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## INCREASING AND DECREASING LABOR SHARES: CROSS-COUNTRY DIFFERENCES IN THE 21<sup>ST</sup> CENTURY\*\*\*\*

*We study the labor share in the OECD corporate sector for the (early) 21<sup>st</sup> century. Firstly, the cross-country average is trendless over this medium-run horizon after adjusting for intellectual property products (IPP) rents as in Koh et al. (2017). Secondly, the behavior of the labor share is heterogeneous increasing for equally as many countries (e.g., France and the United Kingdom) as it decreases (e.g., Germany and the United States). Thirdly, the cross-country differences in labor share are driven by the differences in labor productivity growth and not wages.*

### **Crecientes y decrecientes participaciones del trabajo en las rentas: diferencias entre países en el siglo XXI**

*Se estudia la participación del trabajo en el sector corporativo de la OCDE en los comienzos del siglo XXI. Primero, tras ajustar las rentas de los productos de propiedad industrial (PPI) como en Kohl et al. (2017), el promedio de los diversos países no muestra una tendencia en un horizonte a medio plazo. Segundo, el comportamiento de la participación laboral es heterogéneo, pues hay tantos países donde esta participación incrementa (por ej., Francia y Reino Unido) como países donde decrece (por ej., Alemania y Estados Unidos). Tercero, las diferencias en la participación laboral entre países se explican por diferencias en el crecimiento de la productividad laboral y no en los salarios.*

**Keywords:** labor share, intellectual property products (IPP), system of national accounts (SNA) revisions, cross-country, wages, labor productivity.

**Palabras clave:** participación del trabajo, productos de propiedad intelectual (PPI), revisiones del sistema de cuentas nacional (SCN), comparaciones entre países, salarios, productividad laboral.

**JEL:** E01, E22, E25.

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## 1. Introduction

The notion of a relatively constant labor share in the long run for modern economies (Kaldor, 1957) has directed much of the work regarding the factor distribution of income at its short-run (or cyclical) fluctuations (Gomme and Greenwood, 1995; Boldrin and Horvath, 1995; Ríos-Rull and Santaelàlia-Llopis, 2010).<sup>1</sup> However, the debate on the long-run behavior of the labor share has recently been rejuvenated by the work of Elsby *et al.* (2013) and Karabarbounis and Neiman (2014), who document a decline in the labor share of the U.S. and other countries with sample periods that cover a large part of the twentieth century. In addition, Piketty (2014) has shed light on a potential link between the behavior of the labor share and the rise of within-country income inequality. In sharp contrast with previous work, Koh *et al.* (2017) have recently shown that the long-run decline of the labor share is not an economic phenomenon but the result of an accounting change in the system of national accounts (SNA): the 1999 and 2013 capitalizations of intellectual property products (IPP) that consist of, respectively, software and R&D (plus artistic originals) in the United States. Furthermore, this is not only a feature of the U.S., but also of other OECD countries (Aum *et al.*, 2018).

In this paper we focus on the medium-run behavior of the labor share —more along the lines of Bentolila and Saint-Paul (2003) and Blanchard (1997)— and of its components, mainly labor productivity and wages using data for the 21<sup>st</sup> century only. We focus on the sample period from year 2000 to 2014 in which our cross-country data are available. Note that labor share (*LS*) is a statistic that summarizes the relationship and potential misalignment between wages and labor productivity:

$$LS = \frac{WH}{Y} \quad [1]$$

<sup>1</sup> See a detailed summary in Koh and Santaelàlia-Llopis (2017).

Where *W* is the wage per unit of labor input *H* (e.g., aggregate hours) and we denote the output as *Y* (e.g., gross value added).

Indeed, in logs, we can write the *LS* as:

$$\ln LS = \ln W - \ln \frac{Y}{H} \quad [2]$$

Importantly, note equation [1] is an accounting definition of the labor share and, hence, it does not depend on any model.<sup>2</sup>

Our goal is to describe the behavior of the corporate labor share and its components throughout 2000-2014. Our first finding is that the OECD labor share —a cross-country average of 20 countries— is trendless over this medium-run horizon after adjusting for the labor income generated from IPP rents as in Koh *et al.* (2017) with an annual growth rate of -0.02 % that is not significantly different from zero. That is, the medium-run behavior of the OECD labor share in the 21<sup>st</sup> century is consistent with the trendless long-run behavior of the U.S. labor share (Koh *et al.*, 2017) and the trendless long-run behavior of the OECD labor share described in (Aum *et al.*, 2018).

Secondly, we find that the behavior of the labor share is largely heterogeneous across countries over this period. For example, on the one hand, the corporate labor share in France increases annually at a rate of 0.40 % throughout our sample period from 2000 to 2014, Italy's corporate labor share grows at an annual rate of 1.06 %, and that of Great Britain at a rate of 0.10 %. On the other hand, the corporate labor share in the U.S. decreases annually at a rate of -0.70 % throughout our sample period, Israel's corporate labor share decreases at an annual rate of -0.48 % and that of Germany at an annual rate of -0.19 %. Indeed, in our OECD core sample of twenty countries we find that the corporate labor share increases for equally as many

<sup>2</sup> Theory imposes restrictions on this relationship. For example, competitive markets theory with a constant returns to scale technologies in which the elasticity of substitution between capital and labor equal to one ( $\sigma = 1$ ) implies that  $\ln W = -\ln Y/H$  always.

countries (*i.e.*, ten) as it decreases over our period of interest, from 2000 to 2014.

Thirdly, a breakdown of the corporate labor share behavior into that of its components shows that the cross-country differences in labor share trends are mainly driven by the differences in labor productivity growth and not wages. Specifically, when we separate the subsample of countries for which the corporate labor share increases from the subsample of countries for which the corporate labor share decreases, we find that wage growth is non-significantly different between these two groups of countries and averages an annual growth rate of 1.35 %. In contrast, labor productivity grows at an annual rate of 1.77 % in countries for which labor share decreases, which is almost twice as large as the labor productivity growth of 0.95 % in the sample of countries with decreasing labor share for this sample period.

The proceeds as follows. We describe our data in Section 2. We then examine the behavior of the labor share for our core sample of OECD countries as well as its components in Section 3. In Section 4, we conduct the same analysis by country. Finally, we study our OECD sample in two separate groups (or subsamples), differentiating increasing versus decreasing corporate labor share countries in Section 5.

