

# The Decoupling of Median Wages from Productivity in OECD Countries

Cyrille Schwellnus, Andreas Kappeler and Pierre-Alain Pionnier

*OECD<sup>1</sup>*

ABSTRACT

Over the past two decades, aggregate labour productivity growth in most OECD countries has decoupled from real median compensation growth, implying that increasing productivity is no longer sufficient to raise real wages for the typical worker. This article provides a quantitative description of decoupling in OECD countries over the past two decades, with the results suggesting that it is explained by declines in both labour shares and the ratio of median to average wages (a partial measure of wage inequality). Labour shares have declined in about two thirds of the OECD countries covered by the analysis. However, the contribution of labour shares to decoupling is smaller if sectors are excluded for which labour shares are driven by changes in commodity and asset prices (primary and housing sectors) or by imputation choices (non-market sectors). The ratio of median to average wages has declined in all but two of the OECD countries covered by the analysis and appears to reflect disproportionate wage growth at the very top of the wage distribution rather than stagnating median wages. The causes of these developments will be analysed in follow-up research.

In the long run, raising productivity is the only way to raise living standards, with real wages being the most direct mechanism through which the benefits of productivity growth are transferred to workers. Over the past two decades, however, aggregate labour productivity growth in most OECD countries has decoupled from real median compensation growth.<sup>2</sup>

Increasing productivity no longer appears to be sufficient to raise real wages for the typical worker, suggesting that there is a role for public policies to support a broader sharing of the benefits of productivity gains in the economy.

This article analyses the extent of decoupling of wages from productivity growth in OECD countries over the past two decades. It analyses

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2 Real compensation growth is based on the value added deflator.

whether developments at the macro level mainly reflect changes in labour shares or changes in wage inequality. Existing studies have mainly focused on the United States (Bivens and Mishel, 2015) and Canada (Sharpe *et al.*, 2008), finding that in these countries there has been substantial decoupling of real median wages from labour productivity over the past three decades. The only recent cross-country study (Ugucioni and Sharpe, 2017) finds that there are large cross-country differences in decoupling of real median wages from productivity. The main contributions of this article are to (i) provide evidence on decoupling for the broadest possible range of OECD countries and (ii) to address a number of measurement issues that are likely to bias estimates of decoupling.

The analysis shows that for the covered OECD countries as a whole, total-economy decoupling over the period 1995-2014 is explained by declines in both total-economy labour shares and the ratio of median to average wages (a partial measure of wage inequality). These declines are fully accounted for by pre-2005 developments. Excluding sectors for which labour shares are driven by changes in commodity and asset prices or for which labour shares are driven by imputation choices (primary, housing and non-market sectors) lessens the contribution of labour shares to decoupling. For a number of countries, declines in total-economy labour shares reflect increases in housing rents, which are related to increases in house prices. For commodity-producing countries, declines in total-economy labour shares largely reflect increases in commodity rents. These are, in turn, related to price increases on global markets on which national policies have limited leverage.

While labour shares have declined significantly in about two thirds of the analysed OECD countries covered in this article, all but two countries have experienced significant declines in the ratio of median to average wages

over the past two decades. The increase in wage inequality as measured by the decoupling of median from average wage growth appears to reflect disproportionate wage growth at the very top of the wage distribution. While wage growth at the 90th percentile (top 10 percentile) of the wage distribution has been similar to growth at the median, average wage growth for the top 1 per cent has exceeded growth at the median by a multiple.

This article is organised as follows. The first section describes the conceptual framework for decomposing macro-level decoupling into contributions from labour share and wage inequality developments, and provides descriptive evidence for the covered OECD countries. Section 2 investigates the role of the primary, housing, and non-market sectors as well as capital stock depreciation in total-economy labour share developments. Sector-level data on wage inequality for the sample of OECD countries covered by the analysis are not available so that no such analysis can be conducted for the wage inequality component. Section 3 nonetheless provides a more disaggregated perspective on wage inequality developments by analysing the role of disproportionate wage growth of top earners. Section 4 concludes.

## **Macro-level Decoupling: Overview Framework**

Conceptually, macro-level decoupling between real compensation growth of the median worker and labour productivity growth can be decomposed into the growth differential between average compensation and labour productivity and the growth differential between median and average compensation.

Using the notation  $\Delta$  per cent  $X$  to denote the per cent growth rate of  $X$ , macro-level decoupling in this article is defined as follows:

$$Decoupling \equiv \Delta per\ cent\left(\frac{Y/P^Y}{L}\right) - \Delta per\ cent\left(\frac{W^{med}}{P^Y}\right) \quad (1)$$

where  $Y$  denotes nominal value added,  $P^Y$  denotes the value added price,  $L$  denotes hours worked and  $W^{med}$  denotes the nominal median wage. The first term on the right-hand-side is labour productivity growth and the second term is real median wage growth in terms of the value added price. By adding and subtracting real average wage growth  $\Delta per\ cent(W^{avg}/P^Y)$  equation (1) can be re-written as follows:

$$Decoupling \equiv \left[ \Delta per\ cent\left(\frac{Y/P^Y}{L}\right) - \Delta per\ cent\left(\frac{W^{avg}}{P^Y}\right) \right] + \left[ \Delta per\ cent\left(\frac{W^{avg}}{P^Y}\right) - \Delta per\ cent\left(\frac{W^{med}}{P^Y}\right) \right] \quad (2)$$

where the first term in square brackets denotes the growth differential between labour productivity and the real average wage and the second term in square brackets denotes the growth differential between the real average and the real median wage.

The growth differential between labour productivity and the real average wage can be approximated as  $-\Delta per\ cent((W^{avg} \bullet LY)Y)$ , i.e. the per cent decline in the labour share. The

growth differential between the real average and the real median wage can be re-written as  $\Delta per\ cent(W^{avg}/W^{med})$ , i.e. the per cent increase in the ratio of the average to the median wage. A high ratio of the average to the median wage typically reflects high compensation at the top of the wage distribution, so that it can be interpreted as a partial measure of wage inequality.

In this article, compensation and value added are deflated by the same value added price index<sup>3</sup> so that decoupling between real average compensation and labour productivity reflects declines in labour shares.<sup>4</sup> Deflating compensation by a consumption deflator and value added by the value added deflator would drive an additional wedge between median wage growth and productivity growth (Ugucioni and Sharpe, 2017). This wedge is largely driven by countries' external terms of trade since the consumption deflator includes imported goods whereas the value added deflator includes only domestic production.<sup>5</sup>

For the countries covered by the analysis as a whole, the growth differential between real wages based on a consumption deflator and the value added deflator has been limited and depends on whether the Final Consumption Expenditure (FCE) deflator from the national accounts or the Consumer Price Index (CPI) is used in the analysis (Appendix Chart A1).<sup>6</sup> However, for a number of commodity-importing countries, real wages based on a consumption deflator would have grown less than real wages

3 Note that the value added price index is different from the GDP price index. GDP includes taxes less subsidies on products whereas value added does not. Value added is thus a more relevant concept to study the relation between labour productivity and wages.

