UNIVERSITY OF CAMBRIDGE

Cambridge Industrial Innovation Policy

Insights from the United Kingdom

Understanding sectoral sources of aggregate productivity growth: a cross-country analysis

About this report

This report analyses sectoral sources of labour productivity growth in the United Kingdom during the 1998–2020 period. The overall project includes an overview report of eight economies, a summary report and eight economy-specific studies for China, France, Germany, the Republic of Korea, Taiwan, Singapore, the United Kingdom and the United States. Together, they seek to inform policies aimed at boosting productivity by improving the understanding of how sectors account for aggregate productivity gains and losses and how this differs across economies.

Contributors

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Design by Ella Whellams, IfM Engage, University of Cambridge. Cover image: Adobe Stock

Copy-editing by Amanda George, Perfect Words.

Acknowledgements

This report has been made possible by core funding from the Gatsby Charitable Foundation.

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Cambridge, United Kingdom | 2022

Insights from the United Kingdom

Key messages

How does the UK's productivity performance compare with that observed in other economies?

- The UK has the second-lowest labour productivity level, from the sample of economies studied. In 1998 aggregate productivity in the UK was similar to that observed in Germany and almost twice that in Korea. However, since the global financial crisis of 2008, productivity growth has slowed down significantly. The UK productivity was hit the hardest, and it has since struggled to recover its dynamism to a larger extent than any of the other economies included in this report, showing productivity growth rates below 1% in the post-crisis period.

Which sectors are the main sources of the UK's aggregate labour productivity growth?

- The sectors that contributed the most to the UK's aggregate productivity growth during the period of 1998–2019 include: professional, scientific and technical activities (15%); human health and social activities (15%); financial and insurance activities (14%); construction (12%); and information and communication (10%).
- Important differences are found in the sectors' contributions between the pre- and post-financial crisis periods. The market sectors that, to a larger extent, help to explain the slowdown in the UK's productivity growth in the last decade include: financial and insurance activities; professional, scientific and technical activities; information and communication; wholesale and retail trade; and mining and quarrying.

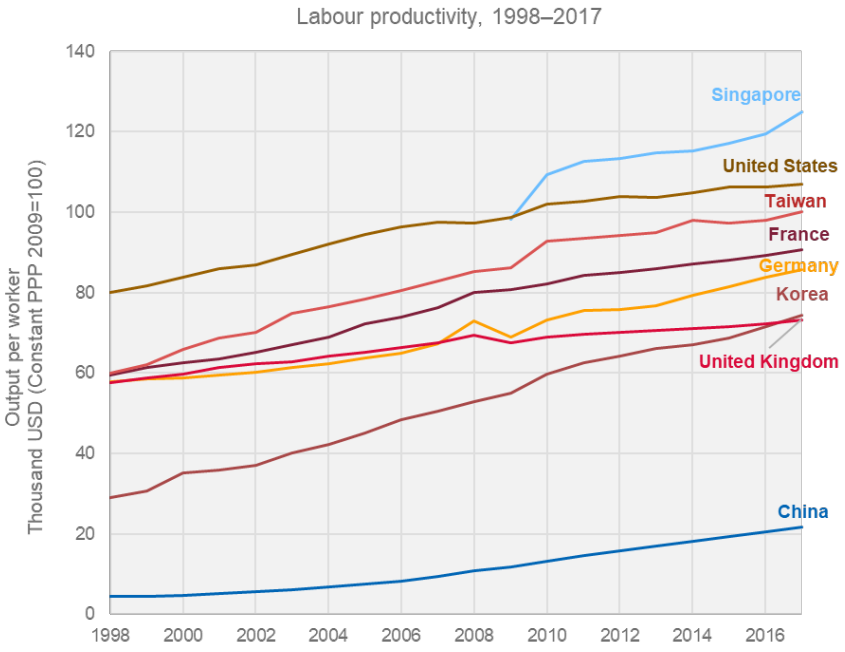
How do sectoral dynamics explain recent trends in aggregate productivity growth?

- The lower productivity growth experienced in the UK in the post-crisis period is mainly explained by slower growth across all sectors. However, changes in the structure of the economy have also slowed down aggregate productivity growth.
- The shrinking of the manufacturing sector, a trend largely observed between 1998 and 2007, has been a major development affecting the UK's economy structure and productivity in the last few decades. On average, we estimate that the shrinking of manufacturing, involving reductions in employment shares and relative output prices, accounted for an annual decline in productivity growth of around -0.7 percentage points during the 1998–2019 period.
- Reductions in relative output prices of information and communication also slowed aggregate productivity growth by -0.45 percentage points in 1998–2019. In addition, contractions of mining and quarrying, mainly caused by reductions in the relative output prices of this sector, and public administration and defence, explained by declines in employment shares, have slowed down aggregate productivity growth, particularly in the post-crisis period. Each of these sectors made negative annual contributions of -0.07 percentage points, on average, between 2011 and 2019.
- In comparison, the construction sector and selected service activities have increased their contribution to overall productivity growth, as they expand and experience accelerating productivity growth. Services that have contributed to improving aggregate productivity include: human health and social activities; professional, scientific and technical activities; administrative and support service activities; and information and communication services.

1. How does the UK's productivity performance compare with that observed in other economies?

The United Kingdom (the UK) had the second-lowest labour productivity level, from the sample of economies studied, at US$73,258 output per worker[1] in 2017 (Figure 1). In 1998 the aggregate productivity level in the UK was similar to that observed in Germany and almost twice that in Korea. However, since the global financial crisis of 2008, productivity growth has slowed down significantly. The UK productivity was hit the hardest during the crisis, and it has since struggled to recover its dynamism to a larger extent than any other of the economies included in this report.

FIGURE 1: WHOLE ECONOMY LABOUR PRODUCTIVITY GROWTH, 1998–2017, SELECTED ECONOMIES



Economy	Output per worker in 2017 (thousand USD, constant PPP, 2009=100)
Singapore	124,967
United States	107,075
Taiwan	100,075
France	90,791
Germany	85,815
Korea	74,431
United Kingdom	73,258
China	21,706

Economy	Growth rate, 1998–2017 (annual average)
China	8.9%
Korea	5.1%
Singapore[1/]	3.1%
Taiwan	2.7%
France	2.2%
Germany	1.7%
US	1.6%
UK	1.1%

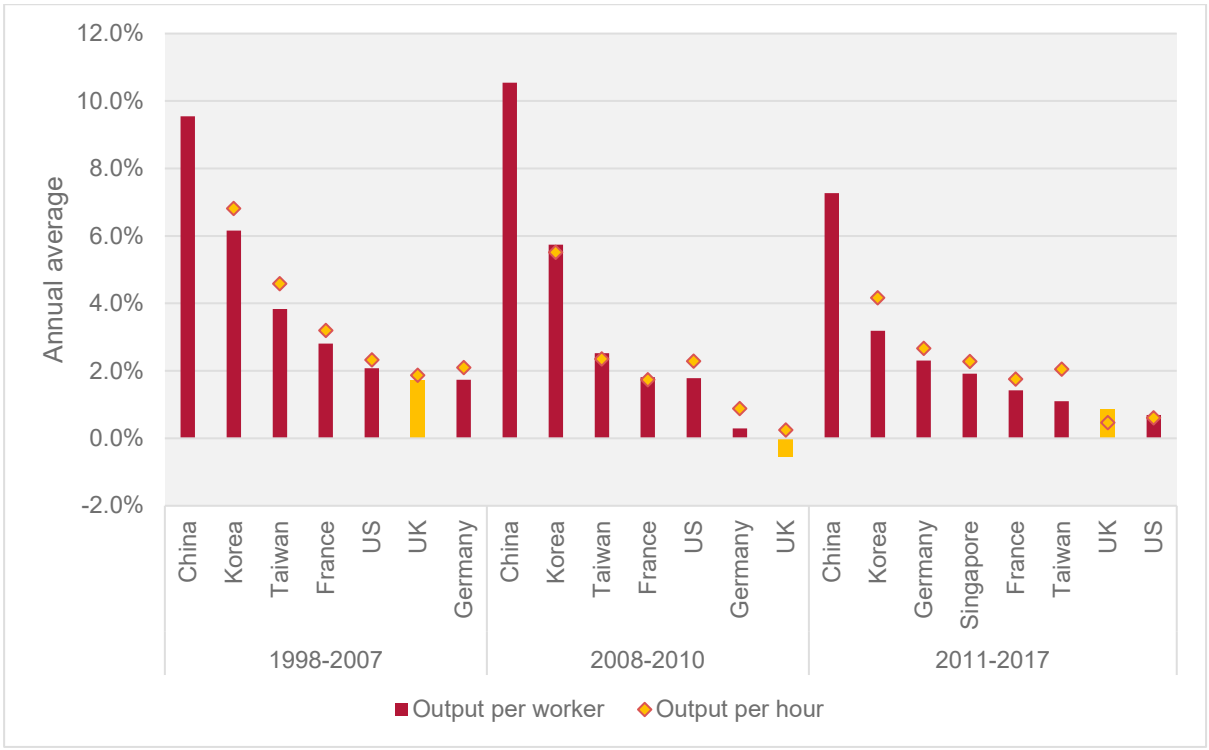
Note: [1/] The 2010–17 period for Singapore.

Source: Authors' computation, based on data from Asian Productivity Organization (APO) Productivity Database 2020 Ver.1 (5 August 2020); OECD Structural Analysis Database (2020 ed.); Korea Productivity Center; Singapore Department of Statistics; Singapore Ministry of Trade and Industry; Manpower Research & Statistics Department; Taiwan Statistical Bureau UK Office for National Statistics; US Bureau of Economic Analysis and US Bureau of Labor Statistics.

