Revisiting the Global Decline of the (Non-Housing) Labor Share

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Abstract:

We show that cross-country comparisons of corporate labor shares are affected by differences in the delineation of corporate sectors. While the US excludes all self-employed and most dwellings from the corporate sector, other countries include large amounts of both – biasing labor shares downwards. We propose two methods to control for these differences and obtain 'harmonized' non-housing labor share series. Contrary to common wisdom, the harmonized series remain stable or increase in all major advanced economies except the US and Canada. These new facts cast doubts on most technological explanations for the decline of the labor share.

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Key words: Labor Share, Residential Real Estate, Self-Employment, National Accounts.

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The stability of the labor share has been an important stylized fact since at least Kaldor (1957), with broad implications for inequality, growth and macroeconomic dynamics. In recent years, however, this stability has been challenged by a series of papers documenting a global decline of the labor share (Piketty and Zucman, 2014; Karabarbounis and Neiman, 2014, among others).

Some of these papers focused on total economy labor shares. However, the literature quickly identified two major empirical challenges affecting such labor shares: the treatment of mixed – i.e., self-employment – income and the role of housing.[1] Elsby et al. (2013), for example, estimate that a third of the decline in the headline measure of the US labor share is an artifact of statistical procedures used to impute wages for the self-employed; and Rognlie (2015) showed that the rise in housing value added explains a large portion of the decline in total economy labor shares.

In response to these challenges, the literature began to focus on corporate sector labor shares when studying the allocation of *business* output between owners and workers – effectively assuming that self-employed workers and housing assets are excluded from the sector. Rognlie (2015, p.14) summarizes the prevailing view noting that "restricting attention to the corporate sector is a common way to deal with [...] measurement difficulties [...] including ambiguity in the labor/capital split of mixed income, as well as the crucial role of housing".

Corporate labor shares also fell (Karabarbounis and Neiman, 2014), however, which sustained the challenge to Kaldor's fact and triggered a long search for an explanation. The most prominent hypotheses to-date emphasize some form of technological change: declining relative prices of capital (Karabarbounis and Neiman, 2014); capital-biased technical change and automation (e.g. Acemoglu and Restrepo, 2018; Martinez, 2018); and winner-take-all effects leading to 'superstar' firms (Autor et al., 2017, 2020).

But, are corporate labor shares truly free from these measurement challenges? This short paper revisits the evidence. It shows that SNA guidelines – followed by most countries outside the US – include "all units engaged in market production that act independently of their owners" in the corporate sector. This includes legally constituted corporations (as in the US), in addition to cooperatives, limited liability partnerships, notional resident units and quasi-corporations. In contrast to common wisdom, these additional entities often own and operate housing and include self-employed workers. In fact, 16% of fixed assets in the EU corporate sector are dwellings (reaching 30% for France); and self-employed workers contribute as much as 15% of total hours

[1] A third issue relates to the rise of depreciation as a share of value added (Rognlie, 2015) associated with the capitalization of intangibles (Koh et al., 2015). We focus on gross instead of net labor shares because depreciation is a conceptually different object that brings its own set of difficulties (in terms of both measurement and interpretation). Using net shares would only strengthen our conclusions (see Appendix Figure D.2).

worked in the corporate sector (e.g., in Italy).[2]

We document these facts, and study their implications for the long-run evolution of non-housing labor shares. We propose two methods to jointly address the measurement challenges and obtain 'harmonized' non-housing labor share series. The first method uses industry accounts to exclude all real estate activities from both wages and value added. This method covers the entire business sector and fully controls for housing, but it has two limitations: (i) it 'over-controls' by excluding commercial in addition to residential real estate and (ii) it relies on imputed wages for the self-employed, which are difficult to estimate.[3] Our second method addresses these limitations by focusing on the corporate sector. We use national account data to estimate the contribution of housing to corporate value added and propose three estimates for the impact of self-employment on the corporate labor share.

Since we are agnostic to technological explanations, we study the longest time-series possible that supports the calculation of at least one of the two methods across most major economies. This leads us to begin our analysis in 1970, which we view as a good starting point given the stability of the labor share from 1950 to 1970.[4] This initial period differs from several papers in the literature, introducing a third measurement challenge: the starting period of analysis. Karabarbounis and Neiman (2014), for example, begin their analysis on 1975 in order to match the fall of the relative price of equipment; and IMF (2017) begin their analysis in 1980, when the share of intangible capital began to rise. The late-1970s/early-1980s, however, coincide with the global stagflation period, over which both unemployment and the labor share increased drastically (Bruno and Sachs, 1985; Blanchard, 1998). Starting in 1970 helps us avoid these confounding factors and provides a longer term perspective on the labor share. Cette et al. (2019) discuss this issue in detail.

