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Determinants of the (non-Housing) Labour Income Share in the EU

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Abstract: The stability of the labour income share has been regarded as a key component of modern macroeconomic analysis. However, a number of recent studies have challenged this apparent stability, documenting a global decline of the labour share. This paper assesses the developments in the non-housing labour income share for the EU member-states during the 1995-2018 period. Our descriptive analysis shows that, for this sample, the labour share has remained relatively constant, exhibiting a slight increase toward the end of the sample period. Using recently developed panel time series estimators that can account for the heterogeneous impact of macroeconomic shocks, we empirically test the impact of capital deepening, the size of the government, globalization and financialization on the labour share. Our results indicate that both relative prices and government size appear to be significant determinants of the labour share, while globalization and financialization do not have a significant effect.

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1 Introduction

Following the publication of the seminal work by Kaldor (1957), which introduced the so-called 'stylized facts' of economic growth, the stability of the shares of income that accrue to the factors of production — namely, labour and capital -– has become an important characteristic of modern macroeconomic analysis. This relative long-run stability has significant implications for inequality and the functional distribution of income, as well as for the analysis of macroeconomic dynamics, the shape of the economy's production function and the technology choices made by firms (see León-Ledesma & Satchi (2019)).

In recent years, there appears to be a consensus that the labour income share has exhibited a global, gradual decline starting from the mid-1970s (see, among others, Dao et al. (2019), Elsby et al. (2013), Karabarbounis & Neiman (2014) and Stockhammer (2017)).

However, there is less consensus regarding the drivers of this long-run trend. The main theories that have been proposed can be broadly classified as supporting the 'accumulation' view, that is, the fact that the share of capital increases and will keep on increasing because of capital accumulation, the 'scarcity' view based on which the (net) capital share is increasing because some forms of capital are becoming more scarce rather than abundant[1] and the (financial and non-financial) globalization view in conjunction with factors related to the bargaining power of labour and the welfare state.[2]

Another source of controversy regarding the long-run trend of the labour share is related to its measurement. In particular, a number of contributions have focused on certain methodological issues that affect the proper measurement and, hence, the observed long-run trajectory of the labour share. Bridgman (2018) has shown that once the depreciation of capital is taken into account, the net labour share in the US exhibits a very small decline. Elsby et al. (2013) argue that part of the observed decline is due to the way the labour income of the self-employed is imputed, focusing on the assumption of the equal hourly compensation between employees and the self-employed.[3] Koh et al. (2020) indicate that the decline of the US labour income share is solely attributed to the accounting treatment of intellectual property and conclude that the observed decline is a statistical artefact. Finally, some authors have attributed the observed trend of the labour share to the developments in the housing sector. In particular, Rognlie (2015) argues that outside of housing, the net capital share rise is merely a reversal of a substantial earlier fall. Gutierrez & Piton (2020) provide empirical evidence that the (corporate) labour income share, once housing services – and the income of the self-employed – are accounted for, has remained largely stable in all major economies, with the exception of the manufacturing sector in the US. Cette et al. (2020) provide a unified analysis of the above mentioned biases in the measurement of the labour income share – that is, they account for the income of the self-employed and for the housing/real estate income – while also highlighting another important bias, that of the starting periods of the analysis. In particular, they argue that because in the late 1970s the labour share in many European countries was

[1] For an analysis of these two approaches see Rognlie (2015).

[2] For a detailed literature review see section 2 of the paper.

[3] However, Elsby et al. (2013) note that in the USA, even when these measurement issues are accounted for, in the long-run there seems to be a decline in the labour income share since the late 1980s.

above its steady-state value, any analysis that uses the 1973-1983 period as a starting point is likely to find a spurious decrease in the labour share. Their conclusions, after correcting for these biases, broadly reinforce the results of Rognlie (2015) and Gutierrez & Piton (2020), namely that outside of the USA, there seems to be no global decline in the labour income share.

In this paper, we examine the evolution of the gross and the non-housing labour income shares in the EU member-states during the 1995-2018 period, focusing on the effects of capital deepening, the welfare state and globalization.

The empirical approach followed in this paper, based on recently developed panel data estimators, allows us to account for the heterogeneous impact of macroeconomic shocks as well as the heterogeneous responses of countries to changes in the potential drivers of the labour share.

First, we provide descriptive evidence regarding the trajectory of the gross and the net of housing labour shares in the EU, in a sample that contains both the global financial crisis as well as the recovery period. Moreover, we test the validity of the capital deepening and the (financial and non-financial) globalization theories.

The empirical results indicate that, for this sample, neither the capital deepening nor the (financial and non-financial) globalization approach seem to be valid. Finally, the size of the welfare state is shown to have a significant impact on the labour income share.

The rest of the paper is organized as follows: section 2 contains a literature review, while section 3 documents the trends of the labour income share. Section 4 presents the data and section 5 details the empirical approach followed. Section 6 presents the empirical results and section 7 concludes.

