

Export Growth Plan

METHODOLOGY NOTE

Office of the Chief Economic Adviser
Scottish Government

Business, Investment and Trade Economics
Office of the Chief Economic Adviser (OCEA)



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Contents

1.	Overview of the analytical framework	3
2.	Economic rationale for the Export Growth Plan	4
3.	Data and sector definitions	12
4.	Choosing priority sectors and countries.....	16
4.1	Export Value Gap tool	16
4.2	Other indicators used in the analysis	21
5.	Analysis of Scottish exporter characteristics.....	25
	ANNEX A	28

List of Figures

<u>Figure 1:</u> Wider economic impact of Export Growth Plan actions; economic transmission channels ...	5
<u>Figure 2:</u> Exports as a percentage of GDP; selected small, advanced economies	8
<u>Figure 3:</u> Exports as a percentage of GDP; selected small advanced economies, indexed 1998 = 100 .	9
<u>Figure 4:</u> Illustrative economic impact of achieving the Export Growth Plan target.....	11
<u>Figure 5:</u> Flow chart; analytical process for country and sector prioritisation	16
<u>Figure 6:</u> Export Value Gap - Model schema.....	17
<u>Figure 7:</u> Scotland's normalised revealed comparative advantage and world import market share ..	19

List of Tables

<u>Table 1:</u> Impact of increasing international exports to 25% of GDP	11
<u>Table 2:</u> Country ranking – sensitivity testing.....	22
<u>Table 3:</u> Priority countries identified	23
<u>Table 4:</u> Priority countries and sectors - matrix.....	24
<u>Table 5:</u> Goods sectors in the Export Value Gap model	28
<u>Table 6:</u> Services sectors included in the model (including mapping to Export Growth Plan sectors) ..	30
<u>Table 7:</u> Mapping SIC services sectors to EBOPS classification.....	30
<u>Table 8:</u> Countries included in the Export Growth Plan model	32
<u>Table 9:</u> Competitor countries chosen in the Export Value Gap tool – goods sectors	32
<u>Table 10:</u> Competitor countries chosen in the Export Value Gap tool – services sectors.....	34
<u>Table 11:</u> Indicators used in sector prioritisation	34
<u>Table 12:</u> Indicators used in country prioritisation.....	35
<u>Table 13:</u> Weightings applied in country prioritisation, sensitivity testing	37
<u>Table 14:</u> Weightings applied in sector prioritisation, sensitivity testing.....	37

1. Overview of the analytical framework

Introduction

1. This methodology paper sets out the analytical methodology underlying the Scottish Government's export plan 'A Trading Nation: a plan for growing Scotland's exports'.
2. 'A Trading Nation' is built on a series of data and analysis. More than 20 datasets were interrogated to build our understanding of current and future export growth opportunities. Analysis was conducted on current and future import demand across 100 countries, 66 goods sectors and 19 services sectors. Detailed firm-level data was also analysed to examine key exporting businesses to understand their strengths, size, location, workforce, products and services.
3. This analysis was shared and tested in a comprehensive consultation exercise with a large number of key business partners and stakeholders to ensure the conclusions drawn reflected their real world experience.
4. As a major part of this work the Office of the Chief Economic Adviser (OCEA) in the Scottish Government has developed new trade data tools for the exporting community that provide broader export intelligence and data for Scotland across a range of industry sectors. They include:
 - Scotland's **Export Performance Monitor**, comprising detailed data analysis interrogating recent export history and trends. This has been published in a user-friendly digital format.¹ It is described in more detail in Section 3 of this note.
 - The **Export Value Gap tool**, which benchmarks Scotland's export performance in market-sector combinations against competitor countries to better understand where Scotland's exports are performing well against its peers and where opportunities for growth exist. This tool helped shape the Export Plan and the focus of activity and will continue to be used and shared with the wider export community. The tool is described in detail in Section 4.1 of this note.
5. This technical note is split into five sections. This section, Section 1, sets out an overview of the note. Section 2 presents the economic rationale underlying the plan, drawing on the relevant academic literature. Section 3 describes the data sources and sector classifications used. Section 4 presents the Export Value Gap tool, developed to support this plan, alongside other economic indicators used to drive country and sector choices. Finally, Section 5 sets out the analysis carried out on exporter characteristics.

¹ <https://www.gov.scot/publications/scotlands-export-performance-monitor/>

2. Economic rationale for the Export Growth Plan

6. Evidence shows that companies which trade internationally tend to be more innovative, more productive and more competitive.
7. Economic theory and empirical evidence demonstrate the significant gains that can be achieved both at the firm and economy level through exporting. Not only can higher exports boost economic growth by contributing directly to GDP, but in addition trade improves productivity over time through the diffusion of new technology, increased competition, investment and exploitation of economies of scale. These economy-wide benefits deliver improvements to individuals through creating more jobs and raising wages.
8. Improvements in productivity support sustainable economic growth. Analysis of firm-level data in the UK suggests that businesses which report goods exports were around 20% more productive than businesses which do not trade after controlling for their size, industry and ownership status.² Research has also found that exporters typically pay higher wages than non-exporters, reflecting their ability to exploit economies of scale, and realise productive gains.³
9. The economic literature suggests a strong two-way link between exporting and innovation, with innovation helping or encouraging a firm to export in the first place and exporting itself also driving investment in innovation and R&D. Evidence from the Small Business Survey Scotland 2017 shows that, in 2017, SME exporters were more likely than SME non-exporters to have innovated in the previous three years.⁴ 33 per cent of SME non-exporters had innovated compared to 66 per cent of SME exporters.
10. The benefits relating to exporting are particularly relevant to SMEs, who employ the majority of the labour force in Scotland. Smaller firms typically have less access to learning opportunities than large firms do. Engaging in international trade however gives SMEs greater access and knowledge of different markets and production technologies.⁵
11. Figure 1 shows the transmission channels by which a reduction in barriers to trade (achieved by reducing market failures and other barriers) can impact on the wider economy, including on jobs and GDP. Empirical evidence suggests that greater openness to trade leads to higher incomes, with the OECD estimating

² ONS, UK trade in goods and productivity: new findings (2018), <https://www.escoe.ac.uk/wp-content/uploads/2018/07/ESCoE-DP-2018-09.pdf>

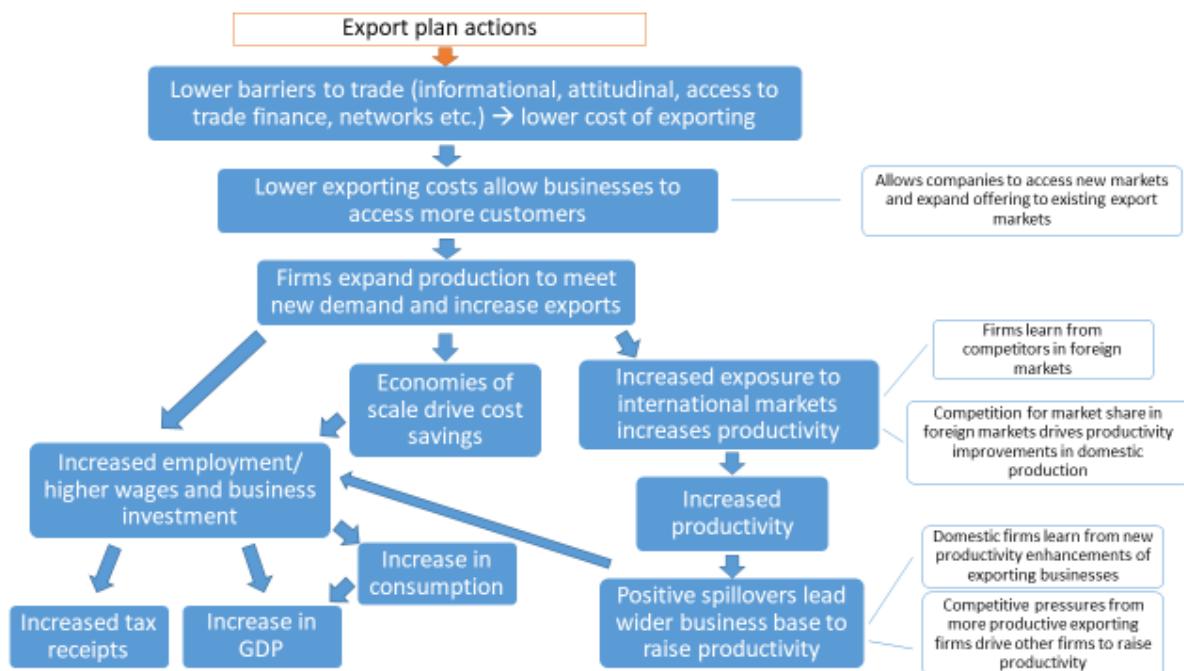
³ OECD, Trade and employment in a fast-changing world (2012), <https://www.oecd.org/site/tadicite/50286917.pdf>

⁴ OCEA analysis based on the Small Business Survey Scotland 2017, <https://www.gov.scot/publications/small-business-survey-scotland-2017/>

⁵ Kiriyama, N. (2012), "Trade and Innovation: Synthesis Report", OECD Trade Policy Papers, No. 135, OECD Publishing, Paris, <https://doi.org/10.1787/5k9gwprtbtxn-en>.

that a 10% increase in openness to trade is associated with a 4% increase in income per head.⁶

Figure 1: Wider economic impact of Export Growth Plan actions; economic transmission channels



12. While international trade has undoubtedly been a major contributor to the rapid growth in living standards globally it can also have significant distributional impacts within an economy. In particular, impacts on groups within society such as businesses, consumers and workers may vary, as may the impacts on different regions.
13. For example, economic theory suggests that for developed countries that specialise in sectors that use high-skilled labour, increased trade may lead to greater demand for high skilled workers relative to low-skilled labour. This may lead to higher wages for high-skilled workers relative to low-skilled workers.
14. The evidence for this happening in practice is far from conclusive. While some studies do find that trade can affect inequality within countries, most studies find that the impact of trade on inequality is fairly modest. Instead, technological change is found to be a much more significant factor in changes in inequality.⁷ Economists tend to find that the solution is not restriction of trade, which can harm prosperity and growth, but rather ensuring measures are in place within

⁶ OECD, 'Sources of Economic Growth in OECD Countries' (Feb 2003)

⁷ See Helpman (2016) for an overview of the evidence:

http://scholar.harvard.edu/files/helpman/files/globalization_and_wage_inequality_120216_final_for_w_p.pdf

countries to complement trade and protect against rising inequality, such as effective tax systems, education programmes and retraining programmes.