4 Feldstein (2008) argues that wages and value added should be deflated by the same output price index, as the basic economic relation is between nominal wages and the marginal revenue product of labour.

5 Despite the exclusion of this wedge, the analysis here does cover the effects on the labour share and wage inequality of changes in the terms of trade. Only the wedge between the consumption and value added deflator per se is excluded from the analysis.

6 Differences between the FCE deflator and the CPI mainly reflect the treatment of imputed rents of home owner-occupiers. While both actual and imputed rents are included in households' final consumption expenditure for all countries, imputed rents are not included in the basket of goods and services underlying the CPI for a number of countries. The FCE deflator is therefore more comparable across countries than the CPI. See Appendix Chart A1 at: [http://www.csls.ca/ipm/32/Schwellnus\\_Kappeler\\_Pionnier%20Appendix.pdf](http://www.csls.ca/ipm/32/Schwellnus_Kappeler_Pionnier%20Appendix.pdf)

based on the value added price index irrespectively of the precise measure of the consumption deflator used in the analysis (Appendix Table A1).<sup>7</sup>

## Data Sources and Definitions

The growth differential between labour productivity and real average compensation in this article is directly computed from national accounts data. Labour productivity is computed as the ratio of real gross value added at factor cost to the number of hours worked while average compensation is computed as the ratio of real compensation to the number of hours worked in the economy. Real gross value added at factor cost is obtained by deflating nominal gross value added at factor cost by the corresponding value added deflator. Total compensation is computed as the sum of the compensation of employees and the compensation of the self-employed, which is imputed by assuming that hourly compensation of the self-employed and of dependent employees is the same at the level of individual industries (see Appendix). The compensation of employees encompasses remuneration in cash and in kind and includes employees' and employers' social contributions. Real compensation is obtained by deflating nominal compensation by the same value added price index used to deflate nominal value added at factor cost. Value added at factor cost, compensation of employees, employment and deflators are sourced from the OECD Annual National Accounts database.

The growth differential between average and median compensation is approximated by the growth differential between gross average and

median wages, with gross wages being defined as compensation excluding employers' social contributions. The approximation is imprecise if developments in employers' social contributions differ for the median and average workers. However, more precise data are unavailable since national accounts do not report distributional statistics.<sup>8</sup> Median and average wages are sourced from the OECD Earnings Database that compiles data on gross wages of full-time workers from a variety of sources, including household, labour force and enterprise surveys. Gross wages encompass remuneration in cash and in kind, including regular payments, irregular supplements and employee social contributions. They exclude stock options, severance payments, cash government transfers, transport subsidies and employers' social contributions. Definitions are not fully consistent across countries, with data referring to weekly or monthly wages for most countries but to hourly or annual wages for some others.<sup>9</sup>

The labour share is defined as the ratio of total nominal labour compensation to value added at factor cost. Given that nominal value added is expressed at factor cost, i.e. net of taxes less subsidies on production, value added can be fully decomposed into total labour compensation, including an imputed labour compensation to self-employed workers, and total gross operating surplus (GOS), including the part of the mixed income of self-employed workers considered as GOS. Aggregate wage inequality is approximated by the ratio of median to average wages while top income inequality is approximated by the ratio of median wages of full-time employees to the average wage of the top 1 per

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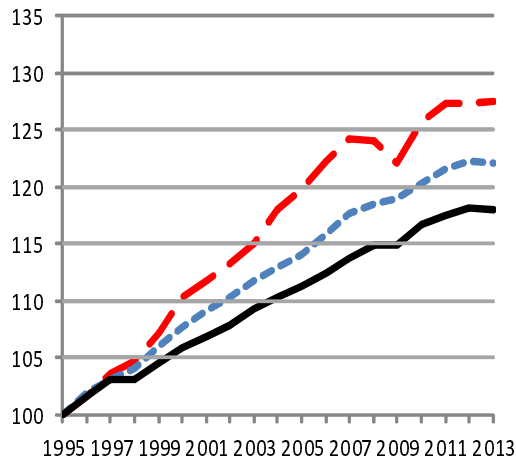
7 See Appendix Table A1 at: [http://www.csls.ca/ipm/32/Schwellnus\\_Kappeler\\_Pionnier%20Appendix.pdf](http://www.csls.ca/ipm/32/Schwellnus_Kappeler_Pionnier%20Appendix.pdf)

8 In the OECD countries covered by the analysis, employers' social contributions account for around 20 per cent of total compensation.

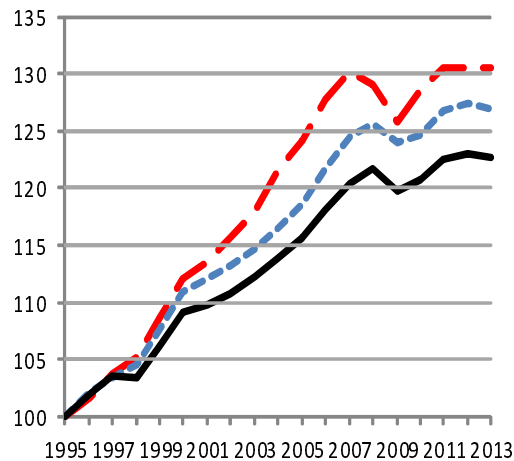
9 Ideally, median and average wages would be based on the distribution of hourly wages of both part-time and full-time workers. However, focusing on full-time workers has the advantage that the wage distribution is not affected by changes in the share of part-time workers when only the distribution of weekly or monthly wages is available.

**Chart 1: Macro-level Decoupling in OECD Countries, 1995-2013, (1995 = 100)**

Panel A: Total Economy



Panel B: Total Economy Excluding Primary Housing, and Non-Market Sectors



—•— Productivity      - - - Real average compensation      — Real median compensation

Note: Unweighted average of 24 OECD countries. 1995-2013 for Austria, Belgium, Germany, Finland, Hungary, Japan, Korea, United Kingdom; 1995-2012 for Australia, Spain, France, Italy, Poland, Sweden; 1996-2013 for Czech Republic, Denmark; 1997-2012 for Canada, New Zealand; 1997-2013 for Norway, United States; 1998-2013 for Ireland; 1995-2010 for Netherlands; 2001-2011 for Israel; 2002-2013 for Slovak Republic. In Panel A, all series are deflated by the total economy value added price index. In Panel B, all series are deflated by the value added price index excluding the primary, housing and non-market sectors. The sectors excluded in panel B are the following (ISIC rev. 4 classification): (1) Agriculture, Forestry and Fishing (A), (2) Mining and quarrying (B), (3) Real estate activities (L), (4) Public administration and defence, compulsory social security (O), (5) Education (P), (6) Human health and social work activities (Q), (7) Activities of households as employers (T), and (8) Activities of extraterritorial organizations and bodies (U).

