences, for some parts of the maritime industries very few responses were received from organisations that reported employing former seafarers onshore, leading to some uncertainty in our results for marine engineering and consulting /surveying, in particular.

Nonetheless, where our survey does enable like-for-like comparisons with the earlier research, it appears that onshore requirements have fallen over the last 10 to 15 years. This may reflect reductions in total onshore employment numbers in some sub-sectors, or the adaptation of roles and training so that more functions may be performed by non-seafarers.

UK supply of seafarers for roles onshore

Seafarers choosing to move to roles onshore are most likely to decide to do so around the age of 30, or in their early 40s after they have gained experience commanding a vessel. Employers report that it can be difficult to find experienced former seafarers to take up roles onshore, which may reflect that onshore roles typically involve a large reduction in take-home pay compared to working at sea, making them unattractive to seafarers who do not wish to make the switch for lifestyle reasons.

Although the number of cadets entering training has increased over the last 10 years, lower numbers trained in earlier years may be affecting the current pipeline of experienced seafarers moving onshore.

Extent to which requirements need to be met by UK seafarers

Overall demand for UK seafarers in the global shipping industry is strong, particularly for more senior officers and those with specialised skills. This reflects the strong international reputation of the UK maritime training system.

Other perceived advantages of UK seafarers include their knowledge of the UK industry, the UK's maritime heritage, the English language and the UK culture and mind-set, which some see as producing pragmatic and strategic seafarers who can think on their feet and solve problems. Some companies feel there are reputational advantages from hiring UK crew, and hope to retain UK seafarers within their company for longer, including when they move onshore. However, some stakeholders suggested that as training improves around the world the skill levels of seafarers of different nationalities are converging, and quality of training is becoming a more important consideration than nationality.

Between 40 and 50 percent of survey respondents felt that the current proportion of UK seafarers or former seafarers in their organisation was about right. Nonetheless, more than 40 percent of those employing officers at sea or former seafarers in roles onshore suggested they would like to employ more UK seafarers if they were available. The greatest barriers to employing more UK seafarers are a lack of suitably qualified seafarers and higher training and employment costs than for seafarers of other nationalities.

The balance between supply and demand

The final step in our analysis is to bring together forecasts for the demand and supply of seafarers. We identify a shortage (or 'excess demand') of around 3,000 to 4,000 deck and engine *officers* in most years of our forecast period. Excess demand for deck and engine *ratings* is estimated to increase throughout the forecast period to reach a shortage of around 2,000 by 2026. These findings are based on conservative assumptions concerning the supply of non-UK seafarers. If we instead assume that the supply of non-UK seafarers continues to grow in line with historic rates, then excess demand is eliminated.

Whether there is a case for substantially increasing the training of UK seafarers to close the gap between demand and supply rests on the likely response of shipping companies. On the one hand, many employers reported that they would prefer to employ more UK seafarers and former seafarers were they available. On the other hand, over the last decade shipping companies have substantially increased their employment of non-UK seafarers. If they were to continue to recruit non-UK seafarers at similar rates in future there may be insufficient posts available for additional UK cadets to take up.

On balance there would appear to be scope for some degree of increase in UK training provision, although uncertainty concerning employers' responses suggests there could be risks associated with attempting to entirely close the gap through additional training. The separate study on the SMarT scheme assesses the costs and benefits of training UK seafarers.

In contrast to the situation at sea, modelling of the demand for and supply of seafarers for roles onshore suggests there should, at least in theory, be an ample supply of former seafarers becoming available to take up such roles in the years ahead. This is in sharp contrast to the current situation, in which stakeholders have reported that it can be very difficult to secure the services of former seafarers for onshore roles.

The apparent inconsistency between current experience and the model results for onshore roles may reflect limitations in the available evidence relating to both the demand for and supply of seafarers to take up such roles. Another possibility is that the skills of seafarers leaving roles at sea are not well aligned with the requirements of employers onshore. That is, a mismatch exists in terms of quality rather than quantity. Our finding for roles onshore should, therefore, be treated with caution, and we would suggest further research and regular data collection to track this issue going forwards.

Caveats and limitations

At the time of writing it is too early to assess how exiting the EU could affect the UK maritime industry, and potentially disrupt the long-run relationships upon which much of our analysis relies. Early discussions with stakeholders suggest that exiting the EU could bring both opportunities and risks for the sector. The implicit assumption throughout our analysis is that exiting the EU does not have a substantive impact on the UK's demand and supply for trained seafarers. It will be important to keep this situation under review as the implications for the maritime industry become clearer.

More broadly, while we have used the best available information throughout our research, the key datasets which underpin our analysis are subject to important limitations. Estimation is required to obtain the time series of global and UK seafarer numbers which provide the foundation for much of our analysis. Estimates of the requirement for former seafarers to work onshore could only be obtained through an industry survey, and therefore rely entirely on information provided to us by a sample of employers who were willing and able to respond. In some parts of the industry the number of responses received was very low. Given these limitations, our findings are subject to a number of uncertainties, and these are highlighted in the relevant places throughout the report.

1. INTRODUCTION

1.1 CONTEXT FOR THIS STUDY

In 2015 DfT published the findings of its Maritime Growth Study, which was undertaken to "identify where and how improvements can be made to improve the sector's international competitiveness and generate growth".[1] One of the recommendations of that study was for government to update its assessment of the UK maritime sector's future seafaring skills requirement to ensure industry and government have an up-to-date picture of supply and demand.

In response to this recommendation, DfT has commissioned Oxford Economics to undertake a comprehensive assessment of the UK's requirement for and supply of trained seafarers to fulfil roles both at sea and onshore over the next 10 years.

This study comes at a time when a number of other workstreams are underway to identify opportunities to support the growth of the maritime industries. For example, DfT has commissioned another study to review the Support for Maritime Training (SMarT) scheme and consider how the UK's maritime skills needs might be delivered in future. And a consortium of stakeholder organisations has recently published research to identify the skills needs of seafarers as they make the transition from a role at sea to one onshore.[2]

1.2 PROJECT OBJECTIVES

The primary objective of the project, in line with the recommendation from the Maritime Growth Study, is to produce updated forecasts of the demand for and supply of seafarers in the UK maritime industries. To do this we assess:

- the global demand for seafarers at sea (discussed in section two);
- the UK's demand for seafarers in roles at sea (section three)
- the UK's supply of seafarers for roles at sea (section four)
- the demand for former seafarers to work in roles onshore in the UK (section five)
- career progression and the supply of former seafarers available for roles onshore (section six).

As part of our research we also give specific consideration to the extent to which roles need to be filled by UK seafarers, as opposed to those of other nationalities (section seven). We conclude in section eight by bringing together the various strands of research to assess the extent to which there may be a gap between the UK's demand for seafarers and former seafarers, and the supply of such individuals. Our focus throughout is on the period to 2026.

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[1] Department for Transport, *Maritime Growth Study: keeping the UK competitive in a global market* (London, 2015), p.24.
[2] Navigate PR and Occam Insight, "Maritime Employers' Research 2016: What training and skills do British merchant navy officers need to make a successful transition from ship to shore?", June 2016.

1.3 APPROACH

The study has gathered evidence from a number of primary and secondary sources. The report is arranged thematically and draws on evidence from all of these sources throughout. The main sources of information are described below.

1.3.1 Consultations

The first phase of the project involved consultations with 18 maritime stakeholders, including representative organisations, major employers, training providers and trade unions. In selecting stakeholders we attempted to ensure that different parts of the maritime industries had a chance to submit evidence and perspectives on the topics included within the scope of the study.

We would like to thank the following organisations for giving up time to participate in the study:

- Associated British Ports
- BP
- British Marine
- British Ports Association
- Camper & Nicholsons
- Carnival UK
- Humber Port
- The Institute of Marine Engineering, Science and Technology
- The Maritime Skills Alliance
- Merchant Navy Training Board
- Nautilus International
- Northern Marine Manning Services Ltd
- P&O
- Port Skills and Safety
- RMT
- South Tyneside College
- UK Chamber of Shipping
- UK Major Ports Group

1.3.2 Survey

An important element of this project has been an online survey of 5,000 firms in the maritime sector. The main objective of the survey was to gather updated evidence on the UK's need for former seafarers to fulfil roles onshore, updating the earlier work in this area by Gardner et al.[3] The survey also included questions relating to other aspects of the project.

The survey was issued to a total of 5,000 employers. After a short pilot phase, organisations in the main sample were sent a letter by post. This was followed up by e-mail, and then by up to four phone calls to each organisation to

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[3] Dr P.B. Marlow, Prof. M.M. Naim, Dr R.V. Nair, Dr S.J.Pettit Prof. B.M. Gardner, *The UK economy's requirements for people with experience of working at sea 2003* ([n.p]: Commissioned by the Department for Transport, the Chamber of Shipping and the Marine Society, 2003).

encourage participation, and offer the option of providing a response by phone. Details of the survey sample and respondents are presented in Fig. 1. Further discussion of the survey approach and the questionnaire are presented in Appendix D.

Fig. 1. Firms included in survey sample by category

Sector	Firms in sample	Respondents	Response rate
Charitable institutions, publishing, representative organisations, public sector, non profit	193	47	24%
Classification societies	14	5	36%
Consultants / surveyors	437	51	12%
Education / training	193	41	21%
Marine engineering, equipment and IT	2010	288	14%
Marine insurance / P&I Club	134	32	24%
Maritime lawyers	113	23	20%
Offshore energy (oil, gas, renewables)	94	21	22%
Port services	372	83	22%
Ports	193	78	40%
Ship agents and management	281	83	30%
Ship companies and broking/chartering	747	119	16%
Ship finance	74	1	1%
Towage / salvage / dredging	31	10	32%
Other	114	31	27%
Total	**5000**	**913**	**18%**

Source: Oxford Economics

A total of 913 responses were received. Of these, 147 organisations reported that they employ seafarers either at sea or onshore, and the remainder confirmed that whilst they worked in the maritime sector they did not employ seafarers. As illustrated by Fig. 1, respondents were spread across a range of activities within the maritime sector (although it was only possible to obtain one response from the ship finance sector). Fig. 2 shows that responses were received from different sized organisations.

Fig. 2. Size of organisations responding to survey by number of employees
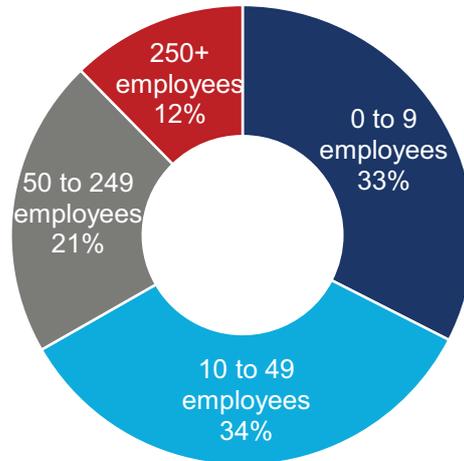
Source: Oxford Economics   910 responses

1.3.3 Analysis of secondary data sources

In addition to the information collected through the consultations and survey, we have analysed a range of existing data. Two sources have been particularly important to the study.

Firstly, to assess trends in global seafarer numbers we have used data from BIMCO Manpower Reports. These studies have been undertaken at five-yearly intervals and we have reviewed results from all studies since 1995. The most recent study was released in 2016 and presents results for 2015.[4]

Secondly, to assess trends in the UK we have made extensive use of results from the UK Chamber of Shipping (UKCoS) manpower survey. These surveys have been produced annually since 2002 and gather information on employment amongst UKCoS members.

While this is the most detailed source of employment in the UK shipping industry available, it does have limitations, particularly when making comparisons over time. The sample of companies responding to the survey changes as the composition of the shipping industry changes, or as UKCoS membership and survey respondents change. Even within the same companies there may be large changes in employment from one year to the next, due to changes in fleets or operations. This is particularly noticeable for cruise ship companies. These issues mean that we cannot be certain whether changes over time reflect genuine changes in employment or other factors.

A second limitation of the UKCoS survey is that it only collects information from UKCoS members. That is, the survey is not issued to UK shipping companies which employ seafarers, but who are not members of the UKCoS. It is therefore necessary to scale up the employment numbers reported in the survey to estimate the total number of seafarers employed in the UK shipping industry.

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[4] BIMCO and International Chamber of Shipping, *Manpower report, the global demand and supply for seafarers 2015* (London: Maritime International Secretariat Services Limited, 2016).

We achieve this by incorporating data published by DfT and the MCA on the number of 'UK certificated officers active at sea'.[5]

In light of these considerations, and given the importance of trends over time to our analysis, we have made certain adjustments to the UKCoS survey results to estimate the 'underlying trend' in the number of seafarers employed in the UK shipping industry. The results presented throughout this report and in our modelling are based on this series. Details of the adjustments made are presented in Appendix A.

DEFINITIONS AND TERMINOLOGY

Throughout the report we refer to **seafarers**, who are individuals who work predominantly at sea. We identify different types of seafarer as follows:

- **Officers** are seafarers who are members of ships' management.
- **Ratings** are members of ships' crew who assist officers.
- **Cadets:** a trainee officer. This report uses the terms 'cadet' and 'trainee' interchangeably.
- **Former seafarers** are individuals who were previously employed at sea and who are now employed in a role onshore because of their relevant sea service.

We also consider seafarers who work in different departments of ships as follows:

- **Deck officers/ratings:** seafarers with responsibility for steering and manoeuvring a vessel, and controlling navigation and communications.
- **Engine officers/ratings:** seafarers responsible for operating and maintaining a vessel's propulsion systems.
- **Technical officers/ratings:** are responsible for the operation and maintenance of the electrical systems on the vessel. The UKCoS manpower survey upon which of our analysis is based adopts a broad definition of technical officers, so this category includes a range of roles, beyond electro-technical officers, or 'ETOs'. Further details of the officer roles included in this category are set out in Appendix A.
- **Hotel, catering, other officers/ratings:** this category primarily includes seafarers working in hospitality functions on board cruise ships and ferries.
- **General purpose ratings:** are qualified to work on either the deck or engineering side of vessel operation.

For brevity, in some sections of the report we use the term **'non-hospitality ratings'**, which includes deck, engine, technical and general purpose ratings.

In some parts of the report we discuss seafarers of different nationalities. In general, we regard **UK seafarers** as UK or other EEA nationals trained in the UK.[6]

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[5] Department for Transport, "UK certificated officers active at sea", *Maritime and shipping statistics*, 27 January 2016. There is further discussion of the estimation process in Appendix A

[6] One complication is that the Chamber of Shipping manpower survey data do not permit us to identify country of training. Where those data are used, we assume that the number of UK national seafarers is a reasonable proxy for our preferred definition of UK seafarers. Discussion with stakeholders suggests that while this is an approximation it is unlikely to substantively affect results.

Our focus is on **UK economic activity**, defined as the parts or subsidiaries of a company that are run or operated from the UK. For **shipping companies**, this includes companies that register, own, or manage/operate vessels in the UK and employ seafarers. Companies should have shore establishments in the UK, which may be a company's headquarters, but they may also be the UK subsidiary/department. Nonetheless, they should be a substantive part of the business that makes decisions for example on day-to-day commercial operations and employment, even if all or part of their shareholding is abroad.

2. GLOBAL DEMAND FOR SEAFARERS AT SEA

2.1 PAST TRENDS

The primary source of information on the global demand for seafarers is the studies undertaken by BIMCO, the most recent of which was published in 2016.[7] The latest figures from BIMCO suggest that global demand for seafarers stood at 1.545 million in 2015, comprising 790,500 officers and 754,500 ratings (Fig. 3). The figure for officers represents a continuation of the steady upward trend apparent since 2005, and is an increase of 24 percent compared to the previous study in 2010. In contrast, the figure for ratings (which excludes hospitality ratings) is an increase of just one percent over the last five years. Stakeholders suggest that the different trends for officers and ratings may reflect that the roles fulfilled by ratings are more susceptible to replacement by technology and automation, whereas the demand for officers has grown in response to growth in the global fleet.

Fig. 3. Global demand for officers and non-hospitality ratings
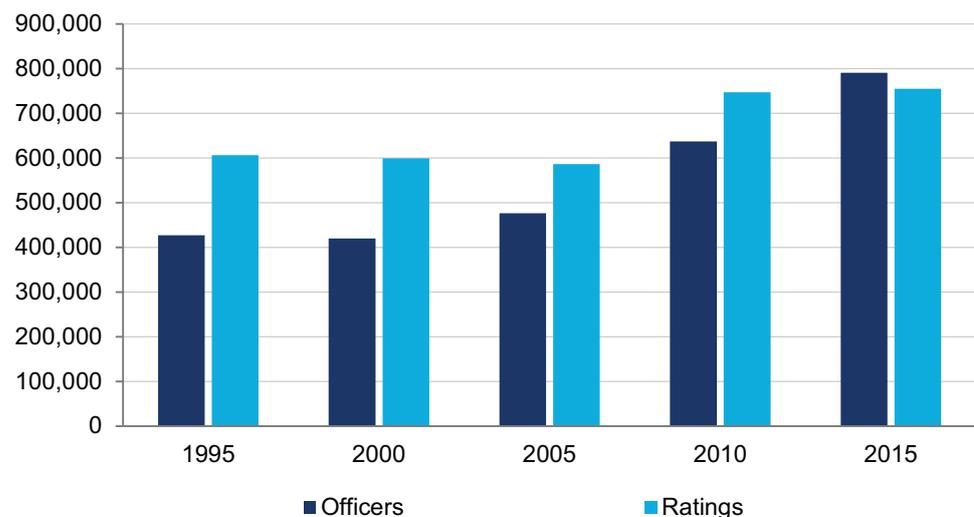
Source: BIMCO

In their report, BIMCO note that a range of factors have driven the overall increase in demand for seafarers over the last five years. The most important driver of the demand for seafarers is the number of ships in operation, which has increased in response to growth in world seaborne trade. Data from UNCTAD suggest that the total volume of seaborne trade increased by 116 percent between 1995 and 2015,[8] while the global fleet, measured in deadweight tonnes, increased by 143 percent over this period.[9]

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[7] BIMCO and International Chamber of Shipping, *Manpower report, the global demand and supply for seafarers 2015* (London: Maritime International Secretariat Services Limited, 2016).
[8] Measured in terms of the total volume of goods loaded

BIMCO suggest that other factors besides trade could also have played a role in the increase over the last five years. Firstly, so-called 'man-berth' ratios have converged for seafarers of different nationalities and different roles. This means that the average number of seafarers required to fulfil each position on a vessel, allowing for factors such as leave, training, and sickness absence, has increased. Secondly, BIMCO have refined their assumptions concerning the average number of seafarers required to operate vessels of particular types.

An important implication of the latest BIMCO demand estimates is that the global demand for officers is now greater than that for ratings. This reflects a continuation of the trend over the last 25 years for officers to represent an increasing share of the total demand for seafarers. This point was also highlighted to us during consultations, where stakeholders explained that the increasing technical complexity of vessels means that the growth in demand for workers has tended to focus on those with higher skill levels.

2.2 DRIVERS OF GROWTH

2.2.1 Trends in global trade

Consultees agreed that global GDP and trade growth would be the main driver of growth in the shipping industry and, as a consequence, the demand for seafarers over the coming decade. Fig. 4 shows that the estimated growth in global demand for seafarers has broadly traced that for seaborne trade over the last 20 years, with the exception of the sharp downturn in trade in 2009. This does not appear to have been matched by a similar contraction in the demand for seafarers, although seafarer demand is based on results at five year intervals and so it is not possible to be certain how things have changed on a year-to-year basis. Nonetheless, Fig. 4 also shows that the global shipping fleet continued to expand between 2010 and 2015, contributing to over-supply in the sector and placing downwards pressure on the rates shipping companies are able to charge for their services. This trend suggests that demand for seafarers is likely to have held up, despite weaker trade growth.

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[9] UNCTADSTAT, "Data Center"
<http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en> [accessed 1 September 2016]

Fig. 4. Global growth in seafarer demand, trade, and shipping fleet, 1996 to 2015

% change on previous year

All seafarers*
World seaborne trade (tons)
World fleet (DWT)
World GDP
Source: BIMCO, UNCTAD, Oxford Economics
*OE estimates based on BIMCO data
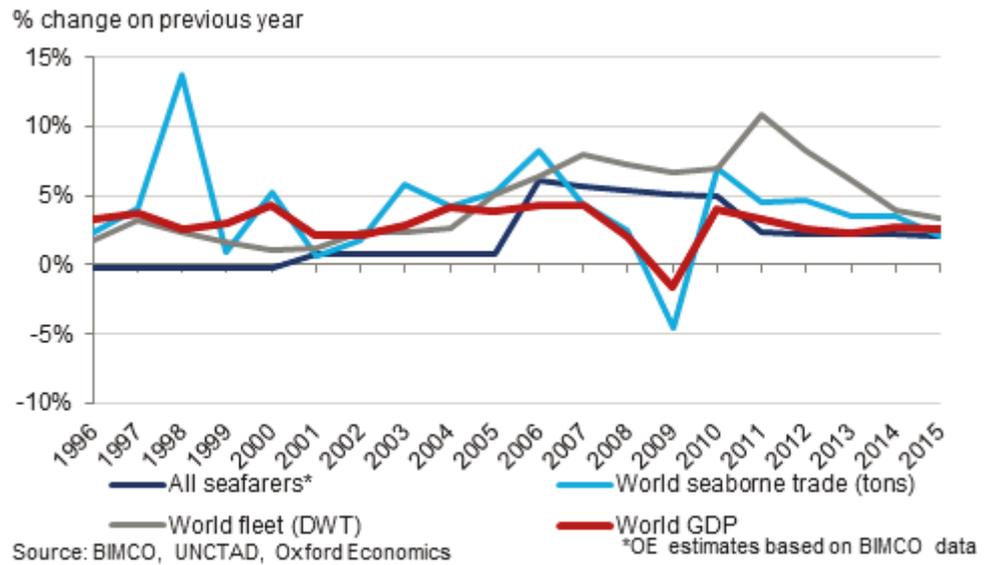
We would expect future prospects for the shipping industry, and therefore the demand for seafarers, to be broadly determined by the outlook for global trade. Fig. 5 presents Oxford Economics' forecasts of global trade growth under a range of scenarios. As well as the 'baseline' scenario, which represents our central view of the most likely path of future growth, we present a range of risk scenarios for the next five years. At present, global economic risks are skewed very much to the downside, and in all except one of the scenarios growth is weaker than in the baseline.

Fig. 5. World goods export growth[10]

% change on previous year

Baseline
China Hard Landing
China Managed Slowdown
Upside
Secular Stagnation
Source: Oxford Economics

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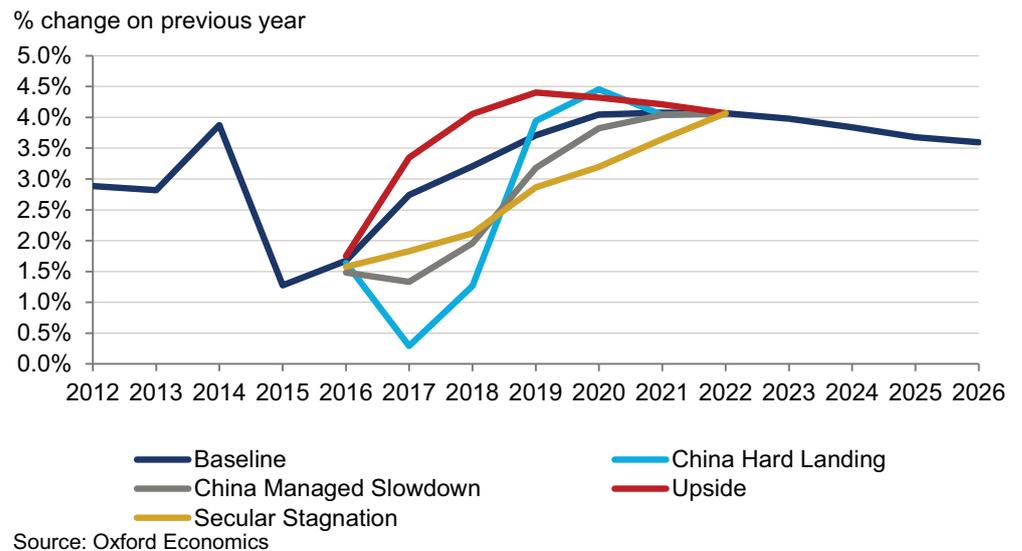
[10] Underlying data are in value terms and in constant prices and exchange rates.

Under the baseline forecast, growth in global exports is expected to pick up gradually over the next few years, reaching four percent in 2020. This trajectory is slightly weaker than assumed in the IMF's April 2016 forecast, but the Oxford Economics and IMF forecasts are very similar in 2020 and 2021. Beyond 2021 the Oxford Economics forecast suggests global trade growth will ease slightly towards its long-term average of around 3.5 percent. No IMF forecast is available for comparison for the second half of the period.

A brief outline of the alternative scenarios is presented in the box below. It is important to note that these scenarios reflect cyclical differences compared to the baseline scenario, and so affect the forecast in the period before 2022. In the longer term all scenarios converge to the long-term average rate. That is, the scenarios do not reflect structural changes which affect the forecast long-term rate of growth for world trade.

OXFORD ECONOMICS GLOBAL SCENARIOS

The **baseline** scenario reflects our central view of the outlook for global economic growth. We attach a 50 percent probability to this scenario. Other scenarios used in this study are described below. Although some relate to individual countries, their impacts are assessed using the Oxford Economics global economic model to determine how their impacts may ripple out across the global economy.

China hard landing (5 percent probability): an investment-led Chinese downturn spills over globally, resulting in market turmoil amid a strengthening dollar and tightening credit conditions in emerging markets.

China managed slowdown (15 percent): the Chinese authorities scale back overly ambitious growth targets and rein in the expansion of credit to a more sustainable trajectory.

Secular stagnation (10 percent): central banks are left floundering as demand weakness persists, dragging down potential supply and weighing on growth throughout the forecast.

Upside (15 percent): the global recovery shifts up a gear, as a cocktail of influences support both a cyclical and structural upturn in productivity growth.

2.2.2 Fleet growth

Insights into the short-term outlook for the global fleet, and therefore seafarer demand, can be obtained by referring to the order books for new vessels. Excess capacity in the shipping industry means that orders are currently well below the peak levels recorded in 2008. UNCTAD report that in April 2015 the order book for new container ships was at its lowest level for more than a decade.[11] Nonetheless, they also point to two factors which are currently sustaining orders. Firstly, in some sectors shipping companies are envisaging sufficiently strong growth in demand for their services in the years ahead for them to order new vessels. Secondly, measures to increase the environmental sustainability of shipping are leading some companies to replace older vessels

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[11] Orders as a proportion of existing capacity. UNCTAD, *Review of Maritime Transport 2015* (Geneva: United Nations, 2015).

with cleaner and more efficient new ones. This may be in response to new regulations, or because it makes economic sense to switch to more efficient vessels.

2.2.3 Ship design and technological developments

While the primary driver of global demand for seafarers is global trade, trends in ship design and technology can play an important role in determining the productivity of seafarers, in terms of the number of workers needed to operate a vessel or transport a given amount of goods.

The most important trend highlighted by stakeholders in relation to ship design is the trend towards larger vessels. This is confirmed by the data in Fig. 6, which show that newer vessels are considerably larger than those constructed 15 or more years ago. The increasing containerisation of cargo ships has played an important role in enabling this trend.

Fig. 6. Average vessel size within the world merchant fleet, by age of vessel, January 2015[12]

Deadweight tonnes
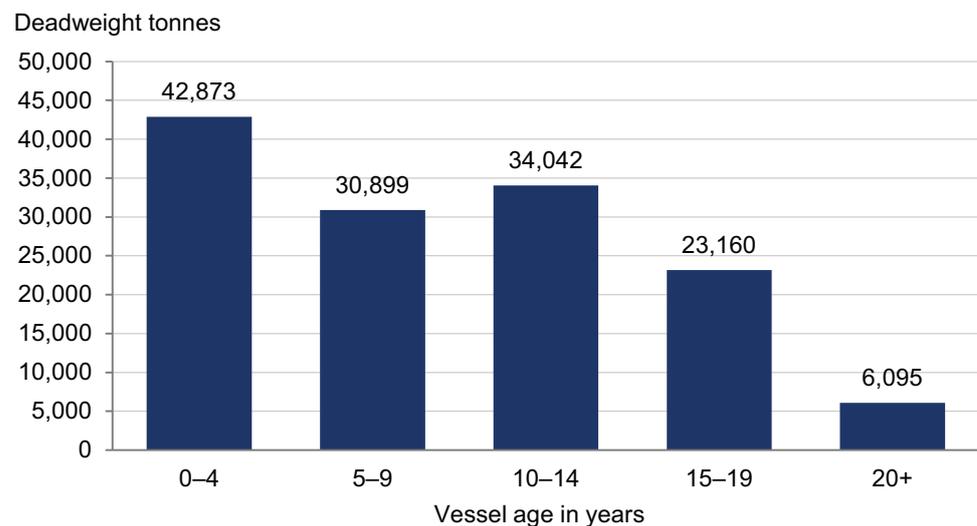
Source: UNCTAD secretariat, based on data supplied by Clarksons Research

Stakeholders felt that the maximum size of ships may have reached a limit, given that few ports would be able to handle even larger vessels and that there is presently little appetite to invest in further port expansion in many countries. UNCTAD also highlight that a lack of public funding can represent a challenge even when ports do wish to expand,[13] while some industry experts suggest that the costs involved with further increasing the size of ports could outweigh the benefits of even larger vessels.[14] Some stakeholders also highlighted that there could be greater concerns about safety if vessels were to grow even larger. However, while maximum vessel size may have reached its limit for the time

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[12] Vessels 100 Gross Tonnes and above

[13] UNCTAD, *Review of Maritime Transport 2015* (Geneva: United Nations, 2015), p.65.