Market failures

15. There is good evidence that market failures and other barriers are present that prevent Scottish companies from fully exploiting potential export opportunities.
16. From an export perspective, market failure refers to circumstances whereby barriers to exporting mean that the actions of each exporter do not lead to an optimal outcome for the whole of society. In particular, market failures in the exporting market tend to reduce both the number of companies that export and also the value that each business exports.
17. Market failures relevant to exporting include:
 - attitudinal barriers (misperceptions of the costs and benefits of exporting that lead to businesses being less globally minded)
 - informational barriers (lack of access to good information on opportunities)
 - internal capacity barriers (lack of in-house specialist knowledge)
 - network barriers (lack of access to in-market networks)
 - cost barriers (lack of access to export finance or over-estimation of exporting costs)
 - positive ‘spill overs’ from exporting (lower positive spill overs than socially optimal)
18. The economic literature highlights that businesses who have the potential to export often don’t export because they lack information on foreign markets and don’t consider it to be cost-effective to pay for their own in-market research (informational and internal capacity barriers). For instance, businesses often lack information on where the potential demand for their goods may be, or don’t have the right networks to capitalise on foreign market opportunities (network barriers). Survey evidence suggests that around half of UK non-exporters with a product suitable for export find access to customers and networks a major barrier.⁸
19. As well as the direct cost to exporting businesses imposed by these market failures, these barriers also have impacts on the wider economy. The economic literature provides evidence that the benefits built up by exporters can ‘spill over’ to other firms, either through social networks, movement of staff, or demonstration effects.⁹ Barriers reduce the extent to which this knowledge ‘spill over’ can occur. In addition, these wider benefits are often not reflected in the

⁸ DIT National survey of registered businesses exporting behaviours, attitudes and needs 2017, <https://www.gov.uk/government/statistics/dit-national-survey-of-registered-businesses-exporting-behaviours-attitudes-and-needs-2017>

⁹ BIS, International trade and investment: the economic rationale for government support, <https://www.gov.uk/government/publications/the-economic-benefits-of-support-for-international-trade-and-investment>

incentives for individual businesses to increase their export activity, leading to lower levels of exporting than may otherwise be “socially optimal”.

20. The presence of these market failures demonstrates the clear role for government in helping Scottish businesses to overcome these barriers and increase their exports.

Scotland's export performance

21. While Scotland's exports have increased in value terms over the last 20 years they have remained broadly static as a proportion of GDP, whilst those of many similar sized nations have increased. In fact, Scotland's international exports have fallen as a proportion of GDP over the last two decades, from 23% of GDP in 1998 to 20% of GDP in 2017. Some of this decline can be attributed to specific events, particularly the decline in Scotland's electronics manufacturing (the so called 'Silicon Glen'). However, the general static trend shows that Scotland has not been internationalising at the same pace as its competitors.

22. Including 'exports' from Scotland to the rest of the UK shows a similar picture, with rest of UK plus international exports as a proportion of GDP remaining at around 53% for the last twenty years. Furthermore, recent research has indicated that Scotland lags behind the rest of the UK on a range of indicators relating to export performance, for example in the number of firms engaged in exporting.¹⁰ This highlights that there is a significant and continuous 'export gap' that is restricting a greater realisation of benefits from trade compared to the rest of the UK.

23. Figure 2 shows Scotland's exports as a percentage of GDP as compared to other small, advanced economies. The red columns only include the onshore economy, with the first red column showing this index when calculated for Scotland's international exports (labelled as Scotland (ROW)), and the second showing this index when calculated including Scotland's exports to the rest of the UK (labelled as Scotland (ROW and RUK)). The green columns include exports of oil and gas from production in Scottish waters in the calculations.¹¹

24. Figure 2 suggests that the share of Scotland's economy that receives the benefits that international exporting can deliver is low when compared to other small advanced economies, at 19%. These benefits can accrue not only to those firms directly engaging in exporting but also to those in their supply chain. Including Scotland's exports to the rest of the UK raises the share to 51%, pushing Scotland closer to the middle of the distribution. However, even including these UK 'exports' Scotland still lags behind other small advanced economies such as

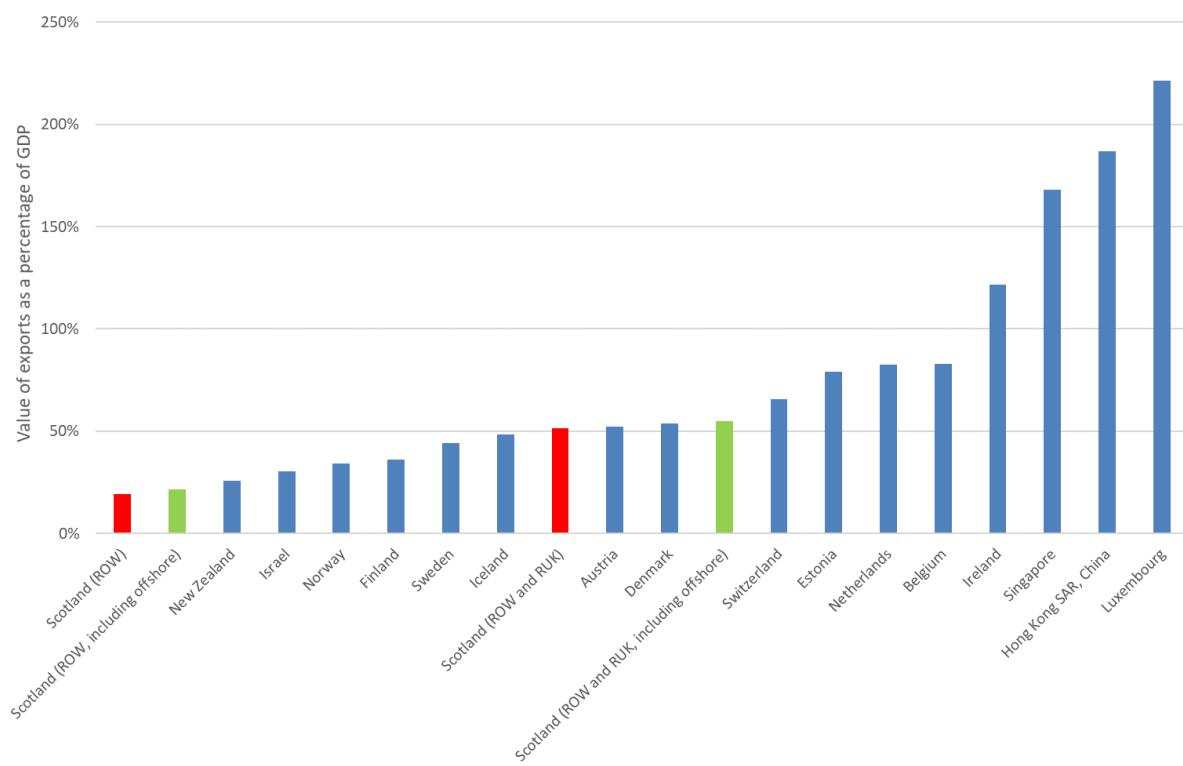
¹⁰Fraser of Allander Institute, Reappraising Scotland's exports and their geographies: Brexit and beyond,

https://www.strath.ac.uk/media/1newwebsite/departmentssubject/economics/fraser/vol42no3/FAI_Economic_Perspectives-Reappraising_Scotland_exports.pdf

¹¹ OCEA calculations based on Whole of Scotland economic accounts found here:
<https://www2.gov.scot/Topics/Statistics/Browse/Economy/SNAP/satelliteaccounts>

Switzerland, Belgium and Ireland. Although including the offshore economy raises Scotland's exports, it also increases Scotland's GDP so the impact on the ratio of exports to GDP is smaller.

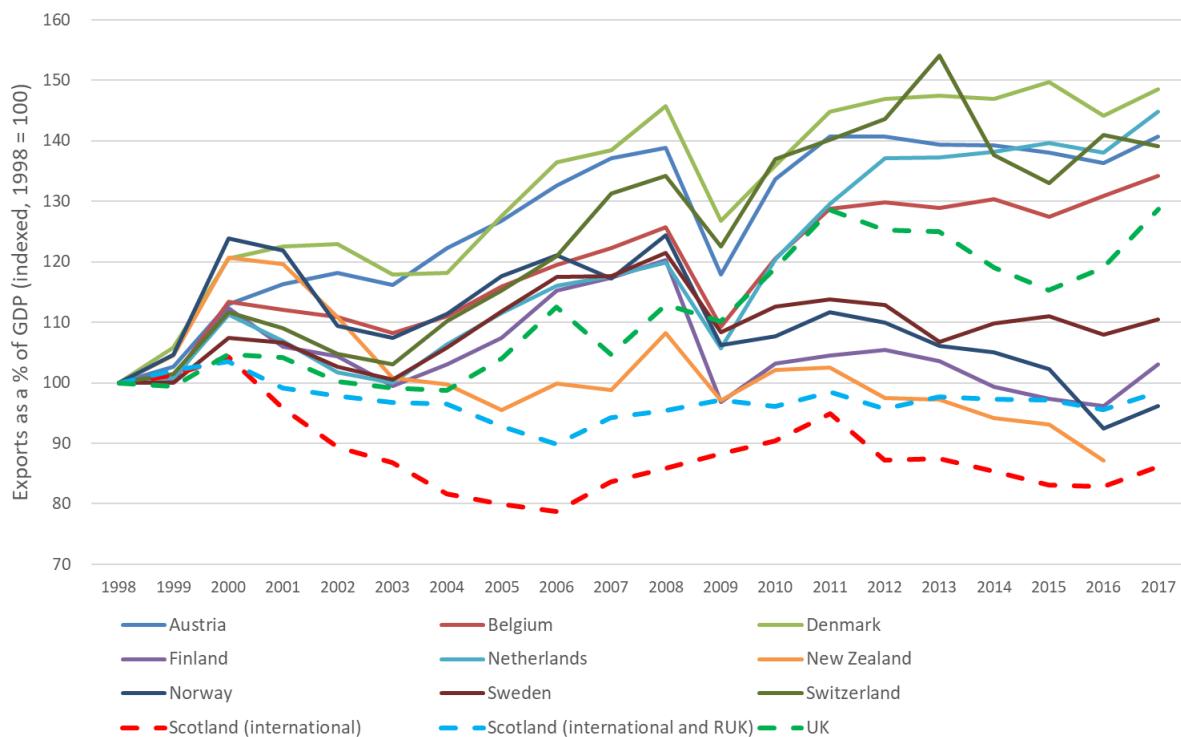
Figure 2: Exports as a percentage of GDP; selected small, advanced economies



Source: World Bank and OCEA calculations based on Quarterly National Accounts Scotland and Supply and Use Satellite Accounts for Extra-Regio Economic Activities

25. Figure 2 shows a snapshot of the international exposure of Scotland's export sector for 2016. Figure 3 examines how the international export penetration of Scotland's companies has changed over time. Values are indexed at 1998 = 100.
26. It shows that Scotland's international exports have fallen as a percentage of GDP (red dashed line) over the period, and Scotland's international and rest of UK exports as a percentage of GDP (blue dashed line) have remained around the same for the last two decades. Meanwhile, UK exports as a percentage of GDP (green dashed line) have grown by almost 30% over the period, as have those in other countries such as Denmark and Norway.