1. "Wage inequality" refers to total economy due to data limitations.

Source: OECD National Accounts Database, OECD Earnings Database.

cent of income earners from the World Wealth and Income Database (Alvaredo *et al.*, 2016).

## Results

For the OECD countries covered in this article as a whole, there has been significant decoupling of real median wages from productivity over the past two decades as real median wages have grown at a lower average rate than labour productivity (Chart 1). Based on the total economy measure, median compensation would have been around 8 per cent higher than observed in 2013 if it had perfectly tracked labour productivity since 1995. Based on the measure excluding the primary, housing and the non-market sectors, decoupling implies a 5 per cent loss in

compensation for the median worker over the period 1995-2013.

The decoupling of real median wages from labour productivity for the covered OECD countries as a whole reflects both declines in labour shares and increases in wage inequality. In line with previous studies on decoupling (Bivens and Mishel, 2015; Ugucconi and Sharpe, 2017), this article uses as a starting point compensation and value added in the total economy (Chart 1, Panel A). This measure of decoupling suggests similar contributions of declines in labour shares and increases in wage inequality to decoupling. However, the total economy includes sectors for which labour shares are largely determined by fluctuations in commodity and asset prices, such as the primary and

housing sectors, or for which labour shares are driven by imputation choices, such as the non-market sector. Labour share fluctuations in these sectors may have different distributional implications from those in the production sector. Once the primary, housing and the non-market sectors are excluded from the analysis, the contribution of the labour share to decoupling becomes smaller than the contribution of wage inequality (Chart 1, Panel B).

While real median wages have decoupled from labour productivity in the majority of countries (15 of 24) covered by the analysis, there have been large cross-country differences, both in the extent of decoupling and the relative contributions of labour shares and wage inequality (Table 1). Among large OECD countries, there was significant decoupling in Germany, Japan and the United States. In these countries the relative contributions of labour

**Table 1: Cross-country Differences in Macro-level Decoupling in OECD Countries, 1995-2013**

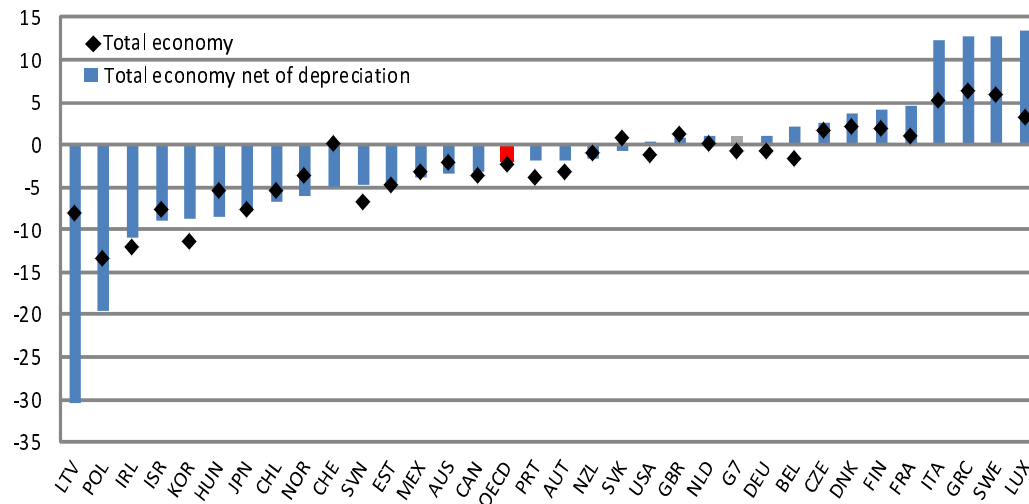
Annualised growth rates; excluding primary, housing and non-market sectors

	(1) Productivity	(2) Real average compensation	(3) Real median compensation	(4) Decoupling (3) - (1)
Australia	1.61	1.25	0.94	-0.67
Austria	1.05	0.88	0.76	-0.29
Belgium	1.50	1.13	1.03	-0.47
Canada	0.84	0.44	0.23	-0.62
Czech Republic	2.91	3.34	2.99	0.08
Denmark	1.25	1.59	1.43	0.18
Finland	1.36	1.90	1.79	0.43
France	1.05	1.32	1.26	0.20
Germany	0.61	0.45	0.34	-0.27
Hungary	1.70	1.25	0.41	-1.29
Ireland	2.67	1.68	1.54	-1.14
Israel	1.08	0.23	0.32	-0.77
Italy	-0.67	-0.03	-0.04	0.63
Japan	0.50	0.03	-0.04	-0.53
Korea	4.07	2.74	2.34	-1.73
Netherlands	1.85	1.37	1.14	-0.71
New Zealand	0.58	1.18	0.83	0.25
Norway	1.68	1.53	1.40	-0.28
Poland	3.64	2.31	1.84	-1.80
Slovak Republic	3.94	3.86	3.61	-0.33
Spain	-0.26	-0.07	0.18	0.44
Sweden	2.15	2.37	2.22	0.07
United Kingdom	1.03	1.63	1.40	0.36
United States	1.44	0.94	0.19	-1.25
OECD	1.57	1.39	1.17	-0.40
G7	0.69	0.68	0.48	-0.21

Note: See note to Chart 1 for country and year coverage. OECD and G-7 averages unweighted.  
Source: OECD National Accounts Database, OECD Earnings Database.

**Chart 2: Changes in Gross and Net Labour Shares in OECD Countries, 1995-2014**

Percentage Points



Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to unweighted averages for the relevant countries included in the figure. 1995-2013 for Australia, Canada, France, Korea, Latvia, Mexico, Portugal; 1996-2014 for Chile; 1997-2014 for United Kingdom; 1996-2012 for New Zealand.

Source: OECD National Accounts Database.

shares and wage inequality differed significantly. For instance, in the United States around 40 per cent of overall decoupling (0.5 percentage points of 1.25 percentage points) is explained by declines in labour shares while this factor explains virtually all decoupling in Japan. In a number of other OECD countries, real median wages have grown at similar or even higher rates than labour productivity. These countries include a number of large countries, such as France, Italy and the United Kingdom, where labour shares have increased and wage inequality has remained broadly constant or increased only modestly over the period.