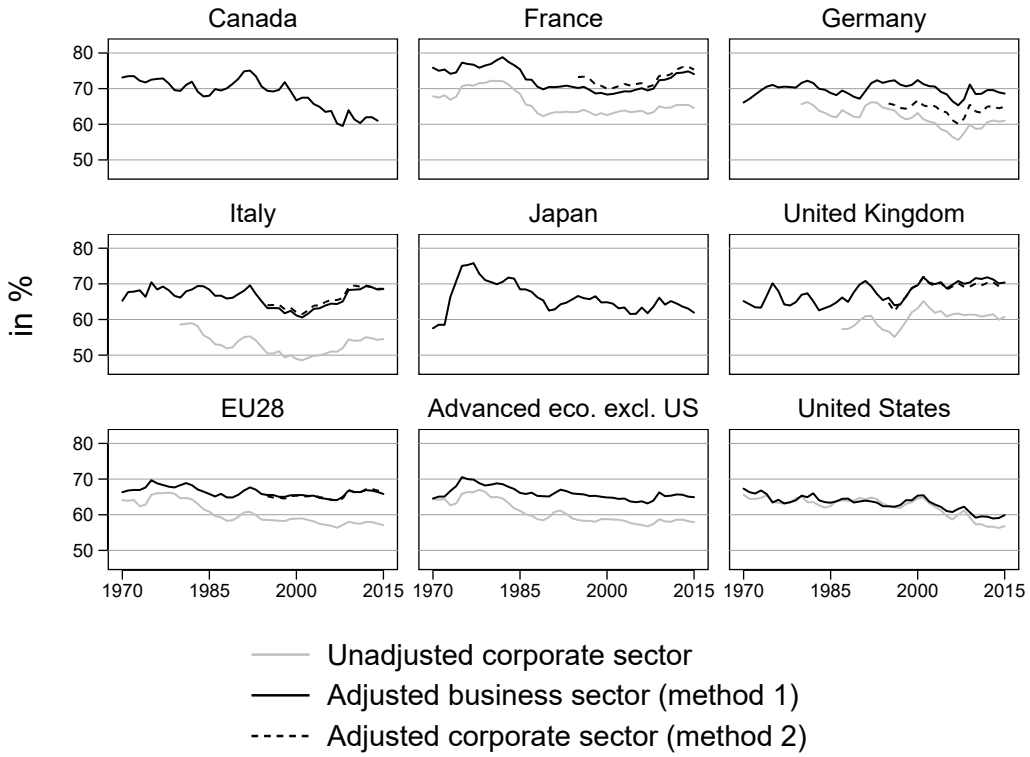
Figure 1 summarizes our results, plotting the unadjusted corporate sector series (gray) and our two harmonized series (black) for each G7 country, as well as the EU28 and an aggregate across advanced economies. Contrary to common wisdom, the harmonized series do not exhibit a global decline in the labor share. In fact, the average non-housing labor share across advanced economies (excluding the US) is higher today than in 1970. The labor share increased in the UK; decreased in the US and Canada; and remained stable in the remaining major economies. Data limitations restrict the sample for adjusted corporate sector series (dotted line) but, where available, it behaves

[2] Pionnier and Guidetti (2015) are the first to discuss the self-employment issue in detail, focusing on the cross-country comparability in the level of profit shares since 1995. They do not study the implications of this issue for the long-run decline of the labor share.

[3] We rely on multiple vintages of KLEMS to obtain as long a time-series as possible. These vintages have been criticized in the literature (e.g. Autor and Salomons, 2018). We discuss our approach and several validation analyses in the Data Appendix.

[4] See Figure G.1 in the Appendix, as well as Rognlie (2015) and Cette et al. (2019).

Figure 1 – Domestic gross labor share in advanced economies, 1970-2015



Note: Unadjusted series from OECD and National institutes, extended back using Karabarbounis and Neiman (2014). Adjusted business sector series based on non-farm market industries in KLEMS or similar international sources, excluding real estate. Adjusted corporate sector series corrects for the contribution of housing and self-employment in the corporate sector. See Section 3 for details on the adjustments, and the Data Appendix for details on data sources. The advanced economy aggregate includes the G7 (except the US), advanced economies of the EU28, South Korea, Norway and Iceland. Country aggregates plot the year fixed effects from regressions of labor shares that also include country fixed effects, to account for entry and exit during the sample. The regressions are weighted by expenditure-side real GDP at chained PPPs from the Penn World Table version 9.1. The effects have been normalized to equal the average labor share in 1995.

similar to the adjusted business series.

Consistent with the *inclusion* of housing services and self-employment in non-US corporate sectors, the harmonized (black) and corporate (gray) series diverge over time. This is observed in all countries except the US, where the corporate sector *excludes* housing and self-employment.[5] As

[5]The US series diverge after 1995, likely due to the rise of S-corporations documented by Smith et al. (2019).

discussed below, the divergence is explained by roughly equal contributions of housing and self-employment.

The advanced economy labor share increased in the 1970s and fell in the 1980s, returning to its initial level by 1990. It then declined slightly until the Global Financial Crisis, and recovered afterwards. The rise and fall in the labor share during the 1970s and 1980s is particularly strong in countries with higher reliance on oil imports and more rigid labor markets, such as Continental Europe and Japan. This appears consistent with wage-push shocks during the Global Stagflation period as opposed to technological explanations (see Appendix G for additional details).

Overall, the heterogeneity in labor share trends across countries, and the quasi-stability of the global labor share since 1990 casts doubts on most technological explanations for the decline of the labor share: automation, intangible capital deepening and declines in the relative price of equipment are observed globally and, if anything, accelerated in the 1990s and early 2000s – precisely when the labor share remained relatively stable. Instead, our results point towards country-specific explanations – perhaps a decline in competition as emphasized by Gutierrez and Philippon (2018) – or at least an offsetting mechanism keeping the labor shares of some countries flat.

The remainder of this paper is organized as follows. Section 1 describes how the treatment of housing and self-employment in national accounts affects corporate sector labor shares. Section 2 introduces our two harmonized measures of the non-housing labor share, which are compared to common measures in the literature in Section 3. Section 4 concludes. The Online Appendix provides additional details on the data, as well as several supporting analyses.

1. Inclusion of Housing and Self-Employment in the Corporate Sector

In principle, measuring the labor share should be straightforward. For each sector/industry of the economy, value added measures the value generated by production activities (output less intermediate consumption).[6] Value added can be decomposed into income paid to capital (operating surplus), income paid to labor, and net taxes on production. The (gross) labor share is then defined as the ratio of income paid to labor to nominal gross value added.[7]

In practice, however, measuring the labor share is a challenging endeavor. Total economy labor shares require a difficult estimation of wages for the self-employed (Gollin, 2002; Elsby et al., 2013).