2 Literature Review

A large and growing body of literature has attempted to identify the causes behind the observed changes in the labour share of income. One of the prominent theories proposed is that of capital accumulation (or, 'capital deepening') as the main driver of the global decline of the labour income share. This approach emphasizes the role of technological change and can be viewed as belonging to the neoclassical macroeconomic tradition. Within this theory, a central role is attributed to the ease with which the two factors of production, namely labour (L) and capital (K) can be substituted; the degree of substitutability is measured by the elasticity of substitution (σ). In particular, an elasticity of substitution greater than 1 implies that capital and labour are gross substitutes, so that if the capital-labour ratio rises as a result of technological change for example, this will lead to a decrease in labour's income share. Conversely, if the elasticity of substitution is lower than 1, then capital and labour are gross complements. Karabarbounis & Neiman (2014) argue that a combination of an elasticity of substitution greater than one and a technologically-induced fall in the relative price of investment are the main drivers of the global decline of the labour share. Based on their results, more than half of the decline in the labour share can be explained by declining relative investment prices. In order to further analyse the impact of changes in relative investment prices, Crivellaro & Karadimitropoulou (2019) emphasize the importance of financial

constraints. In particular, they argue that in the presence of financial constraints firms cannot proceed with substituting capital for labour in response to a decline in relative prices. Their results show that firms facing financial constraints tend to be associated with an overall lower effect of relative investment prices on the labour share. Following the approach of Karabarbounis & Neiman (2014), they also present estimates of an elasticity of substitution greater than one. Stockhammer (2017), using the logarithm of GDP per worker as a proxy for the impact of technological change finds no evidence that it constitutes an important driver of the labour income share developments.

A number of empirical contributions have challenged the finding that capital and labour are gross substitutes. Chirinko & Mallick (2017), using sectoral data, estimate an elasticity of substitution below one, even when they allow for heterogeneity across sectors. Glover & Short (2020), using a large panel of countries and a theoretically derived proxy for rental rates, estimate that the elasticity of substitution is lower than one, and thus conclude that capital deepening is not a driver of the labour share. In this context, Lawrence (2015) argues that the combination of complementarity between the factors of production (i.e. an elasticity of substitution lower than one) and labour-augmenting technical change[4] are the reasons behind the observed decline of the US labour share.

Gonzalez & Trivin (2019) focus on the role of valuation effects in financial assets and build a theoretical model that links asset prices to labour share developments, based on the complementarity of capital and labour. In particular, their model shows that an increase in asset prices leads to a crowding-out effect on capital formation which leads to a decline in the labour share. Their empirical results indicate that this channel can account for almost two-thirds of the decline of the labour share.

The increase in (non-financial) globalization has been regarded as an important driver of the long-run trend of the labour share, with the 'New Political Economy' approach (see Stockhammer (2017)) arguing that increased trade integration has weakened the bargaining power of labour (see also Guschanski & Onaran (2018)). Rodrik (1997) argued that trade liberalization would benefit the more mobile factor, which most likely is capital, thus leading to changes in the functional distribution of income. In most of the relevant literature, globalization (usually proxied by the degree of trade openness) has been shown to have a negative impact on the labour share.

A distinct branch of the literature has focused on the impact of financial globalization, that is, the increased integration of the financial sector and its growing importance. Dünhaupt (2017) argues that the emphasis placed on creation of shareholder value and the short-term horizon of the management have led to a significant decrease in the bargaining power of labour which, combined with the decline in government activity, are the main reasons behind the decline in the labour share. Kohler et al. (2019) explore additional channels via which financialisation can impact on the labour share, including the shareholder value channel, the increased household debt and the financial globalization channels. Their results indicate that shareholder value and financial globalization exert significant negative impacts on the labour share.

[4] In particular, he argues that due to the rapid labour-augmenting technical change in the US, the effective capital-labour ration – i.e. the ratio of efficiency adjusted capital to efficiency adjusted labour – increased, leading to a decline of the labour share.

Apart from the abovementioned macro-based, aggregate approaches regarding the decline of the labour income share, a new emerging literature has focused on industry- and firm-level analysis in order to assess the observed changes in the labour share. Autor et al. (2020) develop a 'winner takes most' mechanism based on which the rise of the so-called 'superstar' firms is the main driver behind the trends in the labour share. In particular, these superstar firms – with above-average markups and below-average labour income shares – experience a rise in their share of value added as a result of increased product market concentration, leading to a decline of the share of income accruing to labour. Barkai (2020) presents empirical evidence that the decline in the labour share can be attributed to the decline in competition, while he also documents that both the labour and the capital share have been declining, being offset by large increases in pure profits (i.e. what a firm earns in excess of all production-related costs). Dao et al. (2019) argue that the within-industry declines rather than shifts from high- to low-labour share sectors matter for the decline of the labour share, emphasizing the role of initial exposure to routinization. Scwellnus et al. (2018) combine industry- and firm-level data and show that technological change and globalization explain much of the contraction of the labour share. Lawless & Rehill (2020) also examine whether within-industry changes or the changes in the composition of industries drive labour share changes. Their results indicate that the within-sector changes dominate, lending support to the 'superstar' firm hypothesis. They also identify that industry concentration, the widening productivity gap between firms at the frontier and runner-ups and the participation in global value chains contribute to the aggregate reduction of the labour share. Finally, Mertens (2019) finds that, for the case of Germany, the majority of changes in the labour share is driven by a declining aggregate output elasticity of labour, implying that the changes in production processes are a significant driver of the labour share.