## Dissecting Labour Share Developments

Several recent studies have emphasised that distributional and policy implications of labour share changes depend on the inclusion of capital depreciation and housing rents in value added (Rognlie, 2015; Bridgman, 2014). This section provides an in-depth analysis of labour share developments, including for OECD countries for which overall decoupling cannot be computed because data on the wage distribution are unavailable.<sup>10</sup>

### Gross or net labour shares?

Even though most analyses of labour shares are based on gross value added, only value added

<sup>10</sup> The labour share analysis is based on National Accounts data only. Therefore, the country sample and time coverage changes compared to the overall decoupling analysis, which also makes use of Labour Force Surveys. Notably, the labour share analysis includes additionally the year 2014 and the following countries: Estonia, Greece, Latvia, Lithuania, Luxembourg, Portugal and Slovenia. The labour share analysis also changes the time coverage for a number of countries. For instance, the labour share analysis for Norway covers 1995-2014, instead of 1997-2013; the labour share analysis for Slovak Republic covers 1995-2014, instead of 2002-2013. For further details see Footnotes to Chart 1 and Table 2.

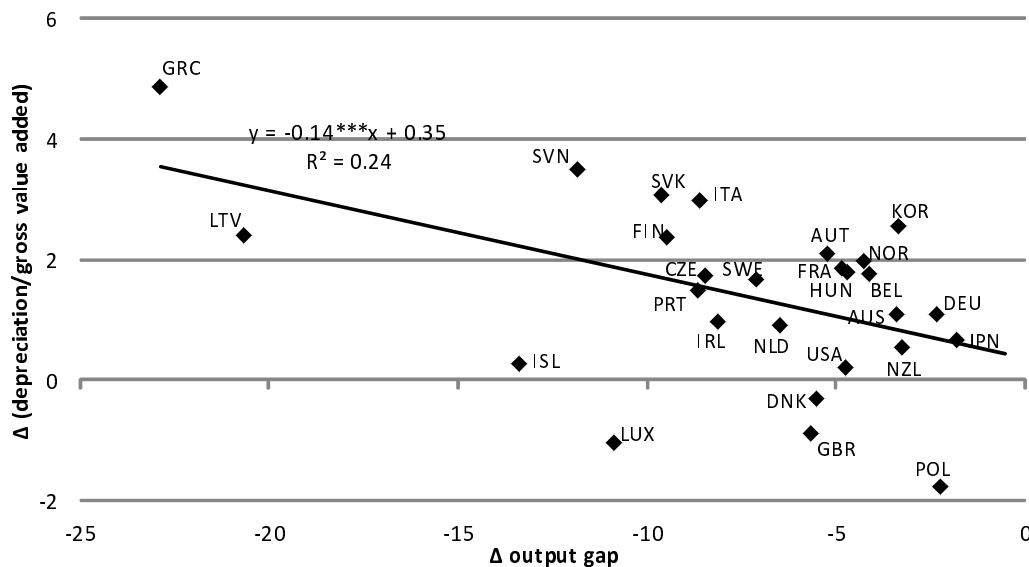
net of capital consumption is available for compensation of workers and capital owners once productive capital has been restored to its pre-production level.<sup>11</sup> From an income distribution perspective, it may therefore be more appropriate to base labour shares on net rather than gross value added (Bridgman, 2014; Rognlie, 2015; Cho *et al.*, 2017).

For the analysed OECD countries and the G7 countries as a whole, developments in gross and net labour shares over the period 1995-2014 have been similar (Chart 2). This is consistent with Rognlie (2015, Figures 1 and 2) who shows that average net and gross labour shares of G7 countries diverged before 1975 but evolved similarly thereafter. However, for some countries there have been large differences between net and gross labour share developments.

There is little empirical evidence in the national accounts that differences between the

evolution of gross and net labour shares are related to longer-term technological developments. The increase of around 2 percentage points in the average value added share of capital depreciation for the analysed OECD countries over the past two decades is commonly attributed to the substitution of rapidly depreciating ICT capital for more slowly depreciating traditional equipment (Appendix). However, the increase in the share of ICT capital in the total capital stock in volume terms (Appendix Chart A3) has been offset by the decline in relative prices so that the substitution of ICT equipment for other types of equipment cannot explain the increase in the value added share of depreciation, which is measured at current prices (Appendix Chart A4). In fact, the share of ICT capital in the total capital stock at current prices has remained broadly constant or has even

**Chart 3: Relationship between the Change in Depreciation Share and Change in the Output Gap in OECD Countries, 2007-2014**  
Percentage point changes



Note: The ratio of depreciation to gross value added is expressed in current prices. 2007-2013 for Korea, Portugal, Sweden and United Kingdom; 2007-2012 for New Zealand.

Source: OECD National Accounts Database, OECD Economic Outlook Database.

11 Analyses based on gross labour shares include Karabarounis and Neiman (2014); Pionnier and Guidetti, (2015); and OECD (2012).



declined for OECD countries (Appendix Chart A5).<sup>12</sup>

There is more support in the data for the hypothesis that the share of depreciation in gross value added is highly counter-cyclical, which implies that net labour share developments are largely driven by the business cycle rather than structural developments. The relationship between changes in the share of depreciation in value added and changes in output gaps appears to be negative (Chart 3). Greece, for instance, experienced the largest widening of the output gap over 2007 and 2014 and is the country in the sample for which the share of depreciation in value added increased most. The increase in the value added share of depreciation appears to mainly reflect cyclical developments rather than a long-term structural change driven by the long-term decrease in ICT prices.

In sum, the business cycle affects gross value added much more than capital consumption, thus implying that the value added share of depreciation is highly counter-cyclical. This makes it difficult to separate structural changes — which are the main focus of this article — from cyclical changes in the net labour share. Consequently, the remainder of the article focuses on gross labour shares.

### **Total-economy labour shares or labour shares excluding the primary, housing and non-market sectors?<sup>13</sup>**

The decline in the total-economy labour share observed in many OECD countries may partly be driven by developments in specific industries for which there are significant conceptual and measurement issues. For instance, total-economy labour shares are partly driven by developments in housing rents. Although the typical worker may actually benefit more from increases in housing rents than from other forms of capital income, the overwhelming part of housing rents ends up in gross operating surplus (i.e. capital income) in the national accounts. Given that the labour share in the housing sector is well below the labour share of the total economy, an increase in the share of housing to total value added puts downward pressure on the total-economy labour share (Box 1).

