

Article

Labour Share Convergence in the European Union

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Abstract: The article examines the issue of labour share convergence between Western Europe (EU15) and Central and Eastern Europe (EU11). The results of our research show that for the period of 2009–2018, the convergence of labour share between the EU11 and the EU15 at the aggregate level was almost 40%. At the sectoral level, convergence of labour share between the EU11 and the EU15 occurred in three of the four main sectors—manufacturing, services, and construction—while there was a divergence in the trade sector. At the sectoral level, the highest level of convergence occurred in manufacturing—over 89.7%. In the service sector, the convergence of labour share was almost 45%, but this was mainly due to the fact that in the information and communication industry, the convergence was almost 87.8%. We have determined that for a number of sectors and industries there is an inverse relationship between the level of labour share and its dynamics, which influences the convergence of labour share between the EU11 and the EU15. We also determined that during the period under review, the level of convergence of labour share between the EU11 and the EU15 was five times higher than the level of convergence of the economy and ascertained the main reasons for the labour share convergence being higher than the economy convergence.

Keywords: labour share convergence; personnel cost; Central and Eastern Europe; Western Europe

JEL Classification: J30; J31; R11



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1. Introduction

Labour share is an important indicator, as a long-term decline in labour share, even with improved macroeconomic performance, may not lead to a commensurate improvement in household income (Atkinson 2009), and in many countries a low labour share in the functional distribution of income is associated with higher levels of inequality (Piketty 2013).

Convergence has always been considered a fundamental economic mechanism and a prerequisite for achieving socioeconomic cohesion in the EU (Alcidi 2019). The accession to the European Union (EU) of the countries of Central and Eastern Europe (CEE) contributed to the acceleration of the growth of their economies due, inter alia, to access to the single market for goods and financing from EU structural funds, which contributed in turn to the convergence of the economies of the EU11 and EU15 countries (European Commission 2009; Cuestas et al. 2012; Czasonis and Quinn 2012).

Accordingly, there were certain prerequisites for the convergence of the labour share between the EU11 and EU15 countries. For example, in a number of Western European (WE) countries, there was a decrease in labour share (Berger and Wolf 2017; Cette et al. 2019), and in some EU11 countries, especially those with relatively low levels of labour share, there was an increase in labour share (Archanskaia et al. 2019).

Despite the fact that labour share is an indicator of important macroeconomic trends (OECD 2015; Takeuchi 2018; International Labour Office 2019) that also characterizes the

effectiveness of EU integration policy, the existing literature is poor in research on labour share convergence in the EU. In a study by [Giovannoni \(2010\)](#), the presence of convergence of labour share between WE and CEE countries was indicated. However, the data from this study ends in 2004, when the first CEE countries joined the EU. A recent study by [Archanskaia et al. \(2019\)](#) finds that there is some evidence of cross-country convergence in the euro area, and their analysis also underpins weak convergence in labour shares across the euro area. The data of this study also include a significant period of time when the CEE countries were not yet part of the EU; that is, the study does not group countries on any basis and is also based only on aggregate data. In addition, only five of the EU11 countries ([European Commission 2022](#)) are members of the Eurozone, and all of these countries have small populations and small economies. Therefore, the question has remained open until now whether there has been a convergence of labour share between the CEE countries that joined the EU and the WE countries that were members of the EU before 2004. There are also two issues not considered in the literature related to the convergence of labour share between the EU11 and the EU15. First, the lack of data on labour share convergence made it impossible to compare the levels of labour share convergence and the convergence of the economy as a whole between the EU11 and the EU15. Secondly, the contribution or influence of specific sectors on labour share convergence is not discussed. The design of our study, which classifies countries into two groups, will allow us to determine the general trends in the dynamics and convergence of labour share for each group of countries, including at the level of sectors and industries of the service sector, and, to some extent, to determine the impact of the entry of CEE countries into the EU on labour share convergence.

Therefore, we intend to test the assumption of labour share convergence between Western European and Central and Eastern European countries during the period of 2009–2018.

For the first time, the level of convergence of labour share between the EU11 and the EU15 was calculated. This allowed us to determine that the convergence of labour share occurred at a much faster rate than the convergence of the economy and to argue for some reasons for the faster growth of convergence of labour share between the EU11 and the EU15.

Our findings have clear practical, empirical and political implications. On a practical level, we have presented for the first time data on convergence of labour share between the EU11 and the EU15 at the aggregate, sectoral and service industries level. We also found new trends in the dynamics of labour share in the service sector, demonstrated that the level of convergence of labour share is five times higher than the level of convergence of the economy between the EU11 and the EU15, and determined the main reasons for the higher level of convergence of labour share.

Our main empirical contribution is that we determined that in a number of sectors and industries there is an inverse relationship between the level of labour share and its dynamics. We showed that when developing a methodology for researching labour share trends, in order to avoid erroneous conclusions, it is necessary to consider not only aggregate data and data at the sector level, but also data at the industry level.

At the political level, the data we have presented are important for assessing the effectiveness of the economic integration of the CEE countries admitted to the EU. The data presented can also be used to discuss the feasibility of applying new political and economic initiatives aimed at achieving target levels of labour share in countries, sectors and industries, both at the national level and at the EU level.

The article is structured as follows: the introduction presents a general overview of the problem, identifies gaps in the scientific literature and indicates the main conclusions. The second section presents the theoretical background and empirical evidence. The third section presents the research methodology and data sources. The fourth section examines changes in the labour share of the EU11 and the EU15 from 2009–2018 at the aggregate and sectoral levels, as well as at the service sector level. This section also examines the existence of a relationship between the labour share level and its dynamics and checks the

consistency of the general trends in labour share dynamics obtained for the two groups of countries. The fifth section explores the issues of labour share convergence between CEE and WE. At the end of the article, we make conclusions and recommendations for further research.

2. Theoretical Background and Empirical Evidence

2.1. Labour Share Dynamics

Since the early 1980s, labour share has declined significantly within the large majority of countries (Lavoie and Stockhammer 2013; Karabarbounis and Neiman 2014; Autor et al. 2017). Between 1995 and 2014, the labour share in OECD countries decreased in 20 countries and increased in 11 countries (Schwellnus et al. 2017). Evolutionary data on labour share in Europe suggest significant heterogeneity between countries (Dao et al. 2017; Berger and Wolf 2017; Archanskaia et al. 2019; Cette et al. 2019). In Europe in transition, the downward trend in labour share is less homogeneous (Stockhammer 2013). CEE countries both on an aggregate and an industry level tend to have a lower labour share than older EU countries (Kónya et al. 2020). In some countries that started with relatively low labour share levels in 2000, most notably Estonia and Latvia, there is an upward trend in labour share (Archanskaia et al. 2019).

In Europe, the rate of decline in labour share varies significantly across sectors (Dao et al. 2017; Archanskaia et al. 2019). In most European countries, labour share has increased in the service sector and decreased in other sectors (Díez-Catalán 2018; Dimova 2019). In the service sector, there is an increase in the relative value added, which stimulates the demand for education and skills of workers, supporting the growth of labour share (Dimova 2019).

The level and steepness of changes in labour share across sectors are often very different (Archanskaia et al. 2019; Dimova 2019). The opposite directions of changes in labour share in different sectors can be explained by differences in the fungibility of capital by labour (Archanskaia et al. 2019). At the sectoral level, CEE countries tend to have a lower labour share than older EU member states (Kónya et al. 2020).

2.2. Reasons behind the Dynamics of Labour Share

The literature identifies two broad groups of explanations for the marked fluctuations in labour share—driving forces associated with manufacturing technologies and drivers that reflect non-technological factors (Dixon and Lim 2020). Technological progress and capital deepening are assumed to be the main determinants of labour share at the sector and industry level (Alvarez-Cuadrado et al. 2017). Technology-driven labour substitution by capita is significantly lower for highly skilled workers (Schwellnus et al. 2018). Falling labour share often reflects faster productivity growth and higher returns on capital than average wages (OECD 2015).

Aggregate industrial performance is highly dependent on factors at the company level (Altomonte et al. 2011). There are large (and increasing) differences between firms, which largely stem from uneven productivity (Redding 2006; Altomonte et al. 2011; Perugini et al. 2017; Van Reenen 2018) and capital intensity (Redding 2006).

A discrepancy in labour share has been observed between companies with high and low profitability (Furman and Orszag 2018) and between small and large firms (OECD 2017; Haldane 2017; Helpman et al. 2017). Labour share is lower for exporting firms (Perugini et al. 2017; Mertens 2019).

Growth in underemployment and temporary contracts are among the main factors contributing to the decline in labour force shares in almost all countries and sectors (Dimova 2019). In the service sector, there is an increase in the relative value added, which stimulates the demand for education and skills of workers, supporting the growth of labour share (Dimova 2019).

Previous studies note a number of other reasons for a decrease in labour shares: increased market power (Perugini et al. 2017; Weche and Wambach 2018), decreased competition and increased net profit (Barkai 2020), and increased margins (Bauer and

Boussard 2020). Grossman et al. (2017) find that a one-percentage-point slowdown in per capita income growth may explain between half and all the observed decline in labour share in the US. Lavoie and Stockhammer (2013) state that the main reason for a decline in labour share is a change in economic policy as well as the institutional and legal environment. Labour costs, and thus labour share, fluctuate during the business cycle and are highest during a recession (Mohun 2006). The formation of global supply chains as a result of globalization in certain cases, including in the case of foreign direct investment, can also lead to a decrease in labour share (Reshef and Santoni 2022).

Given the fairly wide range of possible reasons for a decline in labour share in different countries, Autor et al. (2017) find that the reasons for the decline in labour share in many countries over the past few decades remain unclear.