## 2. Data

We use the data for the corporate sector collected in Aum *et al.* (2018). Table 1 summarizes the availability of data in terms of the construction of the corporate sector labor share for the year 2000 and after which we are interested in. The use of the corporate sector to construct the labor share of income has the advantage that it avoids having to deal with potentially unambiguous income such as proprietor's income (Boldrin and Peralta-Alva, 2009; Karabarbounis and Neiman, 2014).<sup>3</sup>

<sup>3</sup> The use of the corporate sector is, however, not free of caveats, in particular for European countries. See a detailed analysis in Gutiérrez and Piton (2019) related to the role of self-employed income and dwellings.

Our OECD core sample consists of the countries for which we can compute labor share in the corporate sector and for which we can correct for labor income generated from IPP rents using the cost structure of R&D as in Koh *et al.* (2017). The adjustment applied by these authors has to do with the recent capitalizations of IPP (*i.e.*, software in 1999 and R&D in 2013) that is implemented by national income and product accounts keeping the national accounting identity between expenditure and gross national income. As explained in Koh *et al.* (2017) and Aum *et al.* (2018), this implies that under the current system of national accounts (2008 SNA), that national account identity between expenditures (ignoring exports and imports) and gross national income is:

$$Y_{2008\ SNA} = C + X + I = \underbrace{RK}_{\text{Gross Operating Surplus}} + \underbrace{WH}_{\text{Compensation of Employees}} \quad [3]$$

Where  $C$  is consumption,  $X$  is non-IPP investment (*i.e.*, structures and equipment) and  $I$  is IPP investment. Using the current data we can reconstruct the national account identity [3] that applies before the revisions that capitalize IPP, *i.e.*, under the pre-1993 SNA:

$$Y_{\text{Pre-1993 SNA}} = C + X = \underbrace{(RK - \chi I)}_{\text{Gross Operating Surplus}} + \underbrace{(WL - (1 - \chi)I)}_{\text{Compensation of Employees}} \quad [4]$$

Note then that the  $LS$  change from pre-1993 SNA to 2008 SNA is:

$$LS_{2008\ SNA} \equiv \left( 1 - \frac{GOS_{2008\ SNA}}{Y_{2008\ SNA}} \right) < \left( 1 - \frac{GOS_{2008\ SNA} - I}{Y_{2008\ SNA} - I} \right) \equiv LS_{\text{Pre-1993 SNA}}$$

Where the national accounts assume that  $\chi = 1$ . That is, in national accounts under the 2008 SNA all the rents generated from IPP are attributed to capital income. In reality, however, workers in R&D (or other IPP) activities often get paid less than the value of their marginal product in exchange for future equity compensation ( $\chi < 1$ ) (McGrattan and Prescott, 2005; 2014). Following Koh *et al.* (2017), we proxy  $\chi$  with the

**TABLE 1**  
**CORPORATE SECTOR DATA AVAILABILITY BY COUNTRY, POST-2000**

	Available Data Series			
	LS	$LS_{\chi}$	Labor Productivity	Core Sample
Austria .....	2000-2014	2000-2014	2000-2014	Yes
Belgium.....	2000-2014	2000-2014	2000-2014	Yes
Czech Republic .....	2000-2014	2000-2014	2000-2014	Yes
Denmark.....	2000-2014	2000-2013	2000-2014	Yes
Estonia.....	2000-2014	2000-2014	2000-2014	Yes
Finland.....	2000-2014	2000-2014	2000-2014	Yes
France .....	2000-2014	2000-2014	2000-2014	Yes
Germany.....	2000-2014	2000-2014	2000-2014	Yes
Great Britain .....	2000-2013	2000-2013	2000-2014	Yes
Greece.....	2006-2014	2006-2014	2000-2014	No
Hungary.....	2000-2014	2000-2014	2000-2014	Yes
Ireland.....	2000-2014	–	2000-2013	No
Israel.....	2000-2014	2000-2014	2000-2014	Yes
Italy.....	2000-2014	2000-2014	2000-2014	Yes
Korea .....	2010-2013	2010-2013	2000-2014	No
Mexico .....	2003-2013	2003-2013	2000-2013	No
Netherlands .....	2000-2014	2000-2014	2000-2014	Yes
New Zealand .....	2000-2013	–	2000-2011	No
Norway .....	2000-2014	2000-2014	2000-2014	Yes
Poland .....	2000-2014	2000-2014	2000-2014	Yes
Portugal .....	2000-2014	2000-2014	2000-2013	Yes
Slovakia .....	2000-2014	2000-2014	2000-2014	Yes
Slovenia.....	2000-2014	2000-2014	2000-2014	Yes
Spain .....	2000-2014	–	2000-2014	No
Sweden.....	2000-2014	2000-2014	2000-2014	Yes
Switzerland.....	2000-2013	–	2000-2014	No
United States.....	2000-2014	2000-2014	2000-2014	Yes

**SOURCE:** Aum *et al.* (2018).

cost structure of R&D (*i.e.*,  $\chi = 1 - \text{labor cost/total cost}$ ) to adjust the LS.<sup>4</sup> The adjusted labor share is:

$$LS_x = 1 - \frac{GOS - \chi I}{Y} \quad [5]$$

<sup>4</sup> Koh *et al.* (2017) provide additional alternative measures for  $\chi$ , for example, based on long-term incentives.

This implies that we need data on the compensation of employees, gross value added of the corporate sector, gross IPP investment, as well as on the cost structure of R&D for the corporate sector in order to make the adjustment. In this manner, the core OECD sample consists of Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Israel, Italy, Netherlands, Norway, Poland,

**TABLE 2**  
**CORPORATE LABOR SHARE AND ITS COMPONENTS OECD AVERAGE, POST 2000s**  
**(In logs)**

	Labor Share		W	Wages	Labor Prod. Y/H
	LS	LS <sub>x</sub>		W <sub>x</sub>	
(1) OECD Core	-0.0010 (0.074)	-0.0002 (0.718)	0.0127 (0.000)	0.0135 (0.000)	0.0136 (0.000)
(2) OECD Ext. 1	-0.0014 (0.015)	-0.0007 (0.189)	0.0117 (0.000)	0.0126 (0.000)	0.0130 (0.000)
(3) OECD Ext. 2	-0.0015 (0.006)	–	0.0114 (0.000)	–	0.0128 (0.000)

NOTES: Here we report the linear trend,  $\gamma$ , computed from a least square minimization of  $\ln x_{c,t} = \text{const} + \sum_c \beta_c \mathbf{1}_c + \gamma t + \varepsilon_{c,t}$  where  $x = \{LS, LS_x, W, W_x, Y/H\}$  where we control for country-fixed effects,  $\mathbf{1}_c$ ,  $t$  is the calendar year for the post-2000 sample period. In parenthesis we write the  $p$ -value. The core OECD sample of countries is as defined in Section 2. The first extension of the core sample incorporates countries for which we have incomplete time-series for  $LS_x$  which includes Greece, Korea and Mexico. The second extension incorporates countries for which all variables are available except for  $LS_x$  which includes Ireland, New Zealand, Spain and Switzerland.  
**SOURCE: Aum et al. (2018).**

Portugal, Slovakia, Slovenia, Sweden and the United States.

