



# The Labour Share in G20 Economies

International Labour Organization  
Organisation for Economic Co-operation and Development

with contributions from  
International Monetary Fund and  
World Bank Group

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## Introduction

National income is the sum of all income available to the residents of a given country in a given year. The division of national income between labour and capital is called the functional distribution of income. The labour income share (or labour share) is the part of national income allocated to labour compensation, while the capital share is the part of national income going to capital. A falling labour share often reflects more rapid growth in labour productivity than in average labour compensation, and an increase in returns to capital relative to labour. A detailed description of the labour share and how it is measured is presented in Annex A.

Labour shares have long been considered stable and therefore attracted little attention from research and policy discussions. Yet, in recent years, a growing body of evidence suggests that labour shares have seen a *secular* downward trend with important negative consequences. For instance, with declining labour shares, improvements in macroeconomic performance may not translate into commensurate improvements in personal incomes of households (Atkinson 2009). And data shows that over time and across many countries, a higher capital share is associated with higher inequality in the personal distribution of income (Piketty 2013). A declining labour share can also have political consequences if it erodes support for market-oriented economic policies or for globalization more broadly. Importantly, trends in labour shares negatively affect the main macroeconomic aggregates, namely household consumption, private sector investment, net exports and government consumption (ILO 2012; Wolf 2014).

This paper reviews recent trends in the labour share in G20 countries (and over a long period of time in a few) and discusses possible causes of the observed trends. It then explores linkages between the labour income share and the main components of aggregate demand. Other critical issues such as the growth and employment impacts of the labour share and policy implications are raised in the paper “Strengthening the link between employment and growth” submitted to the EWG meeting of 26-28 February 2015 and will be discussed in more detail in a follow-up paper for the third EWG meeting (23-25 July 2015).

## 1. Recent trends in G20 countries

### **(a) Labour shares**

At least until the 1980s, a stable labour income share was accepted as a ‘stylized fact’ of economic growth.<sup>1</sup> Over the past decades, however, this conventional wisdom has been

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<sup>1</sup> These empirical findings date back to the early twentieth century, when Arthur Bowley first observed such regularity using British data from the nineteenth and twentieth centuries and formulated “Bowley’s Law”. Paul Douglas made a similar finding regarding the labour share in the United States, and developed, together with the mathematician Charles Cobb, the famous Cobb–Douglas production function, which simplifies economic modelling by assuming that the functional income distribution between labour and capital always remains constant (see Mankiw, 2003). Keynes described this empirical constancy as “a bit of

challenged by the empirical evidence, which indicates a downward trend for the labour share in many of the countries for which data are available. The OECD (2012) has observed, for example, that over the period from 1990 to 2009 the share of labour compensation in national income declined in 26 out of 30 advanced countries for which data were available, and calculated that the median (adjusted) labour share of national income across these countries fell from 66.1 per cent to 61.7 per cent. A more recent OECD calculation finds that the average adjusted labour share in G20 countries went down by about 0.3 percentage points per year between 1980 and the late 2000s.<sup>2</sup> Similar downward trends have been observed by other international institutions (IMF, 2007; European Commission, 2007; BIS, 2006; ILO, 2012).

In the case of emerging and developing economies, the evidence appears to be more mixed and somewhat ambiguous. Nonetheless, the ILO finds that in many emerging and developing countries the decline in the labour income share is even more pronounced than in advanced economies, with considerable declines in Asia and North Africa and more stable but still declining wage shares in Latin America (ILO-IILS, 2011). Two recent global reviews of labour income shares also documented significant declines in some of the large labour-abundant emerging countries (Karabarbounis, 2013), while also pointing out the greater fluctuations and oscillations in developing countries (Guerriero, 2012).