2.3. Labour Share Convergence in the EU

From 1994–2004, there was a sharp convergence of labour share between WE and CEE countries (Czechia, Hungary, Poland, Slovakia) towards the average labour share in the EU12 (Giovannoni 2010). Based on data from twelve eurozone countries from 1976 to 2013, Pino and Soto (2014) find that wage flexibility can stimulate labour share convergence over time. The data indicate weak convergence of labour share across euro-area member states, as found by (Archanskaia et al. 2019). The conclusion on labour convergence is based on the fact that the countries in which labour share was the highest in 2000—for example, Portugal and Spain—experienced a decrease in labour share by 2017. Also, in countries with a relatively low labour share—for example, Slovakia, Latvia, and Estonia—there was an increase in labour share. Giovannoni (2010) claims that labour share convergence has both economic and political reasons. He finds that perhaps it was fiscal policy that played a more important role in the convergence of labour share, with more on the expenditure side than on the tax side. This is explained by the fact that structural funds were created in the EU, and monetary policy was coordinated. While some purely economic phenomena can affect the functional distribution of income, it is largely dependent on changes in institutions and economic policies (Giovannoni 2010). Giovannoni finds that in the EU, labour share convergence is more characteristic of periods of economic growth. Membership of CEE countries in the EU had a positive impact on their economic growth through access to the pan-European market, elimination of barriers to mobility of factors of production, and adoption of EU standards in terms of economic policy, institutions and economic management, which contributes to the convergence of EU countries' economies in the long term (Crespo-Cuaresma et al. 2008). The market reforms and increased openness that were part of the EU accession process could have contributed to income convergence, especially if they led to increased capital accumulation (Czasonis and Quinn 2012). Sectors in which reforms to improve competitiveness have been the least extensive show a stronger level of labour share divergence between high and low productivity firms (Andrews et al. 2016).

Our analysis of the literature allows us to conclude that there are a number of factors that have a positive impact on the convergence of labour share between the EU11 and EU15 countries, which allows us to test the hypothesis that in the period of 2009 to 2018 there was a convergence of labour share between the countries of the EU11 and the countries of the EU15.

3. Methodology and Data

3.1. Methodology

The primary data required for the present research included labour cost share (labour share), the calculation of which was done by dividing companies' personnel costs by value added. This ratio was calculated for each country and industry analyzed. The labour cost arithmetic average was calculated for two sets of countries, which were classified into two groups based on the countries' period of joining the EU: new members/EU11 (CEE) and old members/EU15 (WE). In the scientific literature, it is often noted that there is a certain heterogeneity of labour share across both countries and sectors. Therefore, we

considered labour share not only at the aggregate level, but also at the level of sectors as well as sub-sectors of services. To see if there was a convergence in the labour share observed, we compared the difference in labour share between the two sets of countries in 2009 and 2018.

The convergence speed was calculated as the relative change in the labour share differences at the beginning and at the end of the period.

We calculated the labour share in relation to value added, since value added is the best proxy for a company's generated value, which is gross income from operating activities after adjusting for operating subsidies and indirect taxes.

The convergence of the economy between the EU11 and the EU15 was calculated on the basis of GDP per capita using the same calculation methodology as for calculating the convergence of labour shares.

For all the dataset levels (aggregate data, industry sectors, and service industry groups) we ran a one-factor regression for EU11 and for EU15 countries to detect if there is any relationship between the growth of labour share and labour share level at the beginning of the period analyzed, i.e., in 2009. As the independent variable, we selected the initial level of share of labour cost, its value in 2009, and as the dependent variable, the growth of labour cost was selected. The regression equation we have applied was the following:

$$LSG = \alpha + \beta \times LSL + \varepsilon,$$

where

LSG—labour share growth during the period of 2009–2018,

LSL—labour share level in 2009.

The following regression was run to all countries and industries within the framework of the analysis. Correlation between these two variables was additionally considered to understand the sensitivity of the relationship.

Additionally, we tested the results of previous studies with regard to the influencing factors on a decline in labour share and, therefore, on the convergence of labour share indicators. The ratios selected as potential descriptors of the relationship are listed in the next section, "Data".

3.2. Data

The data for the research were extracted from the Eurostat database section dedicated to structural business statistics (SBS). The dataset we built as a basis for the research included personnel cost and value added in EUR. Personnel cost is defined as the total remuneration paid by the employer and also includes taxes and social contributions. We did not consider non-wage remuneration within the present research due to data availability limitations.

The indicators were extracted on the aggregate level for the total business economy except financial and insurance activities. Total business economy, according to the Eurostat Structural Business Statistics definition, includes all activities of the business economy with the exception of agricultural activities and personal services ([Eurostat Structural Business Statistics 2021](#)). Furthermore, to see if the patterns we observed within particular sectors follow the pattern on the aggregate level, we considered the following sectors: construction, trade, industry and services. The selection of sectors was based on Eurostat database Structural Business Statistics, which provides the required data for industry (NACE Rev.2 B-E), construction (NACE Rev.2 F), trade (NACE Rev.2 G), and services (NACE Rev.2 H-N).

To identify which industries are responsible for the change in labour share within the service sector, and whether the growth of labour share in these industries matches the growth of the service sector as a whole, we introduced a more detailed breakdown within the service sector: accommodation and food service activities; administrative and support service activities; information and communication; professional, scientific and technical activities; real estate activities; and transportation and storage.

We considered the period of 2009 to 2018 to represent an optimal balance of the maximum available time frame and the number of sample countries to have as many consistent observations as possible. At the time of conducting research in 2021, Eurostat provided the required data for all industries and countries included in the analysis for the period from 2009 till 2018. Therefore, this resulted in certain limitations to the present research.

The ratios we selected to describe the reasons behind labour share convergence are as follows: labour productivity (provided by Eurostat; Eurostat 2021), the level of innovative development proxied by the Summary Innovation Index (provided by the European Commission), tertiary education (provided by the European Commission as a Summary Innovation Index component, European Commission 2007, 2019), the Financial Development Index (provided by the IMF), gross capital formation (World Bank 2021a, 2021b) and the volume of exports in relation to GDP (Eurostat); we compared these indicators from 2018, calculated as means, for the EU11 and the EU15. Additionally, we looked at the shadow economy size based on IMF data (IMF 2019a).

4. Research and Discussion

4.1. Labour Share Growth

4.1.1. Labour Share Growth: Aggregate Level

In the period of 2009 to 2018, labour share in value added in the EU11 decreased by 2.1 percentage points, while in the EU15 it decreased by 4.3 percentage points (Appendix A Table A1).

In order to determine whether a low level of labour share in some countries, as noted by Archanskaia et al. (2019) and Kónya et al. (2020), is a factor influencing the growth of labour share and thus the convergence of labour share between the EU11 and the EU15, we ran a one-factor regression analysis to see if initial labour share influences its growth (Figure 1).

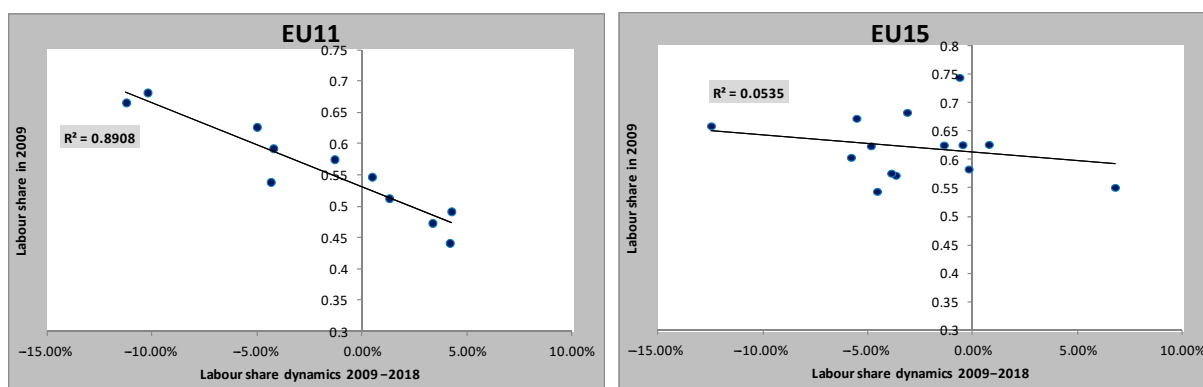


Figure 1. Relationship between level of labour share in 2009 and labour share dynamics.

While we do not see any significant relationship between the labour share level and its growth for the period of 2009 to 2018 among EU15 countries, there is a strong relationship between the labour share level and its growth among EU11 countries: the higher the initial level of labour share is, the faster it declines, and in the case it is already quite low, it does not tend to decline further.

4.1.2. Labour Share Growth: Sectoral Level

Let us consider how the labour share of the EU11 and the EU15 changed at the sectoral level in 2009–2018 (Figure 2). Data on the growth of labour share of the EU11 and the EU15 at the sectoral level for 2009–2018 are presented in Appendix A Table A1.