[6] By aggregating GVA (at basic prices) over the total economy, we get a measure of gross domestic product (at market prices) less net taxes on products.

[7] Note that income paid to labor includes stock options when employees exercise them (Elsby et al., 2013).

The series are also affected by rising capital depreciation (Koh et al., 2015); and conflate two very different dynamics: those of the housing and non-housing (i.e., business) sectors (Rognlie, 2015).

In response to these challenges, the literature has often focused on corporate sector labor shares, effectively assuming that this sector (i) excludes housing income and (ii) excludes all self-employed workers.

This assumption is largely true in the US, where the integrated macroeconomic accounts include a corporate and a non-corporate business sector. The latter combines activities that would be mapped to the corporate as well as the household sectors under SNA guidelines (Moulton, 2014), leaving only legally organized corporations required to file corporate tax returns in the corporate sector.

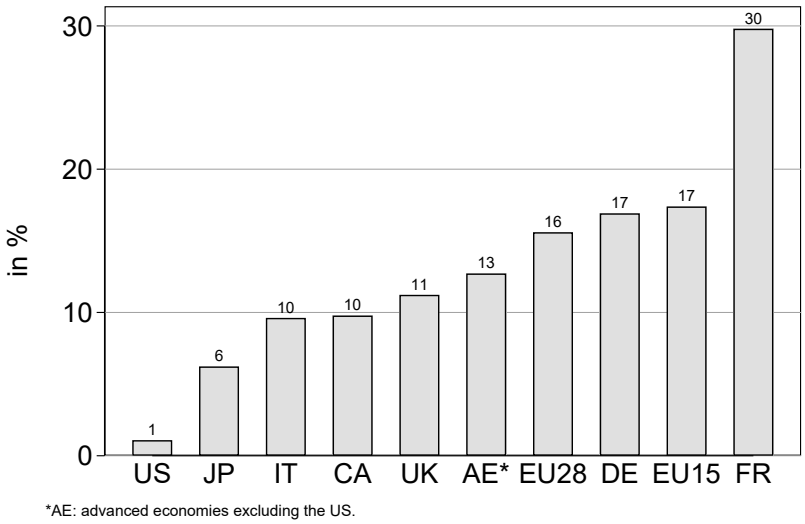
But this is not true outside the US. Most non-US countries follow the 2008 System of National Accounts (United Nations, 2008). Under the SNA, all units engaged in market production that can be sufficiently disentangled from their owners as to produce a separate set of accounts belong to the corporate sector. This includes legally constituted corporations (as in the US), in addition to cooperatives, limited liability partnerships, notional resident units and quasi-corporations (i.e., unincorporated enterprises owned by households, governments, or non-residents that have no legal status separate from their owners but are engaged in market production and act independently of their owners). The broader definition of corporations brings back our two old measurement challenges, this time for the corporate sector:

1. **Inclusion of residential real estate.** Cooperatives, limited liability partnerships, notional resident units and quasi-corporations can all own and operate housing. As a result, non-US corporate sectors own a substantial amount of dwellings. As shown in Figure 2, 16% of the produced fixed assets in the European corporate sector are dwellings, reaching 30% for France.[8] The US is the outlier, with only a 1% housing share.[9]

[8] Land is excluded from produced fixed assets, but obviously influences the contribution of housing to value added. A rise in the value of land underlying housing assets would, therefore, also affect labor shares. By using observed rental prices as the basis for our adjustment, we control for land when building harmonized series.

[9] Some examples may help clarify the inclusion of housing. In the US, tenant-occupied dwellings owned by corporations are included in the corporate sector. However, these account for only 5% of the stock of tenant-occupied housing and 1% of the total stock of housing in 2015 (Figure E.4 in the Appendix). By contrast, in France, social entities (including HLM, i.e., rent-controlled housing) own ∼15% of the French housing stock (Figure E.3 in the Appendix). These entities act independently from their owners and are therefore classified as corporations. Their housing stock accounts for 30% of produced fixed assets in the corporate sector. The remaining housing stock includes owner-occupiers (65%) and tenant-occupied dwellings owned by households (20%), both of which are included in the household sector. Tenant-occupied dwellings owned by private corporations account for less than 1% of the French housing stock – in line with the US. Last, in the UK nearly 70% of rental income (both residential and

Figure 2 – Share of dwellings in total produced fixed assets, corporate sector, advanced economies, 2015



Note: Total assets include all produced non-financial assets and thereby intangibles (see Table A.4 in Appendix for a definition). Dwellings exclude commercial real estate or other buildings. EU15 includes France (FR), Germany (DE), Italy (IT), and the United Kingdom (UK) as well as Austria, Belgium, Denmark, Greece, Ireland, Spain, Finland, Luxembourg, the Netherlands, Portugal and Sweden. EU28 includes all European countries. AE includes all advanced economies available in our dataset, including Japan (JP) and Canada (CA) except the United States (33 countries). Similar numbers for the year 1995 are presented in Figure E.2 in Appendix. Aggregates are averages weighted by expenditure-side real GDP at chained PPPs from the Penn World Table version 9.1.

The inclusion of housing biases the corporate labor share downward, for the reasons emphasized by Rognlie (2015): housing has a low labor share relative to the rest of the corporate sector (∼6% vs. ∼66%, respectively), so an increase in the housing share of corporate value added pushes the corporate labor share downwards. This is important for understanding the distribution of income in the total economy, but says nothing about how *business* output is allocated between owners and workers – which is often the object of interest. Automation, superstar firms, relative prices of equipment and offshoring may affect the business sector labor share, but not the housing share of value added.

