

Understanding the EU-US labour productivity gap

#2 – A granular analysis over the 1995-2019 period





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Table of contents

Executive summary

04

1. Introduction : a granular view of the EU-US labour productivity gap

05

2. The evolution of European productivity between 1995 and 2019

09

3. EU countries' contribution to the EU-US productivity gap

19

4. The factors behind EU productivity lagging that of the US from 1995 to 2019

24

5. Conclusion

27

Appendix 1 : Methodology for the decomposition of labour productivity growth

28

Executive summary



This study provides a detailed analysis of the European Union's (EU)^[1] labour productivity growth and its persistent gap with that of the United States (US). The analysis is set against a backdrop of a well-documented economic divergence between the EU and the US, a phenomenon highlighted in recent reports such as those by Draghi and Letta. This divergence has significant implications for Europe's economic model and its ability to fund its social system and address collective challenges, from living standards and wages to social welfare and future investments.

Our previous study established a long-term decline in EU productivity relative to the US. The analysis also showed that the EU's productivity lag is a broad-based phenomenon, affecting most major sectors, and has accelerated since the COVID-19 pandemic.

This second study is motivated by the need for a more granular perspective, acknowledging the EU's unique characteristics, notably the high degree of heterogeneity among its member states in terms of productivity levels and sectoral structures. This analysis confirms that the overall EU performance is a complex aggregate of disparate national and sectoral dynamics.

We found that while a partial convergence of productivity levels and hours-worked structures has occurred among EU countries since 1995, the productivity gap with the US has simultaneously widened. The decline in the overall EU-US productivity ratio is almost entirely attributable to lower productivity growth in individual EU countries relative to the US, while shifts in hours worked between more and less productive EU countries had a beneficial effect. A country-by-country breakdown reveals that the aggregate EU lag is primarily driven by the core EU economies (Germany, France, Italy, Spain, Belgium and the Netherlands), despite their significant positive contribution to the EU-27 productivity growth. These countries are the largest negative contributors to the overall EU-US productivity ratio, offsetting the positive contributions from new member states and Ireland.

Furthermore, a decomposition of productivity growth by factor reveals that the lag of the core EU countries is rooted in different sources. While Germany and France maintained a total factor productivity (TFP) growth rate similar to that of the US between 1995 and 2019, their lag is mostly due to insufficient investment, particularly in intangible capital and ICT. In contrast, countries like Italy and Spain experienced a significant lag in TFP itself, accounting for the majority of their productivity growth gap with the US. The lag in ICT investment and TFP is particularly acute in sectors like information and communication, where the US has a productivity level significantly higher than the EU at the end of the period.

[1] Along this study, "Europe", "European", "the EU", "the EU-27" and "the European Union" refer to the European Union with its current composition in 2024 (without the UK).

1. Introduction : a granular view of the EU-US labour productivity gap

► 1.1. Context and purpose of the study

This study's objective is to provide a **granular analysis of the labour productivity growth** of the European Union (EU) and its persistent gap with that of the United States.

The context for this analysis is a well-documented economic divergence between Europe and the United States, a phenomenon that, while not new, has become particularly pronounced in recent years. **Our first study established several key findings: a relative decline in EU productivity starting from a close level to the US in 1995, a fall in productivity in terms of volume, and evolving sectoral contributions to this trend over time.**

However, **the EU-27 exhibits significant cross-country heterogeneities that demand a more granular approach.** To begin with, the Union's composition expanded substantially from 12 member states prior to 1995 to 27 today. **In 1995, member states started with highly heterogeneous productivity levels across sectors and disparate sectoral structures.** Furthermore, the national dynamics of productivity growth within the EU, much like the evolution of their productive structures, have been far from uniform.

This second study, therefore, aims to provide a more detailed, country-specific analysis of the 1995-2019 period. The research will proceed in three steps:

- **Step 1:** We will begin by understanding the internal productivity dynamics within the EU, examining the initial heterogeneity and subsequent convergence of productivity levels and hours-worked structures.
- **Step 2:** We will then conduct a sector-by-sector analysis to understand each country's contribution to the overall EU-US productivity gap.
- **Step 3:** Finally, we will align the observed productivity gap with the key explanatory factors identified by economic research.

► 1.2. Methodology and data sources

Our analysis focuses on the EU-27 aggregate and individual European countries, using the EU-KLEMS database for the period from **1995 to 2019**. This timeframe is chosen because it covers a long period of productivity divergence between the EU and the US and precedes the significant disruptions of the COVID-19 pandemic. A subsequent study would be required to analyse the more recent years. All our analysis is based on total employment hours worked and constant 2020 PPP dollar value-added data. This approach allows us to move beyond the aggregate numbers and understand the underlying national and sectoral dynamics that collectively define Europe's productivity path.



Metrics

- **Labour productivity** is defined as the ratio of **value added** to the **volume of hours worked**.
- Unless otherwise specified, the value-added metric used is in **real terms**, using constant 2020 purchasing power parity (PPP) from the IMF/OECD database.
- The **volume of hours worked** includes all employed persons in the economy, both employees and self-employed. Including the self-employed helps to neutralise differences in the proportion of salaried workers across economies.

Data sources

- We rely on **EU-KLEMS data**, published by the Luiss Lab of European Economics, covering 1995 to 2021. This dataset provides detailed information by sector for a wide range of countries, including EU member states and the United States. EU-KLEMS data is a benchmark in most studies that conduct international productivity comparisons with a sectoral approach. This dataset also includes a decomposition of labour productivity growth by factors.

Methodological choices for data processing

The calculations of productivity and the analysis of its evolution are based on two core tables: value added in volume and current prices in national currency and hours worked.

To ensure the cross-country additivity of the value-added data, we created a new table in 2020 PPP dollars by converting the 2020 values and then applying the volume changes in value added.

Missing value-added data for Malta from 1995 to 1999 were imputed using the country's hours worked combined with the productivity ratio and average productivity observed in other EU countries. For Sector B (Mining and quarrying) in Malta, data was missing for all the period, thus both hours and value-added data were set to 0. A similar substitution was applied to Sector T (Activities of households as employers) for Bulgaria and Romania. Sector U (Activities of extraterritorial organisations) was entirely removed from the analysis due to an excessive number of missing values for several countries. Finally, the EU aggregates were recalculated by summing the values from the European countries for each sector, ensuring additivity between value added amounts and between worked hours.

Missing value for hours for Sector T-in the US in 2019 were imputed using a rule-of-thumb method. For the decomposition analysis (structural versus intra-sectoral growth effects), we created an aggregate variable, designated ALL, for the entire economy by summing the value added (using chained-volume methodology) and hours from all included sectors (A through T).

In Chapter 3, the Labour productivity data and its factor decomposition comes from the EU KLEMS database, without specific transformation.

Table 1. Codes and names for industries

Industry code	Industry name
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies
ALL	All economic activities from A to S or T (see Methodology and Data sources)

Table 2. Codes and names for countries

Country code	Country name
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
EU-27	European Union - 27 countries, as of 2020
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania

Country name	Country name
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
US	United States

2. The evolution of European productivity between 1995 and 2019

► 2.1. Introduction

To analyse the productivity growth gap between the European Union (EU) and the United States (US), one must consider the very specific nature of the EU, which brings together countries with highly diverse levels of economic development and sectoral structures.

This diversity of situations plays, a priori, a potentially important role over a long period of nearly a quarter-century. This timeframe covers several national and global business cycles, significant structural changes in both European and American economies, and, for the EU, its expansion from 12 countries in 1994 to 27 in 2019 (excluding the United Kingdom from our analysis).

“
The EU countries' productivity dynamics started in 1995 from highly heterogeneous national situations and partially converged over the period 1995-2019.

► 2.2. Productivity levels across the EU

The starting point for productivity levels exhibits significant disparities among European countries. Table 3 below presents the hourly labour productivity levels we calculated by country and sector in 1995, converted into 2020 PPP dollars^[2].

For all sectors combined (the ALL column), productivity across the EU-27 countries ranged from \$11 (for Latvia) to \$95 per hour (for Luxembourg). A quarter of the countries fell below \$20 per hour, and a quarter were above \$55. The average EU productivity, at \$43 per hour, was somewhat lower than that of the United States (\$46 per hour).

Thus, the average situation of the EU-27 masked highly diverse realities among countries, both for the economy as a whole and for individual sectors. An important point to note is that, except for sectors A, B and T, **the average US productivity level in 1995 was situated within the central 50% of productivity levels observed among European countries.**

“
Productivity levels across the EU partially converged during the 1995-2019 period.

[2] Unless otherwise specified, all figures expressed in dollars (\$) refer to constant 2020 US Dollar Purchasing Power Parity (PPP) terms.