[14] Financial Times, "Shipping's size obsession could be ending, study finds," March, 2016 <http://www.ft.com/cms/s/0/255d9394-e47a-11e5-a09b-1f8b0d268c39.html#axzz4IiTKbkt6> [accessed 8 September 2016]

being, average vessel size is likely to continue to increase as older, smaller vessels are gradually replaced by newer, larger ones.

In addition to the size of ships, stakeholders reported that there is an increasing variety of ships, as vessels become more specialised towards particular tasks. This, in turn, requires more specialist crew to operate them. BIMCO suggest that there are shortages of workers with the skills required to operate some of the newest and most sophisticated vessels.[15]

More broadly, there is a strong tendency for vessels to become more technologically advanced. This does not necessarily change the number of seafarers required to operate them, but it does have implications for the types of skills required. Those with expertise in technology and computer systems will be increasingly sought after, such as electro-technical officers (ETOs). The impact of technology does not only influence the demand for seafarers in particular roles—there is a greater need for seafarers to understand and interact with technology across all roles. In turn, this means that training needs to adapt to equip seafarers with these skills.

Environmental concerns are expected to be a strong driver of changes in ship design. Increasing environmental awareness, pressures to reduce operating costs and regulation in areas such as emissions, waste and ballast water are expected to lead to increasing demand for cleaner and more efficient vessels. Stakeholders highlighted that efficiency measures are likely to result in better designs, a search for new materials, greater use of satellite tracking, and increasingly intelligent power management. Growing interest in vessels powered by LNG was also highlighted by a number of interviewees. As with the broader shift towards more technologically advanced vessels, consultees did not expect these changes to affect the number of seafarers needed, but it will influence how they work. For example, a training organisation explained that they are having to adjust their training offer so that seafarers are able to operate on vessels powered by different types of fuel.

Stakeholders highlighted the increasing trend for real time remote monitoring of ships by headquarters based onshore. Over time this is likely to mean that more and more decisions and processes could be carried out onshore, rather than by crew members on board. This could potentially lead to reductions in average crew numbers, although this may be at least partially offset by a greater need for skilled staff onshore. Stakeholders also suggested that it can affect the skills requirements for seafarers on board vessels, who will be able to access more expertise from people onshore.

A related development is increasing automation, which could ultimately result in autonomous ships with few or even no crew members. An example was given of a vessel recently developed by China which has fully automated systems. The crew's role on the vessel is limited to monitoring these systems, rather than actively operating them. However, such trends are in their infancy, and stakeholders did not expect them to have a substantive influence on the industry and demand for seafarers over the next ten years. Consultees tended

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[15] BIMCO and International Chamber of Shipping, *Manpower report, the global demand and supply for seafarers 2015* (London: Maritime International Secretariat Services Limited, 2016), p.54.

to think it highly unlikely that drone ships would enter operation within the forecast horizon of this project. This view is echoed by BIMCO, who highlight that maintenance issues, regulatory uncertainties and cyber security are important barriers growth in this area.

What is more, autonomous ships are likely to be limited to certain sectors. For example, cruise and ferry passengers expect a certain level of customer service and it is doubtful whether they would be comfortable travelling on automated ships. Tankers were another type of vessel where the scope for automation may be limited for the time being, due to the greater risks involved in this sector. In contrast, there may be more scope to introduce automation on bulk carriers, container ships and other types of freight vessel. There may also be geographical differences in the speed of adoption of new technology. For example, short-sea routes around the Baltic which are well-served by communication networks may be better suited to testing autonomous ships than deep-sea routes far from shore.

It is important to recognise that, as with all types of technological change, there is a high degree of uncertainty concerning the timing of potentially disruptive changes. Many types of ship have a lifetime of around 30 years, suggesting that many of the ships in operation today, or on order books today, will still be in use throughout our forecast horizon. So even if technological change in the shipping industry occurs much more quickly than stakeholders anticipate, it is likely to take time to filter through to the demand for seafarers.[16]

In the longer term, beyond the 2026 horizon of this study, stakeholders accepted that technological development could have major implications for the shipping industry. As well as drone ships, new technologies in land-based transport, or in areas such as 3D printing could reduce the demand for shipping. Such changes could reduce global demand for seafarers in roles at sea, although it could also create demand for workers to undertake jobs that did not exist previously.

2.3 FORECASTS

To develop forecasts of global seafarer demand we need to establish relationships between global seafarer numbers and economic variables. To do this we must first identify relevant economic variables for which future values are available from Oxford Economics' Global Economic Model, ideally under alternative scenarios. We can then use econometric analysis to develop a model to predict global seafarer demand for the period to 2026. This model should be both statistically robust, and make intuitive sense given the insights provided by stakeholders and other research.

A range of model specifications were tested using variables such as global GDP growth, global trade growth and productivity. Given the labour-intensive nature of cruise ships, we also tested specifications using the demand for cruise tourism. This analysis suggested that global trade volumes were the best

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[16] Stakeholders pointed out that some types of vessel may be replaced more frequently. For example, container ships may have an average life of around 13 years. On the other hand, such vessels are often replaced on a like-for-like basis, with relatively little change in technology between the older and newer vessel.

predictor of seafarer demand and a model was specified on this basis. Full details of the econometric modelling are provided in Appendix B. As discussed in our analysis of historical trends, the BIMCO data suggest that recent trends for the global demand for officers and ratings have diverged. Separate models were therefore estimated for each type of seafarer.

Fig. 7. Forecasts for the global demand for officers and non-hospitality ratings
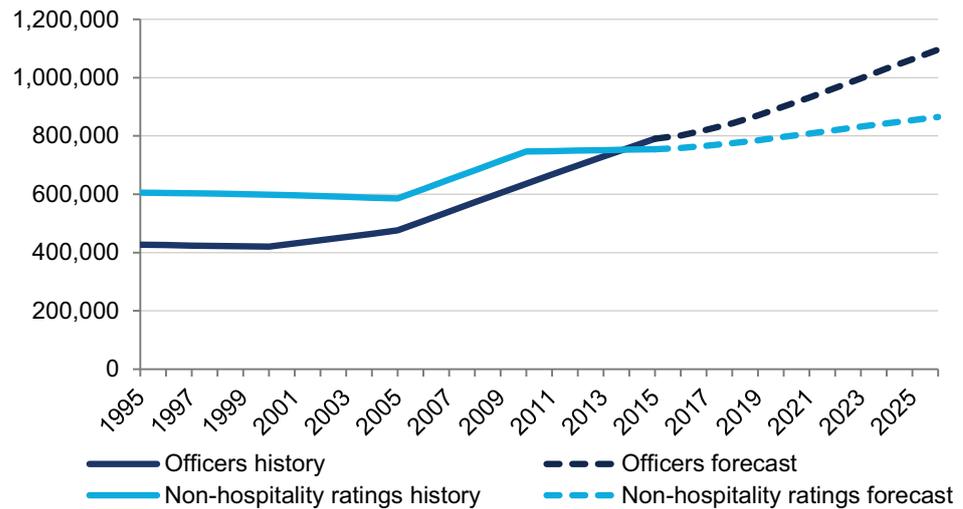
Source: Oxford Economics forecasts based on BIMCO historical data

Our model suggests that global demand for officers could increase from 790,000 in 2015 to almost 1.1 million in 2026 (Fig. 7). Non-hospitality ratings are projected to increase from 754,000 in 2015 to 865,000 in 2026. In both cases growth rates are expected to be slightly lower in the period before 2020, reflecting weaker growth in trade volumes during this period. The average annual growth in demand for officers between 2016 and 2026 is projected to be 3.2 percent, compared to 1.3 percent for ratings.

Producing this forecast is complicated by the lack of a clear historical trend in the global demand for non-hospitality ratings: the data series is characterised by two periods of virtually no growth, and a sharp increase between 2005 and 2010. While feedback from stakeholders confirmed that demand for non-hospitality ratings is likely to grow much less strongly than that for officers, there was no suggestion that demand for non-hospitality ratings would not grow at all in future (as was the case between 2010 and 2015). We therefore base our forecast on the average long-term relationship between demand for non-hospitality ratings and world trade, which implies weak but positive growth in the years ahead.

BIMCO publish forecasts for global officer demand, based on expected growth in the global fleet, in contrast to our trade-driven forecasts. They do, nonetheless, provide a helpful cross-check for our results. BIMCO's baseline forecast is for global demand for officers to reach 881,500 in 2020, around two percent lower than our forecast of 901,000. The difference between the two forecasts increases over the subsequent five years, with BIMCO suggesting global officer demand could reach 952,500 in 2025, which is 10 percent lower than our forecast. BIMCO do not produce forecasts of the demand for ratings.

In Appendix F we set out results from sensitivity tests used to assess how our forecasts of the global demand of seafarers could vary under alternative global trade growth scenarios. These tests suggest that the global demand for officers in 2026 could be around 90,000 higher or lower than the baseline forecast if global trade growth is one percentage point higher or lower in each year of the forecast period. Our forecast for ratings is found to be 30,000 higher or lower than under the baseline.

Aside from variations in the outlook for global trade growth, another risk to the forecast is the impact of a disruptive technological change, such as the accelerated take-up of autonomous ships, or the replacement of physical movement with production through 3D printing. Stakeholders suggested that such changes would be unlikely to occur within the 10-year forecast horizon for this project, but they cannot be ruled out entirely. Given the large degree of uncertainty around such factors we do not have any basis for producing a formal scenario to test the impact of such developments. There is, nonetheless, a risk that the future demand for seafarers could diverge significantly from the baseline view if disruptive technological change occurred more rapidly than assumed. While we cannot be certain precisely how such changes could affect the demand for seafarers, the kinds of technological developments identified appear, on balance, more likely to reduce demand than increase it.

3. UK DEMAND FOR SEAFARERS IN ROLES AT SEA

3.1 PAST TRENDS

The UK fleet grew strongly between 2000 and 2009, reversing the trend of the previous two decades, supported by the introduction of tonnage tax in 2000 (Fig. 8). However, since 2009 the UK fleet has declined by between 15 and 37 percent, depending on the definition used.

Fig. 8. UK interests in trading ships 100 gross tonnes and over, 1997 to 2015
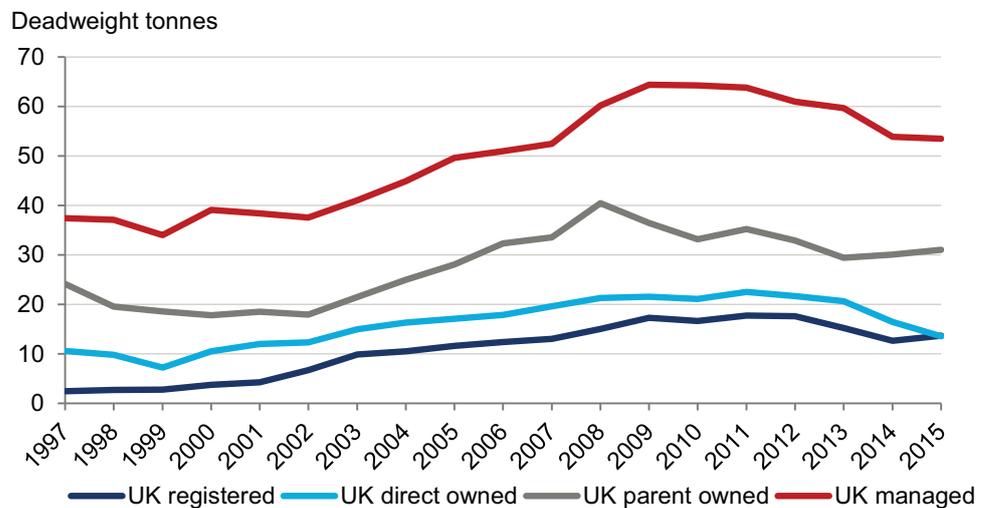
Source: DfT analysis of IHS Global data, Oxford Economics

The main reason for the recent decline in the UK fleet appears to be increasingly strong competition from emerging global maritime centres. For example, Singapore is making strong efforts to become a global maritime hub, including by offering a favourable taxation regime for ships carrying the Singapore flag, or for companies managing their fleet from Singapore. Other countries, including China and Dubai have also taken steps to develop their shipping industries. This strong growth in other parts of the world, combined with a declining UK fleet means that the UK's share of the global fleet has declined since 2009, from five percent to three percent in the case of the managed fleet (Fig. 9).

Fig. 9. UK share of the global shipping fleet, 1997 to 2015[17]
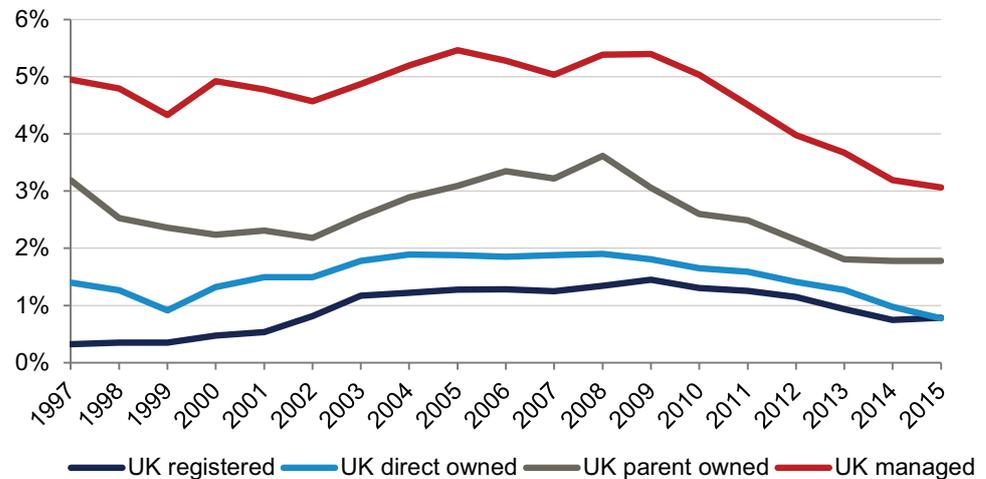
Source: DfT analysis of IHS Global data, UNCTAD, Oxford Economics

More recent data from Clarksons Research for the 'beneficially owned' fleet also suggest a decline in the UK's share of the world fleet between 2009 and 2015, but the most recent data for January 2016 show a slight increase (Fig. 10).

Fig. 10. Beneficially owned UK fleet as a share of the global fleet, 2005 to 2016
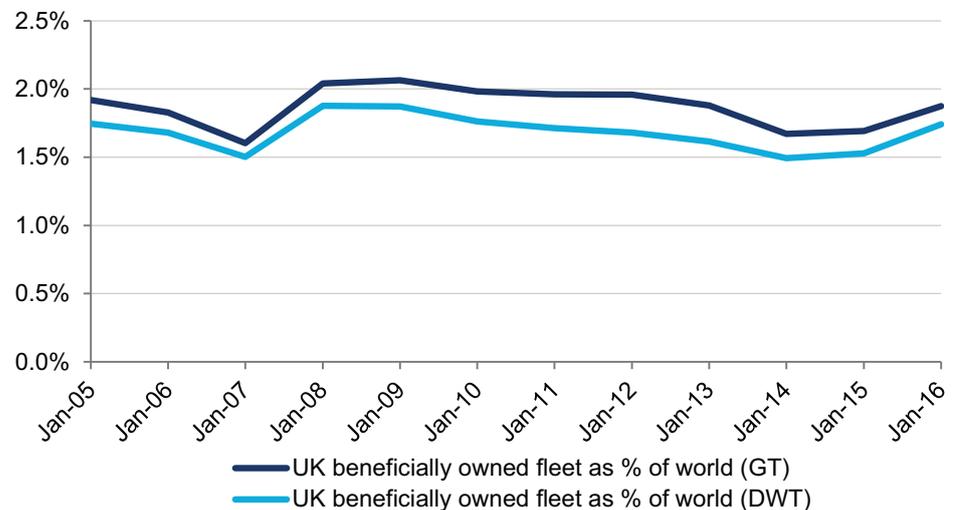
Source: Clarksons Research

Despite the decline in the UK fleet over much of the last decade, employment estimates based on the UKCoS manpower survey suggest that the number of officers and deck, engine, technical and general purpose ratings employed in the UK shipping industry has remained fairly stable since 2006. While no data are available to assess seafarer numbers in different parts of the UK shipping

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[17] Based on deadweight tonnage (DWT)

industry, it is possible that the apparent divergence between trends in employment and fleet size may reflect the strong growth in the UK cruise sector. This part of the industry is very labour intensive, and growth here may have offset declining employment elsewhere. One indication of strong cruise industry growth is that the number of hotel and other ratings is estimated to have increased by almost 25,000 between 2005 and 2015 (Fig. 11).

Fig. 11. Estimated number of seafarers of all nationalities in the UK shipping industry, 2005 to 2015
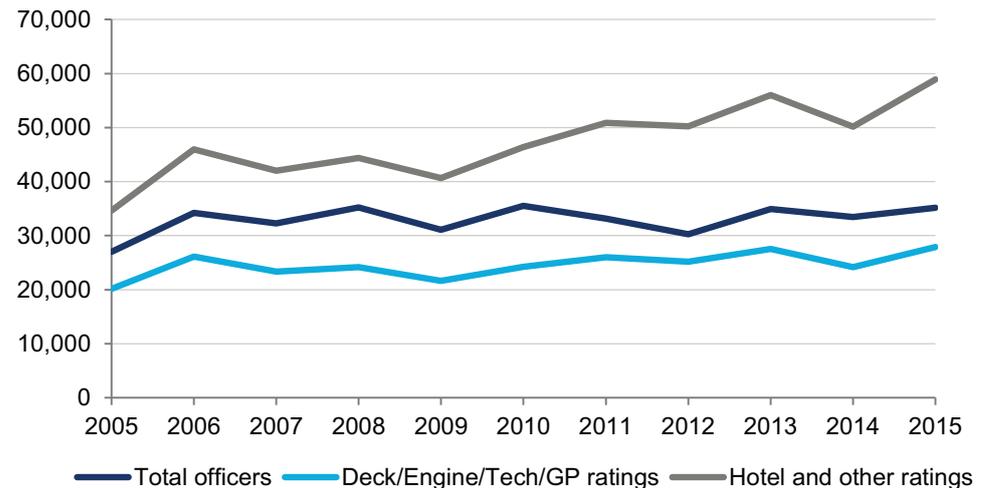
Source: Oxford Economics estimates based on UKCoS manpower survey

3.2 DRIVERS OF GROWTH

3.2.1 Overall trends

When asked about the future demand for seafarers in the UK shipping industry, stakeholders explained that the drivers of growth would be closely aligned with the global picture. This reflects that shipping is a highly-globalised industry and its prospects are primarily determined by global factors, rather than ones specific to the UK. Many UK shipping companies will not necessarily be managing or operating ships in and out of UK ports: origins and destinations could just as easily be in other countries.

Stakeholders did, however, highlight that the UK taxation regime will play a crucial role in determining prospects for UK shipping. They suggested that, given the inherent global mobility of the shipping industry, the UK will need to ensure that its taxation regime remains competitive with the rest of the world to sustain its share of the global market.

Survey respondents were also asked how they expected their need for seafarers (for roles both at sea and onshore) to change over the next 10 years. The largest number of respondents expected their need to remain the same, although almost as many expect a slight increase (Fig. 12). Such questions are extremely difficult for firms to answer because many factors could influence the demand for their services, and therefore demand for seafarers over this period. On balance, however, those in the maritime sector are more likely to be optimistic than pessimistic regarding the outlook for their sector.

Fig. 12. Expectations for how the organisation's requirement for seafarers or former seafarers will change over the next 10 years
Shading indicates type of seafarer employed by organisation

Number of responses

■ Seafarers at sea only ■ Seafarers on shore only ■ Seafarers at sea and on shore
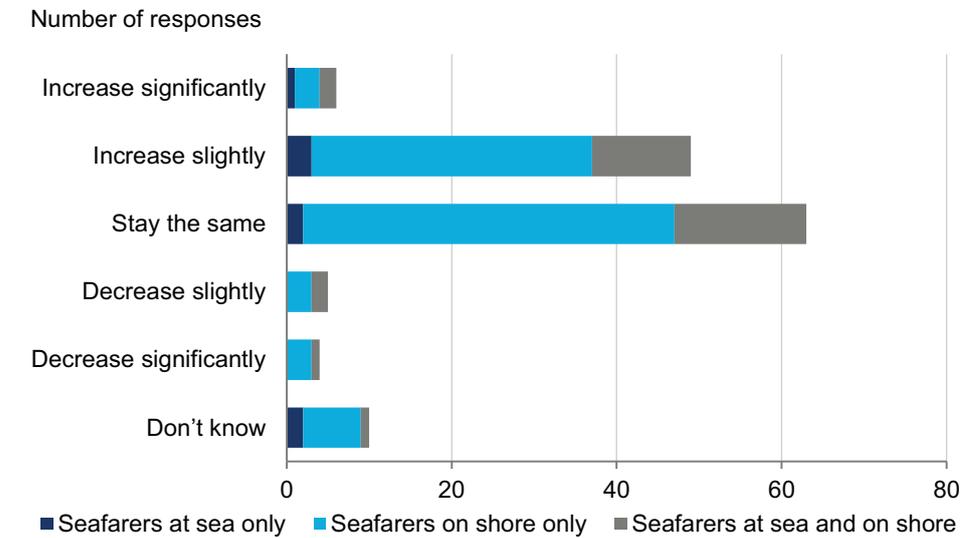
Source: Oxford Economics   137 responses

When asked about the reasons for their view of the future demand for seafarers, firms were most likely to cite the anticipated growth of their company as the main driver. Global economic factors were the second most common reason given (Fig. 13). However, company growth is only likely to be possible when economic conditions are accommodating, suggesting that the first two sets of responses are likely to be closely related in reality.

Fig. 13. Which factors are most likely to drive changes in the organisation's demand for seafarers or former seafarers?
Shading indicates type of seafarer employed by organisation. Respondents could select more than one response

Number of responses

■ Seafarers at sea only ■ Seafarers on shore only ■ Seafarers at sea and on shore
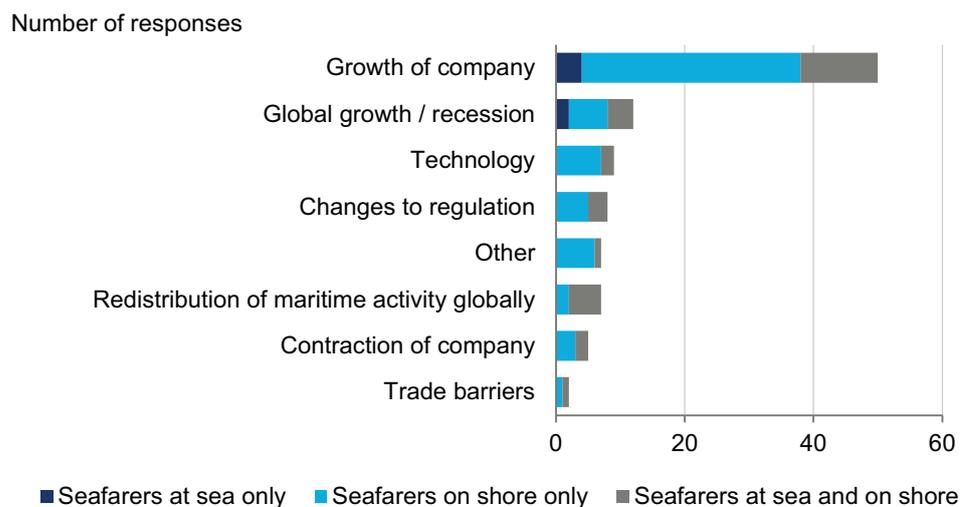
Source: Oxford Economics   65 responses

The increasing technological sophistication of ships means that stakeholders expect demand for electro-technical officers to continue to increase, and the

UK has led the way in developing training for seafarers in this role. Changing technology is also affecting the skills needs for engineers. One training organisation reported that "the majority of training that we are arranging now for our engineers is based around values and inputs into control systems", with the aim of teaching seafarers to interpret information from control systems, rather than physically stripping down and adjusting the mechanics of an engine. Although based on a small sample, there was some tentative evidence of the strength of demand for engineering skills from survey responses. Amongst respondents reporting that they had vacancies which were hard to fill, engineering positions were by far the most commonly cited, suggesting that demand may be outstripping supply for seafarers with this skillset.

Fig. 14. Whether organisations with vacancies for seafarers at sea have vacancies which are hard to fill
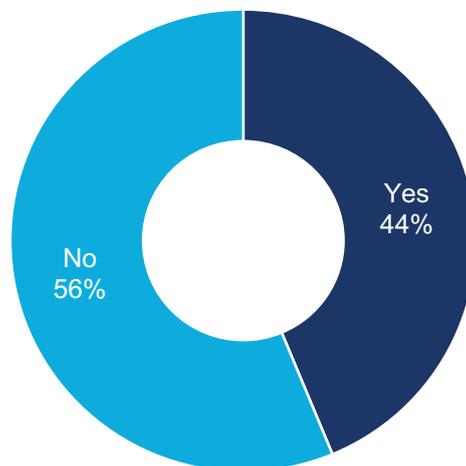
Source: Oxford Economics   32 responses

3.2.2 Sector specific trends

The UK shipping industry tends to be focused on specialised sectors, such as offshore, cruise and ferries, rather than bulk carriers. The types of vessel in which the UK specialises tends to be a source of innovation, which brings more advanced and specialised crew requirements. In addition to the overarching trends discussed above and in section two, stakeholders highlighted a number of issues pertaining to specific parts of the shipping industry.

Cruise sector

Stakeholders pointed to the growth in the middle class population in China, India and the Middle East as important drivers of demand for cruise ships. World cruise visit arrivals are estimated to have increased by 38 percent between 2006 and 2016, and Oxford Economics forecasts that they will increase by a further 50 percent over the coming decade to reach around 65 million cruise visit arrivals by 2026 (Fig. 15).

This is likely to have a disproportionate impact on the demand for seafarers, given that cruise ships employ significantly more seafarers than other types of vessel. For example, one stakeholder highlighted that an oil tanker which is 350

metres long could operate with a crew of 15 to 20 people while a cruise ship of a similar length might have 1,500 crew to service 4,000 guests. Even though many of those crew may operate in hospitality roles, there will be a large proportion of certified seafarers on board.

Fig. 15. World cruise visit arrivals, 2006 to 2026
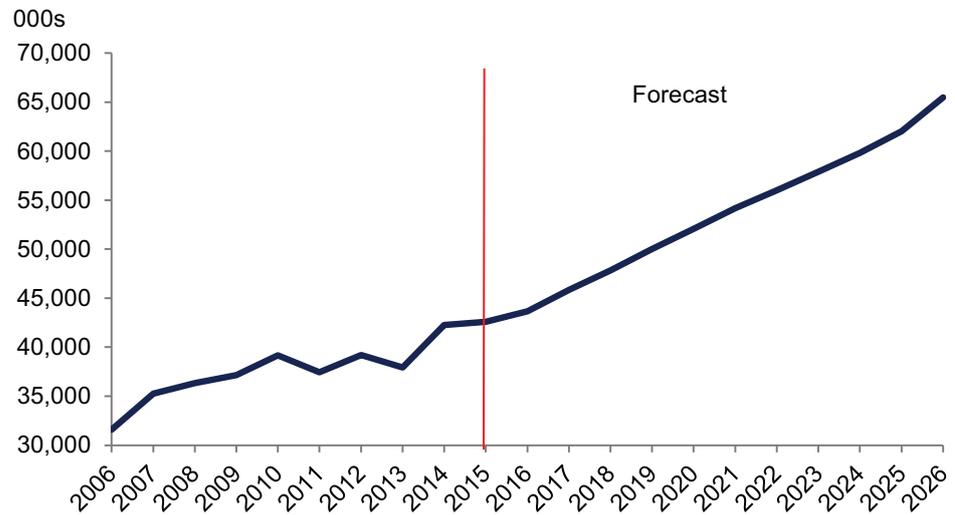
Source: UNWTO, Oxford Economics

Offshore sector

Low oil prices mean that the offshore sector is experiencing a downturn, with stakeholders reporting widespread job losses. In the short term stakeholders felt that the offshore supply vessel industry would stabilise, with demand starting to increase once oil prices rise again. Oil price forecasts are subject to a high degree of uncertainty, but at the time of writing in September 2016 Oxford Economics' central forecast is for Brent crude to remain below $60 per barrel until 2020 (Fig. 16). This may imply that the offshore sector is unlikely to see a rapid recovery in the near term, although current conditions will act as a strong incentive for operators to reduce costs, including through technological solutions. In the medium term, stakeholders suggested that the continuing growth of the offshore wind sector and the de-commissioning of North Sea oil fields will support activity.