Figure 3: Exports as a percentage of GDP; selected small advanced economies, indexed 1998 = 100



Source: World Bank and OCEA calculations based on Quarterly National Accounts Scotland

27. The Export Growth Plan sets a target of increasing Scotland's exports as a percentage of GDP from 20% to 25%. New modelling from the Office of the Chief Economic Adviser assesses the impact of meeting this target on the Scottish economy. This is described in detail below.

Illustrative economic impact of the Export Growth Plan target

28. The Scottish Government Global Econometric Model (SGGEM) has been used for this analysis. SGGEM is a large scale structural global econometric model, created for the Scottish Government by the National Institute of Economic and Social Research (NIESR) and is based on an adaptation of NIESR's own National Institute Global Econometric Model (NiGEM). NiGEM is used by a number of organisations, such as the European Central Bank and the Bank of England.

29. The model covers over 60 countries and regions, and includes over 5,000 variables. Each economy is linked through trade and competitiveness, and they are determined simultaneously. The core of the model consists of a production function determining output in the long term, which is based on the labour force, productivity, and the capital stock. There are also integrated models of the labour market (including wages, consumption, personal income and wealth), government, financial, and non-financial sectors, and international trade. The

model uses historical data to determine the speed of adjustment back to equilibrium in response to a shock.

30. As is standard practice with the application of such models, the approach is to first model a baseline scenario and then to compare the results from the baseline to what would happen under an alternative scenario, in this case, the alternative scenario being an increase in international exports to 25% of Scottish GDP by 2029. The change between the baseline and alternative scenarios then provides the illustrative economic impact of the Export Growth Plan target.

31. The baseline scenario assumes GDP and international exports will continue to grow to 2029. The modelling made the following assumptions for the baseline scenario:

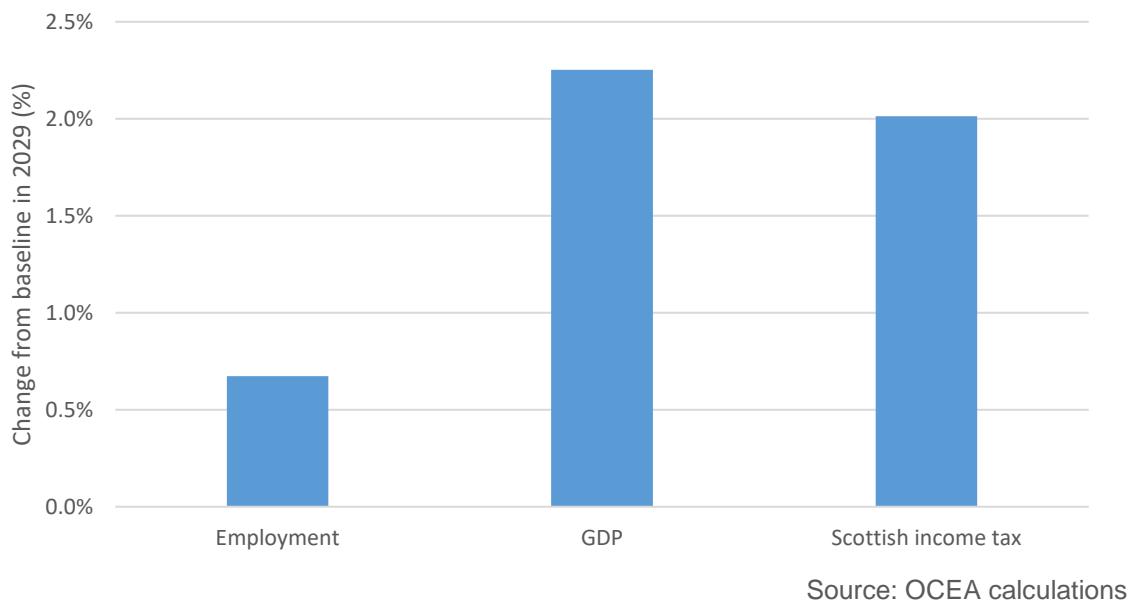
- GDP grows by on average 1.2% a year between 2019 and 2029. This outlook for the Scottish economy is broadly consistent with the Scottish Fiscal Commission's December 2018 Economic and Fiscal Forecasts, which forecast average of growth 1.1% over their five year forecast period;
- International exports grow broadly in line with GDP, meaning that they remain at around 20% of GDP over the forecast period.

32. The alternative scenario modelled the impact of increasing international exports as a share of GDP by 5 percentage points by 2029. The modelling made the following assumptions for the alternative scenario:

- The size of this shock was calibrated to achieve the required 5 percentage point increase. This was done by increasing the baseline international exports sufficiently to meet the target assuming no change in GDP. This increase was then calibrated over a number of iterations to adjust for the fact that increasing exports also leads to increases in GDP. The final analysis assumes that real exports would be 25% higher than in the baseline scenario in 2029.
- This increase was phased in linearly between 2019 and 2029, with international exports increasing by an additional 2.3% each year over the baseline.

33. The results are shown in Figure 4 and report the change from baseline in 2029 (that is, the difference between the baseline and alternative scenarios). Overall, the economy is 2.3% larger in 2029 than it would otherwise have been in the baseline scenario. This is larger than the percentage increase in employment due to the fact that existing workers also see an increase in earnings. Such an outcome would also boost tax revenue. For example, Scottish income tax receipts are estimated to be 2% higher in 2029 as a result of reaching the target than they otherwise would have been.

Figure 4: Illustrative economic impact of achieving the Export Growth Plan target



34. Table 1 shows the impact of achieving the target in level terms. In order to control for the effects of inflation, the economic impacts are expressed in 2017 prices and relative to the size of the economy in 2017.

Table 1: Impact of increasing international exports to 25% of GDP

	Economic impact (£'s in 2017 prices)
Employment	+17,500 people in work
GDP	+£3,500 million
Scottish income tax	+£500 million

3. Data and sector definitions

Introduction

35. The Export Growth Plan is based on a data-driven methodology, which considers Scotland's current and past export performance, as well as Scotland's potential opportunities for increasing exports. Underpinning this analysis are two analytical tools: Scotland's Export Performance Monitor (described below) and the Export Value Gap Model (which is described in Section 4.1).

Scotland's Export Performance Monitor

36. Scotland's Export Performance Monitor has been produced to help understand Scotland's current export trends, including top exporting sectors and markets.

37. It is based on the existing export data from the Export Statistics Scotland¹² publication but presented with the aim to be more accessible and user friendly. It also uses new sector definitions and more detailed sub-sector breakdowns to help users to understand current and past export performance in Scotland. As well as detailed information on international and rest of the UK exports for each sector and sub-sector, this tool contains data on number of businesses, size of businesses, turnover and employment.

Data and sources

38. The Export Performance Monitor uses official Scottish Government export data which is collected annually to produce the Export Statistics Scotland (ESS) publication. The data is presented from 2002, which is when this data was first collected, to 2017 (latest data available) and covers both Scotland's international exports and its exports to the rest of the UK.

39. One of the main sources of this data is the Global Connections Survey (GCS), which is sent to around 6,000 Scottish businesses each year and asks about exporting activity. Further to the GCS, relevant estimates for businesses in Scotland are also sourced from official and administrative sources produced by the Office for National Statistics (ONS) and other parts of the Scottish Government, including the ONS Monthly Business Survey and the ONS International Trade in Services Survey. Further information on various data sources used to produce the export data can be found in the latest ESS publication.

40. The tool also provides data on export destination countries for each sector and sub-sector. However the current ESS methodology means that destination country data should be treated as indicative only, particularly for the smaller sectors and sub-sectors.

¹² Export Statistics Scotland 2017,

<https://www2.gov.scot/Topics/Statistics/Browse/Economy/Exports/ESSPublication>

Sectors and sub-sectors

41. The sector and sub-sector definitions used in this analysis are based on the Standard Industrial Classification (SIC)¹³ of the reporting company, which is based on the main activity of the company exporting. These definitions were developed in collaboration with our partner organisations, Scottish Enterprise and Scottish Development International, to try and give a more detailed analysis than is currently provided from the sectors used in the published ESS data. They have also been designed in a way to avoid any duplication in the data. For example, the sub-sector, Pharmaceuticals is treated as part of the Life Sciences sector only and is not part of, for example, the Chemical Sciences sector. This means, when looking at the performance of a particular sector (i.e. Energy) you may have to consider more than one sector (such as Energy and Chemical Sciences) to be able to assess the full picture. Note, to provide additional context, each sector and sub-sector name is followed by 'G', to denote goods, or 'S' to denote services and this is based on the main activity for that particular sector
42. The ESS data excludes exports of oil and gas extracted from the UK Continental Shelf. However exports of services provided by the onshore Scottish economy to the Scottish offshore oil and gas sector are included and cross over a number of key sectors, including Engineering and Energy (Oil and Gas Support). For some sectors, current export data may not capture all export activity and work will continue to improve this data going forward, working with the relevant industry bodies and stakeholder organisations.

