Office for National Statistics

Article

Trade and productivity in British firms: 2005 to 2022

Analysis on the link between international trade and productivity for British businesses, covering both goods and services trade, using administrative trade data from HM Revenue and Customs and our Annual Business Survey. These are official statistics in development.

Contact:
Economic Microdata Transformation team
productivity@ons.gov.uk
+44 300 068 2612

Release date:
14 August 2025

Next release:
To be announced

Table of contents

1 . Main points

- Firms that engaged in international trade between 2011 and 2022 were 35.4% more productive than firms that did not, in terms of output per worker (after controlling for firm size, foreign ownership, firm age, region, and industry by year differences in productivity).
- Exporters of goods and/or services between 2011 and 2022 were 28.5% more productive than non-exporters (after controlling for observable characteristics).
- Firms experienced a 6.7% increase in productivity when they engaged in any form of international trade (controlling for firm fixed effects); this represents the average within-firm change in productivity associated with transitioning between trading and non-trading (after controlling for observable characteristics).
- For a sub-set of firms that we can track from birth between 2005 and 2022, we find that goods exporters, before their first export, were around 59.0% more productive than comparable firms who will never export (after controlling for observable characteristics).
- However, even among goods exporters we can track from birth between 2005 and 2022, we find that firms exhibited a relative 11.8% gain in productivity in the first year following their first goods export (after controlling for observable characteristics).

2 . International trade and productivity

In this article, and its accompanying research paper, we present new analysis of the size of the trade-productivity premium within British firms for both trade in goods and services. The premium captures how much more productive firms are that trade compared with those firms that do not trade. We also begin to explore the causal link between international trade and productivity for goods exporters born after 2005 using administrative data.

Our research explores the relationship between international trade and productivity. Estimates of labour productivity in other countries have found exporters to be anywhere between 20% to 40% more productive than non-exporting counterparts, as discussed in the Department for Business and Trade's report The relationship between trade and productivity: a feasibility study (PDF, 15.1MB). In their 2018 paper UK trade in goods and productivity: New findings (PDF, 2.2MB), Wales and others similarly find that goods exporters were 21% more productive than businesses that did not export between 2005 and 2016, after controlling for firm characteristics.

What drives this difference in productivity across traders and non-traders? Is it that trade makes firms more productive or is it that highly productive firms self-select into international trade?

Improvements to productivity may come directly from a firm's exposure to international markets. For example, international markets can open firms up to greater choice of suppliers, allowing them to source cheaper or better intermediate inputs, as discussed by Kasahara and Rodrigue in their paper Does the use of imported intermediates increase productivity? Plant-level evidence (full article behind a paywall). Trade can also expose firms to new ideas through international supply chain relationships, allowing them to improve their production processes, as discussed in Crespi and others' paper Productivity, exporting and the Learning-by-Exporting Hypothesis: Direct Evidence from UK Firms (PDF, 0.2MB).

Observed differences in productivity between international traders and non-traders may also be explained by high productivity firms self-selecting into export and import activities, as suggested by Arnold and Hussinger in their paper Export Behavior and Firm Productivity in German Manufacturing: A Firm-Level Analysis. This could be for several reasons, such as their ability to seek out international opportunities or their ability to better overcome barriers to trade.

3 . The productivity premium of trading internationally

Firms in Great Britain that traded by exporting or importing goods and/or services were on average 41.6% more productive than firms that did not trade between 2011 and 2022, in terms of approximate gross value added (aGVA) per worker, according to our Annual Business Survey (ABS). This "productivity premium" was equivalent to £18,730 per worker in 2022. Data on un-adjusted productivity premiums and other descriptive statistics on the characteristics of traders can be found in the accompanying dataset.

We can only conduct analysis using ABS data covering both goods and services trade from 2011. This is when questions on goods exports and imports were introduced to the ABS. As questions on services were introduced before this, combining ABS data with administrative data from HM Revenue and Customs (HMRC) on trade in goods (TiG) allows us to obtain data on both goods and services trade going back to 2005.