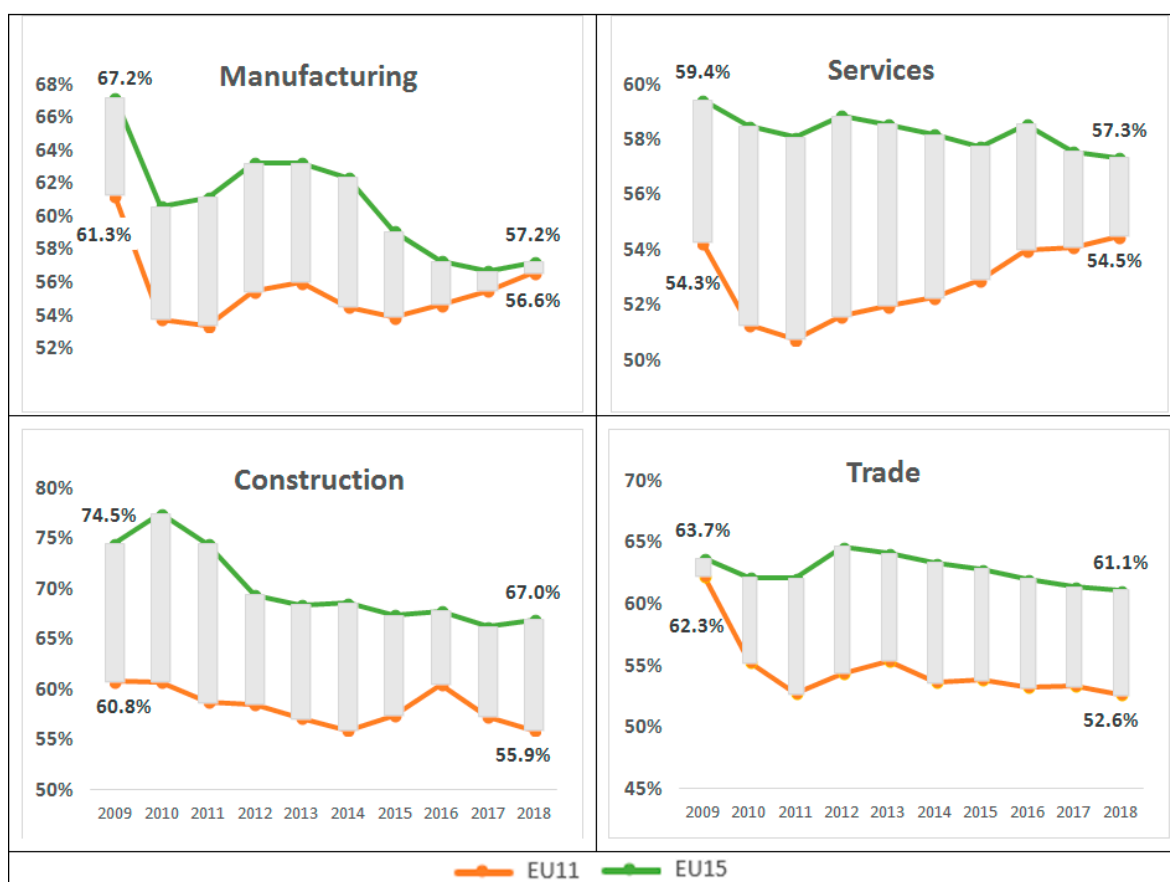


Figure 2. Changes in labour share in the EU11 and the EU15 for 2009–2018.

In all four sectors surveyed in 2009, the labour share in the EU11 was lower than in the EU15. These results correlate with data from [Kónya et al. \(2020\)](#) indicating that at the sectoral level, CEE countries tend to have a lower labour share than older EU member states. Although the same situation continued in 2018, in the manufacturing sector, the EU11 almost reached the EU15 level, and in the service sector, it came much closer to the EU15 indicator.

We also calculated that the average decline in labour share over the period of 2009–2018 at the sectoral level in the EU15 was 17% more pronounced than in the EU11.

The change in labour share in the EU11 sectors varied from minus 9.6 percentage points in the trade sector to plus 0.2 percentage points in the service sector. The decline in labour share in the EU15 ranged from 2.1 percentage points in the service sector to 10.0 percentage points in manufacturing. The largest decrease in labour share in the EU, and primarily in the EU15 in the manufacturing sector, can be explained by the most intensive use of capital in this sector ([OECD 2019](#)).

In the construction and trade sectors, the difference in labour share between the EU11 and the EU15 in 2018 was much larger (11.0 and 8.5 percentage points) than in the manufacturing and service sectors (0.6 and 2.8 percentage points). One of the possible reasons for the largest labour share gap between the EU11 and the EU15 occurring in the construction and trade sectors is possibly the higher level of the shadow economy in the EU11 countries in these sectors. For example, in Latvia the level of the shadow economy in the construction sector (28.7%), wholesale trade (25.3%) and retail trade (23.9%) exceeded the level of the shadow economy in manufacturing (23%) by 5.7, 2.3 and 0.9 percentage points, respectively ([Sauka and Putniņš 2021](#)).

Our findings correlate with data from [Dao et al. \(2017\)](#) and [Archanskaia et al. \(2019\)](#) indicating that in Europe, the level of labour share decline in different sectors varied significantly. However, our analysis of the growth of labour share in the service sector in

the EU as a whole and in the EU15 in particular runs counter to the data of Díez-Catalán (2018) and Dimova (2019), which find that labour share in the service sector has increased in most European countries. Our calculations of labour share in value added in the service sector in the EU15, as well as in the EU as a whole, show a negative trend in the period of 2009–2018. In the EU15, the labour share in the service sector fell by 2.1 percentage points, while in the 26 EU countries it fell by 1.1 percentage points. Only in the EU11 in the service sector was there a small 0.2 percentage point increase in labour share. The difference in the trends of labour share dynamics in the service sector that we found as contrasted to the findings of Díez-Catalán (2018) could be explained by the difference in time period and in regional coverage.

The observation period in the Dimova study (Dimova 2019) also starts much earlier (2002) and ends in 2016. It is possible that the shorter period of our study, which begins after the 2008 Global Financial Crisis, reflects more recent trends that are not visible 15–20 years earlier.

Since we found a strong relationship between the labour share level and its growth among EU11 countries at the aggregate level and significant differences in the growth of labour share of the EU11 and the EU15 at the sectoral level, we will further consider whether there is a relationship between the labour share level and its growth which could have influenced the convergence of labour share of the EU11 and the EU15 at the sectoral level too (Figure 3). The results of the regression analysis are presented in Appendix A Table A2.

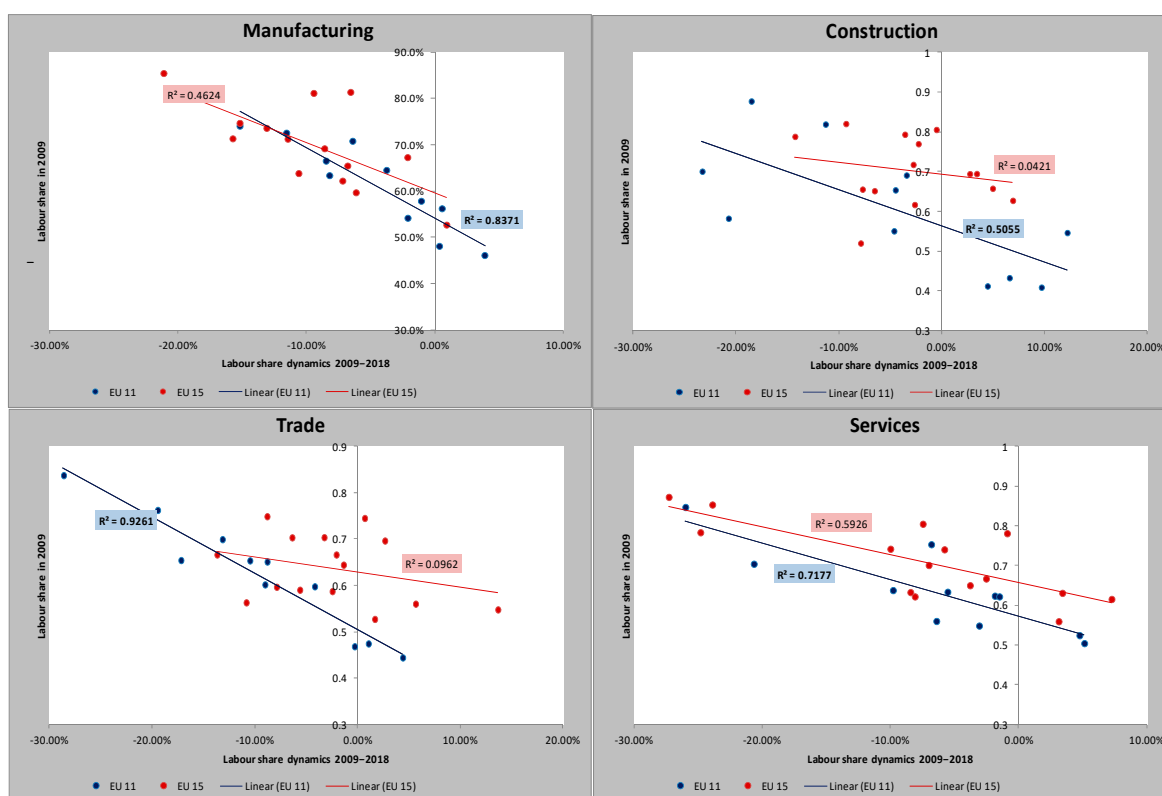


Figure 3. Relationship between level of labour share in 2009 and labour share growth: sectoral level.

Considering the sample of EU11 countries, the strongest inverse relationship between the level of labour share and its further growth is observed within the trade and manufacturing industries, followed by services and construction, as verified by the determination coefficient exceeding 0.5.

With regard to the sample of EU15 countries, no relationship is seen between these two variables if the construction and trade industries are considered, i.e., the level of

labour share does not tend to decline even if it is on a relatively high level. However, the relationship is significant in the case of manufacturing and services, though still below the significance level among EU11 countries.

The results of the regression allow us to conclude that in the manufacturing and service sectors in EU11 and EU15 countries, the higher the initial labour share level is, the faster it tends to decline. So, the labour share convergence between EU11 and EU15 countries we see in these sectors can be explained by the regression results: knowing that there is a higher labour share in EU15 countries, we observe its gradual decline becoming closer to the EU11 level, which leads to a clear convergence in labour share between these groups of countries. We cannot make robust conclusions on the convergence in labour share between EU11 and EU15 countries in the trade and construction sectors as the regression equation for the EU15 does not provide statistically significant results. Therefore, we conclude that in certain sectors the initial labour share level was one of the drivers behind the labour share cost convergence in the EU11 and the EU15, while in others it did not have a significant influence and the existence of convergence should be explained by other factors.

4.1.3. Labour Share Growth: Service Sector Industries

In a number of studies on labour share, the service sector is broken down into separate industries. Researchers such as [Archanskaia et al. \(2019\)](#) and [Dimova \(2019\)](#) find that intrasectoral change is the main driver of labour share change at the country level. For these reasons, let us consider which industries in the service sector led to the convergence of labour share between the EU11 and the EU15 ([Appendix A Table A3](#)).