A number of institutions produced data on labour share estimates. The annual macro-economic database (AMECO) of the European Commission's Directorate General for Economic and Financial Affairs) provides data based on National Accounts on the adjusted labour shares for 11 of the G20 countries plus Spain. The labour income share is calculated as the compensation of employees over total economy GDP multiplied by total employment. From the two published series – market prices and factor costs<sup>3</sup> – the long-term downward trend in labour income shares is evident, as can be seen in Figure 1. When GDP is measured at market prices, the average labour share for the 9 countries with data from the 1960s declines from a peak of more than 65 per cent to about 56 per cent in the most recent year (Figure 1, pane A). When measured at factor cost, the labour share declines from an average of 72 per cent to 63 per cent (Figure 1, panel B).

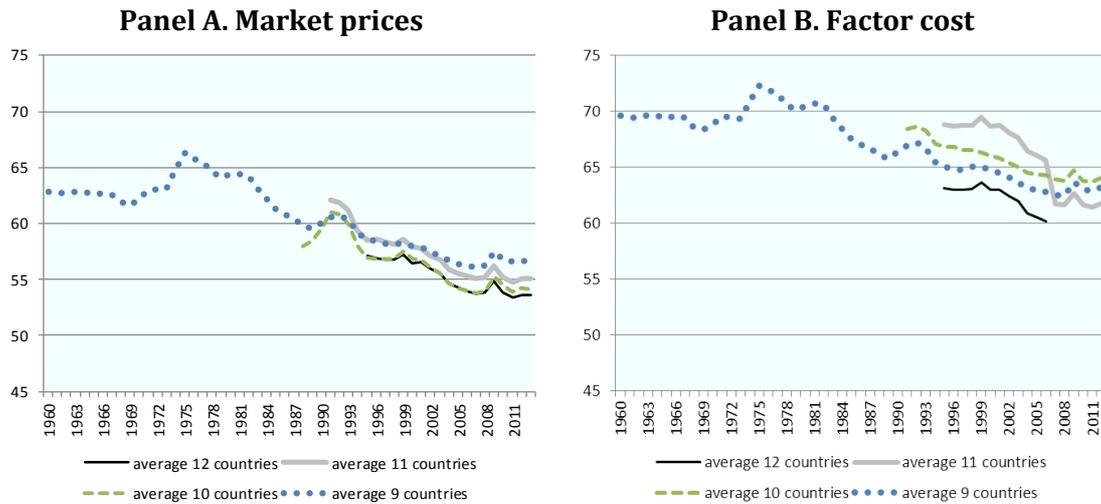
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a miracle" (Keynes, 1939) and later Solow questioned the reliability of the empirical evidence (Solow, 1958) (see La Marca and Lee, 2013).

<sup>2</sup> This estimation uses current basic prices. If factor costs are used, the results are similar (see Annex A on measurement issues). The labour share is defined here as the share of net national income that is received by workers in the form of labour compensation.

<sup>3</sup> AMECO calculates this adjusted labour share with GDP at market prices as well as with GDP at current factor cost (i.e. minus taxes and plus subsidies). According to Guerriero (2012) the latter is more meaningful, since taxes do not represent any kind of return to capital or land.