We also provide an analysis that extends our OECD core sample to include countries for which we have incomplete time-series for the corporate labor share  $LS$  and the adjusted labor share  $LS_x$ . This includes Greece, Korea and Mexico. We further extend the sample for countries for which  $LS$  is available but not  $LS_x$ . This extends our analysis to include Ireland, New Zealand, Spain and Switzerland. All this is summarized in Table 1.

To infer wages in a consistent manner from aggregate data across countries, we use our data on the labor share and labor productivity to solve:

$$W = LS \frac{Y}{H} \quad [6]$$

Note that we also apply [6] to  $LS_x$  which allows us to infer  $W_x$  analogously:

$$W_x = LS_x \frac{Y}{H}$$

A potential caveat of our analysis relates to the measurement of labor productivity. Since corporate

hours are, in general, not available, we attribute the behavior of aggregate hours to the corporate sector. This measurement potentially introduces a downward bias in the sense that if corporate hours grow faster than aggregate hours, then labor productivity growth would be lower and wage growth higher.

### 3. The Corporate Labor Share and Its Components: Post-2000 OECD Average

To assess the behavior of the labor share in the OECD, we compute an average (common) linear trend for the labor share and its components that results from the least square minimization of:

$$\ln LS_{c,t} = \text{const.} + \sum_c \beta_c \mathbf{1}_c + \gamma t + \varepsilon_{c,t}$$

Where we control for country-fixed effects,  $\beta_c$ , with country dummy variables,  $\mathbf{1}_c$ , in which  $c$  denotes the country and  $t$  is the calendar year for the post-2000 sample period. We are interested in the average linear trend  $\gamma$ . If  $\gamma > 0$  then the corporate labor share in the OECD increases throughout the sample

period, and decreases otherwise. The results for our core OECD sample are shown in Table 2. We write the  $p$ -value in parenthesis.

We find that the corporate labor share declines for the post-2000 period by an annual average of -0.10 % under the 2008 SNA that attributes all IPP rents to capital income. The estimated trend is not large—compared with the size of long-run trends (Koh *et al.*, 2017)—but is significant, though only at the 10 % level; see line (1) in Table 2. The corporate  $LS$  that uses the factor income distribution of R&D to split IPP rents (Koh *et al.*, 2017 and Aum *et al.*, 2018) is trendless with a nonsignificant annual change of -0.02 %. Wages grow by an annual rate (1.27 %) that is smaller than that of labor productivity (1.36 %), which explains the mild labor share decline for the post-2000s period under the 2008 SNA. At the same time, the trendless behavior of the corporate labor share adjusted for  $\chi$  is explained by wages that increase by a higher annual rate (1.35 %) and that are balanced by the annual labor productivity increase. Both the increase in wages and the increase in labor productivity are significantly different from zero.

The extension of our analysis to include countries for which we have incomplete time-series for  $LS\chi$  (*i.e.*, Greece, Korea and Mexico) does not alter our results; see line (2) in Table 2. In this case, under the 2008 SNA the corporate labor share also decreases with a significant annual change of -0.14 %, whereas the corrected corporate labor share remains trendless with a nonsignificant -0.07 % annual change. Further extending the sample for countries for which  $LS\chi$  is not available (*i.e.*, Ireland, New Zealand, Spain and Switzerland) does not alter the results for the corporate labor share under the 2008 SNA; see line (3) in Table 2. Notice that the estimates for the trends in the OECD core sample are not significantly different from those of the extended OECD samples. In particular, the point estimates of the extended samples are captured within the confidence intervals at the 5 % level in the core OECD sample.

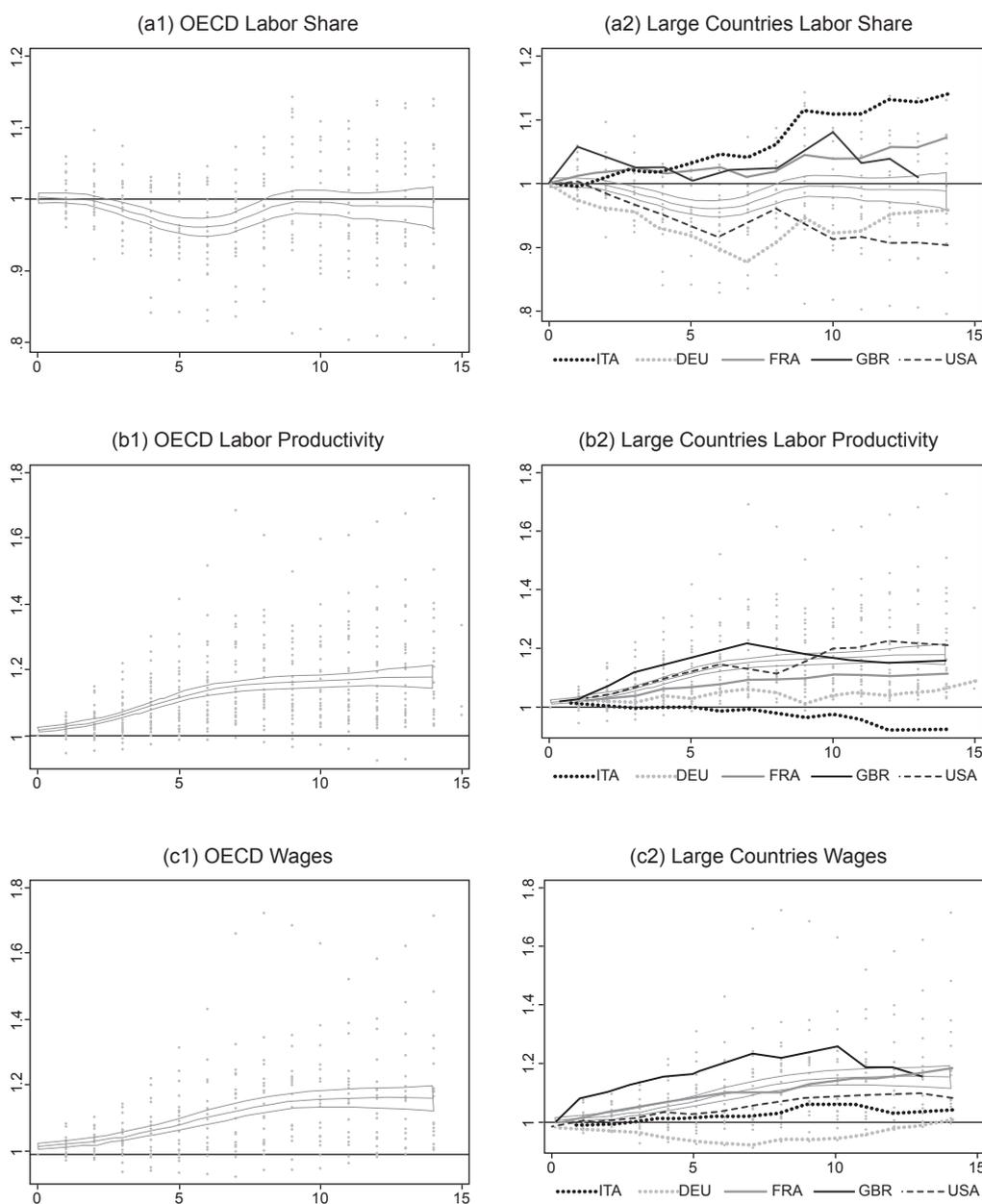
In the left column of Figure 1, we show the behavior of the labor share and its components for the OECD

