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THE IMPACT OF THE BAE SYSTEMS MILITARY AIRCRAFT BUSINESS ON THE UK ECONOMY

JULY 2018

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July 2018

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BAE Systems has a 13-15% workshare of each F-35 aircraft, excluding propulsion. Photograph: Arnel Parker

EXECUTIVE SUMMARY

48,900

Total full-time equivalent (FTE) jobs supported by the BAE Systems military aircraft business in the UK in 2016

For every 100 jobs at the business itself, 400 are supported in the economy as a whole.

£3.2 bn

Total gross value added contribution to GDP in 2016 by the BAE Systems military aircraft business in the UK

Of this figure, £0.9 billion is directly contributed by the business' activities.

The BAE Systems military aircraft business in the UK is primarily involved in the defence aerospace sector.¹ The business designs, builds and maintains the very latest fixed wing combat and training aircraft and electronic systems for the Royal Air Force and customers all around the world. UK operations are based at more than 20 sites, with significant activity at Warton and Samlesbury in Lancashire, Brough in Yorkshire and Yeovil in Somerset. Employees are also located at Royal Air Force bases across the UK. The business is an integral part of BAE Systems, the largest defence and security company in the UK and the third largest globally. This report focuses on the contribution that the BAE Systems military aircraft business made to the UK economy in 2016. It is an extension to Oxford Economics' detailed 2017 study into the contribution of BAE Systems to the UK economy.

In 2016, we estimate that the BAE Systems military aircraft business sustained around 48,900 full-time equivalent (FTE) jobs in the UK— equivalent to one in every 552 FTE jobs in the country. This contribution is the sum of three impact channels: direct on-site jobs; indirect jobs within the business' UK supply chain; and the induced employment effect that results as employees of the business and its suppliers spend their wages in the wider consumer economy. The BAE Systems military aircraft business in the UK employed 12,300 people on an FTE basis in 2016, while a further 36,600 FTE jobs were supported through the indirect and induced channels. This demonstrates that the impact of the UK military aircraft business reaches far beyond its own operations: for every 100 jobs at the business itself, it supported 400 jobs in the UK economy as a whole.

In total, the business' operations are estimated to have supported a £3.2 billion contribution to UK GDP in 2016. This is equivalent to 0.2 percent of the country's entire economic output. Of this, the BAE Systems military aircraft business itself contributed £0.9 billion, while supply chain and worker spending multiplier effects supported a further £2.3 billion. In other words, for every £1 in GDP created directly by the Company's military aircraft business, a total of £3.40 is supported across the UK economy as a whole. This means that business contributed 17 pence in every £100 of UK GDP in 2016, either directly or through multiplier effects.

BAE Systems military aircraft workers are concentrated in highly-skilled roles. Some 70 percent of military aircraft staff are employed in engineering or engineering-related roles. As of September 2017, the BAE Systems military aircraft business in the UK had almost 600 apprentices in training, just over 100 graduates, and in 2017 provided 25 summer internships. Productivity, as measured by gross value added per FTE employee, was £76,000 in 2016, six percent above the UK average.

In 2016, either directly or through secondary channels, the BAE Systems military aircraft business supported a tax contribution of £900 million to

¹ In January 2018, the Company created BAE Systems Air—a global military aircraft business, which incorporated its military aircraft business in the UK.

the UK Exchequer. To give an indication of scale, £900 million in tax revenues is sufficient to pay for the departmental budgets of the Cabinet Office and International Trade combined.²

In 2016, the business exported £1.3 billion worth of goods and services—equivalent to 0.2 percent of UK exports in that year. The majority of the military aircraft business' export sales went to two market areas: the Middle East and the US. Netting off imports, this means the business made a positive contribution to the UK balance of payments of £0.8 billion through its import-export activity.

INTRODUCING ECONOMIC IMPACT ANALYSIS

The economic impact of a company or industry is measured using a standard means of analysis called an economic impact assessment. This involves the quantification of the three 'core' channels of impact that comprise the organisation's 'economic footprint', consisting of:

- **Direct impact**, which relates to the economic benefit of the BAE Systems military aircraft business' operations and activities in the UK;
- **Indirect impact**, which encapsulates the economic benefit and employment supported in the business' supply chain as a result of its procurement of goods and services; and
- **Induced impact**, comprising the wider economic benefit that arises when employees within the military aircraft business and its supply chain spend their earnings, for example, in local retail and leisure establishments.

Using these pathways, a picture of the BAE Systems military aircraft business' economic footprint is presented, using three metrics:

- **GDP**, or more specifically, the business' gross value added (GVA) contribution to GDP;
- **Employment**, as the number of people employed, measured on a full-time equivalent (FTE) basis; and,
- **Government revenues**, including employment and corporate income taxes paid to the UK Exchequer.

The modelling on which this report is based computes the economic footprint of the BAE Systems military aircraft business in the UK in 2016, ensuring full consistency with the analysis presented in the 2017 report of BAE Systems as a whole.³

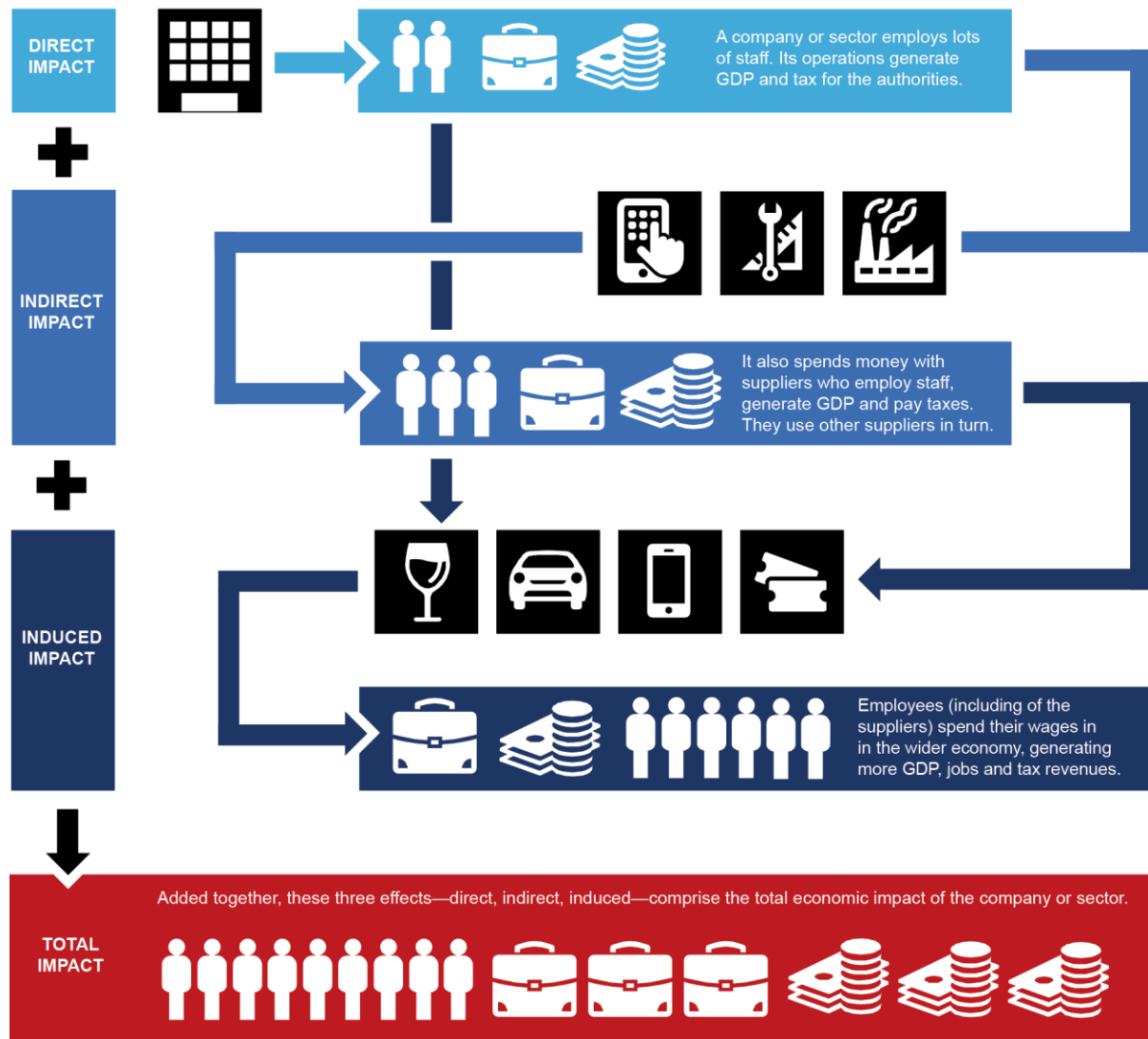
Economic contributions are shown for the whole UK economy.