2. **Inclusion of self-employed workers.** In addition, several of these entities include a substantial share of self-employed workers. This issue was first discussed in Pionnier and Guidetti (2015),

commercial but excluding imputed rents) is included in the corporate sector (Figure E.5).

and is covered in detail in a recent Eurostat note, which reports that 23 out of 30 European economies are affected (Eurostat, 2019).[10]

The inclusion of self-employed workers in the corporate sector has important implications for the labor share. If the labor input of a self-employed worker is not recorded (nor imputed) as wages, gross operating surplus reflects not only profits from the corporations' production activities, but also remuneration for the work of the self-employed. Thus, gross operating surplus of corporations is analogous to mixed income of households: it requires an assumption to separate labor and capital income. Absent such an assumption, the corporate labor share is underestimated.[11]

Unfortunately, since self-employment data by institutional sector are only available in Italy and Finland, this problem is quite difficult to identify and solve in practice. We propose three approaches to estimate the impact of self-employment on corporate sector labor shares; and note that industry accounts provide some solace: data on self-employment are available at the industry-level, and can be used to estimate a self-employment adjustment. Indeed, this is why our primary measure is based on industry accounts.[12]

2. Two Methods for Obtaining Harmonized Non-Housing Labor Shares

The differential treatment of housing and self-employment across countries implies that cross-country comparisons of corporate labor shares are flawed. Let us now propose two methods to obtain harmonized non-housing labor share series.

2.1. Method 1: Excluding Real Estate Activities from Industry Accounts

Our first method is the most straightforward: we simply exclude real estate activities from the calculation of the labor share, using industry accounts.[13] We compute the labor share for the

[10] Seven countries deal with the issue of self-employment in the corporate sector. The Netherlands, Sweden, Norway and Cyprus treat them as employees; Switzerland, Belgium and Romania include them in the mixed income of the household sector.

[11] A distinct but related issue is the remarkable rise of S-Corporations in the US. Partners of S-corporations are classified as employees but have a tax incentive to shift labor income to profits, biasing downward the trend in the corporate wage share (Smith et al., 2019).

[12] Pionnier and Guidetti (2015) reach similar conclusions, recommending the use of industry accounts for cross-country comparisons of factor shares.

[13] Specifically, we use data from EU KLEMS, Country-specific KLEMS reports as well as OECD STAN. See the Data Appendix for details.

business sector[14] excluding Real Estate (RE):

$$LS^{ex\,\mathrm{RE}} = \frac{\sum_k w_e^k (N_e^k + N_s^k) - w_e^{\mathrm{RE}}(N_e^{\mathrm{RE}} + N_s^{\mathrm{RE}})}{Y - Y^{\mathrm{RE}}} = \sum_{k\ \mathrm{ex\ RE}} LS^k \omega^k, \tag{1}$$

where LS^k is the labor share in sector k; $(N_e^k + N_s^k)$ are total hours worked by employees, e, and self-employed, s; w_e^k is the average hourly wage of employees in sector k which, consistent with KLEMS, is assumed to apply for both employees and the self-employed; Y is total gross value added; and Y^{RE} is real estate sector gross value added. ω^k is sector k's share in total gross value added.

Since all dwellings are included in the real estate sector, excluding it fully controls for the rise of housing. And, since data on self-employment are available at the industry-level, an adjustment is included for all self-employed workers. Still, this measure is not perfect: it relies on imputed wages for the self-employed – which are notoriously difficult to estimate; and it requires that we exclude commercial in addition to residential real estate.[15]

2.2. Method 2: Adjusting for Housing and Self-employment in the Corporate Sector

Our second method aims to mitigate these issues by focusing on the corporate sector. The benefit is that self-employment affects only some countries, and we can control for housing directly. The downside is that information documenting the prevalence of self-employment in the corporate sector is fairly limited.

The goal is to estimate adjusted corporate sector labor shares:

$$LS^{c,\mathrm{adj}} = \frac{w_e^c N_e^c + w_s^c N_s^c}{\hat{Y}^c}, \tag{2}$$

where $w_e^c N_e^c + w_s^c N_s^c$ adds up compensation of the employees and self-employed in the corporate sector, respectively; and $\hat{Y}^c = Y^c - Y_h^c$ denotes corporate value added excluding housing.

[14]The business sector is composed of 18 industries, as shown in the Appendix Table A.1. Non-market services (public administration, health, education, activities of households as employers and activities of non-profits serving households) are excluded because their output is often valued at the cost of production, so the net operating surplus is null and the labor share is close to one. The government also plays a significant role in these sectors. Farm activities are excluded because of the large share of self-employment, which introduces substantial measurement error to the labor share (estimates often exceed 1). None of our conclusions depend on which industries are excluded beyond real estate, as shown in Appendix Figure D.1.

[15]Table E.1 in the Appendix provides additional details on the composition of the real estate sector. Housing accounts for ∼70% of activity in most countries, with the remainder composed of non-residential rental activities (∼15%), fee-based activities (∼10%) and buying and selling of own real estate (∼5%)

Housing– We begin with $\hat{Y}^c$. In order to estimate the contribution of housing to corporate value added, Y_h^c, we obtain actual and imputed rents on housing from SNA table 5 and gross operating surplus in the household sector from SNA table 14A ($Rents$ and GOS^h, respectively).[16] $Rents$ include all housing expenditures in the economy, while GOS^h "capture the income generated from households' housing activities" (Piketty and Zucman, 2014, Data Appendix p. 42).[17] Thus, the difference between $Rents$ and GOS^h isolate rents outside the household sector. We allocate these rents according to the distribution of residential structures outside the housing sector:

$$Y_h^c = (Rents - GOS^h)\frac{K_h^c}{K_h - K_h^h}, \tag{3}$$

where K_h denotes the current-cost value of residential structures in the economy, and K_h^j the value for sector j.