First of all, note that information and communication is the only industry of the six service industries in which the labour share in the EU11 has increased. Note that the labour share in this industry in CEE increased very significantly—by 11.8 percentage points. Also, while the labour share of the EU11 decreased in the other five service industries, such a significant increase in the information and communication industry ensured an increase in the labour share in the entire service sector. In the EU15, the information and communication labour share also rose by 2.0 percentage points. As a result of the strong growth in labour share in the information and communication industry in the EU11, this industry is the only one in which the labour share exceeds the labour share in the EU15. Although [Berkowitz \(2018\)](#) finds that the quantitative impact of capital substitution on labour share reduction is small, it is likely that one of the reasons that labour share in the information and communication industry in the EU11 exceeded that in the EU15 in 2018 is a lower level of labour substitution with capital in the EU11. A similar point of view is expressed by [Alvarez-Cuadrado et al. \(2017\)](#).

In the EU15, in addition to information and communication, there is also a slight increase in labour share—by 0.4 percentage points—in another industry: administrative and support service activities. In the remaining four industries of the EU15 service sector, the labour share fell during the period under review.

[Archanskaia et al. \(2019\)](#) note that significant differences in the euro area at the sectoral level, where changes in opposite directions mitigate each other, mask the weak dynamics of changes in labour share at the aggregate level. Our conclusion strengthens the conclusion of [Archanskaia et al. \(2019\)](#) by one more level, as we investigated the growth of labour share, going deeper by one level, and found that the positive dynamics of labour share in one industry basically defines the dynamics of the entire service sector.

Since we identified the presence of a relationship between the level of labour share in 2009 and labour share growth at the aggregate and sectoral levels, it should be considered whether there is a relationship between the initial labour share level and its further change during the period of 2009 to 2018 at the level of the service industries ([Appendix A Table A4](#)).

The relationship between the initial labour share level and its further change is inverse for the majority of the service industry sub-groups analyzed as higher initial labour share is associated with its negative dynamics in the following years, which is relevant for EU11

countries to a greater extent and for the EU15 to a lesser extent. It follows the general pattern we saw when discussing the relationship among EU15 and EU11 countries based on the sample of the selected industry sectors and the aggregate data. So, it directly points to the existence of convergence within each country group, the EU11 and the EU15, and within the aggregate data sample.

The relationship is significant within the transportation and storage industry in the sample of EU15 and EU11 countries and in the broader data sample. It is clearly seen that the group of countries which had a high share of labour cost saw the steepest decline in it during the period analyzed, while in the countries where labour cost was on a relatively low level, its positive dynamics was observed. This directly points to the convergence of labour share between these two groups of countries.

The inverse relationship between the initial labour share and its further dynamics is also significant for information and communication as well as professional services and accommodation and food services, if we consider EU11 countries. Regarding the IT service industry in the EU11 countries, it is clearly seen that the vast majority of the countries analyzed had a rather low initial labour cost, and the lower it was, the higher was its increase, taking EU11 countries closer to EU15 countries' level. An inverse relationship between share of labour cost and its initial level, though at a lower significance rate, is also observed within the EU15 country group. Again, these relationships discovered through the regression analysis point to the existence of a convergence in labour share between EU11 and EU15 countries, indicating that initial labour share was one of the reasons for the convergence.

A downward trend in labour cost share is observed among companies providing professional services in EU15 and EU11 countries. However, within the EU15, this trend did not depend on the initial labour cost level, unlike in the EU11, where the countries with a relatively high share of labour cost experienced its decline and the countries with a relatively low labour cost experienced the reverse trend, therefore contributing to general convergence.

We do not see any significant sensitivity of labour share growth to its initial level among the EU15 or among EU11 countries within the following service industry sub-groups: accommodation and food services, real estate, administrative and support services, repair of computers and personal and household goods.

Attempting to explain labour share convergence between the EU11 and the EU15 within industries with the help of regression, analyzing whether the labour share growth is dependent on its initial level, we conclude that the labour share convergence can be very well explained in the transportation and storage as well as information and communication industries. However, in other industry groups, labour share growth leading to convergence in EU11 and EU15 countries should be explained by factors apart from the initial level of labour share.

4.2. Some Reasons for Labour Share Dynamics

In this section, we will compare some of the EU11 and EU15 indicators that could have affected the dynamics and convergence of labour share (Table 1).

Table 1. Some indicators affecting labour share.

Indicator (Data for 2018)	Nominal Labour Productivity per Active Population	Financial Development Index	Innovation Index	Tertiary Education (% of Population)	Gross Capital Formation	Share of Exports (% to GDP)
EU11	72.50	0.362	0.337	38.5	23.38	69.6
EU15	107.44	0.722	0.574	44.42	21.39	63.6

Data: authors' calculations based on Eurostat, IMF, European Commission and World Bank data.

Our analysis shows that the EU15 had much higher nominal labour productivity per person and a higher value in the Financial Development Index, which characterizes

capital deepening, than the EU11 (+48.2% and +99.4%, respectively). Studies note that technological progress and capital deepening are the main determinants of labour share at the sector and industry level (Alvarez-Cuadrado et al. 2017). The wage and productivity gap may explain 90% of the change in the weighted average labour force share in the UK (Richiardi and Valenzuela 2019). Our comparison of labour productivity and capital deepening of the EU11 and the EU15 may indicate the possible presence of a certain relationship between the above indicators and labour share and confirms the data of the above studies.

Research shows that automation always reduces the labour share in value added and can reduce demand for labour, increasing productivity (Acemoglu and Restrepo 2019); that productivity is higher in innovative firms (Mohnen and Hall 2013; Morris 2018; Ugur and Vivarelli 2020); that product innovation has a positive impact on productivity (Cassiman et al. 2010); and that more productive firms have a stronger incentive to invest in R&D (Aghion et al. 2021). Therefore, we compared the level of innovation development in the EU11 and the EU15. In the EU15, the innovation index was 70.3% higher than in the EU11. This may indicate that a high level of innovative development is one of the factors affecting a decline in labour share. Our findings correlate with data from Alvarez-Cuadrado et al. (2017) and Schwellnus et al. (2018), which find that technology improvement contributed to a reduction in labour share.

We established that in CEE the gross capital formation indicator, which reflects the volume of investments in tangible assets, was 9.3% higher than in WE. The literature indicates that these factors contribute to a decrease in labour share. The share of exports in GDP in CEE is 6.0 percentage points or 9.4% higher than in WE. Studies such as Greenaway and Kneller (2007), Melitz and Trefler (2012), Bernard et al. (2012), and Haldane (2017) indicate that export firms are more productive, and higher levels of productivity, as shown above, contribute to a decrease in labour share and therefore labour share is lower for exporting firms (Perugini et al. 2017; Mertens 2019). However, as we noted above, researchers do not attribute gross capital formation and share of exports (in GDP) to the factors that have the most significant impact on a decline in labour share, and the difference in the levels of these two indicators between the EU11 and the EU15 is not as significant as in nominal labour productivity per person, access to financial capital and to a wide choice of capital attraction options, and the level of innovative development. In addition, for firms in the larger economies of the EU15 countries, that is, for countries with a higher domestic market capacity, possibly it is not relative, but they are absolute indicators of exports important for increasing productivity through economies of scale.

Another factor that could have contributed to the higher labour share decline in the EU15 is the relative number of large companies. It is known that large companies tend to have higher levels of productivity, which consequently contributes to a decrease in labour share (Navaretti et al. 2011). Based on the ORBIS database, we made calculations and determined that in 2018 the number of companies included in the 5000 largest European companies in relation to the share of the active population in the EU15 was 4.8 times higher, while in relation to GDP it was 2 times more than the EU11. The data we present may indicate that a higher level of concentration of large companies might have a greater impact on a decrease in labour share in the EU15 than in the EU11.

Studies also note (Schwellnus et al. 2018) that lower labour share is more common for workers with lower qualifications. We found that the level of tertiary education in CEE is 15.3% lower than in WE. Accordingly, the lower level of tertiary education in the EU11 could also have a downward effect or restrain the growth of labour share in the EU11 compared to the EU15 and, of course, restrain the decline in labour share in WE.

4.3. Labour Share Dynamics: Country-Level Analysis

In order to check the reliability of the trends identified in the previous sections, in this section we analyze the growth of labour share at the country level, not at the group level as in the previous section (Appendix A Table A5).

We established that at the aggregate level, out of the 26 EU countries examined in the study, labour share has increased in 7 countries, including in 2 EU15 countries (Germany and Greece) and 5 EU11 countries (Bulgaria, Czechia, Latvia, Poland and Romania). Accordingly, in 19 countries labour share has decreased. Our results correlate with data on significant heterogeneity in the evolution of labour share in Europe (Dao et al. 2017; Archanskaia et al. 2019; Cette et al. 2019).

A decrease in labour share is especially pronounced in the EU15—in 13 out of 15 countries labour share has decreased. In the EU11, labour share decreased in 6 out of 11 countries, that is, slightly more than half of the countries, which correlates with the data of Stockhammer (2013) indicating that the downward trend in labour share in CEE countries is less homogeneous than in WE. The largest increase in labour share occurred in Greece (6.8 percentage points) and in Romania and Poland (4.2 percentage points). The largest decrease in labour share occurred in Ireland (25.3 percentage points), Denmark (12.5 percentage points), Lithuania (11.2 percentage points) and Slovenia (10.2 percentage points).

Let us consider the changes in labour share in the EU countries at the sectoral level (Appendix A Table A5). In the EU, a decrease in labour share in the manufacturing sector occurred in 22 out of 26 countries (84.6%), of which 14 were WE countries and 8 were CEE countries. In construction, a decrease in labour share occurred in 18 countries (69.2%), of which 11 were WE countries and 7 were CEE countries. In trade, a decrease in labour share occurred in 19 countries (73.1%)—in 10 WE countries and in 9 CEE countries. A more heterogeneous trend was observed in the service sector, with a decrease in labour share occurring in 13 out of 26 countries (50%). In CEE, a decline in labour share in the service sector occurred in 5 out of 11 countries, and in WE it occurred in 8 out of 15 countries.