Table 3. Hourly labour productivity in EU-27 countries and in the US across economic sectors, in 1995, in 2020 USD PPP
Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T	ALL
AT	7	62	45	121	79	40	45	51	63	42	384	51	59	52	30	50
BE	23	53	54	175	49	60	71	47	67	130	1245	51	65	47	14	64
BG	6	24	8	39	7	14	16	7	17	39	673	61	23	7	na	16
CY	16	25	23	70	28	14	46	28	26	51	997	48	49	29	6	32
CZ	15	53	13	134	35	9	39	54	46	44	353	31	41	44	16	27
DE	18	57	53	100	57	33	40	35	45	106	571	83	54	63	21	55
DK	22	456	51	189	50	41	71	55	25	76	605	80	52	72	30	60
EE	4	13	7	46	11	14	13	8	29	21	98	28	25	20	12	14
EL	8	55	29	83	16	19	18	20	32	105	4632	39	37	21	12	28
ES	16	64	46	148	57	28	53	79	58	66	1231	51	52	32	21	48
FI	16	66	36	141	53	27	43	34	36	78	721	52	52	46	11	45
FR	18	122	40	182	59	44	48	38	53	61	572	71	59	44	16	57
HR	11	25	18	26	16	15	17	9	30	65	1691	32	28	17	696	22
HU	8	6	18	45	22	16	20	23	20	99	178	41	22	20	6	21
IE	9	42	46	80	35	46	26	18	50	104	1333	37	66	21	16	44
IT	18	51	50	199	57	28	48	45	51	87	1100	75	69	41	15	56
LT	6	25	10	25	15	13	22	16	35	43	388	11	17	20	17	15
LU	33	140	48	103	45	67	94	66	99	260	2654	86	98	65	23	95
LV	6	8	11	38	10	6	16	6	17	16	29	15	15	13	16	11
MT	13	na	19	32	37	16	37	28	35	46	214	37	36	42	18	30
NL	30	781	50	118	45	37	49	43	46	118	506	50	60	49	23	56
PL	6	73	10	42	37	22	20	14	20	22	95	16	14	23	4	16
PT	7	37	19	85	27	23	37	35	67	45	632	28	40	22	14	29
RO	4	25	12	43	19	6	20	28	23	44	414	24	57	32	na	15
SE	15	251	36	150	52	28	54	31	36	70	339	50	53	36	40	45
SI	4	15	17	81	35	25	27	30	40	44	1639	39	42	34	22	25
SK	2	29	6	55	25	14	31	12	41	140	448	20	19	39	9	19
EU27	10	62	35	98	47	29	39	40	44	83	555	60	49	42	18	43
US	18	188	35	121	48	25	44	21	51	61	394	47	46	34	28	46

Reading Note

Reading note: The data in the table indicates the hourly labour productivity levels for each sector and country in 1995, expressed in constant 2020 PPP dollars. Thus, the hourly productivity of the manufacturing sector in Austria in 1995 amounted to \$45 constant 2020 PPP, the EU-27 average was \$35 constant 2020 PPP, and the US figure for the manufacturing sector was also \$35 constant 2020 PPP. Blue colouring signals the top 25% of hourly productivity levels for each sector, while red colouring indicates the bottom 25%.

In 1995, the gaps in labour productivity levels were much higher among European Union (EU) countries than between the EU average and the United States (see Tab. 4 and Fig. 1 below). Depending on the sector, in 1995, the EU countries with the highest productivity reached levels ranging from 144% to 344% of the EU average^[3].

Conversely, countries with the lowest productivity were situated between 15% and 38% of the EU average, depending on the sector. By comparison, hourly labour productivity in the United States (US) was between 53% and 190% of the EU average, depending on the sector. For the economy as a whole, European countries were situated between 26% and 222% of the average EU productivity in 1995, while the US had a productivity level 6 % higher than the EU average.

[3] The comparison of sector productivity levels excludes real estate: the very specific method for calculating its productivity leads to very high levels that are difficult to interpret and compare to other sectors. We also exclude sectors B (mining and quarrying) and T (household's own production) for similar reasons. Unless otherwise specified, these three sectors are included to the rest of the analysis.

Table 4. Hourly labour productivity in EU-27 countries and in the US relative to the EU-27 average, across economic sectors, in 1995, in % of EU-27 average

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T	ALL
AT	68	100	130	124	168	139	117	127	142	51	69	85	121	123	170	117
BE	242	85	156	179	104	206	184	116	151	158	224	85	134	111	80	149
BG	65	38	22	39	15	47	42	19	38	47	121	101	47	17	na	38
CY	170	41	66	72	58	47	119	70	59	62	180	80	101	70	37	74
CZ	155	85	37	136	74	32	100	134	103	53	64	51	84	104	89	62
DE	184	92	152	102	120	116	104	86	102	129	103	139	111	149	118	129
DK	232	735	146	193	105	143	185	137	57	92	109	133	107	172	168	141
EE	38	21	19	47	24	49	35	20	65	26	18	47	51	48	68	33
EL	82	88	84	84	35	66	47	50	73	127	834	65	77	49	67	64
ES	164	103	132	151	120	99	138	197	131	80	222	85	107	75	120	112
FI	161	106	105	143	113	93	111	85	81	95	130	86	107	109	61	105
FR	188	197	115	186	124	151	123	93	119	74	103	119	121	104	90	133
HR	110	40	51	26	34	53	44	22	67	79	305	53	58	41	3919	51
HU	83	10	51	46	46	54	51	56	46	120	32	68	46	47	31	49
IE	91	68	132	81	75	158	67	45	112	125	240	61	136	50	89	103
IT	188	82	144	202	121	98	126	111	117	106	198	124	141	98	86	130
LT	66	40	29	26	31	46	58	41	80	52	70	18	35	48	93	34
LU	344	226	139	105	95	231	243	162	224	315	478	144	200	155	132	222
LV	57	13	30	38	22	21	42	15	39	19	5	25	31	30	88	26
MT	134	na	54	33	79	56	97	68	79	56	39	61	73	99	103	70
NL	315	1258	144	120	95	127	126	107	103	142	91	83	123	117	130	132
PL	66	117	30	42	78	74	52	36	46	27	17	27	29	55	20	37
PT	77	59	54	87	57	79	97	86	151	55	114	46	81	53	79	68
RO	38	40	33	44	40	22	52	71	52	53	75	40	116	75	na	34
SE	160	404	104	153	109	98	140	76	82	84	61	84	108	85	228	105
SI	42	25	49	83	74	86	70	74	90	53	295	66	87	80	123	60
SK	24	47	18	56	52	50	80	30	93	169	81	33	40	94	53	44
EU27	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
US	190	302	100	123	102	88	113	53	115	74	71	79	95	82	157	106

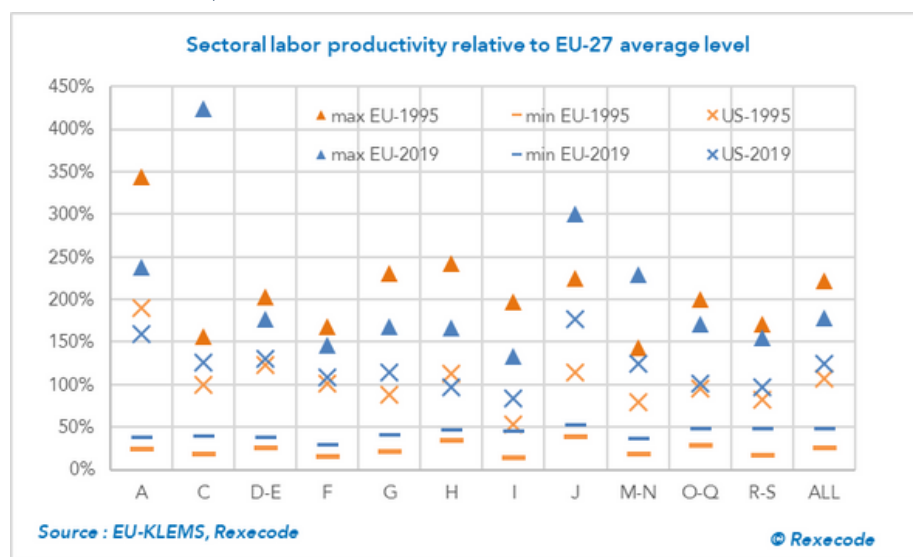
Reading Note

Reading Note: The data in the table indicate the hourly labour productivity levels for each sector and country in 1995, relative to the EU-27 average level. Thus, the hourly productivity of the manufacturing sector in Austria in 1995 amounted to 130% of the EU average, while the figure for the United States was equivalent to the EU average (100%). Blue colouring signals the top 25% of hourly productivity levels for each sector, while red colouring indicates the bottom 25%.

Between 1995 and 2019, the gaps among European countries narrowed somewhat, though they remained larger than the gap between the EU average and the US, which itself widened. By 2019, depending on the sector, the countries with the highest hourly labour productivity reached levels ranging from 134% to 424% of the EU average. Conversely, countries with the lowest productivity were situated between 29% and 57% of the EU average, depending on the sector. By comparison, US productivity was between 84% and 176% of the EU average. For the economy as a whole, European countries were situated between 48% and 179% of the average EU productivity in 2019, while the US had a productivity that was 24% higher than the EU average.

Beyond differences in productivity levels for a given sector, European countries also have highly disparate sectoral structures. These sectoral structures can be assessed by examining how the total hours worked in the economy are distributed among its various sectors.

Figure 1: Sectoral labour productivity relative to the EU-27 average level
Source: EU-KLEMS, Rexecode calculations.



Reading Note

For each economic sector (on the x-axis), the mark represents hourly productivity as a ratio to the average European productivity for that sector. The "max" label indicates the highest productivity level within the EU for a given sector, while "min" indicates the lowest level. In this figure, the comparison of sector productivity levels excludes sectors B, L and T due to very high and difficult to interpret productivity levels.

► 2.3. Structure of worked hours across the EU

At the beginning of the comparison period, the European Union (EU) had significant disparities in the distribution of hours worked across sectors (see Fig. 2 below). The share of hours worked in agriculture, which was 11.1% for the EU as a whole, ranged from 2.5% to 39% depending on the country (compared to 2.7% for the US). For manufacturing, the share, at 19.7% for the EU as a whole, ranged from 10.4% to 27.4%. The average gap between the highest and lowest share of hours for a given sector was 9.8% in 1995. This gap slightly narrowed to 9.6% in 2019.

Structures of worked hours partially converged during the 1995-2019 period.