In the aftermath of the crisis (2008–10) the UK was the only economy, from the eight analysed in this report,[2] to exhibit negative productivity growth rates (-0.5%, output per worker). In the following decade (2011–17), the UK's productivity performance remained weak, showing growth rates of below 1% (Figure 2). Factors that help to explain this weaker growth include: lower levels of investment in capital and research and development; skills shortages; regional inequality; and limited knowledge diffusion.[3]

[1] Constant purchasing power parity (PPP), 2009 = 100.
[2] China, France, Germany, Korea, Taiwan, Singapore, the United Kingdom and the United States.
[3] Britain's productivity problem is long-standing and getting worse. *The Economist*, 9 June 2022.

FIGURE 2: WHOLE ECONOMY LABOUR PRODUCTIVITY GROWTH, 1998–2017, SELECTED COUNTRIES



Source: Authors' computation, based on data from APO Productivity Database 2020 Ver.1 (5 August 2020); OECD STAN Industrial Analysis (2020 ed.); Korea Productivity Center; Singapore Department of Statistics; Singapore Ministry of Trade and Industry; Manpower Research & Statistics Department; Taiwan Statistical Bureau UK Office for National Statistics; US Bureau of Economic Analysis and US Bureau of Labor Statistics.

2. Which sectors are the main sources of the UK's aggregate labour productivity growth?

The economic sectors that contributed the most to UK aggregate productivity gains in the period between 1998 and 2019 include (in brackets, total contributions in percentage points and relative terms): professional, scientific and technical activities (0.17 percentage points, 15.5% of aggregate productivity growth); human health and social activities (0.17 percentage points, 15.4%); financial and insurance activities (0.15 percentage points, 13.8%); construction (0.13 percentage points, 12.4%); and information and communication (0.11 percentage points, 10.2%) (Figure 3). However, there are important differences in the sectors' contributions between the pre- and post-financial crisis periods (Riley et al., 2018).[4]

During the global financial crisis and in its aftermath (2008–10), mainly non-market service activities were driving productivity growth. In the decade that followed (2011–19), real estate activities accounted for almost half of the aggregate productivity growth. In comparison with the patterns observed in the pre-crisis period, the sectors that experienced the largest declines in their contributions to aggregate productivity include: financial and insurance activities; professional, scientific and technical activities; information and communication; wholesale and retail trade; and mining and quarrying.

FIGURE 3: TOP FIVE SECTORS CONTRIBUTING TO THE UK'S AGGREGATE PRODUCTIVITY GROWTH (1998–2019)

United Kingdom: top five sectors
(based on their contribution to aggregate productivity growth measured as output per hour)

Pre-crisis (1998–2007)
Aggregate productivity growth rate: 1.87%

Sector	% of aggregate productivity growth	Percentage points
Financial and insurance activities	18.7	0.35
Construction	15.6	0.29
Human health and social work activities	14.4	0.27
Professional, scientific and technical activities	14.4	0.27
Information and communication	11.5	0.21

Crisis (2008–2010)
Aggregate productivity growth rate: 0.25%

Sector	% of aggregate productivity growth	Percentage points
Education	82.4	0.21
Human health and social work activities	75.0	0.19
Public administration and defence	63.2	0.16
Professional, scientific and technical activities	53.7	0.13
Other service activities	24.0	0.06

Post-crisis (2011–2019)
Aggregate productivity growth rate: 0.49%

Sector	% of aggregate productivity growth	Percentage points
Real estate activities	42.5	0.21
Administrative and support service activities	27.1	0.13
Construction	22.9	0.11
Professional, scientific and technical activities	13.7	0.07
Accommodation and food service activities	11.9	0.06

Whole period (1998–2019)
Aggregate productivity growth rate: 1.08%

Sector	% of aggregate productivity growth	Percentage points
Professional, scientific and technical activities	15.5	0.17
Human health	15.4	0.17
Financial and insurance activities	13.8	0.15
Construction	12.4	0.13
Information and communication	10.2	0.11

Source: Authors' computation, based on data from the UK Office for National Statistics.

[4] Riley, R., Rincon-Aznar, A. and Samek, L. (2018). Below the Aggregate: A Sectoral Account of the UK Productivity Puzzle. London: Economic Statistics Centre of Excellence. Office for National Statistics.

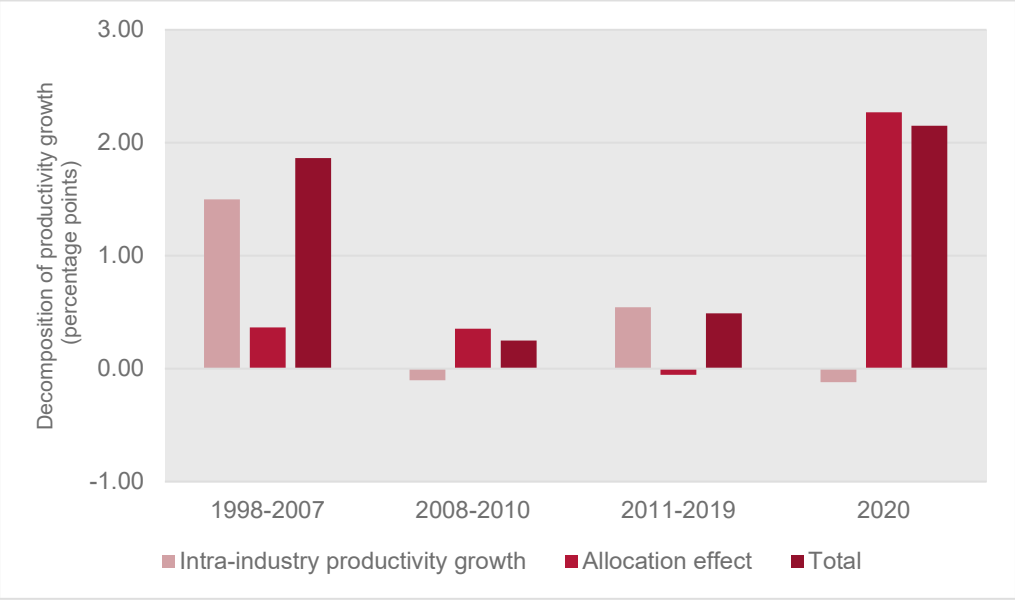
3. How do sectoral dynamics explain recent trends in aggregate productivity growth?

Overall labour productivity growth can be explained by an intra-industry productivity growth effect (or 'within' effect), which captures the productivity growth of each industrial sector and its relative weight in the overall economy; and by an allocation effect (or 'between-industries' effect), which captures the impacts on aggregate productivity growth because of the expansion or contraction of sectors with different levels of productivity.

In order to understand how different sectors have contributed to either aggregate productivity growth or slowdown, labour productivity (measured as output per worker) growth rates by sector were decomposed into these components using the Generalised Exactly Additive Decomposition (GEAD) methodology, as described in Tang and Wang.[5] Appendix II explains this decomposition.

As Figure 4 shows, during the period spanning 1998 to 2019, most of the UK's aggregate productivity growth was explained by the intra-industry productivity growth effect, while the allocation effect explains less than 20% of overall productivity growth. If we look at 2020 alone, however, the allocation effect explains most of the UK's aggregate productivity growth.

FIGURE 4: DECOMPOSITION OF UK AGGREGATE PRODUCTIVITY GROWTH (1998–2020)



Source: Authors' computation, based on data from the UK Office for National Statistics.

The decomposition was also conducted excluding sectors that involve a large non-market component (real estate, public administration and defence, education, human health and social activities). Table 10 presents the results of this decomposition for the period of 1998–2019. Key highlights include a larger aggregate intra-industry productivity growth effect (1.65 percentage points) and a negative aggregate allocation effect in 1998–2019 (-0.87 percentage points), both largely explained by the manufacturing and information and communication sectors.

[5] Tang, J. and Wang, W. (2004). Sources of aggregate labour productivity growth in Canada and the United States. *Canadian Journal of Economics*, Volume 37, Number 2.

As mentioned in Section 2, the economic sectors that contributed the most to the UK's aggregate productivity gains in the period between 1998 and 2019 include: professional, scientific and technical activities; human health and social activities; financial and insurance activities; construction; and information and communication (Figure 5 and Table 6). The contribution of these sectors is explained by their faster productivity growth rates, although expansions of higher-than-average productivity sectors such as professional, scientific and technical activities, and education, have also contributed to aggregated productivity via an allocation effect.

Focusing on the intra-industry productivity growth effect only (productivity growth weighted by output share), the sectors that made the largest contributions to aggregate productivity for the whole of the 1998–2019 period (in brackets, the annual average contribution in percentage points and relative terms) are: information and communication (0.56 percentage points) and manufacturing (0.54 percentage points) (Table 6).

Within manufacturing, the sectors with the largest intra-industry productivity growth effects include (in brackets, 1998–2019 average effects, percentage points): the manufacture of computer, electronic and optical products (0.07 percentage points); the manufacture of chemicals and chemical products (0.05 percentage points); and the manufacture of textiles, wearing apparel and leather products (0.05 percentage points) (Table 8).

While allocation effects tend to be relatively small when aggregated for the whole economy, they help to explain why the contraction of sectors, such as manufacturing, contributes to weaker UK productivity growth. The negative allocation effects for the manufacturing and information and communication sectors stand out. In the case of manufacturing, the large and negative allocation effect is explained by the steady contraction of the sector and a fall in relative output prices, particularly between 1998 and 2007. Meanwhile, the negative allocation effect computed for information and communication is explained by a reduction in relative prices.