Fig. 16. Brent crude price, 2006-2026 (annual average)

US$ per barrel
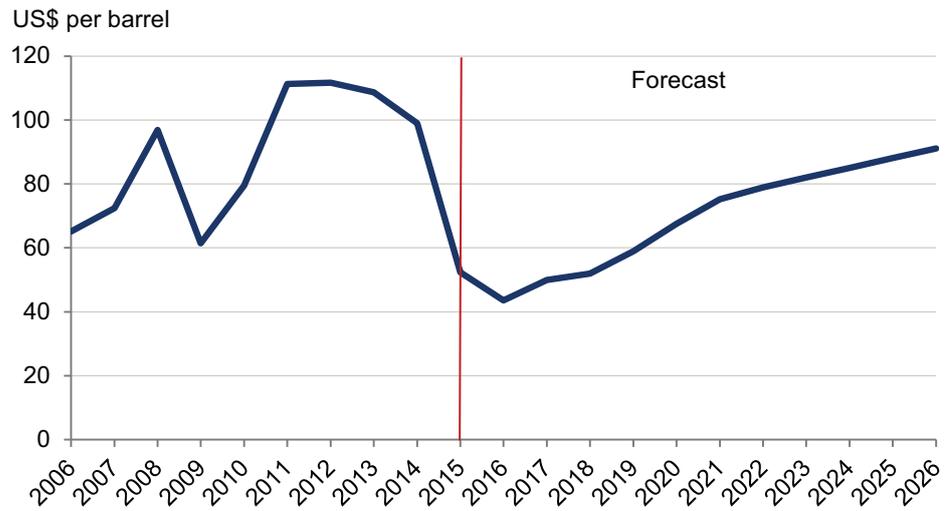
Source: Energy Information Administration, Oxford Economics

LNG sector

Aside from growing demand for ships which run on LNG, growth in global demand for LNG for use in power generation is expected to lead to greater demand for tankers to transport this type of fuel. World trade in LNG increased by more than 80 percent over the last decade, and stakeholders expect this growth to continue, driving demand for seafarers skilled in operating this type of vessel (Fig. 17). However, given that LNG vessels account for around four percent of global gross tonnage,[18] it is unclear whether this will have a large influence on the overall demand for seafarers.

Fig. 17. World trade in LNG, 1985 to 2015

Million tonnes
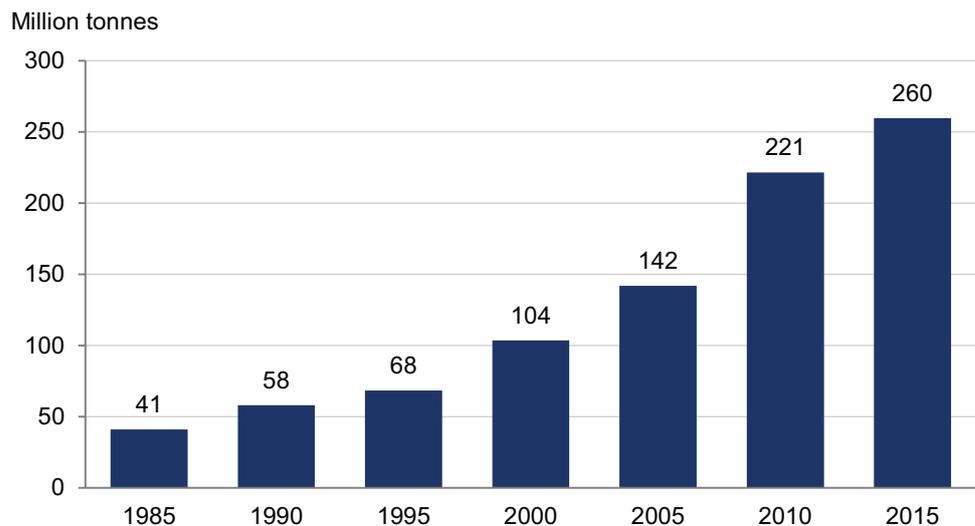
Source: Clarksons Research

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[18] Based on DfT / Oxford Economics analysis of IHS data

Yachting sector

While the yachting sector accounts for a relatively small part of the UK maritime industry, stakeholders suggested that it is growing rapidly. Over the last 10 years the number of yachts sold has increased substantially, and the size of the largest vessels has increased. In the past yachts might typically have been 50 to 60 metres long, whereas now some vessels can reach 140 metres. Given that professional yachtsmen serving on yachts of more than 3,000GT are required to hold full STCW qualifications, the increase in vessel sizes mean that the yachting industry's need for seafarers with these qualifications is increasing. Some seafarers in this part of the industry are having to retrain to obtain the necessary qualifications. UK qualifications are highly regarded throughout the global yachting industry. This is likely to continue to support strong global demand for seafarers with training in the combination of technical and customer service skills this sector seeks.

River boats

The river boat sector is growing due to initiatives to move more freight and passengers onto rivers, most notably in London. This is driving demand for officers and crew to operate these vessels. Such roles may have specific skill requirements, for example to combine customer service expertise with the knowledge of how to operate boats on rivers.[19]

3.3 FORECASTS

In section two we presented forecasts of the global demand for officers and ratings. In this section we consider what this could imply for the number of seafarers (of all nationalities) required by the UK shipping industry.

It is important to note at the outset that, the Government is taking steps to support growth of the maritime industries, building on the Maritime Growth Study, and the MCA has an objective to grow the UK Ship Register. While it is too early to factor the impact of these efforts into our forecasts, if they prove successful there may be scope for stronger growth than suggested by our analysis.

3.3.1 Deck, engine, technical and general purpose ratings

To derive a UK forecast from the global forecasts presented in section two, we refer to trends in UK employment as a proportion of the global demand for seafarers over the last decade. There was some volatility in this trend during the first half of the period, which may have been associated with the global financial crisis. Since 2011, however, the UK's share of global demand has stabilised at around 3.5 percent. This is also the average share for the whole of the 10-year period for which we have data. We could therefore produce a forecast under the assumption that the UK's share of world demand remains at 3.5 percent throughout the forecast period (the light blue line in Fig. 18).

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[19] Those holding Boatmaster qualifications are not included in the estimates of seafarers working at sea presented in this study.

An alternative approach could be to assume that the long-term trend since 2005 continues. This is denoted by the red line in Fig. 18, and results in a slight downwards trend, with the UK share of global demand falling to 3.1 percent in 2026, down from 3.7 percent in 2015. However, this trend is affected by an exceptionally high value in 2006. When the series is adjusted to remove this, the projected trend again stabilises at 3.5 percent.

A third approach could be to assume that the UK's share of global demand stabilises at its 2015 level of 3.7 percent. However, given the year-to-year volatility in the historical data series it may be risky to base the forecast on a single data point in this way. Our preferred forecast is therefore to assume that the UK's share of global demand stabilises at 3.5 percent for the duration of the forecast period.

Fig. 18. Deck, engine, technical and general purpose ratings of all nationalities in the UK shipping industry as a proportion of global demand, 2005 to 2026

UK as % of world
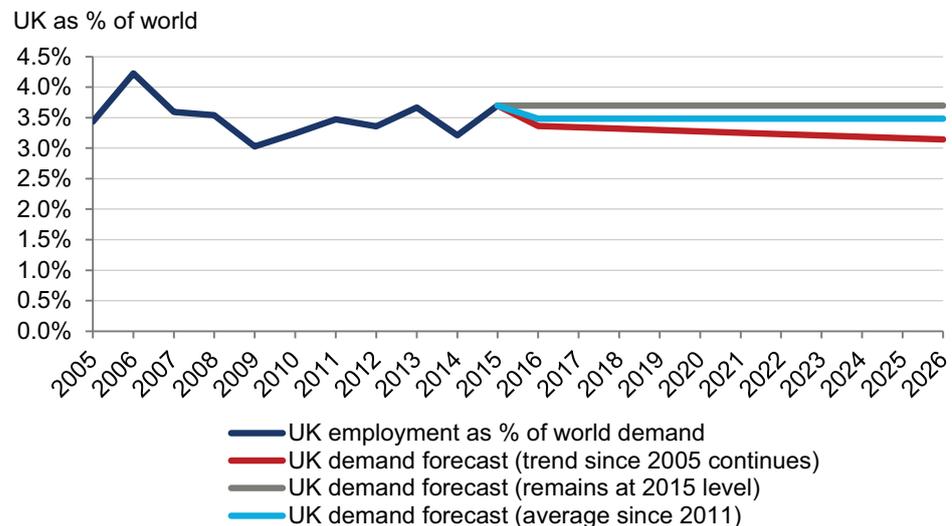
Source: Oxford Economics estimates based on BIMCO and UKCoS manpower survey data

Applying the UK's share to the global demand forecast from section two enables us to derive a forecast for the UK demand for ratings. Under our preferred approach the number of ratings is just over 30,000 in 2026, up from 28,000 in 2015 (Fig. 19).

**Fig. 19. Deck, engine, technical and general purpose ratings of all nationalities in the UK shipping industry, 2005 to 2026**
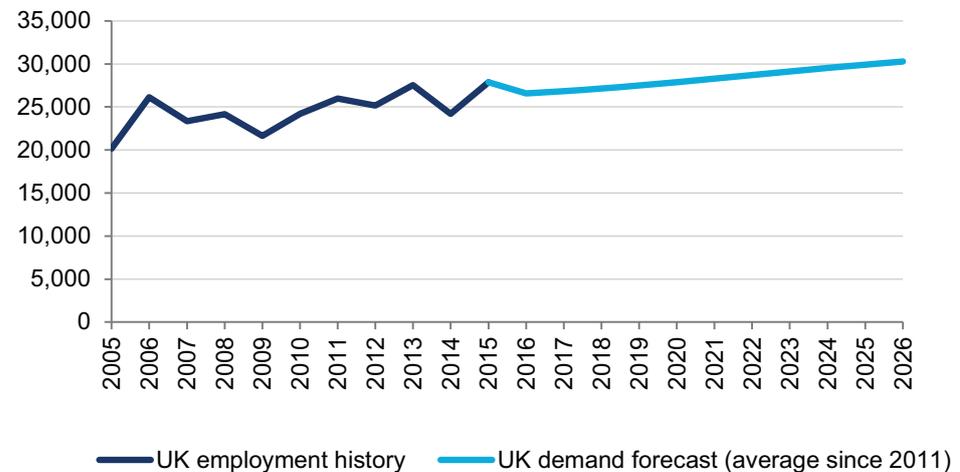
Source: Oxford Economics forecasts based on BIMCO and UKCoS manpower survey data

3.3.2 Officers

In 2010 the number of officers (of all nationalities) employed in the UK shipping industry was equivalent to 6.0 percent of global demand (Fig. 20). But in 2015 this had fallen to 4.7 percent. Looking further back, UK officer employment is estimated to have been as high as 7.1 percent of global demand in 2006, although as with the ratings data employment appears to have been exceptionally high in that year.

If the trend of the last ten years were to continue, UK demand for officers would be just two percent of the world total by 2026 (in this case, smoothing out the abnormally high value in 2006 has less impact). A more optimistic scenario is that the UK stabilises its share of global officer demand at the 2015 level of 4.7 percent, but this would ignore the relatively consistent downwards trend of the last decade.

In contrast to the ratings forecast, it is apparent firstly that the UK's share of global officer demand has not remained constant over time and, secondly, that the officer forecast will be very sensitive to the approach chosen to estimate the UK's share of global demand in future. In light of this we have adopted a more sophisticated quantitative approach to help us understand the data, and considered how other more qualitative factors could inform our forecast.

It is important to recall that a large degree of estimation was required to develop the historical data series, both because the BIMCO global demand data are only available at five-year intervals, and because the UKCoS manpower survey data are not well suited to year-to-year analysis. Nonetheless, while the long-term trend has been for the UK share of global officer demand to decline, the situation appears to have stabilised since 2012. This may reflect the ending of earlier distortions linked to the financial crisis. Statistical analysis also confirms that the behaviour of the time series has changed during the last few years.

In light of these observations, we have developed a forecast of the UK's share of global demand using an econometric technique which draws on a moving average of the historical series (to help smooth out volatility in the underlying data), plus an adjustment to place greater weight on the period since 2012 (to reflect the apparent change in behaviour from that point).[20] The results are denoted by the gold line in Fig. 20. This approach suggests that the UK could continue to lose global market share, but at a lower rate than in the past. Note that while the forecast is generated from a version of the history which has been smoothed using a rolling average, the dark blue line in Fig. 20 is based on the unsmoothed series. When the two series are joined there is therefore a slight uplift in the UK's share of global demand before the light blue line resumes its longer term trend. Details of the econometric model are presented in Appendix B.

Fig. 20. Officers of all nationalities employed in the UK shipping industry as a proportion of global demand, 2005 to 2026

UK as % of world
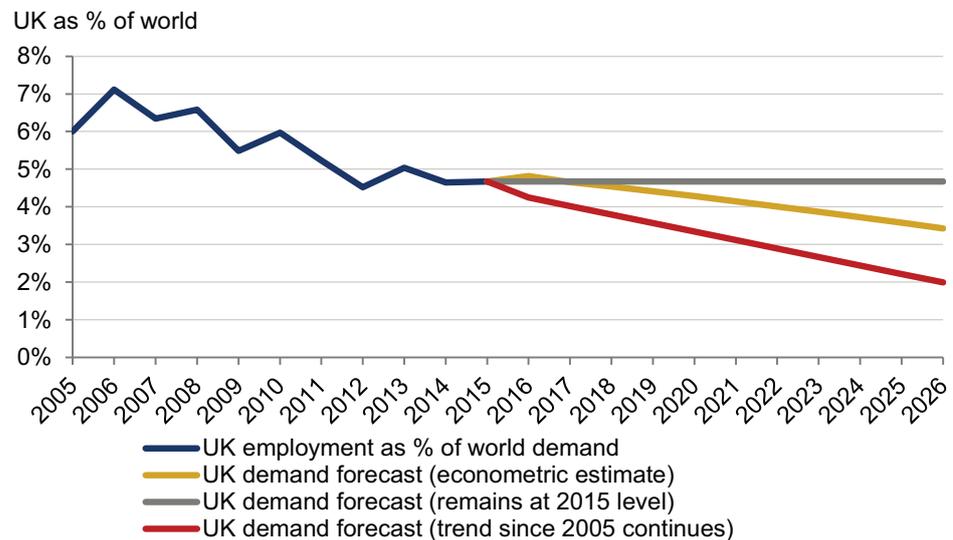
Source: Oxford Economics estimates based on BIMCO and UKCoS manpower survey data

In Fig. 21 we combine our central forecast of the UK's share of global demand with the global demand forecast from section two to produce forecasts of the demand for officers in the UK shipping industry.

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[20] The model chosen is a form of 'ARIMA' model

Fig. 21. Demand for officers of all nationalities in the UK shipping industry 2005 to 2026
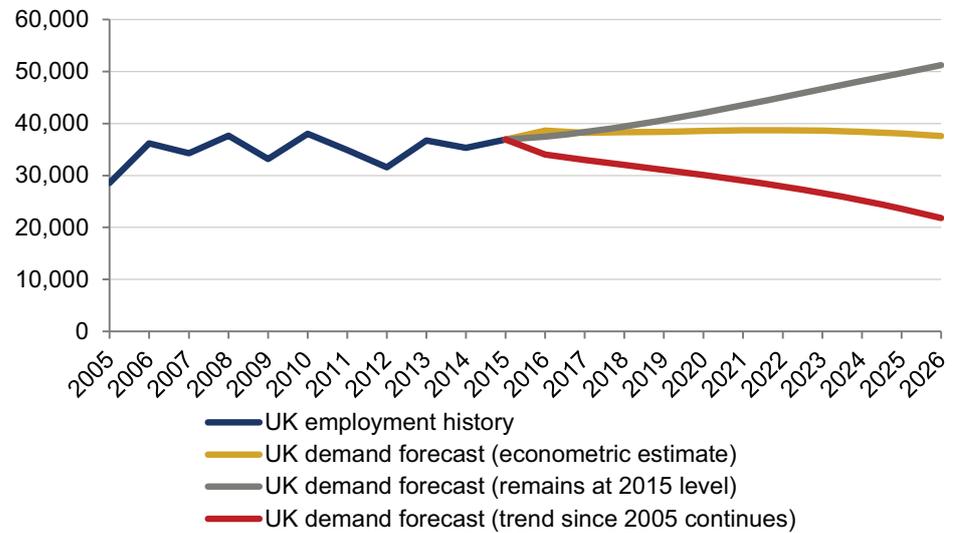
Source: Oxford Economics forecasts based on BIMCO and UKCoS manpower survey data

The analysis suggests that the demand for officers could fall to 22,000 in 2026 if the UK's share of global demand were to continue to decline at the rate recorded over the last decade. In contrast, if the UK could stabilise its share at the 2015 level officer demand could increase to 51,000 in 2026. The econometric approach implies a forecast of 37,500 in 2026.

In considering which outcome is most likely, it is helpful to refer to evidence presented elsewhere in this report. Firstly, the most recent fleet data for January 2016 suggest an increase in the UK's fleet, both in absolute terms and as a proportion of the world total. Secondly, evidence from the survey and consultations does not suggest that those in the maritime industry are pessimistic about the outlook for the UK industry. Both of these points would argue against the very weak forecast implied by the historical trend. On the other hand, the higher forecast would represent a strong break from the past trend, with officer numbers increasing strongly after nine years of no growth. In light of this the econometrically-based approach provides our preferred option.

HOW CAN THE UK'S DEMAND FOR OFFICERS INCREASE WHILST ITS SHARE OF GLOBAL DEMAND IS FALLING?

Of note in the previous two charts is that while the UK's share of global officer demand has declined over the last decade, the number of officers employed in the UK shipping industry has remained broadly level. It is possible for both of these things to be true because officer employment in other parts of the world has grown more strongly than in the UK, as shown in Fig. 22. A similar pattern is assumed for the forecast period, for which our central forecast assumes that the UK share of global demand continues to fall, although at a slower rate than in the past. Applying the UK's future share to the global demand forecast implies an increase in the number of officers required compared to the 2015 level.

Fig. 22. Demand for officers of all nationalities in the UK shipping industry and global demand for officers, 2005 to 2026
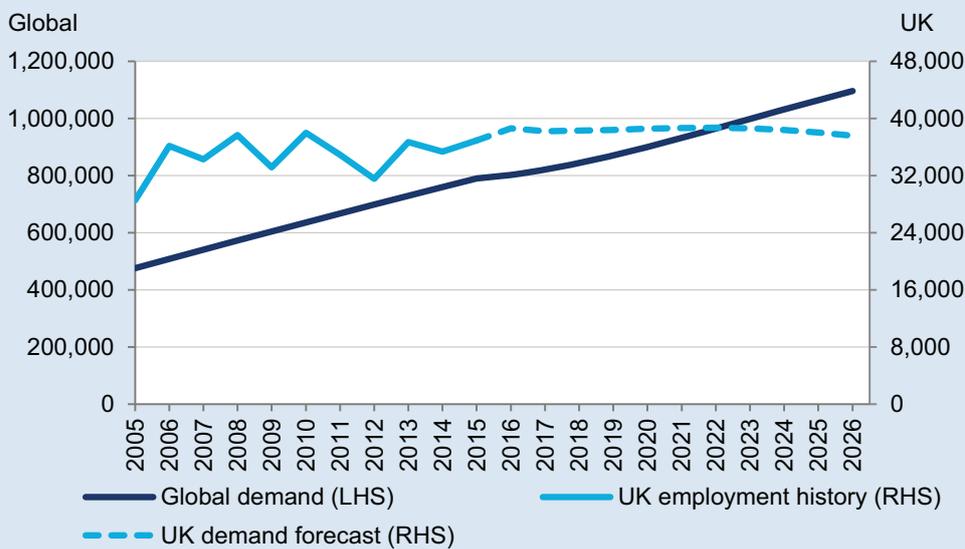
Source: BIMCO, Oxford Economics

3.3.3 Hospitality and other ratings

Ratings working in the hotel and catering departments of cruise ships are excluded from the BIMCO figures. Moreover, the number of such seafarers is extremely volatile within the UKCoS manpower survey data, making it difficult to discern clear trends. We have therefore used the manpower survey data to estimate the ratio of hospitality ratings to those in other categories, based on a smoothed trend. From the information available it is possible to establish that this ratio is increasing over time, reflecting growth in the UK cruise industry as discussed above.

Fig. 23 compares estimated growth in employment of ratings in the hospitality and other category to that of ratings in deck, engine, technical or general purpose roles.

Fig. 23. Annual growth in employment of ratings of all nationalities in the UK shipping industry, 2005 to 2015
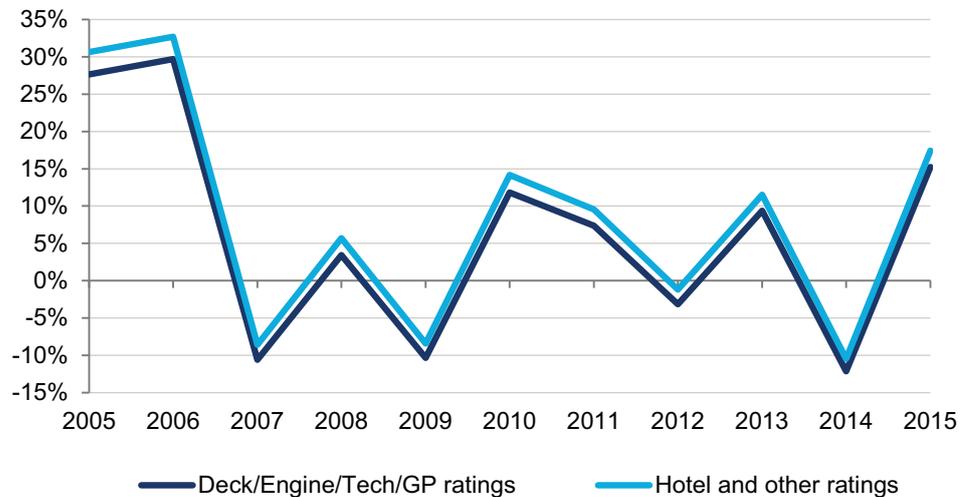
Source: Oxford Economics estimates based on UKCoS manpower survey

Over the last decade we estimate that the annual growth rate for hospitality and other ratings has been an average of 2.1 percentage points above that for other types of ratings. To develop a forecast we assume that this difference persists in future years.

Fig. 24. Demand for ratings of all nationalities in the UK shipping industry, 2005 to 2026
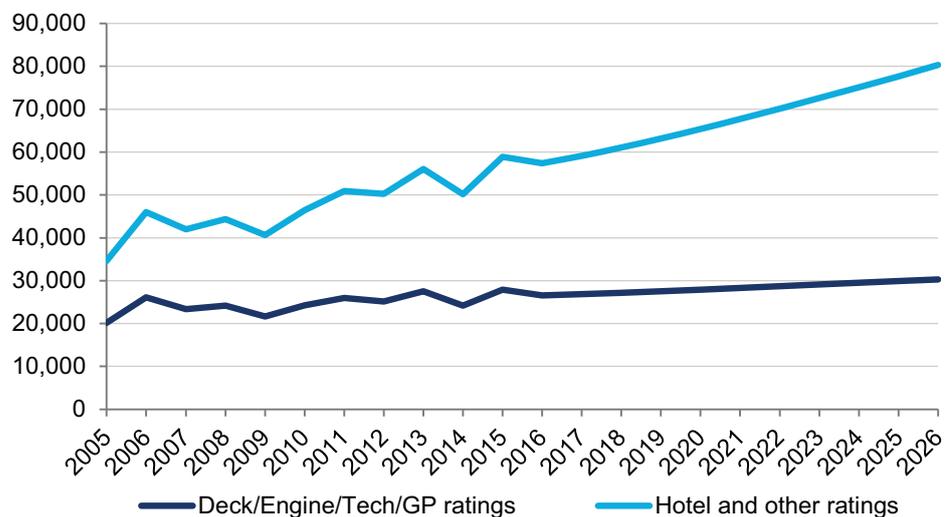
Source: Oxford Economics forecasts based on UKCoS manpower survey data

This approach suggests that the number of hospitality and other ratings employed in the UK shipping industry could rise to more than 80,000 by 2026, an increase of 21,000 over its 2015 level. This compares to an increase of 24,000 between 2005 and 2015. The forecast therefore assumes that the UK cruise sector will continue to achieve a similar rate of growth to in the past. This may be feasible if the industry's expectation of strong growth in demand from

large untapped markets such as China and India is realised, but any sustained slowdown in the pace of development of such markets could make the forecast difficult to achieve. It is also important to note that around four-fifths of such roles are currently filled by non-UK seafarers. Given the large cost advantages they convey over UK seafarers in such roles, much of the forecast additional demand is likely to be realised by non-UK seafarers.

3.4 THE IMPACT OF EXITING THE EU

The forecasts presented above are based on established trends in the UK and global shipping industries, and implicitly assume that past relationships continue into the future. One important risk to this assumption is the potential impact of exiting the EU.

At the time of writing very little is known about how this could affect the UK, and the shipping industry in particular, although some early views were offered by stakeholders. On the one hand, some stakeholders suggested that leaving the EU could give the UK freedom to introduce a more favourable regulatory regime, enabling the country to become a more attractive location for maritime business. On the other hand, some stakeholders suggested that exiting the EU could influence the UK's international competitiveness, reducing its attractiveness as a base of operations for maritime business. A third view put forward was that exiting the EU may have relatively little impact on the maritime sector as, firstly, UK trade with Europe supports a relatively small proportion of the industry's revenue and, secondly, ships of any flag will continue to be allowed into UK ports.

In short, it is too early to assess how exiting the EU could impact on the future UK demand for seafarers, but it will be important to keep this situation under review as events unfold and the implications for the maritime industry become clearer.

4. UK SUPPLY OF SEAFARERS FOR ROLES AT SEA

4.1 OVERVIEW OF APPROACH

To forecast the supply of seafarers for roles at sea, we follow the approach taken in the 2011 seafarer forecasting work.[21] This was based on a stock and flow model which uses assumptions about the number of seafarers joining and leaving the industry to estimate how the number available for employment changes over time. Fig. 25 provides an overview of our modelling approach. On the left-hand side we estimate workers joining the industry, either as newly qualified seafarers, or as experienced workers returning to roles at sea. The right-hand side of the model shows outflows, as seafarers leave roles at sea to take up jobs onshore, work overseas, retire from working life, or become economically inactive for another reason. A final step is to adjust for non-UK seafarers working in the UK shipping industry.

This section of the report outlines our approach to this part of the modelling. Further detail is provided in Appendix C.[22]

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[21] Deloitte and Oxford Economics, *An independent review of the economic requirement for trained seafarers in the UK* (London, 2011).

[22] It is important to note that sample sizes for the numbers of joiners and leavers within individual categories of seafarer and age groups can be very small. While the detailed UKCoS survey returns are, to our knowledge, the only information available for this type of modelling, the estimated numbers of joiners and leaving rates should be regarded as indicative.