We acknowledge that $Rents$ and GOS^h are not entirely consistent: they are compiled separately and sometimes use different definitions (e.g., rents include spending on repairs, while value added does not). As a result, GOS^h exceeds $Rents$ in a few countries with limited housing ownership outside the household sector (e.g., Luxembourg). Appendix E.2 provides additional details on the calculation, and discusses several alternate methods that avoid these limitations. They suggest that the inclusion of housing in the corporate sector introduced a downward bias of 1-2% in the EU15 labor share since 1995 (see online Appendix Figure E.13).

Self-employment– For self-employment, we propose three alternative estimates depending on data availability. Denote the self-employment bias as:

$$\text{SE Bias} = \frac{w_s^c N_s^c}{\hat{Y}^c}. \tag{4}$$

Option 1: If N_s^c is observable (as in Italy and Finland), we can follow standard methods and estimate $w_s^c N_s^c$ assuming the hourly earnings of the self-employed are the same as those of employees (i.e., $w_s = w_e$).[18]

Option 2: If N_s^c is not observable, we use additional information from National Accounts. Begin by noting that self-employed workers appear only in the corporate and household sectors. In that

[16] Ideally, we would use the household sector alone, but data is often missing, so we combine the households and non profit institutions serving households instead.

[17] See also SNA (United Nations, 2008), §7.9, p.2: "In practice, all unincorporated enterprises owned by households that are not quasi-corporations are deemed to have mixed income as their balancing item, except for owner-occupiers in their capacity as producers of housing services for own final consumption, households leasing dwellings and households employing paid domestic staff. *For owner-occupiers and those leasing dwellings, all value added is operating surplus.*"

[18] See Figure F.3 in Appendix for details on the self-employment contribution in Italy, as reported in (ISTAT, 2012) and Figure F.4 for the equivalent in Finland.

case, we can isolate labor compensation of the self-employed in the corporate sector using

$$\text{SE Bias} = \frac{w_s N_s - w_s^h N_s^h}{\hat{Y}^c}, \tag{5}$$

where $w_s N_s$ and $w_s^h N_s^h$ denotes labor compensation of the self-employed in the overall economy and the household sector, respectively. Unfortunately, neither w_s nor $w_s^h N_s^h$ are observable. We assume the self-employed have the same average wages as employees ($w_s = w_e$), and the mixed income labor share is the same as the business sector labor share ($w_s^h N_s^h = LS^{ex\,\text{RE}} MI^h$). This yields our second estimate of the self-employment bias.

Option 3: Options 1 and 2 assume (trends in) wages and labor shares of employees are good estimates for the self-employed. This may be incorrect if the composition of the self-employed varies over the time.[19] Our third method allows for this by comparing the evolution of affected and unaffected countries.

Re-write the last equation to separate reported and unreported quantities:

$$\text{SE Bias} = \frac{(w_e + dW)N_s - (MI^h - R^h K^h)}{\hat{Y}^c}, \tag{6}$$

where dW denotes the wage differential between employees and the self-employed, and $R^h K^h$ denotes the capital component of mixed income. For a given country j:

$$\mathbb{E}\left[\Delta \text{SE Bias}_j\right] = \Delta\left(\frac{w_{ej} N_{sj} - MI_j^h}{\hat{Y}_j^c}\right) + \mathbb{E}\left[\Delta\left(\frac{dW_j N_{sj}}{\hat{Y}_j^c}\right) + \Delta\left(\frac{R_j^h K_j^h}{\hat{Y}_j^c}\right)\right], \tag{7}$$

where Δx denotes changes from 1995 ($\Delta x = x - x_{95}$) to focus on trends rather than levels. The first term can be computed from national accounts but the second one is, unfortunately, unobserved. We estimate it by assuming a common trend in the wage differential and capital income of affected and unaffected countries (as reported in Eurostat, 2019). In particular, we use $E[\text{SE Bias}|\text{Unaffected}] = 0$ to obtain:

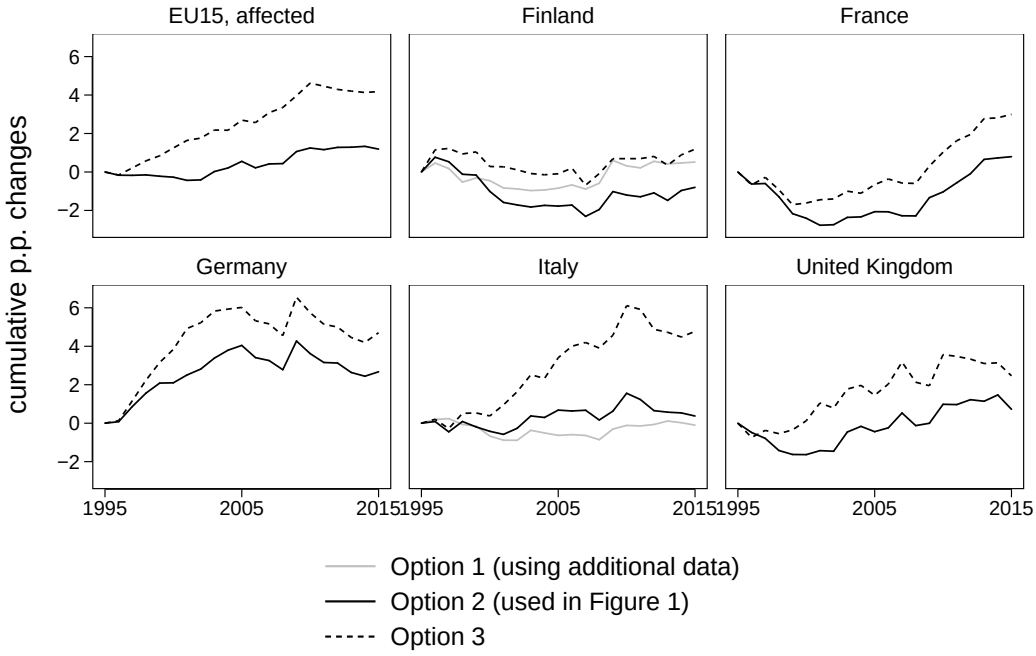
$$\mathbb{E}\left[\Delta\left(\frac{dW_j N_{sj}}{\hat{Y}_j^c}\right) + \Delta\left(\frac{R_j^h K_j^h}{\hat{Y}_j^c}\right)\right] = \frac{1}{N}\sum_{j \in \text{Unaffected}} \Delta\left(\frac{w_{ej} N_{sj} - MI_j^h}{\hat{Y}_j^c}\right), \tag{8}$$