Further detail about the economic impact methodology is included in the technical appendix found at the end of this report.

² HM Treasury, "Spring Budget 2017", March 2017.

³ Oxford Economics, "The contribution of BAE Systems to the UK economy", November 2017. The only exception to full consistency is the indirect and induced employment figures have been calculated using up-to-date output per worker ratios for 2016, based on revised output and employment data by industry released by the ONS.

Fig. 1. Illustration of channels of economic impact



1. EMPLOYMENT CONTRIBUTION

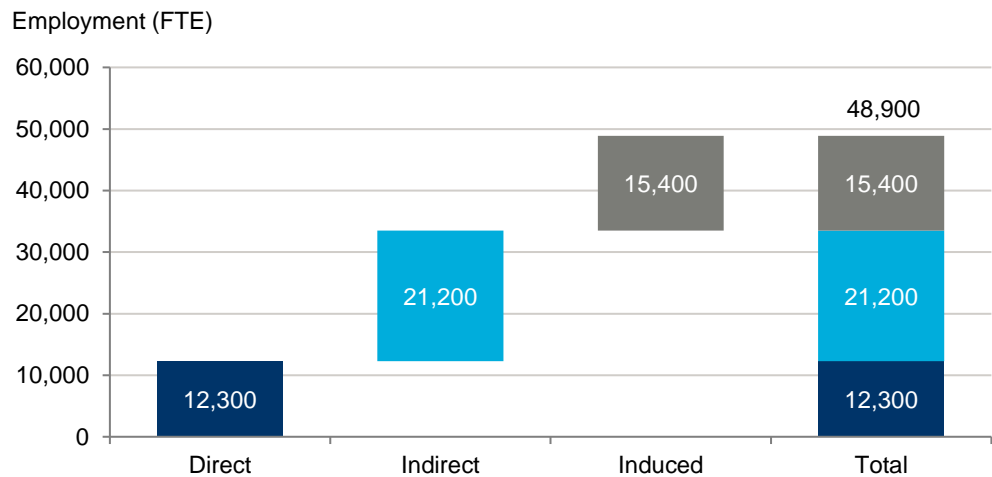
This section describes the BAE Systems military aircraft business' UK employment contribution in 2016. Besides reviewing the three channels of impact, we also examine the skills composition of its workforce. All employment figures presented are in full-time equivalent terms, unless otherwise specified.

1.1 TOTAL EMPLOYMENT CONTRIBUTION

The presence of the BAE Systems military aircraft business in the UK stimulates employment across the country through several channels; the business employs people directly, purchases goods from UK suppliers and pays wages which are spent in domestic retail and leisure outlets. Each of these generates jobs.

In 2016, including all impact channels, the BAE Systems military aircraft business supported around 48,900 full-time equivalent (FTE) jobs in the UK. The business employed 12,300 FTE employees at its UK sites in 2016. This direct contribution was supplemented by 'indirect' employment within its UK supply chain and 'induced' employment as a result of workers' spending (Fig. 2). These findings mean that Company's military aircraft business in the UK had an employment multiplier of 4.0: for every 100 FTE jobs at the business itself, a total of 400 are supported across the UK as a whole.⁴

Fig. 2. The BAE Systems military aircraft business' contribution to employment in the UK, 2016



Source: Oxford Economics

1.2 THE BAE SYSTEMS MILITARY AIRCRAFT BUSINESS' OWN EMPLOYMENT

The BAE Systems military aircraft business is a major UK employer: in 2016, it employed just over 12,300 people on an FTE basis at its UK sites (or 12,500 on

⁴ The 400 includes jobs within BAE Systems military aircraft business in the UK, plus those which result from indirect and induced multiplier effects.

48,900

Total full-time equivalent (FTE) jobs supported by the BAE Systems military aircraft business in the UK

12,300 FTE employees at the business itself, 21,200 employees in its supply chain and 15,400 jobs supported through the consumer spending channel.

4.0

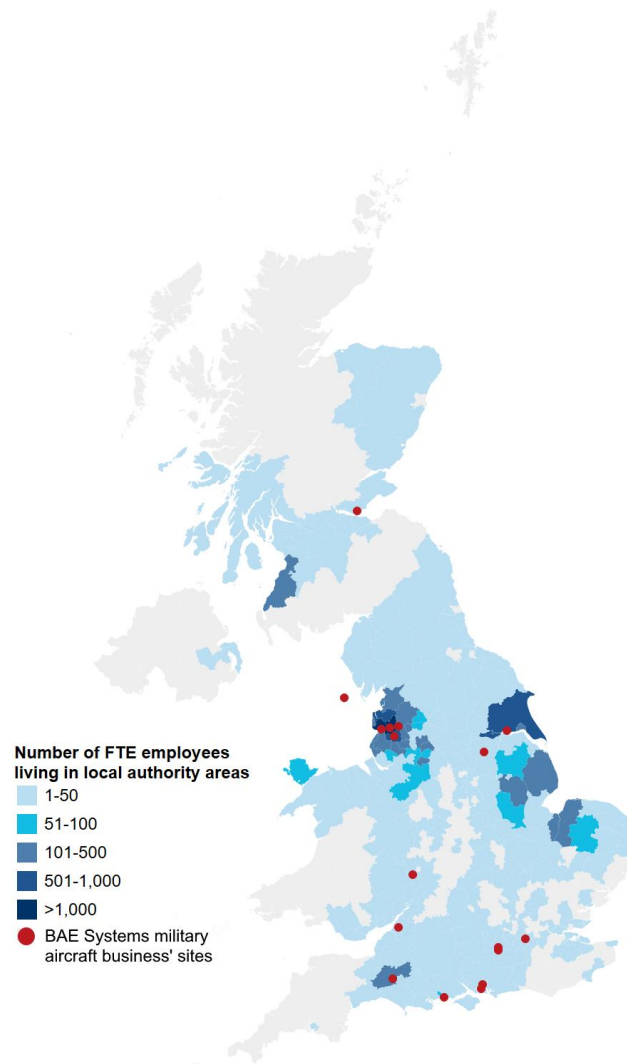
The BAE Systems military aircraft business' employment multiplier

For every 100 FTE jobs at the business itself, a total of 400 are supported across the UK as a whole.

a headcount basis). This represents over one-third of BAE Systems' total UK employment.