At the level of industries in the service sector, in information and communication, a growth in labour share during the period under review occurred in 20 of the 26 countries under consideration—in 10 CEE countries and in 10 WE countries (Appendix A Table A6). If we consider the service sector without the information and communication industry, then a decrease in labour share in the service sector occurred in the EU11 in 69.1% of cases, in the EU15 in 60% of cases, and in the EU as a whole in 63.8% of cases.

We noted the heterogeneity of the growth of labour share in value added in 2009–2018, both in the EU countries as a whole and within the EU11 and EU15 groups of countries. Our results for labour share growth confirm the results of the studies by Berger and Wolf (2017) and Cette et al. (2019).

As a result of the analysis carried out at the country level, we confirmed the correctness of the general trends in the evolution of labour share for the groups of CEE and WE countries at the aggregate and sectoral levels, as well as at the level of industries in the service sector. In other words, our results for the evolution of labour share for the EU11 and the EU15 are not a distortion of the arithmetic mean data we applied when grouping countries.

5. Labour Share Convergence

5.1. Labour Share Convergence: Aggregate Level

According to our calculations, in the period of 2009–2018 at the aggregate level between the EU11 and EU15, a labour share convergence of 40% took place.

Since the convergence of the economy has been identified as one of the main goals of creating the EU (Franks et al. 2018; Leonardi 1995), we compared the data on the level of convergence of labour share with the level of economy convergence between the EU11 and EU15. Beta-convergence of the EU11 and EU15 economies amounted to 7.9%, which is five times lower compared to the level of labour share convergence.

Based on this, the question arises as to the reasons for the much higher level of labour share convergence compared to the convergence of the EU11 and EU15 economies. Since the tasks of our study did not include determining the reasons for the higher level of labour share convergence in comparison with the convergence of the economy, we will provide only a few of our considerations in this regard.

First, the higher level of labour share convergence could be influenced by the EU11 countries' access to the EU labour market after the countries joined the EU. [Pino and Soto \(2014\)](#) and [Naz et al. \(2017\)](#) find that wage convergence is taking place in Europe, which, according to them, has an impact on labour share convergence.

Secondly, due to the use of modern information and communication technologies, the possibility of both remote work and remote provision of services has been created and is constantly increasing, which has contributed to the convergence of labour share in a number of sectors and industries. Studies note that the digitalization of the economy increases the level of labour mobility and, accordingly, contributes to the transformation of the labour market ([Skryl 2021](#)), and also that firms and workers are rapidly becoming familiar with and accustomed to digital technologies such as teleworking or working from home, leading to new ways of doing business, structural changes in the economy, and consequent implications for labour markets ([Anderton et al. 2020](#)).

Third, the rate of convergence of labour share and convergence of the economy may differ in the type and/or duration of the convergence cycles. For example, studies note that labour share dynamics is largely determined by the business cycle ([Schwellnus et al. 2017](#)) and is predominantly countercyclical ([Schneider 2011](#); [Kehrig and Vincent 2018](#); [Alvarez-Cuadrado et al. 2017](#); [Archanskaia et al. 2019](#)) and that the labour share cyclicality can be significantly longer than the business cycle ([Mućk et al. 2015](#); [Acemoglu and Restrepo 2018](#); [Charpe et al. 2019](#)).

Further, of course, the higher level of convergence of labour share between the EU11 and the EU15 could have occurred as a result of a combination of several of the above and a number of other factors that we mentioned in the section "Theoretical Background".

5.2. Labour Share Convergence: Sectoral Level

We calculated that in the period of 2009 to 2018, the greatest convergence of labour share between the EU11 and the EU15 occurred in the manufacturing sector: 89.7% ([Appendix A Table A1](#)). If the same dynamics persist in the manufacturing sector, labour share of the EU11 and the EU15 may become equal for several years. In the service sector, the labour share convergence between the EU11 and the EU15 was 45.0% and at this rate of convergence in the service sector, convergence will take place in 12 years. In the construction sector, convergence was 19.6%.

In the trade sector, between the EU11 and the EU15, there was a significant divergence of labour share—in 2009 the difference in labour share was 1.42 percentage points, and in 2018 the gap widened to 8.5 percentage points.

We established that labour share converged between the EU11 and the EU15 at the sectoral level in three of the four largest sectors, while divergence occurred only in the trade sector.

5.3. Labour Share Convergence: Service Industries

We found that in all six industries in the service sector, there was a convergence of labour share between the EU11 and the EU15. At the same time, in two of the six industries of the service sector—information and communication and real estate activities—convergence in these industries amounted to 87.8% and 83.2%, respectively. Convergence of labour share in other industries was as follows: professional, scientific and technical activities—42.1%; administrative and support service activities—22.9%; accommodation and food service activities—16.6%; and transportation and storage—15.7%.

In our estimation, among other factors, the following influenced the growth of labour share in the information and communication industry we observed. Firstly, the widespread use of information and communication technologies is a growing global trend. Thus, [Bessen \(2017\)](#) notes that successful IT systems play an important role in increasing profitability. Also, IT belongs to those industries that, according to [Van Reenen \(2018\)](#), are characterized by new technologies and the expansion of their use at the global level. Therefore, both for developing companies and for companies following the global digitalization/digital

transformation trend, highly qualified employees are required. There is a high demand on the labour market for workers in this industry, which, accordingly, has a positive effect on the growth of wages in the IT industry. Additionally, as shown in studies such as [Dao et al. \(2017\)](#) and [Dimova \(2019\)](#), the labour share of workers with higher wages increased. Secondly, over time, the role of IT in business success continues to grow. A study by [Archanskaia et al. \(2019\)](#) shows that the time trend is the strongest positive influence on labour income share in the information industry. Thirdly, regarding the provision of information and communication services, remote work and remote service provision have become technologically possible and more widespread, which gives an opportunity for IT sector representatives from low-wage countries to provide their services and labour in high-wage countries, therefore stimulating salary gap elimination. Fourthly, as in other industries, the EU11 labour share in the information and communication industry has been boosted by the free EU labour market. For example, [Naz et al. \(2017\)](#) note that higher mobility implies a narrower wage gap between countries, as labour can flow from countries with lower wages to countries with higher wages ([Franks et al. 2018](#)).

6. Conclusions

In the present study of the convergence of labour share in the EU, we confirmed our assumption on labour share convergence between the EU11 and the EU15, identifying the level of convergence of labour share during the period of 2009–2018. We found that between 2009 and 2018, convergence of labour share between the EU11 and the EU15 at the aggregate level was almost 40%. At the sectoral level, convergence of labour share between the EU11 and the EU15 occurred in three of the four main sectors—manufacturing, services and construction—while there was a divergence in the trade sector. At the sectoral level, the highest level of convergence was in manufacturing—89.7%. Note that in the service sector, convergence of labour share was almost 45%, which was driven by the information and communication industry, where convergence was 87.8%. The level of convergence of labour share in the construction sector was much lower (19.6%), while in the trade sector there was a divergence of labour share. The data we have presented indicate different dynamics of labour share in sectors and within the service sector, which confirms the results of previous studies ([Dao et al. 2017](#); [Archanskaia et al. 2019](#)).

We calculated that in the period under consideration the level of convergence of labour share between the EU11 and the EU15 was five times higher than the level of relative convergence of the economy. In our opinion, the most important reasons for the higher growth in labour share convergence could be related to the accession of the EU11 countries to the EU, for example, the opening of the EU labour market for the EU11 countries, and unrelated reasons, for example, the expansion of technological opportunities to work and provide services remotely.

The latter factor may be supported by the fact that the convergence of labour share in the information and communication industry was almost twice as high as in the service sector and as the aggregate indicator as a whole. Moreover, the information and communication industry was the only industry in the EU11 in which labour share increased significantly, by 12.0 percentage points, although the increase in the same industry in the EU15 was 2.0 percentage points.

We also found that labour share in the service sector in most EU countries is not increasing, which is contrary to the results of previous studies, for example, [Diez-Catalán \(2018\)](#) and [Dimova \(2019\)](#), and in countries that saw an increase in labour share in the service sector, it occurred as a result of an increase in labour share in only one of the industries—information and communication.

Regression analysis, which was conducted with the intention to detect the existence of a relationship between labour share and its further dynamics, showed that there is a statistically significant inverse relationship between the two variables among EU11 countries. The inverse relationship is also significant if applied to the manufacturing and service sectors, as well as to transportation and storage and information and communication, indicating

the convergence of labour share in EU11 and EU15 countries, given that the latter have a higher labour share.

In our study, using the service sector as an example, we showed that the direction and rate of changes in labour share for different industries of the same sector, both for groups of countries and for specific countries, can vary greatly. This allowed us to make recommendations on the labour share research methodology of the labour share survey. Namely, that it is necessary to take into account the dynamics of the share of labour not only at the sectoral level, but also at the industry level. Several factors could have influenced the accuracy of the results of our study. First, the study did not consider changes in the proportion of self-employed persons, while [Elsby et al. \(2013\)](#) find that a third of declining labour share is an artifact of statistical procedures, to impute self-employed labour income.

Second, there are various forms of indirect reward. Thus, [Smith et al. \(2019\)](#) find that owner-managers of S corporations have a tax incentive to misrepresent their income as business income rather than wages, which may be more common in WE. Third, our calculations based on data on the level of the shadow economy in the EU11 and the EU15 in 2009 and 2018 ([IMF 2019b](#)) and data on the share of unofficial wages in the shadow economy ([Putniņš and Sauka 2015](#)) indicate that the level of employment in the shadow economy in CEE countries in 2009 was on average about 2.8 percentage points higher than in WE, and in 2018 it was on average about 1.8 percentage points higher than in WE.