Fig. 25. Overview of supply modelling approach
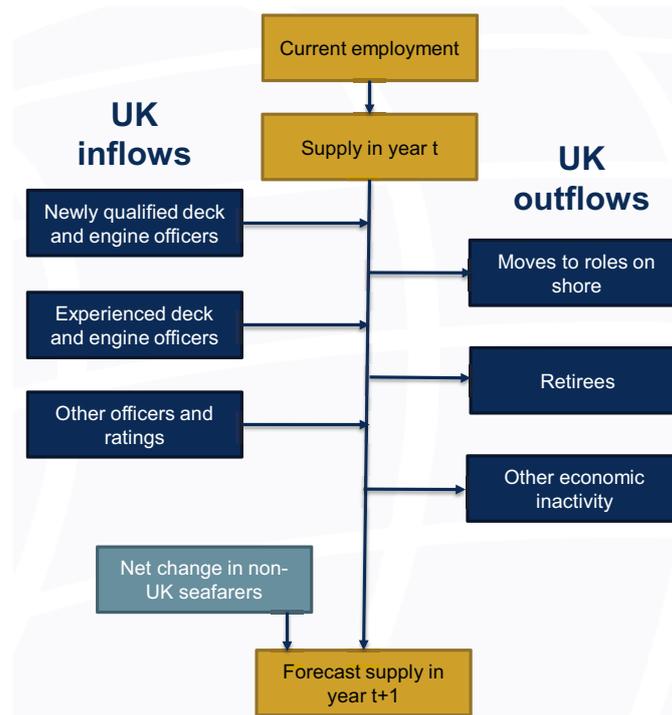
DETERMINING THE STARTING POINT FOR DEMAND AND SUPPLY MODELLING

An important consideration when modelling the demand and supply of workers is whether current employment represents supply or demand. Actual employment is unlikely to reflect both the demand for and supply of seafarers—there is likely to be some degree of excess demand or supply.

In the 2011 seafarer forecasting work, Deloitte and Oxford Economics assumed that current employment of seafarers in roles at sea represented the demand for labour since, at that time, evidence from industry stakeholders and Official Statistics suggested that there was a small pool of seafarers available who were unable to find work. [23]

For the current study we have once again sought the views of stakeholders and employers on this issue. This time the broad consensus appears to be that there is not currently an excess supply of UK seafarers unable to find employment. It is difficult to obtain definitive proof of this from Official Statistics since their coverage of seafarers is limited. Nonetheless, we have reviewed data from the sources identified in the 2011 study and these appear to corroborate stakeholders' view. In particular:

- The ONS Annual Survey of Hours and Earnings suggests that average hours worked per person in the water transport industry increased by 6 percent between 2014 and 2015[24]
- The ONS Annual Business Survey suggests total employment costs in the water transport industry increased by 39% between 2012 and 2014[25]

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[23] Deloitte and Oxford Economics, *An independent review of the economic requirement for trained seafarers in the UK* (London, 2011).
[24] Total paid hours worked per week, all employees, mean

- The Labour Force Survey has very small sample sizes in relevant categories and so results should be treated with caution at this level of detail. Nonetheless, it does not identify anyone working in the water transport industry one year ago now being unemployed and available for work[26]

In addition, the survey undertaken for this study asked maritime organisations whether they had made any seafarers or former seafarers redundant during the last 12 months. Around 90 percent of respondents reported that they had not.[27] In contrast, 66 percent of firms reported that they had recruited seafarers during the last 12 months.[28]

In light of the evidence outlined above, we assume that current employment is equal to the supply of seafarers, and that all trained UK seafarers who want jobs are able to find work.[29] The recent downturn in the offshore sub-sector may be an exception to this overall trend, although we have not uncovered any evidence to suggest that the impact of this has been sufficiently large to change the picture for the shipping industry as a whole. Moreover, stakeholders suggested that many of those laid off by the offshore sector have found work in other parts of the maritime industries.

4.2 INFLOWS

4.2.1 Newly qualified UK deck and engine officers

Since 2010/11 there have been between 1,800 and 2,000 officer cadets in training under the first category of the government's Support for Maritime Training scheme (SMarT1) each year. This scheme provides financial support for the training of cadets studying at junior officer level. Fig. 26 shows that around 800 to 900 cadets per year have entered this training since 2010/11. After allowing for some cadets dropping out of training part way through their course, and given an average course length of three to four years, we estimate that just under 650 newly qualified officers are likely to become available to the shipping industry each year.[30] We assume these are split between the deck and engine departments in proportion to employment.

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[25] This result should be treated with caution due to the large standard error reported for the 2012 value

[26] Based on bespoke analysis of the LFS for this study

[27] Relates to organisations which reported employing seafarers or former seafarers only

[28] Relates to organisations which reported employing seafarers or former seafarers only

[29] In practice it is possible for both 'excess demand' and 'excess supply' to exist in a given industry at the same time, due to skill mismatches or physical location issues. The assumption made here, that employment at any given time is equal to either demand or supply, is therefore a simplifying one. But it is not one considered to be unreasonable for the purpose at hand.

[30] Stakeholders point out that a small number of newly-trained officers joining the UK shipping industry may not have come through the SMarT scheme. On the other hand, some cadets who do pass through SMarT may not end up working in the UK shipping industry. While there are no data to confirm whether these factors have a significant impact, it is useful to note that our approach produces a similar estimate of the number of newly qualified officers joining the industry as is suggested by detailed UKCoS manpower survey returns for 2015.

Fig. 26. UK officer cadets under SMarT1 scheme
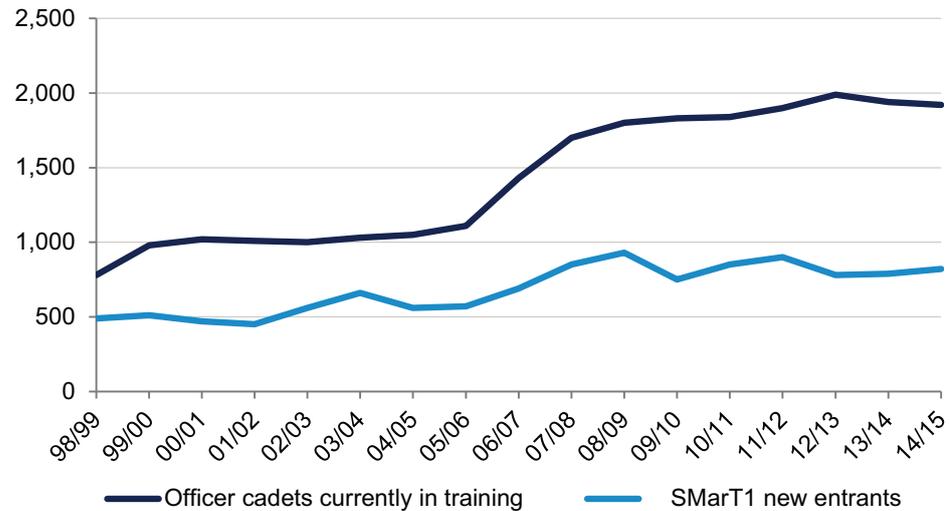
Source: DfT Seafarer Statistics

Consultees suggested that they would like to see more officer trainees coming through the system, but that cost can be a barrier. Although the UK is recognised as a world leader in maritime training, it is also one of the most expensive places to train officers, even after taking into account that government funding covers around one-third of training costs. The perceived advantages of UK seafarers compared to those of other nationalities are discussed in section seven.

4.2.2 Experienced UK deck and engine officers

By comparing UKCoS manpower survey returns for 2014 and 2015 at the individual seafarer level it is possible to obtain an indication of how many UK deck and engine officers joined the industry. Scaling up these findings suggests that just over 600 UK officers aged 30 and over re-entered roles at sea in the most recent year. No information is available on where these seafarers are joining from, but it is possible that they may have been working in another industry, in another country's shipping industry, or returning from a period of inactivity. Our model assumes that this inflow remains at the same level in future years.

4.2.3 Other UK officers and ratings

Based on a similar approach to that outlined above we can also estimate the number of other officers and ratings joining the industry between 2014 and 2015. In total we estimate this inflow to be around 5,200, of which four-fifths are officers or ratings in the hotel and other category.[31]

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[31] From the information available it is not possible to assess the proportion of seafarers in this category which are joining for the first time, as opposed to re-joining the industry.

4.3 OUTFLOWS

Many stakeholders and survey respondents expressed concern about the age profile of seafarers in the UK shipping industry. As shown in Fig. 27, more than one-third of UK seafarers are aged 50 or over, suggesting that a large proportion of the workforce is due to retire in the relatively near future. For certain categories of seafarer the situation is considerably worse. More than half of UK deck and engine ratings are aged 50 or over for example. In light of this, stakeholders emphasised the importance of ensuring there is a good supply of new trainees entering the system to offset the expected outflows of retirees.

Fig. 27. Age of UK seafarers working in the UK shipping industry, 2015
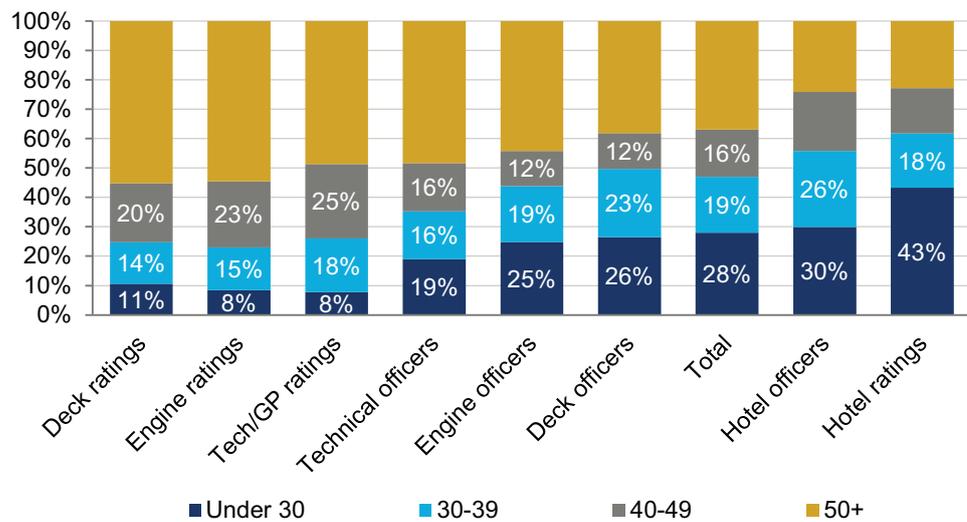
Source: Oxford Economics analysis of UKCoS manpower survey

To model outflows of seafarers a slightly different approach is required to that for inflows. The detailed UKCoS manpower survey data enable us to identify the proportion of seafarers who appear to have left the industry, but no information is available on whether they subsequently enter maritime roles onshore, retire from work entirely, or do something else. Nonetheless, the important point in terms of the availability of workers for roles at sea is the proportion of seafarers which leave the UK industry each year. Using the detailed manpower survey results we are again able to derive indicative estimates of the leaving rates for types of seafarer by age group.

Fig. 28. Estimated annual leaving rates of UK seafarers by role and age group

Annual leaving rate
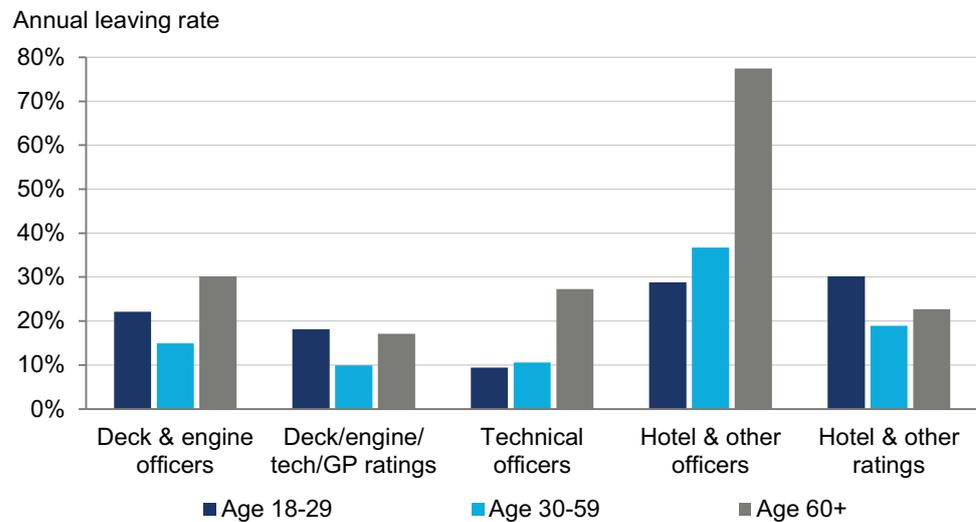
Source: Oxford Economics

This analysis suggests that turnover tends to be greater amongst officers and ratings working in hospitality roles. This may reflect that it is relatively easy for individuals with these skills to switch between hospitality roles onshore and those at sea.

Leaving rates are generally higher for those aged 60-plus, reflecting moves into retirement amongst this age group. Amongst deck and engine officers and ratings, leaving rates tend to be greater for seafarers aged under 30 than for those in the middle age group. Stakeholders suggested that this may be because some younger seafarers may either decide they are not well suited to a career at sea, or wish to settle down onshore around the age of 30.

4.4 THE ROLE OF NON-UK SEAFARERS IN THE UK SHIPPING INDUSTRY

While we have developed the detailed stock and flow model described above for UK seafarers, it is important to recognise that the labour market for seafarers is highly globalised. As one stakeholder explained, "standards are global, the industry is global and the supply [of labour] is global". Shipping companies recruit globally, and some EU shipping companies sponsor maritime training outside of Europe where there may be large pools of workers seeking to work at sea. It is therefore important to consider trends in non-UK seafarers working in UK shipping.

While shipping companies may not always be able to recruit as many UK seafarers as they wish, particularly for senior positions, they are generally able to fill the gap with workers from other countries. As one stakeholder explained, "you don't have ships not going because of staff—all ships sail… [although] you may have an owner complaining the skillset isn't as high as they would like". In short, the gap between shipping companies' needs and the supply of UK seafarers is filled by non-UK seafarers.

Over the last decade the reliance of the UK shipping industry on non-UK seafarers has increased significantly. We estimate that around 67 percent of officers working in the shipping industry were UK nationals in 2004, but this had fallen to around 43 percent by 2008. The situation appears to have stabilised since then. In contrast, officers from other EEA countries have increased their share of employment from 11 percent in 2004 to 25 percent in 2015. Those from the rest of the world increased their share from 22 percent to 34 percent over this period.

In absolute terms, the number of UK officers peaked at around 18,000 in 2006, but had fallen back to 15,000 by 2015. This decline was more than offset by an increase of 4,000 officers from other EEA countries.

Fig. 29. Share of officers working in the UK shipping industry by nationality, 2004 to 2015
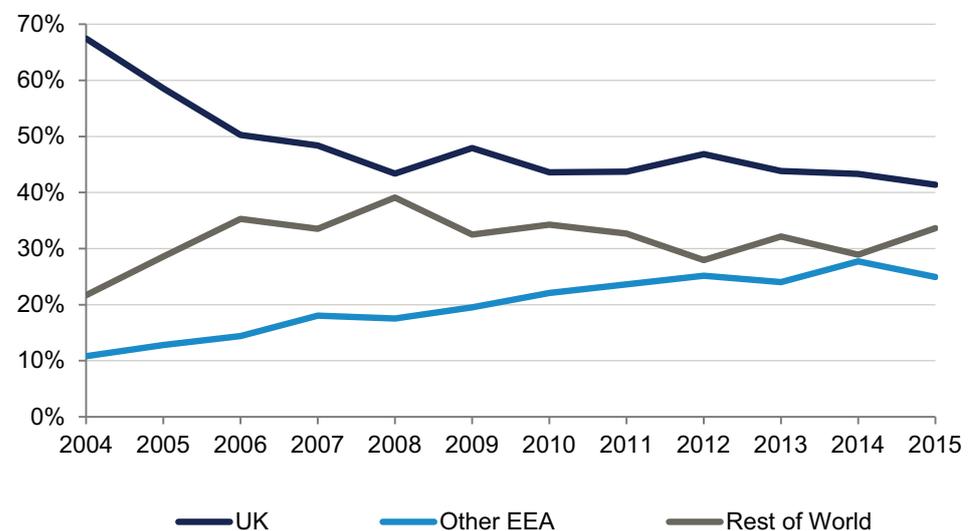
Source: Oxford Economics analysis of UKCoS manpower survey data

Repeating this analysis for non-hospitality ratings reveals a different picture. The share of UK nationals declined sharply from 56 percent in 2004 to 28 percent in 2008, where it has since stabilised. Over the same period, other EEA nationals sharply increased their share of posts from three percent to 16 percent in 2007. The share of ratings in this category from the rest of the world has been fairly stable at just under 60 percent since 2005.

Fig. 30. Share of deck, engine, technical and general purpose ratings working in the UK shipping industry by nationality, 2004 to 2015
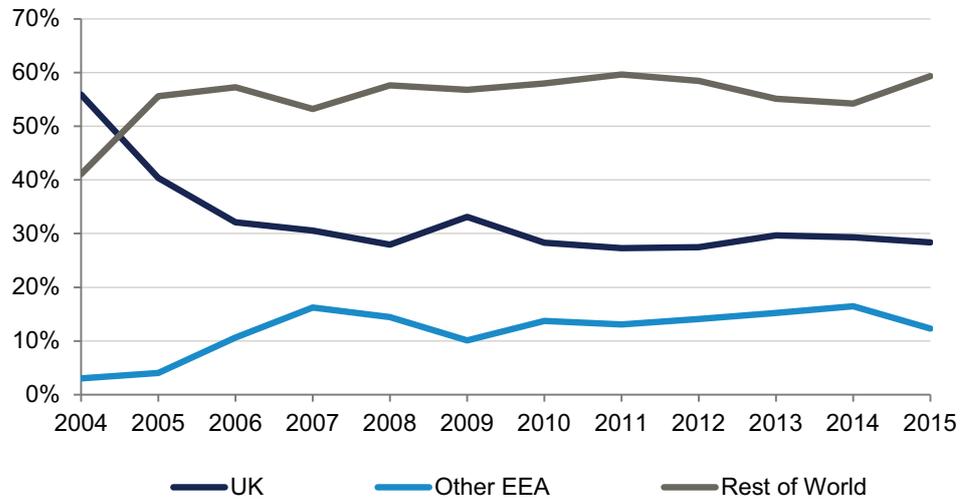
The underlying data for hospitality ratings are extremely volatile. We have therefore applied adjustments for the purposes of this project to smooth out the volatility and facilitate time series analysis. Our estimates suggest that hospitality roles for ratings are dominated by workers from the rest of the world, who accounted for more than 70 percent of the total by 2015.

Fig. 31. Share of hospitality and other ratings working in the UK shipping industry by nationality, 2004 to 2015
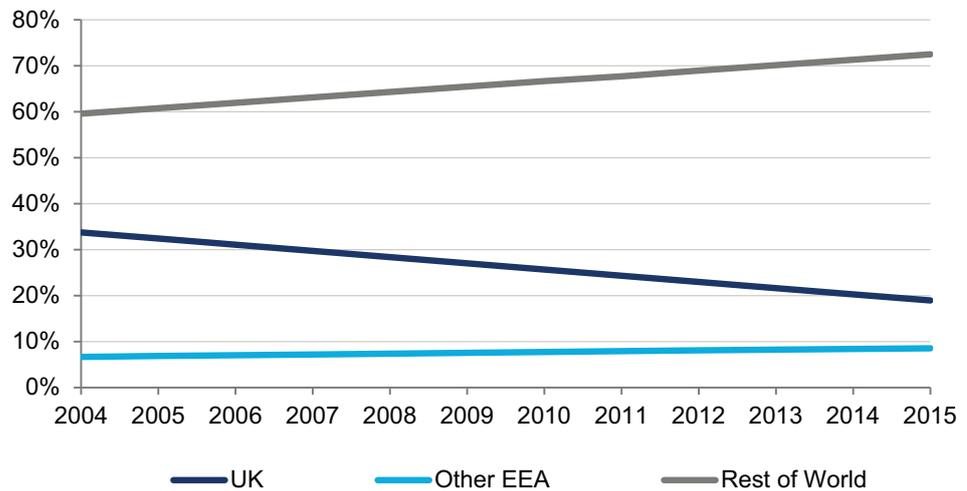
Stakeholders explained that cost is an important driver of these trends—seafarers from countries such as the Philippines and India can offer significant cost advantages over those from the UK, particularly in the case of ratings. For officers, cost advantages may be much lower. In addition, shipping companies may be more willing to pay a premium for senior UK officers, since they value the quality of training and experience they bring, particularly in comparison to

seafarers from outside the EEA. However, one stakeholder reported that training is becoming increasingly commercialised and professional in many countries such that the supply of non-EEA seafarers able to take on more senior roles is increasing. The extent to which it is possible to substitute UK or EEA seafarers with those from other countries may also vary according to the type of vessel. For example, workers in the ferry sector tend to come from other EEA countries since they typically spend a large amount of time onshore and need the right to work in the UK.

A further constraint on the UK's shipping industry's ability to recruit officers from overseas is the global labour supply. Based on analysis of recent global trainee numbers, BIMCO forecast that the global supply of officers could increase by a total of four percent between 2015 and 2025 (or 0.4 percent per year).[32]

Our supply modelling assumes that the UK is able to maintain its current share of the global supply of officers, and so the supply of non-UK officers to the UK shipping industry grows at 0.4 percent per year, in line with the BIMCO forecast.

For ratings there is much greater uncertainty about future supply. Barriers to employing ratings are lower than for officers, due to lower average skill and qualification requirements. In the absence of published forecasts for the global supply of ratings (BIMCO do not forecast the supply of ratings), we assume that the number of ratings available to the UK shipping industry increases by 0.9 percent per year, in line with the UN forecast for the global population of working age.[33]

4.5 FORECASTS

Our modelling suggests that the total supply of seafarers of all nationalities for roles at sea could increase by around four percent between 2015 and 2026. Within this overall figure, there are substantial differences for seafarers fulfilling different roles.

The supply of officers is projected to fall by three percent, while the supply of non-hospitality ratings in 2026 is expected to be one percent lower than in 2015. There is also variation within these categories: the supply of deck and engine officers is forecast to fall by more than 10 percent, while for technical officers growth in the region of 60 percent is expected, albeit from a much lower base. Strong growth in the number of technical officers expected to be available over the next 10 years reflects a relatively low leaving rate and high joining rates for this type of seafarer.[34]

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[32] BIMCO and International Chamber of Shipping, *Manpower report, the global demand and supply for seafarers 2015* (London: Maritime International Secretariat Services Limited, 2016).

[33] UN Department of Economic and Social Affairs, Population Division, "World population prospects: the 2015 revision" <https://esa.un.org/unpd/wpp/DataQuery/> [accessed 22 August 2016]

[34] Stakeholders questioned whether these rates could be sustained throughout the forecast period, so we ran a sensitivity test to halve annual inflows of UK technical officers and align leaving rates with those for deck and engine officers. Under these alternative assumptions the supply of technical officers declines by just one percent between 2015 and 2026.

Fig. 32. Percentage change in supply of seafarers of all nationalities for roles at sea, 2015 to 2026
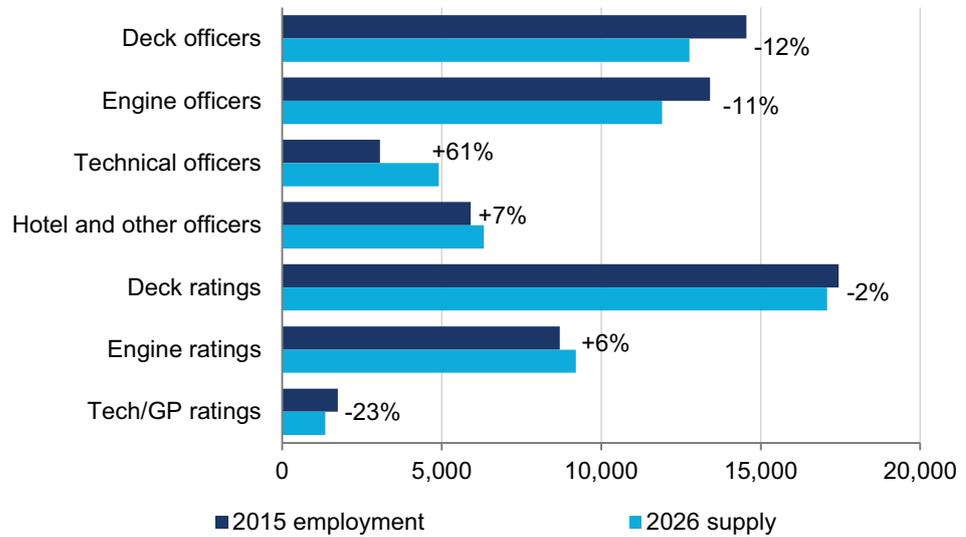
Source: Oxford Economics

The results from sensitivity tests for these forecasts are presented in Appendix F. The most important finding from this testing relates to the assumed growth rates for the supply of non-UK officers and ratings. Our baseline estimates assume a conservative growth rate for non-UK officers and ratings, compared to the historical growth rates actually recorded over the past ten years. If we were to instead assume that the supply of non-UK officers and ratings were to continue to grow at their historical average growth rates throughout the forecast period, the total supply of seafarers (UK and non-UK nationals) could increase by around 71 percent between 2015 and 2026. The modelling is therefore very sensitive to assumptions concerning the supply of non-UK seafarers. We return to this issue in section eight.

The forecasts presented above implicitly assume that there are no substantive policy changes. However, the Maritime Growth Study noted that there is scope for implementing initiatives to increase the attractiveness of careers at sea.[35] To the extent that such initiatives are successfully implemented, the supply of UK seafarers joining the industry could be greater than suggested by our analysis.

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[35] Department for Transport, *Maritime Growth Study: keeping the UK competitive in a global market* (London, 2015).

5. UK DEMAND FOR FORMER SEAFARERS FOR ROLES ONSHORE

Previous research has assessed the demand for former seafarers to fill roles based onshore. The most recent comprehensive study into this subject was undertaken by Gardner et al. in 2003 who estimated that there were 15,700 jobs onshore which employers would prefer to fill with a former seafarer.[36] Given the time which has passed since this research was undertaken, and the changes which have occurred in the maritime sector during that period, an important objective of the current study is to produce an updated estimate of this result.

5.1 CONSULTATION EVIDENCE

Stakeholders explained that there are certain specialist and technical roles onshore where the skills for a former seafarer may be essential. For example, it would be extremely difficult to be a technical superintendent of a group of ships, a ship surveyor or an accident investigator without having served at sea. Other examples given by stakeholders include specialised roles in maritime law, or HR roles within shipping companies, where knowledge and experience of working at sea may be essential.

In other cases, however, it may not be essential for a role to be filled by a former seafarer. Harbour masters are one area where former seafarers have typically been sought after, but constraints on the supply of former seafarers are leading some employers to instead train individuals who have not worked at sea. This is discussed further in section six.

The most important attribute of former seafarers is their knowledge of how vessels operate at sea. Some employers may prefer a former seafarer for certain roles because they feel experience at sea signals a certain level of knowledge of the sea. In the case of a dock or harbour master, there may be a belief that an individual needs experience of working at sea to have the authority to challenge a ship master

Seafarers with experience as a Master or Chief Engineer Officer are most sought after for roles onshore, although given supply shortages fewer employers may insist on this. Stakeholders highlighted a large number of sectors where a former seafarer may be either essential or preferred. These include:

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[36] Dr P.B. Marlow, Prof. M.M. Naim, Dr R.V. Nair, Dr S.J.Pettit Prof. B.M. Gardner, *The UK economy's requirements for people with experience of working at sea 2003* ([n.p]: Commissioned by the Department for Transport, the Chamber of Shipping and the Marine Society, 2003).

- Classification societies
- Consultancy
- Government, notably within the Maritime and Coastguard Agency (MCA) and Marine Accident Investigation Branch (MAIB)
- Maritime business services, such as finance, insurance and law
- Offshore energy, including renewables
- Ports
- Trade bodies
- Training and education
- Ship owners, managers, brokers

Nonetheless, there was also recognition that the absolute number of roles where former seafarers are essential is relatively small. There were mixed views on whether demand is increasing or decreasing. Some stakeholders suggested that demand for former seafarers remains strong, while others suggested it may be declining, possibly because firms are finding alternative ways to fill roles given the shortfall in supply.

5.2 SURVEY FINDINGS

A key objective of the survey of maritime organisations undertaken for this study was to gather updated evidence on the UK's requirement for former seafarers to fulfil roles onshore in the UK. Respondents were asked to report the total number of people they employ in roles onshore in the UK, and how many of these posts are filled by former seafarers. However, the current employment of former seafarers does not necessarily reflect an organisation's total demand for such individuals. There may be other roles which it would be advantageous for a former seafarer to fulfil if one were available, or there may be some roles currently undertaken by a former seafarer where seafaring experience does not convey any particular advantage compared to workers from other backgrounds. Organisations were therefore also asked about the number of posts for which a former seafarer is either essential or advantageous, following the approach of the Gardner et al. study. A series of follow-up questions gathered further details of such roles.

It is important to recognise at the outset that the insights which may be obtained from a survey of this nature can only be as good as the information provided by respondents. This in turn depends on a number of factors. Firstly, while the sample was compiled from respected industry sources, these do not provide coverage of all organisations in the UK maritime sector. Secondly, a large number of the organisations contacted chose not to participate, at least some of which are large employers. And finally, where an organisation has responded, the information provided reflects the knowledge of the individual within the organisation providing the response. For large organisations, in particular, there is a risk that the respondent may not have complete information of the organisation's need to employ individuals with seafaring skills. Where possible we have attempted to mitigate these limitations through discussions with stakeholders and our scaling up process, but for some parts of the maritime sector uncertainties remain.