with N the total number of unaffected countries, and assume this is a good estimate for affected countries. This yields our third estimate of the self-employment bias.

Results: Figure 3 contrasts our three estimates of the self-employment bias across the EU15 and selected EU countries. Where available, options 1 and 2 yield similar estimates. This is

[19] This is likely the case in the UK, for example, where the population of 'incorporated' self-employed is growing rapidly (7% per year from 2000 to 2014) as owner-managers in high-income sectors (e.g., consultants for financial companies) are increasingly remunerating themselves through dividends as opposed to wages (ONS, 2017).

Figure 3 – Contribution of the self-employment adjustment to the change in the corporate sector labor share, 1995-2015



Note: For EU15, for example, the adjustment leads to a +1p.p. to +4p.p. increase in the labor share between 1995 and 2015. See the text for a description of the different adjustments.
EU15 affected includes all affected countries following Eurostat (2019): France, Germany, Italy, the UK, as well as Austria, Denmark, Greece, Ireland, Spain, Finland, Luxembourg, Portugal. It plots the year fixed effects from a regression of labor shares that also include country fixed effects, to account for entry and exit during the sample. The regressions are weighted by expenditure-side real GDP at chained PPPs from the Penn World Table version 9.1.

not surprising, since both assume wages of employees and self-employed are equalized. Option 3 yields a larger adjustment, consistent with affected countries exhibiting growing self-employment biases.[20] Across the affected EU15 countries, options 2 and 3 imply a cumulative adjustment of 1.2% and 4.2% since 1995, respectively. This compares to a -0.5% change in the 'raw' corporate sector series and a 1-2% adjustment from housing. For our main results in Figure 1, we use the conservative estimates from method 2.

[20] As a further robustness, we test whether affected countries exhibit a growing gap between estimated compensation of the self-employed following KLEMS and total mixed income reported in national accounts, $\left(\frac{w_{ej}N_{sj}-MI_j^h}{Y_j^c}\right)$, from 1995 to 2015. This difference is statistically significant at the 5% level.

3. Results

Let us now discuss the evolution of our two harmonized measures of the labor share, and compare them against two common measures in the literature: the raw corporate sector labor share from Karabarbounis and Neiman (2014) (KN) and the unadjusted labor share of Autor and Salomons (2018) (AS, based on previous vintages of EU KLEMS). We focus on advanced economies in the body of the document, and discuss selected developing economies in Appendix C.

3.1. Long-run Trends

We begin with long-run trends in the labor share, reported in Figure 1 in the introduction. We plot the raw corporate sector labor share from KN (gray), along with the adjusted business sector series (solid black) and the adjusted corporate sector series (dotted black). The adjusted corporate sector series are available only since 1995, but behave similar to the adjusted business sector series. This provides comfort for using the adjusted business sector series over the longer period.

Consistent with the *exclusion* of housing and self-employment from the US corporate sector, all measures behave similarly in the US. They exhibit a ∼6% decline from 1980 to 2015, concentrated in the post-2000 period. By contrast, the series evolve quite differently outside the US. Consistent with the *inclusion* of housing services and self-employment in the corporate sector, the harmonized series are much larger and far more stable than the raw ones.

Contrary to common wisdom, we do not find a global decline in the labor share. The harmonized series are higher in 2015 than in 1970 in all major European economies except for France, where our data starts near the historical peak. It is also higher when aggregating across all 33 advanced economies in our dataset (the G7 excluding the US, advanced economies of the EU28, South Korea, Norway and Iceland) and across all countries (unreported, including as well China, India and Russia); and only slightly lower for the EU28.

The harmonized labor shares exhibit common trends across many economies. They increase in the 1970s and fall in the 1980s, returning to their initial level by 1990. They then decline slightly until the Global Financial Crisis, and recover afterwards. The rise and fall during the 1970s and 1980s is particularly strong in countries with higher reliance on oil imports and more rigid labor markets, such as Continental Europe and Japan. Appendix figure G.2 and G.3 show that this relationship is statistically and economically significant. For a sub-sample of countries where data are available, changes in commodity terms of trade during the Oil Shocks are correlated with a rise then fall in the labor share of 2%, from 1970 to 1990. This accounts for nearly all of the variation in the average labor share for the sample, although we do see some overshooting (of approximately 1%).

This suggests an important role for wage-push shocks during the Global Stagflation period, as summarized by Blanchard (1997, p.91):

> "The countries of continental Europe were affected by large adverse shifts in 'labor supply' during the 1970s. [...] There is wide consensus that these shifts came from the failure of wages to adjust to the productivity slowdown and the adverse supply shocks of the 1970s [...] Their initial effect was to decrease profit rates and capital shares. Over time, firms reacted by moving away from labor, leading to a steady increase in unemployment, a recovery, and even an increase in capital shares."

