

LABOUR PRODUCTIVITY CONVERGENCE IN THE BUSINESS ECONOMY ACROSS EU MEMBER STATES

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Abstract. Labour productivity indicates output per employee, represents production efficiency and is the key factor in incomes and therefore the standard of living. Labour productivity in the business economy varied significantly, i.e. six-fold, across EU Member States, with the lowest labour productivity being reported mostly in East European Member States, which makes it necessary to achieve higher productivity there. The present research aims to examine convergence trends in labour productivity and labour cost in the business economy in the EU. The research found that the fastest increase in labour productivity was reported mostly in East European Member States, although different trends were observed and even a slight decrease was reported in some Member States. However, overall, the gaps in labour productivity and labour cost between the Member States decreased significantly over a decade. A correlation analysis revealed that the correlation was strong between the change in labour productivity and that in labour cost, even though a negative trend was observed in most of the Member States with the labour cost increasing at a higher rate than the productivity, which is not sustainable economic growth in the long term.

Key words: labour productivity, convergence, business economy, EU Member States.

JEL code: Q1

Introduction

Labour productivity, according to Eurostat, measures the amount of goods and services produced by each member of the labour force or the output per input of labour. Labour productivity is often defined as the value added per employed person. As a measure, the present research employed apparent labour productivity, which is defined as value added at factor costs divided by the number of persons employed and presented in thousands of euros per person employed. In the author's opinion, labour productivity is an accurate indicator for the tradable sector (business economy), but not for the entire economy because it is difficult to measure labour productivity in the nontradable sector making up most of the economy and representing public-sector and non-market activities, the value added of which could not be measured, e.g. many government-provided services.

D. Sondermann (2012) has found that "no convergence can be found at the aggregate level, selected service sectors and manufacturing sub-industries indicate evidence of convergence. Investments in research and development as well as a high skill level of employees are shown to be beneficial whereas regulations constitute a burden". This is consistent with the author's opinion that at the aggregate level or the entire economy level, measuring labour productivity or identifying the trend therein cannot lead to an accurate result, whereas at the level of some industries or sector (tradable), it yields accurate results.

Disparities in labour productivity vary significantly across countries in the world, including EU Member States, as do incomes and the standard of living. This problem needs to be addressed and is a research focus for a number of researchers. For example, A. Filippetti and A. Peyrache (2013) have found that "disparities in the levels of labour productivity are still substantial and, to a considerable extent, they can be attributed to technology gap differences. This raises concerns about the process of convergence in labour productivity in Europe and suggests further policies aimed at reducing the technology gap". A. Naveed and N. Ahmad (2016) have established that "the speed of convergence is different across different aggregation levels. The convergence speed at the regional levels is faster than at the country and industry levels".

Labour productivity convergence is an urgent problem to be researched in the EU, as a significant gap in labour productivity results in a significant gap in income levels between West and East European

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Member States. This contributes to excessive labour migration within the EU, a "brain drain" and other socio-economic problems, mostly in East European Member States.

The present research employed Eurostat data and aims to examine convergence trends in labour productivity and labour cost in the business economy in the EU. To achieve the aim, the following specific research tasks were set: 1) to examine disparities in labour productivity and labour cost and long-term changes therein in the EU Member States; 2) to identify correlations between changes in labour productivity, labour cost and investment.

The research employed statistical analysis and correlation analysis to identify correlations between the mentioned variables based on Eurostat data.

Research results and discussion

According to the Balassa-Samuelson theory, the income level, as well as the standard of living, are determined by the tradable sector or, more accurately, labour productivity in the tradable sector that represents export industries. The tradable sector is the "engine" of the entire economy. Unfortunately, Eurostat does not provide data on the tradable sector, yet there are data available only on the business economy. The business economy encompasses mostly export industries and, therefore, could be considered to roughly represent the tradable sector determining the income level in the entire economy. The business economy does not include agriculture, forestry and fishing (section A, NACE Rev. 2), which are an insignificant component of the economy, but a significant component of the tradable sector.

Even though this applies to the entire economy, a working document by the European Commission (2023) found "positive trends in labour productivity, reflecting upward convergence, though disparities were still high between Member States and even more between EU regions" and "less developed regions were generally catching up with the EU average in terms of labour productivity. However, the pace of convergence had considerably decelerated since 2008, notably after the economic turmoil which followed the economic and financial crisis which affected EU regions asymmetrically. In transition regions, labour productivity had drifted away from the EU average during the last decade". Therefore, one can conclude that according to the working document, overall, there are mostly positive trends in labour productivity convergence in the EU.