5.2.1 Estimated requirement for former seafarers in roles onshore

Fig. 33 presents estimates of the number of onshore roles which survey respondents suggested that a former seafarer is essential or advantageous. The left-hand column presents the raw results reported to us by survey respondents. In the right-hand column we present scaled up estimates of the industry-wide requirement. Where possible we use a measure of the overall size of each sub-sector to scale-up responses, but where no such measure is available we assume that the situation amongst non-respondents is similar to that for respondents in that sub-sector. Further details of the scaling up process are presented in Appendix E.

It is important to note that these estimates exclude individuals working on vessels based onshore, such as harbour pilots and towage/salvage/dredging crew. Such individuals are included in the published MCA/DfT statistics on seafarers active at sea used to estimate the number of seafarers working at sea for this study. While many survey respondents regard these types of role as shore-based, we exclude them here to avoid double counting.

Fig. 33. Number of onshore posts for which a former seafarer is essential or advantageous

	Unscaled	Scaled
Charitable institutions, publishing, representative organisations, public sector, non profit	695	791
Classification societies	447	633
Consultants / surveyors	65	152
Education / training	416	580
Marine engineering, equipment and IT	108	165
Maritime lawyers	21	159
Port services	5	187
Ports	278	334
Other	25	26
Companies employing seafarers at sea (shipping companies, ship management companies, offshore, towage/salvage/dredging)	402	1277
Total	**2462**	**4306**

Source: Oxford Economics

By far the greatest need for former seafarers for onshore roles is amongst companies which employ seafarers at sea, which include shipping companies, ship management companies, those in the offshore sector, and those working in towage/salvage/dredging. Examples of roles for former seafarers in this category include management positions such as fleet managers, superintendent positions, or technical managers.

The second largest category for onshore employment is charitable institutions, publishing, representative organisations, public sector, and non-profit. This category includes around 400 coastguard officers, marine surveyors working for the Maritime and Coastguard Agency (MCA) and accident inspectors working for the Marine Accident Investigation Branch (MAIB). It also includes those working onshore for the Royal National Lifeboat Institution (RNLI), and as industry representatives in organisations such as the UKCoS, though excludes RNLI lifeboat crew who are classed as working at sea for this study.

Other large employers include classification societies, which employ former seafarers as surveyors; maritime education and training organisations, which employ former seafarers as lecturers and instructors; and ports, which employ former seafarers in roles such as harbour masters and vessel traffic services functions.

Amongst the roles identified, a former seafarer is reported to be essential for 29 percent of roles, and advantageous for 71 percent of roles. Inspection of responses relating to qualification requirements enables us to estimate that 51 percent of the roles identified require a former officer.

Further details of the results for each sub-sector are presented in Annex E.

5.2.2 Comparison of results with previous research

Our estimate that there are around 4,300 onshore roles for which a former seafarer is essential or advantageous is substantially lower than the 2003 Gardner et al. estimate of 15,700. It is therefore important to consider the extent to which this difference may reflect genuine changes within the maritime sector, as opposed to methodological differences or other factors.

Methodological differences

There are two main methodological differences between our estimates and the earlier study. Firstly, we have only gathered information relating to employment within the UK. This reflects that we are primarily interested in the benefits of former seafarers within the UK labour market.[37] In contrast, the Gardner et al. estimates include overseas roles in UK companies which have "habitually been filled by UK employees".[38] It is unclear how many overseas roles were captured in the Gardner et al. study, and in which categories. But in the classification sector, for example, our estimate of around 600 roles would be of a similar order of magnitude to the 2,600 estimated by Gardner et al. if we were to include classification societies' overseas employment. While the current study is focused on workers which would ordinarily be considered part of the UK labour market, it is important to note that UK workers based overseas play an important role in promoting Britain's interests and reputation as a maritime nation. They may also return to work in the UK later in their career, although we have no basis for assessing whether this has a substantive impact on the supply of former seafarers available for work in the UK.

The second main methodological difference relates to seafarers working on vessels which return to shore at the end of each day, such as harbour pilots or crew within the towage/salvage/dredging sector. As noted above such individuals are counted as working at sea in the current study, but appear to have been classed as working onshore in the Gardner et al. work. Once again it is difficult to accurately measure the impact of this difference on the results. One insight is provided by the UK Maritime Pilots' Association, who suggest there are around 600 maritime pilots working in the UK. This methodological

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[37] This means, for example, that classification societies based in the Isle of Man are excluded from our estimates

[38] Dr P.B. Marlow, Prof. M.M. Naim, Dr R.V. Nair, Dr S.J.Pettit Prof. B.M. Gardner, *The UK economy's requirements for people with experience of working at sea 2003* (Commissioned by the Department for Transport, the Chamber of Shipping and the Marine Society, 2003)., page 21

difference is likely to distort comparisons between estimates for the port services and ports sectors, in particular. Assuming lifeboat crew are included in the Gardner et al. estimates, this would also affect comparison of seafarer employment within charitable institutions.

Comparison by sector

Fig. 34 presents the extent of the difference in the number of former seafarers required for roles onshore between the current study and the earlier work by Gardner et al. For all of the sectors shown in the chart the Gardner et al. estimates are higher than those produced for this study.

Fig. 34. Difference between Gardner et al. findings and new estimates of onshore roles requiring a former seafarer
Bars denote extent to which Gardner et al. estimates are greater than those estimated in this study
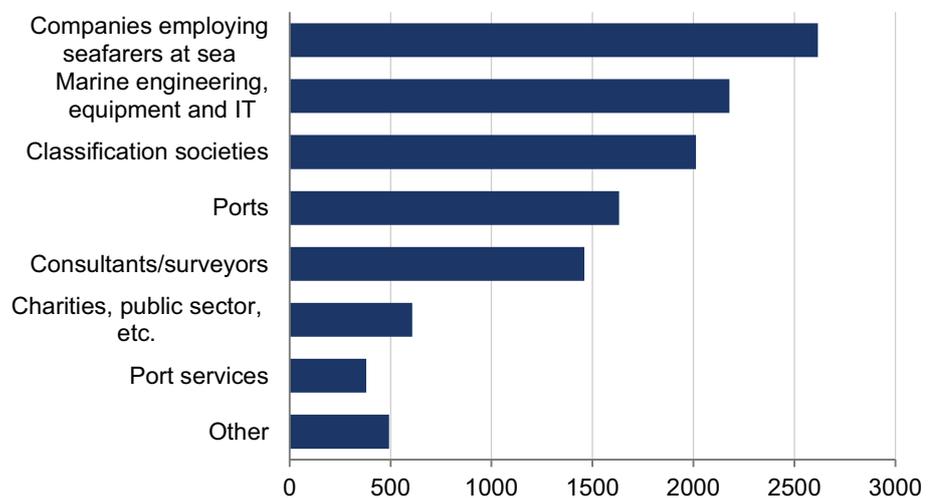
Source: Oxford Economics

The largest difference between the two studies is for companies employing seafarers at sea, which include organisations operating in the shipping, ship management, offshore and towage/salvage/dredging sector. Some of the difference in this sector reflects that we exclude those working on board vessels. This means that many of the 552 former seafarers which Gardner et al. estimated to be working in the towage/salvage/dredging sector do not appear in our estimates. It is also possible that the inclusion of employees based overseas led to higher estimates in the previous study. Nonetheless, the magnitude of the difference between the two studies would seem to suggest that there has been a genuine reduction in companies' requirement for former seafarers over the last decade. This may be linked to a reduction in total UK onshore employment for this type of company.[39]

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[39] Comparison of the total onshore employment estimate from Gardner et al. and our own estimate based on UKCoS manpower survey returns suggests that the total number of onshore roles for such companies may have decreased significantly since 2013.

Our estimate for the ports sector is based on responses from ports which handle more than four-fifths of UK cargo traffic, and so can be regarded as having good coverage of the sector. Our exclusion of harbour pilots reduces the size of our estimate compared to the earlier study, but consistent with feedback from the stakeholder consultations, it appears that at least some ports have responded to the shortage of former seafarers available for work onshore by re-designing roles and training so that they can be undertaken by staff with no experience at sea.

Our exclusion of seafarers working on vessels may be an important factor in explaining the difference for the port services category,[40] and this is also likely to explain at least some of the difference for the category which includes charitable institutions, given our exclusion of lifeboat crew.

The difference in the estimates for classification societies appears to be a direct consequence of our exclusion of workers based overseas, as noted above. This may also be a factor for the consultants and surveyors category, although it is difficult to be certain of this as no up-to-date estimate of total employment in the sector is available.[41] Inspection of membership lists for organisations such as the British Association of Cargo Surveyors, International Institute of Marine Surveying, and Society of Consulting Marine Engineers and Ship surveyors suggests there are around 500 companies engaged in these sectors, many of which appear to be sole traders. Total UK employment in the sector may therefore now be somewhat lower than the 9,150 estimated by Gardner et al. Nonetheless, further sector-specific research may be helpful for this sub-sector.

A similar conclusion applies to the marine engineering, equipment and IT sector. A total of 288 organisations responded to our survey, but less than one percent of roles were found to require seafaring experience, compared to five percent in the earlier research. There does, therefore, appear to have been a sharp reduction in the sector's requirement for former seafarers, but the size of the difference suggests there may be value in further research to validate this finding.

The final bar on Fig. 34 shows that our research identified 500 fewer seafarers in other parts of the maritime industries than the 2003 study. This group mainly includes maritime business services, notably insurance, which contributes more than 400 of the difference. None of the 32 marine insurance companies responding to our survey reported employing former seafarers. While recruitment adverts confirm that former seafarers are required to work in marine insurance, discussions with stakeholders did not suggest the number of posts is likely to be large. Similarly, none of the ship agents, ship broking/chartering or ship finance companies who responded suggested that they employ former seafarers. Once again, anecdotal industry feedback suggests that former seafarers are employed in these activities, but the

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[40] Gardner et al. identified a separate category for terminal operators, and we include their results for that sector within the port services comparison.

[41] In 2016 research for the City of London, PwC estimate that there are a total of around 400 people employed in marine consultancy in the UK, although this excludes those in technical roles such as engineering, naval architecture and surveying. That study also does not estimate how many employees are former seafarers.

Gardner et al. study found only 236 such roles and from our findings it appears that these sectors are still not large employers of former seafarers. In total, our study identified almost 700 fewer roles in maritime business services than Gardner et al. Partially offsetting this within the other category, however, is the education and training sector, where we identified around 170 *more* roles which require a former seafarer than the earlier work.

Further details of the findings for roles on shore are presented in Appendix E.

5.3 FORECASTS

To forecast the UK requirement for former seafarers to work in roles onshore we grow forward current employment in each maritime sector by Oxford Economics' employment forecasts for the corresponding sector.[42]

Fig. 35 presents our forecast for roles requiring a former officer, and other onshore roles which require a former seafarer. Demand for both types of role is forecast to increase by just under two percent over the next ten years. This subdued growth is a reflection of the correspondingly weak employment growth forecast. This can be explained by two main factors. Firstly, the uncertainty created by exiting the EU is expected to weigh down on the UK labour market over the coming years. Secondly, unemployment within the UK is at historically low levels and there is limited scope for further employment growth, particularly if rules on immigration are to become stricter. It is therefore likely that economic growth will come to increasingly rely on productivity growth, rather than employment growth.

Fig. 35. Forecast demand for onshore roles requiring a former seafarer, 2016 to 2026
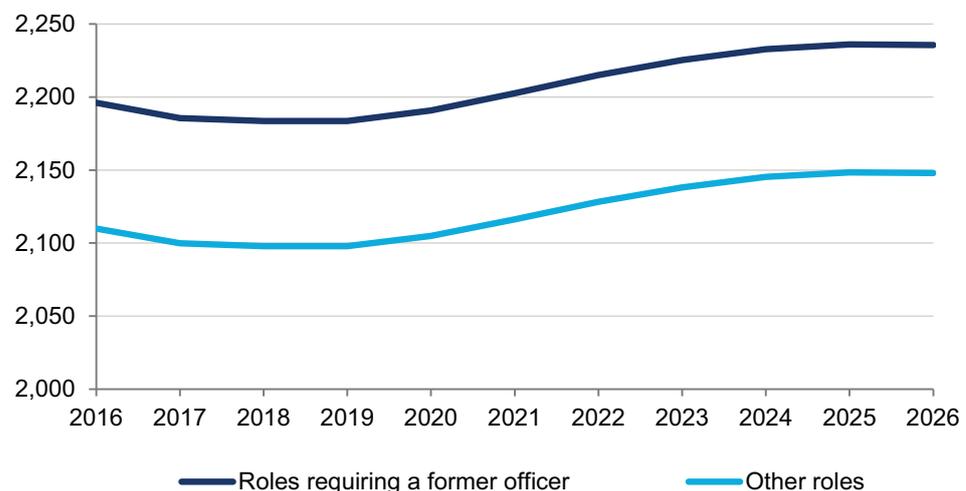
Source: Oxford Economics

Sensitivity tests for these results based on alternative economic growth scenarios are presented in Appendix F.

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[42] Forecasts are available for 2-digit SIC categories, so each maritime sector is grown using the forecast for the closest matching 2-digit sector.

6. UK SUPPLY OF FORMER SEAFARERS FOR ROLES ONSHORE

6.1 CAREER PATHS AND PROGRESSION

6.1.1 Typical career path for a seafarer

There was a consensus amongst stakeholders that it is extremely difficult to identify a 'typical' career path for seafarers. Individuals take many different routes, reflecting their capabilities, performance and aspirations.

Nonetheless, the picture is slightly clearer for the first 10 years, during which there is a natural progression of qualifications to work through. The first three to four years may be spent on a cadetship, before promotion to more senior ranks. At the end of this period, once higher level qualifications, such as a Master Mariners or Chief Engineers certificate have been obtained there is a natural break point when seafarers may decide whether to stay at sea or move to a role onshore. This point usually arrives between the ages of around 28 to 32, after obtaining a masters certificate, which can unlock a wide range of opportunities onshore, particularly in management. Roles in ports, or as marine pilots, were other common shore-based career options cited by stakeholders. Those choosing to stay at sea may move on to larger vessels and work up through the ranks. The other main time when a seafarer may consider moving onshore is in their early 40s, after they have gained experience of commanding a vessel.

A European study found that the majority of trainee seafarers expect to spend around 10 to 15 years at sea. The study found that this was consistent with the expectations of active seafarers, and the experience of former seafarers.[43] Stakeholders interviewed for this study suggested that seafarers may be unlikely to move into a role onshore after the age of 50. They are more likely to finish their career at sea after that point.

Consultees highlighted that personal considerations may be one of the most important factors in the decision of whether to remain at sea or come ashore, given the lifestyle implications of working at sea. Seafarers in their early 30s may wish to settle down and start a family at this point and the prospect of being away from home for months at a time may become less desirable. For this reason, while the first 10 years or so might be spent working on deep sea vessels, seafarers wishing to continue to work on vessels after this may seek work on vessels which permit more time at home, for example on short-sea ferries.

It is important to note that moves between roles at sea and onshore can work in both directions. Some seafarers who have taken up roles onshore may choose

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[43] European Community Shipowners' Associations and European Transport Workers' Federation, *Maritime career path mapping 2013 update* (2013), p.6.

to return to a role at sea, providing they have kept their certificates current and remained in the maritime sector.

6.1.2 Typical retirement ages

One consultee suggested the median retirement age from roles at sea was around 63, while others suggested 65. Beyond that it may be difficult for employers to gain insurance cover, or for seafarers to obtain the necessary health certification. The latter has become stricter over time, forcing some seafarers to move onshore earlier than they might otherwise have chosen to.

Nonetheless, there was an overall sense that the average retirement age has increased in recent years. This may reflect a desire amongst seafarers to remain at sea longer so they can move into full retirement earlier, or that shipping companies have made efforts to encourage experienced seafarers to work for longer due to a lack of younger seafarers moving up through the system.

The age profile of workers may be slightly different in the yachting industry, due to the specific demands of these roles, which typically require long working hours and the need to uphold high standards of service throughout. This tends to favour younger workers, with few above the age of 50. Those working on yachts may also only get five or six weeks holiday each year, meaning that this type of role is not well suited to those with family commitments.

CASE STUDIES[44]

As part of our research we interviewed three individuals working for shipping companies who started out working at sea before making the transition to a role onshore. These interviews illustrate and reaffirm the consultation findings that individual circumstances and preferences play a strong role in shaping individuals' careers within the maritime sector.

Case study 1

Simon joined a major shipping company in the early 1990s as a dual officer cadet. After completing his cadetship he spent 10 years at sea, rising through the ranks to eventually become a chief engineer on board an LNG vessel. When he moved onshore, Simon took on the role of engineer superintendent, in which he worked for just over two years. He subsequently progressed into various other roles including fleet manager, business projects manager, and general manager of maritime services. Simon is currently director of a regional office of the same major shipping company he joined 20 years ago. Reflecting on his career, Simon explained that his training as a seafarer had provided a strong foundation for taking on a diverse range of roles onshore.

Case study 2

Louise started her career as a trainee cadet for a cruise operator, and completed two four-month placements on board vessels. After completing her cadetship she became a front-of-house manager on one of the same company's cruise vessels. This transition was relatively straightforward due to her existing relationship with the company, but some other graduates from the same course who were not able to secure roles at sea went to work in hotels where skills needs are similar and more roles are available. Louise progressed to on-board assistant crew manager and then crew manager. After one year in this role, Louise transitioned into the role of on-board trainer. After a total of 6 years at sea Louise moved onshore to become a resource advisor for the same cruise company. She is currently in charge of internal recruitment for the hotel department of cruise vessels. Lifestyle and the desire to settle down in one place was the main driver of Louise's decision to move onshore. One specific factor was that she was not earning a salaried wage for her work at sea, which made it difficult to obtain a mortgage and take on other financial commitments.

Case study 3

Thomas started his career as a cadet in another EEA country, and after graduation became a deck officer before working his way up to eventually captain a ship (which had been his aspiration at the outset). After holding a captainship for over three years Thomas moved onshore to become the technical manager of a diverse fleet of 24 chartered ships. After a short period of time he was promoted to technical director. Following two years in that role Thomas moved to another company, initially into the role of managing director of the company's London office, before becoming fleet director at the company headquarters in mainland Europe. Thomas is currently working as head of fleet operations at a major shipping company based in London.

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[44] Interviewees' names have been changed

6.2 CURRENT SITUATION

Stakeholders reported that the supply of senior and experienced former seafarers available to take up roles onshore in the UK is currently insufficient to meet demand. As such UK companies tend to have to source staff from overseas to fill some roles. However, there was a perception that this was becoming more difficult due to the complexity of the process for securing visas for former seafarers from outside of the EU.

One factor limiting the supply of former seafarers is the difference in take-home pay for a role at sea compared to one onshore. One stakeholder cited the example of a ships master working at sea who might typically earn £80,000 tax free. To earn an equivalent take-home wage onshore they would need to find a job with a salary offering more than £130,000. Moving to a role onshore may typically therefore involve a large salary reduction. This issue can cause particular challenges for training colleges and public sector positions, where the level of salary which can be offered may be subject to a cap. This can make it very difficult to attract suitably qualified former seafarers.

A further factor impacting on the current supply of seafarers is the fall in the number of cadets trained in the past. Although the number entering training has increased over the last 10 years, lower numbers trained in earlier years are affecting the pipeline of experienced seafarers moving onshore with more than 10 years' experience.

Roles at sea may be shorter than in the past, with perhaps a few weeks at sea followed by a few weeks onshore. This means that it is easier to balance a role at sea with a family life than in the past, when a seafarer might more typically have made trips lasting four to six months. This may be another factor which reduces the relative attractiveness of a move onshore.

In light of the factors above, stakeholders felt that they would need to increasingly rely on shore-based training to ensure workers are available to fulfil roles previously undertaken by former seafarers. Harbour masters were one example suggested of a role for which training onshore could replace the need for a former seafarer. In some cases an individual with experience in business and operational planning may be well placed to be trained to take on such roles, regardless of whether they have maritime experience. Stakeholders also suggested there might be a growing role for shore-based apprenticeships for certain roles. For example, in 2015 ABP launched a marine pilotage apprenticeship scheme. These roles would typically have been filled by master mariners wanting to come and work onshore, but the decline in the availability of individuals with these skills coming through has led to ABP seeking to fill the roles through other means.[45]

Stakeholders suggested that this sort of substitution would not be possible for all roles however, and that there will always be some which require the experience gained from working at sea. There was also a suggestion that smaller employers, such as small ports, may not have the resources to run apprenticeships and so would continue to rely on former seafarers.

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[45] http://www.abports.co.uk/newsarticle/245/

6.3 INFLOW OF SEAFARERS FROM ROLES AT SEA TO THOSE ONSHORE

To estimate the future supply of UK seafarers becoming available for roles onshore we extend the model which estimates the supply of seafarers at sea, described in section four. We assume that UK deck and engine officers and ratings and technical officers leaving roles at sea become available to work onshore in maritime related roles for which a seafarer is essential or advantageous. Those aged 30 or over are assumed to have sufficient experience to take on such roles, while those leaving roles at sea who are aged 60 or over are assumed to move into retirement rather than a role onshore.

We uplift this inflow to make an allowance for the fact that some roles onshore may be taken by former Royal Navy or fishing personnel. Based on discussions with stakeholders, this is assumed to be equivalent to around 10 percent of the total inflow of former seafarers. The supply of non-UK former seafarers available for roles onshore is assumed to grow at the same rate as that for non-UK seafarers working at sea.

A final step is to consider the outflow of former seafarers who either move into retirement, another industry or unemployment each year. One option would be to use the leaving rates estimated for roles at sea. Feedback from stakeholders suggested that these may over-estimate rates for roles onshore as individuals are likely to settle in roles for longer than roles at sea. An alternative would be to use ONS estimates of labour market movements. However, there is a risk that such estimates may under-estimate leaving rates for our purposes because they relate to all age groups, whereas we would expect roles filled by former seafarers to have a greater orientation towards those in older age groups. In the absence of more detailed information we use the average of the two values available. Our assumptions are summarised in Fig. 36.

Fig. 36. Modelling approach for the supply of former seafarers becoming available for roles onshore

	Roles which require a former officer	Other roles
Inflows		
Inflow of UK seafarers from roles at sea	Deck and engine officers aged 30-59 leaving roles at sea	Technical officers, deck ratings, engine ratings aged 30-59 leaving roles at sea
Plus uplift for ex-RN or fishing personnel	Ex-RN or fishing personnel assumed to make up 10 percent of the total inflow	
Non-UK former seafarers	Assumed to grow in line with supply of non-UK officers at sea (+0.4% per year)	Assumed to grow in line with supply of non-UK ratings at sea (+0.9% per year)
Outflows		
Leaving rate based on that for seafarers at sea	9.6% per year	7.1% per year

Based on the assumptions outlined, the supply of individuals available for roles requiring a former officer is estimated to increase from 1,700 in 2016 to 5,600 by 2026. For other types of role, supply increases from 1,100 to 5,200.

We also ran a sensitivity test whereby only those aged up to 50 become available to fill shore-based roles, reflecting the suggestion from some stakeholders that those aged above 50 are most likely to finish their career at sea. Under this scenario the supply for posts requiring a former officer is found to reach 4,200 in 2026, while that for all other on-shore posts reaches 3,100.

At least in theory, therefore, the model suggests that, under either scenario, the number of seafarers expected to leave roles at sea over the coming decade could lead to a strong growth in the supply of former seafarers available for roles onshore. There is further discussion of this finding in section 8.1.3, where we compare forecasts of supply and demand for roles onshore.

7. EXTENT TO WHICH REQUIREMENTS NEED TO BE MET BY UK SEAFARERS

7.1 PERCEIVED ADVANTAGES OF UK SEAFARERS

Our analysis in section 4.4 showed that the UK shipping industry's reliance on non-UK seafarers has increased significantly over the last 10 years, particularly in the case of ratings. Assuming that these trends reflect a lack of supply of UK seafarers, it is helpful to explore whether the industry might find it advantageous to employ more UK seafarers, and the reasons for this.

Stakeholders reported that UK seafarers are generally able to find employment when they want it, which is consistent with our review of labour market indicators reported in section four. Anecdotal evidence based on the CV checking service offered by the Merchant Navy Training Board (MNTB) suggests that it generally takes newly qualified cadets who choose to use the service around four months to find a job, although there can be significant variation around this.

Overall demand for UK seafarers in the global shipping industry is strong, particularly for more senior officers and those with specialised skills. This reflects the strong international reputation of the UK maritime training system. UK certification is highly regarded, and UK training colleges have a strong track record of producing seafarers who attain the high standards demanded by these qualifications. One effect of this is that many foreign seafarers also seek training in the UK, or at UK training institutions which run courses overseas. Seafarers with a British masters certificate may be able to command a higher wage, regardless of their nationality.

However, as noted earlier in the report, some stakeholders felt that training standards are improving in other major seafaring countries, and they suggested that it is uncertain whether UK certification will continue to enjoy such a large reputational advantage in future.

Other sources of the perceived advantages of hiring UK seafarers include the UK's strong heritage as a maritime nation, and the UK culture and mind set, which is seen by some as producing pragmatic and strategic seafarers who can think on their feet and solve problems. UK seafarers are also in demand due to their willingness and ability to think independently and not be afraid to challenge higher ranks if they identify issues. This is not necessarily the case amongst seafarers from cultures which are more hierarchical, which can lead to people carrying out orders from more senior colleagues without challenge. Given the size and complexity of modern vessels, mistakes can be very costly and it is often important to have a number of people on board thinking decisions through.

The English language is another advantage of employing UK seafarers, given that English is the main language used in maritime contexts across the globe. Some stakeholders pointed out that for UK shipping companies, UK seafarers are likely to be easier to retain within the company in the longer term, including when they move to a role onshore.

Some stakeholders highlighted that they prefer to employ seafarers who are UK or EEA nationals because there are no visa restrictions on their employment, making them easier to recruit and cutting down on bureaucracy.

Survey respondents largely confirmed the stakeholders' views on this topic. There was a large degree of consistency in the ranking of responses for roles at sea and those onshore, as shown in Fig. 37. The most commonly cited reason for hiring UK seafarers within the UK maritime sector is that they are believed to have a good knowledge of the way the industry operates in the UK. The other most frequently cited reasons related to experience, training and qualifications. A number of respondents also highlighted that there can be reputational benefits to the company of employing UK staff on their vessels.

Fig. 37. Main advantages of UK trained EEA seafarers for roles at sea and onshore
Respondents could select more than one response

Number of respondents identifying reason
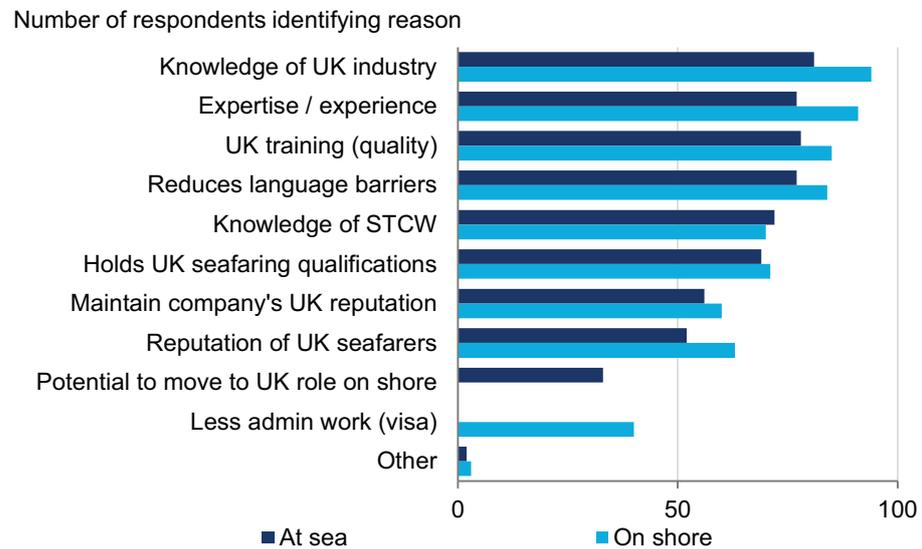
Source: Oxford Economics   169 responses

7.2 ROLES WHERE UK SEAFARERS ARE PREFERRED

UK seafarers are most sought after for senior roles on board ships, where their strong leadership, command and control skills can bring the greatest benefits. The advanced technical skills possessed by some UK officers are also highly regarded on certain vessel types, such as LNG tankers. UK seafarers are in particularly strong demand in the cruise industry, because passengers tend to prefer English speaking staff. A similar situation exists in the yacht industry, where owners expect a certain degree of culture and education amongst their staff, although this more strongly reflects a need for staff with a good level of education, rather than British nationality.