average. We focus on the labor share corrected for IPP labor income as in Koh *et al.* (2017); see panel (a1). For clarity as regards graphical exposition we normalize each country's labor share to one in year 2000; see panel (a1) and (a2) in Figure 1. Each dot in the graph represents a country for each year from year 2000 to 2014. To show the behavior of the labor share for the 21<sup>st</sup> century as a cross-country average of our full sample of countries we use a locally weighted polynomial.<sup>5</sup> Our main finding, consistent with Table 2, is that the OECD labor share is trendless. We also find that the medium-run behavior of labor share over this period shows some aggregate fluctuations with a decline between 2001 and 2005 and an increase between 2006 and 2009. Our insights do not change if instead we normalize each series to the average  $LS$  for each country to one which is equivalent to controlling for country-fixed effects in the estimation of the trend behavior of the OECD average labor share. In panel (a2) of Figure 1 we separately plot the behavior of the five largest countries in the sample against the average OECD behavior. We find that for three of these countries, Italy, France, and Great Britain, the corporate labor share increases through the early 21<sup>st</sup> century. The increase is particularly marked for Italy and France, and to a lesser extent Great Britain. In contrast, for Germany and the U.S. we find that for this sample period the labor share declines, though with different patterns. In the case of the U.S. the labor share declines almost monotonically throughout the sample period, whereas in the case of Germany the labor share declines during the first half of the sample period (between 2000 and 2007) and increases afterwards (between 2008 and 2014).

In panel (b1) and panel (c1), we show the behavior of, respectively, labor productivity and wages for the OECD average using a locally weighted parameter. The average OECD labor productivity increases throughout the sample period with an initial acceleration between

<sup>5</sup> We use the "lpolyci" command in Stata with Epanechnikov kernel and degree 0 (*i.e.*, local mean smoothing).

FIGURE 1  
THE OECD CORPORATE LABOR SHARE AND ITS COMPONENTS, 2000-2015



NOTES: Each dot in each panel represents a country for each year from year 2000 to 2015. In the panels of the left column we also report an OECD average using a locally weighted polynomial with Epanechnikov kernel and degree 0 (*i.e.*, local mean smoothing). In the panels of the right column we add the series for the five largest countries in our sample. Notice that we normalize all series per country to be one in year 2000. See the construction of these series in Section 2.  
**SOURCE: Aum et al. (2018).**

the year 2000 and 2006-2008, and a posterior deceleration between years 2008 and 2014 where the increase in the average OECD labor productivity is mild. The average OECD wages follow a similar pattern but with a lesser acceleration in the first half of the sample period, which explains the drop in labor share (before 2005) and posterior increase (between 2006 and 2009).

We also break down the behavior of the labor share components for the largest five countries in terms of labor productivity (panel b2) and wages (panel c2). On the one hand, focusing on the countries that showed a labor share decline (*i.e.*, Germany and the U.S.), we find that this is explained by wages increasing at a lower rate than labor productivity throughout the sample period. On the other hand, focusing on the countries that showed an increase in labor share throughout this period, we find two potential stories. In the case of France and Great Britain, both wages and labor productivity increase, but the extent of the increase is greater for wages. In the case of Italy, wages barely increase and the labor share increase is explained by a decline in labor productivity.

The differential pattern in the labor share behavior and its components across the largest five countries in the early years of the 21<sup>st</sup> century is the first sign of heterogeneous behavior in the labor share, which we examine in greater detail by country in Section 4.

#### 4. Analysis by Country

##### The Labor Share by Country

We focus on measurements of the labor share from the corporate sector and in the countries for which this measurement is available, a total of twenty countries that form our core OECD sample. We plot the behavior of the labor share by country in two groups depending on whether labor share increases or decreases throughout the sample period. We show the behavior of the labor share in countries for which labor share increases throughout the sample period in panel (a)

of Figure 2, whereas we show the countries for which labor share decreases throughout the sample period in panel (b) of Figure 2. We plot both the corporate labor share attributing the entire IPP rents to capital income (line [.....] in each panel of Figure 2 and the labor share that adjusts for labor income rents using the R&D cost structure (line [.....] in each panel in Figure 2 as in Koh *et al.* (2017)). Note that there are as many countries for which the labor share increases in our core OECD sample for this period, as countries for which labor share decreases. We also plot the linear trends computed as in (2) by country which we also show in Table 3.

##### *Countries with Increasing Corporate Labor Share*

The countries for which the corporate labor share increases throughout the sample period are Austria, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Italy, Norway and Sweden. The largest increase occurs for Italy with an annual increase in the corporate labor share of 1.06 % and Finland 1.12 %, see Table 3. The annual increase is also large and significant for Austria, 0.38 %, Czech Republic, 0.57 %, Denmark, 0.51 %, Estonia, 0.27 %, France, 0.40 % and Sweden, 0.43 %.