At the same time, it is important to note that labour productivity convergence needs to be balanced. Hoffer and Spiecker (2011) have found that "with the Euro, balanced trade requires that wages in all Member States grow in line with national productivity plus targeted inflation rate of the ECB. Otherwise, countries with relatively higher growth in unit labour costs will systematically lose market share and build up trade deficits". This means that in the long term, the pace of labour cost increases needs to be the same as the pace of labour productivity increases.

1. Disparities in labour productivity in the business economy across EU Member States

The research analysed labour productivity in the business economy in the EU. Table 1 shows the Member States arranged in descending order of labour productivity in the business economy. In 2020, the highest labour productivity was reported in Ireland, whereas the lowest, i.e. 10-fold lower, was in Bulgaria, which was a very significant disparity. In the period 2008-2020, the most significant increase in labour productivity in the business economy was reported mostly in East European Member States: Bulgaria (98.9%), Lithuania (83.8%), Estonia (72.5%), Poland (55.4%), Romania (54.1%) and Latvia (37.3%), as well as in two West European Member States: Ireland (132.2%) and Malta (56.2%). The extremely high labour productivity as well as the increase therein in Ireland could be explained by "the impact that the

highly globalized nature of the Irish economy has on productivity measures" (Central Statistics Office of Ireland, 2019).

A decrease in labour productivity in the business economy was reported in three Member States: Greece (34.2%), Cyprus (9.4) and Spain (3.6). Greece underwent a serious economic crisis in the period of analysis, which can explain this decrease. The economy of Cyprus is associated with the economy of Greece, which impacted the situation in this small economy. Spain experienced an insignificant decrease in labour productivity, yet given the period of more than a decade, this indicates long-term economic stagnation. In the same period, France also had no significant progress in this respect.

Table 1

**Apparent labour productivity in the business economy and changes therein
 in EU Member States in 2008-2020, EUR thou./employee**

Country/Year	2008	2012	2016	2020	2020/ 2008,%
Ireland	77	90.8	135.6	178.8	132.2
Luxembourg	75.5	79.4	87.5	95.5	26.5
Denmark	79.5	74.9	82.9	95.2	19.7
Belgium	65.1	69.6	75.6	79.5	22.1
Sweden	59.2	69.7	71.3	75.3	27.2
Austria	59.5	61.8	66.9	69.3	16.5
Finland	61.4	59.7	65.5	68.1	10.9
Netherlands	53.3	57.8	62.0	67.1	25.9
Germany	54.7	52.5	57.0	61.8	13.0
France	58	57.5	60.3	59.7	2.2
Italy	42.1	43.9	48.2	46.4	10.2
Malta	26.0	29.8	38.7	40.6	56.2
Spain	41.2	39.7	40.5	39.7	-3.6
Slovenia	30.0	29.8	34.1	38.1	27.0
Cyprus	38.2	34.4	34.9	34.6	-9.4
Estonia	18.9	23.7	27.4	32.6	72.5
Czechia	24.3	23.9	25.7	30.4	25.1
Poland	18	20.6	21.5	27.5	55.4
Slovakia	22.4	23.2	23.1	25.7	14.7
Portugal	23.3	22.6	24.9	25.0	7.3
Hungary	19.3	19.1	21.2	24.3	25.9
Lithuania	13.0	14.8	17.9	23.9	83.8
Croatia	20.9	19.1	22.1	23.3	11.5
Latvia	15.8	16.2	17.4	21.7	37.3
Romania	13.3	12.6	15.2	20.5	54.1
Greece	28.4	24.9	19.4	18.7	-34.2
Bulgaria	8.7	9.7	12.6	17.3	98.9

Source: author's calculations based on Eurostat

Overall, the situation regarding labour productivity in the EU could be viewed positively, with mostly East European Member States indicating significant increases in labour productivity, which is a natural and logical trend in the convergence. In 2008 in the EU, the productivity gap was more than 9.1-fold

(79.5 EUR thou./employee in Denmark and 8.7 EUR thou./employee in Bulgaria), while in 2020 it was 5.5-fold between Luxembourg and Bulgaria, i.e. significantly lower (Ireland was not taken into consideration for some reasons specified below).