Overall, the heterogeneity in labor share trends across countries, and the quasi-stability of the global labor share since 1990 is hard to reconcile with most technological explanations for the decline in the labor share. Intangible capital deepening accelerated over this period and the relative prices of equipment fell drastically. This is true in all regions, hence according to these theories, we should see substantial declines in the labor share everywhere.

3.2. Comparison to prior literature

Let us now contrast our results to the prior literature.

Table 1 presents a decomposition of cumulative changes in the labor share, starting from the total economy wage shares of KN, working towards the unadjusted labor shares of AS and arriving at our final result. We highlight the impact of revisions to national accounts, timing of analysis, differences in sector composition and (for aggregated series) country coverage. For comparison, we also report the change in the raw corporate sector series of Karabarbounis and Neiman (2014).

We begin with Germany. The total economy wage share of KN falls by 4.84% from 1980 to 2011. Accounting for self-employment, the fall increases by 3.18% for a total of 8.02%. This is fairly similar to the fall in the corporate sector wage share of 7.67%. Omitting the poorly measured farm, private households and public sectors to arrive at AS's sectoral composition offsets the decline by 2.91%. Differences in raw data between KLEMS 2008 and KN increase the decline by 2.50%, while differences in timing offset it by 2.81%. AS begin their sample in 1970, which avoids the Global Stagflation period but they end their sample in 2007, the historical trough. Combining all adjustments to match the sample of AS, we obtain a 4.81% decline.

To get to our sample, we begin by excluding real estate. This offsets the decline by 4.59%. Further excluding health and education increases the decline by 1.75%. This is because the labor share increases in these sectors, so excluding them is conservative for our purposes. Using the latest data and lengthening the period of analysis from 2007 to 2015 offsets the decline by 1.31% and

Table 1 – Adjustment contributions to the change in the labor share

G7 countries

		US	CA	DE	FR	IT	JP	UK
(1)	**KN total economy**	**-3.20**	**-5.05**	**-4.84**	**-1.27**	**-6.01**	**-2.88**	**0.10**
(2)	Adjustment for self-employed	-4.05	-2.31	-3.18	-9.61	-2.04	-6.36	4.39
(3)	Excluding farm, private households and public sectors	-0.53	0.42	2.91	0.01	-0.09	2.86	-0.93
(4)	Raw data differences (revisions)	2.64	1.73	-2.50	-0.01	1.80	6.21	0.20
(5)	Timing (KN to AS)	-2.03	-0.73	2.81	0.13	-0.70	2.96	-2.90
	(for comparison: KN corporate sector)	*-5.68*		*-7.67*	*-4.73*	*-4.59*		*2.24*
(6)	**AS selected industries** (1+2+3+4+5)	**-7.16**	**-5.94**	**-4.81**	**-10.74**	**-7.05**	**2.79**	**0.86**
(7)	Excluding real estate	-0.57	-2.02	4.59	4.87	7.71	3.48	3.76
(8)	Excluding health and education	-0.83	-0.47	-1.75	-1.28	-1.40	-2.25	-2.45
(9)	Raw data differences (revisions)	2.02	-0.69	1.31	1.51	2.33	-5.39	3.45
(10)	Timing (AS to GP)	-0.90	-3.00	3.17	3.86	1.70	5.73	-0.39
(11)	**GP business sector** (6+7+8+9+10)	**-7.43**	**-12.12**	**2.51**	**-1.79**	**3.29**	**4.38**	**5.22**
Time periods	Karabarbounis & Neiman, 2014 (KN)	75-12	75-12	80-11	75-11	80-11	75-11	87-11
	Autor & Salomons, 2018 (AS)	70-05	70-04	70-07	70-07	70-07	73-06	70-07
	Gutierrez & Piton, 2020 (GP)	70-15	70-14	70-15	70-15	70-15	70-15	70-15

Country groups excluding the US

		AE	EU28	Global[a]
(1)	**KN total economy**	**-3.28**	**-4.17**	**-3.50**
(2)	Adjustment for self-employed	-3.83	-3.15	-3.80
(3)	Excluding farm, private households and public sectors	0.41	0.15	0.28
(4)	Raw data differences (revisions and coverage)	0.58	-1.16	1.23
(5)	Timing (KN to AS)	0.48	2.78	0.06
	(for comparison: KN corporate sector)	*-8.56*	*-7.67*	*-8.61*
(6)	**AS selected industries** (1+2+3+4+5)	**-5.64**	**-5.56**	**-5.73**
(7)	Excluding real estate	3.88	4.22	3.63
(8)	Excluding health and education	-1.95	-1.95	-1.89
(9)	Raw data differences (revisions and coverage)	3.05	1.60	2.08
(10)	Timing (AS to GP)	1.05	1.19	2.23
(11)	**GP business sector** (6+7+8+9+10)	**0.38**	**-0.50**	**0.32**
Time periods	Karabarbounis & Neiman, 2014 (KN)	75-12	75-12	75-12
	Autor & Salomons, 2018 (AS)	70-07	70-07	70-07
	Gutierrez & Piton, 2020 (GP)	70-15	70-15	70-15

Note: US: United States, CA: Canada, DE: Germany, FR: France, IT: Italy, JP: Japan, UK: United Kingdom, AE: Advanced economies. Aggregates based on series constructed from year fixed effects from regressions of labor shares that also include country fixed effects to account for entry and exit during the sample. The regressions are weighted by expenditure-side real GDP at chained PPPs from the Penn World Table version 9.1.

[a]: the global aggregate includes all advanced economies, the EU28 as well as China, India and Russia (not included elsewhere because of data limitations, see Appendix C for a discussion).

3.17%, respectively. Combining all adjustments, this yields a 2.51% increase from beginning to end. The adjustments are roughly similar for the remaining countries.