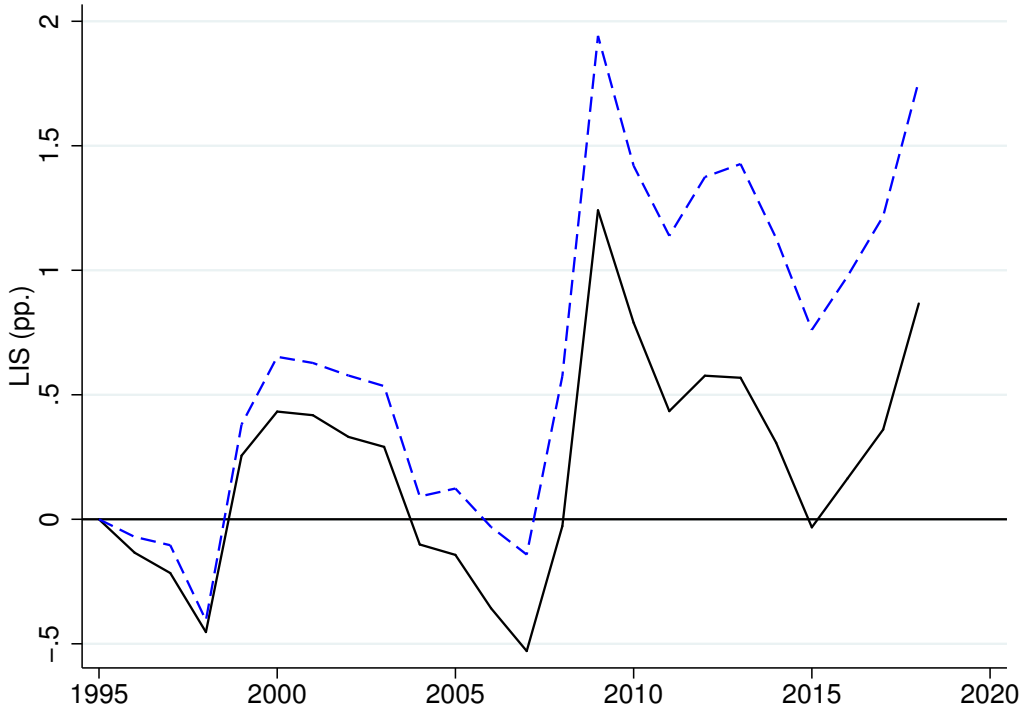
3 Trends in the EU Labour Share

In this section we examine the evolution of the various measures of the labour income share across a sample of EU countries over the 1995-2018 period.

Figure 1 presents the EU-wide trend of the two measures of the labour income share, namely the gross labour share and the labour income share excluding the housing sector (dashed line). In order to calculate these trends, Figure 1 displays the time effects from a panel fixed effects regression (see Figure notes).

Taking 1995 as the reference year, we observe that both the gross labour share and the labour share excluding the housing sector have exhibited significant fluctuations over time. From the early up to the mid-2000s, both measures followed a downward trend, which reversed during the period of the global financial crisis, with the labour share exhibiting the expected countercyclical behaviour, which is more pronounced for the net of housing measure. Then, an almost 5-year long period of decline followed, interrupted by yet another increase in the post-2015 period. Normalizing 1995 to equal the average value of each labour share measure, gross labour share reaches a rate of 50.4% by 2018 (a 1 percentage point increase compared to the initial value), while the labour share excluding housing reaches a rate of 55.8%

Figure 1: EU-wide Labour Shares



Notes: Obtained as year fixed effects from a GDP-weighted regression, which also includes country effects in order to control for the entry and exit of countries from the sample. The solid line depicts the gross labour share measure while the dashed line depicts the non-housing labour income share.

(a 1.8 percentage points increase). Overall, we observe that for this sample of EU countries, there is no global decline in either labour share measure; rather, despite exhibiting significant fluctuations, both measures point to a very small increase by the end of the sample period.

It is evident from the graph that although the two measures of the labour share seem to follow a similar trend overall, the net of housing labour share is larger in magnitude and exhibits a larger degree of volatility. The gap between the two measures of the labour share (for the EU as a whole) is presented in Figure 2. The difference between the two measures has been increasing since the mid-2000s, pointing to an increased share of housing to total GVA.

In order to examine whether the EU-wide trends of Figure 1 accurately depict global effects rather than the impact of large countries, Figure 3 presents the country-specific evolution of the labour share measures. As can be gleaned from the Figure, both measures exhibited a significant degree of heterogeneity across the sample, with most countries having a relatively smooth upward trajectory for the labour share and some exhibiting a decline (with Ireland exhibiting the largest decrease due to the distortions caused in the National Accounts data resulting from the growth of the multinational sector – see the

Figure 2: Gap between gross and non-housing labour income share

See notes in Figure 1

Appendix in Lawless & Rehill (2020) for more details on this). Moreover, the exclusion of the housing sector activities from the labour share results in a larger rate overall for all countries, with the differences between the two measures exhibiting significant variability across the sample.

In order to obtain further insight into the extent of this variability, Figure 4 plots the difference between the average rate of the gross and the non-housing labour income share. The largest differences are observed in the UK, France, Germany, Finland and Greece and their range is between 6 and 8 percentage points. Ireland exhibits the third smallest difference in the sample, equal to almost 2.9 percentage points for the whole period.

The large range in the differences between the two measures of the labour income share is attributed to the heterogeneous developments in the housing sector across countries. This is evident from Figure 5, which depicts the share of the housing sector in the total economy GVA. We observe that, while there are cases where the housing sector's share increased (e.g. in Finland, Greece, Italy, Portugal, Spain and the UK), in most countries it remained relatively stable over the period under examination. Finally, it should be noted that from a theoretical point view, the labour income share of the housing sector is not likely to be driven by the factors that affect the labour share of the rest of the economy. Based on the

Figure 3: Labour income share, gross and excluding housing services

Source: Own calculations based on Eurostat data.

above considerations, in this paper we will focus on assessing the determinants of the non-housing labour income share.