A further issue with total-economy labour shares is that labour share developments are partly driven by commodity price developments and by imputation choices in the non-market sector (Table 1). For countries with large primary sectors (agriculture, forestry, fishing, mining and quarrying as well as extraction of oil and gas), developments in total-economy labour shares are largely driven by developments in commodity prices; when commodity prices increase, aggregate profits rise without commensurate increases in aggregate wages.<sup>14</sup> In Norway, for instance, where the oil and gas sec-

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12 See Appendix at: [http://www.csls.ca/ipm/32/Schwellnus\\_Kappeler\\_Pionnier%20Appendix.pdf](http://www.csls.ca/ipm/32/Schwellnus_Kappeler_Pionnier%20Appendix.pdf)

13 This article uses industry accounts and imputes labour compensation of the self-employed at the industry level rather than following the approach of Rognlie (2015) and Karabarbounis-Neiman (2014) of using the non-financial corporations' institutional account without correction for the self-employed. As in Rognlie (2015) and Karabarbounis-Neiman (2014), Pionnier and Guidetti (2015) have shown that in the national accounts of some countries self-employed workers are allocated to the non-financial corporations' institutional sector, thereby affecting levels and trends of non-financial corporations' labour shares.

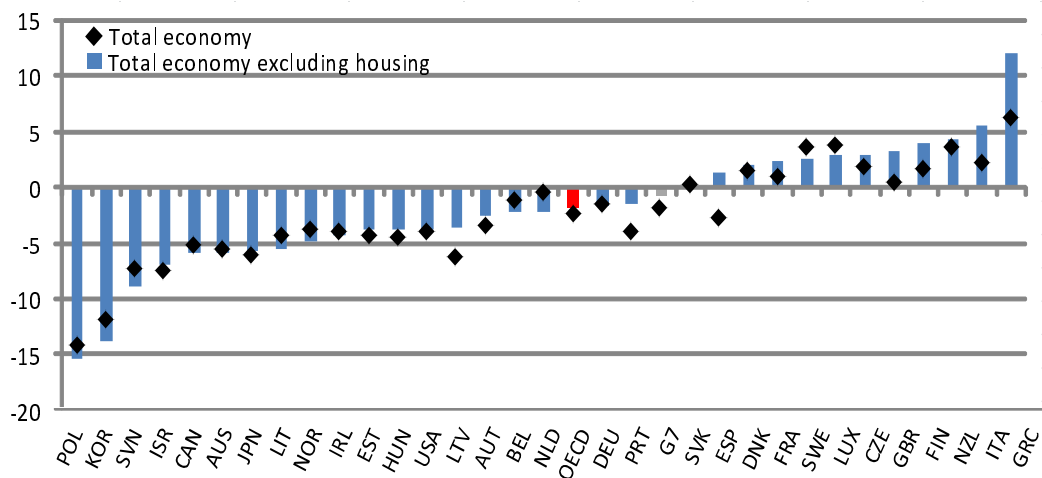
14 The decline in the aggregate labour share partly reflects a change in industry composition: as commodity prices increase, the share of the mining sector - for which the labour share is low - in total value added increases.

### Box 1: Have Increased Housing Rents Contributed to Declines in Labour Shares?

For a number of countries, increases in housing rents contributed to declines in total-economy labour shares (Box Chart 1). Between 1995 and 2014, the share of the housing sector in total value added increased by more than 4 percentage points in Greece, Italy, Latvia, Portugal and Spain, and by more the 2 percentage points in the Czech Republic, Finland, Israel and United Kingdom (Appendix Chart A6). Housing value added consists of rents paid by tenants to landlords and imputed rents of homeowners which are both included in the national accounts. Since the share of this value added distributed as labour compensation is low or non-existent (employment in the housing sector mainly corresponds to real estate agents and employees of corporations engaged in renting activities), the overwhelming part of housing value added ends up in gross operating surplus (i.e. capital income) in the national accounts. Given that rents and house prices are highly correlated, a house price boom typically raises the total-economy capital share.

### Box Chart 1: Change in Labour Shares of the Total Economy and Total Economy Excluding Housing in OECD Countries, 1995-2014

Percentage points



Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to unweighted averages for the relevant countries included in the figure. 1995-2013 for Australia, France, Korea and Portugal; 1995-2012 for New Zealand; 1997-2012 for Canada; 1997-2014 for United Kingdom; 1998-2014 for Ireland and United States.

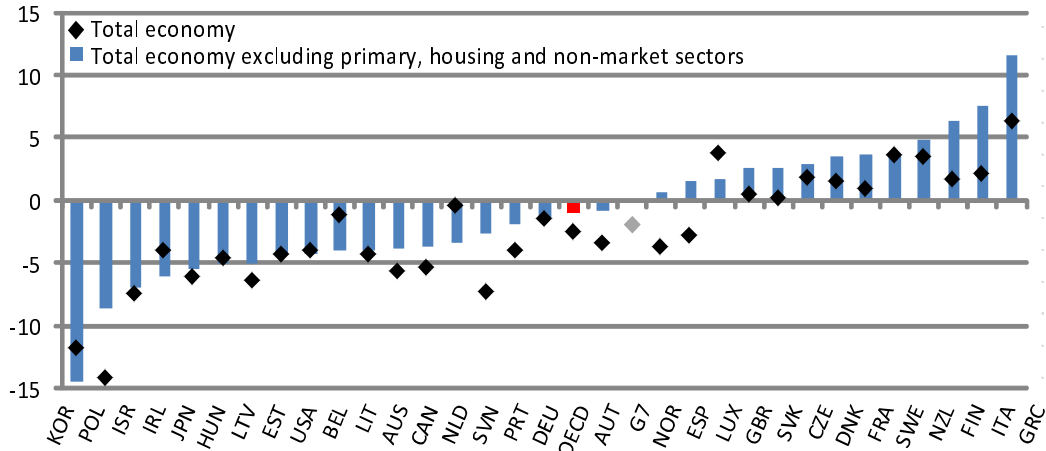
Source: OECD National Accounts Database.

The distributional consequences of increases in housing rents may be different from increases in capital income in the production sector of the economy. Housing wealth is more equally distributed in the population than productive capital so that increases in housing rents can be seen as an indirect channel through which income is transmitted to the typical worker (Murtin and Mira d'Ercole, 2015; Sierminska and Medgyesi, 2013).

Increases in housing rents and their distribution across workers raise a set of public policy issues unrelated to product and labour markets that are the main focus of this article. Increases in housing rents could, for instance, be addressed by public policies directly targeting the housing market, in particular by loosening overly restrictive land-use regulations. This would have the double benefit of raising workers' access to homeownership and limiting rent increases for tenants.