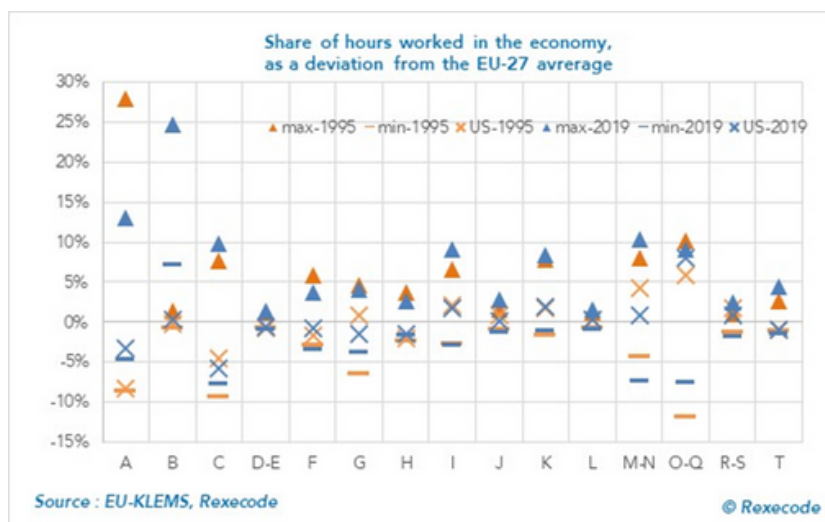


Figure 2: Share of hours worked in the economy, as a deviation from the EU-27 average
Source: EU-KLEMS, Rexecode calculations.

Reading Note

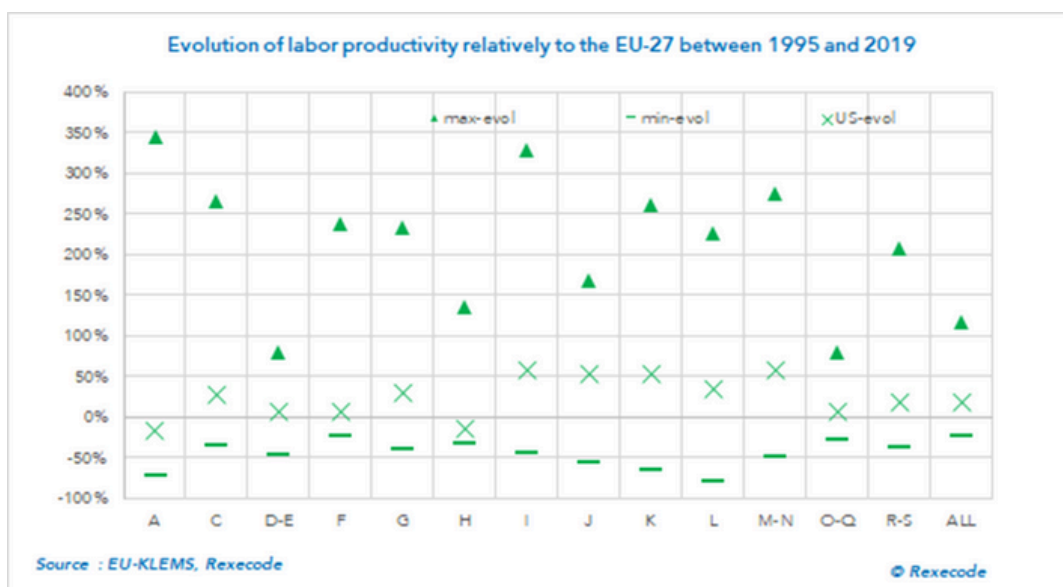
For each economic sector (on the x-axis), the mark represent its share of total hours worked in the economy, as a gap to the EU-27 aggregate figure. "max" indicates the highest share of hours worked within the EU for a given sector, while "min" indicates the lowest. The crossed marks (US) are located between the horizontal bar marks and the triangle marks, which mean that for a given sector, its share of worked hours in the US economy is located in between EU countries' max and min.

► 2.4. Dynamics of productivity levels and structures of worked hours in the EU

Furthermore, productivity levels evolved in a highly heterogeneous manner across European countries during the 1995-2019 period. Relative to the EU average, countries that experienced the strongest productivity growth for a given sector between 1995 and 2019 saw an increase ranging from +79% to +345% depending on the sector^[4]. Conversely, countries that recorded the weakest productivity growth for a given sector saw it decrease by 23% to 78% compared to the EU average. By way of comparison, US productivity, relative to that of the EU, evolved within a range of -16% to +58% depending on the sector.

Figure 3: Evolution of labour productivity relatively to the EU-27 between 1995 and 2019

Source: EU-KLEMS, Rexecode calculations.



Reading Note

Reading Note: For each economic sector (on the x-axis), the marks show the maximum ("max-evol") and minimum ("min-evol") evolution of individual European countries labour productivity ratio the EU average and that for the United States' relatively to the EU average ("US-evol"). Evolutions are calculated as 1995 to 2019 variation rates. In this figure, the comparison of sector productivity levels excludes sectors B and T due to very high and difficult to interpret productivity growth rates.

A more detailed analysis of the cumulative labour productivity growth between 1995 and 2019 by country and sector (see Table 5 below) highlights the following points:

- **The productivity growth of the United States for the economy as a whole was superior to that of the EU-27 (+62% versus +38%),** yet it was situated within the central half of the distribution of growth rates observed among EU countries.
- **The countries of the historical core of the EU-27 experienced productivity growth for the entire economy that was below the EU-27 average and that of the US.** Furthermore, several of these countries were located in the bottom quartile of the productivity growth rate distribution (Belgium, Spain, France, Greece, Italy, Luxembourg, the Netherlands, Portugal).
- **The former Eastern European countries achieved productivity growth rates superior to that of the United States and the EU-27 average.** Several of these countries were situated in the top quartile of the productivity growth rate distribution (Estonia, Latvia, Lithuania, Poland, Romania, Slovakia).

[4] The comparison excludes sectors B, L and T.

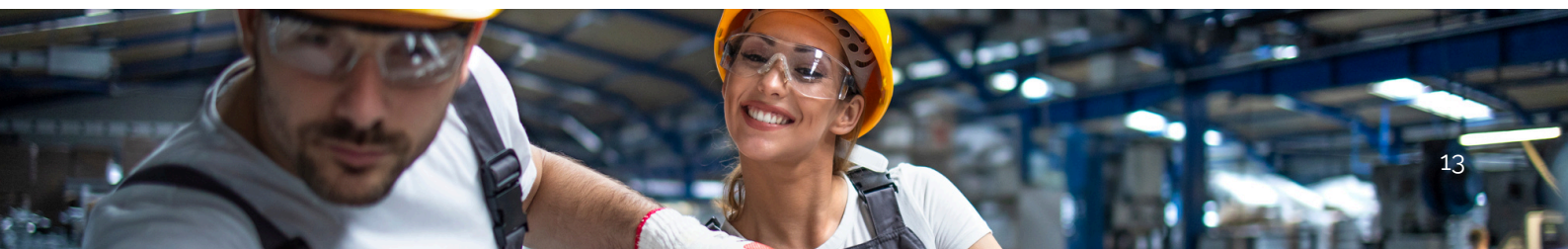


Table 5. Hourly labour productivity growth between 1995 and 2019 in EU-27 countries and in the US across economic sectors, in %

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T	ALL
AT	130	100	91	32	-18	40	57	-16	29	131	4	10	1	-18	-46	36
BE	23	91	88	2	33	23	19	-4	77	66	-8	4	-2	-4	-6	23
BG	23	177	221	36	221	79	63	123	310	98	-43	-53	16	207	na	73
CY	-2	85	53	2	14	100	56	-5	245	42	-30	0	2	6	9	37
CZ	90	7	266	-28	-1	291	13	-53	105	132	-14	24	-3	-36	63	81
DE	98	60	67	20	-6	79	51	4	139	4	40	-24	9	-13	0	33
DK	125	-55	124	5	13	51	30	-35	270	81	-10	-18	11	-15	-22	31
EE	704	418	388	84	196	196	240	141	108	381	251	82	26	19	2644	200
EL	59	60	22	54	-20	-3	122	-17	48	-20	-76	-51	-12	18	116	15
ES	123	95	39	10	-16	34	5	-44	33	81	-55	-21	3	27	-7	16
FI	122	44	128	29	-9	79	20	-14	141	41	11	-10	-9	-13	135	38
FR	88	-4	96	-4	-11	35	38	-5	93	57	32	-6	12	27	-2	30
HR	130	64	55	58	53	98	51	258	61	36	-70	19	-2	82	-47	57
HU	238	1334	136	18	35	77	90	3	155	-19	29	-16	45	28	-16	81
IE	104	-56	501	23	25	56	59	46	454	8	15	238	-21	72	62	139
IT	36	103	28	-39	-27	58	23	-18	56	37	-20	-35	-3	-3	-10	9
LT	204	162	316	104	142	197	161	63	61	53	-30	228	76	12	72	173
LU	-7	-29	52	26	23	17	-2	-37	38	-13	-70	-1	-8	-9	0	8
LV	261	558	195	9	189	437	96	206	211	299	258	121	62	91	333	188
MT	-38	na	90	39	2	73	41	-2	157	68	44	20	9	57	-18	51
NL	50	-51	93	45	20	86	48	-14	89	87	13	19	3	-21	47	29
PL	65	-39	227	69	5	91	103	53	164	217	161	203	95	-12	92	135
PT	116	37	83	50	-9	42	27	-27	-8	133	-41	-10	-10	7	1	30
RO	204	77	233	34	61	324	143	21	439	59	109	166	-19	45	na	171
SE	96	-24	132	-14	-1	107	34	1	182	116	-2	33	-11	17	-13	46
SI	160	343	208	12	14	89	103	5	57	107	-67	-2	7	-9	24	87
SK	873	31	583	101	56	96	56	21	68	-52	-18	72	89	40	45	128
EU27	119	10	86	14	-5	61	44	-16	107	33	10	-10	8	0	-7	38
US	83	-6	136	21	1	110	23	32	219	103	48	42	15	19	41	62

Reading Note

The data in the table indicates the cumulative hourly labour productivity growth for each sector and country between 1995 and 2019, expressed in volume terms. Thus, the hourly productivity of the manufacturing sector (C) in Austria grew by a total of 91% between 1995 and 2019, while the EU-27 average grew by 86%, and the US figure grew by 136%. Blue colouring signals the top 25% of hourly productivity growth rates for each sector, while red colouring indicates the bottom 25%.