**Figure 1. The adjusted labour income share in selected G20 countries and Spain, estimated by AMECO**



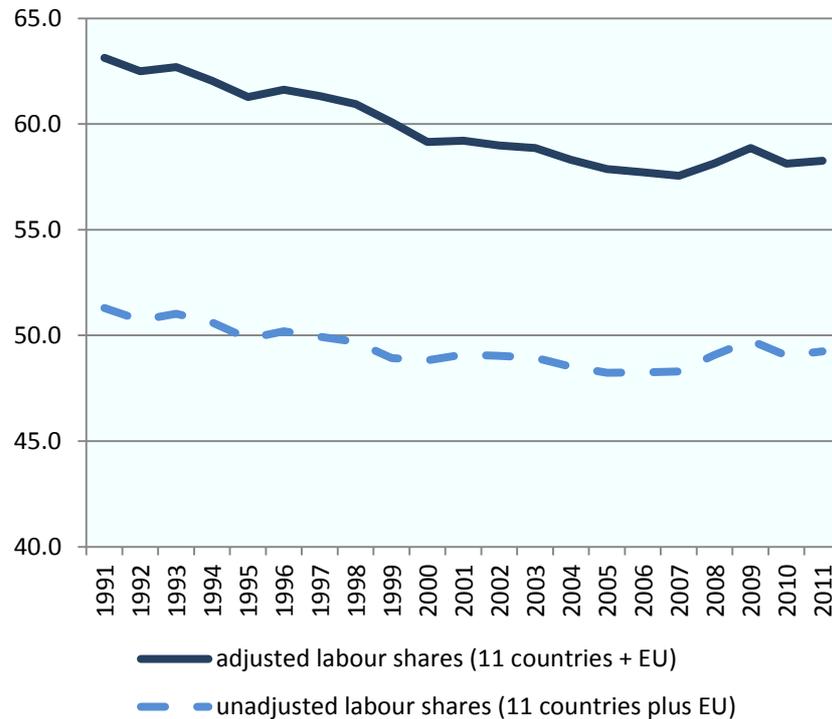
*Note:* The 9 countries are Australia, Canada, Germany, France, Italy, Japan, Spain, the United Kingdom and the United States. The other series include respectively the Republic of Korea (10 countries), Mexico (11 countries) and Turkey (12 countries).

*Source:* AMECO.

The downward trend since the 1990s is also observed by ILO, whose estimates of the adjusted and unadjusted labour shares are based on main national accounts from UN Data (Figure 2). The unadjusted labour share is calculated as total compensation over GDP, and the adjusted labour share increases the unadjusted labour share by the ratio of self-employed (for a sample of countries for which both series can be constructed between 1992 and 2011). The period covered is shorter than in the AMECO database, but includes a larger sample of G20 countries. The adjusted labour shares declines from an average of about 58 per cent to about 55 per cent, and the unadjusted labour share falls from 51 per cent to 49 per cent.

Both Figures 1 and 2 show that during the depths of the global economic crisis the longer term downward trends paused or slightly reversed but began to decline again following 2009. This reflects the reality that wages tend to be less volatile than profits during economic downturns. The OECD observed: “In times of economic recession, this decline [in the wage share] has typically paused, but then subsequently resumed with a recovery. The recent economic and financial crisis and subsequent sluggish recovery have not deviated from this general pattern” (OECD, 2012b, p. 112). Indeed, in most countries, the labour share tends to increase in the initial years of recessions and then resume its negative trend afterwards. This countercyclical behaviour of labour shares in advanced economies has been well documented (see for example the box in IMF, 2012).

**Figure 2. The adjusted and unadjusted labour shares in selected G20 countries, estimated by ILO**



*Note:* To estimate adjusted labour income shares the projections of number of self-employed from the ILO Global Employment Trends (GET April 2014 (LP)) are used. Data for the selected group of countries includes EU-28, Australia, Canada, France, Germany, Italy, Japan, The Rep. of Korea, the Russian Federation, South Africa, United Kingdom and the United States.