The great majority of the business' employees live in the areas surrounding its sites, with the largest concentrations in the North West, (9,100 FTE staff members), followed by a further 1,100 FTE employees residing in Yorkshire and The Humber. Among the local authority districts with the greatest concentration of military aircraft workers is Fylde, Lancashire, where some 1,700 FTE staff members live. A further 1,500 FTE employees live in Preston, 1,400 live in South Ribble, and 700 live in East Riding of Yorkshire (Fig. 3).

Fig. 3. Home location of the BAE Systems military aircraft business' employees, 2016



Source: Oxford Economics, BAE Systems

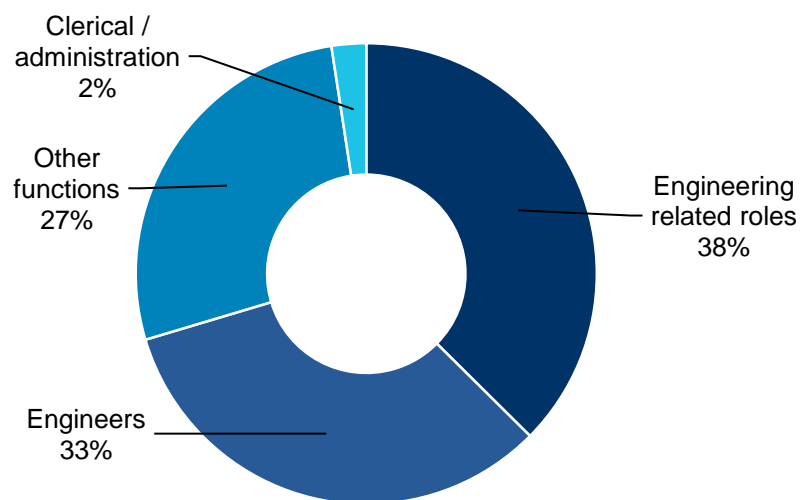
1.3 SKILLS BASE

The BAE Systems military aircraft business in the UK provides employment right across the skills spectrum, in roles ranging from engineers, to operational staff, to management (Fig. 4). The business' workforce is highly educated and

skilled, as demonstrated by the high proportion of employees in technical roles, most notably in engineering. In 2016, the Company's military aircraft business employed almost 8,700 FTE workers in engineering and engineering-related roles in the UK. A further 3,400 FTE employees worked in other functions, in roles that include project management, finance, and procurement.

The business' highly skilled workforce is fundamental to maintaining its role at the forefront of the defence aerospace sector. This not only benefits the Company itself, but also helps to expand and transfer the know-how of the UK defence aerospace industry worldwide. For this reason, maintaining the quality of the workforce is a priority for the BAE Systems military aircraft business, which invests substantially in its recruitment processes and training, as exemplified by its graduate and apprenticeship programmes. As of September 2017, the Company's military aircraft UK business had almost 600 apprentices in training, just over 100 graduates, and that year provided 25 summer internships.

Fig. 4. Share of employment in each job function at the BAE Systems military aircraft business in the UK, 2016



Source: BAE Systems

1.4 SUPPLY CHAIN CONTRIBUTION

To undertake its activities, the BAE Systems military aircraft UK business purchases many of the goods and services it needs in the domestic market. Through this, its procurement supports significant economic activity and employment across the UK.

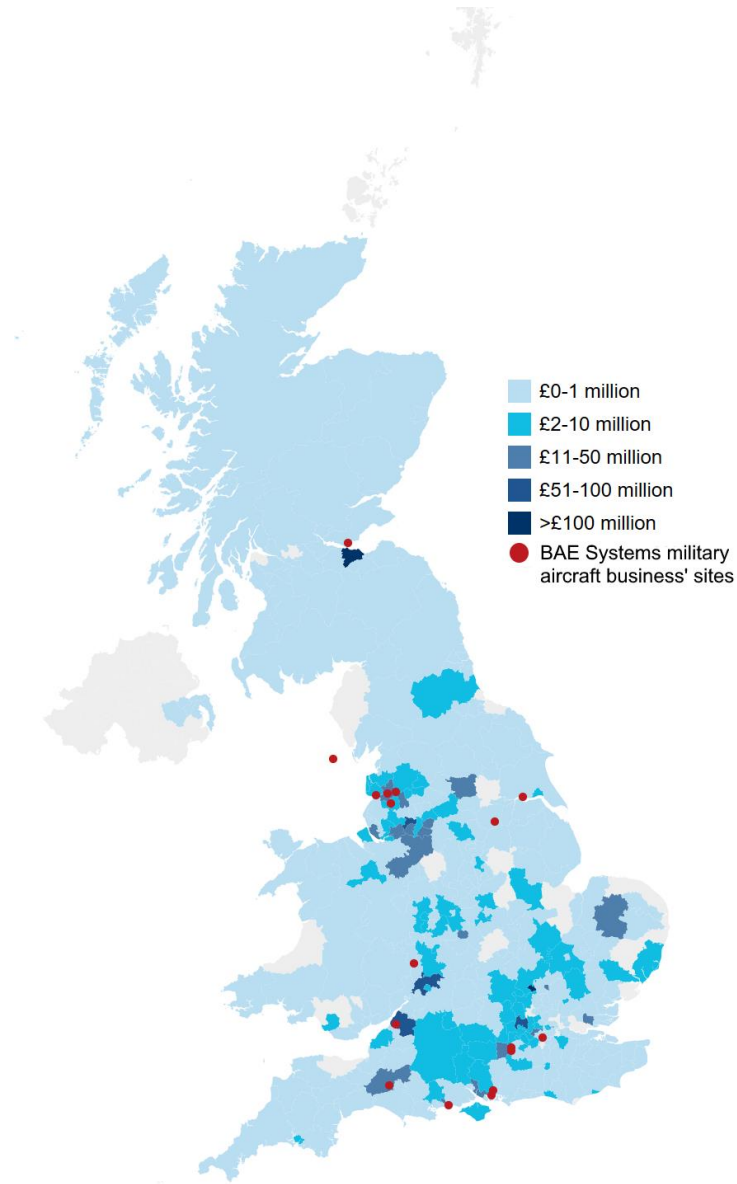
In 2016, the business spent almost £1.4 billion on inputs from some 3,000 suppliers in the UK, representing 73 percent of its total procurement. Of this total, suppliers located in the East of England and the North West received about £300 million respectively, followed by suppliers in the South West and the South East, which received just over £200 million of the business' procurement respectively. In particular, suppliers located in Luton, Edinburgh, South Gloucestershire and Salford emerged as the primary beneficiaries of the military aircraft business' supply chain spending in 2016 (Fig. 5).

£1.4 bn

Expenditure by the BAE Systems military aircraft business in the UK with its UK suppliers in 2016

This is 73 percent of its total procurement.