The overall trend of the net of housing labour income share per country is depicted in Figure 6. The heterogeneous development of the labour share is clear, with the majority of countries exhibiting a relatively small increase in the long-run rate of the labour share which seems to corroborate our finding of a small increase of the EU-wide labour share.[5]

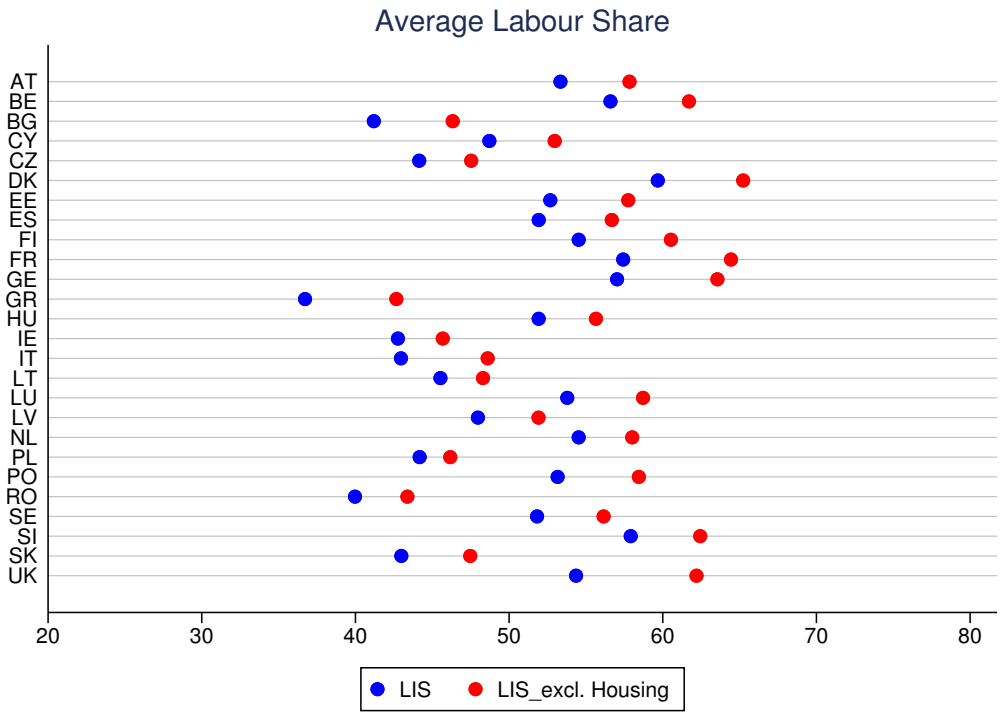
4 Data

In order to empirically assess the relationship between the labour income share and its potential drivers, we utilize a number of different databases available from Eurostat. Our sample consists of 26 EU countries[6] and covers the period 1995-2018. Despite the relatively short T dimension (24 years) this sample has the advantage that it consists of harmonized data, that is, data that are derived from the same source for all countries without the need for imputations.

[5] We note again the large decline of the Irish labour share, which is related to the well-documented distortions of the Irish National Accounts data which stem from the significant growth of (part of) the multinational sector.

[6] Croatia and Malta are excluded due to lack of sufficient observations

Figure 4: Differences between the average rates of the two labour share measures



Source: Own calculations based on Eurostat data.

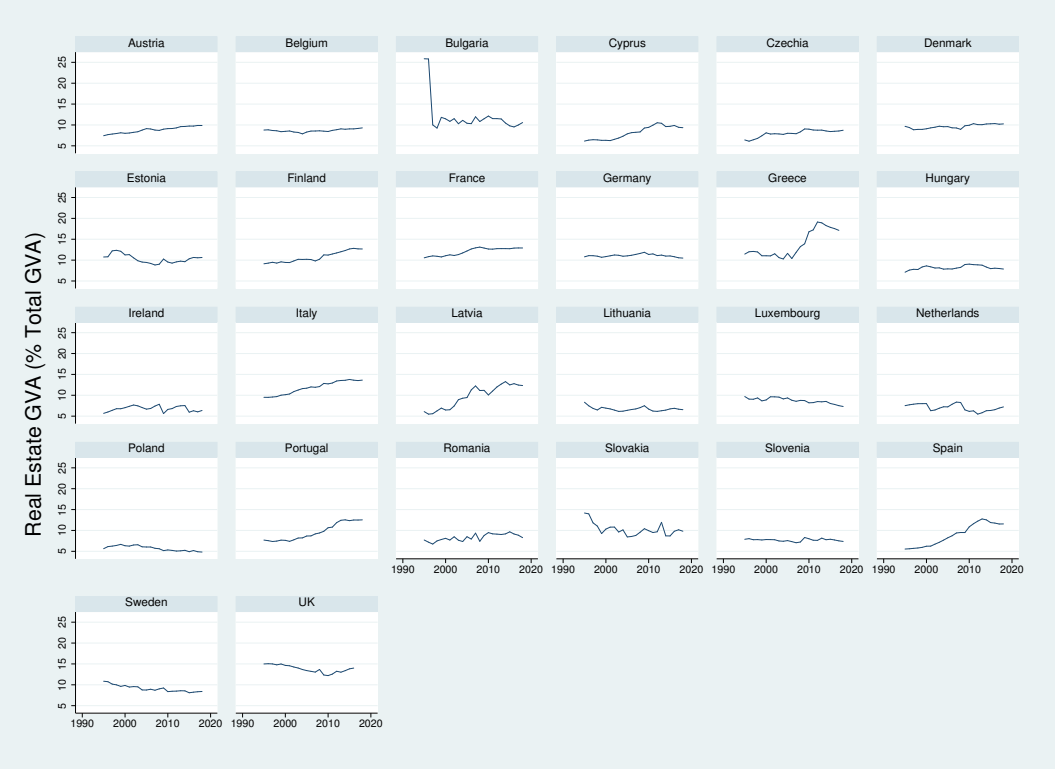
As noted previously, the impact of housing services on the labour share has been highlighted in a number of contributions, and is evident in our sample as well – see Figures 1 to 4. In order to ensure that our results are not affected by the trends in housing income, we follow Gutierrez & Piton (2020) and exclude all real estate activities from the calculation of the labour share. In particular, we use the following formula in order to calculate the economy-wide labour share:

$$LIS^{noh} = \frac{\sum_i W^i L^i - W^H L^H}{GVA^{Total} - GVA^H}$$

where W^i denotes the compensation of employees for sector i, W^H is the compensation of employees in the housing sector and GVA^{Total} and GVA^H are the Gross Value Added of the total economy and the housing sector, respectively. One caveat regarding the exclusion of the housing sector is that, although it fully controls for the distorting impact of housing on the labour share, at the same time it excludes both commercial and residential real estate.[7]