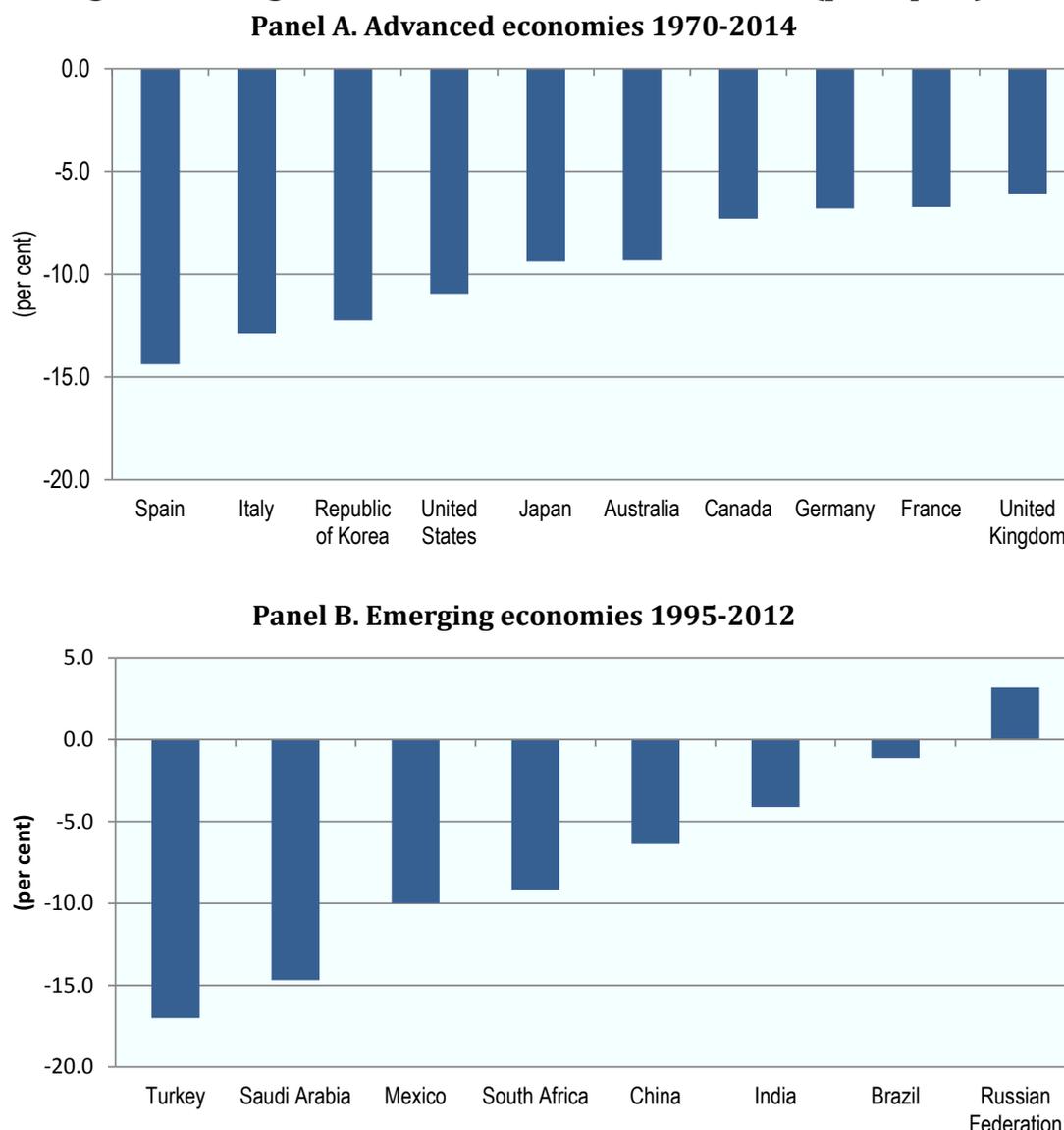
*Source:* ILO based on main National Accounts from UN DATA ([www.data.un.org](http://www.data.un.org)).

Data using a diversity of sources are used to highlight changes in the labour share at the country level – revealing a decline in the vast majority of countries (Figure 3). The trends in the aggregate labour share need to be interpreted with some caution due to a number of measurement issues (see Annex A). For instance, the evolution of the labour share in the *private sector*<sup>4</sup> is likely to be shaped by different forces than the corresponding aggregate for the *public sector*, where measurement of output and factor shares raises more complex issues. By contrast, the private represents a consistent aggregate and measurement issues regarding the labour share are less problematic, at least in OECD countries.<sup>5</sup>

<sup>4</sup> Refers to those industries where most firms are privately-owned (also referred to as “business-sector”).