Fig. 5. The BAE Systems military aircraft business' procurement spending by local authority district, 2016



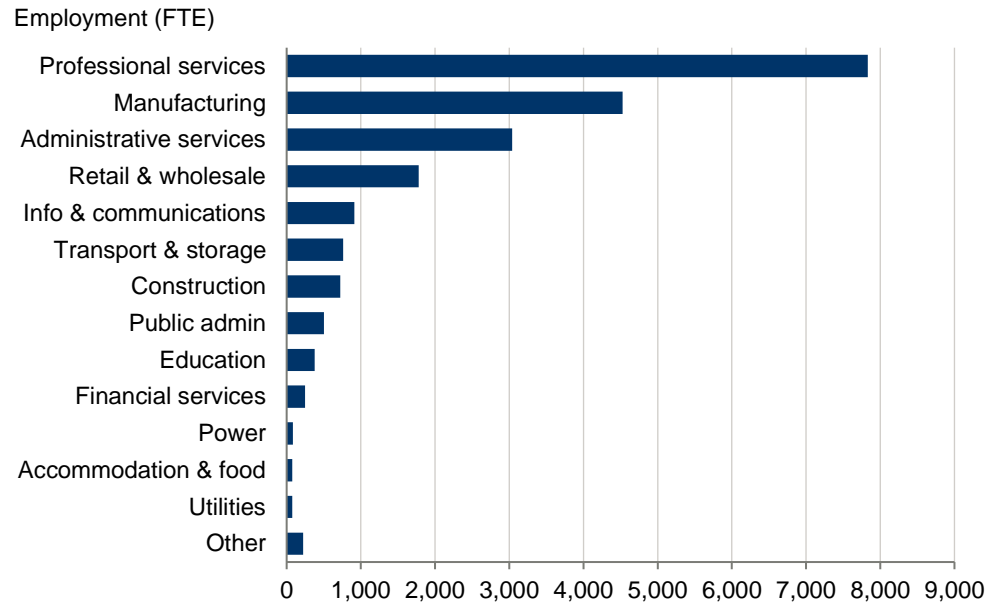
Source: Oxford Economics, BAE Systems

The BAE Systems military aircraft UK business buys goods and services from UK suppliers across a wide range of industries. In 2016, it spent £500 million on engineering and technical business services with UK suppliers and over £300 million on machinery and equipment. The business' £1.4 billion annual spend on goods and services from domestic suppliers is estimated to have supported 21,200 people in FTE employment in the UK.⁵ As expected, given the composition of the domestic procurement spend, the industries displaying

⁵ The indirect and induced employment figures have been calculated using up-to-date output per worker ratios for 2016, based on revised output and employment data by industry released by the ONS.

the largest employment contributions were professional services and manufacturing, as well as administrative services (Fig. 6).

Fig. 6. Indirect employment contribution by industry, 2016



Source: Oxford Economics

1.5 CONSUMER SPEND CONTRIBUTION

Both the BAE Systems military aircraft UK business and its UK suppliers pay wages to their staff, and a proportion of this income is subsequently used by employees to purchase food, clothing and a wide range of goods and services from UK businesses. The economic activity that this spending generates constitutes the ‘induced’ impact of the Company’s military aircraft business on the UK economy.

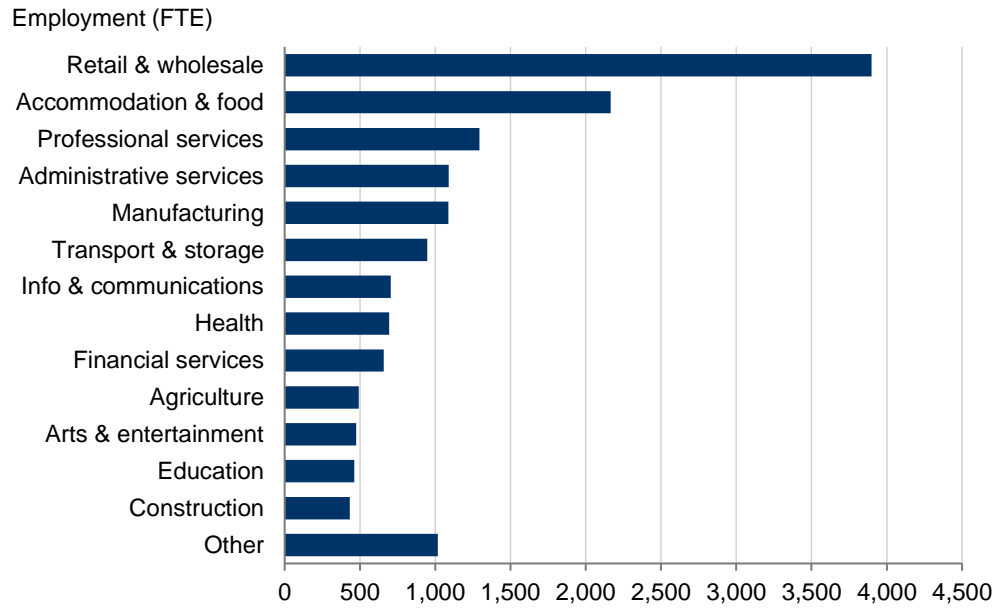
In 2016, the business paid £500 million in gross salaries to its 12,300 FTE employees in the UK. The average gross wage for military aircraft UK staff in 2016 was £41,200. This was 20 percent above the average for UK workers (at £34,400 in 2016).

In addition to this, as described in Section 1.4, the BAE Systems military aircraft business’ procurement supports 21,200 people in jobs at suppliers in the UK. These people are estimated to receive a further £500 million in wages, based on the industrial sectors in which they work.

Staff at the Company’s military aircraft UK business and in its supply chain spend a proportion of their wages in UK retail and leisure outlets, helping to sustain domestic businesses. Their expenditure is estimated to support 15,400 FTE jobs in the UK, many of these in the retail and hospitality sector (Fig. 7).⁶

⁶ The indirect and induced employment figures have been calculated using up-to-date output per worker ratios for 2016, based on revised output and employment data by industry released by the ONS.

Fig. 7. Induced employment contribution by industry, 2016



As of September 2017, the BAE Systems military aircraft business had almost 600 apprentices in training in the UK.

2. GDP CONTRIBUTION AND PRODUCTIVITY

£3.2 bn

Total contribution to GDP supported by the BAE Systems military aircraft business in the UK in 2016

£0.9 billion directly generated, £1.2 billion supported through the supply chain, and £1.1 billion through consumer spending.

This chapter outlines the BAE Systems military aircraft business' contribution to UK GDP during 2016. In doing so, we review the different channels of economic impact and examine the business' labour productivity. All monetary figures presented reflect prices during the 2016 period.

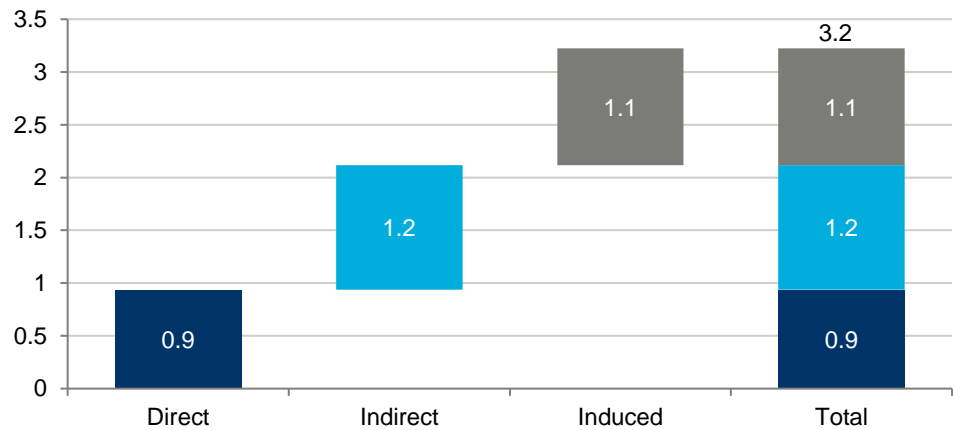
2.1 TOTAL GDP CONTRIBUTION

As well as supporting employment, the BAE Systems military aircraft UK business also contributes substantially to the country's economic activity, conventionally measured in terms of Gross Domestic Product (GDP). In total, the business contributed £3.2 billion to UK GDP in 2016, or 0.2 percent of all economic output in the country. As with employment, this total contribution represents the sum of three types of impact—direct, indirect, and induced, as illustrated in 0.