Table 2 shows the Member States arranged in descending order of labour cost in the business economy in the period 2008-2020. In 2008, the highest labour cost was reported in Denmark with almost 5 thou. EUR, whereas the lowest was in Bulgaria with less than 400 EUR per month, i.e. the difference was 13-fold. In 2020, the highest labour cost was reported in Denmark with more than EUR 6 thou., whereas the lowest was in Bulgaria with less than EUR 1 thou. a month, i.e. almost a 7-fold disparity. Over the period of analysis, the labour cost gap decreased almost 2-fold. Table 2 also shows labour productivity changes (Table 1) and allows a comparison of the labour productivity changes with labour cost changes, with a positive sign (+) indicating a positive trend (an increase in labour cost does not exceed an increase in labour productivity) and a negative sign (-) showing a negative trend (an increase in labour cost exceeds an increase in labour productivity). In most of the Member States, the trend was negative, indicating economic unsustainability. The most negative trend was observed in Latvia (labour cost increase was 73.8%, while labour productivity increase was only 37.3%), Romania (79.6% and 54.1%) and Bulgaria (141.9% and 98.9%). In contrast, the most positive trend was observed in Ireland (12.0% and 132.2%), Malta (9.9% and 56.2%), Lithuania (64.5% and 83.8%), Estonia (53.8% and 72.5%) and Poland (39.5% and 55.4%), thereby indicating economic sustainability. Among the Baltic States, only Latvia demonstrated a negative trend (a labour cost increase exceeding a productivity increase is possible at the expense of the factors of production other than labour as well as of gross fixed capital formation). As regards Ireland, the data might need some adjustment to indicate the true situation, as mentioned above.

Table 2

**Labour cost in the business economy and changes therein in EU Member States
 in 2008-2020, EUR a month**

Country/Year	2008	2012	2016	2020	2020/ 2008, %	Productivity change, %	Trend
Denmark	4 905	5 584	5 897	6 289	28.2	19.7	-
Luxembourg	4 638	5 023	5 539	6 033	30.1	26.5	-
Sweden	4 775	5 691	5 809	5 597	17.2	27.2	+
Netherlands	4 289	4 759	4 976	5 195	21.1	25.9	+
Austria	4 029	4 484	4 872	5 145	27.7	16.5	-
Germany	4 036	4 367	4 771	5 092	26.2	13.0	-
France	4 282	4 612	4 689	4 993	16.6	2.2	-
Belgium	4 590	5 061	5 053	4 905	6.9	22.1	+
Finland	3 848	4 368	4 778	4 773	24.0	10.9	-
Ireland	4 031	4 074	4 235	4 514	12.0	132.2	+
Italy	3 492	3 689	3 869	3 750	7.4	10.2	+
Spain	2 798	3 071	3 062	3 018	7.9	-3.6	-
Slovenia	1 929	2 187	2 310	2 604	35.0	27.0	-
Cyprus	2 269	2 516	2 180	2 258	-0.5	-9.4	-
Estonia	:	1 340	1 650	2 061	53.8	72.5	+
Portugal	1 682	1 840	1 878	2 018	20.0	7.3	-
Malta	1 812	1 993	2 182	1 991	9.9	56.2	+
Czechia	1 349	1 483	1 528	1 985	47.1	25.1	-
Greece	2 465	2 445	2 344	1 927	-21.8	-34.2	-
Slovakia	:	1 325	1 475	1 799	35.8	14.7	-
Croatia	1 363	1 375	1 405	1 667	22.3	11.5	-
Latvia	896	945	1 180	1 557	73.8	37.3	-
Poland	1 103	1 114	1 246	1 539	39.5	55.4	+
Hungary	1 182	1 184	1 301	1 519	28.5	25.9	-
Lithuania	876	874	1 117	1 441	64.5	83.8	+
Romania	636	659	830	1 142	79.6	54.1	-
Bulgaria	375	498	649	907	141.9	98.9	-

Notes: data unavailable (:); positive trend (+); negative trend (-)

Source: author's calculations based on Eurostat

The next measure analysed is investment per person employed in the business economy. Table 3 shows the Member States arranged in descending order of the variable in the period 2008-2020. In 2008, the highest figure was reported in Denmark with EUR 24.0 thou. EUR/person, whereas the lowest one was in Poland (3.9), which was almost a 6-fold gap. In 2020, the highest figure was reported in Belgium with EUR 19.1 thou. EUR/person, whereas the lowest one was in Greece (2.9), which was almost a 7-fold disparity. In contrast to the positive trend (convergence) in labour productivity and labour cost, no significant improvement was reported in terms of investment during the period of analysis. Greece reported the largest decrease in this measure over the period (60.8%). Cyprus and Denmark also reported very significant decreases. In Latvia, investment decreased by 34.8%, while labour productivity increased by 37.3%, indicating that labour cost (wages) could increase at the expense of deteriorating fixed assets, which was one of the factors.