**Chart 4: Changes in the Total Economy Labour Share with and without the Primary, Housing and Non-market Sectors in OECD Countries, 1995-2014**

Percentage points



Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to un-weighted averages for the relevant countries included in the Figure. 1995-2013 for Australia, France, Korea and Portugal; 1995-2012 for New Zealand; 1997-2012 for Canada; 1997-2014 for United Kingdom; 1998-2014 for Ireland and United States.

Source: OECD National Accounts Database.

tor is large, the non-housing labour share declined by around 5 percentage points over the period 1995-2014, but it increased by around 1 percentage point when agriculture, mining and non-market sectors are excluded as oil prices increased over the period covered by the analysis (Table 1).<sup>15</sup> Moreover, national accounting conventions for the non-market sector may bias developments in labour shares. Value added in the non-market sector is equal to the sum of wage compensation and capital consumption, which artificially implies limited variation over time.<sup>16</sup>

Declines in labour shares have typically been smaller (and increases larger) when housing, the primary sector (agriculture and mining) and the non-market sector are excluded from the analy-

sis (Chart 4). The primary, housing and non-market sectors represent about one third of total value added on average across OECD countries.

Moreover, changes in the labour share of both the total economy and in this narrower aggregate have not been uniformly negative. For about two thirds of the analysed OECD countries, labour shares declined between 1995 and 2014 while they increased for the remaining third. This finding is consistent with Cho *et al.* (2017) who also conclude that there has been a small decline in the average gross labour share of 23 OECD countries over the last 20 years, but with substantial heterogeneity across countries. In their sample, gross labour shares declined in 14 countries, whereas they increased in the remaining 9 countries.

15 Since profits of the Norwegian mining sector partly flow into a sovereign wealth fund benefiting future generations of workers, the decline in the total-economy labour share overstates the extent to which value added is appropriated by capital.

16 The finance sector is included in the analysis. Excluding the finance sector would only have a marginal effect on labour share developments for most countries, the exception being Luxembourg for which the labour share would increase by an additional 2 percentage points if the finance sector were excluded.

**Table 2: Changes in Labour Shares in OECD Countries, 1995-2014**  
Percentage points

	(1) = Total economy	(2) = (1) excl. housing	(3) = (2) excl. primary sector	(4) = (3) excl. public sector
Australia	-5.7	-5.9	-2.5	-3.9
Austria	-3.5	-2.6	-0.7	-0.9
Belgium	-1.3	-2.2	-2.3	-4.0
Canada	-5.3	-5.9	-3.4	-3.7
Czech Republic	1.8	3.0	3.2	2.8
Denmark	1.5	2.1	3.4	3.5
Estonia	-4.3	-3.8	-2.0	-4.4
Finland	1.6	3.9	4.9	6.4
France	0.9	2.3	2.7	3.6
Germany	-1.6	-1.7	-1.3	-1.5
Greece	6.2	12.0	10.5	11.6
Hungary	-4.6	-3.8	-3.6	-5.1
Ireland	-4.0	-4.2	-4.0	-6.1
Israel	-7.5	-6.9	-6.8	-7.0
Italy	2.1	5.5	5.9	7.6
Japan	-6.1	-5.6	-5.2	-5.5
Korea	-11.9	-13.8	-12.7	-14.5
Latvia	-6.4	-3.7	-1.4	-5.0
Lithuania	-4.4	-5.5	-4.0	-4.0
Luxembourg	3.7	2.9	2.5	1.7
Netherlands	-0.5	-2.1	-2.0	-3.4
New Zealand	3.5	4.4	5.1	4.8
Norway	-3.8	-4.7	1.4	0.7
Poland	-14.2	-15.4	-8.0	-8.6
Portugal	-4.1	-1.5	-2.0	-1.9
Slovak Republic	0.2	0.3	1.9	2.6
Slovenia	-7.4	-8.9	-2.0	-2.7
Spain	-2.8	1.2	0.9	1.5
Sweden	3.6	2.5	2.7	3.6
United Kingdom	0.4	3.3	3.0	2.6
United States	-4.0	-3.7	-2.5	-4.3
OECD	-2.5	-1.9	-0.6	-1.1
G7	-1.9	-0.8	-0.1	-0.2

Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to unweighted averages for the relevant countries included in the Table. 1995-2013 for Australia, France, Korea and Portugal; 1995-2012 for New Zealand; 1997-2012 for Canada; 1996-2014 for Chile; 1997-2014 for United Kingdom; 1998-2014 for Ireland and United States.

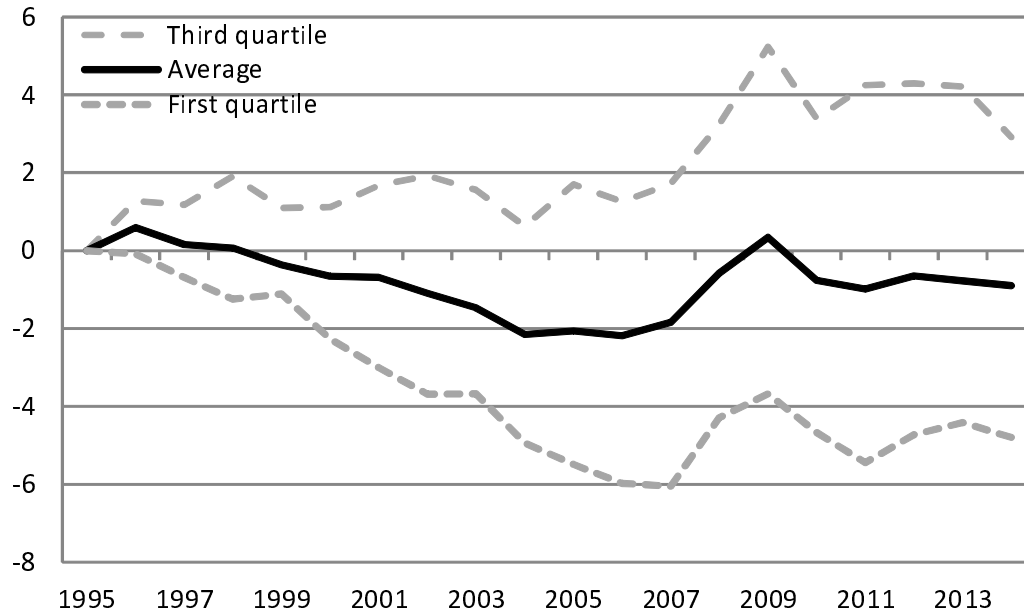
Source: OECD National Accounts Database.