The difference in productivity between firms doing any international trade and non-trading firms was 58.4% between 2005 and 2022. This estimate uses HMRC TiG data to identify whether a firm is trading goods. HMRC TiG data is affected by upward bias, compared with ABS estimates. This is because of the thresholds for reporting trade in goods with the EU to HMRC up until 2021. For more information, please see the full Economic Statistics Centre of Excellence (ESCoE) Trade and productivity in British firms: 2005 to 2022 report (PDF, 2.6MB).

Part of the productivity gap between firms that trade internationally and firms that do not, when estimated as averages, can be explained by observable firm characteristics. Table 1 shows that firms that export or import goods or services were 35.4% to 47.0% more productive than firms that do not trade in the ABS and combined ABS/HMRC TiG data, respectively (when controlling for observable characteristics of firm size, foreign ownership, firm age, region, and industry by year differences in productivity).

Table 1: Productivity premium of international traders, controlling for observable firm characteristics

	(1)	(2)
	Log of labour productivity	
	ABS (2011 to 2022)	ABS/HMRC TiG (2005 to 2022)
Participating in any trade	0.354***	0.470***
	(0.0360)	(0.0411)
Observations	385,593	662,863
R-squared	0.138	0.129

Source: Annual Business Survey (ABS) from the Office for National Statistics and Trade in goods (TiG) data from HM Revenue and Customs (HMRC)

Notes

1. The table presents the coefficient of a dummy equal to one if a firm participates in any form of trade regressed against approximate gross value added (aGVA) per worker while controlling for employment foreign ownership, age, region, and industry by year differences in productivity.

2. The regressions are weighted by survey sample weights.

3. Standard errors are clustered at industry division level.

4. Asterisks correspond to statistical significance p-values. *** denotes p less than 0.01, ** denotes p less than 0.05, * denotes p less than 0.1.

5. Coefficients have been log transformed so that they can be interpreted in percentage terms.

6. The coefficients in columns marked as "ABS" are taken from a regression where goods and services trade status are taken from the ABS. In columns marked as "ABS/HMRC TiG", services trade status is taken from the ABS and goods trade status is derived from HMRC TiG data.

Over time, we find that the productivity premium of being an international trader is consistently positive and of similar magnitude across our window of analysis.

Using ABS data from 2011 to 2022, we find that firms exporting goods and/or services were 28.5% more productive than non-exporters. Similarly, importers were 21.2% more productive than non-importers (after controlling for firm size, foreign ownership, firm age, region, and industry by year differences in productivity).

Using combined ABS/HMRC TiG data from 2005 to 2022, exporters were 33.5% more productive than non-exporters, while importers were 31.0% more productive than non-importers.

Figure 1 plots coefficients from the same model presented in Table 1, but with exporters and importers categories separated and estimated individually for each year. The coefficients reflect the productivity premium, in percentage terms, of being an exporter/importer relative to a non-exporter/importer, within a given year (when controlling for firm size, foreign ownership, firm age, region, and industry). The stability of the premia attached to both exporters and importers over this period shows that the productivity premium is a characteristic of our business population, rather than an effect that is changing through time.

Figure 1: Productivity premium of being an exporter or importer is stable through time

Exporter and importer productivity premium by year, Great Britain, 2005 to 2022

Notes:

1. The productivity premia in figure 1 are the coefficients from a regression where exporter and importer dummies are regressed against approximate gross value added (aGVA) per worker, while controlling for employment, foreign ownership, age, region, and industry differences in productivity.

2. The regressions are weighted by survey sample weights.

3. Standard errors are clustered at industry division level.

4. Coefficients have been log transformed so that they can be interpreted in percentage terms.

5. The coefficients in columns marked as "ABS" are taken from a regression where goods and services trade status are taken from the ABS. In columns marked as "ABS/HMRC TiG", services trade status is taken from the ABS and goods trade status is derived from HMRC TiG data.

Download the data

Table 2 shows that the productivity premium is higher for firms that both export and import. Controlling for firm characteristics, firms that are both importers and exporters are 55.9% more productive than firms that do not trade according to the ABS (72.1% using the ABS and goods trade status from the HMRC TiG dataset between 2005 and 2022). The respective premium for firms that export only is 28.1% (36.2%) and the premium for firms that import only is 20.8% (34.4%) relative to firms that do not trade.