The evolution of the shares of hours worked for a given sector was also highly heterogeneous across European countries between 1995 and 2019 (see Figure 4 below). The most positive evolutions reached up to +8 percentage points in the share of hours worked, while the most negative evolutions reached -15 points. For comparison, the range of progress in hours worked for a given sector between the EU and the US was between -3 points and +5 points, depending on the sector.

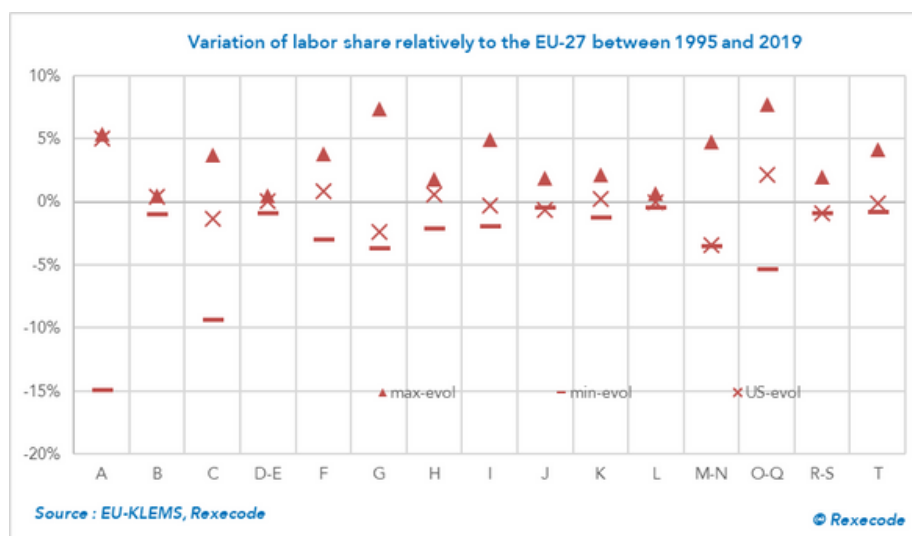


Figure 4: Variation of labour share relatively to the EU-27 between 1995 and 2019

Source: EU-KLEMS, Rexecode calculations.

Reading Note

For each economic sector (on the x-axis), the marks shows the maximum and minimum evolution of its share of total hours worked in EU countries, and the evolution of its share in the United States, relative to that of the UE-27.

In summary, the overall picture that emerges from this analysis is a **very high diversity of situations within the EU**, both in initial conditions and in the evolutions over the 1995-2019 period. The US situation thus appears less distant from the average European situation than that of some of the countries that make it up, both in terms of level and evolution.



► 2.5. The interplay of productivity and worked hours dynamics

The very strong heterogeneities in both initial levels and the evolution of the distribution of hours worked and hourly labour productivity call for a more granular analysis of the overall evolution of the European Union's labour productivity. This is because the overall figure aggregates situations and dynamics that lead to very different economic interpretations.

It is therefore useful to decompose this growth into the contribution of structural effects on the one hand, and the contribution of productivity growth effects within sectors and countries on the other. As a reminder, the contribution of structural effects is the portion of the total labour productivity growth, averaged across all EU countries, that is attributable to the evolution of the distribution of hours worked between countries and between sectors, with productivity levels held constant. The contribution of growth effects within countries and sectors refers to the portion of productivity growth attributable to changes in hourly productivity within each country-sector pair, with the distribution of hours worked held constant (see the methodological appendix for more details).

The cumulative growth of hourly labour productivity for the EU as a whole between 1995 and 2019, which stands at **38.2%**, can be broken down as follows:

- **26.5 points** of this total come from productivity growth within sectors and countries, with the structure of hours worked held constant across country-sector pairs;
- **9.4 points** of this total come from the evolution of the structure of hours worked;
- **2.4 points** of residual due to the deformation of the relative price structure between 1995 and 2019.^[5]

This decomposition provides two insights. Firstly, productivity growth within countries and sectors is the main contributor to the overall productivity growth across all EU sectors and countries. Furthermore, the structural effects between countries and sectors have a positive and significant contribution, accounting for a quarter of the total. This means that, on average, the share of hours worked tended to increase in sectors and countries that were more productive than the EU average, and to decrease in those that were less productive.

► 2.6. Economic sector's contribution to the EU productivity dynamics

The table below details these effects by sector and for the economy as a whole. The primary sectors contributing to European productivity growth between 1995 and 2019 are:

- Manufacturing industry (12.4 points out of 38.2), primarily through intra-sector productivity growth.
- Agriculture (7.0 points), primarily through inter-sector structural effects.
- Trade (5.9 points), essentially through intra-sector productivity growth, even though the growth in hours worked in this sector—given its lower productivity—weighed on overall productivity growth.

[5] Due to the use of chained-volume value-added values, contributions do not sum to the productivity growth of the whole economy (Sector ALL), which is 38.2 % over the 1995-2019 period.

Some sectors contributed negatively to productivity growth:

- Accommodation and food services, because on the one hand, its productivity decreased, and on the other hand, the share of hours worked in the sector increased, while its productivity is below the economic average in most countries.
- Construction, which suffered from negative productivity growth in the major EU countries.
- Professional services, which experienced a decline in their productivity on average across the EU.

Table 6. Decomposition of European Union hourly labour productivity growth between 1995 and 2019 into structural and intra-sector growth effects, by economic sector, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T
Total	7,0	-0,1	12,4	0,3	-0,4	5,9	2,2	-1,2	3,3	1,4	3,8	-0,4	1,9	-0,1	-0,1
Structure effect	4,8	0,0	0,1	-0,2	0,0	0,0	0,0	-0,5	0,4	-0,2	2,6	0,8	0,0	-0,2	-0,1
Growth effect	2,2	0,0	12,3	0,5	-0,4	6,0	2,2	-0,7	2,9	1,5	1,2	-1,2	1,9	0,0	0,0

Reading Note

Out of the 38.2% growth in hourly labour productivity in the EU between 1995 and 2019, agriculture contributed 7.0 percentage points. Of this, 4.8 points came from structural effects and 2.2 points from intra-sector growth. Structural effects relate here to the reallocation of hours across sectors while growth effects relates here to the growth of labour productivity within each sector.

The reallocation of hours across sectors contributed positively to the labour productivity growth of the EU-27 between 1995 and 2019 (the sum of the sector structural effects is +7.8 points out of 38.2 %), which means that worked hours have moved from less productive sectors to more productive ones. But this positive contribution comes mainly from two sectors: agriculture and real estate. The sum of the structural effect contributions by other sectors is close to zero, but slightly positive.

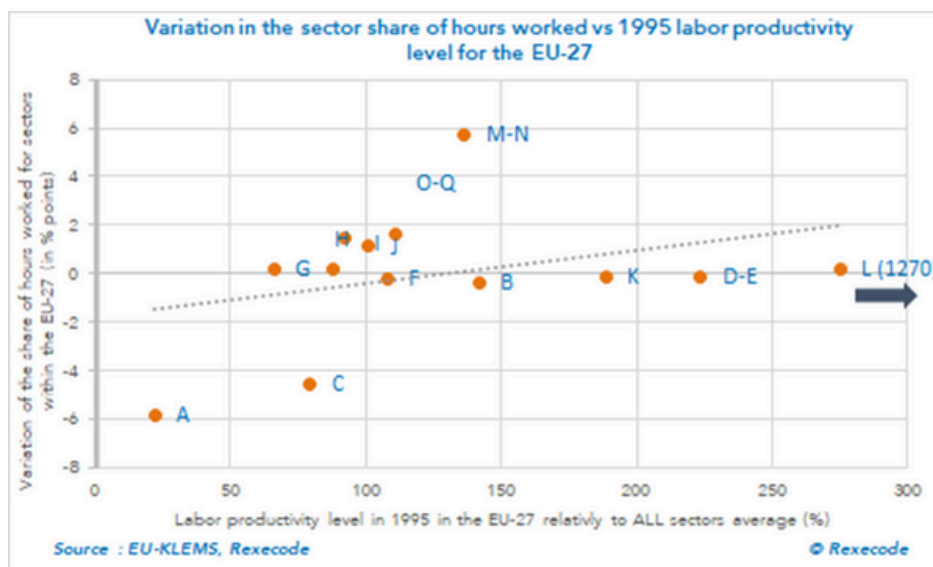


Figure 5: Variation in the sector share of hours worked vs 1995 labour productivity level for the EU-27

Reading Note

Each point on the graph corresponds to a sector of the EU-27 economy. The x-axis provides the sector's productivity in 1995 relative to the average of all sectors, and the y-axis provides the change in that sector's share of the EU-27's total hours worked. The arrow refers to Sector L very high productivity, which goes beyond the x-range of the figure.





► 2.7. Worked hours reallocation across EU countries

When we look at the decomposition by country, we observe that:

- All countries contributed to the hourly productivity growth of the EU as a whole, to varying degrees.
- The strongest contributors to EU productivity growth between 1995 and 2019 were **Germany** (7.8 points out of a total of 38.2%), **France** (5.2 points), **Poland** (5.0 points), and **Romania** (4.6 points).
- Structural effects were positive or zero for all countries, except Germany and Italy, where they were slightly negative. This means that the share of hours worked tended to increase in countries more productive than the European average, while it decreased in less productive ones (see Fig. 6 below).