<sup>5</sup> In particular, the availability of data on hours worked for both employees and self-employed for a fine industry partition of the private sector allows refining the imputation of sole proprietors’ labour earnings, by assuming their hourly rate in each industry is equal to the average hourly wage in the same industry.

**Figure 3. Changes in labour shares in G20 countries (plus Spain)**



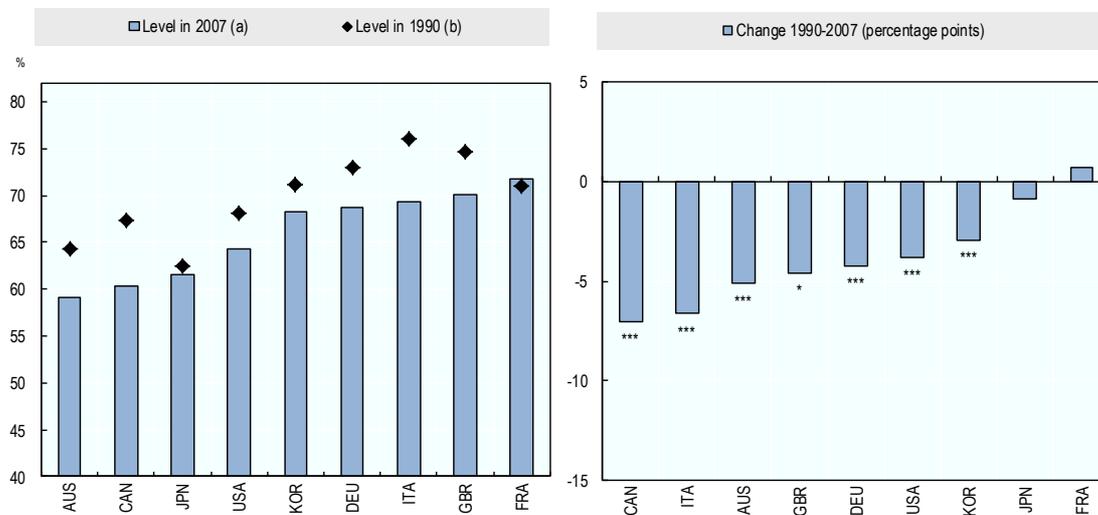
*Notes:* Figures refer to the change in the adjusted labour share between 1970-2014 for advanced economies and 1995-2012 for emerging economies. Exceptions include: Republic of Korea: 1991-2014, Saudi Arabia: 2002-09, Turkey and Mexico: 1995-2014, South Africa: 1995-2013, and Brazil: 1995-2009. Data refer to the adjusted labour income share except for China and the Russian Federation where the unadjusted labour income share is used. Data for Argentina and Indonesia are not available. Prior to 1991, the adjusted labour income share in Germany refers to West Germany.

*Source:* ILO based on AMECO Database and ILO Databases.

Nevertheless, the picture that emerges from focusing on the private sector is rather similar to the results obtained for the whole economy (Figure 4). The cross-country average labour share in the private sector, excluding agriculture, mining, fuel and real estate, was 69.8 per cent in the G20 countries for which data are available in the early 1990s and 65.9 per cent in 2007. On average the contraction over the period was 0.24 percentage points per year. None of the countries for which data are available experienced a significant trend increase. By contrast, the labour share contracted significantly in more than three-quarters of the countries. Very large falls in the labour share were observed in Australia, Canada and Italy where the decline in the private sector

labour share exceeded 5 percentage points. The implication is that, in these countries, labour is obtaining an increasingly smaller share of the private-sector's pre-tax revenue.