The shrinking of manufacturing has been a major change affecting the UK and other economies in recent decades. This is clearly illustrated in Table 3, which shows the extent of the declining output and employment shares between 1998 and 2007 (a continuation of a trend that began in the late 1970s and 1980s). While this phenomenon is not unique to the UK, and countries such as the US, France and Germany have experienced a similar phenomenon, the UK saw a deeper decline in manufacturing employment, output and relative output prices in comparison to other advanced economies.

Similar to the US case, UK deindustrialisation was, in the first instance, triggered by rent-seeking behaviour that motivated the offshoring of manufacturing operations to lower-cost countries that also provided easier access to new markets. Although offshored manufacturing began with the movement of low-skilled jobs for high-volume assembly, as new locations upgraded the skills of their population and improved the overall business environment, over time offshored manufacturing evolved into more complex production processes.[6]

Alongside manufacturing offshoring, the UK manufacturing competitive position deteriorated. The UK's manufacturing imports increased steadily from 1990 – with the exception of the global financial crisis of 2008 – returning to 2007 levels by 2014. However, the recovery of exports was

[6] Theyel, G., Hofmann, K. and Gregory, M. (2018). Understanding Manufacturing Location Decision Making: Rationales for Retaining, Offshoring, Reshoring, and Hybrid Approaches. *Economic Development Quarterly*, 32(4): 300–312. doi:10.1177/0891242418800222

more sluggish, and in 2014 real exports were still lower than in 2006. The trade deficit in manufactured goods stopped widening during the global financial crisis but started to grow again in 2011.[7]

On average, we estimate that the shrinking of manufacturing, involving reductions in employment shares and relative output prices, accounted for an annual decline in productivity of around 0.7 percentage points during the 1998–2019 period.

The greatest contraction of manufacturing employment and output is seen in the first part of the period analysed, with falls in output and employment shares above 5 percentage points between 1998 and 2007. During this period, manufacturing output prices also saw a pronounced fall by 56 percentage points (Table 3).

As Table 3 shows, the shrinking of the manufacturing sector implied a reduction in overall productivity growth, contributing to a decrease in 1.3 percentage points between 1998 and 2007. This is the estimation of the allocation effect for the reference period. Although the robust productivity growth of manufacturing counteracted this effect to some extent, the overall contribution of the manufacturing sector to aggregate productivity was negative, namely, -0.34 percentage points between 1998 and 2007.

Manufacturing sub-sectors contributing to this include (in brackets, annual allocation effects in 1998–2007): the manufacture of computer, electronic and optical products, reporting the largest negative allocation effect on productivity growth (-0.16 percentage points); the manufacture of textiles, wearing apparel and leather products (-0.14 percentage points); the manufacture of machinery and equipment (-0.13 percentage points); the manufacture of chemicals and chemical products (-0.12 percentage points); and the manufacture of food products, beverages and tobacco (-0.12 percentage points) (Table 8).

As the manufacturing sector shrunk, construction and service activities increased their weight in the economy. Services that experienced among the largest increase in output and employment shares include: human health and social activities; professional, scientific and technical activities; administrative and support service activities; and information and communication. Between 1998 and 2007, the increases in output shares ranged between 0.2 and 1.5 percentage points, and between 0.2 and 1.3 percentage points in terms of employment shares (Table 3).

Although human health and social activities show productivity levels below the average of the whole economy, their expansion, compounded by increases in relative output prices, have led to positive allocation effects. Caution is needed when interpreting results for education and other public services, given the lack of market transactions, which leads to challenges in measuring productivity.

Productivity growth, however, slowed down across most sectors after the financial crisis of 2008. Market sectors that, to a larger extent, contribute to explaining the slowdown of the UK's productivity growth between 1998–2007 and 2011–19 include: financial and insurance activities; professional, scientific and technical activities; information and communication; manufacturing; wholesale and retail trade; and mining and quarrying. All of these sectors experienced a significant worsening in productivity growth rates after the financial crisis, and, in the case of

[7] Green, A., Hogarth, T., Kispeter, E., Owen, D. and Glover, P. (2016). The future of productivity in manufacturing. Institute for Employment Research, University of Warwick.

financial and insurance activities and professional, scientific and technical activities, even negative rates.

Looking closely at Table 2, we can highlight sectoral differences in productivity performance (in terms of both growth and levels) across detailed segments of the economy. A number of manufacturing sub-sectors have suffered a substantial productivity deterioration since 2008 and thus have contributed to the overall productivity slowdown. These include: the manufacture of pharmaceutical products; the manufacture of coke and refined petroleum products; the manufacture of transport equipment; the manufacture of chemical products; and the manufacture of computer, electronic and optical products. These are mainly sectors that rank high in terms of labour productivity (output per hour), above the economy-wide levels in most cases. For the period 1998–2019, the average output hours were highest in the manufacture of coke (£159), pharmaceuticals (£162) and the manufacture of transport equipment, well above the economy average of £33 per hour.

In the manufacture of basic pharmaceutical products and pharmaceutical preparations, the decline in the productivity growth rate was substantial (-3.1%) during the period of 2011–19. This can be explained by myriad factors, including: stagnant R&D expenditure, offshoring of pharmaceutical manufacturing, and difficulties attracting international investments.[8] In comparison, the manufacture of coke and refined petroleum (16.2%), the manufacture of chemicals (7.6%), the manufacture of textiles, wearing apparel and leather products (4.9%) and printing and reproduction of recorded media (4.9%) have fared better (Table 2).

Financial and insurance activities made an important contribution to aggregate productivity growth (18.7%, 0.35 percentage points) in the pre-financial crisis period, 1998–2007, but has since turned negative (-4% in 2011–19, -0.02 percentage points) (Table 3 and Table 5). A likely explanation for the decline in the financial sector is that, in the pre-crisis period, high productivity growth was mainly driven by unsustainable increased debt and higher risk tolerance.[9]

The contraction of manufacturing has been more moderate in the decade after the financial crisis (2011–19); however, many of these industries still have negative allocation effects. These include: the manufacture of food products, beverages and tobacco (-0.04 percentage points); the manufacture of chemicals and chemical products (-0.04 percentage points); printing and reproduction of recorded media (-0.02 percentage points); the manufacture of computer, electronic and optical products (-0.02 percentage points); and the manufacture of electric equipment (-0.02 percentage points) (Table 8).

The impact of lower productivity growth rates in manufacturing and wholesale and retail trade was compounded by lower output shares. As these sectors have become smaller, their weight in aggregate productivity has also diminished.

Information and communication also exhibit negative allocation effects (-0.45 percentage points annual average in 1998–2019); however, this is explained by decreases in relative prices rather than contractions in employment shares. The relative output prices of this sector fell by 290

[8] Policy Links (2022). UK Innovation Report 2022. Benchmarking the UK's Industrial and Innovation Performance in a Global Context. IfM Engage. Institute for Manufacturing, University of Cambridge.
[9] Teneyro, S. (2018). The fall in productivity growth: causes and implications. Speech. Bank of England.

percentage points in 1998–2007 (Table 3) and by 419 percentage points for the whole period of 1998–2019 (Table 6).

In the post-crisis period (2011–19), the contraction of mining and quarrying, mainly caused by reductions in the relative output prices of this sector, and public administration and defence, explained by declines in employment shares, have also slowed down aggregate productivity growth. Each of these sectors made negative annual contributions of -0.07 percentage points, on average, between 2011 and 2019 (Table 5).

In contrast, the sectors that made sizeable contributions to the UK's productivity growth after the financial crisis include (in brackets, total average contribution to aggregate productivity growth in percentage points and relative terms): real estate activities (0.21 percentage points, 42.5%), administrative and support service activities (0.13 percentage points, 27.1%); construction (0.11 percentage points, 22.9%); and professional, scientific and technical activities (0.07 percentage points, 13.7%); accommodation and food service activities (0.06 percentage points); and human health and social activities (0.05 percentage points, 11.9%) (Figure 5 and Table 5). Caution is required when analysing the productivity figures of the real estate sector considering the inclusion of imputed rents from owner-occupied dwellings in the value added of this sector..[10]

More recently, the COVID-19 pandemic and Britain's exit from the European Union have impacted output and employment and thus productivity. Supply chains have been disrupted, uncertainty has slowed down investment and employment losses have resulted in demand contraction. The fall in output during 2020 was almost five times the size of the fall during the global financial crisis, and productivity deteriorated because of demand deficiencies, capital shallowing and labour scarring..[11]

The impacts, however, have been uneven across sectors. Economic activities that depended less on social interaction and which were essential in the response to the crisis saw a stronger performance. In addition, although output fell across most sectors, larger falls in employment resulted in improvements in productivity measures..[12] Economic activities that saw positive productivity improvements in 2020 include (in brackets, the labour productivity growth rate in 2020): wholesale and retail trade (5.5%); manufacturing (5.4%); and construction (3.9%).

In contrast, the sectors where productivity deteriorated more sharply include: mining and quarrying (-18%); accommodation and food service activities (-10.8%); education (-8.4%); human health and social activities (-6.6%); and agriculture, forestry and fishing (-4.9%) (Table 1).