Survey respondents highlighted a range of roles where a UK seafarer was preferred, but the most common related to senior officer roles, particularly those for engineers.

Fig. 38. Roles at sea where a UK-trained EEA seafarer is particularly advantageous

Number of responses
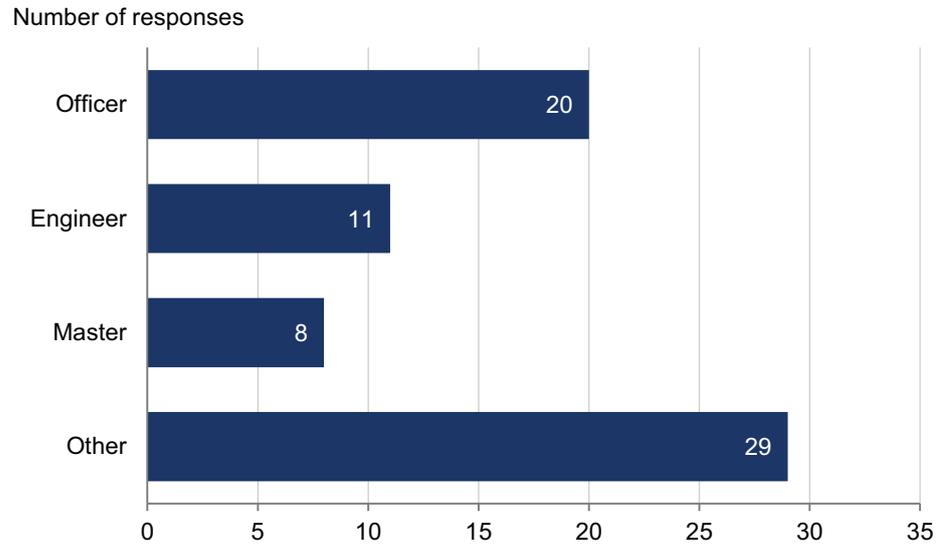
Source: Oxford Economics

68 responses

Despite the kinds of advantages outlined above, it is important to point out that not all of the stakeholders interviewed felt there were clear advantages of hiring UK seafarers over those of other nationalities. Some suggested that as training improves around the world the skill levels of seafarers of different nationalities are converging. As one interviewee explained, "it's about training, not nationality". Others highlighted specific countries, such as the Netherlands, France, Belgium, Australia or the US as also producing high quality seafarers.

For roles onshore, stakeholders highlighted that maritime colleges have a strong need for UK former seafarers because students coming from overseas expect to be taught by a UK seafarer, even if other nationalities might be just as capable. Maritime surveyors were another role cited as being typically filled by UK former seafarers. Other interviewees explained that having the right to work in the UK may be the most important factor in identifying the nationality of a former seafarer for a role onshore.

Fig. 39. Roles onshore where a UK-trained EEA former seafarer is particularly advantageous

Number of responses

Source: Oxford Economics

113 responses
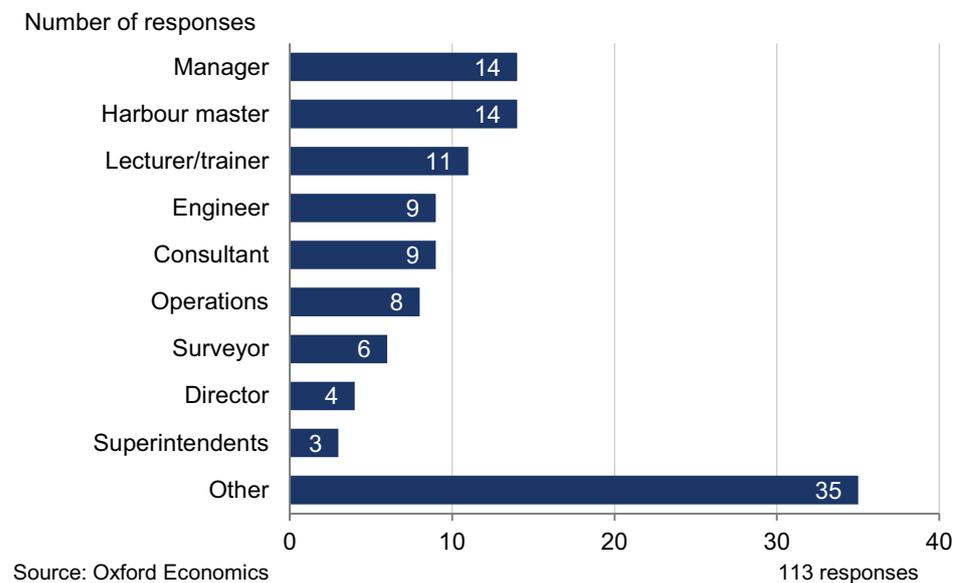
7.3 BARRIERS TO EMPLOYING UK SEAFARERS

The survey asked maritime organisations about the barriers to employing more UK trained EEA seafarers in roles either at sea or onshore. Around half of those responding to this question suggested that there were no barriers. Amongst those who did identify barriers, by far the most commonly cited reason was a lack of supply of suitably qualified seafarers. In some cases this appears to reflect a view that the supply simply does not exist, although other respondents pointed out that individuals may decide against a career in their organisation for personal reasons. For example, an unwillingness to spend long periods of time at sea or, for those who have worked at sea, an unwillingness to accept a lower take-home salary for working onshore. Responses suggest it can be particularly challenging to find experienced UK officers with management level certification. Consistent with the findings of the Maritime Growth Study, our research therefore suggests that there may be scope for initiatives to both increase the awareness of career opportunities in the maritime sector, and to make those opportunities more attractive.

Participants in both the survey and stakeholder interviews highlighted cost as another barrier to employing more UK trained EEA seafarers. It was suggested that the cost of training cadets is much higher in the UK than in other countries, even after allowing for the government support provided through SMarT. One effect of this is that relatively few seafarers from other EEA countries train in the UK as they are able to do so more cheaply in their own country.

Salary expectations can be substantially higher for UK seafarers, which may be linked to the shortage of supply highlighted in the previous paragraph. One survey respondent suggested that "UK trained officers are now becoming a luxury". UK seafarers may also be prepared to work fewer contracted hours, or have less flexibility around working patterns and working at sea for long periods than those from non-EEA countries. These factors ultimately add to the cost of employing UK seafarers.

Fig. 40. Barriers to employing more UK trained EEA seafarers in roles either at sea or onshore

Shading indicates type of seafarers employed

Number of respondents
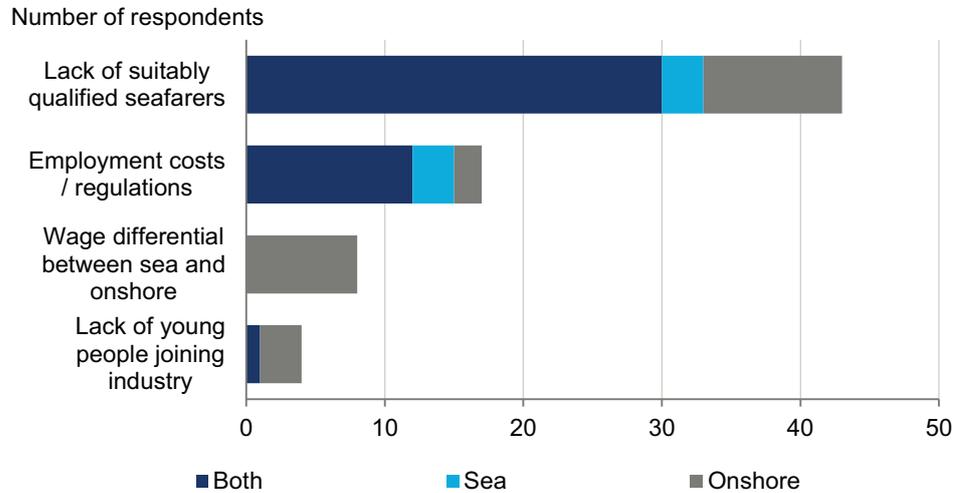
Source: Oxford Economics

72 responses

7.4 THE DESIRED SPLIT BETWEEN UK AND NON-UK SEAFARERS

While there was agreement amongst stakeholders that UK seafarers can bring advantages, particularly in more senior roles, shipping companies are typically seeking to balance cost and effectiveness. As one stakeholder explained: "the British seafarer will be very effective and very expensive, so it's about getting them in the positions where they will add the most value". On cruise vessels, this balance is often struck by seeking UK seafarers to fulfil senior officer roles, with more junior roles being filled by seafarers from lower cost countries.

Survey respondents were asked whether they would like to employ more UK seafarers or former seafarers (Fig. 41). Between 40 and 50 percent of respondents felt that the current proportion of UK seafarers or former seafarers in their organisation was about right. Nonetheless, more than 40 percent of those employing officers at sea or former seafarers in roles onshore suggested they would like to employ more UK seafarers if they were available.

Fig. 41. Whether organisations in the maritime sector would like to employ more UK trained EEA seafarers

Source: Oxford Economics
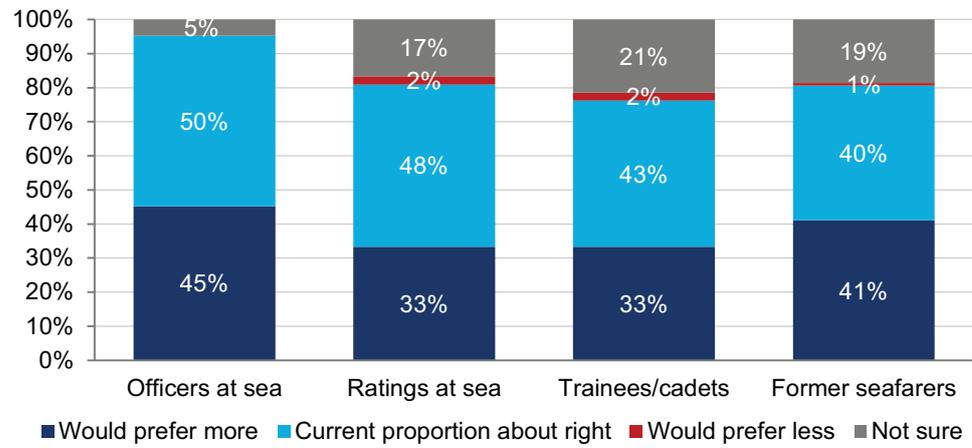
Based on 42 organisations which employ seafarers at sea and 129 which employ former seafarers on shore

8. CONCLUSIONS: THE BALANCE BETWEEN SUPPLY AND DEMAND

In this final section of the report we compare the demand and supply forecasts outlined in the previous sections to estimate the 'gap' between supply and demand for each type of seafarer within our model. This gap is also known as the 'excess demand' which exists where the industry's requirement for seafarers is greater than the number of seafarers available to fill such roles. Where the supply of seafarers exceeds industry's demand for such seafarers there is 'excess supply'.

8.1 ROLES AT SEA

8.1.1 Officers

Our model suggests that the UK shipping industry's requirement for deck and engine officers could be greater than the available supply throughout the forecast period (Fig. 42). The gap between demand and supply (or 'excess demand') peaks at 4,400 officers in 2023, before easing back to 3,800 by the end of the forecast period.

Conversely, the number of technical officers available is forecast to be greater than the industry's requirement over the coming decade. This 'excess supply' reaches almost 1,800 by 2026. Strong growth in the number of technical officers expected to be available over the next 10 years reflects a relatively low leaving rate and high joining rates for this type of seafarer. If we adjust the model to halve the annual inflow of technical officers and align leaving rates with those for deck and engine officers, the excess supply is eliminated.

Fig. 42. Excess demand for officers of all nationalities in the UK shipping industry, by type of officer, 2016 to 2026
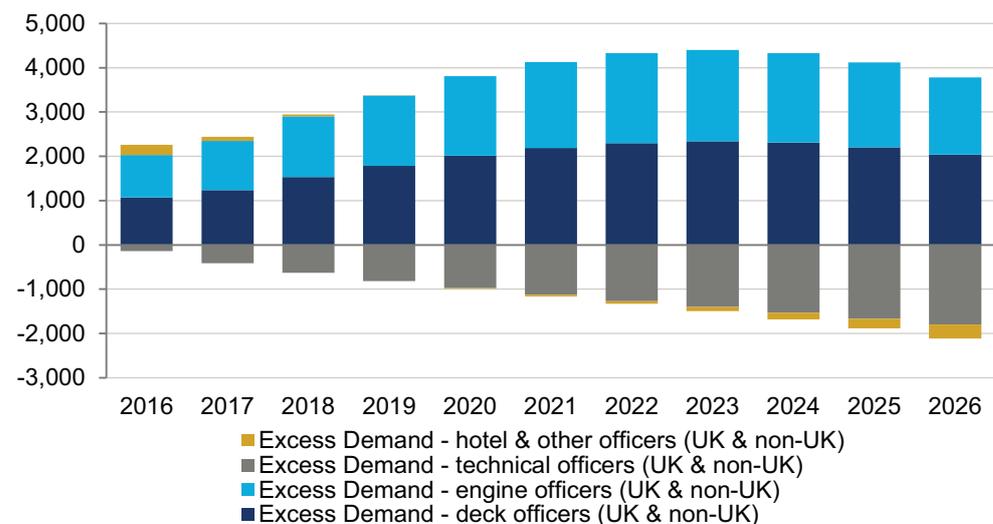
Excess Demand - hotel & other officers (UK & non-UK)
Excess Demand - technical officers (UK & non-UK)
Excess Demand - engine officers (UK & non-UK)
Excess Demand - deck officers (UK & non-UK)
Source: Oxford Economics

There are two main options for addressing the forecast shortage of deck and engine officers. The first would be to increase the inflow of newly qualified officers. Closing the gap by the end of the forecast period would require increasing the annual inflow from the 645 per year assumed in the baseline case to between 1,500 and 1,600 per year.

An alternative option would be for the industry to further increase the supply of non-UK officers. Increasing the annual growth rate for this group from the 0.4 percent assumed in the baseline case to 2.2 percent would eliminate the excess demand for deck and engine officers by the end of the forecast period. It is important to note that this would still be below the average annual growth rates recorded over the last decade.

8.1.2 Ratings

Repeating the analysis above for non-hospitality ratings suggests that a gap could gradually open up between demand and supply to reach a shortage of around 2,700 seafarers by 2026. By department, 70 percent of the excess demand identified for non-hospitality ratings in 2026 is for those in the deck category, although there is also a shortage of over 500 technical and general purpose ratings. The latter result appears to be at odds with the finding of an excess supply of technical officers discussed above. However, it is important to note that there were only around 1,700 technical and general purpose ratings in 2015 (of which 800 were UK ratings) and the historic series is subject to a great deal of volatility. The finding of excess demand here may therefore be an anomaly caused by the small sample size available for this group and should be interpreted with caution. Nonetheless, stakeholders did report that the cruise industry employs a large number of technical ratings, so our belief that this part of the industry will continue to grow strongly could sustain growth in demand for this type of seafarer.

Fig. 43. Excess demand for non-hospitality ratings of all nationalities in the UK shipping industry, by type of rating, 2016 to 2026

Excess Demand technical / general purpose ratings (UK & non-UK)
Excess Demand engine ratings (UK & non-UK)
Excess Demand deck ratings (UK & non-UK)
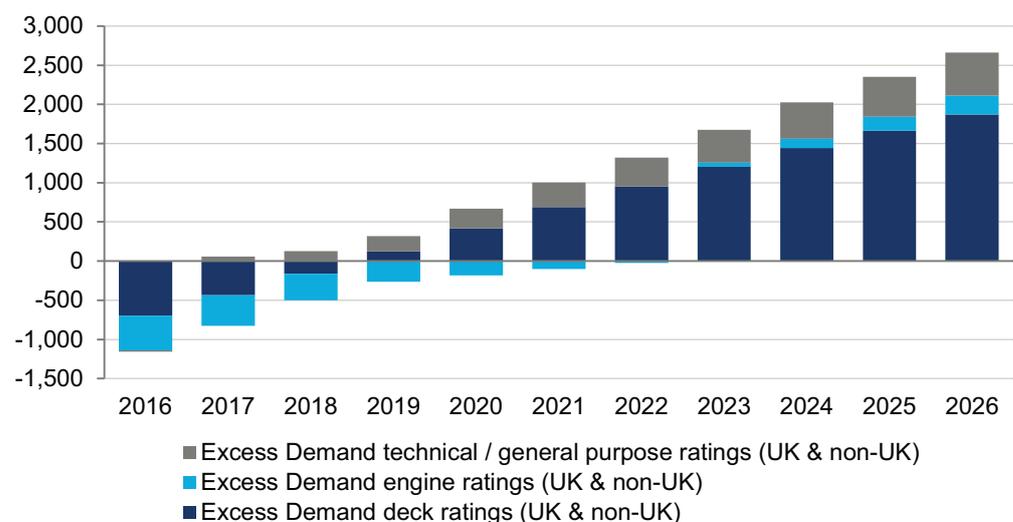
Source: Oxford Economics

To eliminate the excess demand for deck ratings by 2026 through training it would be necessary to increase the annual inflow of UK deck ratings aged

under 30 from 122 to 470 per year. In contrast, increasing the assumed growth rate for non-UK ratings from 0.9 percent per year to just over two percent per year would have a similar effect. This higher net inflow rate for non-UK ratings would still be less than half of the historical growth rate recorded over the last 10 years.

Stakeholders suggested that in reality it is likely that excess demand for deck, engine and technical ratings will arise amongst companies based in the UK, operating in UK waters, and where seafarers return to base in the UK at the end of a shift. Ferry companies would perhaps be the best example of this. In such cases companies are not easily able to recruit seafarers from outside of the EEA. In contrast, stakeholders felt that companies operating on a global basis would generally have easy access to the global pool of ratings and may be unlikely to face shortages. No data are available to separately identify the number of ratings employed on vessels operating in UK waters. Further research into this issue could be helpful in identifying the extent to which there is a need for additional UK ratings to fill roles which can be less easily taken up by non-UK seafarers.

Our model suggests that a substantial shortage (or excess demand) for ratings in the hotel and other category could develop over the coming decade. This reflects the implicit assumption that the UK cruise industry continues to grow at similar rates to in the past. In 2015 four-fifths of those employed in this category within the UK shipping industry were non-UK seafarers. Closing the gap of around 15,000 by the end of the period would require an approximately three-fold increase in the number of UK joiners under the age of 30, or increasing the assumed rate of growth of non-UK ratings to 3.2 percent per year.

Fig. 44. Excess demand for hotel and other ratings of all nationalities in the UK shipping industry, by type of rating, 2015 to 2026

■ Excess Demand hotel & other ratings (UK & non-UK)
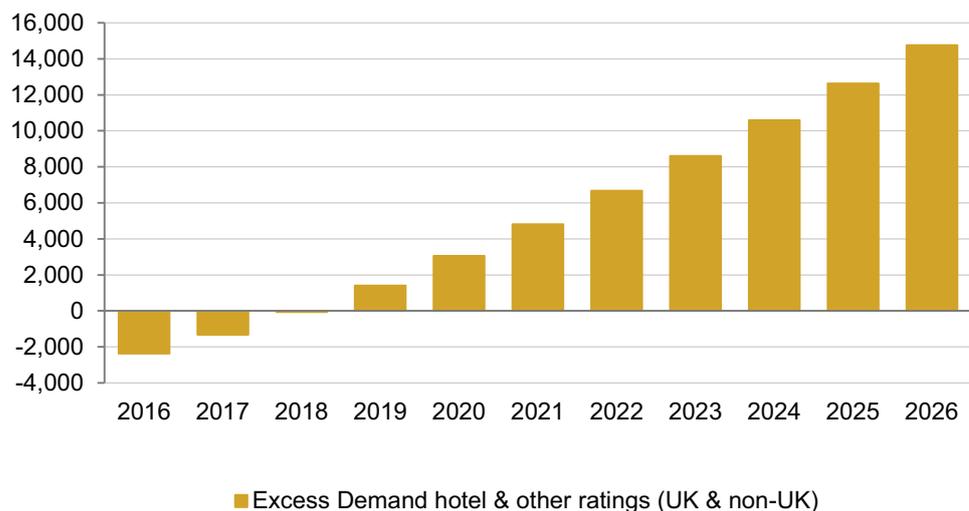
Source: Oxford Economics

8.1.3 Roles onshore

Our analysis of survey responses enabled us to estimate the industry's total requirement for former seafarers to work in roles onshore. We consider the

supply of seafarers available for these roles to be the number of UK and non-UK former seafarers working in such roles in 2016.

There are also some roles which employers would like to fill with a former seafarer, but are unable to do so. They are instead filled by a non-seafarer or left vacant. We consider these roles as excess demand.

From that starting point we grow demand in line with Oxford Economics' employment forecasts, as discussed in section 5.3. Annual changes in the number of former seafarers available to work onshore are estimated following the approach described in section 6.3. As with roles at sea, we then compare demand and supply to estimate whether the number of former seafarers available for onshore roles is sufficient to meet the industry's needs.

Fig. 45. Demand and supply for former seafarers in roles onshore which require a former officer
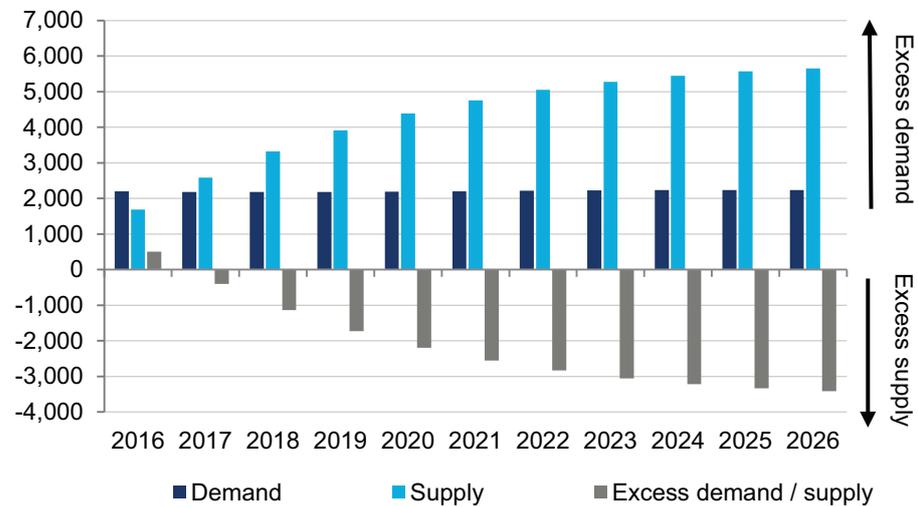
Source: Oxford Economics

For both types of onshore roles—those which require a former deck or engine officer and other types of role—the modelling suggests that the supply of officers leaving roles at sea should be more than sufficient to meet onshore demand in the years ahead.

Fig. 46. Demand and supply for former seafarers in other roles onshore
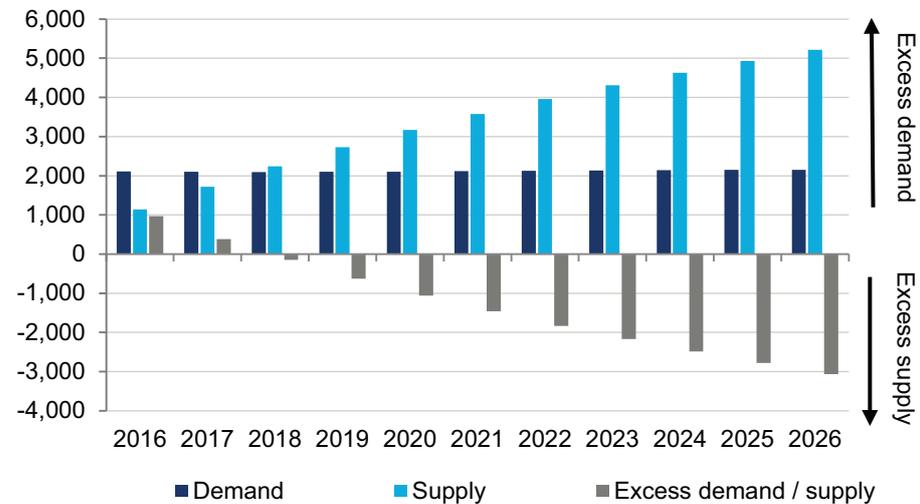
Source: Oxford Economics

Our findings here suggest a rapid change away from the current situation in which employers report difficulties in recruiting former seafarers for roles onshore. It could be that the labour market for former seafarers is on the point of moving from excess demand to excess supply. This could, for example, result from the historical lack of trainees entering the system more than 10 years ago, either because there are fewer seafarers to move to roles on shore once they have spent 10 years at sea, or because shipping companies have made it attractive for seafarers to remain at sea for longer to offset fewer recruits entering the system. The increased inflow of newly qualified officers in more recent years may now be correcting the imbalance.

However, the speed of change implied by the model suggests the results should be treated with a large degree of caution. Discussion with stakeholders identified three other potential explanations for our finding of excess supply in future years.

Firstly, it is possible that **the model over-estimates supply**. This may be the case if less than 100 percent of those leaving roles at sea make themselves available for onshore roles which require a former seafarer. Some of those leaving roles at sea in the UK shipping industry might, for example, take early retirement, work overseas, move into another industry entirely, or take up a role within the maritime industry for which a seafarer is not essential or advantageous. In the absence of information on the destination of leavers from roles at sea we have no basis for estimating the true proportion of seafarers who seek roles onshore within the maritime industries. However, the model is broadly in equilibrium if around 30 percent of leavers are assumed to enter roles for which a former seafarer is essential or advantageous.

A second possibility is that the **information available from the survey responses has not enabled us to fully estimate all of the demand for former seafarers**. As discussed in section five, the quality of the estimates for demand onshore is entirely dependent on the quantity and quality of information provided by maritime employers. While in some cases it is possible to explain the large apparent reduction in onshore demand compared to earlier

research, for some parts of the industry uncertainties remain and it is possible that the survey responses have not enabled us to obtain a complete picture of the onshore labour market. Nonetheless, demand for shore-based roles would need to be in excess of 13,000 for demand and supply to broadly balance by the end of the forecast period, so it appears unlikely that this provides a complete explanation.

Thirdly, it may be that **the skills of seafarers leaving roles at sea are not well aligned with the requirements of employers onshore**. That is, a mismatch exists in terms of quality rather than quantity. Forthcoming research suggests that some onshore employers of former seafarers feel that some former seafarers need to adapt their skills to onshore working, and some prefer to only employ seafarers who already have experience of working in an onshore environment.[46]

8.2 IMPLICATIONS

For seafarers working at sea our baseline models have adopted conservative assumptions regarding the supply of non-UK seafarers to enable us to explore how the shipping industry could develop if it were to reduce its reliance on non-UK seafarers. This analysis suggests that a shortage of deck and engine officers and deck ratings would be likely to arise over the forecast period. To close this gap purely through additional training of UK seafarers would require trainee numbers to increase substantially from current levels.

In reality, shipping companies are likely to fill gaps by continuing to recruit non-UK seafarers. Nonetheless, companies have reported that they feel there are genuine advantages to employing UK seafarers, particularly in more senior roles. And they have also suggested that they would often prefer to employ more UK nationals were they available, again, particularly in officer roles. There may therefore be an opportunity for the government to support the industry further by increasing training provision, should it wish to do so. The potential benefits of training UK seafarers as compared to employing those of other nationalities are considered in the separate study on the SMarT scheme.

For roles onshore uncertainties are much greater. The onshore market for former seafarers is much smaller than that for those working at sea, yet the data on the demand and supply for such roles is even more uncertain. Although our modelling suggests there should be ample supply of former seafarers for roles onshore, this finding should be treated with caution for the reasons outlined above. What is more, while there is a good degree of substitution between UK and non-UK seafarers for roles at sea, this is less likely to be the case for roles on shore where migration rules prevent employers from freely accessing the global labour market. We would suggest further research and more regular data collection to track trends in onshore employment going forwards. One possibility could be to explore how to make greater use of the UKCoS manpower survey to gather more information relating to roles onshore.

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[46] Navigate PR and Occam Insight, "Maritime Employers' Research 2016: What training and skills do British merchant navy officers need to make a successful transition from ship to shore?", June 2016.

