UNIVERSITY OF CAMBRIDGE

Cambridge Industrial Innovation Policy

Insights from France

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

About this report

This report analyses sectoral sources of labour productivity growth in France during the 1998–2017 period. The overall project includes an overview report for 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

The authors of this report are Jennifer Castañeda-Navarrete and Carlos López-Gómez.

Ana Rincon-Aznar, Principal Economist at National Institute of Economic and Social Research (NIESR), provided scientific advice.

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Insights from France

Key messages

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

- France has the fourth-highest labour productivity level, from the sample of economies studied, behind Singapore, the US and Taiwan. Between 1998 and 2017 France experienced modest productivity growth, the fourth slowest of our sample, at 2.2% (output per worker) in the1998–2017 period.
- During the global financial crisis France's productivity did not deteriorate like other European advanced economies, such as Germany and the UK. This can partly be attributed to larger amounts committed to the crisis response, the higher emphasis of this response on businesses and investment, and the smaller participation of French companies in international trade. In the decade after, however, France's productivity experienced slower growth, although the slowdown was less severe than that experienced in other large developed countries, such as the US and the UK.

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

- The sectors that contributed the most to spurring France's labour aggregate productivity in 1998–2017 include: real estate activities (15.8%); professional, scientific and technical activities (10.9%); wholesale and retail trade (9.3%); construction (7.1%); and administrative and support service activities (7.0%).
- In the pre-crisis period (1998–2007), the top five sectors driving productivity growth were: real estate activities (17.5%); professional, scientific and technical activities (10.7%); wholesale and retail trade (9.5%); construction (9.0%); and administrative and support service activities (7.8%).
- During the crisis and in its aftermath (2008–10) mostly non-market services drove productivity growth. In the decade that followed (2011–17), manufacturing saw an increase in its relative and absolute contributions to aggregate productivity growth, in comparison with those observed in the pre-crisis period. In contrast, most of the sectors experienced slower productivity growth and thus reductions in their contributions to aggregate productivity growth.

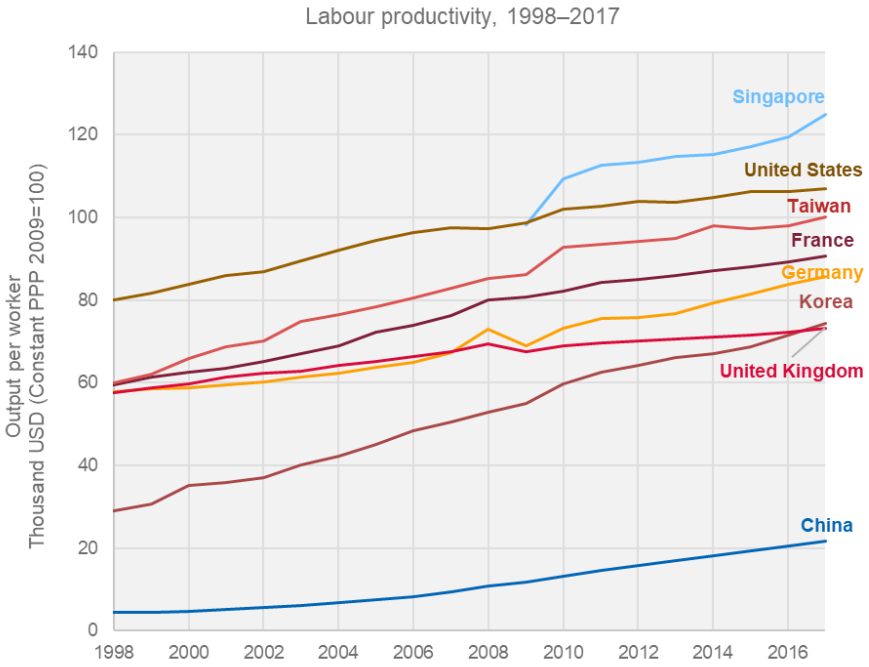
How do sectoral dynamics explain recent trends in aggregate productivity growth?

- With the exception of wholesale and retail trade and administrative and support service activities, the sectors contributing the most to aggregate productivity growth have experienced productivity growth rates that are larger than the national average of 2.5% observed in 1998–2017.
- Although wholesale and retail trade and administrative and support service activities show slower productivity growth and labour productivity levels that are below the national average, the large size of the wholesale and retail trade sector, and the sustained expansion of administrative and support service activities, explain their relatively large contributions to aggregate productivity growth.
- Professional, scientific and technical activities, which make up a sector with productivity levels above the national average, have also experienced an expansion in size.
- Manufacturing is the sector with the second-largest intra-industry productivity growth effect (productivity growth weighted by output share) in 1998–2017, behind real estate activities; however, it has experienced a significant contraction, slowing down aggregate productivity growth. Manufacturing employment shares contracted by 4.8 percentage points between 1998 and 2017. We estimate that this contraction has slowed down aggregate productivity growth by -0.3 percentage points, on average.
- The manufacture of chemical, rubber, plastics, fuel products and other non-metallic mineral products and the manufacture of transport equipment are among the industries that have experienced the largest contractions in size. These industries were severely impacted during the global financial crisis, and they have struggled to remain competitive, a phenomenon observed since the late 1990s.

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

France has the fourth-highest labour productivity level, from the sample of economies studied,[1] with US$90,791 output per worker[2] in 2017, behind Singapore, the US and Taiwan. Between 1998 and 2017 France experienced modest productivity growth, the fourth slowest, observing an annual average growth rate of 2.2% (output per worker) in the period of 1998–2017 (Figure 1).