Manufacturing industries where productivity declined during the pandemic include (in brackets, the labour productivity growth rate in 2020): the manufacture of motor vehicles, trailers and semi-trailers (-11%); the manufacture of other transport equipment (-9.8%); the manufacture of machinery and equipment (-6.3%); and the manufacture of computer, electronic and optical products (-4.2%). In contrast, other manufacturing activities such as the manufacture of paper and paper products (20.9%), printing and reproduction of recorded media (19.1%), the manufacture of fabricated metal products (16.4%), the manufacture of chemicals and chemical

[10] Riley, R., Rincon-Aznar, A. and Samek, L. (2018). Below the Aggregate: A Sectoral Account of the UK Productivity Puzzle. London: Economic Statistics Centre of Excellence. Office for National Statistics.
[11] Mortimer-Lee, P. and Pabst, A. (Eds) (2022). *Covid-19 and Productivity. Impacts and Implications.* National Institute of Economic and Social Research.
[12] Whyte, K. (2022). The Covid-19 Shock and Productivity: A Sectoral View. In: Mortimer-Lee, P. and Pabst, A. (eds). *Covid-19 and Productivity. Impacts and Implications.* Pp. 9–22. National Institute of Economic and Social Research.

products (12.5%) and the manufacture of basic pharmaceutical products and pharmaceutical preparations (11.1%) have continued to see their productivity increase (Table 2).

In 2020 the largest negative allocation effects were estimated for: accommodation and food service activities (-0.80 percentage points); construction (-0.76 percentage points); manufacturing (-0.70 percentage points); wholesale and retail trade (-0.51 percentage points); and arts, entertainment and recreation (-0.27 percentage points). In contrast, the human health and social activities sector made a positive contribution to overall growth of 1.6 percentage points, explained by an increase in relative output prices of 14.6 percentage points (Table 7). Factors influencing this raise in output prices include an increase in non-elective patient admissions, including emergencies..[13]

Within manufacturing, basic pharmaceutical products and pharmaceutical preparations made the largest contributions to overall productivity growth (0.12 intra-industry productivity growth effect and 0.01 allocation effect), accounting for 6.4% of the aggregate productivity growth observed in 2020 (Table 8).

[13] See, for example, ONS (2020). Coronavirus and the effects on UK productivity measures.

TABLE 1: UNITED KINGDOM: PRODUCTIVITY LEVELS AND GROWTH RATES BY SECTOR, 1998–2020

Economic sector	Output per hour									
	1998–2007		2008–2010		2011–2019		1998–2019		2020	
	Average absolute value (pounds[1/])	Average annual growth	Average absolute value (pounds[1/])	Average annual growth	Average absolute value (pounds[1/])	Average annual growth	Average absolute value (pounds[1/])	Average annual growth	Average absolute value (pounds[1/])	Average annual growth
Agriculture, forestry and fishing	15.16	8.25%	15.12	-5.51%	15.53	4.70%	15.30	4.92%	15.77	-4.93%
Mining and quarrying	448.38	-4.86%	274.60	-12.36%	140.42	-1.72%	298.70	-4.60%	136.42	-17.99%
Manufacturing	26.33	7.13%	35.91	1.55%	38.40	1.53%	32.57	4.08%	43.68	5.36%
Electricity, gas, steam and air conditioning supply	155.19	3.65%	114.92	-4.65%	99.46	0.61%	126.90	1.27%	116.01	4.63%
Water supply; sewerage, waste management and remediation activities	112.04	-1.76%	92.58	-2.95%	69.63	-2.47%	92.04	-2.21%	70.10	2.87%
Construction	32.79	-0.87%	27.86	0.02%	30.96	0.20%	31.37	-0.31%	31.03	3.98%
Wholesale and retail trade; repair of motor vehicles and motorcycles	24.36	0.96%	25.75	-0.03%	27.07	0.36%	25.66	0.58%	29.12	5.54%
Transportation and storage	28.19	1.47%	29.29	-0.07%	28.77	-1.08%	28.58	0.22%	25.71	-4.26%
Accommodation and food service activities	19.57	-0.23%	18.69	1.09%	18.79	-0.67%	19.13	-0.23%	16.04	-10.79%
Information and communication	15.54	12.90%	26.68	7.52%	36.63	5.85%	25.69	9.28%	45.41	-2.60%
Financial and insurance activities	73.41	4.13%	91.53	-2.60%	82.39	-0.51%	79.56	1.31%	81.40	-2.69%
Real estate activities	360.07	-4.17%	286.60	0.37%	300.55	0.46%	325.70	-1.65%	307.87	3.31%
Professional, scientific and technical activities	31.76	1.18%	33.67	1.17%	31.98	-1.32%	32.11	0.16%	31.12	2.36%
Administrative and support service activities	20.19	-1.23%	19.84	0.35%	22.02	1.54%	20.89	0.12%	21.98	-4.34%
Public administration and defence; compulsory social security	28.42	0.72%	31.18	1.19%	36.82	2.90%	32.23	1.68%	39.92	0.27%
Education	39.12	-2.67%	32.35	-2.00%	30.45	0.07%	34.65	-1.45%	29.28	-8.36%
Human health and social activities	27.25	0.30%	25.69	-2.76%	24.90	-0.15%	26.07	-0.30%	23.14	-6.65%
Arts, entertainment and recreation	27.19	1.02%	27.81	-1.86%	26.08	-0.92%	26.82	-0.16%	25.19	1.13%
Other service activities	27.84	-2.36%	26.14	1.13%	25.98	0.05%	26.85	-0.90%	28.10	6.10%
Activities of households	39.56	-1.75%	28.82	9.73%	41.18	7.92%	38.76	3.77%	57.95	-11.22%
Whole economy	32.44	1.87%	34.92	0.25%	35.89	0.49%	34.19	1.08%	37.64	2.15%

Note: [1/]Annual average, chain volume measure (CVM) prices, 2019 = 100.

Source: Authors' computation, based on data from the UK Office for National Statistics.

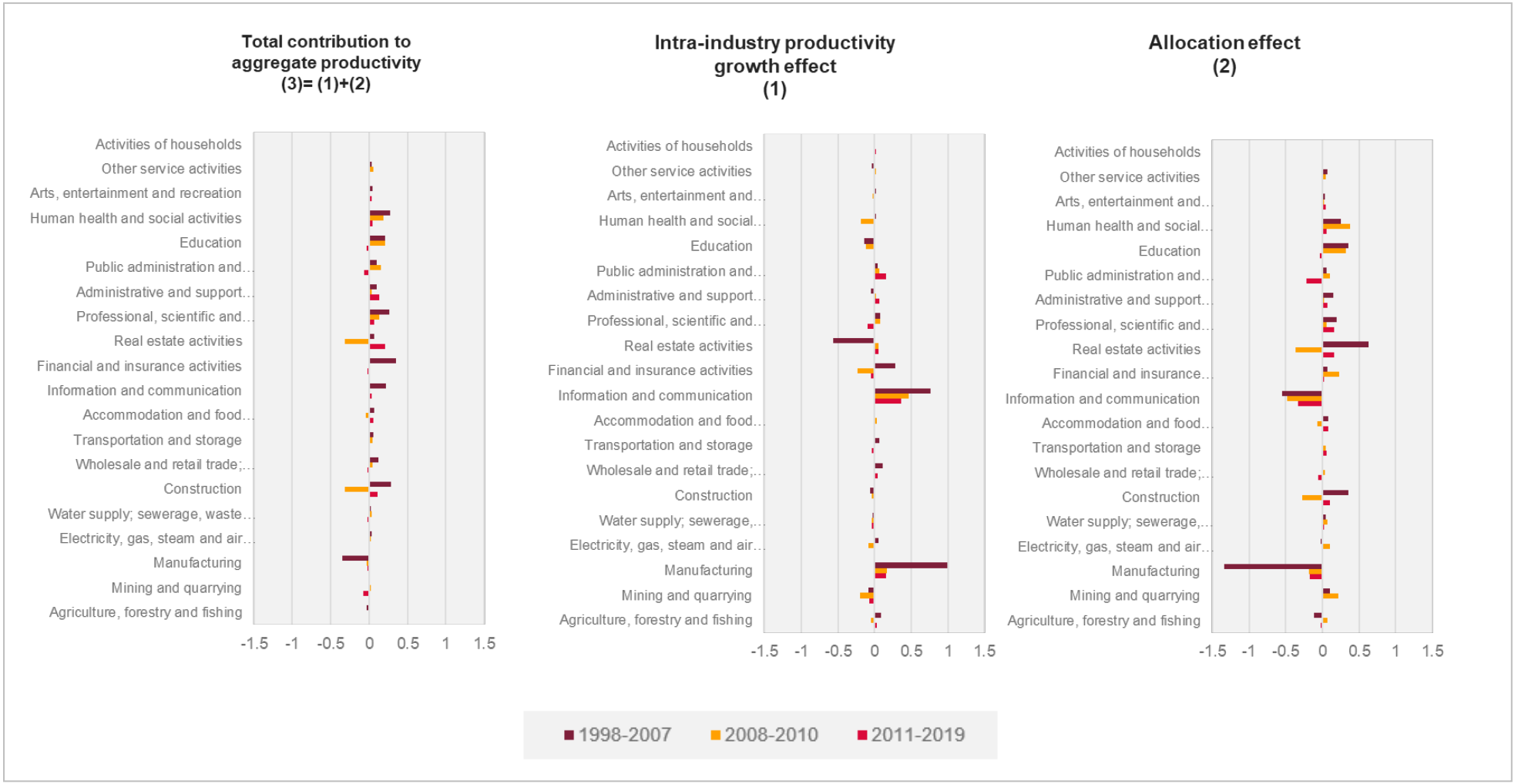
TABLE 2: UNITED KINGDOM: PRODUCTIVITY LEVELS AND GROWTH BY MANUFACTURING SUB-SECTORS, 1998–2020