APPENDIX A: ASSUMPTIONS USED TO ESTIMATE HISTORIC NUMBER OF SEAFARERS IN THE UK SHIPPING INDUSTRY

SCALING UP

When working with data from the UKCoS manpower survey it is important to keep in mind that the survey only covers UKCoS members, which do not represent the entire UK shipping industry. Some previous projects have scaled up on the basis of a constant 1.7 factor, across all departments and years, consistent with advice from ONS. However, this can create two types of distortion when applied to time series analysis. Firstly, the proportion of the total industry covered by the survey varies from one year to the next due to changes in UKCoS membership and survey response rates. It is possible that year-to-year changes could reflect changes in survey coverage, rather than 'genuine' changes in the number of seafarers employed. Secondly, changes in the country of registration of vessels, particularly cruise ships, can lead to large changes in the apparent ratio of hotel department to other department staff from one year to the next.

To develop the forecasts required for this project, we need to develop a time series which represents the underlying growth trend in seafarer numbers and minimises the types of distortion described above. Our process for estimating this series is described below.

(1) Work out the implicit scaling factor for UK deck and ship officers between the survey numbers for that group and the DfT / MCA series for 'UK certificated officers active at sea'. We regard the DfT / MCA series suitable for this purpose because it is based on official MCA records and should therefore provide a complete count of all active seafarers. The resulting scaling factor varies from one year to the next, within a range of 1.4–1.9.
(2) Apply this scaling factor to all categories and nationality of seafarer, except those in the hotel category.
(3) Smooth trends in the ratios of hotel:non-hotel seafarers (for all nationalities), separately for officers and ratings, from the CoS surveys.
(4) Apply these ratios to estimate total hotel department seafarers from total non-hotel seafarers (from step 2).
(5) Separate out total hotel seafarers from step 4 between UK nationals, EEA, rest of world based on smoothed trends from CoS surveys.

Fig. 47 compares our estimated historical trend for seafarer numbers to that obtained by applying a constant scaling factor of 1.7 throughout.

Fig. 47. Estimates of seafarer numbers used in this study versus time series based on a constant scaling factor, 2004 to 2015
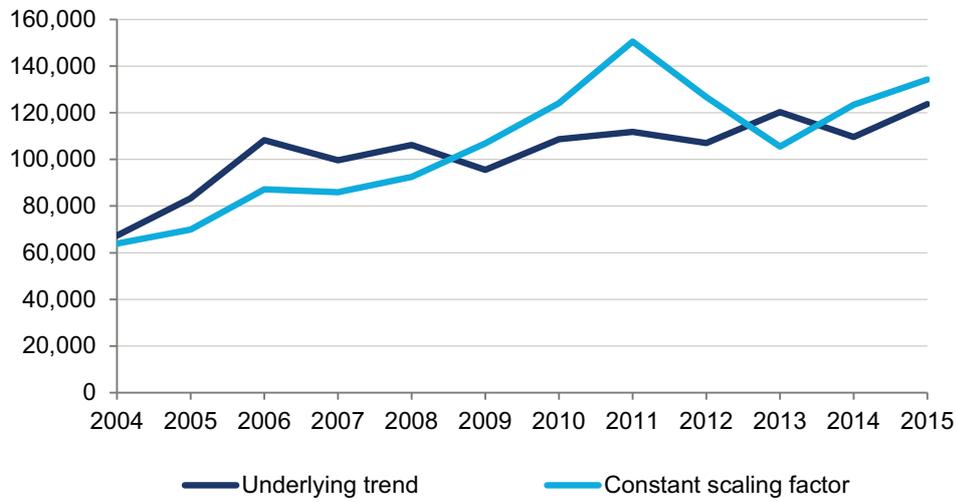
Source: Oxford Economics estimates based on UKCoS manpower survey

OTHER ADJUSTMENTS

- Officers and ratings of unknown nationality are allocated between UK, other EEA and Rest of World in proportion to those of known nationality.[47]
- Other EEA countries are assumed to include current EEA members for the entire history, e.g. including Bulgaria, Romania and Croatia for all years.

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[47] 70 percent of Bachmann unknown nationality are allocated to the UK, based on advice from the UKCoS

TECHNICAL OFFICERS

This report uses the definition of technical officers used in the UKCoS manpower survey. Examples of the types of job roles included in this category are shown in the list below.

- 1st Electro-Technical Officer
- 1st Vent Officer
- 2nd Electro-Technical Officer
- 3rd Elec-Technical Officer
- Automation Engineer
- Communications Officer
- Communications Technician
- Computer Tech Support Officer
- Deputy Site Manager
- Dive Master
- Dive System Senior Technician (Electrician)
- Dive System Senior Technician (Mechanical)
- Dive Tech Electrician
- Dive Tech Mechanical
- Dive Tech Supervisor Mechanical
- Dive Tech Supervisors Electrician
- Electrical Systems Officer
- Electrician
- Electronics Engineer
- Electronics System Officer
- ERPO
- Fleet Trainer
- HVAC - Refrigeration Engineer
- Hydraulic/Electronic Technician
- Hydraulic Engineer
- Hydraulic Technician
- Inspection Coordinator
- Instrument Technician
- IT
- IT Technical Analyst
- IT Technical Specialist
- ITO
- Junior Electro Technical Officer
- Lay Tech Mechanic
- Lay Tech Supervisor
- Lay Technician
- Lead Diver
- Lead Rigger
- Reefer Engineer
- Refrigeration Engineer
- ROV Senior Pilot Tech
- ROV Senior Sub Engineer
- ROV Senior Technicians
- ROV Sub Engineer
- ROV Sub Engineer/Support

- ROV Sub Engineer SNR PLT
- ROV Superintendents/Supervisor
- ROV Superintendent
- Senior Dive Technician
- Senior Electro Technical Officer
- Senior Master
- Senior Pilot Technician
- Senior Pilot Tech/ Sub Engineer
- Senior Pilot /Supervisor
- Senior Refrigeration Engineer
- Senior Survey Engineer
- Senior Surveyor
- Senior Systems Technicians
- Senior Technician
- Senior Trenching/Plough Tech
- Senior Electrical Dive Technician
- Senior Equipment Technician
- Senior IT Officer
- Senior Mechanic Dive Technician
- Senior Pilot
- Senior Pilot technician
- Senior Vent Officer
- Staff Elec-Tech Officer
- Staff ET Officer
- System Engineer
- Technician
- Technical Superintendent

APPENDIX B: APPROACH TO FORECASTING THE DEMAND FOR SEAFARERS IN ROLES AT SEA

Our overall approach is to start by generating econometric forecasts of the global demand for seafarers. We then analyse trends in the UK's share of global demand to determine a forecast for the UK shipping industry. Given the very different historical trends in the demand for officers and ratings, we use separate models for the two types of seafarer.

GLOBAL DEMAND

Historical data

The first challenge when developing the global forecasts is that BIMCO estimates of the global demand for seafarers are only available at five-year intervals. We therefore needed to develop an approach to estimating the intervening years. A number of approaches were attempted, primarily using data on the size of the global shipping fleet and estimates of productivity. We also investigated using Eurostat data on water transport employment to estimate missing years for a subset of countries. However, none of these approaches provided satisfactory estimates, and we therefore settled for using simple linear interpolation to estimate the missing years.

Approach to forecasting global demand

The aim of the forecast is to establish a relationship between global seafarer numbers and one or more economic variables. Forecasts of the economic variables can then be used to derive forecasts of seafarer numbers. Given the apparent divergence in trends for officers and ratings in the BIMCO data we decided to develop separate models for officers and ratings.

Economic variables were selected based on:

- Feedback and existing evidence on drivers of growth
- Availability of historic data at the global level
- Availability of forecasts in Oxford Economics' models, ideally under alternative economic growth scenarios

Based on these criteria, a number of model specifications were tested based on the following variables:

- Global GDP growth
- Global trade growth (value and volume)
- Estimated productivity of seafarers (DWT of world fleet per seafarer)
- World cruise visits

The best model specifications were based on the relationship between the volume of world goods trade and seafarer numbers. Our preferred model specification was based on an Error Correction Model (ECM) which is well suited to situations where the dependent and independent variables are 'co-integrated', or move together at some point in time, as was found be the case here.

More formally, we tested for co-integration between officers and goods trade volumes in our first econometric model, and ratings and goods trade volumes in our second model. We found evidence of a co-integrating relationship between these series as evidenced by the magnitudes and signs of the coefficients on the speed of adjustment: -0.093** for officers and -0.159** for ratings. In the presence

of a co-integrating relationship, these coefficients are expected to be between [-1,0]. The Ramsey Reset test for model specification shows that both models are well specified. The model coefficients and test statistics are shown below.

Error Correction model for officers	Coefficients (t stats)
Lagged officers growth rate	0.511** (2.73)
Growth rate of world trade	0.083 (1.11)
Lagged world trade	0.122** (2.91)
Lagged officers	-0.093** (-2.72)
Constant	0.154 (0.73)
R-Squared	0.85
Omitted variable test	Passed (P-value: 0.19)

Error Correction model for ratings	Coefficients (t stats)
Lagged ratings growth rate	0.727*** (4.46)
Growth rate of world trade	0.108 (1.04)
Lagged world trade	0.071** (2.41)
Lagged ratings	-0.159** (2.69)
Constant	1.507** (2.50)
R-Squared	0.70
Omitted variable test	Passed (P-value: 0.10)

As discussed in Appendix A, the time series data for global seafarer demand are only available at five-yearly intervals. In contrast, values for interim years had to be estimated through linear interpolation. This means that while the underlying data are appropriate for assessing long run relationships, there is greater uncertainty concerning the short run effects identified by the model. To develop forecasts we therefore use only the long run relationships between seafarers and world trade to forecast each series. To do this we regress the co-integrated officer or ratings series against global trade.

Officers long-run model	Coefficients (t stats)
Log world trade	0.863*** (9.26)
Constant	5.525*** (6.65)
R-Squared	0.86

Ratings long-run model	Coefficients (t stats)
Log world trade	0.362*** (7.31)
Constant	10.183*** (23.13)
R-Squared	0.70

UK SHARE OF WORLD OFFICER DEMAND

As discussed in section three, we developed an econometric model to assess how the UK share of global officer demand could evolve in future. The historic series for the UK share of global officer demand is very 'lumpy' with structural breaks occurring throughout the sample period. Modelling such datasets can be challenging. We therefore started by obtaining a smoother series through a rolling average. In addition, although the UK share of seafarers has been declining over time, we find the rate of decline to be weaker since 2012. To account for these features of the dataset, we include both a time trend over the full sample period and a second trend to account for the slower decline since 2012. An interaction term between the latter two time trends is also included in the model. In addition, to account for potential non-linearity in the time trend we include its squared value. Our resulting model specification passes the RAMSEY RESET test for model specification. The coefficients for the resulting ARIMA (1,0,0) model are shown below.

ARIMA model to forecast UK share of global seafarer demand	Coefficients (t stats)
Lagged share of UK seafarers	-0.1999 (-1.28)
Time trend	0.0038 (1.52)
Time trend squared	-0.0006* (-2.24)
Time trend to capture past 4 years	-0.0047** (-2.61)
Interaction between time trends	0.0006** (2.42)
Constant	0.0714*** (6.11)
R-Squared	0.96
Omitted variable test	Passed (P-value: 0.15)

APPENDIX C: DETAILED ASSUMPTIONS USED TO MODEL THE SUPPLY OF SEAFARERS FOR ROLES AT SEA

Principles

- The stock of seafarers for a given year is that at mid-year, the time of the annual UKCoS manpower survey.
- Flows of leavers and joiners are modelled for the 12 month intervening periods.
- Leavers are calculated based on set rates, as a proportion of the stock at the start of the 12 month period.
- Joiners are assumed to be independent of the existing stock, with the flow kept the same from year to year in terms of absolute headcount.
- UK nationals have been used as a proxy for UK-trained EEA seafarers (country of training is not recorded in the UKCoS survey). Discussion with stakeholders confirmed that this should not substantively affect results.

Approach to calculating annual leavers and joiners

- The stock of seafarers who are UK nationals, by age, rank and department was calculated for the sample of companies reporting nationalities and ages in the manpower survey, separately for 2014 and 2015. Deck and engine officer cadets were identified from recorded job titles and excluded from these numbers.
- These results were scaled to the industry-wide estimated totals by category, to give the stock of seafarers who were UK nationals by category and age at mid-2014 and mid-2015.
- A smaller sub-sample of the 2014 and 2015 manpower studies was then extracted, covering 29 companies reporting nationalities and dates of birth in both surveys. That is, companies which provide details of individual seafarers in both surveys.
- Those leaving, joining and moving between companies within this sample were identified by matching dates of birth and department.
- Estimates for those leaving and joining the industry were calculated by scaling up on the basis of the 2014 stock of seafarers in and outside of the sample, for each category and age band.

Newly qualified deck and engine officers

- The average flow of new officer cadets receiving training under the SMarT scheme in the period from 2010/11 to 2014/15 was 828 per annum.
- We assume the average length of a cadetship to be 3.5 years (based on typical course lengths) with an annual drop-out rate of 8% (consistent with the 2011 study and verified against the latest data from the MCA).
- The resulting flow of newly-certificated officers available to the industry was therefore estimated to be 645 per annum on average.
- This was split between deck and engine departments in proportion to the recent stock of officers (result: 374 / 271 per annum).
- These headcount flows are assumed to be repeated each year from 2016 onwards.

UK officer re-joiners

- Deck and engine officers aged 30 and over joining the industry are assumed to be experienced re-joiners, and those aged 29 and under newly-certificated officers. (Ages are at mid-year, at the start of the 12-month flow period.)
- Based on analysis of numbers joining the industry between mid-2014 and mid-2015, estimates of the annual flows of experienced re-joiners are as shown below.

	Age 18-29	Age 30-59	Age 60-73
Deck	Assumed to be new	262	56
Engine	joiners	235	56
Technical	199	215	32
Hotel and other	615	517	8

- NB: equivalent calculations for under-30s were found to yield very similar results to those based on the flow of officer cadets. This provides a degree of validation for the new entrants' figures in the previous section.

UK ratings joiners

- The annual inflow of UK ratings has also been estimated by analysing the 2014 and 2015 manpower survey results for individual seafarers, based on dates of birth. Estimated inflows are as below.

	Age 18-29	Age 30-59	Age 60-73
Deck	122	337	4
Engine	22	95	1
General	4	16	0
Hotel and other	2,090	948	36

Outflow of leavers

- The annual proportion of leavers for each category of seafarers has been estimated based on analysis of the Manpower Survey results for individual seafarers.
- All seafarers aged 74 or over at mid-year are assumed to retire within 12 months.
- Leaving rates by role and age group are shown below.

	Age 18-29	Age 30-59	Age 60-73
Deck & engine officers	22%	15%	30%
Deck, engine, technical & general purpose ratings	18%	10%	17%
Technical officers	9%	11%	27%
Hotel and other officers	29%	37%	77%
Hotel & other ratings	30%	19%	23%

Allocation across age bands

- Numbers joining were spread evenly within the three age categories (18-29, 30-59, 60-73) in most cases.

- But newly-certificated officers are spread across ages 19-29, with a higher concentration around 21-23 and tapering below and above based on inspection of observed trends.
- Projections were then made for future years. As an example:
  Number of deck ratings aged 34 in mid-2016
  = Number of deck ratings aged 33 at mid-2015
  less number of deck ratings aged 33 at mid-2015 leaving over the next 12 months
  plus number of deck ratings aged 33 at mid-2015 joining over the next 12 months
- This process is repeated for each type of seafarer in each year.

APPENDIX D: SURVEY METHODOLOGY AND QUESTIONNAIRE

An important element of this project was an online survey of 5,000 firms in the maritime sector. The main objective of the survey was to gather updated evidence on the UK's need for former seafarers to fulfil roles onshore, updating the earlier work in this area by Gardner et al.[48] The survey also included questions relating to other aspects of the project.

METHODOLOGY

Organisations in different parts of the maritime sector were identified from three main sources:

- IHS Sea-web[49]
- Lloyd's List online directory[50]
- Stakeholder lists compiled by the Maritime and Coastguard Agency

The three contact lists were combined and duplicates removed to give a total of 5,100 contacts. Organisations were allocated to categories, devised to align with our definition of the maritime industries, although we also referred to those used in the Gardner et al. study. A further consideration was that many companies fulfil more than one function within the maritime sector, making it difficult to assign them to a single activity. For example, shipping companies may also offer broking and chartering services, while marine engineering firms often also offer other services relating to marine equipment and possibly IT.

A pilot survey was initially issued to 48 organisations who were asked to provide feedback on the ease of completing the questionnaire, as well as responses for their own organisation. To obtain the main sample, 96 percent of companies in each category were sampled at random to obtain a final list of 4,949 companies. Letters were sent to these 4,949 organisations by post to invite them to complete the online survey. The initial letters were followed up by e-mail and telephone calls to encourage responses and offer organisations the option of responding over the phone.[51]

Following the approach of Gardner et al., three organisations were identified as special cases on the basis that they were expected to employ a large number of former seafarers. These were:

- Lloyd's Register
- The Maritime and Coastguard Agency
- The Royal National Lifeboat Institution

These three organisations were approached separately and all agreed to participate.

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[48] Dr P.B. Marlow, Prof. M.M. Naim, Dr R.V. Nair, Dr S.J.Pettit Prof. B.M. Gardner, *The UK economy's requirements for people with experience of working at sea 2003* ([n.p]: Commissioned by the Department for Transport, the Chamber of Shipping and the Marine Society, 2003).

[49] http://www.sea-web.com/seaweb_welcome.aspx

[50] http://directories.lloydslist.com/services/

[51] The survey was carried out by Perceptive Insight Market Research: http://www.perceptiveinsight.co.uk/

A total of 913 responses were received. Of these, 147 organisations reported that they employ seafarers either at sea or onshore, and the remainder confirmed that whilst they worked in the maritime sector they did not employ seafarers. Overall response rates are as shown in Fig. 48.

Fig. 48. Survey response rates by maritime sub-sector

Sector	Firms in sample	Respondents	Response rate
Charitable institutions, publishing, representative organisations, public sector, non profit	193	47	24%
Classification societies	14	5	36%
Consultants / surveyors	437	51	12%
Education / training	193	41	21%
Marine engineering, equipment and IT	2010	288	14%
Marine insurance / P&I Club	134	32	24%
Maritime lawyers	113	23	20%
Offshore energy (oil, gas, renewables)	94	21	22%
Port services	372	83	22%
Ports	193	78	40%
Ship agents and management	281	83	30%
Ship companies and broking/chartering	747	119	16%
Ship finance	74	1	1%
Towage / salvage / dredging	31	10	32%
Other	114	31	27%
Total	**5000**	**913**	**18%**

Source: Oxford Economics

SURVEY QUESTIONNAIRE

INTRODUCTION

Login - please insert the reference number provided in the letter sent to you from DfT (this is case sensitive)

What is the name of your organisation?

What is the name of the person completing the questionnaire?

Job title

Email address

Telephone number

YOUR ORGANISATION

Q101 Please name the parts / subsidiaries of your organisation that you would characterise as contributing to UK economic activity

Q102 Which segment(s) of the maritime sector do you operate in? (Please select all that apply).
   a. Charitable institutions, publishing, representative organisations, public sector, non profit
   b. Classification societies
   c. Consultants / surveyors
   d. Education / training
   e. Marine engineering, equipment and IT
   f. Marine insurance / P&I Club
   g. Maritime lawyers
   h. Offshore energy (oil, gas, renewables)
   i. Port services
   j. Ports
   k. Ship agents and management
   l. Ship companies and broking / chartering
   m. Ship finance
   n. Towage / salvage / dredging
   o. Other (please specify)

Q102b Which is the main sector (in terms of the number of employees)?
   a. Charitable institutions, publishing, representative organisations, public sector, non profit
   b. Classification societies
   c. Consultants / surveyors
   d. Education / training
   e. Marine engineering, equipment and IT
   f. Maritime lawyers
   g. Offshore energy (oil, gas, renewables)
   h. Port services

  i. Ports
  j. Ship agents and management
  k. Ship companies and broking / chartering
  l. Ship finance
  m. Towing / salvage / dredging
  n. Other

Q103 How many staff does your organisation employ in total?

Q104 Do any of these staff work predominantly (i.e. spend most of their time) on maritime activities, either at sea or onshore?
  a. Yes
  b. No

Q105 What is the total number of staff who work predominantly on maritime activities, either at sea or onshore?

YOUR ORGANISATION'S NEED FOR SEAFARERS AND FORMER SEAFARERS

Q201 How many seafarers or former seafarers (of all nationalities) has your organisation recruited over the last 12 months?
  a. None
  b. 1-9
  c. 10-24
  d. 25-49
  e. 50-99
  f. 100 or more
  g. *Not sure*

Q202 How many seafarers or former seafarers (of all nationalities) does your organisation expect to recruit over the next 12 months?
  a. None
  b. 1-9
  c. 10-24
  d. 25-49
  e. 50-99
  f. 100 or more
  g. *Not sure*

Q203 Of those expected new employees, approximately how many do you expect to be: [Please give a number]
  a. Active seafarers
  b. New trainees / cadets completing their first certificate of competency
  c. Former seafarers working onshore
  d. Other

Q204 How many vacancies do you currently have for seafarers in roles at sea? [Please give a number]
  a. Number of vacancies for officers

b. Number of vacancies for ratings

c. Number of vacancies which could be filled by either an officer or rating

Q205 Are any of these vacancies proving hard to fill?

For example, have you advertised any of these roles and found no suitable candidates?

a. Yes

b. No

Q206 For which roles are vacancies particularly hard to fill?

Q207 Do you employ seafarers in roles at sea?

a. Yes

b. No

Q208 How many do you expect in total to move to roles onshore or retire from work completely during the next 5 years; and the next 10 years? [Please give a number]

a. …during the next 5 years

b. …during the next 10 years

Q209 Have you made any seafarers or former seafarers (of any nationality) redundant during the last 12 months?

a. Yes

b. No

Q210 How many?

YOUR ORGANISATION'S NEED FOR FORMER SEAFARERS FOR ROLES ONSHORE

Q301 How many people (of all nationalities) does your organisation employ in maritime- related jobs based onshore in the UK? (shore-based jobs include those on oil rigs)

Q302 Of these, how many are filled by former seafarers?

Q303 Is it either essential or advantageous for any of these posts to be filled by former seafarers?

a. Yes

b. No

If yes, how many posts?

Q304 How many occupations within your organisation do you consider it is essential or advantageous to be filled by former seafarers?

a. None

b. One

c. Two

d. Three

e. Four

f.   Five
g.   More than five (please specify how many)

PLEASE PROVIDE DETAILS FOR THE MOST IMPORTANT OCCUPATIONS (UP TO A MAXIMUM OF 5 OCCUPATIONS)

Please insert the first *(second / third / fourth / fifth)* occupation for which a former seafarer is essential or advantageous

For this occupation is a former seafarer
a.   Essential
b.   Advantageous

How many posts in total do you have for this occupation?

Please detail the present status of these occupations. How many are… [Please give a number]
a.   …filled by a UK trained EEA former seafarer
b.   …filled by other former seafarers (those trained outside the UK or not nationals of an EEA Member State)
c.   …filled by a worker who has not previously worked at sea
d.   …vacant

What is the minimum professional qualification required for this occupation?

Is a valid certificate required for this occupation?
a.   Yes
b.   No

EXTENT TO WHICH DEMAND NEEDS TO BE MET BY UK SEAFARERS

Q401 How many of the seafarers, or former seafarers, you employ are UK trained EEA seafarers?

Q402 Of these UK trained EEA seafarers, how many are… [Please give a number]
a.   Officers working at sea
b.   Ratings working at sea
c.   Trainees / cadets
d.   Former seafarers working onshore in the UK

Q403 Would you like to employ more or fewer UK trained EEA seafarers or former UK trained EEA seafarers in the following roles?
a.   Officers working at sea
    i.   Would prefer more UK trained EEA seafarers
    ii.   Current proportion is about right
    iii. Would prefer fewer UK trained EEA seafarers
    iv.   *Not sure*
b.   Ratings working at sea

   i. Would prefer more UK trained EEA seafarers

   ii. Current proportion is about right

   iii. Would prefer fewer UK trained EEA seafarers

   iv. *Not sure*

  c. Trainees / cadets

   i. Would prefer more UK trained EEA seafarers

   ii. Current proportion is about right

   iii. Would prefer fewer UK trained EEA seafarers

   iv. *Not sure*

  d. Former seafarers working onshore in the UK

   i. Would prefer more UK trained EEA seafarers

   ii. Current proportion is about right

   iii. Would prefer fewer UK trained EEA seafarers

   iv. *Not sure*

Q404 Please list any roles at sea for which it is particularly advantageous to hire a UK trained EEA seafarer

Q405 What do you consider to be the main advantages of hiring a UK trained EEA former seafarer compared to those of other countries for roles at sea? (Please select all that apply).

  a. Expertise / experience

  b. Knowledge of UK system / maritime industry

  c. Knowledge of standards for training, certification and watchkeeping (STCW)

  d. UK training (quality)

  e. Holds UK seafaring qualifications

  f. Reduces language barriers

  g. Reputation of UK seafarers and former seafarers

  h. Maintain company's reputation by employing UK seafarers and former seafarers

  i. Potential for the individual to move into the company's onshore operations in the UK once they retire from a role at sea

  j. Other

  k. *Not applicable*

Q406 Please list any roles onshore for which it is particularly advantageous to hire a UK trained EEA former seafarer?

Q407 What do you consider to be the main advantages of hiring a UK trained EEA former seafarer compared to those of other countries for roles onshore? (Please select all that apply).

  a. Expertise / experience

  b. Knowledge of UK system / maritime industry

  c. Knowledge of standards for training, certification and watchkeeping (STCW)

  d. UK training (quality)

  e. Holds UK seafaring qualifications

  f. Reduces language barriers

  g. Reputation of UK seafarers and former seafarers

h.   Maintain company's reputation by employing UK seafarers and former seafarers
i.   Potential for the individual to move into the company's onshore operations in the UK once they retire from a role at sea
j.   Other
k.   *Not applicable*

Q408 Please list any barriers to employing more UK trained EEA seafarers in roles either at sea or onshore?

REQUIREMENTS FOR THE NEXT TEN YEARS

Q501 How do you expect your requirements for seafarers or former seafarers to change over the next ten years?
a.   Decrease significantly
b.   Decrease slightly
c.   Stay the same
d.   Increase slightly
e.   Increase significantly
f.   Don't know

Q502 What do you think will drive this change? (Please select all that apply)
a.   Technology
b.   Anticipated growth of company
c.   Anticipated contraction of company
d.   Global growth / recession
e.   Changes to regulation (e.g. new Health and Safety requirements, ILO legislation, etc.)
f.   Trade barriers
g.   Redistribution of maritime activity globally
h.   Other
i.   *Not sure*

Q503 What external factors might impact the delivery of your requirements? (Please select all that apply)
a.   Funding for training
b.   Availability of new recruits
c.   Availability of apprenticeships
d.   Other
e.   *Not sure (please specify)*

Q504 Please use the following section to share your views on any other issues you think we should consider when preparing the updated projections on the supply and demand of seafarers.

APPENDIX E: FURTHER DETAIL OF SURVEY RESPONSES FOR ONSHORE ROLES

The tables below present further insights from the survey results and subsequent analysis undertaken to estimate the number of roles onshore for which a former seafarer is essential or advantageous. As well as our own findings and those from the 2003 Gardner et al. study, this section reports estimates from two other studies relating to sectors which may employ former seafarers:

- A 2016 study by PwC for the City of London which provides data and insights into the economic contribution of the UK's maritime business services sector[52]
- A 2014 study by the Baltic Exchange which focuses on the shipbroking and maritime insurance industries[53]

Sector	Charitable institutions, publishing, representative organisations, public sector, non profit
Responses	
Employ seafarers or former seafarers	16
Do not employ seafarers or former seafarers	31
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	695
Scaled	791
Gardner et al. estimate	1398
Roles for which a former officer is required	33%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Coastguard Officer, Marine Surveyor, Technical Manager, Industrial Organiser, Operations Manager, Policy Advisor	
Comparator information	
Potential reasons for differences with Gardner estimates	We exclude RNLI lifeboat crew, who are assumed to be counted in the estimates of seafarers at sea.
Coverage of our estimate	Respondents to our survey reported employing over 4,900 people in total.

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[52] PwC, "The UK's Global Maritime Professional Services: Contribution and Trends", *Research Report published by the City of London Corporation*, 2016
[53] Sun Wei, "Updates on UK maritime professional services revenue and employment (figures for 2013)", *Baltic Exchange*, 2014, unpublished

Sector	Classification societies
Responses	
Employ seafarers or former seafarers	4
Do not employ seafarers or former seafarers	1
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	447
Scaled	633
Gardner et al. estimate	2645
Roles for which a former officer is required	46%
Scaling approach	
Applied proportion of roles for which a former seafarer is essential/advantageous to Baltic Exchange estimate of total employment in classification societies	
Examples of roles	
Field Surveyor, Plan Approval Surveyor, Operations Manager	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. included UK companies' employment overseas. Our estimates only include employment within the UK. Our scaled estimate would be in excess of 2,000 if we added overseas employment to our numbers.
Coverage of our estimate	Baltic Exchange research identifies four big players in the classification industry, two of which completed our survey. Respondents to our survey account for at least 50 percent of employment in this part of the industry.
Other research findings	Baltic Exchange estimated that 841 people worked in the classification industry in 2013.