**Figure 4. Private-sector labour shares in selected G20 countries, 1990<sup>a</sup>-2007<sup>b</sup>**



Notes: 3-year averages, starting and ending with indicated years. \*\*\*, \*\*, \* significant at the 1%, 5% and 10% level, respectively. Statistical significance refers to the coefficient of the time trend in a bivariate regression on annual data with the labour share as dependent variable. The wage of the self-employed is imputed assuming that in each industry their hourly wage is the same as for the average employee of the industry.

a) Germany: 1992.

b) Canada: 2004; Korea: 2005; Japan: 2006.

Source: OECD calculations based on OECD STAN and EUKLEMS.

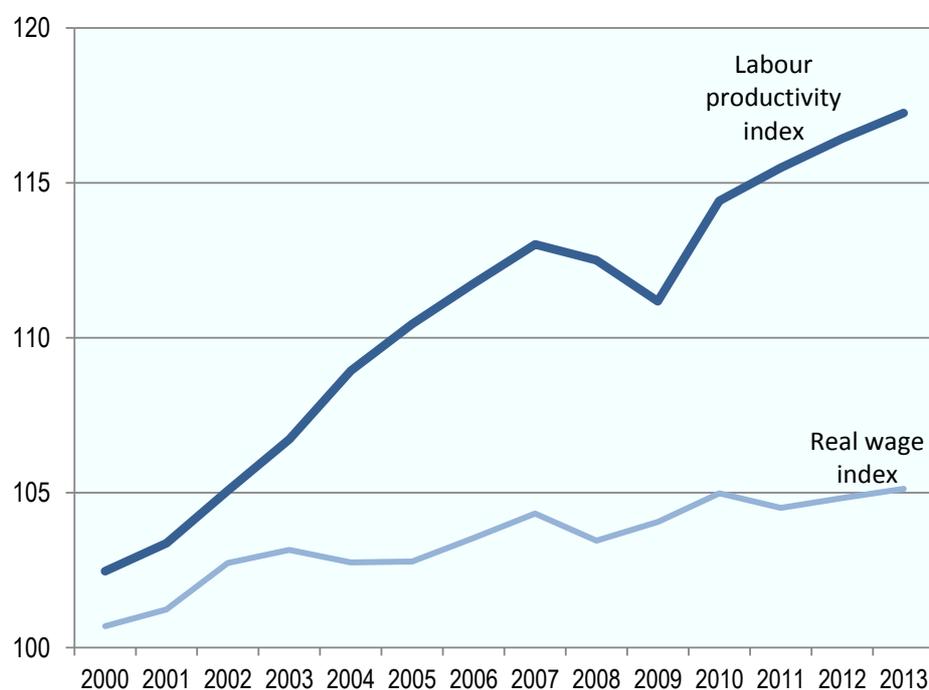
One question arises whether the low level in the labour share witnessed today corresponds to a historical low point when looking at data over the entire 20th century. Annex B shows the evolution of the labour share of income using historical data for France (1897-2010), United Kingdom (1856-2010) and the United States (1899-2010). The labour share has reached a low point since World War II and is back to its 1897 level in France. Similarly in the United Kingdom, the labour share is reaching a level similar to the level reached before World War II. In the United States, the labour share shows a decline in the past 30 years that pushes the labour share down to a level lower than the level reached in the 1930s.

### **(b) Wages and productivity**

Trends in labour shares are to a large extent driven by the comparative evolution of average wages and labour productivity. Under most circumstances, when average wages increase more rapidly than average labour productivity, the labour share increases. Conversely, when the growth in average wages lags the growth in labour productivity, the result is a decline in the labour share. This relationship can become more complex if the proportion of wages in total compensation changes over time, or if different deflators are used to deflate wages and output per worker (CPI and GDP deflators can be substantially different). The ILO (2014) has shown that in a number of countries where labour shares declined, wage growth significantly lagged behind productivity growth, even when different deflators are used or if total compensation is used instead of the narrower concept of wages. Because a majority of large economies, including the United States, Germany and Japan, have seen wage growth lagging behind productivity growth,

labour productivity has outpaced real average wage growth in a group of nine advanced G20 economies for which data is available since 1999 (Figure 5).