Of this combined total, the business itself contributed £0.9 billion gross value added to national GDP, whilst the remaining £2.3 billion was supported through its supply chain and consumer spending multiplier effects.

Fig. 8. The BAE Systems military aircraft business' contribution to UK GDP, 2016

Gross value added (£bn)



Source: Oxford Economics

Our modelling indicates that the BAE Systems military aircraft business in the UK had a gross value added multiplier of 3.4, so for every £1 of economic activity it produced in the UK, it supported a total of £3.40 in the domestic economy.

3.4

The BAE Systems military aircraft business' gross value added multiplier

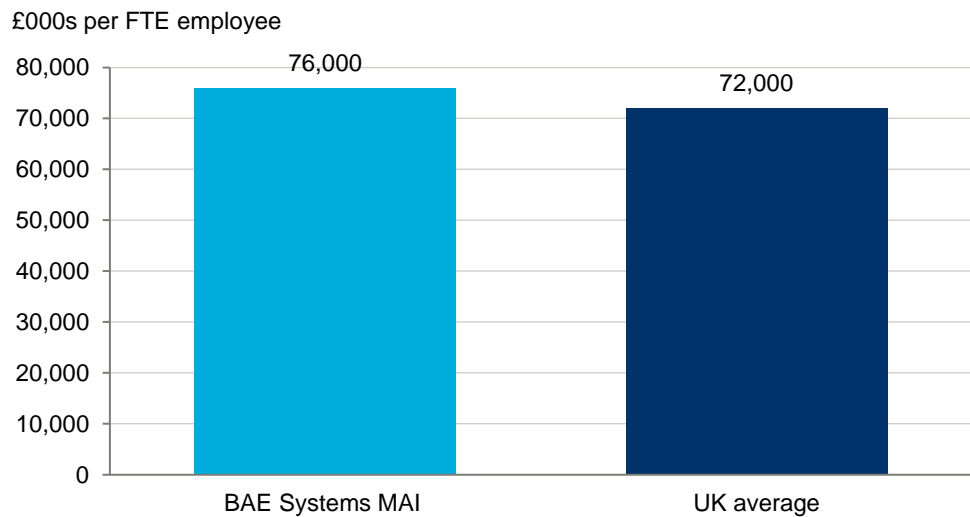
For every £1 of economic activity generated by the business itself, a total of £3.40 is supported in the economy as a whole.

2.2 DIRECT GDP CONTRIBUTION

In 2016, the BAE Systems military aircraft business earned £2.8 billion in income in the UK, equivalent to 29 percent of the total for BAE Systems in the UK. Of this income, the business spent about £1.4 billion on goods and services procured from UK suppliers and a further £0.5 billion from suppliers located overseas. Based on this information, we estimate that the business made a £0.9 billion direct gross value added contribution to GDP.⁷

Our analysis shows that the labour productivity of the BAE Systems military aircraft workforce—as measured by value added directly contributed to the UK economy per full-time equivalent employee—was £76,000 in 2016. This is six percent higher than the UK average of £72,000 (Fig. 9).

Fig. 9. Labour productivity of the BAE Systems military aircraft business in the UK in context, 2016



Source: Oxford Economics

In addition to the output the Company's military aircraft business produced, it also made a significant contribution to R&D spending, with some 45 percent of BAE Systems' UK R&D expenditure allocated to its military aircraft business.

£1.2 bn

GDP contribution supported by the BAE Systems military aircraft business in the UK via its supply chain

This expenditure sustains economic activity and supports jobs in the wider economy.

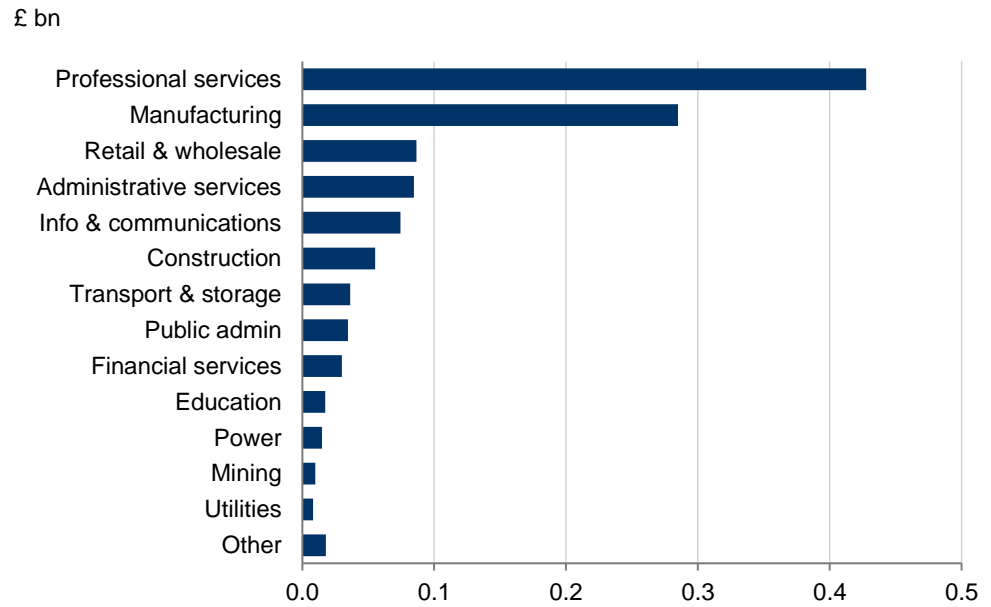
2.3 SUPPLY CHAIN CONTRIBUTION

As with the effects on employment, the BAE Systems military aircraft business' expenditure on goods and services feeds through to numerous business activities in its supply chain, sustaining economic activity and jobs in the wider UK economy. During 2016, the business purchased £1.4 billion worth of goods and services from almost 3,000 suppliers in the UK. Of these UK purchases, 43 percent came from manufacturing firms, and 40 percent came from firms in the professional services sector, mainly firms involved in engineering related activities. This expenditure is estimated to support an indirect GDP contribution of £1.2 billion.