[7] Throughout this paper, the housing sector corresponds to the Real Estate Activities sector - see Gutierrez & Piton (2020) for more details.

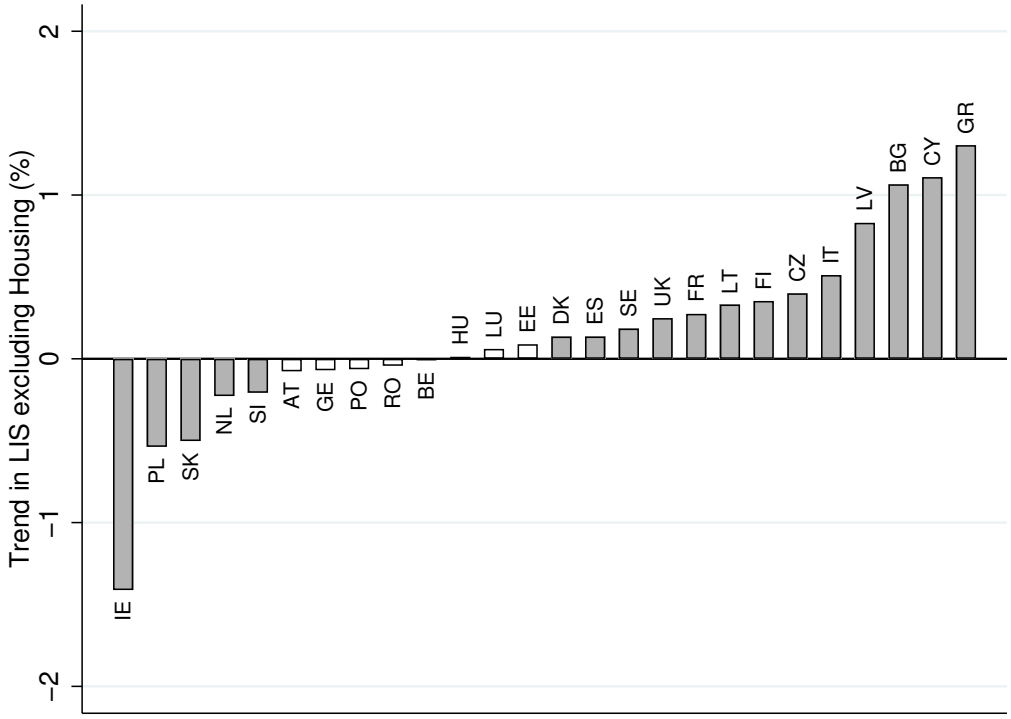
Figure 5: Real Estate sector GVA



Source: Own calculations based on Eurostat data.

The analysis is complemented with a set of variables that will allow us to assess the validity of a number of alternative theories that have been proposed to explain the observed trends of the labour income share. As already stated, the accumulation view postulates that one of the main drivers of labour shares is the relative price of investment goods. We construct a proxy for the relative prices as the ratio of the deflator of Gross Fixed Capital Formation over the deflator of Final Consumption Expenditure. Further, we include government consumption (FCE GG) as a proxy of the importance of the welfare state (see Stockhammer (2017)). In order to assess the (financial and non-financial) globalization approach, we include in the analysis trade openness, constructed as the ratio of the sum of exports and imports of goods and services as a share of GDP, and the net financial payments of non-financial corporations (see Dünhaupt (2017) and Kohler et al. (2019)). Table 1 presents some descriptive statistics, Table 2 presents the correlations between the variables of interest and Table A.1 in the Appendix lists the data sources for the variables used in the analysis.

Figure 6: Country-Specific Trends of the non-Housing Labour Income Share



Notes: The long-run trends are obtained from the following regression: $\ln(LIS_t) = \alpha_0 + \alpha_1 t + \varepsilon_t$. The vertical axis shows α_i in %. Grey bars indicate significance at the 5% level.

5 Empirical Approach

One of the main characteristics of the long-run trend of the labour share is its countercyclical behaviour; that is, in the event of a crisis, the share of income accruing to labour increases (e.g. because of the stickiness of wages). Our sample includes the global financial crisis, which constituted a significant macroeconomic shock impacting on all countries in the sample; as was previously demonstrated, the labour share exhibited a large increase during this period. In addition, as we documented in section 2, the labour exhibited a significant degree of heterogeneity across countries and over time.

This implies that the use of the traditional panel estimators (such as the Fixed Effects estimator) may not be suitable for the case at hand. In particular, if we assume that the changes in relative prices will have a different impact on the labour share depending on country-specific characteristics or that a large common macroeconomic shock, such as the crisis, will have a different impact across countries, then the identification strategy of the traditional estimators fails and inference made based on these estimators will be invalid.