Moving from individual countries to aggregates, we find that housing explains 4% of the decline while differences in data sources, country coverage and timing (from AS to GP) explain 1-2% each.

The sizable impact of revisions is perhaps surprising. In the US, the differences are explained by the different data sources: AS use an old SIC-based dataset, while we use a more recent NAICS-based series and only extend back from 1977 to 1970 using the old vintage. Outside the US, most differences are explained by the capitalization of intangibles: AS use primarily the 2007 KLEMS vintage, which does not capitalize intangibles, while both KN and our data incorporate them. This is why we see a negative then positive impact of revisions, so that combining rows 4 and 9, the total revision is substantially smaller.[21] That said, revisions in hours worked (and estimated total labor compensations) also explain some of the differences.[22]

3.3. Sectoral variation and validation with firm-level data

Before concluding, let us briefly discuss the sectoral evolution of US and EU labor shares, and compare our results to firm-level data from EU CompNet.

The right plot of Figure 4 shows that – in line with the results of Kehrig and Vincent (2018) – the manufacturing labor share collapsed in the US, while the service sector labor share remained relatively stable. By contrast, both manufacturing and service sector labor shares remained largely stable across the EU28. This is true when using industry data (as in the rest of the paper) or firm-level data from the ECB's CompNet, which provides an additional validation of our results.[23]

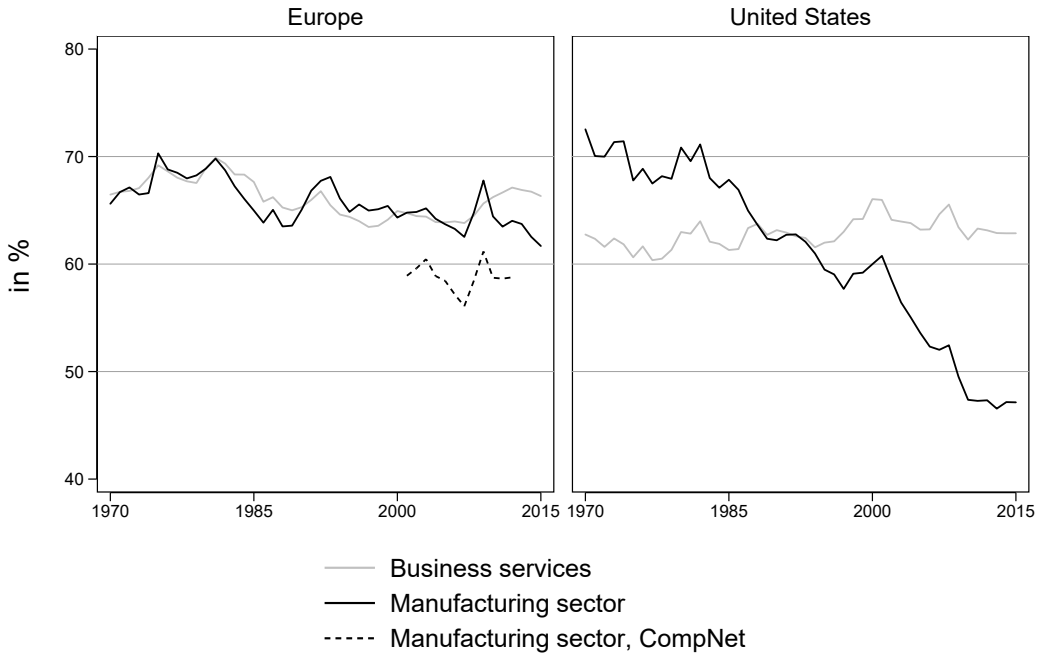
We acknowledge that these aggregates obscure substantial heterogeneity within and across countries: the US labor share fell in wholesale and retail trade and increased in post and telecommunications; while the manufacturing labor share fell in some European economies and rose in others. Nonetheless, the stark differences in the evolution of manufacturing labor shares appear critical to

[21] This is not the case for aggregates because revisions include differences in country coverage.

[22] See Appendix B for a detailed comparison of raw series across various data sources, which suggests that revisions do not explain a large portion of our results.

[23] We use CompNet 4th round of data. See di Mauro and Lopez-Garcia (2015) for more details. The reader must be aware that data collection rules and procedures across countries are different, and out of CompNet's control. Hence, despite all efforts made to improve sample comparability across countries (including the use of population weights), some country samples might still suffer from biases. For a more detailed account of raw data characteristics and sample biases, please refer to the Cross-Country Comparability Report available on CompNet's website (www.compnet.org).

Figure 4 – Manufacturing vs. business services labor share, Europe vs. United States, 1970-2015



Note: Europe includes all 28 countries in KLEMS, and only available countries in the 4th vintage for CompNet (Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Romania, Slovenia, Slovakia). It plots the year fixed effects from a regression of labor shares that also include country fixed effects, to account for entry and exit during the sample. The regressions are weighted by expenditure-side real GDP at chained PPPs from the Penn World Table version 9.1. The effects have been normalized to match the average labor share in 2001.

understanding cross-country heterogeneity in the decline of the labor share.

4. Conclusion

Our results challenge the common wisdom of a global decline in the non-housing labor share, and cast doubts on most common explanations for these trends. Technological changes – including declining capital prices, automation, import competition and intangibles – predict similar effects across countries and industries; as well as continued declines in the labor share since 1990. The quasi-stability of the global labor share since 1990 along with the heterogeneity across countries suggests that other factors may be at play: perhaps declining competition has led to rising profits in selected US industries, as emphasized by Gutierrez and Philippon (2018). Or perhaps the

mechanisms emphasized so far interacted with institutional differences to yield different outcomes across regions and industries. We explore this in future work (Gutierrez et al., 2019).

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