Table 2: Productivity premium by combined export-import status, controlling for observable firm characteristics

	(1)	**(2)**
	Log of labour productivity	
	ABS (2011 to 2022)	**ABS/HMRC TiG (2005 to 2022)**
Importer Only	0.208***	0.344***
	(0.0356)	(0.0452)
Exporter Only	0.281***	0.362***
	(0.0359)	(0.0383)
Importer & Exporter	0.559***	0.721***
	(0.0528)	(0.0565)
Observations	385,593	662,863
R-squared	0.139	0.130

Source: Annual Business Survey (ABS) from the Office for National Statistics and Trade in goods (TiG) data from HM Revenue and Customs (HMRC)

Notes

1. The table presents the coefficient of a trade status dummy classifying the combination of export and import activities a firm can engage in regressed against approximate gross value added (aGVA) per worker while controlling for employment foreign ownership, age, region, and industry by year differences in productivity.
2. The regressions are weighted by survey sample weights.
3. Standard errors are clustered at industry division level.
4. Asterisks correspond to statistical significance p-values. *** denotes p less than 0.01, ** denotes p less than 0.05, * denotes p less than 0.1.
5. Coefficients have been log transformed so that they can be interpreted in percentage terms.
6. The coefficients in columns marked as "ABS" are taken from a regression where goods and services trade status are taken from the ABS. In columns marked as "ABS/HMRC TiG", services trade status is taken from the ABS and goods trade status is derived from HMRC TiG data.

We also explore this productivity premium across the types of goods and/or services that firms trade. Table 3 separates the classification of a firm’s international trade status into the combinations of goods and/or services they export or import.

The productivity premium associated with exporting both goods and services is no higher than the premium associated with exporting only services or only goods, after controlling for observable characteristics. We found some evidence that firms importing both goods and services are more productive than other types of importers.

Table 3: Productivity premium by import/export type, controlling for observable firm characteristics

	(1)	(2)
	Log of labour productivity	
	ABS (2011 to 2022)	ABS/HMRC TiG (2005 to 2022)
Goods Exporter Only	0. 245***	0.416***
	(0.0226)	(0.0361)
Service Exporter Only	0.319***	0.300***
	(0.0405)	(0.0343)
Both Goods & Services Exporter	0.246***	0.495***
	(0.0363)	(0.0294)
Goods Importer Only	0.239***	0.432***
	(0.0372)	(0.0239)
Service Importer Only	0.135*	0.142**
	(0.0703)	(0.0541)
Both Goods & Services Importer	0.354***	0.579***
	(0.0356)	(0.0293)
Observations	385,593	662,863
R-squared	0.139	0.132

Source: Annual Business Survey (ABS) from the Office for National Statistics and Trade in goods (TiG) data from HM Revenue and Customs (HMRC)

Notes

1. The table presents coefficients attached to dummies contained in two categorical variables classifying export and import types which have been regressed against approximate gross value added (aGVA) per worker while controlling for employment foreign ownership, age, region, and industry by year differences in productivity.

2. The regressions are weighted by survey sample weights.

3. Standard errors are clustered at industry division level.

4. Asterisks correspond to statistical significance p-values. *** denotes p less than 0.01, ** denotes p less than 0.05, * denotes p less than 0.1.

5. Coefficients have been log transformed so that they can be interpreted in percentage terms.

6. The coefficients in columns marked as "ABS" are taken from a regression where goods and services trade status are taken from the ABS. In columns marked as "ABS/HMRC TiG", services trade status is taken from the ABS and goods trade status is derived from HMRC TiG data.

4 . Within-firm trade productivity premium

Estimates presented so far have only controlled for observed differences in firms' employment, foreign ownership, age, region, and industry. They do not however control for unobserved firm-specific characteristics not captured by these controls, such as management practices. This is of particular concern where these unobserved characteristics are correlated with both trade status and productivity.

To control for unobserved firm-specific differences, we use firm fixed effects. Firm- fixed effects will control for any time-invariant observable characteristics, such as industry, region or employment size band, but will also control for any other unchanging characteristics of the firm that cannot be directly observed. Table 4 therefore shows the average productivity "uplift" a given firm experiences when it switches from not trading to trading. This gives a within-firm productivity premium.