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%

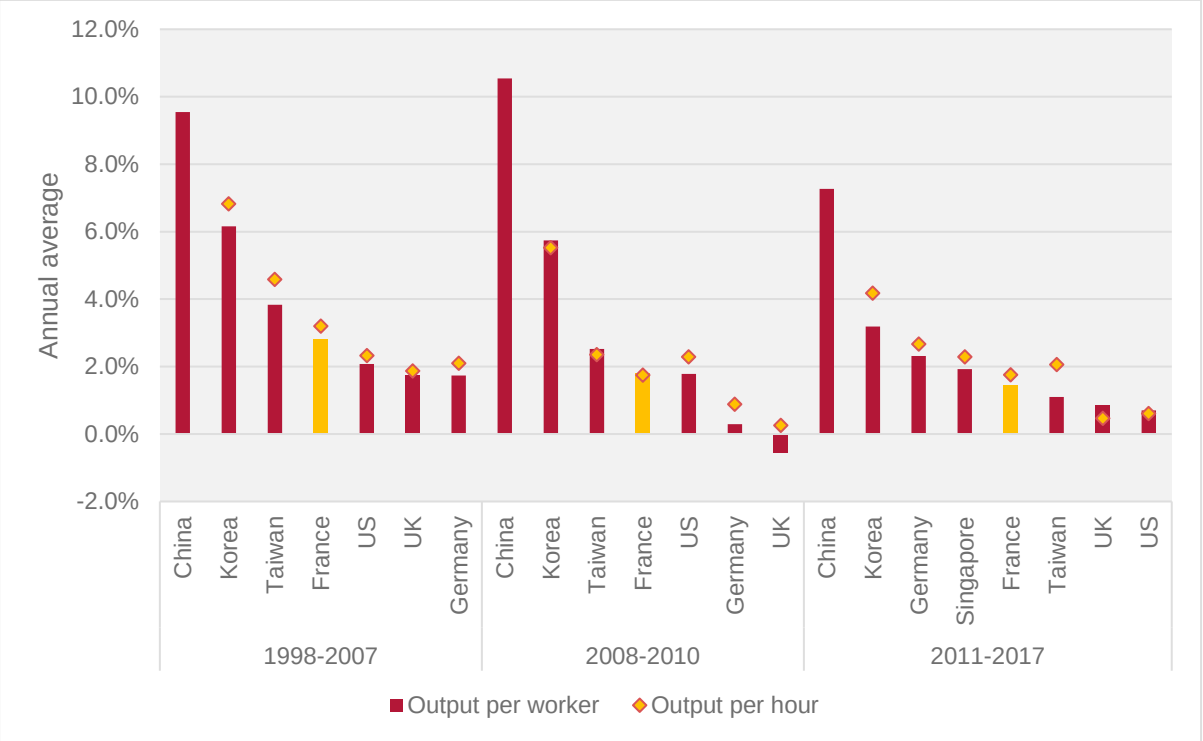
Note: [1/] The period of 2010–17 for Singapore.

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.); 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.

During the global financial crisis France's productivity did not deteriorate as much as other European advanced economies, such as Germany and the UK. This can partly be attributed to larger amounts committed to the crisis response, the higher emphasis of this response on businesses and investment, and the smaller participation of French companies in international trade.[3] In the decade after, however, France's productivity experienced slower growth, although the slowdown was less severe than that seen in other large developed countries, such as the US and the UK (Figure 2).

[1] China, France, Germany, Korea, Taiwan, Singapore, the United Kingdom and the United States.
[2] Constant purchasing power parity (PPP), 2009 = 100.
[3] Cabannes, P.Y., Cottet, V., Dubois, Y., Lelarge, C. and Sicsic, M. (2013). French firms in the face of the 2008/2009 crisis (No. g2013-13). Institut National de la Statistique et des Etudes Economiques, DESE.

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



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 France's aggregate labour productivity growth?

The sectors that contributed the most to spurring France's labour aggregate productivity in 1998–2017 include: real estate activities (15.8%); professional, scientific and technical activities (10.9%); wholesale and retail trade (9.3%); construction (7.1%); and administrative and support service activities (7.0%).

In the pre-crisis period (1998–2007) the top five sectors driving productivity growth were: real estate activities (17.5%); professional, scientific and technical activities (10.7%); wholesale and retail trade (9.5%); construction (9.0%); and administrative and support service activities (7.8%).

During the crisis and in its aftermath (2008–10), mostly non-market services drove productivity growth. In the decade that followed (2011–17) manufacturing saw an increase in its relative and absolute contributions to aggregate productivity growth, in comparison with those observed in the pre-crisis period. In contrast, most of the sectors experienced contractions in their contributions to aggregate productivity growth (Figure 3 and Figure 5). As Table 1 shows, with the exception of agriculture, forestry and fishing, all sectors observed a reduction in their productivity growth rates between 1998–2007 and 2011–17.

FIGURE 3: TOP FIVE SECTORS CONTRIBUTING TO FRANCE'S AGGREGATE PRODUCTIVITY GROWTH (1998–2017)

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

Pre-crisis (1998-2007)
Aggregate productivity growth rate: 3.2%

Sector	% of aggregate productivity growth	Percentage points
Real estate activities	17.5	0.56
Professional, scientific and technical activities	10.7	0.34
Wholesale and retail trade	9.5	0.30
Construction	9.0	0.29
Administrative and support service activities	7.8	0.25

Crisis (2008-2010)
Aggregate productivity growth rate: 1.7%

Sector	% of aggregate productivity growth	Percentage points
Financial and insurance activities	17.2	0.30
Public administration and defence	15.1	0.26
Human health and social activities	11.8	0.21
Education	11.3	0.20
Professional, scientific and technical activities	11.2	0.19

Post-crisis (2011-2017)
Aggregate productivity growth rate: 1.8%

Sector	% of aggregate productivity growth	Percentage points
Real estate activities	14.9	0.26
Professional, scientific and technical activities	11.4	0.20
Manufacturing	9.5	0.17
Wholesale and retail trade	9.5	0.17
Administrative and support service activities	8.5	0.15

Whole period (1998-2017)
Aggregate productivity growth rate: 2.5%

Sector	% of aggregate productivity growth	Percentage points
Real estate activities	15.8	0.39
Professional, scientific and technical activities	10.9	0.27
Wholesale and retail trade	9.3	0.23
Construction	7.1	0.17
Administrative and support service activities	7.0	0.17

Source: OECD (2020). Structural Analysis Database (STAN).

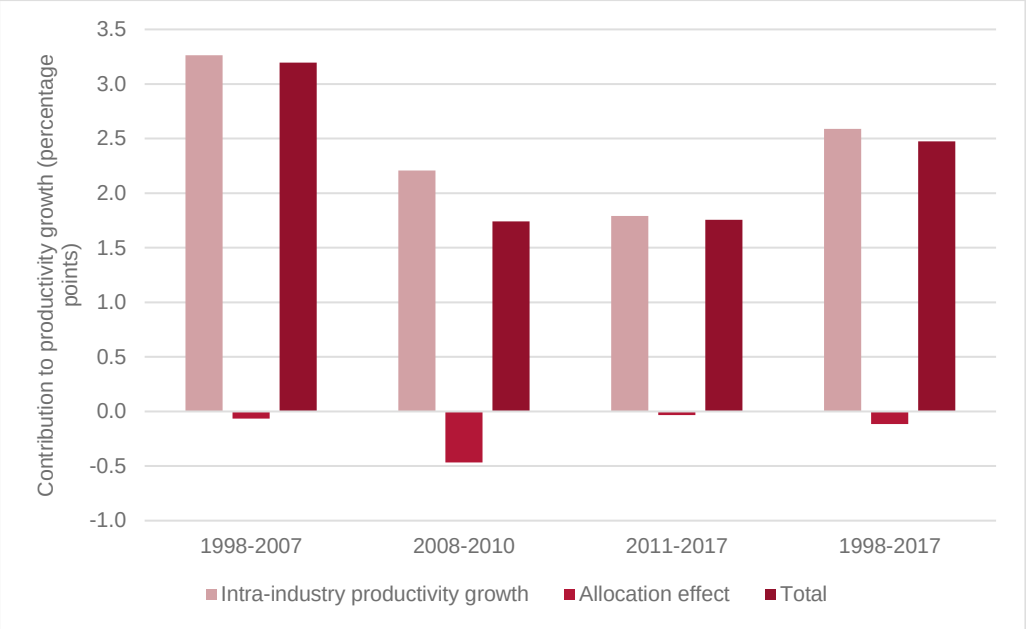
3. How do sectoral dynamics explain recent trends in aggregate productivity growth?