Growth rates and inflation

43. The analysis includes growth rates for each sector and sub-sector. These have been calculated over the shorter (2012 to 2017), medium (2007 and 2017) and longer term (2002 to 2017) periods. These rates are also compared with inflation for each sector and sub-sector. This is to help assess whether export growth has outperformed what we might have expected if the nominal value had increased in line with inflation, and to highlight the sectors and sub-sectors that have demonstrated strong performance. The inflation rate used is the Consumer Price Inflation index taken from the ONS website.¹⁴

¹³ONS, UK SIC 2007,
<https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>

¹⁴ ONS, Consumer price inflation tables,
<https://www.ons.gov.uk/economy/inflationandpriceindices/datasets/consumerpriceinflation>

Business statistics

44. A number of key business statistics are also included, such as business counts, number of employees and turnover, and for consistency, have been calculated using the same sector and sub-sector definitions as the export statistics. This means they may not match other published data.
45. These business statistics are sourced from the Inter-Departmental Business Register (IDBR). The IDBR, maintained by the ONS, is a database of all enterprises registered for VAT and/or PAYE, covering 99% of economic activity in the UK. Those excluded are small businesses with no employees and an annual turnover below the VAT threshold (£83,000 as at March 2017). Although the IDBR is not usually the preferred source for sectoral employment or turnover, IDBR employment and turnover data has been used here for consistency with the IDBR business counts and to provide a breakdown by business size. Note that business size here has been defined according to the number of employees that the business employs in Scotland (rather than UK-wide). Further information on business statistics, including methodology, can be found on the Scottish Government website.¹⁵

Other data sources: UK-level data

46. In addition to using data collected for Export Statistics Scotland, the analysis draws on HMRC Regional Trade Statistics (HMRC RTS).¹⁶ HMRC RTS use customs data to apportion goods trade to different parts of the UK, including Scotland. This is based on the location of the trading company with employment shares used if the company has multiple sites in different parts of the UK. However this methodology means that some Scottish exports may not be counted in the Scotland figures. For example, only 75% of the value of Scotch Whisky exports are included in the Scottish RTS data, while the other 25% is allocated to other parts of the UK.
47. These data are used in the Export Growth Plan to compare Scotland's exports to international data on other countries imports and exports. It should be noted that the HMRC RTS data are collected on a different basis from the Export Statistics Scotland data, so the two do not always match. Analysis on the Food and Drink sector is also carried out using HMRC RTS data rather than Export Statistics Scotland data. This is to ensure consistency with existing published analysis for this sector.
48. The key benefit of the HMRC RTS data is that it is collected and categorised in a consistent way to that of other countries. In particular, it is classified according to the Standard International Trade Classification (SITC). It is this attribute that

¹⁵ Scottish Government, Business, Enterprise and Energy Statistics, <https://www2.gov.scot/Topics/Statistics/Browse/Business>

¹⁶ HMRC UK Trade Info, www.uktradeinfo.com

makes it possible to use this data to compare Scotland's performance in markets around the world to that of competitors. However, as in the paragraph above, using the HMRC RTS data for Scotland's goods exports does come with some caveats as the methodology means that not all Scottish exports will be included in the data for Scotland.

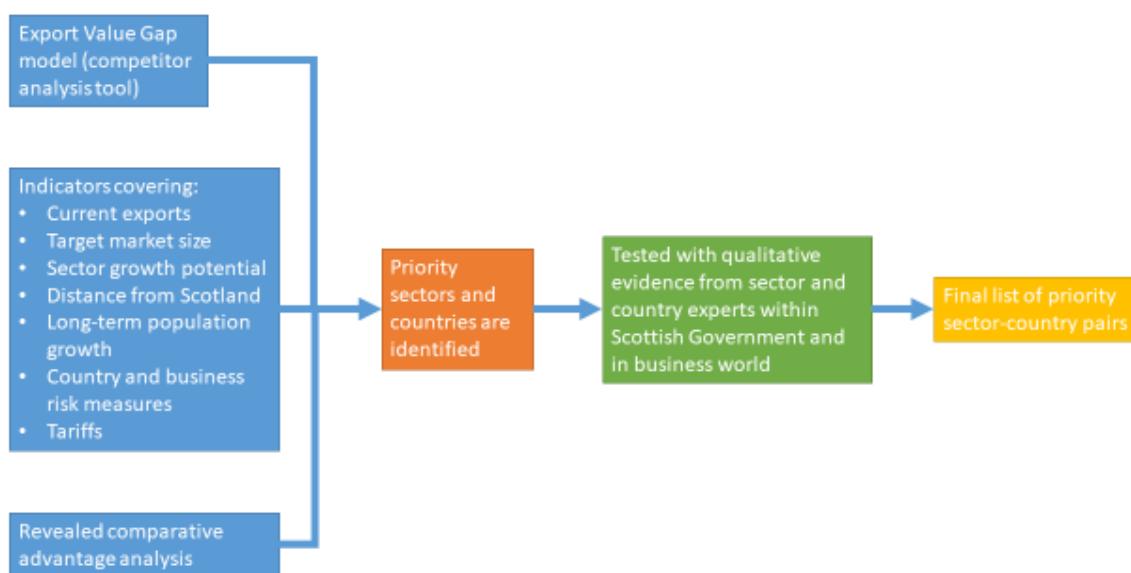
Other data sources: international data sources

49. Data on other countries imports and exports is extracted from UN COMTRADE. UN COMTRADE is a depository of trade data managed by the United Nations Statistics Division. It takes data self-reported by over 170 countries and processes it to make it as consistent as possible. It is available to download classified using the Standard International Trade Classification (SITC), making it consistent with the HMRC RTS data.

4. Choosing priority sectors and countries

50. Figure 5 shows a simplified flow chart showing the main inputs into the analysis. The main analytical inputs can be broken down into three broad categories: the Export Value Gap tool, other calculated indicators and measures of revealed comparative advantage. These three analytical inputs are treated in turn in this section.

Figure 5: Flow chart; analytical process for country and sector prioritisation

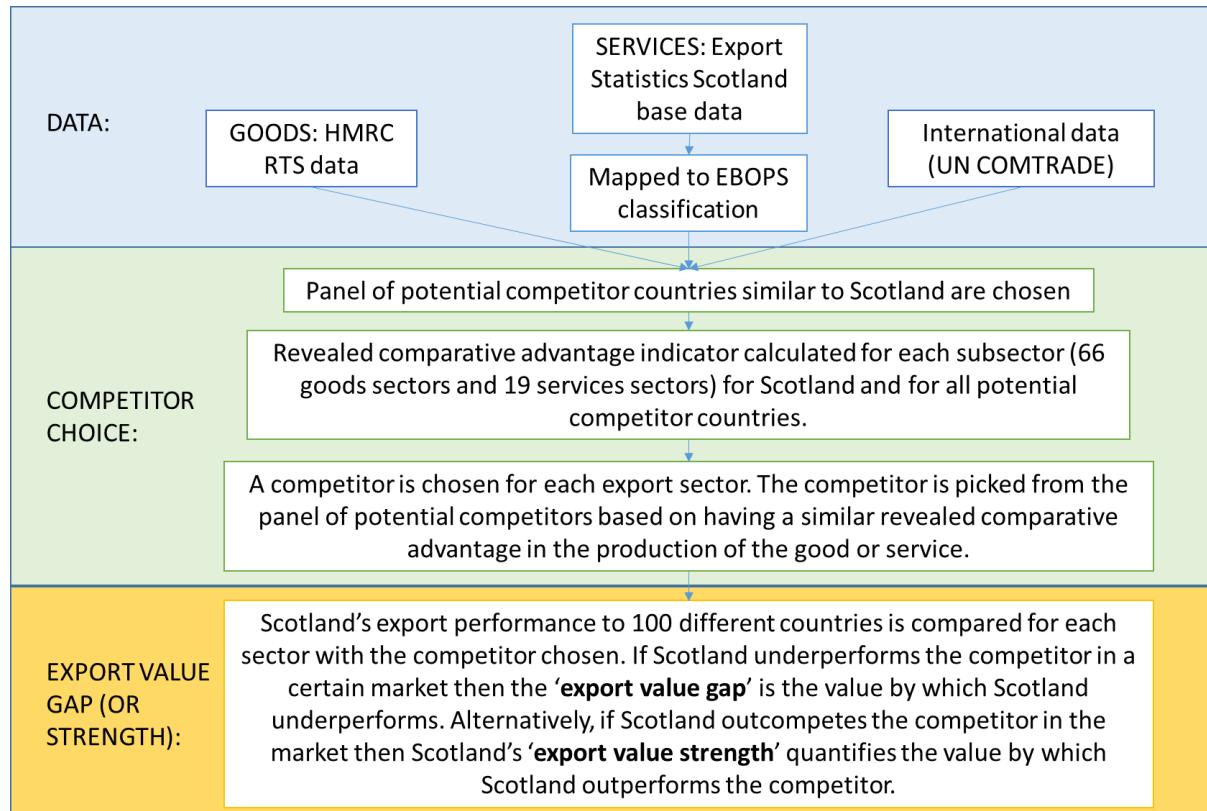


4.1 Export Value Gap tool

51. To help understand Scotland's export performance in different sectors and markets around the world and to identify opportunities to increase exports, economists in the Office of the Chief Economic Adviser have built a model that uses trade data to compare Scotland's export performance to that of similar competitors in markets around the world.
52. The Export Value Gap model takes Scotland and UK level data and matches it to international trade data collected by UN COMTRADE. This matching makes it possible to compare Scotland's exports to those of a competitor country across different sectors and countries. Where Scotland underperforms a similar competitor country, the model quantifies an 'export value gap' – i.e. the additional value that could be achieved if Scotland were to improve its export performance to that of the competitor.
53. The model is calculated across 66 goods sectors and 19 services sectors. 100 countries are included. ANNEX A sets out a list of the sectors and countries included in the model.

54. Figure 6 sets out the schema for the tool.

Figure 6: Export Value Gap - Model schema



55. Each step of the schema is now described in detail.

Data: mapping export data to EGP sector definitions

56. The goods data used in the model is based on HMRC RTS (described in more detail in Section 3). The model is calculated at the most disaggregated level for which this data is available (SITC2). The services data in the model comes from the Export Statistics Scotland base data. This base data is classified using the SIC classification. This is mapped to the Extended Balance of Payments Services (EBOPS) classification to make it comparable with international services data. The mapping used can be found in Table 7 in ANNEX A.