We estimate a within-firm productivity premium of doing any international trade of 6.7% between 2011 and 2022 using the Annual Business Survey (ABS) data, and 9.8% between 2005 and 2022 using ABS/HM Revenue and Customs (HMRC) Trade in Goods (TiG) data.

Separating the effect of exports and imports, we estimate a within-firm productivity premium of 3.7% and 5.5% for exports and imports, respectively, using ABS data. We estimate a larger within-firm productivity premium of 8.2% and 7.5% for exports and imports, respectively, when deriving goods trade status from HMRC TiG data.

Switching trade status does not always reflect a firm’s first engagement in international trade. This will sometimes reflect a firm starting to trade after a period of inactivity in international markets. We are also only able to estimate the within-firm productivity premium using firms that change trade status between the years we have data for.

Table 4: Within-firm productivity premium, using firm-level fixed effects

	(1)	(2)	(3)	(4)
	Log of labour productivity			
	ABS (2011-2022)	ABS/HMRC TiG (2005-2022)	ABS (2011-2022)	ABS/HMRC TiG (2005-2022)
Participating in any trade	0.067***	0.098***		
	(0.0138)	(0.0209)		
Exporter			0.037**	0.082***
			(0.0151)	(0.0194)
Importer			0.055***	0.075***
			(0.0133)	(0.0126)
Observations	216,868	369,911	216,868	369,911
R-squared	0.856	0.836	0.856	0.836

Source: Annual Business Survey (ABS) from the Office for National Statistics and Trade in goods (TiG) data from HM Revenue and Customs (HMRC)

Notes

1. The table presents coefficients attached to a dummy indicating any engagement in international trade (for regressions 1 and 2) and separately indicating any export or import activity (for regressions 3 and 4). In both instances these dummy variables are regressed against approximate gross value added (aGVA) per worker whilst controlling for employment

2. region and industry by year differences in productivity in addition to firm fixed effects.,The regressions are weighted by survey sample weights.,Standard errors are clustered at industry division level.,Asterisks correspond to statistical significance p-values. *** denotes p less than 0.01, ** denotes p less than 0.05, * denotes p less than 0.1.,Coefficients have been log transformed so that they can be interpreted in percentage terms.,The coefficients in columns marked as "ABS" are taken from a regression where goods and services trade status are taken from the ABS. In columns marked as "ABS/HMRC TiG", services trade status is taken from the ABS and goods trade status is derived from HMRC TiG data.

5 . Exploring the causal impact of exporting

Understanding the causal link between productivity and international trade is important when considering how trade policy might be used to influence economic growth.

We presented a within-firm trade productivity premium in Section 4: Within-firm trade productivity premium. Because of the different types of switching captured in these models, these estimates cannot be directly interpreted as the expected productivity boost that a firm experiences following their first engagement in international markets.

However, using administrative data on trade in goods (TiG) from HM Revenue and Customs (HMRC), for a subsample of firms born between 2005 and 2022, we can accurately determine the time at which a firm first exports goods. Combining this with information from the Annual Business Survey (ABS), for a further refined selection of firms, we can estimate changes in productivity around this event, relative to a control group.

Using a "differences-in-differences" (DiD) approach, we first estimate with a control group of firms that will not go on to export goods. This allows us to estimate how goods exporters, both before and after they start exporting, differ in productivity to comparable firms who will never export goods.

We estimate that future goods exporters, before their first export, are around 59.0% more productive than comparable firms who will never go on to export (after controlling for firm size, foreign ownership, firm age, region, and industry by year differences in productivity). This implies that high productivity firms are more likely to start exporting goods.

Figure 2: High productivity firms are more likely to export goods

Productivity premiums (%) of goods exporters vs comparable never exporting firms, Great Britain, 2005 to 2022

Notes:

1. The productivity premiums presented in Figure 2 represent the difference in productivity between a control of firms who will never export goods, compared with firms who will export goods, by the exporting firm's distance to their first goods export, while controlling for employment, foreign ownership, age, region, and industry by year differences in productivity.

2. Goods export status is solely derived from HMRC TiG data. This output does not consider service export activity.

3. Distance from first goods export is given in terms of (t) years. For example, (t+2) reflects a firm's third year exporting goods.