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 contribution to overall labour productivity growth, given 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 (2004).[4] Appendix II explains this decomposition in more detail.

Like the rest of the economies analysed in this report, aggregate productivity growth in France is mainly explained by intra-industry productivity growth, while structural changes have led to negative contributions to aggregate productivity, as Figure 4 shows (-0.1 in 1998–2017). The importance of allocation effects, which capture the reallocation of resources across sectors over time, rose during the financial crisis (2008–10), representing 27% of the productivity growth experienced in that period (1.7%).

FIGURE 4: DECOMPOSITION OF FRANCE'S AGGREGATE PRODUCTIVITY GROWTH (1998–2017)



Source: OECD (2020). Structural Analysis Database (STAN).

The decomposition was also conducted excluding sectors that involve a large non-market component (real estate activities, public administration and defence, education, human health activities, and residential care and social work activities). Table 9 presents the results of this decomposition for the 1998–2017 period. Key highlights include smaller aggregate intra-industry

[4] 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.

productivity growth effects (2.36 percentage points) and less negative allocation effects (-0.10 percentage points). Smaller intra-industry productivity growth effects are mainly explained by the exclusion of real estate activities from the analysis, which is the sector with the largest intra-industry growth effect in the period of analysis. The changes in allocation effects are explained by larger and positive allocation effects from professional, scientific and technical activities and administrative and support service activities.

As discussed in Section 2, the economic sectors that contributed the most to France's aggregate labour productivity include: real estate activities; professional, scientific and technical activities; wholesale and retail trade; construction; and administrative and support service activities. As Table 1 and Table 7 show, with the exception of wholesale and retail trade and administrative and support service activities, these sectors experienced productivity growth rates that are larger than the national average of 2.5% observed in 1998–2017.

Although wholesale and retail trade and administrative and support service activities show slower productivity growth and labour productivity levels that are below the national average, the large size of the wholesale and retail trade sector (10.4% output shares and 13.4% employment shares in 2017), and the sustained expansion of administrative and support service activities (0.6 percentage points increase in output shares and 2.3 percentage points increase in employment shares between 1998 and 2017), explain their relatively large contributions to aggregate productivity growth. Professional, scientific and technical activities, which make up a sector with productivity levels above the national average, also experienced an expansion between 1998 and 2017 (1.8 percentage points increase in output shares and 1.7 percentage points increase in employment shares).

Focusing only on the contribution of economic sectors to aggregate productivity growth because of their intra-industry productivity growth effect (productivity growth weighted by their output share), manufacturing was the sector that made the second largest contribution in 1998–2017 (0.38 percentage points), behind real estate activities (0.41 percentage points).

Manufacturing productivity shows a moderate growth rate in the period analysed (2.7%, on average, in 1998–2017) (Table 1). Within this sector, the manufacturing sub-sectors that experienced the fastest productivity growth include (in brackets, annual average growth in 1998–2017): the manufacture of transport equipment (3.9%); the manufacture of chemical products (3.3%); the manufacture of textiles, wearing apparel, leather and related products (3.3%); the manufacture of furniture and other manufacturing (3.0%); and the manufacture of machinery and equipment (3.0%) (Table 2).

Between 1998 and 2017, France's manufacturing sector experienced a significant contraction, which slowed down aggregate productivity growth. Manufacturing employment shares contracted by 4.8 percentage points. We estimate that this contraction imposed a penalty on aggregate productivity growth of -0.3 percentage points, on average, between 1998 and 2017 (allocation effect, see Table 6).

Manufacturing sub-sectors that help to explain this behaviour include (in brackets, negative allocation effect in 1998–2017): the manufacture of chemical, rubber, plastics, fuel products and other non-metallic mineral products (-0.07 percentage points); the manufacture of transport equipment (-0.04 percentage points); and the manufacture of basic metals and fabricated metal products, except machinery and equipment (-0.03 percentage points). These are industries that have experienced among the largest contractions in their size. In the case of transport equipment, large reductions are also seen in relative output prices (-2.92 percentage points in 1998-2017, Table 8). These industries were severely impacted during the global financial crisis and they have struggled to remain competitive, a phenomenon observed since the late 1990s.[5]

[5] Ministry for Finance and Public Accounts – Ministry for the Economy, Industrial Renewal and Digital Affairs (2014). Challenges facing the French manufacturing sector. Trésor-economics. No. 124 - February 2014.