Table 3

**Investment per person employed in the business economy and changes therein
 in EU Member States in 2008-2020, thou. EUR**

Country/Year	2008	2012	2016	2020	2020/ 2008, %	Productivity change, %	Trend
Ireland	16	26.9	10.0	25.8	60.2	132.2	+
Belgium	21.9	15.2	18.7	19.1	-12.8	22.1	+
Sweden	13.6	13.7	14.2	15.4	13.2	27.2	+
Luxembourg	9.4	11.5	12.8	13.9	47.9	26.5	-
Denmark	24.0	14.9	14.6	13.5	-43.8	19.7	+
France	13	13	12.2	12.8	1.6	2.2	+
Austria	14.2	12.1	11.9	12.7	-10.6	16.5	+
Finland	11.1	9.3	11.6	11.9	7.2	10.9	+
Netherlands	10.5	8.9	8.7	10.5	0.0	25.9	+
Germany	8.5	6.7	7.9	9.2	8.2	13.0	+
Hungary	4.9	4.5	5.7	7.9	61.2	25.9	-
Estonia	7.0	7.7	7.4	7.7	10.0	72.5	+
Czechia	6.6	5.9	5.7	7.1	7.6	25.1	+
Romania	8.7	7.0	6.6	7.1	-18.4	54.1	+
Slovenia	10.7	6.4	6.5	6.6	-38.3	27.0	+
Slovakia	9.5	6.2	6.5	6.6	-30.5	14.7	+
Italy	7.9	5.9	6.0	5.9	-25.3	10.2	+
Latvia	8.9	5.9	4.9	5.8	-34.8	37.3	+
Portugal	7.4	4.0	5.5	5.8	-21.6	7.3	+
Spain	9.0	5.6	5.6	5.7	-36.7	-3.6	-
Poland	3.9	4.3	4.7	5.6	43.6	55.4	+
Lithuania	5.4	4.3	4.8	5.5	1.9	83.8	+
Bulgaria	6.1	4.1	3.6	4.9	-19.7	98.9	+
Malta	5.4	5.3	11	4.5	-16.7	56.2	+
Croatia	7.5	4.0	4.4	4.4	-41.3	11.5	+
Cyprus	8.5	4.6	3.8	4.1	-51.8	-9.4	-
Greece	7.4	5.0	3.5	2.9	-60.8	-34.2	-

Source: author's calculations based on Eurostat

Overall, the situation regarding investment was quite negative, as most of the Member States decreased investment in their business economies. In several Member States, the amounts of investment decreased, whereas labour productivity increased, with the most notable positive trend being observed in Latvia, Romania, Slovenia, Slovakia, Croatia, Italy and Bulgaria. The same trend was observed in Malta, yet the variable was quite volatile in this Member State, which could be explained by its offshore country status. A very positive trend was observed in Estonia, as an increase of 10% in investment led to a 72.5 % increase in labour productivity.

2. Correlation between labour productivity and selected variables

The research calculated coefficients of correlation between changes in labour productivity and those in other two variables: labour cost and investment per person employed. The correlation analysis revealed that the coefficient of correlation between changes in labour productivity and those in labour cost was 0.6,

indicating a moderate correlation. However, if Ireland is excluded, the correlation coefficient was 0.81, which is a strong correlation. In 2020, Ireland reported very high labour productivity (178.8 EUR thou./employee) at a relatively low labour cost (EUR 4514 a month). For comparison, Germany reported almost 3-fold lower labour productivity (61.8 EUR thou./employee) at even a higher labour cost of EUR 5092 a month, which is illogical (Fig. 1).