4. The underlying regressions are unweighted and cover only firms born after 2005.

5. Standard errors are clustered at industry division level.

Download the data

Downloac

We then estimate this DiD model with both the control and treatment group being goods exporters, but with the treatment group exporting within the estimated window, while the control group exporting at some later date but not within the window used for estimation.

Comparing these groups, we estimate that there is little difference in productivity among exporters before they start exporting goods. We do however see some productivity gains following a firm's first goods export.

We find that firms exhibited a relative 11.8% gain in labour productivity in the first year following their first goods export, compared with similar firms who have not yet started exporting. However, evidence of this initial gain being maintained over longer periods is weaker on average.

This suggests that while high productivity firms are more likely to start exporting goods, there are still productivity gains to be had following this first export.

Figure 3: Among goods exporters, firms still see productivity gains following their first export

Productivity premia (%) of goods exporters vs comparable exporters to be, Great Britain, 2005 to 2022

Notes:

1. The productivity premia presented in figure 3 gives the difference in productivity between a goods exporter that is (t) years from their first export and a control of similar firms who are pre-export, controlling for employment, foreign ownership, age, region, and industry by year differences in productivity.

2. Goods export status is solely derived from HMRC TiG data. This output does not consider service export activity.

3. Distance from first goods export is given in terms of (t) years. For example, (t+2) reflects a firms 3rd year exporting goods.

4. The underlying regressions are unweighted and cover only firms born after 2005.

5. Standard errors are clustered at industry division level.

Download the data

Downloac

We extended our DiD analysis to understand the extent to which productivity gains are observed across firms with different sized goods export operations. We separated out firms based on whether they mainly export above or below the median goods export value for their Standard Industrial Classification (SIC) division.

Firms exporting above the median for their industry saw higher relative productivity gains of 29.7% following their first goods export. This suggests that scale does matter and that not all small-scale export activities will result in productivity gains. Additionally, productivity gains for these relatively more intense exporters are maintained for longer periods following their initial entry to goods export markets.

Figure 4: Firms that exported more had greater productivity gains

Productivity premia (%) of goods exporters vs comparable exporters-to-be split by above and below median trade value, Great Britain, 2005 to 022

Notes:

1. Figure 4 represents the same model as discussed in figure 3 but estimated separately based on whether a firm, once they have started exporting, mainly exports above or below the median goods export value for their Standard Industrial Classification (SIC) division within a given year.

2. Goods export status is solely derived from HMRC TiG data. This output does not consider service export activity.

3. Distance from first goods export is given in terms of (t) years. For example, (t+2) reflects a firms 3rd year exporting goods.

4. The underlying regressions are unweighted and cover only firms born after 2005.

5. Standard errors are clustered at industry division level.

Download the data

Downloac

6 . Future developments

In this article, we show the value of combining firm-level microdata from administrative and survey sources. However, we are reliant on survey-based measures of productivity. This means our analysis is limited to the subsample of Annual Business Survey (ABS) respondents. For many firms, this means we cannot track their productivity regularly across periods. This limits our ability to implement econometric methods robustly across the full business population.

Greater adoption of productivity measures based on administrative data, for example using Value Added Tax (VAT) or Corporation Tax with Pay As You Earn (PAYE), would allow us to estimate a total factor productivity (TFP) measure for the entire population in the Inter-Departmental Business Register (IDBR). This would greatly increase the opportunities for research into the causal link between a firm's engagement in international trade and productivity.

Productivity growth is a central route for wage growth and, by extension, improvements in living standards. Future work relating to our forthcoming linked employer-employee dataset (LEED) will allow for more study into the impact of international trade on workers and their wages, as discussed in our National Statistical blog post Data linkage to shine new light on UK labour market.

7 . Data on trade and productivity

Trade and productivity in Great Britain, evidence from firm-level microdata: 2005 to 2022 Dataset | Released 26 March 2025 Summary statistics of labour productivity, trade value, trade intensity, number of firms participating in trade, and firm exit, provided by trade status and different firm characteristics. Uses HM Revenue and Customs (HMRC) trade in goods data linked to the Inter-Departmental Business Register (IDBR), the Annual Business Survey (ABS), International Trade in Services, and the Longitudinal Business Database. These are official statistics in development.