Table 1: Descriptive Statistics

	Obs.	Mean	St. Dev.	Min	P25	Median	P75	Max
Labour Share	621	54.62	7.429	32.61	47.98	56.38	60.51	69.71
Relative Inv. Prices	624	1.04	0.113	0.733	0.985	1.007	1.064	2.146
FCE GG	622	19.73	3.009	11.671	17.682	19.472	21.399	27.93
Trade Openness	624	1.06	0.565	0.371	0.639	0.916	1.329	4.083
NFC	624	12.09	7.119	-18.726	7.486	10.838	15.8	43.93

Notes:: FCE GG denotes the Final Consumption Expenditure of the General Government while NFC denotes Net Financial Payments. St.dev denotes standard deviation while P25 and P75 are the lower and upper quartiles, respectively.

Table 2: Correlation between variables

	Labour Share	Relative Inv. Prices	FCE GG	Trade Openness	NFC
Labour Share	1				
Relative Inv. Prices	-0.086	1			
FCE GG	0.494	0.058	1		
Trade Openness	0.005	-0.071	-0.21	1	
NFC	-0.165	0.050	0.050	-0.180	1

Notes: The Table presents the cross-correlations between the variables used in the analysis.

In order to circumvent these issues, in this paper we use two recently developed panel estimators that are based on the Common Correlated Effects (CCE) approach introduced in Pesaran (2006). For the purposes of this paper, we will limit the presentation of this approach to a more descriptive discussion – a detailed analysis can be found in Pesaran (2006), Eberhardt & Teal (2011, 2013, 2020) and Eberhardt et al. (2013).

The baseline specification takes the following form that has been extensively used in the literature:

$$\text{LIS}_{it} = \alpha_i + \beta_i' X_{it} + u_{it} \tag{1}$$

where LIS denotes our measure of the labour income share and X_{it} is a vector of variables that may, theoretically, affect the evolution of the labour share and u_{it} is the error term. Notice that the coefficients on the proposed drivers of the labour share are assumed to be heterogeneous across countries.

What is crucial for our analysis is that the error term is assumed to be composed of a number of unobserved common factors (e.g. an exogenous shock that is common to all countries in the sample). In the standard Fixed Effects model, these factors are all assumed to be subsumed under the country-specific fixed effects (α_i) and time-effects. However, since it is plausible to assume that these time-varying common factors have a different impact across countries, the fixed effects are not properly capturing their impact.

The Common Correlated Effects approach introduced in Pesaran (2006) solves the abovementioned problem in a very intuitive way: since these unobserved factors are common across countries, then we

can utilize the information provided by the panel setup (the observables) in order to construct proxies that will eliminate the impact of the unobserved factors. In particular, Pesaran (2006) proposes to augment the baseline specification with cross-sectional averages of all the variables, so that the model becomes:

$$\text{LIS}_{it} = \alpha_i + \beta_i' X_{it} + c_{0i}\overline{\text{LIS}}_i + \sum_{j=1}^{K} c_{ji}\bar{X}_{jt} + \varepsilon_{it} \tag{2}$$

with a bar above the variables denoting their cross-sectional average. This is the Common Correlated Effects Mean Group (CCE-MG) model. Apart from this model, Pesaran (2006) also proposed its pooled version, dubbed the Common Correlated Effects Pooled (CCE-P) model, where all the model parameters are assumed to be homogeneous.

One of the main advantages of this approach is that the above models can be estimated using OLS. Another significant advantage is that this model is quite general and, essentially, it encompasses a number of different approaches. In particular, if we remove the cross-sectional averages and assume that all parameters are homogeneous, we obtain the standard Fixed Effects model. Moreover, the CCE-type estimators directly address the endogeneity bias that arises as a result of the impact of the unobserved common factors.[8]

In the empirical analysis that follows, we compare and contrast the results of four alternative models, in order to be able to assess the importance of the different assumptions regarding the homogeneity of parameters and of the impact of the unobserved shock. Table 3 presents the models with reference to equation 2:

Table 3: Classification of Models

Models	**Assumptions**
Fixed Effects model [FE]	$\beta_i = \beta, c_{ji} = 0$
Common Correlated Effects Pooled [CCE-P]	$\beta_i = \beta, c_{ji} \neq 0$
Mean Group [MG]	$c_{ji} = 0$
Common Correlated Effects Mean Group[CCE-MG]	$\beta_i \neq \beta, c_{ji} = 0$

6 Empirical Results

In this section, we begin with the analysis of the impact of changes in the relative price of investment, in order to assess the impact of capital deepening on the evolution of the labour income share. In subsection 6.2, we augment the baseline model with the size of the government, which serves as a proxy for the welfare state. Finally, in subsection 6.3 we examine whether, for our sample, globalization and financialization exert any impact on the labour income share.

[8] In particular, not accounting for the presence of the unobserved common factors introduces an omitted variables bias. It should be noted here that these factors should not be considered as being merely omitted variables; rather, they are latent processes that essentially drive the observables.

Prior to the empirical analysis, the cross-sectional dependence and time-series properties of all the variables were examined. The Pesaran (2015) test indicates the presence of strong-cross sectional dependence, while the Pesaran (2007) CIPS test indicates that the null of non-stationarity cannot be rejected (results are available upon request).

6.1 Baseline Model

One of the main theories proposed to explain the evolution of the labour income share is the one based on capital deepening. In particular, this theory asserts that the technologically-induced changes in the relative price of investment are the main driver of the labour share, as lower prices for capital goods imply more incentives to invest in capital – since it is relatively cheaper compared to labour – leading to a substitution of capital for labour (see Karabarbounis & Neiman (2014)).