57. The need to map services data from one classification to another has some drawbacks. In particular, SIC and EBOPS classifications do not align perfectly, so there is inevitably a loss of accuracy through mapping sector data from one to the other.

Competitor Choice: revealed comparative advantage indicator

58. To better understand where Scotland's export strengths lie, an indicator of 'revealed comparative advantage' is calculated.

59. Absolute advantage is where a country can produce a good or service more efficiently than other countries. Countries benefit from trade where they specialise in producing goods/services in which they have an absolute advantage. Comparative advantage is where a country specialises even if some of them do not have an absolute advantage, but where trade allows them to optimise their production to maximise the overall efficiency of production. Theory suggests therefore that a country should focus on producing goods and services in which it has a comparative advantage and then export these to the rest of the world. It should, in turn, import those goods and services which it has a comparative disadvantage in producing. This should, in theory, lead to increases in total trade and welfare gains, as production is located where it is most efficient.

60. The Revealed Comparative Advantage (RCA) indicator aims to provide a measure of comparative advantage by observing past and current trade flows. It is defined as follows (where i is a good or service sector and j is the country):

$$RCA_i^j = \frac{\left(\frac{X_i^j}{\sum_i X_i^j} \right)}{\left(\frac{X_i^{world}}{\sum_i X_i^{world}} \right)} = \frac{\left(\frac{\text{Country } j's \text{ exports of } i}{\text{Country } j's \text{ total exports}} \right)}{\left(\frac{\text{World's exports of good } i}{\text{World's total exports}} \right)}$$

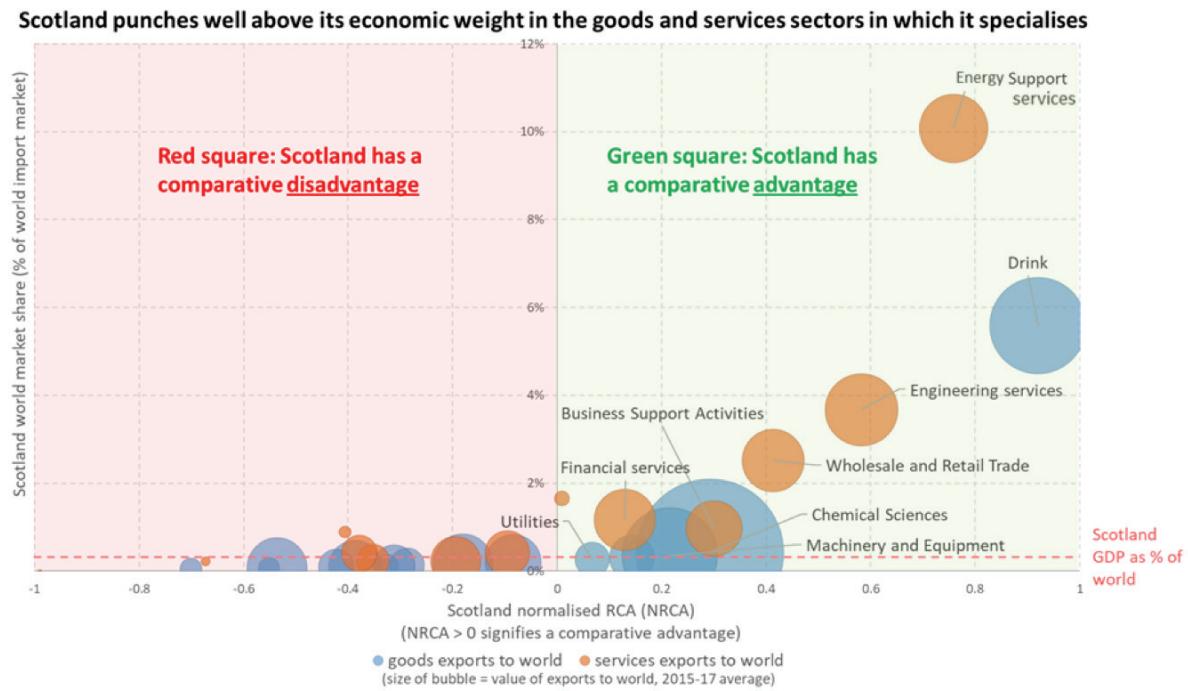
61. Intuitively, the RCA indicator calculates the degree to which countries are specialised in the export of a good or service, as compared to the world average degree of specialisation. If a country is more specialised than the world average, the country is said to have a 'revealed comparative advantage'.

62. In practice it is easier to use a normalised version of the RCA, called the Normalised Revealed Comparative Advantage (NRCA) indicator. This indicator is more intuitive to use as it is bounded by -1 and 1, with a negative number meaning a comparative disadvantage and a positive number a comparative advantage. It is defined as follows:

$$NRCA_i^j = \frac{RCA_i^j - 1}{RCA_i^j + 1}$$

63. Figure 7 shows the normalised revealed comparative advantage index for Scotland plotted against Scotland's market share in world import markets for each sector. This shows that Scotland specialises in a handful of export sectors such as oil and gas related services (which make up 'energy support services' and some of 'engineering services'), drink, wholesale and retail trade and business support activities. In these sectors Scotland punches well above its economic weight, in the sense that Scotland's world market share is significantly higher than the Scottish economy's total share of world output (as measured by GDP), represented by the red dashed line.

Figure 7: Scotland's normalised revealed comparative advantage and world import market share



Source: OCEA calculations based on HMRC RTS, Export Statistics Scotland 2017 and UN COMTRADE data

Note: the international market share calculations should be treated with caution as results are likely to be affected by imperfect data mapping between different classifications

64. It should be noted that for the purposes of clarity the normalised revealed comparative advantage indicator in Figure 7 has been calculated at an aggregated sector level. When calculated at a more disaggregated level, other subsectors would appear in the comparative advantage box (e.g. fisheries).

Competitor choice: choosing competitor countries

65. For each export sector, the model picks a similar international competitor to compare Scotland's exports to. The potential competitors have been chosen based on having a similar population, export mix and current trading arrangements with other countries. They are also chosen based on their geographical location – the economic literature strongly supports the notion that the geographical distance between two countries is a major determinant of the amount they trade, so the countries picked are all in Northern Europe.

66. The possible competitor countries differ for goods and services. For goods, the panel of possible competitor countries identified are Norway, Denmark, Finland and Ireland. For services, due to the lack of international data available a different selection of competitors must be made. The panel of possible competitors for services identified are Belgium, Denmark, Ireland, the Netherlands, Sweden, and Poland.

67. For each export sector, the most similar competitor country is chosen from the potential panel. Scotland's performance in a given sector is compared to competitors based on the 'Revealed Comparative Advantage Index' (RCA) described above. The RCA index is calculated across 66 goods sectors and 19 services sectors for Scotland and for all the competitors outlined above. The competitor who is most similarly competitive globally (i.e. has as similar a RCA index as Scotland) is chosen.
68. Intuitively, for each export sector the model finds a comparator country that exports about as much of the good globally as a proportion of its total global exports as Scotland does. It then compares Scotland's exports to 100 countries in this sector to this chosen competitor to assess whether Scotland is underperforming or outperforming, and to what extent.
69. One other modification is made. A wealth of qualitative evidence shows that countries tend to trade most with other countries with which they share a land border. For example, 60% of Scotland's exports go to the rest of the UK.¹⁷ To make sure that the comparison with each chosen competitor is fair, the choice of competitor is screened to remove contiguous pairs (e.g. it would be an unfair comparison to compare Scotland's exports to Germany to those of Denmark, as Denmark shares a land border with Germany). In the case that the chosen competitor and target market are contiguous, the second-best choice competitor is chosen instead.
70. Table 9 and Table 10 in ANNEX A show the chosen competitor countries for each goods and services sector.

Export value gap: calculation of 'export value gap'

71. Once the competitor is chosen then the 'export value gap' can be calculated.
72. The 'export value gap' is defined as the difference in value between Scotland's exports to a certain market and the exports of the chosen competitor to that same market. For example, Scotland exported £174m worth of professional and scientific instruments to the USA annually on average over the period 2015-17. Finland, which is identified as a similar competitor to Scotland in this sector, exported £521m annually on average over the same period. The difference, £347m, is defined as the 'export value gap'.
73. 'Export value gaps' are calculated for each sector-country pair. These can then be aggregated as desired by summing over countries or sectors. The sum of all the 'export value gaps' across all export sectors and target markets gives the total world 'export gap' – at more than £14bn, this represents the value that

¹⁷ Export Statistics Scotland 2017,
<https://www2.gov.scot/Topics/Statistics/Browse/Economy/Exports/ESSPublication>

Scotland could gain if exports were increased in each sector and market to that of the chosen competitors.

74. It is very important to note that the tool has some limitations that mean its outputs must be treated carefully. In particular, the model is defined at the SITC2 classification level for goods and the EBOPS level for services.¹⁸ This is the most detailed level of available data for Scottish exports. While this does provide a reasonable level of disaggregation, the categories still contain a range of sometimes quite different products and services. This implies that it would be possible for the tool to select a competitor that is somewhat similar to Scotland at the broader sector level, but that actually produces goods within that sector code that are quite different to those that Scottish businesses produce.
75. Because of this crucial limitation the model is intended to point out *potential* opportunities that should then be cross-checked with country and sector experts. This cross-checking and testing has been carried out by the project team, and is described in more detail in the main report accompanying the release of the Export Growth Plan.

4.2 Other indicators used in the analysis

76. In addition to the Export Value Gap tool and revealed comparative advantage index, a range of other indicators are calculated to assist in the selection of priority countries and sectors. There are many factors that need to be assessed to identify the existence of an export opportunity. The size, scope and precise nature of each opportunity is likely to be different and the barriers to Scottish businesses ability to exploit it will vary.
77. For each country and each sector, the other indicators that have been considered fall in to five broad categories: current exports and market size; sector and market growth potential; competitor analysis; and country risk and trade barriers.
78. These additional indicators allow for a wider consideration of market and sector opportunities by considering other factors such as distance to market, size of the import market for a particular sector, historic import market growth over time, future projected import market growth, Scotland's export growth over time, country risk indicators and population change.
79. Table 11 in ANNEX A sets out the indicators used for sector prioritisation. Table 12 sets out those used for country prioritisation.