Table 7. Decomposition of European Union hourly labour productivity growth between 1995 and 2019 into structural and intra-country growth effects, by country, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU
Total	0,9	0,9	0,7	0,0	1,5	7,8	0,5	0,3	0,3	1,6	0,5	5,2	0,3	1,0
Structure effect	0,0	0,1	0,2	0,0	0,1	-0,2	0,0	0,0	0,0	0,0	0,0	0,2	0,0	0,1
Growth effect	0,9	0,7	0,5	0,1	1,5	8,0	0,5	0,2	0,3	1,6	0,5	5,0	0,3	1,0

	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
Total	1,7	1,4	0,5	0,1	0,4	0,0	1,6	5,0	0,6	4,6	1,1	0,3	0,7
Structure effect	0,1	-0,1	0,0	0,1	0,1	0,0	0,2	0,0	0,0	1,3	0,0	0,0	0,0
Growth effect	1,5	1,5	0,5	0,0	0,3	0,0	1,4	5,0	0,6	3,4	1,1	0,3	0,7

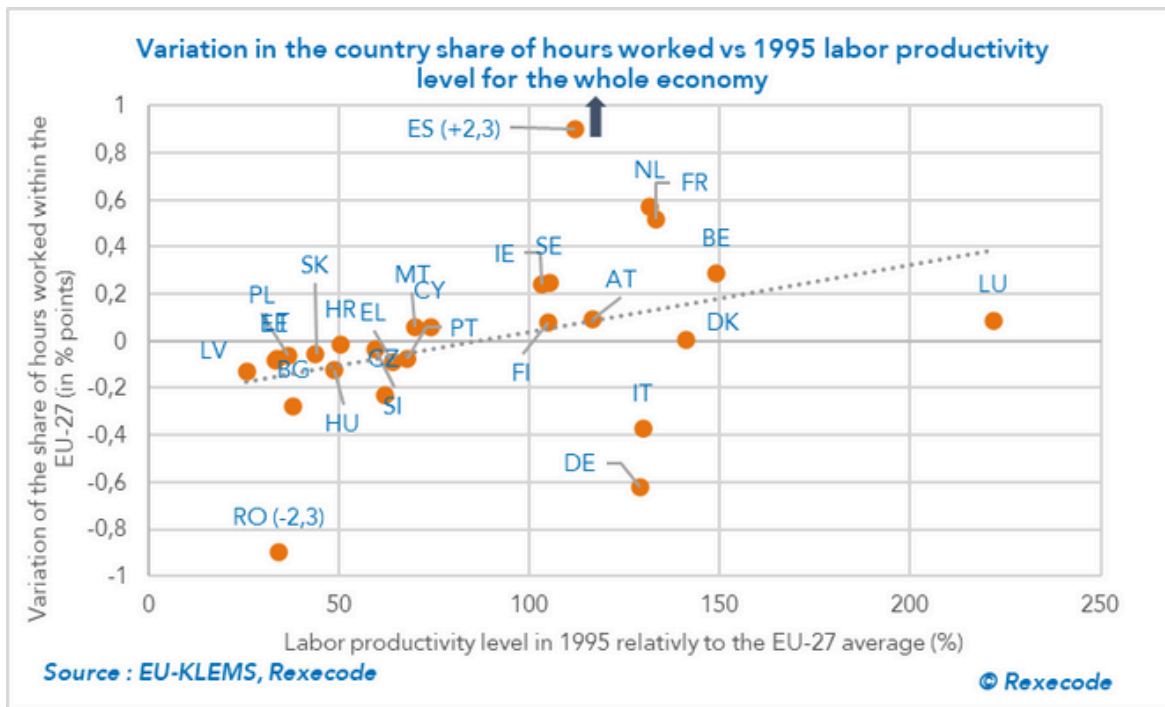
Reading Note

Out of the 38.2% growth in hourly labour productivity in the EU between 1995 and 2019, Austria (AT) contributed 0.9 points. Of this, 0.0 points came from structural effects and 0.9 points from intra-country and intra-sector growth. Structural effects relate here to the reallocation of hours across countries while growth effects relates here to the growth of labour productivity within each country.

“ The strongest contributors to EU productivity growth between 1995 and 2019 were Germany, France, Poland, and Romania. ”



Figure 6: Variation in the country share of hours worked vs 1995 labour productivity level for the whole economy
Source: EU-KLEMS, Rexecode calculations.



Reading Note

Each point on the graph corresponds to a country. The x-axis provides the country's productivity in 1995 relative to the EU-27 average, and the y-axis provides the change in that country's share of the EU-27's total hours worked. The arrows for Romania and Spain signal that their variations of worked hours go beyond the y-range of the figure.

In summary, the evolution of labour productivity in the European Union between 1995 and 2019 involved three dynamics:

- **Productivity growth within sectors and countries**, which was the main contributor to overall productivity growth, albeit with very heterogeneous rates.
- **Generally favourable structural effects across countries**, with a relatively systematic reallocation of hours worked toward countries more productive than the average.
- **Less homogeneous structural effects between sectors**, with an increase in hours worked also benefiting sectors that were relatively less productive, such as trade and accommodation-and-food services. However, the decrease in hours worked in agriculture, and the increase of those in real estate, leads to a positive contribution of between-sector structural effects.

3. EU countries' contribution to the EU-US productivity gap.

▶ 3.1. Introduction

The evolution of the overall productivity gap between the European Union (EU) and the United States (US) is the result of several developments:

- Highly disparate evolutions of productivity in EU countries, and very different from those of the US, for each sector;
- Very different evolutions of the distribution of hours worked across sectors, both among EU countries and relative to the US, combined with heterogeneous productivity levels themselves.

To assess the interplay of these dynamics, we will first examine the contributions of differences in productivity growth and hours worked for the economy as a whole, and then sector by sector, to the evolution of the EU-US productivity gap.

“
Sectoral and productivity heterogeneities among European countries shed light on the overall evolution of the productivity gap between the EU and the US.
”

▶ 3.2 Relative productivity growth rates to the US across EU countries

The growth of labour productivity of the EU-27 countries relative to the US differs significantly across countries and sectors between 1995 and 2019 (see table below).

For the economy as a whole (column ALL of the table below), the EU-27 labour productivity ratio relative to the US decreased by 14.4% between 1995 and 2019. However, eleven countries experienced productivity growth stronger than that of the United States, notably Estonia (where relative labour productivity increased by +85.5%), Latvia (+78.6%), Lithuania (+68.8%), Romania (+67.9%), Ireland (+48.2%), and Poland (+45.3%).

Nevertheless, a majority of countries experienced a decline in their productivity relative to the US, particularly the largest EU-27 countries by economic size: Italy (-32.5%), Spain (-28.4%), Belgium (-23.8%), France (-19.4%), Germany (-17.4%), and the Netherlands (-20.4%).

“
The countries in the core of the EU displayed weaker productivity growth than the US, while the new entrant countries experienced superior productivity growth.
”

Table 8. Variation in the ratio of hourly labour productivity in EU-27 countries relatively to that of the US between 1995 and 2019 by sector, in %

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	ALL
AT	25,4	113,4	-19,0	9,3	-18,6	-33,4	27,5	-36,5	-59,5	14,1	-29,8	-22,8	-11,8	-30,7	-16,0
BE	-32,8	103,9	-20,4	-16,0	32,6	-41,2	-3,0	-27,0	-44,4	-17,9	-37,8	-26,8	-14,3	-19,0	-23,8
BG	-32,8	194,8	36,2	12,6	218,5	-14,6	32,8	69,1	28,7	-2,4	-61,4	-67,1	0,9	158,3	7,0
CY	-46,7	97,7	-35,2	-15,7	12,9	-4,5	27,0	-27,6	8,4	-29,8	-52,6	-29,5	-11,1	-11,2	-15,2
CZ	3,6	14,2	55,1	-40,5	-1,8	86,3	-7,9	-64,5	-35,8	14,4	-41,9	-13,2	-15,4	-46,3	11,8
DE	7,9	70,8	-29,1	-1,0	-6,2	-14,5	22,9	-21,1	-25,1	-48,7	-5,3	-46,8	-5,0	-27,2	-17,4
DK	22,7	-52,3	-5,0	-13,3	12,4	-28,0	6,1	-50,4	16,2	-10,6	-39,3	-42,5	-3,5	-28,5	-19,2
EE	338,7	452,1	106,8	51,6	194,0	41,3	176,3	83,1	-34,9	137,3	137,0	28,0	9,5	-0,3	85,5
EL	-13,4	70,6	-48,4	27,1	-20,5	-53,6	80,8	-36,8	-53,4	-60,3	-83,5	-65,7	-23,6	-0,7	-28,6
ES	21,4	108,3	-41,0	-8,8	-16,5	-36,1	-14,6	-57,2	-58,3	-10,4	-69,3	-44,7	-10,2	6,8	-28,4
FI	21,3	53,4	-3,3	6,3	-9,7	-14,7	-2,4	-34,7	-24,4	-30,6	-25,1	-36,6	-21,2	-26,7	-14,6
FR	2,3	2,7	-17,0	-20,9	-11,3	-35,8	12,1	-28,1	-39,4	-22,4	-11,0	-34,2	-2,7	6,4	-19,4
HR	25,3	75,2	-34,1	30,6	52,3	-5,9	23,3	171,4	-49,5	-33,1	-79,8	-16,3	-14,6	52,6	-3,0
HU	84,6	1428,8	0,3	-2,2	34,6	-15,5	54,5	-22,2	-20,1	-59,8	-12,7	-41,0	26,6	7,6	12,2
IE	11,1	-52,7	154,7	1,3	23,8	-25,7	29,1	11,1	73,9	-46,8	-22,4	137,6	-30,9	44,4	48,2
IT	-26,0	116,0	-45,8	-50,0	-27,1	-24,6	-0,1	-37,5	-51,0	-32,5	-45,9	-54,3	-16,0	-18,3	-32,5
LT	66,0	179,4	76,3	68,7	140,9	41,5	112,3	24,0	-49,3	-24,6	-52,6	130,7	53,3	-6,1	68,8
LU	-49,3	-24,1	-35,6	3,6	22,1	-44,1	-20,0	-52,2	-56,7	-57,2	-79,8	-30,5	-19,6	-23,6	-33,0
LV	97,1	601,9	25,3	-10,0	187,1	155,7	59,3	132,0	-2,4	96,8	141,6	55,4	41,4	60,6	78,6
MT	-66,2	na	-19,3	14,8	1,6	-17,7	14,6	-26,0	-19,4	-17,3	-2,6	-15,6	-5,5	31,6	-6,2
NL	-18,3	-47,8	-18,2	19,4	19,6	-11,5	20,8	-34,5	-40,7	-7,5	-23,9	-16,5	-10,0	-33,7	-20,4
PL	-9,9	-35,3	38,7	39,9	4,4	-8,9	65,1	15,7	-17,1	56,5	76,0	112,9	69,7	-26,4	45,3
PT	17,7	45,7	-22,3	24,2	-9,4	-32,3	3,3	-44,6	-71,1	14,8	-60,2	-36,9	-21,4	-10,2	-19,7
RO	65,7	89,0	41,4	10,2	59,6	102,0	98,1	-8,0	69,2	-21,7	41,1	86,6	-29,4	21,9	67,9
SE	6,8	-18,7	-1,6	-28,9	-1,3	-1,4	9,0	-23,3	-11,6	6,5	-34,2	-6,3	-22,3	-2,0	-9,7
SI	41,9	372,5	30,6	-7,8	13,3	-9,9	65,5	-20,2	-50,8	2,4	-77,8	-31,3	-6,6	-23,1	15,8
SK	431,0	40,0	189,7	65,5	54,6	-6,5	26,9	-8,4	-47,4	-76,1	-44,6	20,8	64,3	17,4	41,4
EU-27	19,3	16,9	-21,0	-5,7	-5,6	-23,4	17,4	-36,5	-34,9	-34,2	-26,1	-36,5	-5,8	-15,9	-14,4