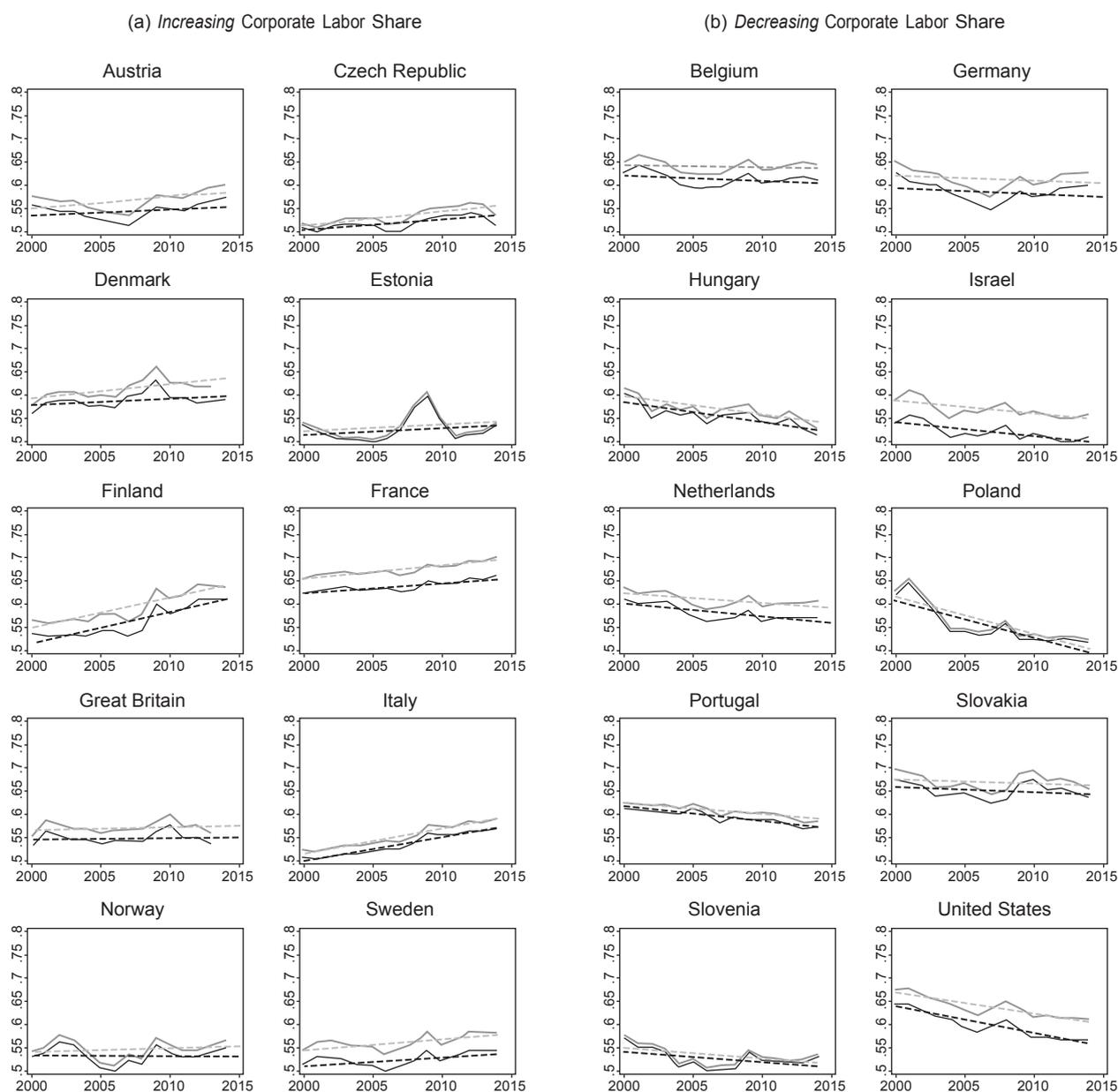
Furthermore, Great Britain and Norway show smaller annual increases that are not significant with respective annual rates of 0.10 % and 0.18 %. Notice that the correction for labor income rents using the R&D cost structure does not change the sign of the trend, except for Norway, although in this case the 2008 SNA labor share and its corrected measure are both nonsignificantly different from zero.

##### *Countries with Decreasing Corporate Labor Share*

The countries for which the corporate labor share decreases are Belgium, Germany, Hungary, Israel, Netherlands, Poland, Portugal, Slovakia, Slovenia and the United States. Of these countries, the largest labor share declines for this sample period are observed

FIGURE 2

LABOR SHARE BY COUNTRY, CORPORATE SECTOR, 2000-2014



NOTES: In each of these panels we show by country the time-series of the corporate labor shares  $LS$  (—) and  $LSx$  (---) for the sample period 2000-2014. The first and second (third and fourth) columns show the results for the countries with increasing (decreasing) corporate labor share  $LSx$  over the sample period. See the construction of these series in Section 2.

SOURCE: Aum *et al.* (2018).

**TABLE 3**  
**CORPORATE LABOR SHARE AND ITS COMPONENTS BY COUNTRY, POST 2000s.**  
**(In logs)**

	Labor Share		W	Wages		Labor Prod. Y/H
	LS	LS $\chi$		W $\chi$		
Austria .....	0.0028 (0.153)	0.0038 (0.061)	0.0079 (0.000)	0.0090 (0.000)	0.0051 (0.005)	
Belgium.....	-0.0018 (0.194)	-0.0007 (0.613)	0.0059 (0.000)	0.0071 (0.000)	0.0077 (0.000)	
Czech Republic .....	0.0041 (0.003)	0.0057 (0.000)	0.0307 (0.000)	0.0323 (0.000)	0.0265 (0.000)	
Denmark.....	0.0024 (0.133)	0.0051 (0.011)	0.0107 (0.000)	0.0135 (0.000)	0.0083 (0.000)	
Estonia.....	0.0023 (0.465)	0.0027 (0.401)	0.0353 (0.000)	0.0357 (0.000)	0.0330 (0.000)	
Finland.....	0.0115 (0.000)	0.0112 (0.000)	0.0106 (0.000)	0.0103 (0.000)	-0.0008 (0.769)	
France .....	0.0033 (0.000)	0.0040 (0.000)	0.0105 (0.000)	0.0112 (0.000)	0.0072 (0.000)	
Germany.....	-0.0023 (0.290)	-0.0019 (0.378)	0.0050 (0.001)	0.0055 (0.000)	0.0074 (0.000)	
Great Britain .....	0.0007 (0.666)	0.0010 (0.495)	0.0040 (0.018)	0.0043 (0.011)	0.0039 (0.027)	
Hungary .....	-0.0075 (0.000)	-0.0066 (0.000)	0.0201 (0.000)	0.0210 (0.000)	0.0276 (0.000)	
Israel.....	-0.0057 (0.001)	-0.0048 (0.004)	0.0043 (0.057)	0.0051 (0.030)	0.0099 (0.000)	
Italy.....	0.0103 (0.000)	0.0106 (0.000)	0.0032 (0.001)	0.0035 (0.001)	-0.0071 (0.000)	
Netherlands .....	-0.0050 (0.001)	-0.0034 (0.010)	0.0037 (0.000)	0.0053 (0.000)	0.0087 (0.000)	
Norway .....	-0.0001 (0.983)	0.0018 (0.601)	0.0040 (0.039)	0.0060 (0.006)	0.0041 (0.092)	
Poland .....	-0.0173 (0.000)	-0.0171 (0.000)	0.0216 (0.000)	0.0218 (0.000)	0.0389 (0.000)	
Portugal .....	-0.0053 (0.000)	-0.0046 (0.000)	0.0053 (0.000)	0.0060 (0.000)	0.0105 (0.000)	
Slovakia.....	-0.0053 (0.072)	-0.0056 (0.048)	0.0286 (0.000)	0.0283 (0.000)	0.0339 (0.000)	
Slovenia.....	-0.0013 (0.391)	-0.0013 (0.404)	0.0181 (0.000)	0.0180 (0.000)	0.0194 (0.000)	
Sweden.....	0.0039 (0.038)	0.0043 (0.013)	0.0190 (0.000)	0.0194 (0.000)	0.0150 (0.000)	
United States.....	-0.0094 (0.000)	-0.0070 (0.000)	0.0015 (0.042)	0.0039 (0.000)	0.0109 (0.000)	