Weighting indicators

80. In order to combine the indicators and calculate an aggregated score for each country and sector a weighting is applied to each indicator. An initial weighting is

¹⁸ Details of the EBOPS classification can be at UN Stats,
<https://unstats.un.org/unsd/classifications/Family/Detail/101>

applied based on judgement over the perceived relative importance of different indicators in the prioritisation decision.

81. The weighting process is applied as follows. For each indicator, countries are given a score equal to their ranking relative to other countries. For example, since the United States is Scotland's largest single-country export market, the United States gets the score '1' under the indicator 'Scottish exports to market'. Note that lower numbers indicate a higher rank.
82. Once every country has received a score for all indicators the weighting scheme is applied. This is done by multiplying the initial score by the indicator weight. An average ranking score is then calculated for each country by averaging the weighted scores for that country and dividing through by the sum of the weights in the weighting scheme.
83. By this process a ranked list of countries is generated for each weighting scheme. The same process is followed to generate a ranked list of sectors based on the sector indicators.
84. While all care is taken to ensure that the initial weighting is reasonable, extensive sensitivity testing is carried out to verify that the country and sector choices are robust to individual judgement. This sensitivity testing is carried out by varying both the scale of the weighting and the relative weighting of different indicators. Full details of the weightings used can be found in Table 13 and Table 14 in ANNEX A.
85. Table 2 shows that the results of this process are robust to the choice of both the scale and the relative importance of different weightings, with most countries in the top 10 appearing across all rankings.

Table 2: Country ranking – sensitivity testing

Rank	FINAL WEIGHTING	TESTING SENSITIVITY OF SCALE OF WEIGHTING				TESTING SENSITIVITY OF WEIGHTING DECISIONS			
		WEIGHTING 1.1	WEIGHTING 1.2	WEIGHTING 1.3	WEIGHTING 1.4	WEIGHTING 2.1	WEIGHTING 2.2	WEIGHTING 2.3	WEIGHTING 2.4
1	United States	United States	Germany	Germany	United States	United States	United States	Irish Republic	United States
2	Germany	France	United States	United States	Germany	France	France	United States	Irish Republic
3	France	Germany	Netherlands	Netherlands	France	Germany	Irish Republic	France	Norway
4	Netherlands	Netherlands	France	France	Netherlands	Denmark	Germany	Turkey	France
5	Switzerland	Irish Republic	Poland	Poland	Irish Republic	Norway	Switzerland	Germany	Denmark
6	Norway	Switzerland	Italy	Italy	Switzerland	Irish Republic	Norway	Netherlands	Germany
7	Poland	Denmark	Norway	Norway	Denmark	Netherlands	Denmark	Norway	Turkey
8	Belgium	Canada	Belgium	Belgium	Norway	Switzerland	Netherlands	Denmark	Switzerland
9	China	Norway	Switzerland	Switzerland	Canada	Canada	China	Canada	Netherlands
10	Irish Republic	Belgium	Sweden	Sweden	China	Turkey	Turkey	Switzerland	Nigeria

86. Finally, an additional exercise is conducted to identify those markets that may not come top when compared against the broad indicators across all sectors, but that may have particular importance for certain export sectors. These countries are identified through current export flows and sector/country knowledge.

87. Table 3 shows the countries identified as priorities.

Table 3: Priority countries identified

Immediate opportunities in multiple sectors	Specific sectoral opportunities in the mid to long term
1) USA	16) Japan
2) Germany	17) Australia
3) France	18) Turkey
4) Netherlands	19) Mexico
5) Switzerland	20) India
6) Norway	21) Singapore
7) Poland	22) UAE
8) Belgium	23) Nigeria
9) China	24) South Korea
10) Irish Republic	25) Brazil
11) Denmark	26) Indonesia
12) Sweden	
13) Italy	
14) Canada	
15) Spain	

88. Table 4 shows these priority countries plotted in a matrix against the priority sectors identified. The cells in the matrix provide some further information that helps to illuminate the reason for the prioritisation, and the sectoral pattern of opportunities in the countries. The matrix is colour coded from bright green indicating a high potential opportunity through to red which suggests no particular opportunity identified in that sector and country.

Table 4: Priority countries and sectors - matrix

Summary matrix	Engineering and Advanced Manufacturing	Food and Drink	Technology, Software and Communication	Energy Support	Financial and Business Services	Chemical Sciences	Life Sciences
USA	M G X	M G X	V M G X	X	M G X	V M X	V M G X
Germany	V M G X	M G X	V M G X	M X	V M G	V M X	V M G X
France	M	M X	V M X	V M G	V M X	V M X	V M X
Netherlands	V G	V M G X	V M X	M G X	V M G X	V M X	M G X
Switzerland		V	V G X		V		V M G X
Norway	X	V	V X	X	X		X
Poland	V	V		V	V	G	V
Belgium	M	V M		M G	V	V M X	V M
China	V M G	V M G	M G			M G X	V M G X
Ireland	V	X	V X		M G X	V G X	M G
Denmark	X			M X		V	V G
Sweden				V M	V G		X
Italy	M G	V M	X		V	X	M G
Canada	M G X	M G X		V M	M G X	V	V
Spain	M G	M G X			X	V X	
Japan	M	M G	V M G		V G X	M	M G X
Australia	X	V X	V	V G	X		X
Turkey						G	
Mexico	M G		M G			G	
India	G	G	V G	V G	M	M	
Singapore	X	X	M G	V M G		M	
UAE	X	X	X	X	X		
Nigeria	X						
South							
Korea	V G X	G	M G	V G	M G	M X	V G
Brazil				G X	M G		
Indonesia							

Key:	
V	in top 10 export value gaps for sector
M	in top 10 importing countries of products from sector
G	in top 10 import growth countries for sector
X	in top 10 Scottish export markets for sector

Source: OCEA calculations based on Export Statistics Scotland and UN COMTRADE data

5. Analysis of Scottish exporter characteristics

Scotland's business profile

89. The export plan uses a number of official data sources to help understand Scotland's business profile. This section explains the sources for the statistics used in the main export plan document, which this methodology note accompanies.

Number of businesses

90. This is sourced from the Businesses in Scotland¹⁹ publication which provides information on the number of enterprises (businesses) operating in Scotland.
91. The data is based on business counts from the IDBR, which provides the number of enterprises registered for VAT and/or PAYE in Scotland. However there is a substantial number of very small enterprises which have no employees and are therefore not included on the IDBR. A modelling procedure that combines data from the IDBR with estimates derived from the Labour Force Survey, Family Resources Survey and Self-Assessment data is used to estimate the number of unregistered enterprises. As a result, this provides the most comprehensive estimate of business counts for Scotland.
92. Data from the 2018 publication was used in the plan to provide a baseline for the number of companies in Scotland. Using the breakdown by employee size band also provides an estimate on the number of companies with zero employees and the number of micro-business (1 to 9 employees).

Number of exporters

93. This is sourced from the ONS Importers and Exporters by Regional Breakdown data²⁰ which provides an estimate for the number of companies exporting goods and services by region of the UK, including Scotland.
94. This data is based on the Annual Business Survey (ABS) which is a sample survey of 62,000 businesses in Great Britain and includes all large businesses (those with 250 or more employees). However this survey excludes parts of the agriculture sector and also the financial services sector.
95. This ONS data relating to the number of exporters and importers by region is currently classed as experimental statistics which are defined as official statistics in the testing phase that are not fully developed. Despite this, it is the only official

¹⁹ Scottish Government, Businesses in Scotland 2018,

<https://www2.gov.scot/Topics/Statistics/Browse/Business/Corporate>

²⁰ ONS, Importers and exporters by regional breakdown,

<https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/annualbusinesssurveyimportersandexportersregionalbreakdown>

source for the number of exporters in Scotland that includes trade in both goods and services.²¹

96. The latest available figure is for 2017 and this was used in the plan to provide an estimate for the number of those companies in Scotland (from the Businesses in Scotland figure mentioned above) that are exporting. The published number is 10,700 businesses. Given the ABS excludes some sectors (as mentioned above), the actual number of exporting companies in Scotland is likely to be higher than this. As a result, the number was rounded up to 11,000, although this is still likely to be an underestimate.

Number of non-exporters

97. There is no official source on the number of non-exporting businesses in Scotland. As a result, the two sources explained above were used to estimate this. We start with the total number of businesses in Scotland, 346,000 and exclude the 238,000 zero-employee businesses (although in reality some of these businesses will be exporters). This gives an estimated 108,000 businesses that could be exporting. However, if we assume that 11,000 of these businesses are known exporters, it follows that the rest are non-exporters. This means there are an estimated 97,000 businesses in Scotland that do not export.

Company level export data

98. As well as the analysis carried out to help understand Scotland's current and future export growth opportunities, analytical work was undertaken to examine key exporting businesses and their characteristics. This company-level analysis was done to help understand who the top exporting companies are, what sectors they are in as well as other factors such as their size, location, ownership as well as their export performance over time. This analysis helped to understand where trade promotion can have the most impact on boosting Scotland's exports.

99. The main source for this analysis is the Export Statistics Scotland data. Further information on how this data is compiled is covered in section 3. This data estimates the value of international exports for individual companies in Scotland which allows companies to be ranked and grouped based on this value, for example by the top 100 or top 500 exporters.

100. This company-level export data can be linked to data from the IDBR by reporting unit number which allows export performance to be analysed against other business characteristics, including country of ownership and size of business.

²¹ HMRC also publish estimates for number of exporters in Scotland but this relates to companies trading goods only: <https://www.uktradeinfo.com/Statistics/RTS/Pages/default.aspx>

Country of ownership

101. Business country of ownership is determined by the nationality of the ultimate parent of the business (i.e. the institutional unit, proceeding up a business' chain of control, which is not controlled by another institutional unit). Where control of the business is shared, country of ownership is determined by the country of residence of the majority ultimate owner. Enterprise groups with foreign ownership are identified of using data provided by Dun & Bradstreet. All businesses that do not belong to an enterprise group, and are therefore not under the control of another institutional unit, are classified as UK-owned. It is assumed that a UK-owned company that only has sites in Scotland is a Scottish owned company. However manual amendments are also made to ensure the country of ownership data is as accurate as possible.