Table 4 contains the results from our baseline model, which examines the impact of changes in the relative price of investment on the labour income share. Columns [1] and [2] display the results from homogeneous estimators; that is, the impact of relative prices is assumed to be identical across all countries in the sample. In particular, column [1] presents the results of the standard Fixed Effects estimator, while column [2] presents the results of the CCE-P estimator which, as previously mentioned, can account for the impact of large, unobserved global shocks. Columns [3] and [4] display the results from heterogeneous estimators, where the impact of relative prices is allowed to vary across countries. Column [3] presents the results of the Pesaran & Smith (1995) Mean Group estimator while column [4] contains the results of the CCE-MG estimator of Pesaran (2006).

Across all estimators, we observe a positive impact of relative prices on the labour share; however, there is a large degree of heterogeneity in the magnitudes of the estimated coefficients, while the impact is significant only in the CCE-MG case (see column [4]). In this case, the results indicate that a 10 percentage point decrease in relative prices will lead to a decrease of the labour share by 1.85%. A careful inspection of the residual diagnostics – presented in the last three rows of Table 1 – indicates that the results of columns [1] and [3], i.e. the ones obtained from the traditional panel estimators, are invalid. In particular, the results from the Pesaran (2015) test for the presence of cross-sectional dependence suggest that there exist strong pair-wise correlations, while the Pesaran (2007) panel unit root test shows that the residuals are non-stationary, so that the presence of a spurious relationship cannot be rejected. The same holds for the CCEP estimator (column [3]) which, surprisingly, does not tackle cross-sectional dependence. Turning to the CCE-MG results (column [4]) we observe a significant improvement with respect to cross-sectional dependence (as illustrated by the large decline in the CD statistic) while the residuals are now stationary. We interpret the stationarity of the residuals as an informal test verifying the existence of a long-run (cointegrating) relationship.[9]

[9] We appreciate that this constitutes an ad-hoc approach to testing for cointegration. However, the limited time dimension of the panel does not allow us to formally test for the existence of a cointegrating relationship using, for example, the procedure developed in Gengenbach et al. (2016).

Table 4: Baseline Specification

	[1] FE	[2] CCE-P	[3] MG	[4] CCEMG
Rel. Prices	0.009	0.123	0.0253	0.185***
	(0.0352)	(0.115)	(0.0735)	(0.0956)
Number of Countries	26	26	26	26
Observations	621	621	621	621
RMSE	0.0576	0.0443	0.0482	0.0369
CD	-2.244	-2.179	7.43	-1.28
CDp	0.025	0.0294	0.000	0.2
Int.	I(1)	I(1)	I(1)	I(0)

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
FE: Fixed Effects, CCE-P: Pesaran (2006) Common Correlated Effects Pooled estimator, MG: Pesaran & Smith (1995) Mean Group estimator, CCE-MG: CCE-P: Pesaran (2006) Common Correlated Effects Mean Group estimator.
The MG and CCE-MG estimation was carried out using the *xtmg* STATA routine of Eberhardt (2011b) and are based on an outlier-robust version that accounts for the impact of outliers by placing less weight on them.
Int. indicates the order of integration of the residuals, with I(0) denoting stationarity and I(1) non-stationarity, based on the Pesaran (2007) CIPS test. The results were obtained using the *multipurt* STATA routine of Eberhardt (2011a).
CD and CDp report the Pesaran (2015) statistic, which under the null of weak cross-sectional dependence has a standard normal distribution, and the corresponding p-value. The results were obtained using the *xtcd2* STATA routine of Ditzen (2018).

Finally, on a more technical note, the results from the baseline specification indicate that, for this sample, in order to ensure that the regression models do not suffer from some type of misspecification the use of estimators that account both for the heterogeneous responses to changes in relative prices as well as the heterogeneous impact of large, unobserved shocks is necessary. As such, the CCE-MG is our preferred estimator.

6.1.1 Addressing Endogeneity Concerns

The CCE-type estimators can directly tackle the endogeneity bias that arises due to the presence of the unobserved common factors, via the augmentation of the specification with cross-sectional averages; however, they cannot directly address the impact of reverse causality.

The standard approach in the literature is the use of instrumental variables and, in most of the cases, the use of internally generated instruments (i.e. lags of the variables) in the context of a system GMM estimation. However, once the presence of unobserved common factors is accounted for, this approach cannot be implemented in principle.

In this paper, we circumvent this issue by utilizing the Group Mean Fully Modified OLS (FMOLS) estimator of Pedroni (2000) – see Eberhardt & Teal (2020) for a similar approach. In particular, given that the variables are non-stationary and there exists a long-run (cointegrating) relationship amongst them, the FMOLS estimates are robust to reverse causality concerns. In order to address the presence of cross-

sectional dependence, we follow Pesaran (2006) and augment the model with cross-sectional averages of the dependent and independent variables. The results (available upon request) are qualitatively similar and of the same magnitude as the ones reported in Table 4, lending assurance that the baseline estimates are not affected by reverse causality.

6.2 The Impact of Government Size

In this subsection, we test whether for our sample the size of the government is a driver of the labour share. Government size in this context is considered as a proxy for the size of the welfare state – see Stockhammer (2017). In particular, we include final consumption expenditure of the general government (FCE), which also serves as an indicator of the importance of the size of the government for the economy.

The results are presented in Table 5; again, the first two columns present the results from the homogeneous-type estimators while columns [3] and [4] present the results from the heterogeneous estimators.

Table 5: Model with Government Size

	[1] FE	[2] CCE-P	[3] MG	[4] CCEMG
Rel. Prices	-0.0998***	0.170***	-0.011	0.217**
	(0.0327)	(0.0578)	(0.0879)	(0.0863)
FCE	0.337***	0.387***	0.389***	0.361***
	(0.029)	(0.105)	(0.0653)	(0.0537)
Number of Countries	26	26	26	26
Observations	621	621	621	621
RMSE	0.0515	0.0325	0.0482	0.0369
CD	-1.798	-2.163	4.274	-1.238
CDp	0.072	0.0305	0.000	0.216
Int.	I(1)	I(0)	I(1)	I(0)

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
See notes in Table 4.