Manufacturing sub-sector	Output per hour									
	1998–2007 (average)		2008–2010 (average)		2011–2019 (average)		1998–2019 (average)		2020	
	Average absolute value (pounds[1/])	Annual growth	Average absolute value (pounds[1/])	Annual growth	Average absolute value (pounds[1/])	Annual growth	Average absolute value (pounds[1/])	Annual growth	Average absolute value (pounds[1/])	Annual growth
Manufacture of food products, beverages and tobacco	31.37	3.91%	36.65	-1.77%	34.46	0.76%	33.35	1.85%	39.37	6.02%
Manufacture of textiles, wearing apparel and leather products	8.61	15.76%	22.08	17.63%	29.03	4.92%	18.80	11.58%	36.21	0.24%
Manufacture of wood and of products of wood and cork, except furniture	15.24	6.32%	17.21	-5.91%	19.28	4.83%	17.16	4.04%	19.77	0.60%
Manufacture of paper and paper products	20.55	10.08%	34.98	11.68%	38.66	1.38%	29.93	6.74%	48.82	20.85%
Printing and reproduction of recorded media	14.51	8.58%	22.10	1.86%	25.60	4.87%	20.08	6.15%	38.33	19.12%
Manufacture of coke and refined petroleum products	181.19	-3.27%	163.88	15.30%	132.26	16.18%	158.81	7.22%	139.52	-1.70%
Manufacture of chemicals and chemical products	26.91	6.19%	35.90	4.69%	53.53	7.58%	39.02	6.55%	66.40	12.55%
Manufacture of basic pharmaceutical products and pharmaceutical preparations	141.84	8.63%	223.02	0.55%	164.60	-3.09%	162.22	2.73%	163.58	11.05%
Manufacture of rubber and plastic products	18.83	6.20%	23.58	3.13%	25.04	1.56%	22.02	3.88%	28.33	8.53%
Manufacture of other non-metallic mineral products	25.28	4.53%	25.69	-0.78%	34.16	3.29%	28.97	3.30%	31.02	4.09%
Manufacture of basic metals	44.76	2.60%	31.19	-11.22%	37.77	3.36%	40.05	1.03%	30.63	8.81%
Manufacture of fabricated metal products, except machinery and equipment	23.20	3.60%	25.19	0.23%	29.66	2.52%	26.11	2.70%	32.44	16.36%
Manufacture of computer, electronic and optical products	19.81	15.06%	47.13	14.43%	54.99	2.59%	37.93	9.87%	57.97	-4.23%
Manufacture of electrical equipment	22.45	8.44%	29.62	-4.55%	30.07	4.74%	26.55	5.16%	35.43	4.19%
Manufacture of machinery and equipment n.e.c.	32.59	9.52%	40.64	-2.52%	42.15	-0.08%	37.60	3.95%	37.61	-6.27%
Manufacture of motor vehicles, trailers and semi-trailers	26.91	6.60%	50.66	12.58%	62.00	1.43%	44.50	5.30%	45.17	-11.03%
Manufacture of other transport equipment	55.29	9.68%	56.50	-11.68%	42.59	0.17%	50.26	2.88%	39.12	-9.80%
Manufacture of furniture	19.18	4.22%	24.03	5.32%	24.87	-0.37%	22.17	2.49%	25.54	-1.77%
Other manufacturing	20.03	11.09%	33.99	3.72%	33.79	1.10%	27.56	6.00%	33.97	-9.86%
Repair and installation of machinery and equipment	26.16	4.27%	34.25	8.96%	35.24	-2.10%	30.98	2.31%	27.95	1.55%
Total manufacturing	26.33	7.13%	35.91	1.55%	38.40	1.53%	32.57	4.08%	40.84	4.48%

Note: [1/]Annual average, chain volume measure (CVM) prices, 2019 = 100.

Source: Authors' computation, based on data from the UK Office for National Statistics.

FIGURE 5: SECTORAL CONTRIBUTION TO UK AGGREGATE PRODUCTIVITY GROWTH, 1998–2019



Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 3: UNITED KINGDOM: SECTORAL CONTRIBUTIONS TO AGGREGATE PRODUCTIVITY GROWTH,1998–2007

Economic sector	Output shares		Employment shares		Change (1998–2007, percentage points)			Contribution to productivity growth (1998–2007, average, percentage points)			Labour productivity growth (1998–2007)
	1998	2007	1998	2007	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	1.07%	0.62%	1.59%	1.17%	-0.45	-0.42	-67.04	0.08	-0.11	-0.03	8.25%
Mining and quarrying	1.49%	1.74%	0.27%	0.22%	0.26	-0.06	46.68	-0.09	0.10	0.01	-4.86%
Manufacturing	16.03%	10.71%	15.01%	9.46%	-5.32	-5.55	-56.04	0.99	-1.34	-0.34	7.13%
Electricity, gas, steam and air conditioning supply	1.45%	1.50%	0.41%	0.36%	0.06	-0.04	26.54	0.05	-0.02	0.03	3.65%
Water supply; sewerage, waste management and remediation activities	1.40%	1.31%	0.45%	0.45%	-0.09	0.00	23.74	-0.02	0.04	0.02	-1.76%
Construction	5.25%	6.68%	6.47%	7.12%	1.43	0.64	32.29	-0.06	0.35	0.29	-0.87%
Wholesale and retail trade; repair of motor vehicles and motorcycles	12.15%	11.02%	16.72%	15.89%	-1.13	-0.83	-0.98	0.11	0.01	0.12	0.96%
Transportation and storage	4.35%	3.92%	4.58%	4.62%	-0.43	0.03	0.92	0.06	-0.01	0.05	1.47%
Accommodation and food service activities	2.55%	2.67%	6.02%	6.33%	0.12	0.30	14.48	-0.01	0.08	0.07	-0.23%
Information and communication	5.67%	6.25%	3.83%	4.03%	0.58	0.20	-290.25	0.76	-0.55	0.21	12.90%
Financial and insurance activities	6.41%	8.78%	3.94%	3.79%	2.36	-0.16	8.47	0.28	0.07	0.35	4.13%
Real estate activities	14.55%	12.79%	0.99%	1.44%	-1.76	0.45	-3.17	-0.57	0.63	0.06	-4.17%
Professional, scientific and technical activities	5.62%	6.82%	6.03%	7.14%	1.20	1.11	5.38	0.07	0.20	0.27	1.18%
Administrative and support service activities	3.85%	4.05%	6.01%	7.29%	0.20	1.28	7.28	-0.05	0.15	0.10	-1.23%
Public administration and defence; compulsory social security	5.03%	5.21%	5.57%	5.59%	0.18	0.02	12.87	0.04	0.06	0.10	0.72%
Education	4.87%	5.89%	7.14%	8.13%	1.02	1.00	34.74	-0.15	0.36	0.21	-2.67%
Human health and social activities	5.51%	6.97%	10.17%	11.35%	1.46	1.19	18.75	0.01	0.25	0.27	0.30%
Arts, entertainment and recreation	1.11%	1.41%	2.29%	2.71%	0.30	0.42	5.62	0.01	0.03	0.05	1.02%
Other service activities	1.48%	1.52%	2.22%	2.43%	0.05	0.21	26.84	-0.04	0.07	0.03	-2.36%
Activities of households	0.16%	0.12%	0.28%	0.48%	-0.04	0.19	21.78	0.00	0.00	0.00	-1.75%
Whole economy	100%	100%	100%	100%	N/A	N/A	N/A	1.50	0.37	1.87	1.87%

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 4: UNITED KINGDOM: SECTORAL CONTRIBUTIONS TO AGGREGATE PRODUCTIVITY GROWTH, 2008–2010

Economic sector	Output shares		Employment shares		Change (2008–10, percentage points)			Contribution to productivity growth (2008–10, average, percentage points)			Labour productivity growth (2008–10)
	2008	2010	2008	2010	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	0.75%	0.67%	1.21%	1.32%	-0.07	0.11	3.07	-0.05	0.07	0.02	-5.51%
Mining and quarrying	2.02%	1.79%	0.21%	0.21%	-0.23	-0.01	48.54	-0.20	0.22	0.02	-12.36%
Manufacturing	10.50%	10.58%	9.12%	8.43%	0.08	-0.69	7.91	0.16	-0.19	-0.03	1.55%
Electricity, gas, steam and air conditioning supply	1.63%	1.61%	0.39%	0.43%	-0.02	0.05	-12.13	-0.08	0.10	0.02	-4.65%
Water supply; sewerage, waste management and remediation activities	1.34%	1.40%	0.46%	0.50%	0.06	0.04	12.75	-0.04	0.07	0.03	-2.95%
Construction	6.58%	5.70%	7.09%	6.55%	-0.88	-0.54	-11.51	-0.04	-0.28	-0.32	0.02%
Wholesale and retail trade; repair of motor vehicles and motorcycles	10.84%	11.11%	15.95%	15.70%	0.27	-0.25	-1.11	0.00	0.04	0.04	-0.03%
Transportation and storage	4.00%	4.08%	4.58%	4.55%	0.08	-0.04	4.43	-0.01	0.05	0.04	-0.07%
Accommodation and food service activities	2.58%	2.53%	6.34%	6.25%	-0.05	-0.10	-0.48	0.02	-0.06	-0.04	1.09%
Information and communication	6.24%	6.21%	3.93%	3.83%	-0.04	-0.10	-37.84	0.47	-0.48	-0.01	7.52%
Financial and insurance activities	8.05%	8.05%	3.81%	3.62%	0.00	-0.20	16.57	-0.23	0.23	0.00	-2.60%
Real estate activities	13.28%	11.98%	1.46%	1.53%	-1.30	0.07	-19.04	0.05	-0.36	-0.31	0.37%
Professional, scientific and technical activities	6.81%	7.21%	7.05%	7.18%	0.40	0.13	5.56	0.08	0.05	0.13	1.17%
Administrative and support service activities	4.04%	4.13%	7.54%	7.57%	0.09	0.03	0.07	0.01	0.02	0.03	0.35%
Public administration and defence; compulsory social security	5.26%	5.67%	5.45%	5.58%	0.42	0.12	-2.65	0.06	0.10	0.16	1.19%
Education	6.10%	6.46%	8.17%	8.79%	0.37	0.62	4.58	-0.12	0.33	0.21	-2.00%
Human health and social activities	6.93%	7.47%	11.53%	12.58%	0.55	1.05	5.96	-0.19	0.38	0.19	-2.76%
Arts, entertainment and recreation	1.39%	1.39%	2.78%	2.61%	0.00	-0.16	9.36	-0.03	0.03	0.00	-1.86%
Other service activities	1.53%	1.70%	2.43%	2.53%	0.17	0.10	5.36	0.02	0.04	0.06	1.13%
Activities of households	0.13%	0.24%	0.50%	0.24%	0.12	-0.26	1.80	0.01	0.00	0.01	9.73%
Whole economy	100%	100%	100%	100%	N/A	N/A	N/A	-0.10	0.35	0.25	0.25%