7. Recommendations for Future Research

Since the observation period in our study corresponded to the period of economic growth, and according to the point of view of [Giovannoni \(2010\)](#), labour share convergence is more typical for periods of economic growth. In future studies it would also be advisable to test the level of labour share convergence between CEE and WE for a longer period of time. This would allow our conclusions to be verified not only in the positive phase of the business cycle. In addition, the duration of the period of change in the labour share trend can be much longer than the business cycle ([Mućk et al. 2015](#); [Acemoglu and Restrepo 2018](#); [Charpe et al. 2019](#)), which also requires a longer observation period.

Additionally, we recommend conducting further analysis of the implications of the convergence of EU11 and EU15 labour shares in terms of policy implications, taking into account the direct and indirect impacts on aggregate demand.

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Appendix A

Table A1. Labour share dynamics and convergence in the EU11 and the EU15 (in %), aggregate data and sectors, 2009–2018.

Years/Sectors	EU11			EU15			Difference		Convergence
	2009	2018	Delta	2009	2018	Delta	EU11/EU15 2009	EU11/EU15 2018	
Aggregate data	55.88	53.80	−2.08	61.41	57.12	−4.29	5.53	3.32	39.96% (convergence)
Manufacturing	61.29	56.6	−4.69	67.2	57.21	−9.99	5.91	0.61	89.68% (convergence)
Services	54.27	54.5	0.23	59.43	57.34	−2.09	5.16	2.84	44.96% (convergence)
Construction	60.79	55.93	−4.86	74.49	66.95	−7.54	13.7	11.02	19.56% (convergence)
Trade	62.25	52.62	−9.63	63.67	61.12	−2.56	1.42	8.5	6× (divergence)

Table A2. Labour share level in 2009 (independent variable, x) and its dynamics in 2009–2018 (dependent variable, y) regression results, aggregate data and sectors, 2009–2018.

Sectors	EU11				EU15			
	Coefficient	p-Value	R	R-Square	Coefficient	p-Value	R	R-Square
Aggregate data	−0.66	0.00	0.94	0.89	−0.18	0.55	0.23	0.05
Manufacturing	−0.55	0.00	0.91	0.84	−0.43	0.01	0.68	0.46
Services	−0.78	0.00	0.85	0.72	−0.84	0.00	0.77	0.59
Construction	−0.56	0.01	0.71	0.51	−0.14	0.48	0.21	0.04
Trade	−0.76	0.00	0.96	0.93	−0.29	0.26	0.31	0.10

Table A3. Labour share convergence in the EU11 and the EU15, service sector industries, 2009–2018.

Service Industries	EU11			EU15			Difference		Convergence/Trend Changes
	2009	2018	Delta	2009	2018	Delta	EU11/EU15 2009	EU11/EU15 2018	
Accommodation and food service activities	74.68	66.1	−8.58	70.53	69.56	−0.97	4.15	3.46	16.63% (convergence + trend changes)
Administrative and support service activities	65.27	65.06	−0.21	64.92	65.33	0.41	0.35	0.27	22.86% (convergence + trend changes)
Information and communication	44.55	56.31	11.76	53.23	55.25	2.02	8.68	1.06	87.79% (convergence + trend changes)
Professional, scientific and technical activities	58.07	57.28	−0.79	64.94	61.26	−3.68	6.87	3.98	42.07% (convergence)
Real estate activities	26.56	21.85	−4.71	38.84	23.91	−14.93	12.28	2.06	83.22% (convergence)
Transportation and storage	63.28	56.76	−6.52	71.06	63.32	−7.74	7.78	6.56	15.68% (convergence)

Table A4. Labour share level in 2009 (independent variable, x) and its dynamics in 2009–2018 (dependent variable, y) regression results, service industry sub-groups, 2009–2018.

Service Sub-Group	EU11				EU15			
	Coefficient	p-Value	R	R-Square	Coefficient	p-Value	R	R-Square
Transportation and storage	−0.78	0.00	0.85	0.72	−0.84	0.00	0.77	0.59
Accommodation and food services	−0.63	0.01	0.77	0.59	−0.00	0.99	0.00	0.00
Information and communication *	−0.78	0.03	0.65	0.42	−0.32	0.07	0.51	0.26
Real estate *	−0.35	0.08	0.55	0.30	−0.16	0.24	0.34	0.12
Professional * services	−1.25	0.00	0.95	0.91	−0.12	0.32	0.29	0.08
Administrative and support services	−0.00	0.99	0.01	0.00	0.06	0.79	0.07	0.01

* Ireland was excluded from calculations as it appeared to be an outlier in these data sets.

Table A5. Labour share dynamics in the EU countries 2009–2018, aggregate and sectoral level (percentage points).

Country Groups	Country	Aggregate Level	Sectors			
			Construction	Manufacturing	Services	Trade
EU11	Bulgaria	3.35	9.70	−2.08	7.40	1.04
	Croatia	−1.32	12.22	−3.73	−2.51	−4.20
	Czechia	1.29	−4.64	−1.03	3.62	−9.04
	Estonia	−5.01	−11.31	−6.38	0.43	−19.49
	Hungary	−4.35	−20.75	0.38	−4.62	−17.21
	Latvia	0.47	−4.50	−8.18	6.75	−10.50
	Lithuania	−11.24	−18.53	−8.45	−6.66	−28.64
	Poland	4.17	4.45	3.91	6.15	4.38
	Romania	4.25	6.59	0.58	8.06	−0.31
	Slovakia	−4.23	−23.31	−15.15	−5.10	−8.82
	Slovenia	−10.22	−3.43	−11.53	−11.03	−13.18
EU11 Total		0.83	−4.86	−4.70	0.23	−9.64
EU15	Austria	−0.48	3.40	−2.10	0.82	−6.40
	Belgium	−3.66	−2.63	−10.58	−4.51	1.65
	Denmark	−12.46	−3.59	−15.71	−12.00	−8.83
	Finland	−5.54	2.74	−15.16	−2.15	−3.28
	France	−0.63	−0.52	−6.53	2.26	0.67
	Germany	0.77	−14.28	−9.40	6.19	5.63
	Greece	6.78	−2.77	0.94	8.58	13.64
	Ireland	−25.27	−73.54	−17.15	−24.24	−13.71
	Italy	−5.80	−6.54	−11.42	−0.93	−5.64
	Luxembourg	−4.85	−9.32	−21.09	2.11	−10.86
	Netherlands	−3.88	−7.71	−7.16	−3.54	−7.91
	Portugal	−0.19	4.96	−6.77	3.50	−1.39
	Spain	−1.37	6.92	−8.56	1.35	−2.10
	Sweden	−3.13	−2.27	−13.07	−1.34	2.64
	United Kingdom	−4.56	−7.88	−6.11	−7.45	−2.49
EU15 Total		−3.34	−7.54	−9.99	−2.09	−2.56

Table A6. Labour share dynamics in the EU countries 2009–2018, service sector industries (percentage points).

Country Groups	Country	Service Sector	Service Sector Industries					
			Accommodation and Food Service Activities	Administrative and Support Service Activities	Information and Communication	Professional, Scientific and Technical Activities	Real Estate Activities	Transportation and Storage
EU11	Bulgaria	7.40	−0.85	5.76	23.24	9.11	−3.69	−6.41
	Croatia	−2.51	−12.89	−3.92	3.25	6.08	−5.49	−5.54
	Czechia	3.62	−0.97	4.95	9.41	5.33	−2.20	−1.86
	Estonia	0.43	−16.18	−13.28	14.48	−5.87	−2.21	4.75
	Hungary	−4.62	−29.87	−1.86	5.29	−16.64	−4.69	−6.81
	Latvia	6.75	−4.38	2.08	13.43	15.02	−4.08	5.13
	Lithuania	−6.66	−20.13	−8.25	14.58	−13.88	−11.02	−9.80
	Poland	6.15	−3.27	7.17	14.55	17.57	−9.81	−3.08
	Romania	8.06	1.47	9.52	20.03	4.84	2.16	−1.50
	Slovakia	−5.10	2.66	3.79	15.80	−17.74	−5.52	−26.00
	Slovenia	−11.03	−9.93	−8.20	−4.63	−12.44	−5.20	−20.66
EU15	Austria	0.82	1.64	9.54	1.87	−5.69	2.56	−2.54
	Belgium	−4.51	−2.63	5.79	−4.55	−9.63	0.23	−7.01
	Denmark	−12.00	2.56	−1.20	−1.26	−1.59	−7.43	−27.29
	Finland	−2.15	−2.74	1.62	−5.46	−1.34	2.53	−5.79
	France	2.26	0.98	6.19	5.89	−2.51	4.52	−0.90
	Germany	6.19	−0.39	1.28	10.62	3.01	6.04	7.26
	Greece	8.58	16.26	5.52	7.32	5.32	1.45	3.41
	Ireland	−24.24	−14.73	−16.32	−9.84	−26.94	−229.58	−24.82
	Italy	−0.93	−3.47	−2.59	3.52	−1.65	1.52	−10.00
	Luxembourg	2.11	11.66	13.40	5.41	−1.86	2.53	−23.90
	Netherlands	−3.54	−4.74	−4.64	0.87	−5.23	−5.49	−3.79
	Portugal	3.50	−5.46	2.90	11.35	4.32	−1.63	3.13
	Spain	1.35	−1.72	−2.06	9.03	5.77	2.35	−8.09
	Sweden	−1.34	−4.23	−1.23	0.37	−10.34	3.06	−7.47
	United Kingdom	−7.45	−7.61	−12.12	−4.79	−6.79	−6.70	−8.44