NOTES: Here we report the country-specific linear trend ( $\gamma$ ) computed from a least square minimization of  $\ln x_{c,t} = \text{cons.} + \gamma_{c,t}$  where  $x = \{LS, LS\chi, W, W\chi, Y/H\}$  and  $t$  is the calendar year for the post-2000 sample period; see the construction of these series in Section 2. In parenthesis we write the  $p$ -value.

**SOURCE: Aum et al. (2018).**

for the United States, which shows an annual decrease in the corporate labor share of 0.70 %, Poland, -1.71 % and Hungary, 0.66 %; see Table 3. Significant declines in the labor share are also displayed in the case of Israel, -0.48 %, Portugal, -0.46 %, Netherlands, -0.34 % and Slovakia, -0.56 %. Finally, we also find smaller declines in the labor share, which are nonsignificantly different from zero, for Belgium, Germany, and Slovenia with respective annual rates of -0.07 %, -0.19 % and -0.13 %.

### Labor Productivity and Wages by Country

We now examine cross-country differences in labor productivity and wages separately for countries in which the corporate labor share increases and for countries in which the corporate labor share decreases. In panel (a) of Figure 3, we plot the behavior of the labor share  $LS_{\chi}$ , wages  $W_{\chi}$  and labor productivity  $Y/H$  for the sample of countries for which the corporate labor share increases between 2000 and 2014. In panel (b) of Figure 3 we do the same for the sample of countries in which labor share decreases throughout the sample period. Note that we normalize by country all variables to one in year 2000. The normalization helps highlight some patterns for wage and labor productivity growth across countries.

#### *Countries with Increasing Corporate Labor Share*

In the case of Denmark, Finland, Sweden and France we find that wage growth is greater than labor productivity growth in almost all years under study, in particular after 2008; see panel (a) in Figure 3. Throughout the sample period wages grow annually at a significant rate for Denmark, Finland, Sweden and France, by 1.35 %, 1.03 %, 1.94 % and 1.12 % respectively, whereas labor productivity grows annually at a significant rate of 0.83 %, -0.08 %, 1.50 % and 0.72 % respectively; see Table 3. In the case of the Czech Republic and Estonia we also find this pattern but to a lesser extent after 2008. Indeed, for Estonia we do not

find that the increase in the labor share throughout the period is significantly different from zero.

The case of Austria is similar to the previous countries though it differs in that labor productivity increased at a greater rate than wages before 2008; see panel (a) in Figure 3. This implies a decline in the labor share of Austria for the 2000-2008 subperiod that has been offset by wages that overtake labor productivity after 2011, generating an overall increase in the labor share at an annual rate of 0.38 % throughout the period; see Table 3.

The case of Italy is substantially different to the rest of the countries for which labor share increases. We find that the increase in the labor share throughout the period is generated by a mild but significant increase in wages (0.35 %) which is accompanied by a decline in labor productivity growth by a significant annual rate of -0.71 %; see panel (a) in Figure 3 and Table 3. Italy is the only country for which we found a decline in labor productivity throughout the sample period.

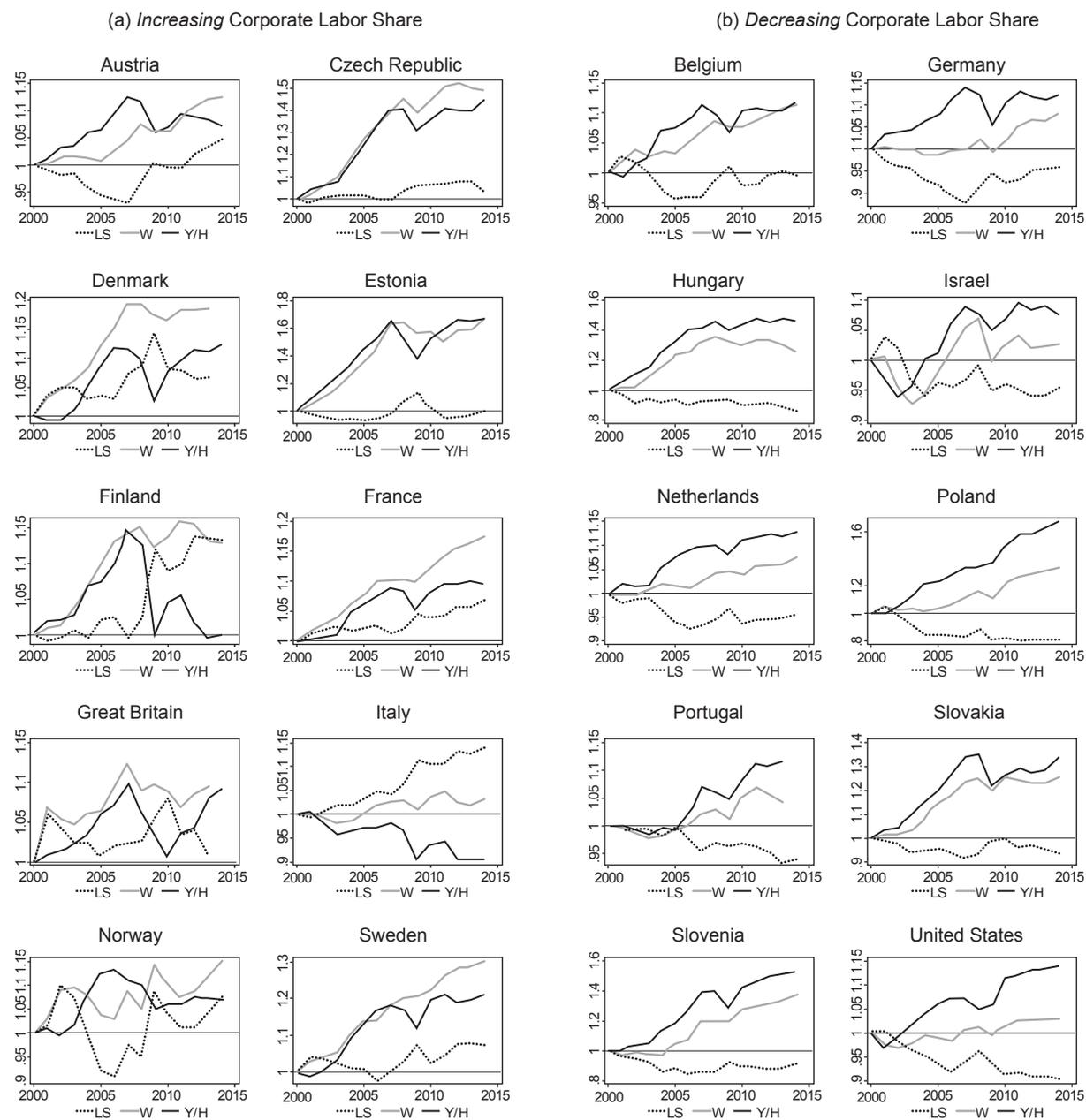
Finally, although the point estimates of the labor share trend are positive for both Great Britain and Norway, the labor share growth estimates are not significant for this sample period. In the case of Great Britain, although the normalized wages are always above labor productivity, these two series never really diverge from each other and we find periods in which both series move in parallel (*e.g.*, between 2003 and 2008 and back in 2014). Specifically, for Great Britain, wages grow annually at a rate of 0.43 % and labor productivity at a rate of 0.39 %, leaving labor share basically trendless; see Table 3. The behavior of wages and labor productivity for Norway is less clear, with normalized wages and labor productivity crossing more than once throughout the sample period. This implies large fluctuations in the corporate labor share for Norway around an average labor share; see panel (a) in Figure 3.