TABLE 1: FRANCE: PRODUCTIVITY LEVELS AND GROWTH RATES BY SECTOR, 1998–2017

Economic sector	Output per hour							
	1998–2007		2008–2010		2011–2017		1998–2017	
	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth
Agriculture, forestry and fishing	13.7	2.9%	15.6	0.7%	18.9	7.8%	15.8	4.3%
Mining and quarrying	54.6	8.8%	69.3	-1.6%	74.5	2.1%	63.8	4.9%
Manufacturing	41.6	3.2%	47.2	1.9%	53.4	2.5%	46.6	2.7%
Electricity, gas, steam and air conditioning supply	142.4	4.9%	127.5	-7.8%	160.2	4.8%	146.4	3.0%
Water supply; sewerage, waste management and remediation activities	45.6	2.6%	54.3	3.0%	56.7	1.4%	50.8	2.2%
Construction	26.5	3.9%	32.6	2.1%	35.1	2.0%	30.4	3.0%
Wholesale and retail trade; repair of motor vehicles and motorcycles	29.5	2.4%	32.9	0.7%	35.2	1.6%	32.0	1.9%
Transportation and storage	31.2	2.6%	37.4	4.7%	41.0	1.4%	35.6	2.5%
Accommodation and food service activities	21.7	3.0%	24.9	0.6%	26.8	1.9%	24.0	2.3%
Information and communication	67.8	2.6%	73.7	-0.4%	74.0	0.6%	70.9	1.4%
Financial and insurance activities	48.3	3.9%	57.0	0.0%	68.3	3.2%	56.6	3.1%
Real estate activities	288.8	4.2%	403.6	5.7%	427.9	1.4%	354.7	3.4%
Professional, scientific and technical activities	39.4	3.9%	48.7	2.0%	48.9	0.5%	44.1	2.4%
Administrative and support service activities	29.2	1.1%	32.8	0.9%	34.0	0.7%	31.4	0.9%
Public administration and defence; compulsory social security	31.5	3.5%	40.3	4.6%	46.3	1.8%	38.0	3.1%
Education	35.4	2.6%	39.6	1.4%	44.5	2.1%	39.2	2.2%
Human health activities	30.6	3.6%	36.9	1.8%	39.0	1.6%	34.5	2.6%
Residential care and social work activities	17.3	4.0%	22.0	4.5%	25.0	2.3%	20.7	3.5%
Arts, entertainment and recreation	27.9	2.8%	31.9	1.3%	34.0	1.6%	30.6	2.2%
Other service activities	23.5	4.7%	27.9	0.1%	26.9	0.3%	25.3	2.5%
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	10.0	3.9%	11.1	-4.5%	10.7	0.4%	10.4	1.4%
Whole economy	35.9	3.2%	42.5	1.7%	46.1	1.8%	40.5	2.5%

Note: [1/] Chained prices of the previous year.

Source: OECD (2020). Structural Analysis Database (STAN).

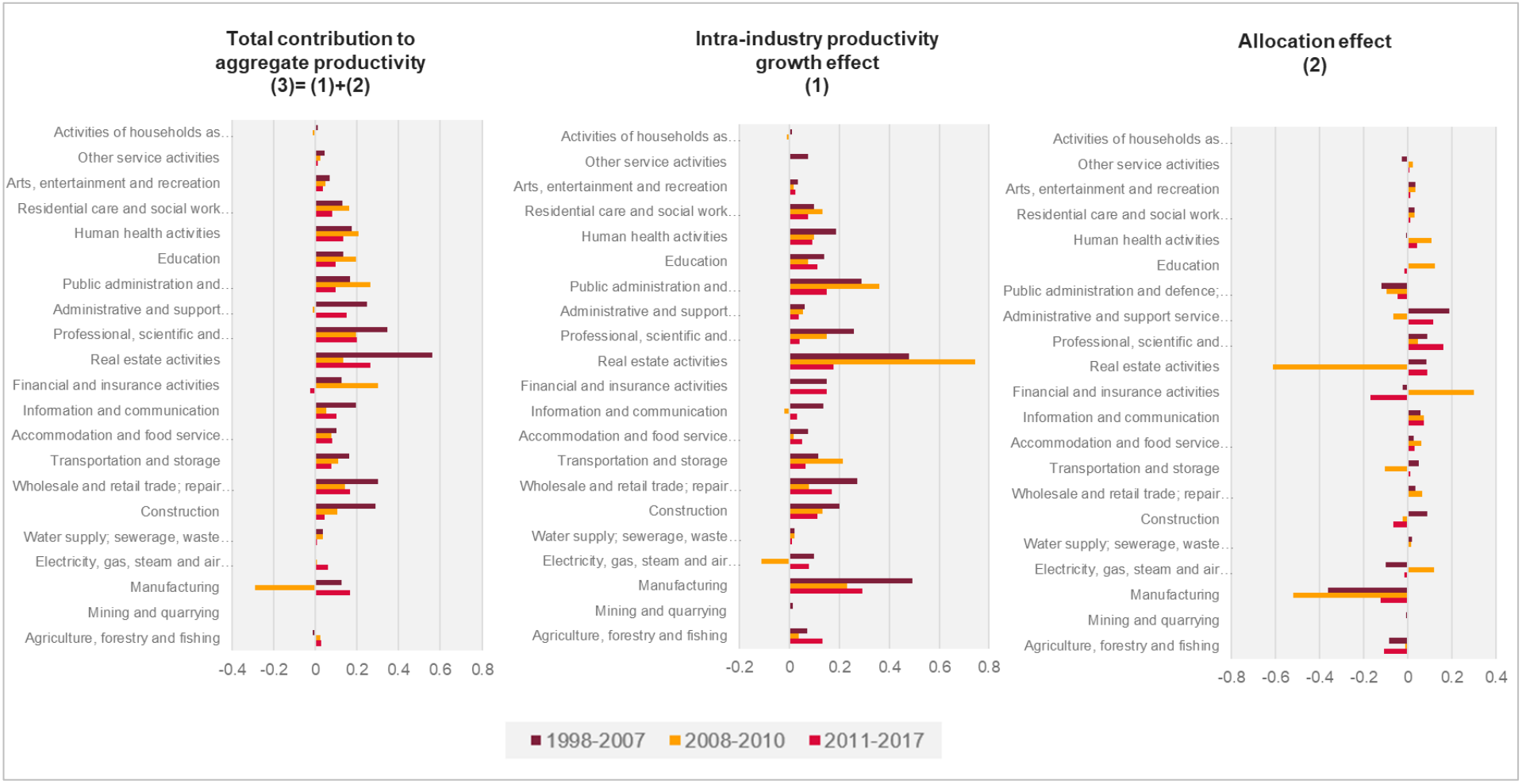
TABLE 2: FRANCE: PRODUCTIVITY LEVELS AND GROWTH BY MANUFACTURING SUB-SECTORS, 1998–2017

Manufacturing sub- sector	Output per hour							
	1998–2007		2008–2010		2011–2017		1998–2017	
	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth	Average absolute value (euros[1/])	Average annual growth
Manufacture of food products, beverages and tobacco	36.8	2.5%	40.4	2.6%	42.8	1.1%	39.4	2.0%
Manufacture of textiles, wearing apparel, leather and related products	23.8	4.6%	28.2	0.0%	32.6	2.8%	27.5	3.3%
Manufacture of wood and paper products, and printing	31.1	2.2%	34.2	0.8%	36.9	2.9%	33.6	2.2%
Manufacture of chemical, rubber, plastics, fuel products and other non-metallic mineral products	58.6	3.7%	67.1	0.2%	80.3	4.2%	67.5	3.3%
Manufacture of basic metals and fabricated metal products, except machinery and equipment	32.0	3.0%	39.3	2.6%	41.6	1.7%	36.5	2.5%
Manufacture of computer, electronic and optical products	74.2	2.4%	79.8	5.5%	86.4	0.7%	79.3	2.3%
Manufacture of electrical equipment	44.0	1.9%	47.4	2.4%	51.3	1.6%	47.1	1.9%
Manufacture of machinery and equipment n.e.c.	38.5	3.8%	42.5	2.1%	49.8	2.2%	43.1	3.0%
Manufacture of transport equipment	65.6	3.5%	74.3	5.2%	92.0	3.8%	76.2	3.9%
Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment	31.7	3.0%	36.7	3.0%	44.2	3.0%	36.8	3.0%
Total manufacturing	41.6	3.2%	47.2	1.9%	53.4	2.5%	46.6	2.7%

Note: [1/] Chained prices of the previous year.