Size of business

102. The IDBR also contains information on the number of employees for each business and this is used to determine the size of the business. In this analysis, 'small' businesses are defined as those with fewer than 50 employees; 'medium' are defined as those with 50 to 249 employees and 'large' are defined as businesses with 250+ employees. This is based on the total employment for their Scottish sites only.

Export concentration

103. As mentioned above, individual companies in the ESS data can be ranked by their estimated value of international exports. This is used to measure the level of export concentration. For example, this shows that in Scotland, it is estimated that the top 100 exporters account for around 59% of all international exports. The next 400 exporters account for 23% of all international exports, meaning over 80% of all international exports are delivered by just 500 businesses. Dividing this number by the total number of businesses in Scotland (346,000) gives the 0.1% figure mentioned in the report.

ANNEX A

Table 5: Goods sectors in the Export Value Gap model

SITC2 Code	Sector Name (SITC)	Export Growth Plan Sector
00	Live animals other than animals of division 03	Food and Drink
01	Meat & meat preparations	Food and Drink
02	Dairy products & birds' eggs	Food and Drink
03	Fish, crustaceans, molluscs & aq.inverts & preps thereof	Food and Drink
04	Cereals & cereal preparations	Food and Drink
05	Vegetables & fruit	Food and Drink
06	Sugar, sugar preparations & honey	Food and Drink
07	Coffee, tea, cocoa, spices & manufactures thereof	Food and Drink
08	Feeding stuff for animals (not inc.unmilled cereals)	Other (mostly Agricultural)
09	Miscellaneous edible products & preparations	Food and Drink
11	Beverages	Food and Drink
12	Tobacco & tobacco manufactures	Other (mostly Agricultural)
21	Hides, skins & furskins, raw	Textiles
22	Oil seeds & oleaginous fruits	Other (mostly Agricultural)
23	Crude rubber (including synthetic & reclaimed)	Chemical Sciences
24	Cork & wood	Forest & Timber
25	Pulp & waste paper	Forest & Timber
26	Textile fibres not manufactured & their waste etc	Textiles
27	Crude fertilizers & crude minerals (exc fuels etc)	Chemical Sciences
28	Metalliferous ores & metal scrap	Engineering and Advanced Manufacturing
29	Crude animal & vegetable materials n.e.s.	Other (mostly Agricultural)
32	Coal, coke & briquettes	Chemical Sciences
33	Petroleum, petroleum products & related materials	Chemical Sciences
34	Gas, natural & manufactured	Utilities
35	Electric current	Utilities
41	Animal oils & fats	Other (mostly Agricultural)
42	Fixed vegetable fats & oils, crude,refined,fractionated	Other (mostly Agricultural)
43	Animal or vegetable fats & oils, processed, & waxes	Other (mostly Agricultural)
51	Organic chemicals	Chemical Sciences
52	Inorganic chemicals	Chemical Sciences
53	Dyeing, tanning & colouring materials	Chemical Sciences
54	Medicinal & pharmaceutical products	Life Sciences
55	Essential oils & perfume materials; toilet preps etc	Chemical Sciences
56	Fertilizers (other than those of group 272)	Chemical Sciences
57	Plastics in primary forms	Chemical Sciences
58	Plastics in non-primary forms	Chemical Sciences
59	Chemical materials & products n.e.s.	Chemical Sciences

61	Leather, leather manufactures n.e.s & dressed furskins	Textiles
62	Rubber manufactures n.e.s.	Chemical Sciences
63	Cork & wood manufactures (excluding furniture)	Manufacturing for Construction
64	Paper, paperboard & manufactures thereof	Forest & Timber
65	Textile yarn, fabrics, made up articles etc	Textiles
66	Non-metallic mineral manufactures n.e.s.	Manufacturing for Construction
67	Iron & steel	Engineering and Advanced Manufacturing
68	Non-ferrous metals	Engineering and Advanced Manufacturing
69	Manufactures of metal n.e.s.	Engineering and Advanced Manufacturing
71	Power generating machinery & equipment	Engineering and Advanced Manufacturing
72	Machinery specialized for particular industries	Engineering and Advanced Manufacturing
73	Metalworking machinery	Engineering and Advanced Manufacturing
74	General industrial machinery & eqp. & machine pt.n.e.s.	Engineering and Advanced Manufacturing
75	Office machines & adp machines	Technology, Software and Communication
76	Telecomms & sound recording & reproducing app. & eqp.	Technology, Software and Communication
77	Ele machinery, app & appliances & ele pt thereof n.e.s.	Technology, Software and Communication
78	Road vehicles (including air cushion vehicles)	Engineering and Advanced Manufacturing
79	Other transport equipment	Engineering and Advanced Manufacturing
81	P/fab buildings;sanit.,plumbing,heating &lighting fixt.	Manufacturing for Construction
82	Furniture & parts thereof; bedding, mattresses etc	Engineering and Advanced Manufacturing
83	Travel goods, handbags & similar containers	Engineering and Advanced Manufacturing
84	Articles of apparel & clothing accessories	Textiles
85	Footwear	Textiles
87	Professional, scientific & controlling ins & app n.e.s.	Life Sciences
88	Photographic & optical goods, n.e.s.; watches & clocks	Technology, Software and Communication
89	Miscellaneous manufactured articles n.e.s.	Engineering and Advanced Manufacturing
93	Special transactions and commodities not classified according to kind	Other (mostly Agricultural)
96	Coin (other than gold coin), not being of legal tender	Not assigned
98	Military arms and ammunition	Defence

Table 6: Services sectors included in the model (including mapping to Export Growth Plan sectors)

EBOPS code	Sector Name	Export Growth Plan Sector
1.1	Sea transport	Transportation and Storage
1.2	Air transport	Transportation and Storage
1.3	Other transport	Transportation and Storage
3.1	Postal and courier services	Transportation and Storage
3.2	Telecommunications services	Technology, Software and Communication
5	Insurance services	Financial and Business Services
6	Financial services	Financial and Business Services
7	Computer and information services	Technology, Software and Communication
9.1	Merchanting and other trade-related services	Wholesale and Retail Trade
9.2	Operational leasing services	Financial and Business Services
9.3.1	Legal, accounting, management consulting, and public relations	Financial and Business Services
9.3.2	Advertising, market research, and public opinion polling	Financial and Business Services
9.3.3	Research and development	Life Sciences
9.3.4	Architectural, engineering, and other technical services	Engineering and Advanced Manufacturing
9.3.5	Agricultural, mining, and on-site processing services	Energy
9.3.6	Other business services	Financial and Business Services
10.1	Audiovisual and related services	Technology, Software and Communication
10.2.1	Education services	Education
10.2.3	Other	Sustainable Tourism

Table 7: Mapping SIC services sectors to EBOPS classification

2 Digit SIC code	Sector name	EBOPS (comparator list)
9	Mining Support Service Activities	9.3.5 Agricultural, mining, and on-site processing services
45	Wholesale and Retail Trade and Repair of Motor Vehicles and Motorcycles	9.1 Merchanting and other trade-related services
46	Wholesale Trade, Except of Motor Vehicles and Motorcycles	9.1 Merchanting and other trade-related services
47	Retail Trade, Except of Motor Vehicles and Motorcycles	9.1 Merchanting and other trade-related services

49	Land Transport and Transport via Pipelines	1.3 Other transport
50	Water Transport	1.1 Sea transport
51	Air Transport	1.2 Air transport
52	Warehousing and Support Activities for Transportation	1.3 Other transport
53	Postal and Courier Activities	3.1 Postal and courier services
55	Accommodation	
56	Food and Beverage Service Activities	9.1 Merchanting and other trade-related services
58	Publishing Activities	9.3.6 Other business services
59	Motion Picture, Video and Television Programme Production, Sound Recording and Music Publishing Activities	10.1 Audiovisual and related services
60	Programming and Broadcasting Activities	10.1 Audiovisual and related services
61	Telecommunications	3.2 Telecommunications services
62	Computer Programming, Consultancy and Related Activities	7 Computer and information services
63	Information Service Activities	7 Computer and information services
64	Financial Service Activities, Except Insurance and Pension Funding	6 Financial services
65	Insurance, Reinsurance and Pension Funding, Except Compulsory Social Security	5 Insurance services
66	Activities Auxiliary to Financial Services and Insurance Activities	6 Financial services
68	Real Estate Activities	9.3.6 Other business services
69	Legal and Accounting Activities	9.3.1 Legal, accounting, management consulting, and public relations
70	Activities of Head Offices; Management Consultancy Activities	9.3.1 Legal, accounting, management consulting, and public relations
71	Architectural and Engineering Activities; Technical Testing and Analysis	9.3.4 Architectural, engineering, and other technical services
72	Scientific Research and Development	9.3.3 Research and development
73	Advertising and Market Research	9.3.2 Advertising, market research, and public opinion polling
74	Other Professional, Scientific and Technical Activities	9.3.6 Other business services
77	Rental and Leasing Activities	9.2 Operational leasing services
78	Employment Activities	9.3.6 Other business services
79	Travel Agency, Tour Operator and Other Reservation Service and Related Activities	
80	Security and Investigation Activities	9.3.6 Other business services
81	Services to Building and Landscape Activities	9.3.6 Other business services
82	Office Administrative, Office Support and Other Business Support Activities	9.3.6 Other business services

85	Education	10.2.1 Education services
90	Creative, Arts and Entertainment Activities	10.2.3 Other
91	Libraries, Archives, Museums and Other Cultural Activities	10.2.3 Other
95	Repair of Computers and Personal Household Goods	9.1 Merchanting and other trade-related services