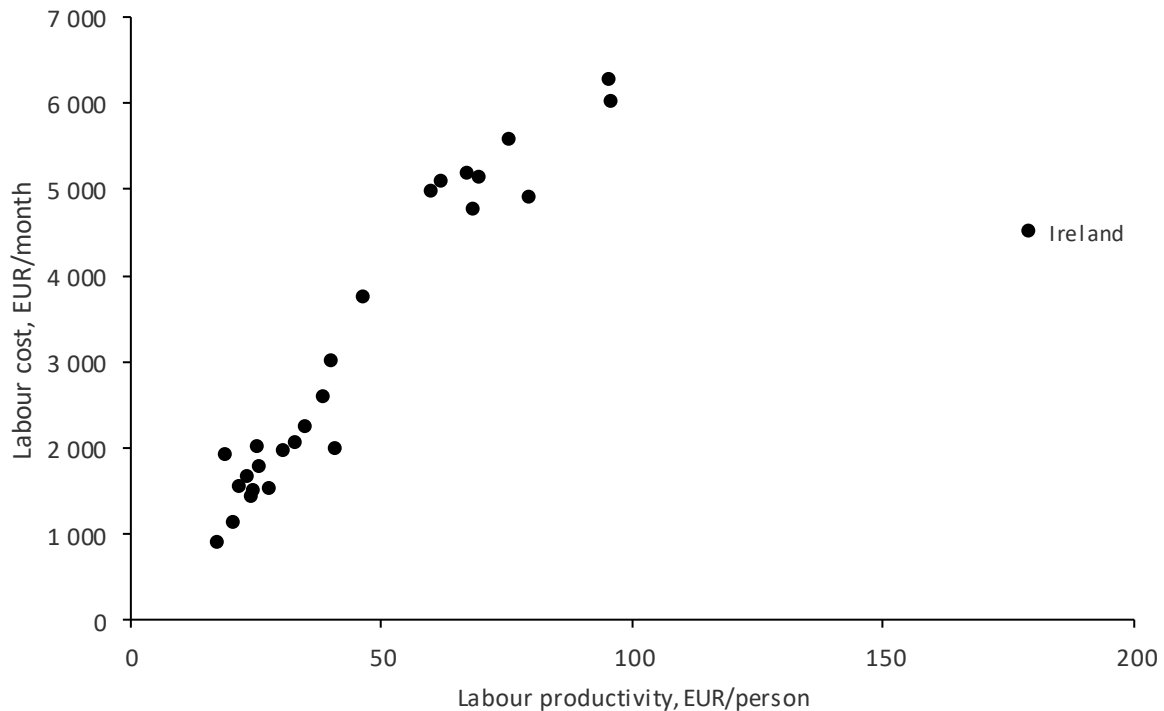


Fig. 1. **Empirical relationship between apparent labour productivity and labour cost in the business economy across EU Members States in 2020**

As shown in Figure 1, the position of Ireland on the chart is far away from the positions of other Member States, indicating that the labour productivity in Ireland needs to be adjusted for some factor(s) therein.

As regards correlation with the second variable or investment per person employed, the research identified a correlation coefficient of 0.42, which is a moderate correlation. However, if excluding Bulgaria, the coefficient reached 0.5. An exclusion of none of the other Member States could increase the coefficient so significantly. This could be explained by the fact that in the period of analysis, Bulgaria succeeded in increasing labour productivity by 98.9%, whereas investment per person employed decreased in this Member State by 19.7%, and such a strong positive trend was not observed in any other Member State.

Overall, it could be concluded that labour productivity and labour cost converged between the EU Member States during the period of analysis, which in turn reduced the gap in income and, therefore, the living standards between the developed Western European and less developed Eastern European EU Member States, thus also reducing various socio-economic problems in the Eastern European EU Member States.

Conclusions

- 1) In the period 2008-2020, the most significant increase in labour productivity in the business economy was reported mostly in East European Member States, as well as a couple of West European Member States, thereby indicating the convergence of labour productivity between the Member States.

- 2) In the EU, the labour productivity gap decreased significantly from 9.1-fold in 2008 to 5.5-fold in 2020 (between Denmark/Luxembourg and Bulgaria), thereby indicating a positive trend.
- 3) In the EU, the labour cost gap decreased significantly from approximately 13-fold in 2008 to 7-fold in 2020 (between Denmark and Bulgaria), thus indicating a positive trend.
- 4) In 2020, there was a 10-fold labour productivity gap across EU Member States, with the highest productivity being reported in Ireland, leading to a significant gap in income levels within the EU. The high productivity in Ireland probably should be adjusted for some factors, as the figure might not indicate the real situation in this respect.
- 5) In the period 2008-2020 in the EU, the change in labour productivity and that in labour cost indicated both a positive trend (productivity increased more than labour cost) in some Member States and a negative trend (productivity increased less than labour cost did) in the other ones, which was possible at the expense of the factors of production other than labour as well as of gross fixed capital formation.
- 6) The correlation between changes in labour productivity and those in labour cost was strong, while the correlation between changes in labour productivity and those in investment per person employed was moderate, which means that an increase in investment did not lead to a corresponding increase in labour productivity and was affected by some other factors.
- 7) The convergence of labour productivity and labour cost in the EU reduced the gap in income and, therefore, the living standards between the developed Western European and less developed Eastern European EU Member States, thus also reducing various socio-economic problems in the Eastern European EU Member States.

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