References

- Acemoglu, Daron, and Pascual Restrepo. 2018. The Race between Man and Machine: Implications of Technology for Growth, Factor Shares, and Employment. *American Economic Review* 108: 1488–542. [CrossRef]
- Acemoglu, Daron, and Pascual Restrepo. 2019. Automation and New Tasks: How Technology Displaces and Reinstates Labor. *Journal of Economic Perspectives*. Available online: https://www.bu.edu/econ/files/2019/05/JEP_automation_March_29_nber.pdf (accessed on 18 May 2022).
- Aghion, Philippe, Antonin Bergeaud, Timo Boppart, Peter J. Klenow, and Huiyu Li. 2021. A Theory of Falling Growth and Rising Rents. Available online: https://scholar.harvard.edu/files/aghion/files/theory_of_falling_growth_and_rising_rents_nov2020.pdf (accessed on 18 May 2022).
- Alcidi, Cinzia. 2019. Economic Integration and Income Convergence in the EU. *Review of European Economic Policy* 54: 5–11. Available online: <https://www.intereconomics.eu/contents/year/2019/number/1/article/economic-integration-and-income-convergence-in-the-eu.html> (accessed on 18 May 2022). [CrossRef]
- Altomonte, Carlo, Giorgio Barba Navaretti, Filippo Di Mauro, and Gianmarco Ottaviano. 2011. Assessing Competitiveness: How Firm-Level Data Can Help. Research Report, Bruegel Policy Contribution, No. 2011/16. Available online: <https://www.econstor.eu/bitstream/10419/72103/1/672712199.pdf> (accessed on 18 May 2022).
- Alvarez-Cuadrado, Francisco, Ngo Van Long, and Markus Poschke. 2017. Capital-labor substitution, structural change, and growth. *Theoretical Economics* 12: 1229–66. [CrossRef]
- Anderton, Robert, Valerie Jarvis, Vincent Labhard, Filippos Petroulakis, and Lara Vivian. 2020. *Virtually Everywhere? Digitalisation and the Euro Area and EU Economies: Degree, Effects, and Key Issues*. ECB Occasional Paper No. 244. Frankfurt am Main: European Central Bank (ECB). ISBN 978-92-899-4250-8. [CrossRef]
- Andrews, Dan, Chiara Criscuolo, and Peter N. Gal. 2016. The Best Versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy. Available online: <https://www.oecd-ilibrary.org/content/paper/63629cc9-en> (accessed on 18 May 2022).
- Archanskaia, Elizaveta, Eric Meyermans, and Anneleen Vandeplass. 2019. The labour income share in the euro area. In *Quarterly Report on the Euro Area (QREA), Directorate General Economic and Financial Affairs (DG ECFIN)*. Brussels: European Commission, vol. 17, pp. 41–57.
- Atkinson, Anthony Barnes. 2009. Factor shares: The principal problem of political economy? *Oxford Review of Economic Policy* 25: 3–16. [CrossRef]
- Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen. 2017. *The Fall of the Labor Share and the Rise of Superstar Firms*. Working Paper No. 23396. Cambridge: National Bureau of Economic Research.
- Barkai, Simcha. 2020. Declining Labor and Capital Shares. *The Journal of Finance* 75: 2421–63. Available online: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/jofi.12909> (accessed on 18 May 2022). [CrossRef]
- Bauer, Arthur, and Jocelyn Boussard. 2020. *Market Power and Labor Share*. No. G2020/13. Paris: Institut National de la Statistique et des Études Économiques. Available online: https://www.banque-france.fr/sites/default/files/bb_markups_paper.pdf (accessed on 18 May 2022).
- Berger, Bennet, and Guntram B. Wolf. 2017. The Global Decline in the Labour Income share: Is Capital the Answer to Germany's Current Account Surplus? Policy Contribution Issue No. 12 April 2017. Available online: <https://www.bruegel.org/wp-content/uploads/2017/04/PC-12-2017-1.pdf> (accessed on 18 May 2022).
- Berkowitz, Dan. 2018. *Capital-Labor Substitution and the Decline in Labor's Share*. Working Paper 6380. Pittsburgh: Department of Economics, University of Pittsburgh. Available online: https://www.econ.pitt.edu/sites/default/files/working_papers/Working%20Paper%20coverpage.18.06.pdf (accessed on 18 May 2022).
- Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott. 2012. The Empirics of Firm Heterogeneity and International Trade. *Annual Review of Economics* 4: 283–313. [CrossRef]
- Bessen, James. 2017. *Information Technology and Industry Concentration*. Law and Economics Paper No. 17-41. Boston: Boston University School of Law. Available online: https://scholarship.law.bu.edu/cgi/viewcontent.cgi?article=1269&context=faculty_scholarship (accessed on 18 May 2022).
- Cassiman, Bruno, Elena Golovko, and Ester Martínez-Ros. 2010. Innovation, exports and productivity. *International Journal of Industrial Organization* 28: 372–76. [CrossRef]
- Cette, Gilbert, Lorraine Koehl, and Thomas Philippon. 2019. Labor Shares in Some Advanced Economies. Working Paper 26136. Available online: <http://www.nber.org/papers/w26136> (accessed on 18 May 2022).
- Charpe, Matthieu, Slim Bridji, and Peter McAdam. 2019. Labor Share and Growth in the Long Run. ECB Working Paper Series No. 2251. March. Available online: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2251~{}e73a1e85d1.en.pdf> (accessed on 18 May 2022).
- Crespo-Cuaresma, Jesus, Maria Antoinette Silgoner, and Doris Ritzberger-Gruenwald. 2008. Growth, convergence and EU membership. *Applied Economics* 40: 643–56. [CrossRef]
- Cuestas, Juan Carlos, Mercedes Monfort, and Javier Ordóñez. 2012. Real Convergence in Europe: A Cluster Analysis. Sheffield Economic Research Paper Series, SERP Number: 2012023. Available online: https://eprints.whiterose.ac.uk/74527/1/serps_2012_023.pdf (accessed on 18 May 2022).

- Czaronis, Megan, and Michael A. Quinn. 2012. Income convergence in Europe: Catching up or falling behind? *Acta Oeconomica* 62: 183–204. Available online: <https://akjournals.com/view/journals/032/62/2/article-p183.xml> (accessed on 18 May 2022). [CrossRef]
- Dao, Mai, Mitali Das, Zsoka Koczan, and Weicheng Lian. 2017. *Why Is Labor Receiving a Smaller Share of Global Income? Theory and Empirical Evidence*. IMF Working Paper 17/169. Washington, DC: International Monetary Fund.
- Díez-Catalán, Luis. 2018. The Labour Share in the Service Economy. BBVA Research, Spain Watch—28 August. Available online: https://www.bbvaesearch.com/wp-content/uploads/2018/09/Observatorio_LaborShare_sept3_finalversion_english_maquetacion.pdf (accessed on 18 May 2022).
- Dimova, Dilyana. 2019. *The Structural Determinants of the Labor Share in Europe*. International Monetary Fund WP/19/67. Washington, DC: International Monetary Fund.
- Dixon, Robert, and Guay C. Lim. 2020. Is the decline in labour's share in the US driven by changes in technology and/or market power? An empirical analysis. *Applied Economics* 52: 6400–415. [CrossRef]
- Elsby, Michael W.L., Bart Hobijn, and Aysegül Sahin. 2013. The Decline of the U.S. Labor Share. FEDERAL RESERVE BANK OF SAN FRANCISCO Working Paper 2013-27. Available online: https://www.lexissecuritiesmosaic.com/gateway/FEDRES/SPEECHES/files_wp2013-27.pdf (accessed on 18 May 2022).
- European Commission. 2007. The labour income share in the European Union, Chapter 5 of Employment in Europe. Available online: https://ec.europa.eu/economy_finance/publications/pages/publication15147_en.pdf (accessed on 18 May 2022).
- European Commission. 2009. Five Years of an Enlarged EU: Economic Achievements and Challenges, Brussels. Available online: https://ec.europa.eu/economy_finance/publications/pages/publication14078_en.pdf (accessed on 18 May 2022).
- European Commission. 2019. European Innovation Scoreboard. Available online: https://ec.europa.eu/growth/content/2019-innovation-scoreboards-innovation-performance-eu-and-its-regions-increasing_en (accessed on 18 May 2022).
- European Commission. 2022. What Is the Euro Area? Available online: https://economy-finance.ec.europa.eu/euro/what-euro-area_en (accessed on 17 July 2022).
- Eurostat. 2021. Labour Productivity. Available online: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_lp_ulcandlang=en (accessed on 19 January 2021).
- Eurostat Structural Business Statistics. 2021. Metadata Description. Available online: https://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm (accessed on 19 January 2021).
- Franks, Jeffrey R., Bergljot B. Barkbu, Rodolphe Blavy, William Oman, and Hanni Schoelermann. 2018. *Economic Convergence in the Euro Area: Coming Together or Drifting Apart?* IMF Working Paper WP/18/10. Washington, DC: International Monetary Fund.
- Furman, Jason, and Peter Orszag. 2018. Slower Productivity and Higher Inequality Related? In *Facing Up to Low Productivity Growth*. Edited by A. S. Posen and J. Zettelmeyer. Washington, DC: Peterson Institute for International Economics, pp. 245–62.
- Giovannoni, Olivier. 2010. Functional Distribution of Income, Inequality and the Incidence of Poverty: Stylized Facts and the Role of Macroeconomic Policy. UTIP Working Paper No. 58. January 30. Available online: https://utip.lbj.utexas.edu/papers/utip_58.pdf (accessed on 18 May 2022).
- Greenaway, David, and Richard Kneller. 2007. Firm heterogeneity, exporting and foreign direct investment. *The Economic Journal* 117: F134–61. [CrossRef]
- Grossman, Gene M., Elhanan Helpman, Ezra Oberfield, and Thomas Sampson. 2017. The Productivity Slowdown and the Declining Labor Share: A Neoclassical Exploration. NBER Working Paper Series, Working Paper 23853. Available online: https://www.nber.org/system/files/working_papers/w23853/w23853.pdf (accessed on 18 May 2022).
- Haldane, Andrew. 2017. Productivity Puzzles. London School of Economics, March 20. Available online: http://worldmanagementsurvey.org/wp-content/uploads/2017/03/boespeech_220317.pdf (accessed on 18 May 2022).
- Helpman, Elhanan, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen J. Redding. 2017. Trade and inequality: From theory to estimation. *The Review of Economic Studies* 84: 357–405. [CrossRef]
- IMF. 2019a. *Explaining the Shadow Economy in Europe: Size, Causes and Policy Options*. IMF Working Paper WP/19/278. Washington, DC: IMF.
- IMF. 2019b. Financial Development Index. Available online: <https://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B> (accessed on 5 May 2021).
- International Labour Office. 2019. The Global Labour Income Share and Distribution. Data Production and Analysis Unit, ILO Department of Statistics, July. Available online: <https://www.ilo.org/ilostat-files/Documents/Labour%20income%20share%20and%20distribution.pdf> (accessed on 15 May 2022).
- Karabarbounis, Loukas, and Brent Neiman. 2014. *The Global Decline of the Labor Share*. NBER Working Paper Series, Working Paper 19136; Cambridge: NBER. Available online: <http://www.nber.org/papers/w19136> (accessed on 18 May 2022).
- Kehrig, Matthias, and Nicolas Vincent. 2018. *The Micro-Level Anatomy of the Labor Share Decline*. NBER Working Paper 25275. Cambridge: National Bureau of Economic Research.
- Kónya, István, Judit Krekó, and Gábor Oblath. 2020. Labor shares in the old and new EU member states - Sectoral effects and the role of relative prices. *Economic Modelling* 90: 254–72. [CrossRef]
- Lavoie, Marc, and Engelbert Stockhammer. 2013. Wage-Led Growth: Concept, Theories and Policies. Available online: https://link.springer.com/chapter/10.1057/9781137357939_2 (accessed on 18 May 2022).
- Leonardi, Robert. 1995. *Convergence, Cohesion and Integration in the European Union*. London: MacMillan Press.