Source: OECD (2020). Structural Analysis Database (STAN).

FIGURE 5: SECTORAL CONTRIBUTION TO FRANCE'S AGGREGATE PRODUCTIVITY GROWTH, 1998–2017



Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 3: FRANCE: SECTORAL CONTRIBUTIONS TO OVERALL PRODUCTIVITY GROWTH,1998–2007

Economic sector	Output shares		Employment shares		Structural 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	2.6%	1.8%	4.0%	3.0%	-0.8	-1.0	8.2	0.07	-0.08	-0.01	2.92%
Mining and quarrying	0.1%	0.1%	0.1%	0.1%	0.0	0.0	4.4	0.01	-0.01	0.00	8.83%
Manufacturing	16.4%	13.0%	14.1%	11.3%	-3.5	-2.8	1.0	0.49	-0.36	0.13	3.16%
Electricity, gas, steam and air conditioning supply	2.2%	1.5%	0.5%	0.5%	-0.7	-0.1	-15.6	0.10	-0.10	0.00	4.90%
Water supply; sewerage, waste management and remediation activities	0.6%	0.7%	0.5%	0.6%	0.1	0.1	1.8	0.02	0.02	0.04	2.60%
Construction	4.7%	6.0%	5.7%	6.7%	1.4	1.0	2.7	0.20	0.09	0.29	3.93%
Wholesale and retail trade; repair of motor vehicles and motorcycles	11.3%	10.7%	13.3%	13.6%	-0.6	0.3	-0.8	0.27	0.03	0.30	2.39%
Transportation and storage	4.5%	4.5%	5.0%	5.2%	0.1	0.1	3.3	0.11	0.05	0.16	2.56%
Accommodation and food service activities	2.4%	2.5%	3.5%	3.9%	0.2	0.4	-2.2	0.07	0.03	0.10	3.05%
Information and communication	5.1%	5.3%	2.6%	2.8%	0.1	0.2	-1.9	0.14	0.06	0.19	2.56%
Financial and insurance activities	3.7%	3.8%	2.8%	2.8%	0.2	0.0	-1.1	0.15	-0.03	0.12	3.91%
Real estate activities	10.9%	12.9%	1.4%	1.4%	2.0	0.0	0.9	0.48	0.08	0.56	4.19%
Professional, scientific and technical activities	6.1%	7.3%	5.5%	6.2%	1.2	0.7	0.6	0.26	0.09	0.34	3.92%
Administrative and support service activities	5.0%	5.6%	5.9%	7.4%	0.6	1.5	-0.5	0.06	0.19	0.25	1.14%
Public administration and defence; compulsory social security	8.5%	7.8%	10.5%	9.6%	-0.7	-0.9	-1.1	0.29	-0.12	0.17	3.54%
Education	5.4%	5.1%	7.2%	6.9%	-0.3	-0.3	-2.0	0.14	-0.01	0.13	2.60%
Human health activities	5.2%	5.4%	6.2%	6.3%	0.2	0.0	-0.4	0.19	-0.01	0.18	3.61%
Residential care and social work activities	2.3%	2.8%	6.0%	6.4%	0.5	0.5	0.3	0.10	0.03	0.13	4.04%
Arts, entertainment and recreation	1.0%	1.3%	1.5%	2.0%	0.2	0.5	0.0	0.03	0.03	0.07	2.84%
Other service activities	1.6%	1.5%	2.9%	2.4%	-0.1	-0.5	-4.5	0.07	-0.03	0.04	4.69%
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.2%	0.3%	0.6%	0.7%	0.0	0.2	-2.3	0.01	0.00	0.01	3.94%
Whole economy	100.0%	100.0%	100.0%	100.0%	N/A	N/A	N/A	3.26	-0.07	3.20	3.20%

Note: N/A, not available.

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 4: FRANCE: SECTORAL CONTRIBUTIONS TO OVERALL PRODUCTIVITY GROWTH, 2008–2010

Economic sector	Output shares		Employment shares		Structural 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	1.7%	1.8%	2.9%	2.8%	0.1	-0.1	37.9	0.04	-0.01	0.02	0.70%
Mining and quarrying	0.1%	0.1%	0.1%	0.1%	0.0	0.0	0.8	0.00	0.00	0.00	-1.59%
Manufacturing	12.3%	11.5%	11.1%	10.2%	-0.9	-0.9	-1.7	0.23	-0.52	-0.29	1.93%
Electricity, gas, steam and air conditioning supply	1.4%	1.4%	0.4%	0.5%	0.0	0.0	-0.2	-0.11	0.12	0.00	-7.78%
Water supply; sewerage, waste management and remediation activities	0.7%	0.8%	0.5%	0.6%	0.1	0.0	4.6	0.02	0.01	0.03	2.97%
Construction	6.3%	6.0%	6.9%	6.9%	-0.3	0.0	-6.4	0.13	-0.03	0.11	2.11%
Wholesale and retail trade; repair of motor vehicles and motorcycles	11.0%	10.5%	13.6%	13.8%	-0.5	0.1	-3.2	0.08	0.07	0.14	0.71%
Transportation and storage	4.6%	4.6%	5.2%	5.0%	0.0	-0.1	-5.6	0.21	-0.11	0.11	4.70%
Accommodation and food service activities	2.5%	2.6%	3.9%	4.1%	0.1	0.2	3.6	0.02	0.06	0.08	0.62%
Information and communication	5.2%	5.1%	2.9%	2.9%	-0.1	0.0	-0.9	-0.02	0.07	0.05	-0.40%
Financial and insurance activities	3.6%	4.5%	2.8%	2.9%	1.0	0.0	24.5	0.00	0.30	0.30	0.00%
Real estate activities	13.1%	12.7%	1.4%	1.3%	-0.5	-0.1	-3.8	0.74	-0.61	0.13	5.68%
Professional, scientific and technical activities	7.5%	7.5%	6.3%	6.4%	0.0	0.1	-1.9	0.15	0.04	0.19	2.03%
Administrative and support service activities	5.6%	5.3%	7.4%	7.1%	-0.4	-0.3	0.7	0.05	-0.07	-0.02	0.95%
Public administration and defence; compulsory social security	7.8%	8.2%	9.4%	9.2%	0.4	-0.2	0.7	0.36	-0.10	0.26	4.57%
Education	5.2%	5.4%	7.0%	7.3%	0.2	0.3	-1.5	0.07	0.12	0.20	1.40%
Human health activities	5.4%	5.7%	6.3%	6.7%	0.3	0.3	1.5	0.10	0.11	0.21	1.82%
Residential care and social work activities	2.9%	3.1%	6.5%	6.8%	0.3	0.3	0.6	0.13	0.03	0.16	4.47%
Arts, entertainment and recreation	1.3%	1.4%	2.0%	2.2%	0.1	0.1	3.5	0.02	0.03	0.05	1.29%
Other service activities	1.5%	1.5%	2.4%	2.5%	0.0	0.1	0.3	0.00	0.02	0.02	0.08%
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.2%	0.2%	0.7%	0.8%	0.0	0.0	17.9	-0.01	0.00	-0.01	-4.53%
Whole economy	100.0%	100.0%	100.0%	100.0%	N/A	N/A	N/A	2.21	-0.47	1.74	1.74%