#### *Countries with Decreasing Corporate Labor Share*

For this set of countries the behavior of labor productivity and wages is more homogeneous than in

FIGURE 3

WAGES AND LABOR PRODUCTIVITY BY COUNTRY, CORPORATE SECTOR, 2000-2014



NOTES: In each of these panels we show by country the time-series of the labor share  $LS_X$  (.....), wages  $W_X$  (—) and labor productivity  $Y/H$  (---) for the sample period 2000-2014. The first and second (third and fourth) columns show the results for the countries with increasing (decreasing) corporate labor share  $LS_X$  over the sample period. See the construction of these series in Section 2.

SOURCE: Aum et al. (2018).

the previous sample. In general, the normalized values of labor productivity are (almost) always above those of wages throughout the sample period. This is the case of Germany, Hungary, Israel, Netherlands, Poland, Portugal, Slovakia and the United States; see panel (b) of Figure 3 and also Table 3. The case of Germany and Portugal is slightly different from the rest of these countries in that wage growth is not really present before 2005. Indeed, the increase in wages in Germany is so large after 2008 —compared to previous years— that it generates an increase in the labor share for that 2008-2014 subperiod in a manner that makes the corporate labor share for the entire sample period not significantly different from zero.

Finally, in Belgium both labor productivity and wages increase significantly throughout the sample period but intertwine in a manner that makes the observed labor share decline not significant. In the case of Slovenia the observed labor share decline is also not significant and is due to the fact that although labor productivity and wages increase significantly throughout the sample period they do so in parallel after approximately year 2005; see panel (b) of Figure 3 and also Table 3.

##### 5. Sources of Cross-Country Differences: Wages and Labor Productivity in Increasing versus Decreasing Labor Share Countries

At the peril of ignoring country-specific idiosyncrasies described in the previous Section 4, we firstly split the core OECD sample into countries for which the corporate labor share increases and countries for which the corporate labor share decreases. Then, we once more perform our computation of the corporate labor share trend following (2) separately for the sample of countries with increasing corporate labor share and for the sample of countries with decreasing corporate labor share. The sample of countries with increasing labor share in the OECD through the post-2000 period is Austria, Czech Republic, Denmark, Estonia, Finland,

France, Great Britain, Italy, Norway and Sweden. The sample of countries with decreasing labor share in the OECD for the post-2000 period is Belgium, Germany, Hungary, Israel, Netherlands, Poland, Portugal, Slovakia, Slovenia and the United States. Next, we conduct our analysis by splitting a restricted sample that focuses on countries for which either the increase or decrease of the corporate labor share is significantly different from zero over the sample period. Following our results in Section 4, this implies that the restricted sample excludes Great Britain and Norway from the previous increasing labor share sample and Belgium, Germany and Slovenia from the previous decreasing labor share sample.

Our results are shown in Table 4. For the full OECD core sample we find that the corporate labor share ( $LS$ ) significantly increases by 0.42 % under the 2008 SNA that attribute all IPP rents to capital income and the corporate labor share ( $LS_X$ ) significantly increases by 0.51 % after a correction that attributed to labor income a proportion of the IPP rents using data on the R&D cost structure; see Table 4. Using the restricted sample we find a larger significant increase of 0.55 % in  $LS$  and of 0.64 % in  $LS_X$ . In the decreasing labor share sample we find a significant decrease of -0.61 % in  $LS$  and -0.53 % in  $LS_X$ . In the restricted sample the decrease is magnified to -0.79 % in  $LS$  and -0.71 % in  $LS_X$ .

What component of the labor share is behind the differential trends in the labor share across these two groups —increasing vs. decreasing— over the early 21<sup>st</sup> century? We find that labor productivity differences, and not wages, is what drives the different corporate labor share behavior. Firstly, focusing on the sample of countries with increasing labor share through this period, we find that wages significantly increase at an annual rate of 1.48 % with a confidence interval [1.25 %, 1.70 %] at the 5 % level, while labor productivity grows annually at a lower rate, 0.95 % with a confidence interval [0.71 %, 1.19 %] at the 5 % level. Secondly, focusing on the sample of countries with decreasing corporate labor share throughout the sample period, we find that wages