- Melitz, Marc J., and Daniel Trefler. 2012. Gains from trade when firms matter. *Journal of Economic Perspectives* 26: 91–118. [CrossRef]
- Mertens, Matthias. 2019. *Micro-Mechanisms behind Declining Labour Shares: Market Power, Production Processes, and Global Competition*. IWH-CompNet Discussion Papers No. 3/2019. Halle: Leibniz-Institut für Wirtschaftsforschung Halle (IWH). Available online: <http://nbn-resolving.de/urn:nbn:de:gbv:3:2-104802> (accessed on 18 May 2022).
- Mohnen, Pierre, and Bronwyn H. Hall. 2013. *Innovation and Productivity: An Update*. UNU-MERIT Working Papers. Maastricht: UNU-MERIT. ISSN 1871-9872. Available online: <http://collections.unu.edu/eserv/UNU:105/wp2013-021.pdf> (accessed on 14 May 2022).
- Mohun, Simon. 2006. Distributive Shares in the US Economy, 1964–2001. *Cambridge Journal of Economics* 30: 347–70. [CrossRef]
- Morris, Diego M. 2018. Innovation and productivity among heterogeneous firms. *Research Policy* 47: 1918–32. Available online: http://irep.ntu.ac.uk/id/eprint/34421/1/11863_Morris.pdf (accessed on 18 May 2022). [CrossRef]
- Mučk, Jakub, Peter McAdam, and Jakub Growiec. 2015. *Will the True Labor Share Stand Up?* ECB Working Paper No. 1806. Frankfurt am Main: European Central Bank (ECB). ISBN 978-92-899-1619-6. Available online: <https://www.econstor.eu/bitstream/10419/154239/1/ecbwp1806.pdf> (accessed on 18 May 2022).
- Navaretti, Giorgio Barba, Matteo Bugamelli, Fabiano Schivardi, Carlo Altomonte, Daniel Horgos, and Daniela Maggioni. 2011. *The Global Operations of European Firms*. Paris: Bruegel Blueprint 12.
- Naz, Amber, Nisar Ahmad, and Amjad Naveed. 2017. Wage Convergence across European Regions: Do International Borders Matter? *Journal of Economic Integration* 32: 35–64. Available online: https://www.e-jei.org/upload/JEI_32_1_35_64_2013600121.pdf (accessed on 18 May 2022). [CrossRef]
- OECD. 2015. *The Labour Share in G20 Economies*. International Labour Organization, Organisation for Economic Co-operation and Development with Contributions from International Monetary Fund and World Bank Group. Paper present at the G20 Employment Working Group, Antalya, Turkey, February 26–27. Available online: <https://www.oecd.org/g20/topics/employment-and-social-policy/The-Labour-Share-in-G20-Economies.pdf> (accessed on 18 May 2022).
- OECD. 2017. *Productivity by Enterprise Size, Productivity Gaps across Enterprises*. Available online: https://www.oecd-ilibrary.org/docserver/entrepreneur_aag-2017-10-en.pdf?expires=1620788569&id=idandacname=guestandchecksum=6B6721A3D9C1D845D8F66B541920D775 (accessed on 18 May 2022).
- OECD. 2019. *Labour Income Shares*. In *OECD Compendium of Productivity Indicators 2019*. Paris: OECD Publishing. Available online: https://read.oecd-ilibrary.org/industry-and-services/oecd-compendium-of-productivity-indicators-2019_a3498d1b-en#page1 (accessed on 18 May 2022).
- Perugini, Cristiano, Michela Vecchi, and Francesco Venturini. 2017. Globalisation and the decline of the labour share: A microeconomic perspective. *Economic Systems* 41: 524–36. [CrossRef]
- Piketty, Thomas. 2013. *Le Capital au XXI^e Siècle*. Paris: Seuil.
- Pino, Gabriel, and Ariel Soto. 2014. Analysis of wage flexibility across the Euro Area: Evidence from the process of convergence of the labour income share ratio. *Applied Economics* 46: 3572–80. Available online: http://www.economie.ens.fr/IMG/pdf/porter_1990_-_the_competitive_advantage_of_nations.pdf (accessed on 18 May 2022). [CrossRef]
- Putniņš, Tālis, and Arnis Sauka. 2015. Measuring the shadow economy using company managers. *Journal of Comparative Economics* 43: 471–90. [CrossRef]
- Redding, Stephen J. 2006. *Empirical Approaches to International Trade*. London: London School of Economics and CEPR. Available online: https://www.princeton.edu/~reddings/pubpapers/emprade_palgrave10web.pdf (accessed on 18 May 2022).
- Reshef, Ariell, and Gianluca Santoni. 2022. Are Your Labor Shares Set in Beijing? The View through the Lens of Global Value Chains. CESifo Working Paper No. 9835. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4163324 (accessed on 18 May 2022).
- Richiardi, Matteo G., and Luis Valenzuela. 2019. Firm Heterogeneity and the Aggregate Labour Share. MPRA Paper No. 95649. August 22. Available online: <https://mpra.ub.uni-muenchen.de/95649/> (accessed on 18 May 2022).
- Sauka, Arnis, and Tālis Putniņš. 2021. Shadow Economy Index for the Baltic Countries. Available online: <https://www.sseriga.edu/shadow-economy-index-baltic-countries> (accessed on 18 May 2022).
- Schneider, Dorothee. 2011. *The Labor Share: A Review of Theory and Evidence*. SFB 649 Discussion Paper 2011-069. Berlin: Humboldt University of Berlin. Available online: <https://www.econstor.eu/bitstream/10419/56621/1/67118542X.pdf> (accessed on 18 May 2022).
- Schwellnus, Cyrille, Andreas Kappeler, and Pierre-Alain Pionnier. 2017. Decoupling of Wages from Productivity: Macro-Level Facts. OECD Economics Department Working Papers No. 1373. Available online: <http://pinguet.free.fr/schwellnus17.pdf> (accessed on 18 May 2022).
- Schwellnus, Cyrille, Mathilde Pak, Pierre-Alain Pionnier, and Elena Crivellaro. 2018. *Labour Share Developments over the Past Two Decades: The Role of Technological Progress, Globalization and “Winner-Takes-Most” Dynamics*; OECD Economics Department Working Papers No. 1503. Paris: OECD Economics Department. Available online: <https://www.rba.gov.au/publications/confs/2019/pdf/rba-conference-2019-schwellnus-further-reading.pdf> (accessed on 18 May 2022).
- Skryl, Tatiana V. 2021. The Role of Telework in Digital Economy. In *Complex Systems: Innovation and Sustainability in the Digital Age. Studies in Systems, Decision and Control*. Edited by A. V. Bogoviz. Cham: Springer, vol. 283. [CrossRef]
- Smith, Matthew, Danny Yagan, Owen M. Zidar, and Eric Zwick. 2019. Capitalists in the Twenty-First Century. *Quarterly Journal of Economics* 134: 1675–745. [CrossRef]

- Stockhammer, Engelbert. 2013. *Why Have Wage Shares Fallen? A Panel Analysis of the Determinants of Functional Income Distribution. Paper for the International Labour Organisation (ILO) Project "New Perspectives on Wages and Economic Growth"*. ILO Working Papers 994709133402676. Geneva: International Labour Organization.
- Takeuchi, Fumihide. 2018. The Declining Labor Income Shares Revisited: Intersectoral Production Linkage in Global Value Chains. Open Access Peer-Reviewed Chapter. Available online: <https://www.intechopen.com/chapters/63821#B1> (accessed on 18 May 2022). [CrossRef]
- Ugur, Mehmet, and Marco Vivarelli. 2020. *Innovation, Firm Survival and Productivity: The State of the Art*. IZA Discussion Papers No. 13654. Bonn: Institute of Labor Economics (IZA). Available online: <https://www.econstor.eu/bitstream/10419/227181/1/dp13654.pdf> (accessed on 18 May 2022).
- Van Reenen, John. 2018. *Increasing Differences between Firms: Market Power and the Macro-Economy*. CEP Discussion Paper No. 1576. London: Centre for Economic Performance.
- Weche, John P., and Achim Wambach. 2018. *The Fall and Rise of Market Power in Europe*. Discussion Paper No. 18-003. Mannheim: Centre for European Economic Research (ZEW).
- World Bank. 2021a. Export of Goods and Services. Available online: <https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS> (accessed on 20 March 2021).
- World Bank. 2021b. Gross Capital Formation. Available online: <https://data.worldbank.org/indicator/NE.GDI.TOTL.ZS> (accessed on 20 March 2021).