Note: N/A, not applicable.

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 5: FRANCE: SECTORAL CONTRIBUTIONS TO OVERALL PRODUCTIVITY GROWTH, 2011–2017

Economic sector	Output shares		Employment shares		Structural change (2011–17, percentage points)			Contribution to productivity growth (2011–17, average, percentage points)			Labour productivity growth (2011–17)
	2011	2017	2011	2017	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	1.8%	1.7%	2.8%	2.7%	-0.1	-0.1	-0.1	0.13	-0.11	0.03	7.76%
Mining and quarrying	0.1%	0.1%	0.1%	0.1%	0.0	0.0	-2.1	0.00	-0.01	0.00	2.15%
Manufacturing	11.6%	11.2%	10.0%	9.3%	-0.4	-0.8	-0.9	0.29	-0.12	0.17	2.52%
Electricity, gas, steam and air conditioning supply	1.5%	1.7%	0.5%	0.5%	0.2	0.0	-13.1	0.08	-0.02	0.06	4.83%
Water supply; sewerage, waste management and remediation activities	0.8%	0.7%	0.6%	0.6%	0.0	0.0	-2.6	0.01	0.00	0.01	1.38%
Construction	6.0%	5.6%	6.8%	6.2%	-0.4	-0.6	-2.1	0.11	-0.07	0.04	1.97%
Wholesale and retail trade; repair of motor vehicles and motorcycles	10.5%	10.4%	13.6%	13.4%	-0.1	-0.3	1.2	0.17	0.00	0.17	1.63%
Transportation and storage	4.5%	4.6%	5.1%	5.0%	0.1	-0.1	2.4	0.06	0.01	0.08	1.42%
Accommodation and food service activities	2.7%	2.8%	4.2%	4.4%	0.2	0.2	2.6	0.05	0.03	0.08	1.93%
Information and communication	5.1%	5.2%	2.9%	3.1%	0.2	0.2	3.3	0.03	0.07	0.10	0.61%
Financial and insurance activities	4.3%	3.8%	2.9%	2.8%	-0.4	-0.1	1.4	0.15	-0.17	-0.02	3.22%
Real estate activities	12.6%	12.9%	1.4%	1.3%	0.3	-0.1	-0.5	0.18	0.09	0.26	1.38%
Professional, scientific and technical activities	7.7%	8.0%	6.7%	7.2%	0.3	0.5	-0.9	0.04	0.16	0.20	0.49%
Administrative and support service activities	5.4%	5.7%	7.3%	8.2%	0.3	0.9	-1.5	0.04	0.11	0.15	0.67%
Public administration and defence; compulsory social security	8.1%	7.9%	9.0%	8.7%	-0.3	-0.3	0.0	0.15	-0.05	0.10	1.80%
Education	5.4%	5.4%	7.0%	7.2%	0.0	0.1	1.5	0.11	-0.02	0.09	2.07%
Human health activities	5.7%	5.9%	6.7%	7.0%	0.2	0.3	0.3	0.09	0.04	0.13	1.56%
Residential care and social work activities	3.2%	3.3%	7.0%	7.0%	0.1	0.1	-1.3	0.07	0.01	0.08	2.25%
Arts, entertainment and recreation	1.3%	1.4%	2.1%	2.2%	0.1	0.0	-0.1	0.02	0.01	0.03	1.62%
Other service activities	1.4%	1.4%	2.6%	2.7%	0.0	0.1	-0.4	0.00	0.01	0.01	0.30%
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.2%	0.2%	0.7%	0.6%	0.0	-0.1	-0.7	0.00	-0.01	0.00	0.38%
Whole economy	100.0%	100.0%	100.0%	100.0%	N/A	N/A	N/A	1.79	-0.03	1.76	1.76%

Note: N/A, not applicable.

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 6: FRANCE: SECTORAL CONTRIBUTIONS TO OVERALL PRODUCTIVITY GROWTH, 1998–2017