For a number of countries, the change in the labour share is significantly more positive when the housing sector is excluded from the analysis (Table 2, Column 2). For most of these countries, including Greece, Italy, Spain and the United Kingdom, this reflects house price booms in the run-up to the global crisis of 2008-

09 that were followed by a slow downward adjustment of rents in the subsequent bust so that the share of rents in value added increased over the period 1995-2014. For countries with large primary sectors, such as Australia, Canada and Norway, labour share developments are significantly more positive when the primary sector

**Chart 5: Cumulated Change in Labour Share excl. Primary, Housing and Non-market Sectors in 31 OECD Countries, 1995-2014**

Unweighted average, in percentage points



Note: 1995-2014 for Austria, Belgium, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Hungary, Israel, Italy, Japan, Lithuania, Latvia, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia and Sweden; 1995-2012 for New Zealand; 1995-2013 for Australia and Korea; 1997-2012 for Canada; 1998-2014 for Ireland and United States.

Source: OECD National Accounts Database.

is excluded from the analysis, which reflects the trend increase in commodity prices over the period 1995-2014 (Table 2, Column 3). On the whole, for the OECD countries covered by the analysis the commodity price effect appears to be larger than the house price effect. Excluding the non-market sector typically amplifies changes in labour shares stemming from the remaining sectors because the labour share in the non-market sector is broadly stable (Table 2, Column 4).<sup>17</sup>

### Pre- or post-crisis developments?

Most of the decline in the business labour share excluding the housing and primary sectors

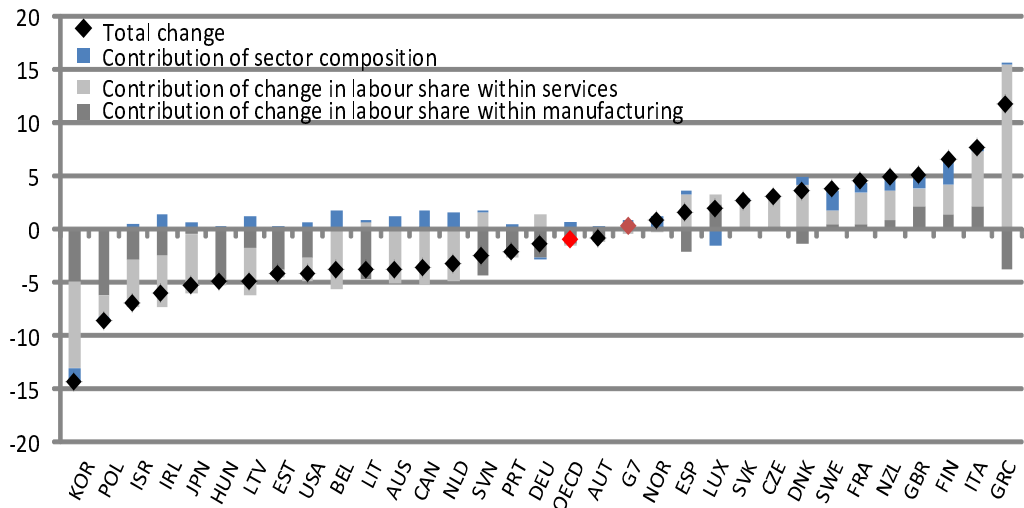
took place before the global crisis of 2008-09 (Chart 5). However, labour share developments have been very heterogeneous across countries, with no pre-crisis decline for the country at the third quartile of the distribution of cumulated labour share changes and a large decline for the country at the bottom quartile. Given that this narrowly defined labour share is not affected by house and commodity price developments, the timing of the decline and rebound suggests that the structural factors that drove down the labour share before 2005 weakened thereafter.

The timing of the decline and the rebound of the labour share is consistent with evidence suggesting that the pace of expansion of global value chains associated with China's integration

<sup>17</sup> The stability of the labour share in the non-market sector reflects to a large extent the national account convention that value added in the government sector is equal to labour compensation plus consumption of fixed capital, so that the labour share is highly stable and around 1.

**Chart 6: Contribution of Manufacturing and Services to Labour Share Developments in OECD Countries, 1995-2014**

Excluding primary, housing and non-market sectors, percentage points



Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to unweighted averages for the relevant countries included in the Figure. 1995-2013 for Australia, Korea; 1995-2012 for New Zealand; 1997-2012 for Canada; 1998-2014 for Ireland and United States.

Source: OECD National Accounts Database.

into the world trading system — which may have contributed to labour share declines (IMF, 2017) — slowed in the wake of the global crisis of 2008-09 (Ferrantino and Taglioni, 2014). Alternative explanations could be the slowing pace of IT-related technological change or the reduced scope of regulatory reforms, especially in network industries, which appear to be two major drivers of labour share declines (Karabarbounis and Neiman, 2014; Azmat *et al.*, 2012). The post-2005 rebound in the labour share may partly also reflect business cycle conditions, with limited downward adjustment of wages relative to profits during and in the wake of the global economic crisis.

### Manufacturing or services?

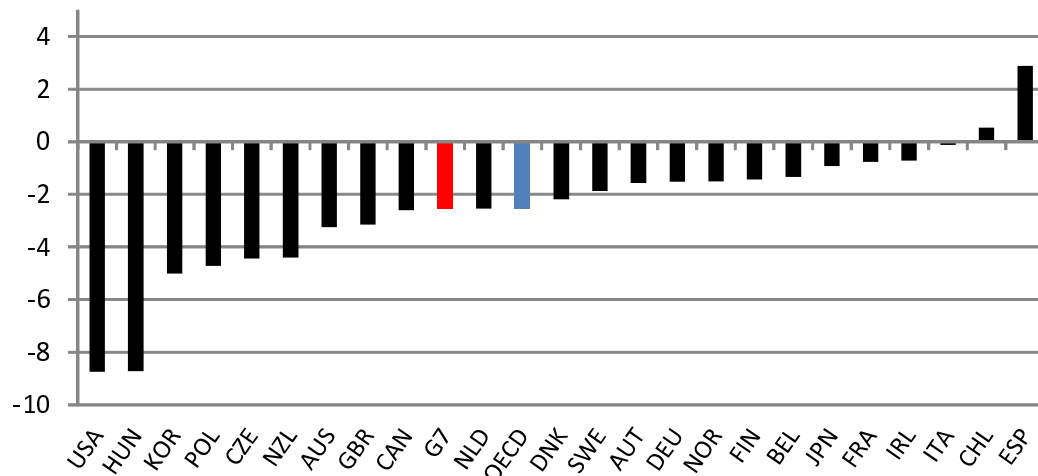
In most of the countries examined here, changes in labour shares when primary, housing

and non-market sectors are excluded reflect similar rather than diverging developments in manufacturing and services and a limited role of changes in industry composition (Chart 6).<sup>18</sup> If labour share developments were entirely driven by declines in labour shares within manufacturing — which is more exposed to increased trade integration than services — or by a shift in industry composition from manufacturing to services, this would suggest globalization as the most plausible explanation of aggregate labour share developments. However, the similarity of developments in services and manufacturing does not imply that technological change is the ultimate source of aggregate labour share developments as globalization may induce technological change or displace manufacturing workers that are then re-employed in services at lower wages.