Reading Note

Each column corresponds to a sector, ALL corresponds to the entire economy, and each row corresponds to a country. For each country-sector pair, the cell reports the variation in the productivity ratio relative to the US for the same sector. Thus, labour productivity in the agricultural sector (A) in Austria (AT) grew by 25.4% relative to that of the same sector in the United States between 1995 and 2019.

► 3.3 Individual countries contribution to the EU-US productivity gap

When we look at the economy as a whole, the productivity ratio between the European Union (EU) and the United States (US) decreased by 14.4% between 1995 and 2019. **The decline in the EU-US productivity ratio stems entirely from the effects of lower productivity growth relative to the United States in the various EU countries (a -15.0 points sum of intra-country relative growth contributions to the overall decline).**

The evolution of the distribution of hours worked among EU countries played a counteracting role, with the share of hours worked tending to increase in favour of countries where the productivity ratio was higher than the average, and to decrease in countries where it was lower. In particular, the decrease in Romania's share of hours worked (notably in agriculture, as discussed earlier) contributed 1.1 points positively to the evolution of the European Union's productivity ratio relative to the United States.

The main contributors to the deterioration of the EU/US productivity ratio are the large EU countries: Italy (-5.4 points of the total 14.4% decline), Germany (-4.3 points), France (-3.1 points), and Spain (-2.8 points). While these countries experienced positive labour productivity growth and contributed positively to the EU-27 labour productivity growth, their labour productivity growth was below that of the US. Given their weight in the EU-27 economy, they have contributed negatively and significantly to the widening of the EU-27 labour productivity gap versus the US. Conversely, **Romania and Poland**, through their positive contribution to European productivity growth, limited the deterioration of the productivity ratio. Eleven European countries, or more than a third of the EU countries, recorded labour productivity growth superior to that of the US over the 1995-2019 period.

The analysis that follows breaks down into country contributions to the gap's evolution, sector by sector.

	Structure effect	Growth effect	Total
AT	0,0	-0,4	-0,4
BE	0,1	-0,8	-0,6
BG	0,1	0,0	0,2
CY	0,0	0,0	0,0
CZ	0,1	0,2	0,3
DE	-0,2	-4,2	-4,3
DK	0,0	-0,3	-0,3
EE	0,0	0,1	0,1
EL	0,0	-0,5	-0,5
ES	0,1	-2,9	-2,8
FI	0,0	-0,2	-0,2
FR	0,1	-3,2	-3,1
HR	0,0	0,0	0,0
HU	0,1	0,1	0,2
IE	0,1	0,5	0,6
IT	-0,1	-5,4	-5,4
LT	0,0	0,2	0,2
LU	0,1	-0,1	0,0
LV	0,1	0,1	0,2
MT	0,0	0,0	0,0
NL	0,1	-1,0	-0,9
PL	0,0	1,7	1,7
PT	0,0	-0,4	-0,3
RO	1,1	1,3	2,4
SE	0,0	-0,2	-0,2
SI	0,0	0,0	0,1
SK	0,0	0,2	0,2
Total	2,0	-15,0	-12,9

Table 9. Decomposition of the growth of the EU/US hourly labour productivity ratio between 1995 and 2019 for the entire economy, by structural and intra-country growth effects, in percentage points.

Source: EU-KLEMS, Rexecode calculations.

Reading Note

On the 14.4 % decrease in hourly labour productivity in the EU between 1995 and 2019 relatively to that of the US, Austria (AT) contributed -0.4 points, of which 0.0 points were in the form of structural effects and -0.4 points in the form of intra-country growth.

Note : the sum of contributions differs from the evolution of relative labour productivity (-14.4 %) due to a residual effect from the deformation of relative prices.

The deterioration of the European Union's labour productivity relative to that of the United States results from insufficient growth in the main European economies.

► 3.4. Contribution of the structure of worked hours between countries

Even though structural effects contributed positively to the evolution of the EU/US productivity ratio for the European economy as a whole between 1995 and 2019, this was not systematic across sectors.

Agriculture benefited from a very positive contribution from structural effects (13.2 points out of a total growth of the EU/US productivity ratio of 19.3% for the Sector). This was due to the decrease in the share of hours worked in countries with low productivity (notably Romania) and its increase in countries where it is higher (Spain, France, Italy, Netherlands). The same is true for the extractive industries: structural effects amounts to a contribution of 10.9 points out of the 16.9 % growth of the EU/US productivity ratio of the sector. The energy-water-waste sectors also show a positive contribution from structural effects, even if their overall productivity in the EU-27 fell relative to the US. For accommodation and food services, another sector for which structural effects had a positive impact on the growth of the EU/US productivity sector ratio, the explanation seems to be primarily the increase of the share of worked hours in Spain; without it, the contribution of structural effects would have been negative.

In several sectors, the contribution of structural effects to the evolution of the EU/US productivity gap was negative. This includes construction and trade, two sectors in which the share of hours worked in Germany—where productivity is higher than the EU average—fell sharply, to the benefit of countries with lower hourly productivity. A similar movement occurred in financial services, with a decrease share of Germany, Italy, and the Netherlands in the worked hours, benefiting Poland in particular.



Table 10. Contribution of structural effects between countries to the growth of the EU/US hourly labour productivity ratio between 1995 and 2019 for each sector, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T	ALL
AT	0.0	0.2	0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
BE	0.4	0.0	-0.1	0.3	0.1	-0.2	-0.1	-0.1	0.1	-0.4	0.3	0.0	0.1	0.0	0.2	0.1
BG	-0.6	0.1	0.1	0.4	0.0	-0.1	0.0	0.1	-0.1	-0.3	0.0	0.0	0.3	0.2	0.0	0.1
CY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.4	0.0
CZ	0.1	0.5	-0.3	0.0	0.3	0.1	0.0	-0.1	0.0	-0.1	-0.3	0.4	0.0	0.0	0.0	0.1
DE	0.1	-1.1	0.6	-0.1	-1.5	-0.6	-0.1	0.2	-0.2	-0.9	-0.5	-0.1	0.1	-1.2	-0.3	-0.2
DK	-0.1	1.6	-0.1	-0.1	0.0	0.0	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	0.0
EE	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-0.1	0.0
EL	-0.3	0.0	0.0	0.0	0.5	0.1	0.5	-0.7	0.1	0.0	4.3	0.1	-0.1	0.0	0.0	0.0
ES	1.7	-0.2	0.1	1.5	0.1	-0.2	0.2	2.3	0.2	0.0	4.8	-0.6	0.1	-0.6	-0.1	0.1
FI	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FR	1.6	-0.4	-0.2	0.9	0.2	0.2	0.2	0.0	-0.2	-0.2	-0.4	-0.4	-0.2	0.0	0.1	0.1
HR	0.0	-0.1	0.0	-0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.4	0.0	-0.1	-0.1	-1.6	0.0
HU	-0.1	0.5	-0.2	0.8	-0.3	-0.1	0.3	0.1	-0.2	0.0	0.3	-0.3	0.2	0.2	-0.1	0.1
IE	0.0	-0.6	0.0	-0.1	0.0	0.0	-0.1	0.0	0.4	0.1	0.1	0.0	0.1	0.0	0.0	0.1
IT	2.1	0.2	-0.2	1.0	0.0	0.1	0.0	0.0	-0.1	-0.1	0.2	0.0	-0.5	0.0	-0.4	-0.1
LT	0.1	-0.1	0.0	0.3	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.1	-0.1	0.0	0.0
LU	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.7	0.3	0.1	0.1	0.0	0.0	0.1
LV	0.0	-0.2	0.1	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.0	-0.1	0.1
MT	0.0	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
NL	1.8	4.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.4	0.0	0.1	0.1	0.0	0.4	0.1
PL	0.9	-2.1	-1.3	0.2	-0.9	-0.1	-0.9	-0.6	-1.1	-2.9	2.0	-0.3	0.8	-0.4	-0.3	0.0
PT	0.1	-0.1	0.1	0.0	0.5	0.0	0.0	-0.1	0.1	0.1	-0.1	0.0	-0.1	-0.2	0.2	0.0
RO	4.9	5.0	1.0	0.7	-0.2	-0.6	0.2	-0.1	0.2	0.0	0.0	0.1	0.0	0.1	0.0	1.1
SE	0.2	2.5	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
SI	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
SK	0.2	0.4	-0.1	0.1	-0.1	-0.2	0.0	-0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0
EU-27 sum	13.2	10.9	-0.4	6.3	-1.0	-1.5	0.2	1.3	-0.7	-4.5	12.0	-0.9	1.4	-1.9	-2.2	2.0
EU/US relative growth	29.3	16.9	-21.0	-5.7	-5.6	-23.4	17.4	-36.5	-34.9	-34.2	-26.1	-36.5	-5.8	-15.9	-34.0	-12.9

Reading Note

On the 19.3% growth in the EU/US hourly labour productivity ratio for the agricultural sector between 1995 and 2019, the change in the distribution of hours worked between countries accounted for a contribution of 13.2 points, of which 4.9 points were for Romania.