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 5: UNITED KINGDOM: SECTORAL CONTRIBUTIONS TO AGGREGATE PRODUCTIVITY GROWTH, 2011–2019

Economic sector	Output shares		Employment shares		Structural change (2011–19, percentage points)			Contribution to productivity growth (2011–19, average, percentage points)			Labour productivity growth (2011–19)
	2011	2019	2011	2019	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	0.77%	0.68%	1.32%	1.12%	-0.09	-0.20	5.61	0.03	-0.02	0.01	4.70%
Mining and quarrying	1.85%	1.07%	0.22%	0.18%	-0.78	-0.03	-41.05	-0.07	0.00	-0.07	-1.72%
Manufacturing	10.45%	9.93%	8.32%	7.76%	-0.53	-0.57	-6.70	0.16	-0.17	-0.02	1.53%
Electricity, gas, steam and air conditioning supply	1.32%	1.50%	0.44%	0.43%	0.18	-0.01	-0.91	0.00	0.00	0.00	0.61%
Water supply; sewerage, waste management and remediation activities	1.40%	1.20%	0.53%	0.57%	-0.21	0.04	-4.86	-0.03	0.02	-0.02	-2.47%
Construction	5.71%	6.40%	6.48%	6.62%	0.69	0.14	15.63	0.01	0.11	0.11	0.20%
Wholesale and retail trade; repair of motor vehicles and motorcycles	10.62%	10.45%	15.61%	14.64%	-0.17	-0.97	6.02	0.04	-0.05	-0.02	0.36%
Transportation and storage	4.06%	3.99%	4.52%	4.81%	-0.08	0.30	8.50	-0.04	0.06	0.02	-1.08%
Accommodation and food service activities	2.66%	2.94%	6.31%	7.07%	0.28	0.76	10.47	-0.02	0.08	0.06	-0.67%
Information and communication	6.37%	6.21%	3.97%	4.25%	-0.17	0.27	-68.42	0.37	-0.33	0.03	5.85%
Financial and insurance activities	8.73%	8.17%	3.64%	3.24%	-0.56	-0.40	10.04	-0.05	0.03	-0.02	-0.51%
Real estate activities	12.07%	13.06%	1.50%	1.71%	0.99	0.21	4.02	0.05	0.16	0.21	0.46%
Professional, scientific and technical activities	7.10%	7.44%	7.12%	8.34%	0.34	1.22	2.46	-0.10	0.16	0.07	-1.32%
Administrative and support service activities	4.18%	5.09%	7.82%	8.44%	0.92	0.62	2.88	0.07	0.06	0.13	1.54%
Public administration and defence; compulsory social security	5.47%	4.84%	5.25%	4.32%	-0.63	-0.93	-0.72	0.15	-0.22	-0.07	2.90%
Education	6.42%	5.92%	8.75%	8.34%	-0.49	-0.42	-3.13	0.00	-0.03	-0.03	0.07%
Human health and social activities	7.55%	7.56%	12.73%	12.48%	0.01	-0.25	5.97	-0.01	0.06	0.05	-0.15%
Arts, entertainment and recreation	1.49%	1.62%	2.64%	2.88%	0.13	0.25	13.81	-0.01	0.05	0.03	-0.92%
Other service activities	1.62%	1.72%	2.58%	2.63%	0.10	0.05	3.44	0.00	0.01	0.01	0.05%
Activities of households	0.15%	0.19%	0.24%	0.15%	0.05	-0.09	5.68	0.01	-0.01	0.01	7.92%
Whole economy	100%	100%	100%	100%	N/A	N/A	N/A	0.54	-0.05	0.49	0.49%

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 6: UNITED KINGDOM: SECTORAL CONTRIBUTIONS TO AGGREGATE PRODUCTIVITY GROWTH, 1998–2019

Economic sector	Output shares		Employment shares		Change (1998–2019, percentage points)			Contribution to productivity growth (1998–2019, average, percentage points)			Labour productivity growth (1998–2019)
	1998	2019	1998	2019	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	1.07%	0.68%	1.59%	1.12%	-0.39	-0.47	-62.68	0.04	-0.05	-0.01	4.92%
Mining and quarrying	1.49%	1.07%	0.27%	0.18%	-0.42	-0.09	74.93	-0.10	0.07	-0.02	-4.60%
Manufacturing	16.03%	9.93%	15.01%	7.76%	-6.10	-7.26	-56.66	0.54	-0.70	-0.17	4.08%
Electricity, gas, steam and air conditioning supply	1.45%	1.50%	0.41%	0.43%	0.05	0.03	24.13	0.01	0.00	0.02	1.27%
Water supply; sewerage, waste management and remediation activities	1.40%	1.20%	0.45%	0.57%	-0.20	0.12	34.58	-0.03	0.04	0.01	-2.21%
Construction	5.25%	6.40%	6.47%	6.62%	1.15	0.15	40.78	-0.03	0.17	0.13	-0.31%
Wholesale and retail trade; repair of motor vehicles and motorcycles	12.15%	10.45%	16.72%	14.64%	-1.70	-2.08	4.71	0.06	-0.01	0.05	0.58%
Transportation and storage	4.35%	3.99%	4.58%	4.81%	-0.36	0.23	13.46	0.01	0.03	0.04	0.22%
Accommodation and food service activities	2.55%	2.94%	6.02%	7.07%	0.39	1.05	22.24	-0.01	0.06	0.05	-0.23%
Information and communication	5.67%	6.21%	3.83%	4.25%	0.54	0.42	-418.69	0.56	-0.45	0.11	9.28%
Financial and insurance activities	6.41%	8.17%	3.94%	3.24%	1.76	-0.70	28.97	0.08	0.07	0.15	1.31%
Real estate activities	14.55%	13.06%	0.99%	1.71%	-1.49	0.72	-15.93	-0.23	0.30	0.07	-1.65%
Professional, scientific and technical activities	5.62%	7.44%	6.03%	8.34%	1.82	2.32	14.68	0.00	0.16	0.17	0.16%
Administrative and support service activities	3.85%	5.09%	6.01%	8.44%	1.24	2.43	8.33	0.01	0.10	0.10	0.12%
Public administration and defence; compulsory social security	5.03%	4.84%	5.57%	4.32%	-0.19	-1.26	10.29	0.09	-0.05	0.04	1.68%
Education	4.87%	5.92%	7.14%	8.34%	1.05	1.20	41.77	-0.08	0.19	0.11	-1.45%
Human health and social activities	5.51%	7.56%	10.17%	12.48%	2.05	2.31	29.83	-0.02	0.19	0.17	-0.30%
Arts, entertainment and recreation	1.11%	1.62%	2.29%	2.88%	0.51	0.60	28.61	0.00	0.04	0.03	-0.16%
Other service activities	1.48%	1.72%	2.22%	2.63%	0.24	0.40	36.94	-0.01	0.04	0.03	-0.90%
Activities of households	0.16%	0.19%	0.28%	0.15%	0.03	-0.13	29.67	0.01	0.00	0.00	3.77%
Whole economy	100%	100%	100%	100%	N/A	N/A	N/A	0.89	0.19	1.08	1.08%

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 7: UNITED KINGDOM: SECTORAL CONTRIBUTIONS TO AGGREGATE PRODUCTIVITY GROWTH, 2019–2020