**TABLE 4**  
**INCREASING AND DECREASING LABOR SHARE, OECD CORE SAMPLE, POST 2000s**

	Labor Share		Wages		Labor Prod.
	$LS$	$LS_x$	$W$	$W_x$	$Y/H$
Full Sample:					
(1) <i>Increasing</i> Labor Share Countries	0.0042 (0.000)	0.0051 (0.000)	0.0138 (0.000)	0.0148 (0.000)	0.0095 (0.000)
(2) <i>Decreasing</i> Labor Share Countries	-0.0061 (0.000)	-0.0053 (0.001)	0.0115 (0.000)	0.0123 (0.000)	0.0177 (0.000)
Restricted Sample:					
(3) <i>Increasing</i> Labor Share Countries	0.0055 (0.000)	0.0064 (0.000)	0.0133 (0.000)	0.0142 (0.000)	0.0078 (0.000)
(4) <i>Decreasing</i> Labor Share Countries	-0.0079 (0.000)	-0.0071 (0.000)	0.0124 (0.000)	0.0133 (0.000)	0.0204 (0.000)

NOTES: Here we report the linear trend,  $\gamma$ , computed from a least square minimization of  $\ln x_{g,c,t} = \text{const} + \sum_{c \in c_g} \beta_c \mathbf{1}_c + \gamma_g t + \varepsilon_{g,c,t}$  where  $x = \{LS, LS_x, W, W_x, Y/H\}$  where we control for country-fixed effects,  $\mathbf{1}_c$ ,  $t$  is the calendar year for the post-2000 sample period. In parenthesis we write the  $p$ -value. The full OECD core sample of countries is as defined in Section 2. We compute  $\gamma$  separately for two groups  $g$ . The sample of countries with increasing labor share in the full OECD core sample through the post-2000 period is Austria, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Italy, Norway and Sweden. The sample of countries with decreasing labor share in the OECD for the post-2000 period is Belgium, Germany, Hungary, Israel, Netherlands, Poland, Portugal, Slovakia, Slovenia and the United States. Secondly, we conduct our analysis by splitting a restricted sample that focuses on countries for which either the increase or decrease of the corporate labor share is significant over the sample period. Following our results in Section 4, this implies that the restricted sample excludes Great Britain and Norway from the previous increasing labor share sample and Belgium, Germany and Slovenia from the previous decreasing labor share sample.

**SOURCE: Aum et al. (2018).**

significantly increase at an annual rate of 1.23 % with a confidence interval [1.04 % and 1.41 %] at the 5 % level and labor productivity annual growth is larger in this sample, 1.77 % with a confidence interval [1.54 %, 1.99 %] at the 5 % level.

It is important to highlight that wage growth is non-significantly different between the sample of countries with increasing corporate labor share and the sample of countries with decreasing corporate labor share. This can be seen from the fact that the confidence intervals of wage growth at the 5 % overlap across the increasing and decreasing labor share groups. In contrast labor productivity growth is significantly different across the two groups. In particular, labor productivity growth in

countries for which labor share declines is almost twice as large point estimate is almost twice as large in the sample of countries with decreasing labor share as in the sample of countries with increasing labor share for this sample period. The restricted sample also attains similar insights with even greater (and also significant) differences in labor productivity across increasing and decreasing labor share samples, and smaller (and not significant) differences in wages across the two samples.

## 6. Conclusion

The OECD corporate labor share that attributes to labor income a proportion of the IPP rents using data

on the R&D cost structure (Koh *et al.*, 2017) is trendless for the 2000-2014 period; a medium-run horizon. Nevertheless, we find large cross-country heterogeneity in the relationship between wages and labor productivity and hence the labor share throughout this period. Indeed, the number of countries in which the labor share increases is equal to the number of countries in which labor share decreases in this period. This finding makes a one-fit-all theory of the labor share very unlikely.

Furthermore, we find that the countries in which labor share increases experience similar (nonsignificantly different) wage growth to the countries in which labor share decreases. This implies that labor productivity growth—and hence sources generating labor productivity growth differences across countries—is behind the differential behavior of the labor share between these two groups of countries. Specifically, we find that labor productivity growth in countries where labor share decreases is approximately twice as large as labor productivity growth in countries where labor share increases for the sample period 2000-2014.

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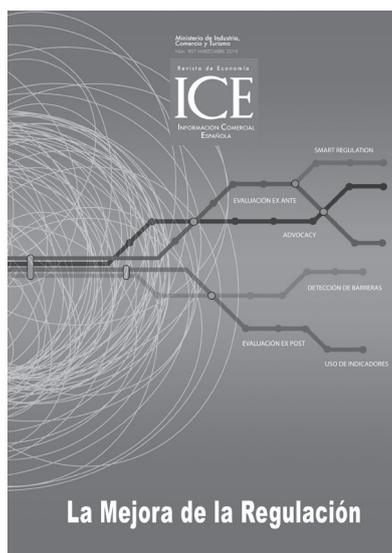
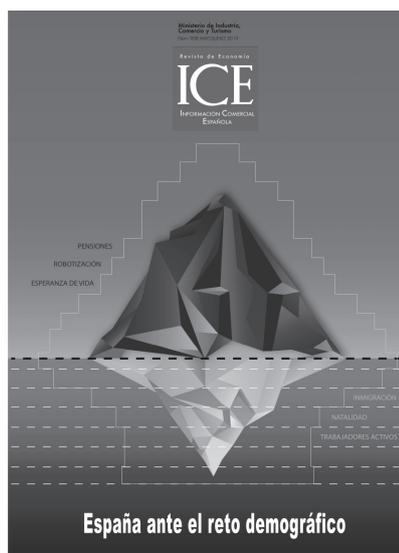
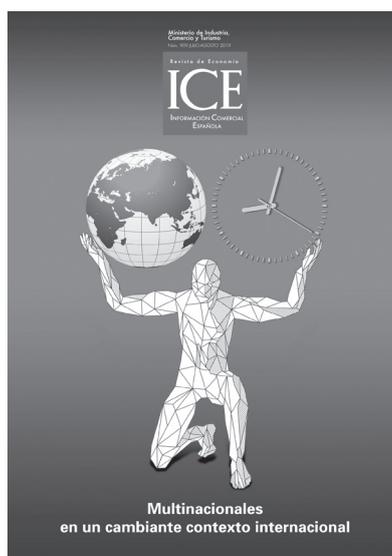
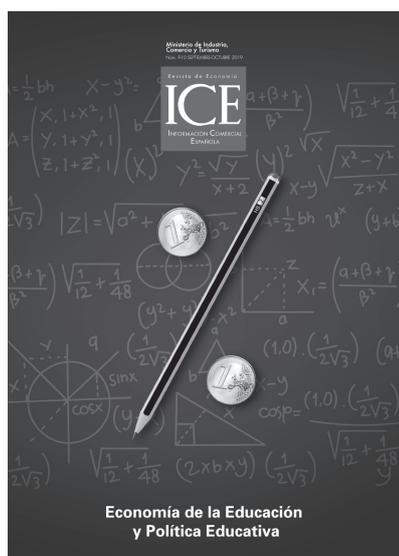
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