Economic sector	Output shares		Employment shares		Structural change (1998–2017, percentage points)			Contribution to productivity growth (1998–2017, average, percentage points)			Labour productivity growth (1998–2017)
	1998	2017	1998	2017	Output	Employment	Relative output prices	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	
Agriculture, forestry and fishing	2.6%	1.7%	4.0%	2.7%	-0.9	-1.3	0.1	0.09	-0.08	0.01	4.28%
Mining and quarrying	0.1%	0.1%	0.1%	0.1%	-0.1	-0.1	-2.9	0.01	-0.01	0.00	4.93%
Manufacturing	16.4%	11.2%	14.1%	9.3%	-5.2	-4.8	-0.1	0.38	-0.30	0.08	2.75%
Electricity, gas, steam and air conditioning supply	2.2%	1.7%	0.5%	0.5%	-0.5	-0.1	2.5	0.06	-0.04	0.02	2.97%
Water supply; sewerage, waste management and remediation activities	0.6%	0.7%	0.5%	0.6%	0.1	0.1	0.8	0.02	0.01	0.03	2.23%
Construction	4.7%	5.6%	5.7%	6.2%	1.0	0.5	2.0	0.16	0.02	0.17	2.97%
Wholesale and retail trade; repair of motor vehicles and motorcycles	11.3%	10.4%	13.3%	13.4%	-0.9	0.1	1.1	0.21	0.02	0.23	1.87%
Transportation and storage	4.5%	4.6%	5.0%	5.0%	0.1	-0.1	2.0	0.11	0.01	0.12	2.48%
Accommodation and food service activities	2.4%	2.8%	3.5%	4.4%	0.5	0.9	-1.7	0.06	0.03	0.09	2.29%
Information and communication	5.1%	5.2%	2.6%	3.1%	0.1	0.5	0.0	0.08	0.06	0.14	1.43%
Financial and insurance activities	3.7%	3.8%	2.8%	2.8%	0.2	0.0	-4.9	0.13	-0.03	0.10	3.08%
Real estate activities	10.9%	12.9%	1.4%	1.3%	2.0	-0.1	-0.7	0.41	-0.02	0.39	3.43%
Professional, scientific and technical activities	6.1%	8.0%	5.5%	7.2%	1.8	1.7	-0.3	0.17	0.11	0.27	2.44%
Administrative and support service activities	5.0%	5.7%	5.9%	8.2%	0.6	2.3	-1.2	0.05	0.12	0.17	0.95%
Public administration and defence; compulsory social security	8.5%	7.9%	10.5%	8.7%	-0.7	-1.8	0.5	0.25	-0.09	0.16	3.09%
Education	5.4%	5.4%	7.2%	7.2%	0.0	0.0	-0.4	0.12	0.01	0.13	2.23%
Human health activities	5.2%	5.9%	6.2%	7.0%	0.7	0.7	-0.7	0.14	0.03	0.17	2.62%
Residential care and social work activities	2.3%	3.3%	6.0%	7.0%	1.0	1.1	-2.1	0.09	0.02	0.12	3.48%
Arts, entertainment and recreation	1.0%	1.4%	1.5%	2.2%	0.4	0.7	1.0	0.03	0.03	0.05	2.18%
Other service activities	1.6%	1.4%	2.9%	2.7%	-0.2	-0.2	-2.6	0.04	-0.01	0.03	2.46%
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.2%	0.2%	0.6%	0.6%	-0.1	0.0	-1.9	0.00	0.00	0.00	1.42%
Whole economy	100.0%	100.0%	100.0%	100.0%	N/A	N/A	N/A	2.59	-0.11	2.47	2.47%

Note: N/A, not applicable.

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 7: FRANCE: CONTRIBUTIONS OF MANUFACTURING SUB-SECTORS TO OVERALL PRODUCTIVITY GROWTH, 1998–2017

Manufacturing sub-sector	1998–2007 (average, percentage points)			2008–2010 (average, percentage points)			2011–2017 (average, percentage points)			1998–2017 (average, 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
Manufacture of food products, beverages and tobacco	0.07	-0.04	0.03	0.06	-0.07	-0.02	0.03	0.02	0.05	0.05	-0.02	0.03
Manufacture of textiles, wearing apparel, leather and related products	0.03	-0.05	-0.02	0.00	-0.02	-0.03	0.01	-0.01	0.00	0.02	-0.03	-0.01
Manufacture of wood and paper products, and printing	0.02	-0.03	0.00	0.01	-0.04	-0.03	0.02	-0.01	0.00	0.02	-0.02	-0.01
Manufacture of chemical, rubber, plastics, fuel products and other non-metallic mineral products	0.12	-0.08	0.05	0.00	-0.12	-0.12	0.11	-0.05	0.06	0.10	-0.07	0.03
Manufacture of basic metals and fabricated metal products, except machinery and equipment	0.05	-0.03	0.03	0.04	-0.08	-0.04	0.02	-0.01	0.01	0.04	-0.03	0.01
Manufacture of computer, electronic and optical products	0.03	-0.04	-0.01	0.04	-0.06	-0.03	0.00	0.00	0.00	0.02	-0.03	-0.01
Manufacture of electrical equipment	0.01	-0.02	-0.01	0.01	-0.02	-0.01	0.01	-0.01	0.00	0.01	-0.01	-0.01
Manufacture of machinery and equipment n.e.c.	0.03	-0.02	0.02	0.01	-0.05	-0.04	0.01	-0.01	0.00	0.02	-0.02	0.00
Manufacture of transport equipment	0.07	-0.04	0.03	0.07	-0.08	-0.01	0.06	-0.03	0.02	0.06	-0.04	0.02
Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment	0.05	-0.03	0.02	0.04	-0.02	0.03	0.04	-0.03	0.02	0.05	-0.02	0.02
Total manufacturing	0.23	-0.52	-0.29	0.23	-0.52	-0.29	0.29	-0.12	0.17	0.38	-0.30	0.08

Note: N/A, not applicable.

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 8: FRANCE: CHANGES IN RELATIVE SIZE OF MANUFACTURING SUB-SECTORS, 1998–2017

Manufacturing sub-sector	Change, 1998–2007, percentage points			Change, 2008–2010, percentage points			Change, 2011–2017, percentage points			Change, 1998–2017, 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
Manufacture of food products, beverages and tobacco	-0.58	-0.25	1.42	-0.09	-0.04	-13.02	0.02	0.02	-4.11	-0.68	-0.25	-1.94
Manufacture of textiles, wearing apparel, leather and related products	-0.35	-0.62	-1.91	-0.06	-0.08	2.68	-0.04	-0.05	2.74	-0.47	-0.80	-2.84
Manufacture of wood and paper products, and printing	-0.33	-0.27	-1.26	-0.10	-0.09	1.89	-0.07	-0.14	1.22	-0.51	-0.55	0.31
Manufacture of chemical, rubber, plastics, fuel products and other non-metallic mineral products	-0.51	-0.34	-0.73	-0.27	-0.21	1.89	0.03	-0.18	0.66	-0.89	-0.78	-0.07
Manufacture of basic metals and fabricated metal products, except machinery and equipment	-0.29	-0.31	4.93	-0.13	-0.14	0.60	-0.15	-0.14	-2.03	-0.58	-0.63	4.10
Manufacture of computer, electronic and optical products	-0.37	-0.16	-0.01	-0.05	-0.06	-2.28	0.00	-0.01	4.73	-0.53	-0.27	1.21
Manufacture of electrical equipment	-0.21	-0.17	7.68	-0.04	-0.02	-3.54	-0.05	-0.05	-4.40	-0.33	-0.25	3.15
Manufacture of machinery and equipment n.e.c.	-0.13	-0.15	1.66	-0.14	-0.12	-1.52	-0.11	-0.06	-1.56	-0.36	-0.35	-1.37
Manufacture of transport equipment	-0.36	-0.18	0.43	-0.05	-0.10	-1.41	0.09	-0.07	0.37	-0.49	-0.41	-2.92
Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment	-0.32	-0.32	0.15	0.04	-0.07	3.01	-0.06	-0.12	-1.66	-0.36	-0.54	1.02
Total manufacturing	-3.47	-2.78	1.01	-0.88	-0.94	-1.72	-0.35	-0.79	-0.88	-5.20	-4.84	-0.06

Source: OECD (2020). Structural Analysis Database (STAN).