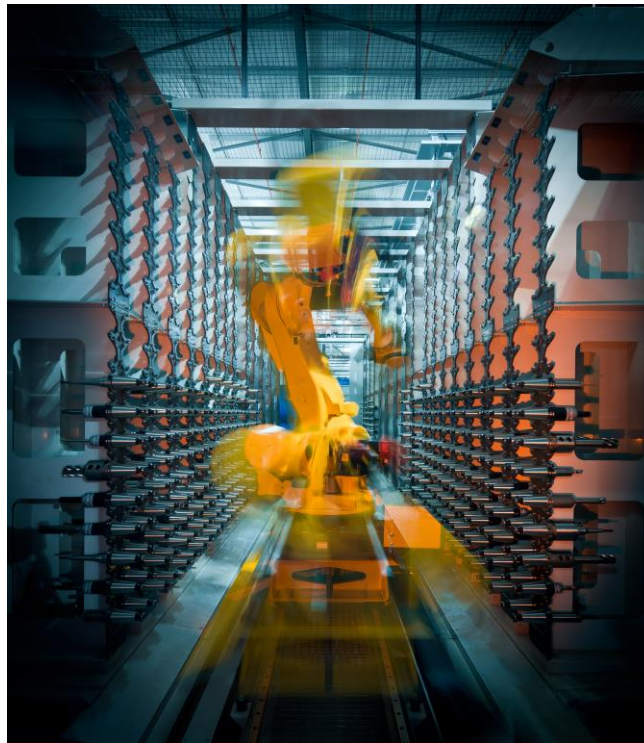
⁷ The business' gross value added contribution to the UK was measured using the 'production approach', which is the difference between revenues and the costs of inputs from domestic and foreign suppliers.

Via its supply chain, the military aircraft business' contribution to GDP boosted a range of sectors across the UK economy: over a third (or £0.4 billion) of the GDP contribution from the business' domestic procurement accrued to the professional services sector, mainly engineering services as expected (Fig. 10). In addition, nearly one-quarter of the indirect GDP impact accrued within UK manufacturing firms (almost £0.3 billion).

Fig. 10. Indirect GDP contribution by industry, 2016



Source: Oxford Economics

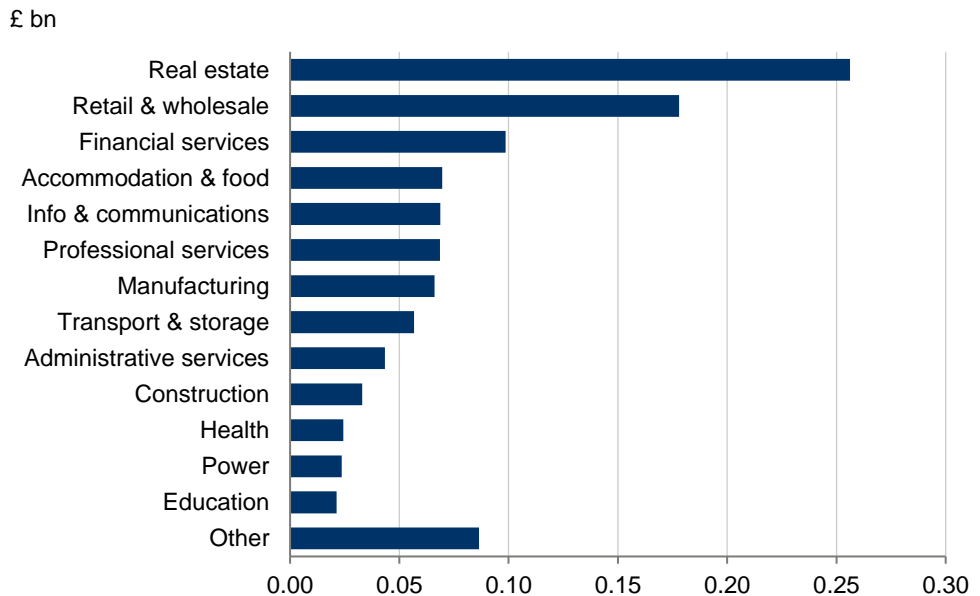


Advanced manufacturing at BAE Systems' facility in Samlesbury, Lancashire. Photograph: Ray Troll

2.4 CONSUMER SPEND CONTRIBUTION

In addition to the direct and indirect (supply chain) GDP contribution, a further economic stimulus is created when the BAE Systems military aircraft UK business and the firms in its direct supply chain pay their staff wages, which are then spent in the domestic economy. This expenditure supported a further £1.1 billion contribution to UK GDP in 2016. Activity sustained as workers spend their wages primarily supports consumer-facing industries such as real estate and retail. Fig. 11 illustrates how the £1.1 billion GDP contribution supported by the consumer spending of workers at the BAE Systems military aircraft business and in its supply chain was spread around the UK economy, assuming they spend their disposable income in line with typical spending patterns. As such, the real estate sector was a notable beneficiary of this expenditure (accounting for £0.3 billion of the induced GDP contribution), as was the retail sector (£0.2 billion).

Fig. 11. Induced GDP contribution by industry, 2016



Source: Oxford Economics

£1.1 bn

Contribution to UK GDP in 2016 via consumer spending

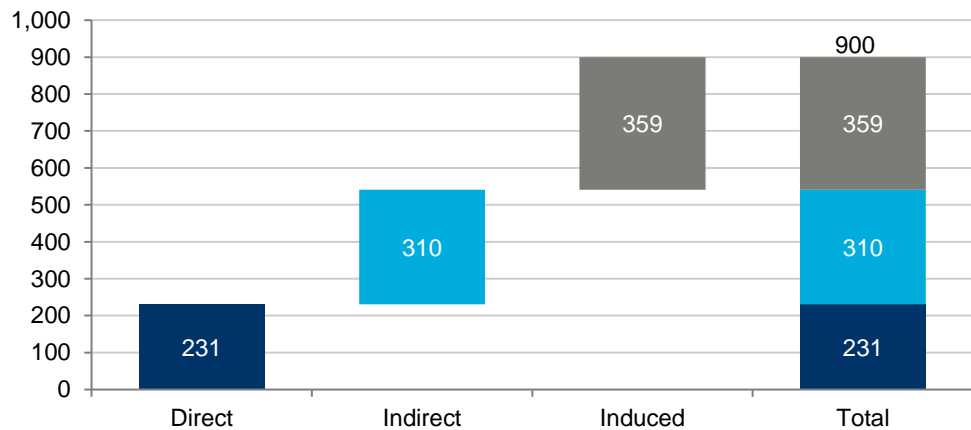
This impact is generated as staff of the BAE Systems military aircraft business and its direct suppliers spend their wages.

3. TAX CONTRIBUTION

The economic activity and employment contributions outlined above bring with them tax revenues, which are used, in turn, to finance essential public services. In total the BAE Systems military aircraft business supported a total tax contribution of £900 million to the UK Exchequer in 2016. To give a sense of scale, this amount would cover the estimated 2016-17 Departmental Resource Budget of the Cabinet Office and the Department for International Trade.