8 . Glossary

Approximate gross value added (aGVA)

The Annual Business Survey (ABS) provides information on turnover and intermediate purchases, which can be used to estimate businesses' approximate gross value added (aGVA). aGVA is a measure of the income generated by those surveyed, less their intermediate consumption of goods and services used up to produce their output.

Labour productivity

Labour productivity is calculated by dividing output by labour input. For this article, we measure output by aGVA and labour input by number of workers in the firm.

Log transformed coefficients:

Labour productivity in our models enters as the natural logarithm of aGVA per worker. We interpret the impact of the independent dummy variables on labour productivity as the exponent of the estimated coefficient minus one. For example, in table 1 using the ABS between 2011 and 2022, the original coefficient of participating in any trade on the natural logarithm of labour productivity is 0.303. The impact on labour productivity is therefore (0.303 - 1) 100 = 35.4%

9 . Data sources and quality

Annual Business Survey

The Annual Business Survey (ABS) is Great Britain's structural business survey. We conduct the ABS once a year, to collect important information about businesses' income, expenditure, capital assets, and trade behaviour, to feed into the UK's national accounts.

The survey samples approximately 62,000 firms. The ABS covers the non-financial business sector only, so our analysis does not include the financial sector, which makes up a large share of UK services trade. In our analysis, we also drop private sector firms in section O (Public administration and defence; compulsory social security), section P (Education), and section Q (Human health and social work activities).

We take ABS information on gross value added at the firm level and divide it by firm employment to create an estimate of labour productivity. We also use data from questions on international trade included in the ABS. For trade in services, firms are asked to provide an estimate of income from and expenditure on services from organisations based outside the UK. Questions on trade in goods were added to the ABS later in 2011 and require firms to report whether they exported or imported goods from abroad. This question does not ask for a value amount of goods traded.

The ABS includes firms with fewer than nine employees. We use this to identify exporting and importing by firms whose trade may fall under the reporting cutoffs in the linked trade in goods (TiG) Inter-Departmental Business Register (IDBR) dataset. However, firms with fewer than 250 employees may be sampled only a few times over the course of the 17 years in our sample and many may appear only once. This limits our ability to carry out longitudinal analysis and measure trade activity within the same firm over time.

HM Revenue and Customs trade in goods

We link HM Revenue and Customs (HMRC) trade in goods (TiG) data to the Inter-Departmental Business Register (IDBR) between 2005 and 2022. We do this to identify British firms that export or import goods and to measure the value and volume of goods traded from administrative sources. Our linked dataset forms an updated and extended dataset to the initial linked trade in goods (TiG) Inter-Departmental Business Register (IDBR) dataset in the Economic Statistics Centre of Excellence's UK trade in goods and productivity: New findings paper (PDF, 2.2MB).

This data is a comprehensive account of all trade, excluding low value trade (currently defined as trade with a value of less than £873) for firms trading goods with countries outside the EU. Before Brexit, data on trade in goods with EU countries were collected by the Intrastat survey, which sampled firms only above a certain threshold (roughly £250,000 for exports, and from £600,000 to £1.5 million for imports).

After 2021, all trade, including trade with the EU, is reported by customs declarations. However, goods traded with the EU through Northern Ireland is still reported using the Intrastat survey. To make sure the data used in our analysis are consistent over time, we exclude trade from firms that began exporting with the EU after 2021, but that would not have been sampled by Intrastat in previous years because they submitted declarations below the Intrastat threshold.

This means some smaller exporters and importers may be missed in outputs using HMRC TiG data. Firms above the threshold are likely to be larger and more productive. This means that the estimated trade premiums that draw goods export and goods import status from the HMRC TiG dataset are higher because of the threshold-induced upward bias.

10 . Related links

UK trade in goods and productivity: new findings
Article | Released 6 July 2018
Earlier research using HM Revenue and Customs' administrative trade data to analyse the link between productivity and goods trader status for British businesses.

Trade and productivity in British firms: 2005 to 2022
Report | Released 14 August 2025
Full report by Jones and Palmou exploring the link between international trade and productivity for British businesses, covering both goods and services trade, using administrative trade data from HM Revenue and Customs and our Annual Business Survey.

11 . Cite this article

Office for National Statistics (ONS), released 14 August 2025, ONS website, article, Trade and productivity in British firms: 2005 to 2022