Economic sector	Output shares		Employment shares		Change (2019–20, percentage points)			Contribution to productivity growth (2020, percentage points)			Labour productivity growth (2020)
	2019	2020	2019	2020	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	0.68%	0.64%	1.12%	1.12%	-0.04	0.00	-6.52	-0.03	0.01	-0.03	-4.93%
Mining and quarrying	1.07%	0.68%	0.18%	0.19%	-0.40	0.00	-29.48	-0.19	-0.19	-0.38	-17.99%
Manufacturing	9.93%	9.56%	7.76%	7.66%	-0.37	-0.10	-4.24	0.53	-0.70	-0.16	5.36%
Electricity, gas, steam and air conditioning supply	1.50%	1.56%	0.43%	0.43%	0.05	0.00	-4.04	0.07	0.02	0.09	4.63%
Water supply; sewerage, waste management and remediation activities	1.20%	1.24%	0.57%	0.57%	0.04	-0.01	-4.53	0.03	0.04	0.07	2.87%
Construction	6.40%	5.77%	6.61%	6.33%	-0.63	-0.28	-2.73	0.25	-0.76	-0.51	3.98%
Wholesale and retail trade; repair of motor vehicles and motorcycles	10.45%	10.30%	14.63%	14.60%	-0.15	-0.03	-3.38	0.58	-0.51	0.07	5.54%
Transportation and storage	3.99%	3.60%	4.81%	4.85%	-0.39	0.04	-1.69	-0.17	-0.14	-0.31	-4.26%
Accommodation and food service activities	2.94%	1.78%	7.06%	6.79%	-1.16	-0.27	-4.75	-0.32	-0.80	-1.12	-10.79%
Information and communication	6.21%	6.33%	4.27%	4.40%	0.12	0.14	-2.72	-0.16	0.42	0.26	-2.60%
Financial and insurance activities	8.17%	8.62%	3.24%	3.28%	0.45	0.04	-0.95	-0.22	0.86	0.64	-2.69%
Real estate activities	13.06%	13.69%	1.71%	1.82%	0.62	0.11	-4.26	0.43	0.48	0.92	3.31%
Professional, scientific and technical activities	7.44%	7.72%	8.35%	8.33%	0.28	-0.02	-0.51	0.18	0.27	0.44	2.36%
Administrative and support service activities	5.09%	4.50%	8.44%	8.39%	-0.59	-0.05	-2.76	-0.22	-0.27	-0.50	-4.34%
Public administration and defence; compulsory social security	4.84%	5.68%	4.32%	4.49%	0.84	0.17	3.67	0.01	0.95	0.96	0.27%
Education	5.92%	6.38%	8.34%	8.49%	0.45	0.15	19.06	-0.50	1.09	0.59	-8.36%
Human health and social activities	7.56%	8.95%	12.49%	12.81%	1.39	0.32	14.62	-0.50	2.08	1.58	-6.65%
Arts, entertainment and recreation	1.62%	1.33%	2.88%	2.76%	-0.29	-0.12	0.32	0.02	-0.28	-0.26	1.13%
Other service activities	1.72%	1.53%	2.62%	2.55%	-0.20	-0.07	-1.38	0.10	-0.27	-0.16	6.10%
Activities of households	0.19%	0.16%	0.15%	0.14%	-0.04	-0.01	-2.93	-0.02	-0.01	-0.03	-11.22%
Whole economy	100%	100%	100%	100%	N/A	N/A	N/A	-0.12	2.27	2.15	2.15%

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 8: UNITED KINGDOM: CONTRIBUTIONS OF MANUFACTURING SUB-SECTORS TO OVERALL PRODUCTIVITY GROWTH, 1998–2020

Manufacturing sub-sector	1998–2007 (average, percentage points)			2008–2010 (average, percentage points)			2011–2019 (average, percentage points)			1998–2019 (average, percentage points)			2020 (percentage points)		
	Intra-industry productivity growth effect	Allocation effect	Total	Intra-industry productivity growth effect	Allocation effect	Total	Intra-industry productivity growth effect	Allocation effect	Total	Intra-industry productivity growth effect	Allocation effect	Total	Intra-industry productivity growth effect	Allocation effect	Total
Manufacture of food products, beverages and tobacco	0.09	-0.12	-0.03	-0.03	0.03	0.00	0.01	-0.04	-0.03	0.04	-0.06	-0.03	0.08	-0.03	0.05
Manufacture of textiles, wearing apparel and leather products	0.09	-0.14	-0.05	0.05	-0.05	0.00	0.02	-0.01	0.00	0.05	-0.07	-0.02	0.04	-0.05	-0.02
Manufacture of wood and of products of wood and cork, except furniture	0.01	-0.01	0.00	-0.01	-0.01	-0.01	0.01	0.00	0.01	0.01	-0.01	0.00	0.01	-0.01	0.00
Manufacture of paper and paper products	0.03	-0.04	-0.01	0.03	-0.01	0.02	0.00	-0.01	0.00	0.02	-0.02	-0.01	0.06	-0.05	0.01
Printing and reproduction of recorded media	0.04	-0.04	0.00	0.01	-0.03	-0.02	0.01	-0.02	-0.01	0.03	-0.03	-0.01	0.02	-0.05	-0.03
Manufacture of coke and refined petroleum products	0.00	0.00	0.00	0.02	0.00	0.02	0.02	-0.01	0.00	0.01	-0.01	0.00	0.00	-0.06	-0.07
Manufacture of chemicals and chemical products	0.06	-0.12	-0.06	0.03	-0.04	-0.02	0.05	-0.04	0.01	0.05	-0.08	-0.03	0.17	-0.08	0.09
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0.07	-0.05	0.02	0.00	0.04	0.04	-0.03	0.00	-0.03	0.02	-0.02	0.00	0.12	0.01	0.12
Manufacture of rubber and plastic products	0.05	-0.06	-0.02	0.01	-0.03	-0.02	0.01	-0.01	0.00	0.02	-0.03	-0.01	0.05	-0.04	0.01
Manufacture of other non-metallic mineral products	0.02	-0.03	-0.01	-0.01	-0.02	-0.02	0.01	-0.01	0.00	0.01	-0.02	-0.01	0.02	-0.02	0.00
Manufacture of basic metals	0.01	-0.03	-0.02	-0.04	0.02	-0.01	0.01	-0.01	0.00	0.00	-0.02	-0.01	0.03	-0.01	0.02
Manufacture of fabricated metal products, except machinery and equipment	0.04	-0.07	-0.03	0.00	-0.01	-0.01	0.02	-0.01	0.01	0.03	-0.04	-0.01	0.04	-0.06	-0.02
Manufacture of computer, electronic and optical products	0.12	-0.16	-0.04	0.09	-0.05	0.05	0.02	-0.02	0.00	0.07	-0.09	-0.01	-0.03	0.01	-0.02
Manufacture of electrical equipment	0.04	-0.06	-0.02	-0.01	0.01	-0.01	0.01	-0.02	-0.01	0.02	-0.03	-0.01	0.00	-0.01	0.00
Manufacture of machinery and equipment n.e.c.	0.11	-0.13	-0.03	-0.03	0.01	-0.02	0.00	0.00	0.00	0.04	-0.06	-0.02	-0.04	-0.06	-0.10
Manufacture of motor vehicles, trailers and semi-trailers	0.05	-0.08	-0.04	0.06	-0.03	0.04	0.01	0.02	0.03	0.03	-0.03	0.00	-0.13	-0.01	-0.14
Manufacture of other transport equipment	0.07	-0.07	0.01	-0.08	0.04	-0.04	0.00	0.01	0.01	0.02	-0.02	0.00	-0.08	-0.01	-0.09
Manufacture of furniture	0.01	-0.02	0.00	0.01	-0.03	-0.01	0.00	0.00	0.00	0.01	-0.01	0.00	0.01	-0.04	-0.03
Other manufacturing	0.04	-0.04	0.00	0.01	-0.01	0.00	0.00	-0.01	0.00	0.02	-0.02	0.00	0.01	0.01	0.01
Repair and installation of machinery and equipment	0.02	-0.03	-0.01	0.03	-0.02	0.02	-0.01	0.01	0.00	0.01	-0.01	0.00	0.07	-0.02	0.04
Total manufacturing	0.99	-1.34	-0.34	0.16	-0.19	-0.03	0.16	-0.17	-0.02	0.54	-0.70	-0.17	0.53	-0.70	-0.16

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 9: UNITED KINGDOM: CHANGES IN RELATIVE SIZE OF MANUFACTURING SUB-SECTORS, 1998–2020

Manufacturing sub-sector	Change, 1998–2007, percentage points			Change, 2008–2010, percentage points			Change, 2011–2019, percentage points			Change, 1998–2019, percentage points			Change, 2019–2020, percentage points		
	Output shares	Employment shares	Relative output prices	Output shares	Employment shares	Relative output prices	Output shares	Employment shares	Relative output prices	Output shares	Employment shares	Relative output prices	Output shares	Employment shares	Relative output prices
Manufacture of food products, beverages and tobacco	-0.60	-0.48	-23.49	0.06	0.00	7.95	-0.23	-0.03	-0.23	-0.94	-0.58	-30.64	0.02	0.01	-3.32
Manufacture of textiles, wearing apparel and leather products	-0.49	-0.93	-284.35	0.06	-0.01	-25.15	0.09	-0.02	0.09	-0.48	-1.03	-350.13	-0.03	0.00	-5.11
Manufacture of wood and of products of wood and cork	-0.04	-0.10	-33.99	-0.03	0.00	-1.73	0.03	0.00	0.03	-0.05	-0.13	-42.09	0.00	0.00	-5.43
Manufacture of paper and paper products	-0.16	-0.10	-155.07	0.05	-0.02	2.07	-0.04	-0.01	-0.04	-0.15	-0.14	-158.87	0.01	-0.01	-6.13
Printing and reproduction of recorded media	-0.16	-0.22	-77.52	-0.08	-0.06	-5.59	-0.08	-0.15	-0.08	-0.34	-0.48	-108.89	-0.04	-0.01	-4.08
Manufacture of coke and refined petroleum products	-0.08	-0.01	33.08	0.03	-0.01	-3.92	0.11	0.00	0.11	0.01	-0.02	60.57	-0.07	0.00	-33.80
Manufacture of chemicals and chemical products	-0.66	-0.24	-125.36	-0.02	-0.06	-1.35	-0.01	-0.05	-0.01	-0.63	-0.37	-149.73	0.08	-0.03	-4.32
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0.10	-0.08	-12.00	0.01	0.00	14.98	-0.24	0.00	-0.24	-0.09	-0.10	4.80	0.11	0.00	-7.68
Manufacture of rubber and plastic products	-0.27	-0.35	-52.43	0.01	-0.07	-0.33	-0.06	-0.02	-0.06	-0.37	-0.49	-63.30	0.00	-0.01	-4.72
Manufacture of other non-metallic mineral products	-0.12	-0.16	-20.03	-0.01	-0.05	-3.45	0.02	-0.04	0.02	-0.20	-0.26	-26.88	-0.01	0.00	-2.74
Manufacture of basic metals	-0.23	-0.13	-12.65	-0.03	-0.03	19.36	-0.03	-0.04	-0.03	-0.32	-0.20	7.42	0.02	0.00	9.29
Manufacture of fabricated metal products, except machinery and equipment	-0.45	-0.58	-17.15	-0.10	-0.14	0.35	-0.03	-0.08	-0.03	-0.45	-0.79	-12.73	-0.04	-0.01	-2.95
Manufacture of computer, electronic and optical products	-0.59	-0.45	-215.53	0.07	-0.08	5.60	-0.06	-0.04	-0.06	-0.51	-0.61	-228.35	-0.03	0.00	-2.66
Manufacture of electrical equipment	-0.25	-0.26	-84.43	-0.01	0.00	29.40	-0.04	-0.08	-0.04	-0.34	-0.36	-91.26	-0.01	0.00	-4.59
Manufacture of machinery and equipment n.e.c.	-0.44	-0.42	-64.75	0.00	-0.06	11.22	-0.12	-0.07	-0.12	-0.55	-0.53	-47.41	-0.11	-0.04	-3.93
Manufacture of motor vehicles, trailers and semi-trailers	-0.43	-0.28	-78.52	0.06	-0.10	20.54	0.23	0.06	0.23	-0.10	-0.34	-52.60	-0.16	0.01	-1.82
Manufacture of other transport equipment	-0.05	-0.18	-34.93	-0.13	0.06	-1.13	-0.06	-0.01	-0.06	-0.11	-0.14	-6.77	-0.10	0.02	-4.41
Manufacture of furniture	-0.09	-0.14	-31.33	0.00	-0.06	-1.60	-0.02	0.01	-0.02	-0.17	-0.21	-40.97	-0.04	-0.02	-3.63
Other manufacturing	-0.07	-0.21	-83.00	0.00	-0.01	-3.64	-0.03	-0.06	-0.03	-0.12	-0.29	-79.81	0.01	0.00	-3.01
Repair and installation of machinery and equipment	-0.24	-0.24	-19.43	0.09	0.01	1.79	0.03	0.07	0.03	-0.20	-0.20	-6.38	0.03	-0.01	-3.66
Total manufacturing	-5.32	-5.55	-56.04	0.04	-0.69	5.70	-0.53	-0.56	-0.53	-6.10	-7.25	-56.66	-0.37	-0.10	-4.24