Overall, we observe that the coefficient of government size is positive and significant in all cases, and its magnitude does not exhibit a large degree of variability. Given that our sample includes the Global Financial Crisis and the recovery period, this result seems to suggest that increases in expenditures related to the welfare state support the countercyclical behaviour of the labour income share. In terms of the relative price coefficients, we observe that when cross-sectional dependence is not accounted for (columns [1] and [3]) the coefficients are negatively signed, implying that the reduction in investment prices would lead to an increase in the labour share.

Another important observation is that the coefficients of relative prices are larger in magnitude –and correctly signed- when we account for the presence of large shocks (columns [2] and [4]) compared to the benchmark case. The results imply that a 10 percentage point decrease in the relative price would lead to a decrease of the labour share by 1.7 to 2.2 percentage points. Finally, examining the residual

diagnostics, we again see that the standard panel estimators produce residuals that are cross-sectionally dependent and non-stationary, thus rendering any inference invalid. On the contrary, the diagnostics are favourable for the CCE-type estimators.

The empirical results of this subsection provide further evidence regarding the impact of changes in relative investment prices on the labour share trend. Moreover, they imply that, for our sample, an expansion of the welfare state will exert a positive and statistically significant impact on the labour income share.

6.3 The Impact of Globalization and Financialization

In this subsection, we focus on the assessment of the effects of globalization and financialization. In order to account for the impact of globalization, we include trade openness[10] (the sum of exports and imports as a share of GDP), while the impact of financial globalization is proxied by the net financial payments of non-financial corporations (NFC PAY).[11] The relevant results are presented in Table 6.

Table 6: Model with Government Size and Globalization

	[1] FE	[2] CCE-P	[3] MG	[4] CCEMG
Rel. Prices	-0.123***	0.157*	0.0905	0.254**
	(0.0327)	(0.0889)	(0.0819)	(0.107)
FCE	0.306***	0.288***	0.407***	0.355***
	(0.0308)	(0.0844)	(0.0475)	(0.0722)
Openness	-0.0979***	-0.0932***	0.00967	-0.0758
	(0.0252)	(0.0368)	(0.0257)	(0.0531)
NFC Payments	0.009	-0.008	-0.007	-0.004
	(0.005)	(0.006)	(0.009)	(0.006)
Number of Countries	26	26	26	26
Observations	621	621	621	621
RMSE	0.0502	0.0251	0.0287	0.0164
CD	-1.899	-0.408	2.363	0.021
CDp	0.058	0.683	0.018	0.983
Int.	I(1)	I(0)	I(1)	I(0)

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
See notes in Table 4.

Focusing on columns [2] and [4], which display the results of the CCE-type estimators, we observe that the inclusion of the additional covariates does not have an impact on the significance and the mag-

[10] Trade openness can also be interpreted as a measure of the (non-financial) exit options of capital e.g. via offshoring (see Kohler et al. (2019)

[11] We also used an alternative measure of financial globalization, namely foreign assets plus foreign liabilities from Lane & Milesi-Ferretti (2007). Given that this variable could only be constructed for a shorter time period (up to 2015), it prohibited the use of the heterogeneous estimators. We report that, for the FE and CCEP estimators, the coefficient of this variable was statistically insignificant at the 1% and 5% levels.

nitude of the relative price and government size coefficients. Trade openness has the expected negative impact on the labour income share, a result that is commonly identified in the literature; however it is statistically insignificant when we allow for heterogeneity in country-specific responses (see column [4]). The net financial payments coefficient is very small in magnitude and statistically insignificant across all estimators. These results imply that, for this sample, neither globalization nor financialization seem to affect the trajectory of the labour income share. The results of the residual diagnostics are favourable for both the CCEP and the CCE-MG estimators, again highlighting the importance of accounting for the heterogeneous impact of large macroeconomic shocks.

7 Conclusions

The long-run constancy of the labour income share has been challenged by a large number of recent contributions, most of which have documented a global decline in its long-run trend.

In this paper, focusing on a sample of EU countries and excluding the impact of housing services, we first documented that the labour income share does not follow a downward trend; rather, it remained relatively stable and exhibited a small increase by the end of the sample period. Moreover, using recently developed panel estimators able to accommodate country-specific responses to changes in the determinants and the heterogeneous impact of large macroeconomic shocks, we documented that relative prices have a significant impact on the labour share, lending support to the validity of the capital deepening theory for this sample. Moreover, the size of the government has a significant impact, indicating the importance of the welfare state as a determinant of the labour share. Finally, we find no evidence supporting the impact of globalization and financialization.

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Appendix A Variable Definitions

Table A.1: Sample Appendix Table

Variable	Definition	Source
Labour Share	Labour income as a share of Gross Value Added, excluding the Real Estate Sector	Eurostat: nama_10_a10
Relative Inv. Price	Relative Price of Investment, constructed as the ratio of the Gross Fixed Capital Formation deflator (excluding dwellings) over the Final Consumption Expenditure of Households deflator	Eurostat: nama_10_gdp
FCE GG	Final Consumption of the General Government as a share of GDP	Eurostat: nama_10_gdp
Trade Openness	The sum of exports of goods and services and imports of goods and services over GDP	Eurostat: nama_10_gdp
NFC PAY	The difference between the sum of dividend and interest income of non-financial corporations as a share of GVA	Eurostat: nasa_10_nf_tr