Sector	Consultants / surveyors
Responses	
Employ seafarers or former seafarers	16
Do not employ seafarers or former seafarers	35
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	65
Scaled	152
Gardner et al. estimate	1611
Roles for which a former officer is required	74%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Risk Consultant, Marine Engineer, Surveyor, Naval Architect	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. estimated total employment in the sector to be 9,150, which includes some surveyors based outside the UK. This total employment estimate appears high relative to the current evidence from PwC and the professional associations outlined below.
Coverage of our estimate	Respondents to our survey reported employing almost 2,700 people in total.
Other research findings	Research by PwC suggests there are less than 400 people employed in marine consultancy, although this excludes technical consulting, such as in engineering, naval architecture, navigation, surveying and marine science.
Stakeholder insights	The following associations have a total of around 600 UK members: - Yacht Designers and Surveyors Association (although this part of the industry does not attract former seafarers to any great degree) - Society of Consulting Marine Engineers and Ship Surveyors which has 160 individual UK members (of which approximately three-quarters may be former seafarers) - International Institute of Marine Surveying - British Association of Cargo Surveyors A large proportion of members of these societies appear to be sole traders, rather than larger businesses, suggesting that total employment may not be substantially higher than the number of members. There may also be some overlap across the membership associations.

Sector	Education / training
Responses	
Employ seafarers or former seafarers	15
Do not employ seafarers or former seafarers	26
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	416
Scaled	580
Gardner et al. estimate	409
Roles for which a former officer is required	87%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Lecturer, Superintendent, Management, Instructor	
Comparator information	
Potential reasons for differences with Gardner estimates	Our estimate is similar to the earlier research
Coverage of our estimate	Two of the four large maritime colleges provided details of the number of posts they have requiring former seafarers. We applied estimates in the case of the other two.
Other research findings	PwC estimate that the maritime training sector employs around 400 people in total. Respondents to our survey employ more than this number, suggesting that it may be an under-estimate.

Sector	Marine engineering, equipment and IT
Responses	
Employ seafarers or former seafarers	21
Do not employ seafarers or former seafarers	267
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	108
Scaled	165
Gardner et al. estimate	2343
Roles for which a former officer is required	67%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Ship Maintenance and Support, Marine Engineer, Naval Architect, Project Manager	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. estimated this sector employs 44,000 people of which 5% need to be former seafarers. Firms who responded to our survey employ 54,000 in total, but only 0.1% of roles require a former seafarer (93% of firms do not employ seafarers).

Sector	Marine insurance / P&I club
Responses	
Employ seafarers or former seafarers	0
Do not employ seafarers or former seafarers	32
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	0
Scaled	0
Gardner et al. estimate	430
Roles for which a former officer is required	NA
Scaling approach	
None of the companies we spoke to reported that they had roles where a former seafarer is essential or advantageous.	
Examples of roles	
N/A	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. estimated a confidence interval of 337 either side of their central estimate of 430. This implies that their figure is subject to a relatively high degree of uncertainty.
Coverage of our estimate	Respondents to our survey employ approximately 1,600 people in maritime insurance. This is between 26 percent and 44 percent of total employment in the industry.
Other research findings	The Baltic Exchange estimate that 3,700 people are employed in marine insurance, while PwC estimate 6,300.
Stakeholder insights	Discussions with the British Maritime Law Association and Lloyd's Market Association suggested that very few former seafarers may now be employed in marine insurance or P&I clubs.
Other observations	Recruitment adverts suggest that the insurance industry does employ former seafarers, but none of the evidence outlined above suggests the number of such posts is large.

Sector	Maritime lawyers
Responses	
Employ seafarers or former seafarers	3
Do not employ seafarers or former seafarers	20
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	21
Scaled	159
Gardner et al. estimate	183
Roles for which a former officer is required	67%
Scaling approach	
Proportion of roles for which a former seafarer is essential or preferred applied to mid-point of Baltic Exchange and PwC estimates of total employment in the industry.	
Examples of roles	
Shipping Solicitor, Casualty Investigator	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. estimated total employment in the sector to be 2,300, compared to 1,000 to 1,500 in more recent studies.
Coverage of our estimate	Respondents to our survey employ 165 people in maritime law. This is between 11 percent and 17 percent of total employment in the industry.
Other research findings	PwC estimated that the industry employs 1,000 people, and the Baltic Exchange estimated 1,500. We have used the mid-point of the two recent estimates.
Stakeholder insights	Discussions with the British Maritime Law Association suggest that few former seafarers may now be employed in either maritime law or P&I clubs.

Sector	Port services
Responses	
Employ seafarers or former seafarers	1
Do not employ seafarers or former seafarers	82
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	5
Scaled	187
Gardner et al. estimate	567
Roles for which a former officer is required	0%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Ship agents, Ship Operations	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. note that very few seafarers are employed in stevedoring or cargo handling. Much of the employment they identified in this sector appears to relate to roles on vessels, such as pilots, or crew on pollution control vessels. Such individuals are counted as working at sea in our study.

Sector	Ports
Responses	
Employ seafarers or former seafarers	22
Do not employ seafarers or former seafarers	56
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	278
Scaled	334
Gardner et al. estimate	1966
Roles for which a former officer is required	47%
Scaling approach	
Number of on shore roles for which a former seafarer is essential or advantageous scaled up in proportion to the share of UK cargo handled by the ports which responded to the survey.	
Examples of roles	
Dock / Harbour Master, Vessel Traffic Services Operator, Harbour Commissioner	
Comparator information	
Potential reasons for differences with Gardner estimates	Gardner et al. include harbour pilots in their estimate of on shore employment, but these are counted as roles at sea in our study. Our consultations with stakeholders suggest that some ports have responded to the shortage of former seafarers available for roles on shore by training non-seafarers.
Coverage of our estimate	Ports responding to our survey handle 83 percent of UK cargo.
Other observations	A number of ports reported that they do not employ any seafarers on shore. If we were to disregard these ports from our estimates (and so only make use of responses from the ports which said that they do employ former seafarers) our scaled figure would be in excess of 400. The scaled estimate would be in excess of 700 if harbour pilots and similar roles were included.
Stakeholder insights	The UK Harbour Masters' Association (UKHMA) estimates that there are at least 1,000 people in the UK working as harbour masters or in associated roles. Approximately 40 percent of the UKHMA's 300 or so members hold STCW seagoing qualifications. The UKHMA suggests that while 10 years ago the majority of harbour master and associated positions would have ideally been filled by former seafarers, today the situation has changed significantly (the pace of change has accelerated noticeably during the last five years).

Sector	Ship agents and broking/chartering
Responses	
Employ seafarers or former seafarers	3
Do not employ seafarers or former seafarers	80
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	0
Scaled	0
Gardner et al. estimate	223
Roles for which a former officer is required	N/A
Scaling approach	
N/A	
Examples of roles	
Comparator information	
Other research findings	PwC research finds that shipbroking in the UK directly employs around 2,400 people. This is very similar to the Gardner et al. estimate that ship broking and chartering employed 2,500 people in total. While the size of the sector is found to be similar, no evidence is available to suggest whether the proportion of roles requiring a former seafarer has changed over the last decade.

Sector	Ship finance
Responses	
Employ seafarers or former seafarers	0
Do not employ seafarers or former seafarers	1
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	0
Scaled	0
Gardner et al. estimate	13
Roles for which a former officer is required	N/A
Scaling approach	
N/A	
Examples of roles	
Comparator information	
Potential reasons for differences with Gardner estimates	The Gardner et al. estimate of 13 roles has a 95 percent confidence interval of +/- 23. The finding from the earlier study is therefore small and very uncertain.
Other research findings	The Baltic Exchange estimates that 136 people are employed in maritime finance, while PwC's analysis implies there are around 300 (estimated using PwC GVA results and OE productivity data). This compares to 834 estimated by Gardner et al. This sector therefore appears to be much smaller today than estimated by Gardner et al.

Sector	Other - includes river boat operators
Responses	
Employ seafarers or former seafarers	6
Do not employ seafarers or former seafarers	25
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	25
Scaled	26
Gardner et al. estimate	1398
Roles for which a former officer is required	4%
Scaling approach	
Requirement for former seafarers amongst non-respondents estimated using information for respondents on the proportion of organisations requiring former seafarers, and the median number of such roles per organisation.	
Examples of roles	
Maritime Protection Officer, Fleet Director, Crewing manager, Head of Fleet Operations, Head of Safety	
Comparator information	
Potential reasons for differences with Gardner estimates	No equivalent category in Gardner et al.

| Sector	Companies employing seafarers at sea, including ship owners, ship managers, towage/salvage/dredging and offshore
Responses	
Employ seafarers or former seafarers	40
Do not employ seafarers or former seafarers	110
Number of roles for which a former seafarer is essential or advantageous	
Unscaled	402
Scaled	1277
Gardner et al. estimate	3894
Roles for which a former officer is required	59%
Scaling approach	
Step 1) Use survey responses to estimate proportion of roles on shore for which a seafarer is essential or advantageous Step 2) Use UKCoS manpower survey responses to estimate ratio of on shore employment to seafarers at sea Step 3) Apply ratios obtained from the first two steps to estimate total on shore employment and seafarer roles for all UK companies employing seafarers at sea	
Examples of roles	
Fleet Manager, Superintendent, Technical Advisor/Manager, Maritime Assurance Assessor, Marine Engineer	
Comparator information	
Potential reasons for differences with Gardner estimates	Our estimates exclude those operating vessels since they are counted within the 'at sea' estimates in our study. This may be particularly important for the towage/salvage/dredging sector, which Gardner et al. estimated employed 552 people, many on board vessels. Our estimate of total onshore employment for these sectors is around half that estimated by Gardner et al. This may be because Gardner et al. include a number of overseas employees and/or because UK shore-based employment has declined in recent years.

APPENDIX F: ADDITIONAL SENSITIVITY TESTING

GLOBAL DEMAND FOR SEAFARERS AT SEA

As discussed in section 2.2, the global economic outlook is uncertain, with risks weighted to the downside. It is therefore informative to consider how the forecasts for the global demand for seafarers could vary under alternative forecasts for global trade growth.

Fig. 49 shows the forecast for global officer demand. Our central forecast for officers in 2026 is 1,097,000. Under the secular stagnation scenario this would fall to 1,059,000, while under the upside scenario the forecast would increase to 1,121,000, giving a range of around 63,000 between the highest and lowest forecast.

Fig. 49. Global demand for officers under alternative global trade scenarios
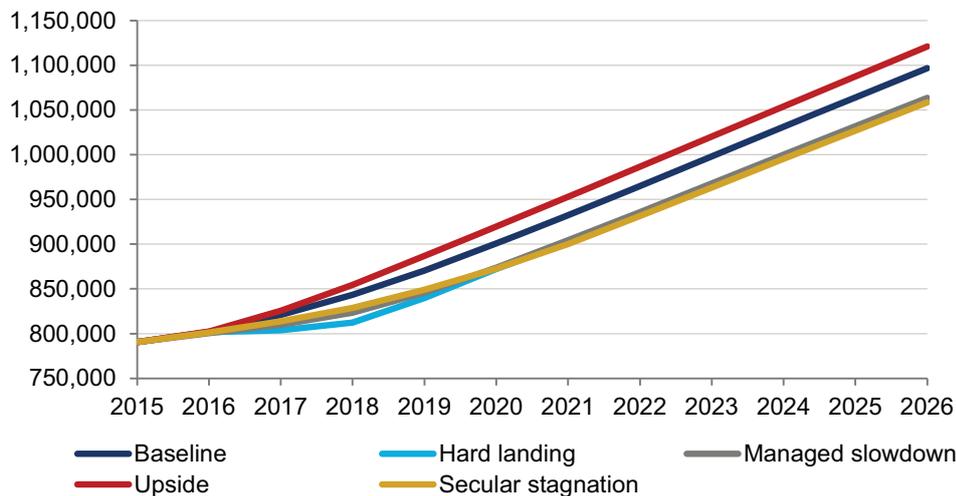
Source: Oxford Economics

Repeating this exercise for ratings produces an even narrower range of forecasts than for officers. In this case the forecast is found to be between 853,000 and 873,000 in 2026, a difference of 20,000.

Fig. 50. Global demand for non-hospitality ratings under alternative global trade scenarios, 2015 to 2021
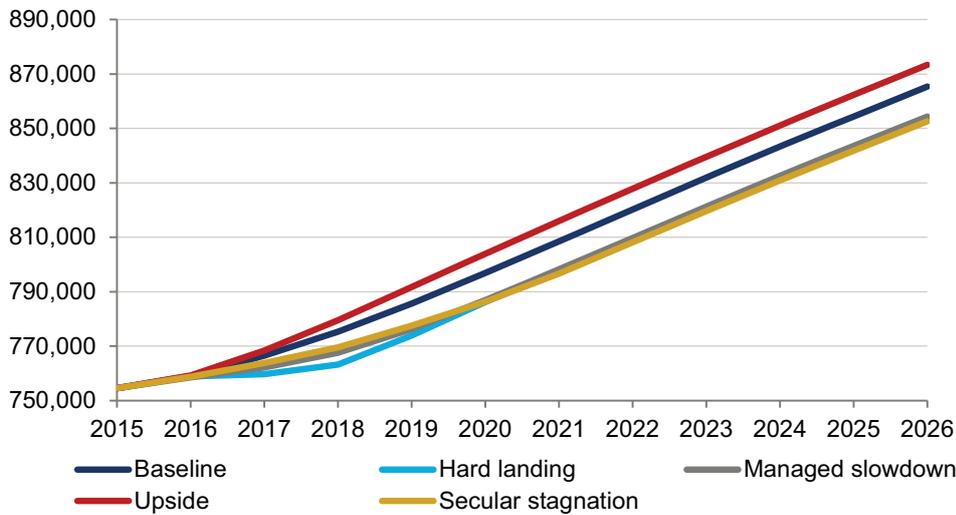
Source: Oxford Economics

These sensitivity tests therefore suggest that the forecasts are not substantively affected by alternative outlooks for global trade. This is likely to reflect that the alternative macroeconomic scenarios are designed to provide insights into uncertainties within the short to medium –term outlook, whereas our model is based on long-term trends. In light of this we have undertaken further sensitivity testing to test the impact of a sustained shift in the world trade forecast. For this test we assume that global trade grows by one percentage point more or less, *in every year*, than in the baseline case.[54]

Fig. 51. Impact of a one percentage point increase or decrease in the global trade forecast on global demand for officers
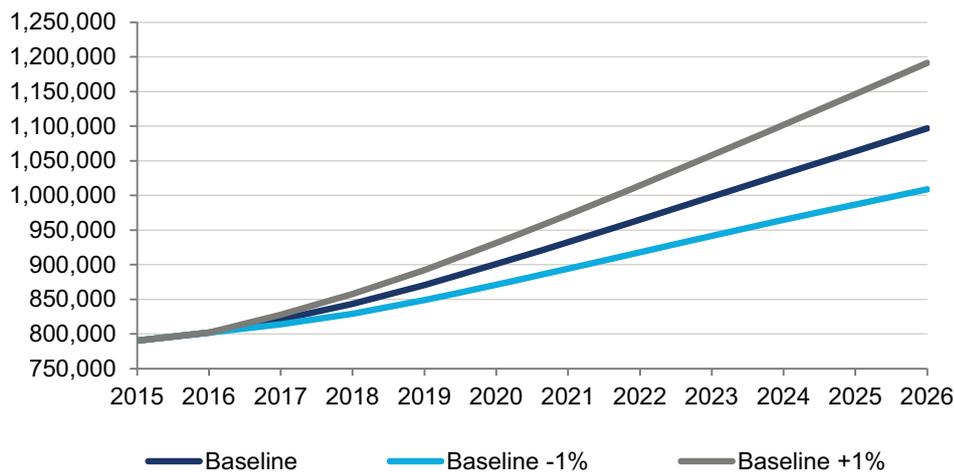

Source: Oxford Economics

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[54] This approach does not represent a formal forecast, it is simply a means to understanding how a persistent change in global trade growth could affect the outlook for seafarer demand.

This test suggests that the global demand for officers in 2026 could be around 90,000 higher or lower than the baseline forecast if global trade growth is one percentage point higher or lower in each year of the forecast period.

Fig. 52. Impact of a one percentage point increase or decrease in the global trade forecast on global demand for ratings
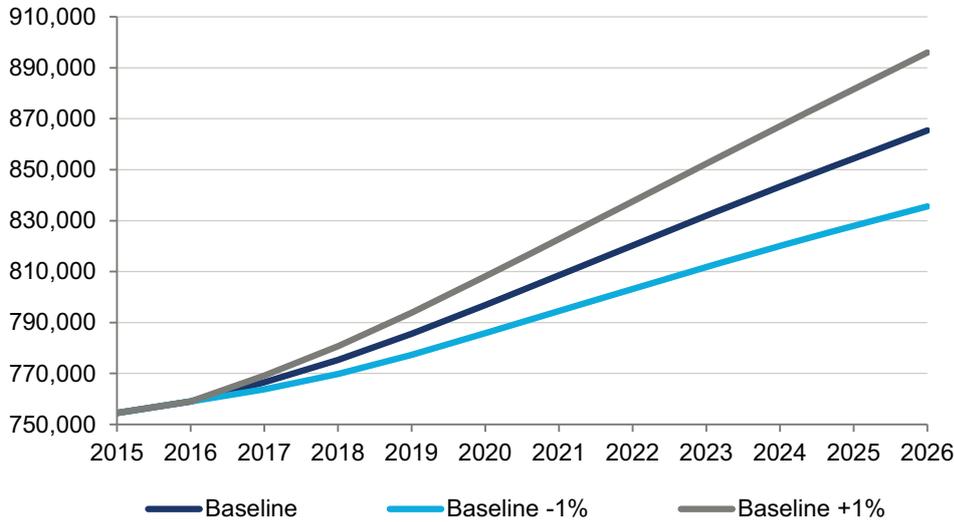

Source: Oxford Economics

In the case of ratings, adjusting the baseline trade forecast by one percentage point per year produces a forecast in 2026 which is around 30,000 higher or lower than the baseline.

UK DEMAND FOR SEAFARERS FOR ROLES AT SEA: NON-HOSPITALITY RATINGS

As a sensitivity test we produced a forecast under the two alternative approaches to calculating the UK's share of global demand. If we were to assume that the UK's share remained at its 2015 level throughout the forecasting period the forecast increases to 32,000, while assuming that the UK share of global demand decreases slightly over the coming decade reduces the 2026 forecast to 27,000. In either case the difference from the central forecast is less than ten percent, suggesting that our approach is reasonably insensitive to the approach selected.

Fig. 53. Deck, engine, technical and general purpose ratings of all nationalities in the UK shipping industry, 2005 to 2026


- UK employment history
- UK demand forecast (trend since 2005 continues)
- UK demand forecast (remains at 2015 level)
- UK demand forecast (average since 2011)
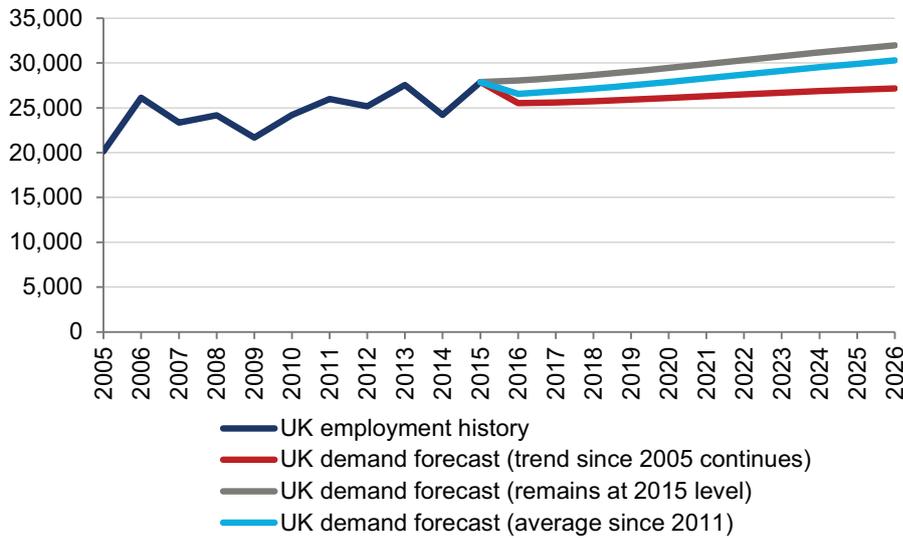
Source: Oxford Economics forecasts based on BIMCO and UKCoS manpower survey data

UK SUPPLY OF SEAFARERS FOR ROLES AT SEA

Survey respondents felt that the greatest risk to being able to secure the number of seafarers they require for roles either at sea or onshore in future was likely to be the availability of new recruits. Funding for training and the availability for apprenticeships were also identified as risks to securing the supply of seafarers required.

Fig. 54. External factors which might impact on organisations' ability to recruit seafarers for roles at sea or onshore
Shading indicates type of seafarer employed by organisation. Respondents could select more than one response

Number of responses

- Seafarers at sea only
- Seafarers on shore only
- Seafarers at sea and on shore
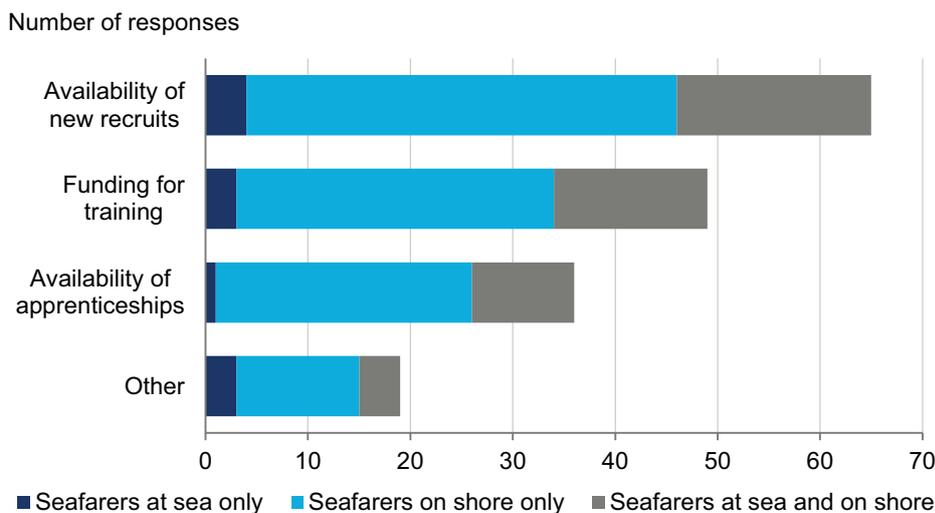
Source: Oxford Economics

170 responses

To explore the potential impact of fewer young people joining the industry, we ran a sensitivity test in which the number of UK joiners aged under 30 is reduced by 25 percent for each category of seafarer (assumptions relating to the supply of non-UK seafarers are left unchanged). Under this alternative assumption the biggest impact is on the supply of officers, which declines by seven percent between 2015 and 2026, compared to three percent in the baseline case. The supply of non-hospitality ratings falls by two percent, instead of one percent, while hospitality ratings increase by eight percent instead of 11 percent.

We also test the opposite scenario, in which there is a 25 percent increase in the number of UK joiners in each category. Also in this case, the largest impact is on officers supply, which in this scenario rises by one percent over the forecast period, compared to a fall in the baseline scenario. The non-hospitality ratings supply remains constant over the ten years, rather than falling by one percent. Lastly, hospitality ratings supply increases by 14 percent between 2015 and 2026.

Stakeholders noted that our assumption for the annual inflow of newly qualified officers is based on data for SMarT1 entrants for the period 2010/11 to 2014/15, a period during which the number of new entrants has been particularly strong. We therefore ran a further sensitivity test to assess how the forecasts would change if the average number of cadets for 2005/06 to 2009/10 was used. Under this assumption, officers supply still falls by 3 percent over the period 2015 to 2026 (after rounding), suggesting that basing the assumption for the inflow of newly qualified officers on experience from the last five years has not unduly affected our estimates.

Another uncertainty highlighted by stakeholders is the extremely strong growth forecast for the supply of technical officers. This result reflects that the annual number of UK joiners is relatively high relative to the stock of seafarers in this category, while leaving rates are lower than for other categories of UK officers within the same age groups. The assumptions are based on analysis of detailed UKCoS manpower survey returns and we cannot rule out the possibility that demand for this type of seafarer was unusually strong in 2014 and 2015, resulting in a relatively high joining rate assumption and a comparatively low leaving rate assumption. It is unclear whether these assumptions will prove sustainable throughout the forecast period. We therefore ran a second sensitivity test to halve annual inflows of UK technical officers, and align leaving rates with those for deck and engine officers (again, we leave assumptions regarding non-UK seafarers unchanged). Under these alternative assumptions, the number of technical officers is forecast to decline by one percent between 2015 and 2026, compared to growth of 61 percent in the baseline case.[55]

This test highlights the sensitivity of the analysis to the assumed leaving and joining rates. However, it is important to note that the absolute number of technical officers is relatively small—3,100 in 2015, rising to 4,900 in 2026 under the baseline forecast, or falling to 3,000 in 2026 under the sensitivity test. In contrast, there are an estimated 28,000 deck and engine officers in 2015.

Finally we test the sensitivity of the model to the assumed growth rate for the supply of non-UK officers and ratings. Our baseline estimates assume a conservative growth rate for non-UK officers and ratings, compared to the historical growth rates recorded over the past ten years. We therefore test the impact of applying historical average growth rates for non-UK officers and ratings throughout the forecast period.[56] The test suggests that the total supply of seafarers (including UK and non-UK nationals) for roles at sea could increase by more than 70 percent between 2015 and 2026,

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[55] Stakeholders highlighted that the annual number of ETO CoCs issued is currently around 30 to 40 per year. However, it is important to note that the definition of technical officers used in this study includes a number of other technical roles for which an ETO CoC is not required.

[56] We use the average growth rate of non UK officers and ratings during the period 2005 to 2015, which is equivalent to 6 and 7 percent per year, respectively.

generating a considerable excess supply by the end of the forecast period. The modelling is therefore very sensitive to assumptions concerning the supply of non-UK seafarers.

UK DEMAND FOR FORMER SEAFARERS FOR ROLES ONSHORE

As with the forecasts for global demand at sea we produce forecasts under alternative growth scenarios to test the sensitivity of the results to alternative macroeconomic outcomes. The results are presented below. In both cases applying the alternative economic growth scenarios has very little impact on forecast, reflecting that average annual employment growth rates are expected to be within a fairly narrow range of 0 percent to 0.3 percent per year.

Fig. 55. Forecast requirement for onshore roles requiring former officers, 2016 to 2026
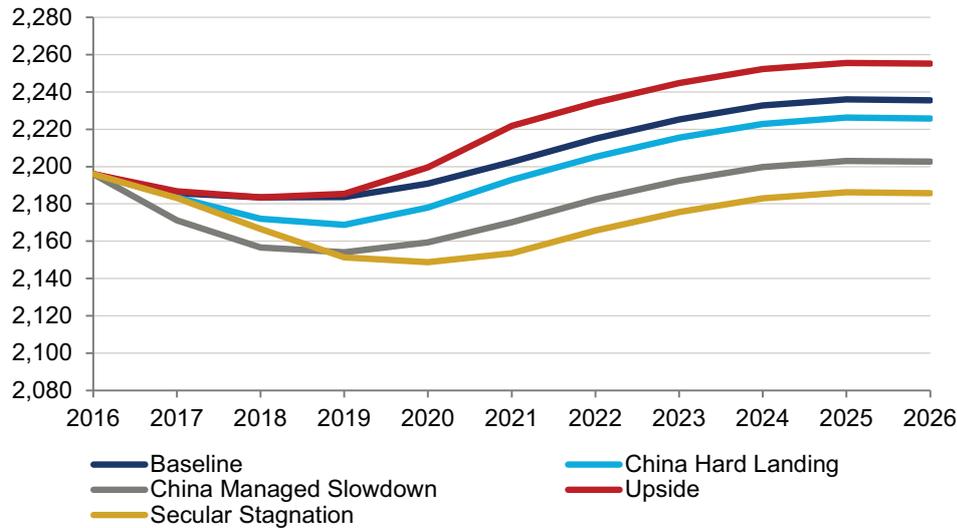
Source: Oxford Economics

Fig. 56. Forecast requirement for other onshore roles, 2016 to 2026

Source: Oxford Economics