Fig. 12. The business' total tax contribution in the UK, 2016

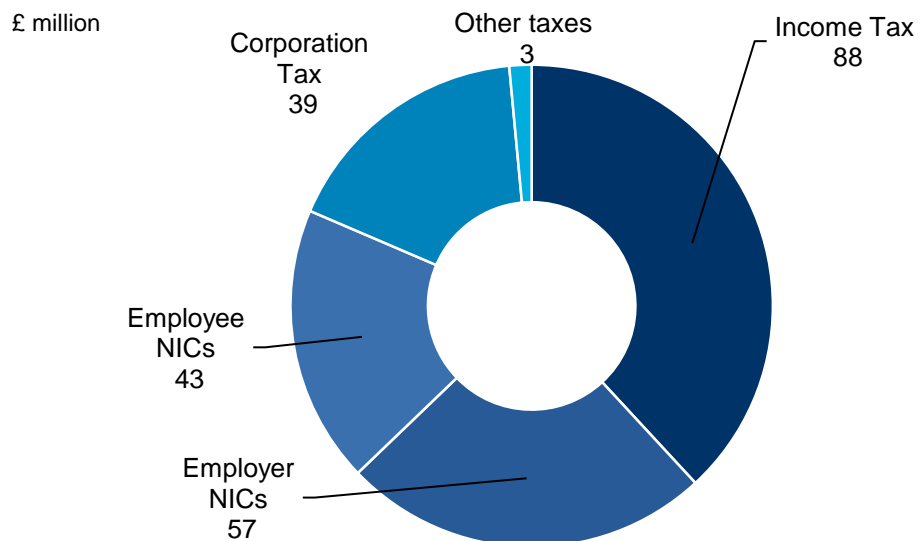
Tax contribution (£m)



Source: Oxford Economics

A total of £231 million in taxes was paid through the activities of the business itself in 2016. Of this amount, employer and employee National Insurance contributions accounted for £100 million, or 43 percent of the business' direct tax contribution (Fig. 13). In addition to this, employees' income tax generated a further £88 million (or 38 percent of the total) and payments of corporation tax accounted for £39 million (or 17 percent of the total).

Fig. 13. The business' direct tax contribution by type, 2016



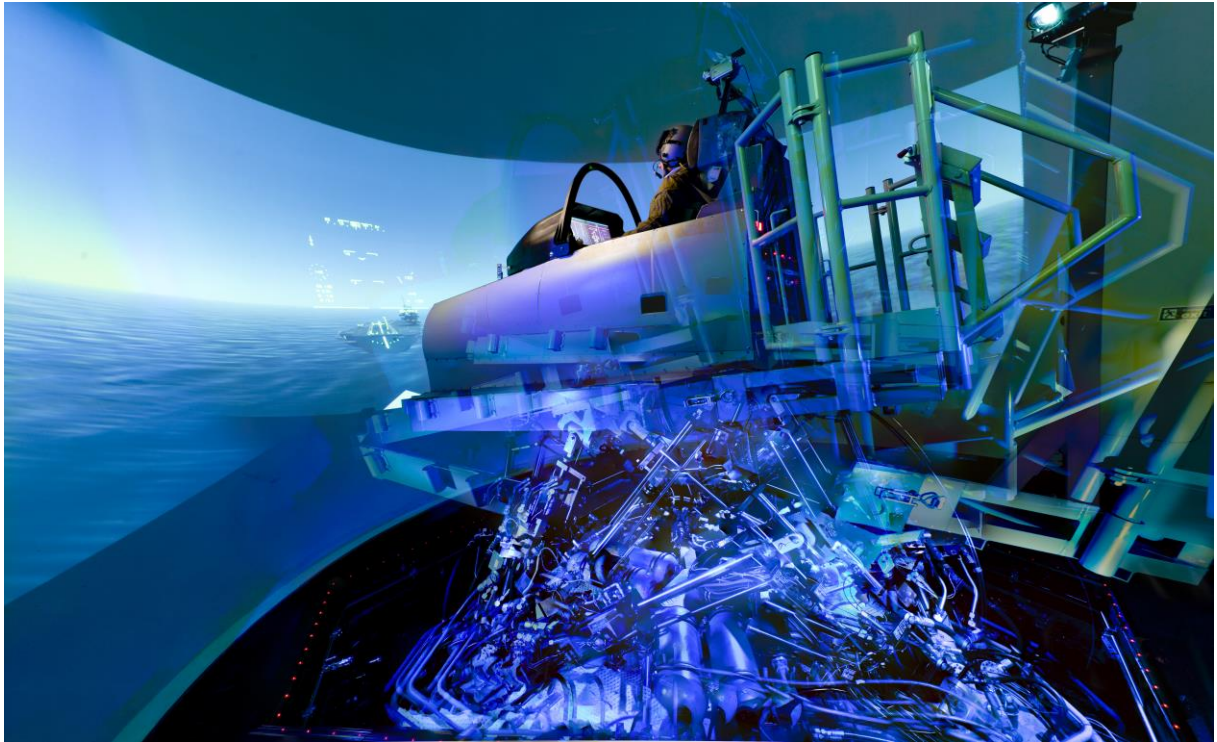
Source: BAE Systems, Oxford Economics

£0.9 bn

Total tax contribution supported by the BAE Systems military aircraft business in the UK in 2016

Tax contributions generated by the business' direct activities account for £231 million of this figure.

On top of the tax contributions made through the direct activities of the military aircraft business itself, further tax revenues were generated through the supply chain social security payments, income tax, corporate income tax and further taxes on production and products, including Insurance Premium Tax. A total of £310 million is attributed to the indirect effect, with a further £359 million in the induced effect. The total tax footprint of the BAE Systems military aircraft business in the UK, therefore, stood at £900 million. For every £1.0 million paid directly by the business and its workers in taxes, a further £2.9 million was generated for the Treasury across the rest of the UK economy.



Simulators are used to support engineering design as well as train pilots.

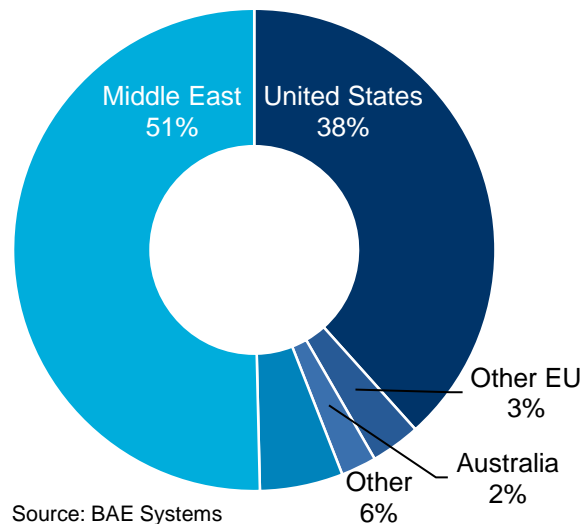
4. EXPORTS

In 2016, the BAE Systems military aircraft business' earnings from sales abroad totalled £1.3 billion, which is 47 percent of its turnover. The total value of military aircraft exports means that the business contributed about 0.2 percent of all UK exports of goods and services in 2016.

The majority of its export sales went to two market areas: the Middle East and the US (Fig. 14). The figure for the Middle East includes the sales of Typhoons to Saudi Arabia and Hawk trainer aircraft to Oman. The BAE Systems military aircraft business in the UK exported £497 million of goods to the US in 2016, including components for the F-35 Programme.⁸

Fig. 14. The BAE Systems military aircraft business' export revenue breakdown by origin, 2016

Percent of total exports



The business imported £0.5 billion worth of goods and services in 2016, meaning that it made a net positive contribution to the UK balance of payments of around £0.8 billion.

⁸ This is separate to the significant sales made by BAE Systems, Inc., the Company's US subsidiary and a top-ten supplier to the Pentagon.