► 3.5. Contribution of the growth of productivity within countries

The contribution of each country's growth to the evolution of the EU-US productivity gap, within each sector, is generally of the same sign as that measured for the economy as a whole. This supports the hypothesis there is a strong national dimension to the evolution of the EU/US productivity gap. Thus, the contribution of national productivity growth to the EU/US productivity ratio was negative in eleven sectors of the market economy in Italy, in ten sectors in Belgium and Spain and Luxembourg, and in nine sectors in Germany, Greece, Finland, France, the Netherlands and Sweden. Conversely, Estonia had a negative contribution in only one market economy sector, Latvia or Romania in only two, Ireland and Lithuania in three, and Poland in four.

Overall, there was a generalised polarization of productivity rates across economic sectors: on the one hand, the historical core of Europe and more generally the most advanced countries lost ground relative to the United States in a large part of their economy, while new entrants, particularly in Eastern Europe and Ireland, gained ground, but not enough to offset the lag of the core.

Table 11. Contribution of intra-country growth effects to the growth of the EU/US hourly labour productivity ratio between 1995 and 2019 for each sector, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	T	ALL
AT	0.4	1.0	-0.5	0.2	-0.6	-1.0	0.7	-1.5	-1.7	0.2	-0.7	-0.4	-0.3	-0.8	-0.4	-0.4
BE	-0.5	0.3	-0.5	-0.4	0.6	-1.7	-0.1	-0.5	-1.3	-0.7	-1.0	-0.9	-0.5	-0.4	-0.5	-0.8
BG	-0.9	2.9	0.2	0.1	0.5	-0.1	0.3	0.2	0.2	0.0	-0.7	-0.7	0.0	0.4	0.0	0.0
CY	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0
CZ	0.1	0.7	0.9	-2.0	0.0	0.8	-0.3	-2.2	-0.9	0.1	-1.2	-0.2	-0.3	-1.1	0.0	0.2
DE	0.8	6.7	-9.3	-0.2	-1.5	-3.0	4.4	-2.9	-5.4	-14.6	-1.0	-13.4	-1.2	-8.7	-4.8	-4.2
DK	0.3	-2.2	-0.1	-0.2	0.2	-0.5	0.1	-0.5	0.1	-0.1	-0.8	-0.7	-0.1	-0.6	-0.5	-0.3
EE	0.4	0.9	0.1	0.1	0.2	0.1	0.4	0.0	-0.1	0.1	0.2	0.0	0.0	0.0	0.2	0.1
EL	-0.6	1.0	-0.6	0.6	-0.1	-1.3	1.4	-1.3	-0.8	-1.8	-5.7	-0.9	-0.4	0.0	0.6	-0.5
ES	2.5	4.0	-3.8	-0.9	-2.0	-4.0	-1.6	-16.0	-5.9	-0.6	-10.6	-3.3	-0.9	0.5	-8.3	-2.9
FI	0.4	0.5	0.0	0.1	-0.2	-0.1	0.0	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.3	0.1	-0.2
FR	0.3	0.2	-1.8	-3.1	-1.9	-6.0	1.7	-3.2	-7.5	-2.4	-2.0	-7.2	-0.5	0.9	-2.0	-3.2
HR	0.3	0.3	-0.2	0.1	0.2	0.0	0.1	0.6	-0.4	-0.2	-0.9	0.0	-0.1	0.2	-0.8	0.0
HU	2.1	2.9	0.0	0.0	0.4	-0.2	0.8	-0.2	-0.2	-1.4	-0.2	-0.5	0.3	0.1	0.0	0.1
IE	0.1	-0.4	2.0	0.0	0.2	-0.4	0.2	0.1	1.6	-1.1	-0.2	0.9	-0.4	0.3	0.0	0.5
IT	-5.0	3.3	-9.1	-10.5	-3.5	-3.6	0.0	-6.8	-7.0	-5.0	-9.8	-8.6	-2.2	-2.4	-14.4	-5.4
LT	0.5	0.3	0.2	0.2	0.4	0.2	0.7	0.0	-0.2	-0.1	-0.2	0.1	0.2	0.0	0.0	0.2
LU	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.1	-0.3	-1.3	-0.5	-0.1	-0.1	0.0	-0.1	-0.1
LV	0.4	0.3	0.0	0.0	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MT	-0.1	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
NL	-1.0	-7.5	-0.6	0.5	0.7	-0.6	0.9	-1.3	-1.9	-0.5	-0.7	-1.0	-0.6	-1.6	0.0	-1.0
PL	-1.1	-15.3	1.4	2.6	0.3	-0.6	3.6	0.2	-0.6	1.1	1.4	1.5	2.0	-1.0	0.0	1.7
PT	0.4	0.5	-0.3	0.4	-0.2	-0.7	0.1	-1.6	-1.9	0.2	-1.9	-0.5	-0.4	-0.1	-1.0	-0.4
RO	5.1	6.0	0.9	0.4	1.3	1.0	2.9	-0.1	1.3	-0.3	0.7	0.7	-1.0	0.7	0.0	1.1
SE	0.1	-1.1	0.0	-0.8	0.0	0.0	0.3	-0.3	-0.3	0.1	-0.8	-0.1	-0.8	0.0	-0.1	-0.2
SI	0.2	0.5	0.1	0.0	0.0	0.0	0.2	-0.1	-0.2	0.0	-0.4	-0.1	0.0	-0.1	0.0	0.0
SK	1.0	0.2	0.6	0.7	0.4	0.0	0.3	0.0	-0.5	-1.1	-0.5	0.1	0.3	0.1	0.0	0.2
EU-27 sum	6.1	5.9	-20.5	-12.1	-4.6	-21.9	17.2	-37.8	-34.3	-29.7	-38.1	-35.6	-7.2	-13.9	-31.8	-15.0
EU/US relative growth	29.3	26.9	-21.0	-5.7	-5.6	-23.4	17.4	-36.5	-34.9	-34.2	-26.1	-36.5	-5.8	-15.9	-34.0	-12.9

Reading Note

On the 19.3% growth of the EU/US hourly labour productivity ratio for the agricultural sector between 1995 and 2019, the growth in hours worked within countries represents a contribution of 6.1 points, of which 5.1 points were for Romania.

► 3.4. Two conclusions from the analysis of country contributions

Two main conclusions emerge from the analysis of countries' contribution to the evolution of the EU/US labour productivity ratio across sectors between 1995 and 2019:

- The deterioration of the productivity ratio between the EU and the US is mainly caused by the weaker productivity growth than the US in core European countries, in combination with their weight in hours worked and economic value-added in the EU. A third of the countries experienced labour productivity growth equal to or greater than that of the US. This finding is generally consistent across major economic sectors, suggesting a national dimension to the productivity loss.
- The effects of the evolution of the structure of hours worked among European countries were generally positive for the economy as a whole. This signifies that hours worked tended to shift from less productive countries toward more productive ones. Nevertheless, some sectors experienced negative country structural effects.

To delve deeper into the causes of the generalised productivity decline in core EU countries across all major economic sectors, we now analyse the gap between the average productivity growth of these countries and that of the US, broken down by productivity growth factor.

4. The factors behind EU productivity lagging that of the US from 1995 to 2019

The EU-KLEMS database provides a decomposition of productivity growth for each sector by a number of productivity factors (see Table 12 below). This analysis is available for most major European countries and the United States for the period 1995-2019. For this analysis, we will focus on the following six countries that, due to their lower productivity growth, contribute most significantly to the EU's lag relative to the US: France, Germany, Italy, Spain, the Netherlands, and Belgium.

The factors analysed in the EU-KLEMS database are:

- **Labour composition:** The effect of changes in the education and age of the workforce.
- **Tangible ICT capital services:** The contribution of investment in Information and Communication Technology (ICT) assets.
- **Tangible non-ICT capital services:** The contribution of investment in physical assets other than ICT.
- **Total intangible capital services:** The contribution of investment in intangible assets like software, database, R&D, and organisational capital.
- **Total factor productivity (TFP):** A residual measure of productivity not explained by the other factors, often attributed to technological and organisational innovation.

The table below shows significant disparities in factors contributions to labour productivity across EU countries, France and Germany displaying more similarity to the US than other core countries.