Source: Authors' computation, based on data from the UK Office for National Statistics.

TABLE 10: UNITED KINGDOM: PRODUCTIVITY GROWTH DECOMPOSITION OF 'MARKET SECTORS', 1998–2019

Economic sector	All sectors			'Market' sectors		
	Contribution to productivity growth (1998–2019, average, percentage points)			Contribution to productivity growth (1998–2019, average, percentage points)		
	Intra-industry productivity growth	Allocation effect	Total	Intra-industry productivity growth	Allocation effect	Total
Agriculture, forestry and fishing	0.04	-0.05	-0.01	0.06	-0.08	-0.02
Mining and quarrying	-0.10	0.07	-0.02	-0.14	0.10	-0.04
Manufacturing	0.54	-0.70	-0.17	0.78	-1.06	-0.28
Electricity, gas, steam and air conditioning supply	0.01	0.00	0.02	0.02	0.00	0.02
Water supply; sewerage, waste management and remediation activities	-0.03	0.04	0.01	-0.04	0.05	0.01
Construction	-0.03	0.17	0.13	-0.04	0.22	0.17
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.06	-0.01	0.05	0.09	-0.05	0.04
Transportation and storage	0.01	0.03	0.04	0.01	0.03	0.04
Accommodation and food service activities	-0.01	0.06	0.05	-0.01	0.07	0.06
Information and communication	0.56	-0.45	0.11	0.81	-0.67	0.14
Financial and insurance activities	0.08	0.07	0.15	0.11	0.08	0.19
Real estate activities	-0.23	0.30	0.07	N/A	N/A	0.00
Professional, scientific and technical activities	0.00	0.16	0.17	0.01	0.21	0.22
Administrative and support service activities	0.01	0.10	0.10	0.01	0.12	0.14
Public administration and defence; compulsory social security	0.09	-0.05	0.04	N/A	N/A	N/A
Education	-0.08	0.19	0.11	N/A	N/A	N/A
Human health and social activities	-0.02	0.19	0.17	N/A	N/A	N/A
Arts, entertainment and recreation	0.00	0.04	0.03	-0.01	0.05	0.05
Other service activities	-0.01	0.04	0.03	-0.02	0.06	0.04
Activities of households	0.01	0.00	0.00	0.01	0.00	0.00
Whole economy	0.89	0.19	1.08	1.65	-0.87	0.77

Note: N/A, not applicable.

Source: Authors' computation, based on data from the UK Office for National Statistics.

Appendix I. Definitions of variables and data sources

Variable	Measure, units	Source
Labour (hours)	Hours worked, million	UK Office for National Statistics, Compendium of data related to labour productivity by low-level industry. January 2022 release.
Labour (people)	Total jobs (thousands)	
Output (real values)	GVA in pounds, million chained volume measure (2019 = 100)	
Output (nominal values)	GVA in pounds, million at current prices	

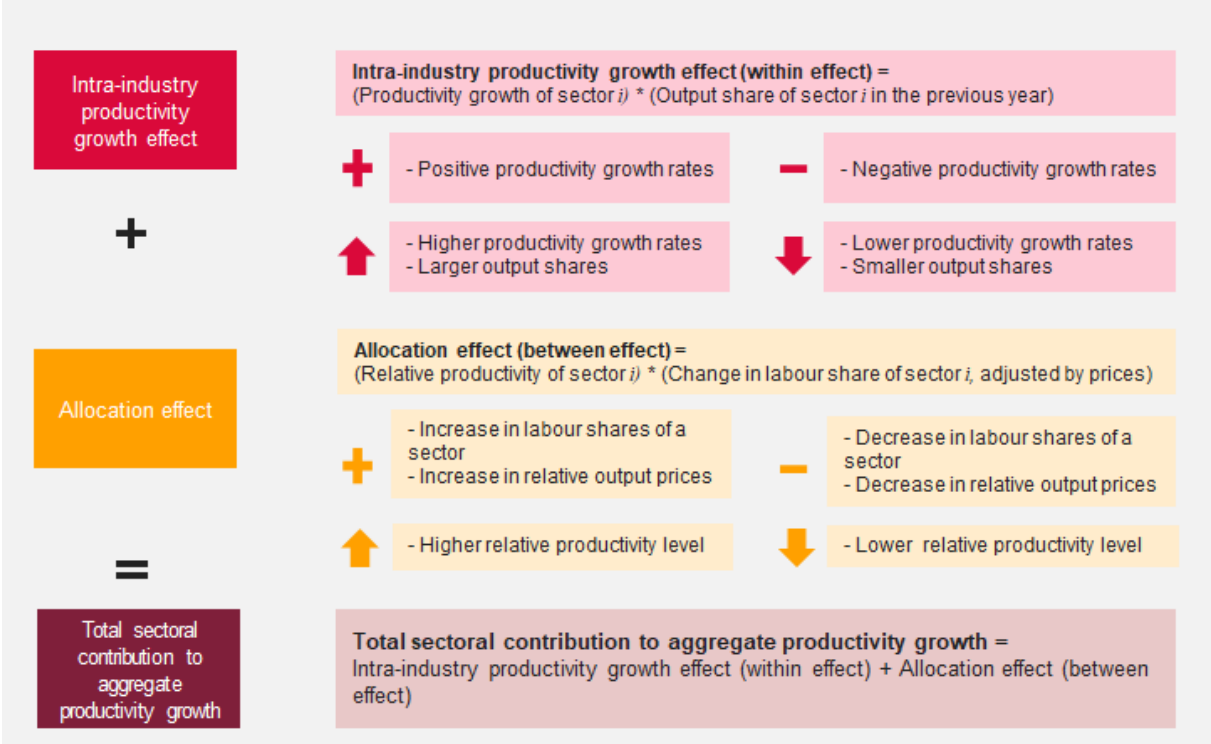
Appendix II. Decomposition of productivity growth

Economic sectors contribute disparately to aggregate productivity growth, depending on their productivity gains over time, as well as their weight in the total economy and relative productivity differences.

In order to understand the extent and nature of these contributions, we decompose the economy-wide labour productivity growth rates into sectoral contribution effects, as described in Tang and Wang:.[14] (i) an intra-industry effect that captures the productivity growth of each economic sector, given the relative importance in the economy (within effect); and (ii) an allocation effect (between-industries effect) that captures the effects of changes in the relative size of sectors.

The *intra-industry productivity growth effect* of a given sector i takes positive (negative) values whenever the sector shows positive (negative) productivity growth. Its magnitude depends on the productivity growth rate and how large the sector is in relation to other sectors in the economy. Assuming that a sector i shows a productivity level above the national average, then the *allocation effect* will take positive (negative) values if the sector increases (decreases) in size. The relative size is determined by changes in labour shares and relative output prices of sector i. By changes in relative output prices, we mean how much output prices in sector i change in relation to changes in the output prices of the whole economy.

FIGURE A.1: DECOMPOSITION OF SECTORAL CONTRIBUTION TO AGGREGATE PRODUCTIVITY GROWTH



Source: Authors, based on Tang and Wang (2004).

[14] Tang, J. and Wang, W. (2004). Sources of aggregate labour productivity growth in Canada and the United States. *Canadian Journal of Economics*, Volume 37, Number 2.

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