Table 8: Countries included in the Export Growth Plan model

Algeria	Cyprus	Indonesia	Namibia	Slovakia
Angola	Czech Republic	Iran	Netherlands	Slovenia
Argentina	Denmark	Irish Republic	New Zealand	South Africa
Australia	Dominican Rep	Israel	Nigeria	Spain
Austria	Ecuador	Italy	Norway	Sri Lanka
Azerbaijan	Egypt	Jamaica	Oman	Sweden
Bahrain	Estonia	Japan	Pakistan	Switzerland
Bangladesh	Ethiopia	Jordan	Panama	Syria
Belgium	Finland	Kazakhstan	Peru	FYR Macedonia
Botswana	France	Kenya	Philippines	Thailand
Brazil	Georgia	Kuwait	Poland	Trinidad:Tobago
Bulgaria	Germany	Latvia	Portugal	Tunisia
Cameroon	Ghana	Lebanon	Qatar	Turkey
Canada	Greece	Lithuania	South Korea	Ukraine
Chile	Guatemala	Luxembourg	Romania	UAE
China	Guyana	Malaysia	Russia	Tanzania
Hong Kong	Honduras	Malta	Saudi Arabia	Uruguay
Colombia	Hungary	Mauritius	Senegal	United States
Costa Rica	Iceland	Mexico	Serbia	Vietnam
Croatia	India	Morocco	Singapore	Zimbabwe

Table 9: Competitor countries chosen in the Export Value Gap tool – goods sectors

SITC Code	Sector name	Chosen competitor
00	Live animals other than animals of division 03	Finland
01	Meat & meat preparations	Finland
02	Dairy products & birds' eggs	Norway
03	Fish,crustaceans,molluscs & aq.inverts & preps thereof	Denmark
04	Cereals & cereal preparations	Finland
05	Vegetables & fruit	Ireland
06	Sugar, sugar preparations & honey	Finland
07	Coffee, tea, cocoa, spices & manufactures thereof	Norway

08	Feeding stuff for animals (not inc.unmilled cereals)	Norway
09	Miscellaneous edible products & preparations	Finland
11	Beverages	Ireland
12	Tobacco & tobacco manufactures	Finland
22	Oil seeds & oleaginous fruits	Ireland
23	Crude rubber (including synthetic & reclaimed)	Finland
25	Pulp & waste paper	Ireland
26	Textile fibres not manufactured & their waste etc	Ireland
28	Metalliferous ores & metal scrap	Ireland
29	Crude animal & vegetable materials n.e.s.	Ireland
32	Coal, coke & briquettes	Denmark
33	Petroleum, petroleum products & related materials	Norway
34	Gas, natural & manufactured	Finland
41	Animal oils & fats	Ireland
42	Fixed vegetable fats & oils, crude,refined,fractionated	Ireland
43	Animal or vegetable fats & oils, processed, & waxes	Norway
51	Organic chemicals	Denmark
52	Inorganic chemicals	Finland
53	Dyeing, tanning & colouring materials	Finland
54	Medicinal & pharmaceutical products	Finland
55	Essential oils & perfume materials; toilet preps etc	Finland
56	Fertilizers (other than those of group 272)	Finland
57	Plastics in primary forms	Ireland
58	Plastics in non-primary forms	Denmark
59	Chemical materials & products n.e.s.	Ireland
61	Leather, leather manufactures n.e.s & dressed furskins	Denmark
62	Rubber manufactures n.e.s.	Finland
64	Paper, paperboard & manufactures thereof	Denmark
65	Textile yarn, fabrics, made up articles etc	Denmark
66	Non-metallic mineral manufactures n.e.s.	Ireland
67	Iron & steel	Norway
68	Non-ferrous metals	Denmark
69	Manufactures of metal n.e.s.	Finland
71	Power generating machinery & equipment	Denmark
72	Machinery specialized for particular industries	Norway
73	Metalworking machinery	Denmark
74	General industrial machinery & eqp. & machine pt.n.e.s.	Finland
75	Office machines & adp machines	Denmark
76	Telecomms & sound recording & reproducing app. & eqp.	Finland
77	Ele machinery, app & appliances & ele pt thereof n.e.s.	Denmark
78	Road vehicles (including air cushion vehicles)	Norway
79	Other transport equipment	Finland
81	P/fab buildings;sanit.,plumbing,heating &lighting fixt.	Norway
82	Furniture & parts thereof; bedding, mattresses etc	Ireland
83	Travel goods, handbags & similar containers	Finland

84	Articles of apparel & clothing accessories	Finland
85	Footwear	Finland
87	Professional, scientific & controlling ins & app n.e.s.	Finland
88	Photographic & optical goods, n.e.s.; watches & clocks	Denmark
89	Miscellaneous manufactured articles n.e.s.	Finland
96	Coin (other than gold coin), not being of legal tender	Denmark

Table 10: Competitor countries chosen in the Export Value Gap tool – services sectors

EBOPS code	Sector Name	Chosen competitor
1.1	Sea transport	Poland
1.2	Air transport	Sweden
1.3	Other transport	Sweden
3.1	Postal and courier services	Sweden
3.2	Telecommunications services	Sweden
5	Insurance services	Denmark
6	Financial services	Ireland
7	Computer and information services	Sweden
9.1	Merchanting and other trade-related services	Sweden
9.2	Operational leasing services	Belgium
9.3.1	Legal, accounting, management consulting, and public relations	Sweden
9.3.2	Advertising, market research, and public opinion polling	Sweden
9.3.3	Research and development	Poland
9.3.4	Architectural, engineering, and other technical services	Sweden
9.3.5	Agricultural, mining, and on-site processing services	Netherlands
9.3.6	Other business services	Poland
10.1	Audiovisual and related services	Poland
10.2.1	Education services	Poland
10.2.3	Other	Belgium

Table 11: Indicators used in sector prioritisation

Indicator	Source
Current exports and market size	
Value of Scottish exports in sector, 2014-16 average	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Size of world import market in sector, 2014-16 average	UN COMTRADE

Sector growth potential	
Long-term growth in Scotland's exports in sector, absolute value, 2006-16	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Recent growth in Scotland's exports in sector, absolute value, 2011-16	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Long-term growth in world imports in sector, absolute value, 2008-16	UN COMTRADE
Recent growth in world imports in sector, absolute value, 2011-16	UN COMTRADE
Value if Scotland were to increase world market share by half	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor), UN COMTRADE
Competitor analysis	
Total export value gap in sector	Output from the Export Value Gap model
Total export value strength in sector	Output from the Export Value Gap model
Opportunity concentration (% of export value gap in top 5 countries)	Output from the Export Value Gap model
Import growth concentration (% of world import growth coming from top 5 countries)	UN COMTRADE

Table 12: Indicators used in country prioritisation

Indicator	Source
Current exports and market size	
Value of Scottish exports to country, 2014-16 average	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Size of country's import market, 2016	UN COMTRADE
Distance to country	
Sector growth potential	
Long-term growth in Scotland's exports to country, absolute value, 2006-16	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Recent growth in Scotland's exports to country, absolute value, 2011-16	HMRC regional trade statistics, Scotland's Export performance monitor (Scotland's Export Performance Monitor)
Recent growth in country's imports, absolute value, 2011-16	UN COMTRADE

Forecast country total imports, absolute value, 2018-23	IMF forecasts
Long-term population growth, increase in population, 2017-50	World Bank
Competitor analysis	
Total export value gap in country	Output from the Export Value Gap model
Total export value strength in country	Output from the Export Value Gap model
Opportunity concentration (% of export value gap in top 5 sectors in country)	Output from the Export Value Gap model
Import growth concentration (% of country's import growth coming from top 5 sectors)	UN COMTRADE
Country risk and trade barriers	
Country risk	Coface, https://www.coface.com/
Country business risk	Coface, https://www.coface.com/
Country simple average applied tariff	WTO

Table 13: Weightings applied in country prioritisation, sensitivity testing

	Scottish exports to market (2014-16 average, £m)	Size of import market (2016, £m)	Distance to Country (miles)	Growth in Scottish exports to market		Growth of import market			[Underperformance] Total Export Value Gap (£m)	[Beating competitors] Export Value Strength (£m)	Key sectors (from competitor analysis)	Key sectors for import growth (2013-17)	Country risk	Business risk	Trade barriers
				Long-term growth (2006-16, abs value £m)	Recent growth (2011-16, abs value £m)	Recent growth (2012-16, abs value £m)	Forecast total imports (2018-23, abs value £m)	Long-term population growth (2017-2050) (number)							
WEIGHTING 1.1	3	3	2	2	3	3	2	1	3	1	1	1	2	2	3
WEIGHTING 1.2	10	10	5	5	10	10	5	3	10	3	3	3	5	5	10
WEIGHTING 1.3	2	2	1	1	2	2	1	1	2	1	1	1	1	1	2
WEIGHTING 1.4	5	4	2	2	4	3	2	1	5	2	2	1	2	2	4
WEIGHTING 2.1	3	1	2	3	3	1	1	1	3	1	1	1	2	2	3
WEIGHTING 2.2	2	1	2	3	3	3	3	1	2	1	1	3	2	2	2
WEIGHTING 2.3	1	1	2	1	1	1	1	1	3	2	3	1	2	2	2
WEIGHTING 2.4	3	1	2	3	3	1	1	1	3	2	3	3	2	2	2

Table 14: Weightings applied in sector prioritisation, sensitivity testing

	Scottish exports (2014-16 average, £m)	Size of world import market (2014-16 average, £m)	Growth in Scottish exports		Growth in world imports		Value if Scotland were to increase world market share by 50% (£m)	[Underperformance] Total Export Value Gap (£m)	[Beating competitors] Export Value Strength (£m)	Key Countries (from competitor analysis)	Key countries for import growth (2013-17)	Import growth concentration (% of world import growth coming from top 5 countries)
			Long-term growth (2006-16, abs value £m)	Recent growth (2011-16, abs value £m)	Long-term growth (2008-16, abs value £m)	Recent growth (2011-16, abs value £m)						
WEIGHTING 1.1	3	3	2	3	2	3	3	3	3	1	1	1
WEIGHTING 1.2	10	10	5	10	5	10	10	10	10	3	3	3
WEIGHTING 1.3	2	2	1	2	1	2	2	2	2	1	1	1
WEIGHTING 1.4	5	5	3	4	3	4	2	2	5	2	1	1
WEIGHTING 2.1	3	1	2	3	1	1	1	3	3	3	2	1
WEIGHTING 2.2	2	1	3	3	3	3	3	2	1	1	1	3
WEIGHTING 2.3	1	1	1	1	1	1	1	1	3	2	3	1
WEIGHTING 2.4	3	1	3	3	1	1	1	3	3	2	3	3