18 This is consistent with previous studies suggesting that labour share developments are overwhelmingly driven by developments within industries (OECD, 2012; De Serres *et al.*, 2001).

**Chart 7: Change in Ratio of Median to Average Wages in OECD countries, 1995-2013**

Percentage points



Note: Three-year averages starting and ending in indicated years. OECD and G7 refer to unweighted averages for the relevant countries. 1996-2013 for Chile, Czech Republic, Denmark; 1995-2012 for Australia, Spain, France, Italy, Poland, Sweden; 1997-2013 for Norway, New Zealand; 1998-2013 for Canada; 1995-2010 for Netherlands.

Source: OECD Earnings Database.

## Dissecting Wage Inequality Developments

Increases in wage inequality have contributed to aggregate decoupling by reducing the ratio of median to average wages in a wide range of OECD countries. The average decline in the ratio of median to average wages based on the OECD Earnings Database was around 2 percentage points over the period 1995-2014, but for a number of countries, including the Czech Republic, Hungary, Korea, New Zealand, Poland and the United States, declines in the ratio were significantly more pronounced (Chart 7). Of the analysed OECD countries only Chile, Italy and Spain bucked the trend of increasing wage inequality.

The decline in the ratio of median to average wages appears to be overwhelmingly driven by high wage growth of top earners. Information on wages of workers at the top of the wage distribution from surveys is unreliable — which

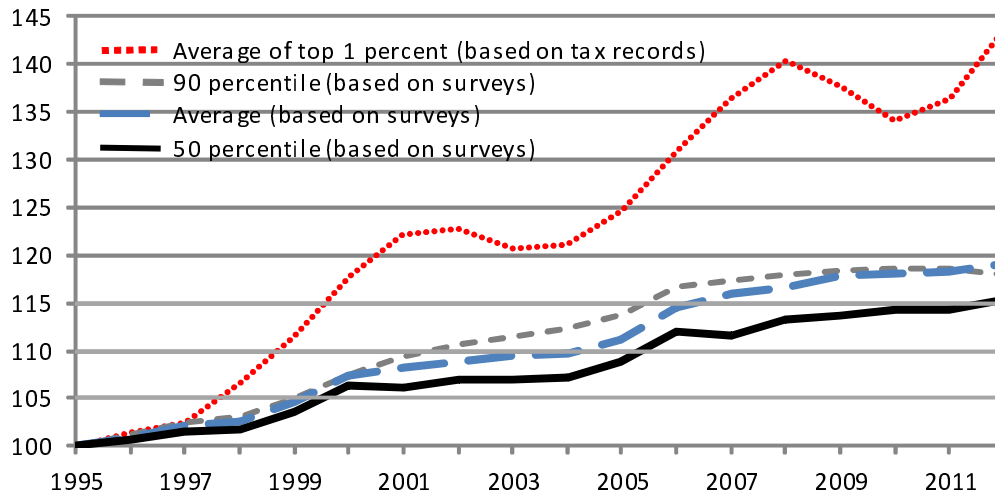
reflects top-coding, sampling issues and under-reporting — so that it is preferable to base wage growth of top earners on tax records.<sup>19</sup> Alvaredo *et al.* (2016) provide average wage income of the top 1 per cent of income earners, which likely overlaps with the top 1 per cent of wage earners. According to these data, which are available only for a limited number of countries, the most striking development over the past two decades has been the divergence of wages of the top 1 per cent of income earners from both the 90th percentile and the median of wage earners (Chart 8).<sup>20</sup> Well-known explanations for increased wage inequality such as skill-biased technological change and globalization cannot plausibly account for the disproportionate wage growth at the very top of the wage distribution. Skill-biased technological change and globalization may both raise the relative demand for high-skilled workers, but this should be reflected in broadly rising relative wages of high-skilled

19 Atkinson *et al.* (2011), Burkhauser *et al.* (2012), Deaton (2005) and Ruiz and Woloszko (2016) discuss issues with the coverage of top earners in surveys.

20 To the extent that surveys only incompletely capture wage growth at the top of the wage distribution and therefore underestimate average wage growth, the actual decoupling of median from average wages may be larger than suggested by surveys.

**Chart 8: Wages Trends in OECD Countries by Group, 1995-2012**

Index, 1995=100



Note: Indices based on unweighted average for seven OECD countries: Australia (1995-2010), Spain (1995-2012), France (1995-2006), Italy (1995-2009), Japan (1995-2010), Korea (1997-2012), and United States (1995-2012), for which data on wages of the top 1 per cent of income earners are available. All series are deflated by country-specific value added price indices.

Source: OECD Earnings Database; World Wealth and Income Database.

workers rather than narrowly rising relative wages of top-earners. Brynjolfsson and McAfee (2014) argue that digitalisation leads to "winner-take-most" dynamics, with innovators reaping outsized rewards as digital innovations are replicable at very low cost and have a global scale. Recent studies provide evidence consistent with "winner-take-most" dynamics, in the sense that productivity of firms at the technology frontier has diverged from the remaining firms and that market shares of frontier firms have increased (Andrews *et al.*, 2016). This type of technological change may allow firms at the technology frontier to raise the wages of their key employees to "superstar" levels.

## Conclusion

This article is limited to a quantitative description of decoupling of real median wages from labour productivity in OECD countries as well as its proximate causes, i.e. changes in labour shares and wage inequality. The cross-country heterogeneity in these movements and

the fact that wage inequality is mainly driven by high wage growth of top earners suggest that longer-term global trends such as technological change and globalization alone cannot fully account for decoupling of wages from productivity. Country-specific factors, including public policy settings, may play a significant role in shaping the effects of global trends on labour shares and wage inequality.

Further research needs to investigate the structural causes of the decoupling of wages from productivity and the relation with economic policies. Country- and sector-level data could be used to analyse the extent to which movements in labour shares and wage inequality are related to measures of technological change, trade integration and public policies. Of particular interest is the issue whether digitalization, declining real investment prices and trade integration with labour-abundant countries reduce labour shares and raise wage inequality and whether public policies can play a mitigating role. Micro-level data could be used to analyse



the transmission of productivity gains to wages at the firm level, in particular whether macro-level decoupling reflects changes in the composition of firms or changes within firms and the role of public policies in these developments.

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