TABLE 9: FRANCE: PRODUCTIVITY GROWTH DECOMPOSITION OF 'MARKET SECTORS', 1998–2017

Economic sector	All sectors			'Market' sectors		
	Contribution to productivity growth (1998–2017, average, percentage points)			Contribution to productivity growth (1998–2017, average, percentage points)		
	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)	Intra-industry productivity growth effect (1)	Allocation effect (2)	Total (3) = (1) + (2)
Agriculture, forestry and fishing	0.09	-0.08	0.01	0.13	-0.12	0.01
Mining and quarrying	0.01	-0.01	0.00	0.01	-0.01	0.00
Manufacturing	0.38	-0.30	0.08	0.57	-0.46	0.11
Electricity, gas, steam and air conditioning supply	0.06	-0.04	0.02	0.09	-0.06	0.03
Water supply; sewerage, waste management and remediation activities	0.02	0.01	0.03	0.02	0.02	0.04
Construction	0.16	0.02	0.17	0.24	0.02	0.26
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.21	0.02	0.23	0.31	0.03	0.34
Transportation and storage	0.11	0.01	0.12	0.17	0.02	0.19
Accommodation and food service activities	0.06	0.03	0.09	0.09	0.05	0.14
Information and communication	0.08	0.06	0.14	0.11	0.10	0.21
Financial and insurance activities	0.13	-0.03	0.10	0.19	-0.04	0.15
Real estate activities	0.41	-0.02	0.39	N/A	N/A	N/A
Professional, scientific and technical activities	0.17	0.11	0.27	0.25	0.16	0.41
Administrative and support service activities	0.05	0.12	0.17	0.08	0.18	0.26
Public administration and defence; compulsory social security	0.25	-0.09	0.16	N/A	N/A	N/A
Education	0.12	0.01	0.13	N/A	N/A	N/A
Human health activities	0.14	0.03	0.17	N/A	N/A	N/A
Residential care and social work activities	0.09	0.02	0.12	N/A	N/A	N/A
Arts, entertainment and recreation	0.03	0.03	0.05	0.04	0.04	0.08
Other service activities	0.04	-0.01	0.03	0.06	-0.01	0.04
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.00	0.00	0.00	0.01	0.00	0.00
Whole economy	2.59	-0.11	2.47	2.36	-0.10	2.27

Note: N/A, not applicable.

Source: OECD (2020). Structural Analysis Database (STAN).

Appendix I. Definitions of variables and data sources

Variable	Measure, units	Source
Labour (hours)	Hours worked – hours, millions	OECD (2020). Structural Analysis Database (STAN)
Labour (people)	Number of persons engaged (total employment) – persons, thousands	
Output (real values)	Value added, chained prices of the previous year – euros, millions	
Output (nominal values)	Value added, current prices – euros, millions	

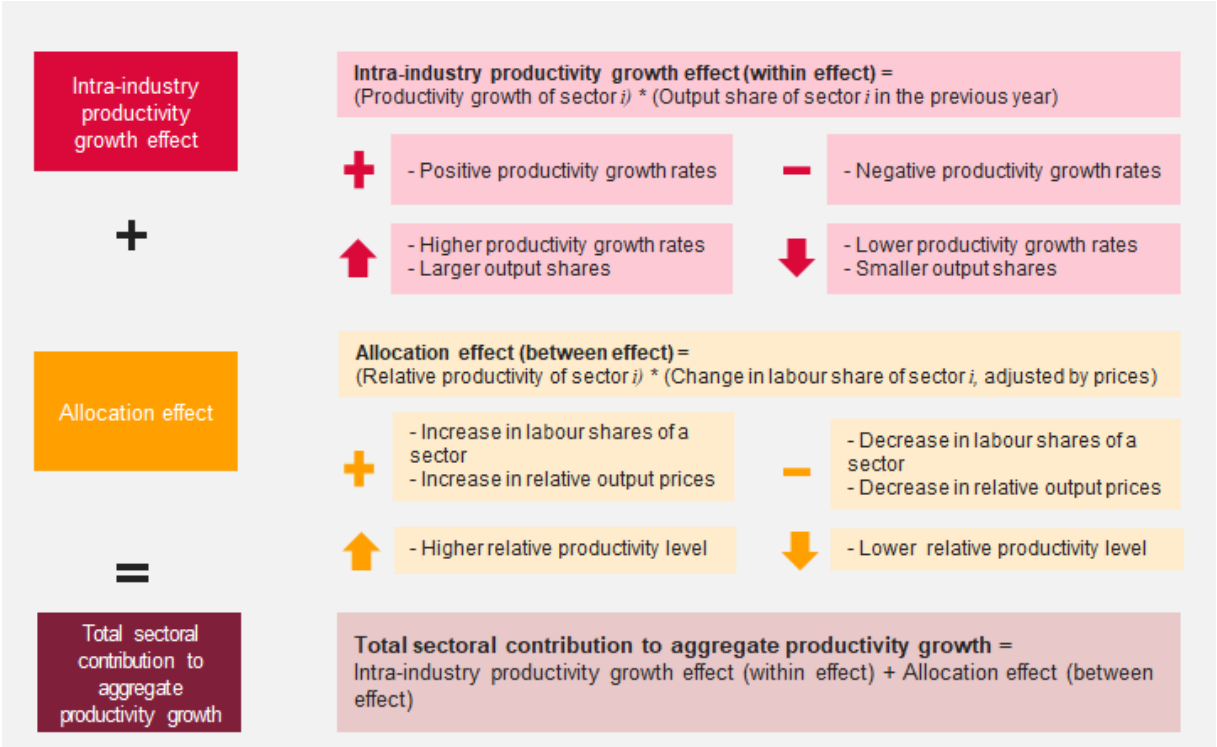
Appendix II. Decomposition of productivity growth

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:[6] (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 the labour shares and relative output prices of sector i. By changes in relative output prices, we mean how much the 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).

[6] 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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