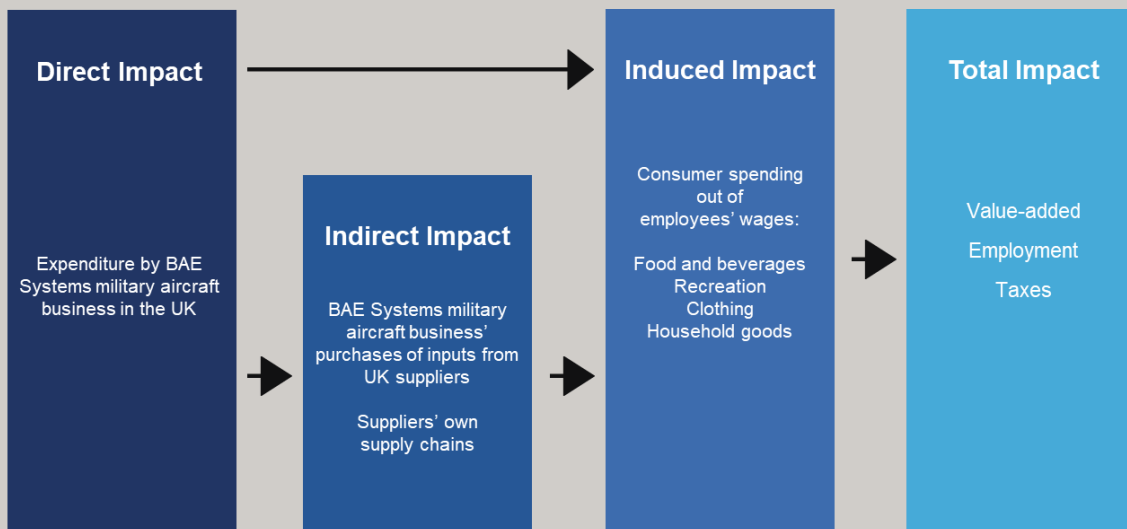
5. APPENDIX

ECONOMIC IMPACT MODELLING

Economic impact modelling is a standard tool used to quantify the economic contribution of an investment or a company. Impact analysis traces the economic contribution of an investment through three separate channels:

- **Direct impact**—refers to activity conducted directly by the BAE Systems military aircraft business in the UK.
- **Indirect impact**—consists of activity that is supported as a result of the procurement of goods and services by the Company's military aircraft business in the UK, purchases by those companies in turn and so on.
- **Induced impact**—reflects activity supported by the spending of wage income by direct and indirect employees.

Fig. 15. Direct, indirect and total economic impacts



Direct impacts

The direct value added of the BAE Systems military aircraft business in the UK is calculated as revenues minus the cost of goods bought in. Value added per employee, a measure of productivity, is a figure derived from dividing direct value added by the number of FTE employees.

Indirect and induced impacts

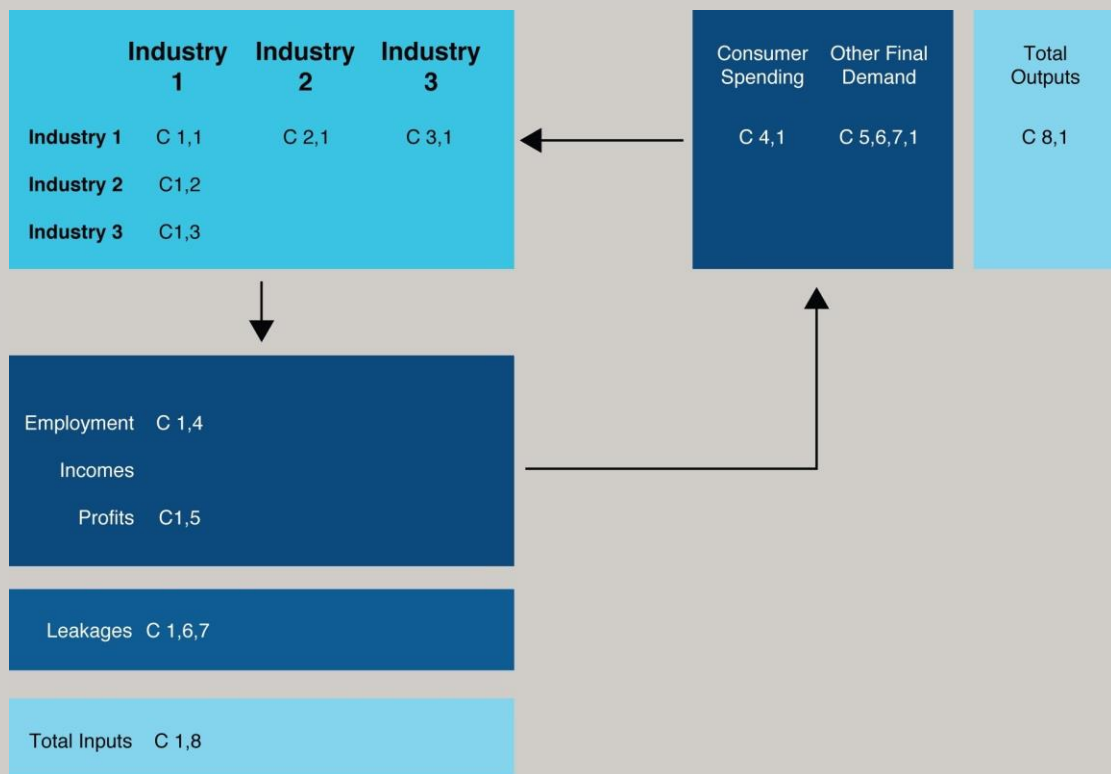
Indirect and induced impacts are estimated using an input-output model. An input-output model gives a snapshot of an economy at any point in time. The model shows the major spending flows from "final demand" (i.e. consumer spending, government spending, investment and exports to the rest of the world); intermediate spending patterns (i.e. what each sector buys from every other sector—the supply chain in other words); how much of that spending stays within the economy; and the distribution of income between employment and other forms such as corporate profits. As these models measure activity within an economy,

the direct impact figures will often not match Company annual accounts, which follow accounting standards and rules.

An input-output model uses a matrix representation of a nation’s interconnected economy to calculate the effect of changes by consumers, by an industry, or by others, on other industries and therefore on the economy as a whole. These input-output tables ultimately measure “multiplier effects” of an industry by tracing the effects of its inter-industry transactions—that is the value of goods and services that are needed (inputs) to produce each dollar of output for the individual sector being studied. These models can be used to measure the relationship between an economic change or “shock,” and the final outcome across the whole of the economy.

In essence an input-output model is a table which shows who buys what from whom in the economy. Fig. 16 provides an illustrative guide to a stylized input-output model.

Fig. 16. A stylised input-output model



Oxford Economics used the input-output table for the United Kingdom for 2010, provided by the ONS, for this analysis. This was the most recent input-output table for the United Kingdom at the time the models used in our 2017 study were developed.

Direct, indirect and induced employment figures in this report have been rounded to the nearest 100 FTE jobs. The employment and GDP multipliers quoted in the report represent the multiple of direct impacts that account for total impacts. For instance, if 20 FTE jobs were direct impacts and the total impact multiplier was 2, then the total impact would be 40 FTE jobs. These multipliers are calculated from the input-output model results.



Industry breakdowns

The UK 2010 input-output table is divided into 105 different industry sectors, and the table shows how each sector interacts with the 104 other sectors. For purposes of illustration to show value added and employment supported across different sectors, the 105 different industries have been pooled into 20 broad industry categories. For example, the professional services industry amalgamates the following sectors:

- Legal services
- Accounting, bookkeeping and auditing services; tax consulting services
- Services of head offices; management consulting services
- Architectural and engineering services; technical testing and analysis services
- Scientific research and development services
- Advertising and market research services
- Other professional, scientific and technical services
- Veterinary services



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