Table 12. Decomposition of annual average labour productivity growth between 1995 and 2019 into productivity factors for the entire economy and by country, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	BE	DE	ES	FR	IT	NL	US
Labour composition	0.17	0.09	0.35	0.39	0.27	0.3	0.21
Tangible ICT capital services	0.06	0.06	0.02	0.02	0.03	0.12	0.21
Tangible non-ICT capital services	0.15	0.19	0.39	-0.05	0.22	0.09	0.26
Total intangible capital services	0.15	0.11	0.1	0.08	0.08	0.14	0.2
Total factor productivity (residual)	0.22	0.75	-0.25	0.65	-0.23	0.41	0.7
Labour productivity	0.86	1.2	0.61	1.1	0.36	1.05	1.58

When we decompose the productivity growth gap between these six core EU countries and the US for the economy as a whole, very strong differences emerge (see Table 13 below):

- For Germany and France, the lower productivity growth relative to the US does not result from a lag in TFP; it grew at the same rate in both countries as in the US. For Germany, the growth gap (-0.4 percentage points) comes from labour composition (one-quarter) and investment (three-quarters). In France, the growth gap (-0.5 percentage points) is entirely due to investment, while the composition of the workforce supported French productivity.
- In contrast, in the other countries, the productivity growth gap with the US is overwhelmingly attributable to TFP (-0.9 percentage points in Spain and Italy), and to a lesser extent to the evolution of tangible and intangible capital stock, while labour composition was a supportive factor.
- In all six countries, the stock of intangible capital, as well as tangible ICT capital, supported productivity growth less than in the US. For tangible non-ICT capital, the contribution to productivity growth was stronger than in the US in Spain, equivalent in Italy, and weaker in the other four countries.
- Overall, the average picture that emerges from these six countries is a lower productivity growth of -0.7 percentage points per year on average. This growth gap is attributable by half to TFP and by half to investment, particularly in ICT.

Table 13: Decomposition of annual average labour productivity growth between 1995 and 2019 into productivity factors for the entire economy and by country, as a deviation from the US, in percentage points

Source: EU-KLEMS, Rexecode calculations.

	BE	DE	ES	FR	IT	NL	Core-EU average
Labour composition	0	-0.1	0.1	0.2	0.1	0.1	0
Tangible ICT capital services	-0.2	-0.1	-0.2	-0.2	-0.2	-0.1	-0.2
Tangible non-ICT capital services	-0.1	-0.1	0.1	-0.3	0	-0.2	-0.1
Total intangible capital services	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Total factor productivity (residual)	-0.5	0	-0.9	0	-0.9	-0.3	-0.4
Labour productivity (total)	-0.7	-0.4	-1	-0.5	-1.2	-0.5	-0.7



The analysis above can be complemented by a sector-by-sector analysis, using the arithmetic mean of the gaps between the core EU countries and the US for each sector. This sectoral analysis reveals significant disparities. The productivity lag between the core EU countries and the US affects the majority of sectors (see table below):

- **The gap is strongest in the information and-communication (J) sector (-2.6 percentage points)**, where it results from a combination of a weaker growth in capital stock (particularly tangible ICT capital, accounting for two-thirds of the gap) and lower TFP growth (accounting for one-third). The productivity growth gap in Sector J is significant in all countries but varies, ranging from -1.4 points in Germany to -3.8 points in Spain. With the exception of Germany, where TFP in Sector J grew more strongly than in the US, TFP contributed 30% to 50% of the sector's productivity growth gap in the six countries studied. The growth of ICT capital is the second factor in the sector's lower productivity growth in European countries, followed by investment in intangible capital.
- **The second strongest gap occurs in professional services sectors (M-N)**, amounting 1.8 points ; half of the gap is attributable to a lack of capital growth, and more than a third to lower TFP growth than the US.
- **The growth gap is also particularly significant in agriculture (-1.5 percentage points), and is attributable to TFP** (more than two-thirds) and to the growth of tangible non-ICT capital (the remainder).
- **In manufacturing (C), the productivity growth of the core EU countries was -1.4 percentage points lower than that of the US.** The gap is attributable to TFP (two-thirds, or -1 point) and to the growth of intangible capital (one-third). The TFP contribution to the gap is particularly strong for Spain and Italy, while it is more modest for France and Germany. Germany, however, suffers from a more pronounced lag in tangible investment.
- The **trade, accommodation, and food services** also experienced significant relative productivity losses. These are primarily due to TFP for accommodation and food services, while a lack of investment weighed on trade.

Conversely, two sectors experienced productivity growth in the EU core countries that was, on average, higher than in the US:

- **Construction**, with productivity growth **1 point** higher in core EU countries, mainly due to TFP.
- **Transportation**, with productivity growth **0.9 points** higher in core EU countries, mainly due to tangible investment and labour composition.

Table 14. Decomposition of annual average labour productivity growth between 1995 and 2019 into productivity factors, for the entire economy and by sector, averaged over the 6 countries and as a deviation from the US, in percentage points
Source: EU-KLEMS, Rexecode calculations.

	A	B	C	D-E	F	G	H	I	J	K	L	M-N	O-Q	R-S	TOT
Labour composition	0	2	3	0	1	1	5	2	-1	-1	0	-3	4	1	1
Tangible ICT capital services	0	0	-1	0	-1	-2	-1	0	-12	-4	0	-3	0	-1	-2
Tangible non-ICT capital services	-4	13	-2	-7	-1	-1	4	0	0	-1	-9	-3	0	0	-1
Total intangible capital services	0	7	-5	-1	0	-1	0	0	-4	-1	0	-3	0	0	-1
Total factor productivity (residual)	-11	-26	-10	5	11	-6	2	-11	-9	2	-3	-7	-3	0	-4
Labour productivity	-15	-4	-14	-3	10	-9	9	-10	-26	-3	-12	-18	0	0	-7

5. Conclusion

Our findings lead to several decisive conclusions regarding the protracted divergence of EU and US labour productivity, synthesised through the interplay of national and sectoral dynamics over the 1995-2019 period.

1. Despite their positive and significant contribution to the EU labour productivity growth, core economies are responsible for the productivity growth gap between the EU and the US.

The analysis reveals a fundamental polarisation in productivity growth rates across the continent. The EU's overall decline in productivity relative to the US is primarily driven by the core, large economies (Germany, France, Italy, Spain, Belgium, and the Netherlands). Their comparatively lower growth rates, when combined with their substantial economic weight, entirely account for the aggregate EU-US productivity ratio deterioration. It is important to note that while these countries drove the relative decline, their size ensured they remained the largest absolute contributors to the EU-27's overall labour productivity growth during the period.

2. Strong productivity growth in the non-core economies proved insufficient to achieve internal convergence within the EU.

A clear and positive trend of internal convergence is evident within the EU: less productive member states, particularly the new entrants in Eastern Europe, consistently recorded productivity growth superior to that of the US. However, the superior growth rates achieved by the converging economies failed to compensate for the significant productivity lag accumulated by the core economies relative to the US.

3. Among core economies, low productivity growth results from different sources.

The factor decomposition analysis confirms that the causes of the core EU countries' underperformance are not homogeneous. For major economies such as France and Germany, the growth gap relative to the US does not stem from a deficit in Total Factor Productivity (TFP), which grew at parity with the US. Instead, their entire lag is attributable to a shortfall in capital formation, specifically a lack of investment in both tangible and intangible capital, including Information and Communication Technology (ICT) assets. Conversely, for other major economies like Italy and Spain, the productivity gap is overwhelmingly defined by a substantial TFP deficit. This suggests a more fundamental structural problem relating to innovation diffusion, efficiency, and organisational capacity.

Appendix 1: Methodology for the decomposition of labour productivity growth

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This section outlines the methodology used to analyse the contributions of sectoral growth differences and labour structure effects to the widening labour productivity gap between the EU and the US.

Hourly labour productivity and its decomposition

Hourly labour productivity is defined as the ratio of value added in volume to the total volume of hours worked. This definition can be applied at an aggregate level (for the entire economy) or for each individual sector.

From an accounting perspective, aggregate productivity is the sum of the productivities of different sectors, weighted by each sector's share in total hours worked. Consequently, each sector contributes to the evolution of aggregate productivity through two main effects:

1. **Intra-Sector Growth Effect (or "within-branch effect"):** This effect captures the contribution of a sector's own productivity. It is defined as the sector's productivity weighted by its share in total hours worked. For a given sector, with an unchanged structure of hours worked, changes in its productivity directly affect the evolution of aggregate productivity, with a greater impact if that sector's share in total hours worked is high.
2. **Structure Effect:** This effect reflects the reallocation of hours worked between sectors. It is calculated as the change in a sector's share of total hours worked, weighted by that sector's relative productivity. This effect captures the evolution of aggregate productivity resulting from variations in the structure of hours worked. It is more pronounced (in absolute value) when the difference between the sector's productivity and the average productivity is large. The structure (or composition) effect can arise from either a distortion in the structure of hours per capita or a reallocation of employment between sectors.

The decomposition formula used is formally based on Berthier (2002)^[6] for calculating contributions. Let P_{jt} denote the productivity in sector j at time t , and α_{jt} denote the share of sector j in total hours worked at time t . The aggregate productivity variation between time t and time t_0 can be written as :

$$P_t - P_{t_0} = \sum_j (\alpha_{jt} - \alpha_{jt_0}) \left(\frac{P_{jt} + P_{jt_0}}{2} - \frac{P_t + P_{t_0}}{2} \right) + \sum_j \frac{(\alpha_{jt} + \alpha_{jt_0})}{2} (P_{jt} - P_{jt_0})$$

Where $\sum_j \alpha_{jt} P_{jt}$ is the aggregate productivity of all sectors. The first term of the decomposition represents the **structure effect**, and the second term represents the **intra-sector growth effect**.

To estimate the contributions of structural effects and intra-sectoral growth to the widening labour productivity gap between the EU and the US, this decomposition is performed separately for the EU and for the US. The contribution of the structural effect is then the difference between their respective structural effects, and similarly for the intra-sectoral growth effects.

[6] Berthier, J.P. (2002). Réflexions sur les différentes notions de volume dans les comptes nationaux. Document de travail de l'Insee n°8, juin 2002, mentionné in Insee, Note de conjoncture, décembre 2021.



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