**Figure 5. Evolution of average wages and labour productivity in selected advanced G20 economies, 1999-2013**



*Notes:* Data refer to Australia, Canada, France, Germany, Italy, Japan, Rep. of Korea, the United Kingdom and the United States. Real wage growth is calculated as a weighted average of year-on-year growth in real average monthly wages in the advanced G20 economies (for a description of the methodology, see ILO Global Wage Report 2014-15, Appendix I). Index is based on 1999 because of data availability.

*Sources:* ILO Global Wage Database; ILO Trends Econometric Models, Apr. 2014.

In most of the G20 advanced countries for which data is available, the aggregate growth of real wages was significantly slower than that of aggregate productivity even taking into account the dynamics of relative prices, thus accounting for the decline in the labour share. However, this does not mean that there was slower growth of average real wages with respect to aggregate productivity within all industries. In fact, in many countries, real wages grew faster than productivity in a number of industries and less than productivity in others. Yet, in these countries, the labour share decreased on average within industries because productivity grew faster than wages in high-productivity industries, thereby raising the average growth of productivity above that of wages. This phenomenon is quantified in Annex C.

## 2. What determines labour shares?

### *(a) Sectoral shifts and “within-sector” changes*

Most studies that have documented the fall in the labour income share since the 1980s have also tried to understand its causes. One possibility that has been studied is that trends in the labour share are determined by a compositional shift in employment from labour-intensive to more capital-intensive sectors, where labour shares are lower.

Indeed, the labour share is significantly different across industries. A key question, therefore, is whether the decline of the aggregate labour share has been the result of a structural shift away from labour-intensive activities or whether instead it has been the result of a decline in the labour share within each industry. Shift-share analysis based on comparable data for 26 OECD countries and 20 industries in the private sector since 1990, shows that the fall in the labour share is by and large due to *within-industry* decline of this share (OECD, 2012). Interestingly, this decline is widespread across industries, since essentially all industries experienced a considerable decline of the labour share in the last 20 years. By contrast, although part of the secular decline observed in the labour share of OECD countries can be attributed to the fact that the economy is shifting away from agriculture, the contribution of changes in the *value-added share* of industries with high labour shares versus those with low labour shares has remained limited. An ILO study also found that the shift in sectoral composition was indeed a contributory factor in many countries, but that in advanced economies most of the fall in the labour share was the result of falling shares *within industries* (ILO, 2010).

### ***(b) Possible determinants of changes in the labour income share***

The usual explanations for changes in labour shares include technological change, globalization, financial markets, product and labour market institutions, the bargaining power of labour and unemployment. In this section the paper briefly reviews all the factors that have been associated with the decline in different studies. There is a wide diversity of findings in the literature on the relative importance and effects of these factors, and further evaluation of these different factors will be included in future revisions of the present paper.

Technological changes are often presented as the main culprit, with some authors seeing the role of capital accumulation and capital-augmenting technical change as determinants of the evolution of the labour share (see *e.g.* Bentolila and Saint-Paul, 2003; Arpaia *et al.*, 2009; Driver and Muñoz-Bugarin, 2010; Raurich *et al.*, 2012; Hutchinson and Persyn, 2012). According to OECD estimates (OECD, 2012), *total factor productivity (TFP) growth and capital deepening* – the key drivers of economic growth – accounted for most of the average within-industry decline of the labour share in OECD countries between 1990 and 2007 (see the extended discussion in Annex D).

Studies typically also find smaller negative effects of globalization on the labour share in high-income countries, possibly due to the intensification of competition and the entry of labour-abundant countries into the global economy which may have worked as a wage-moderating factor (ILO, 2008). It is also possible that redistribution from labour to capital has occurred through offshoring or the so-called “threat effects” that can occur even without actual changes in production locations (Epstein and Burke, 2001). The role of financial markets has also been highlighted, particularly its influence on businesses to increase shareholder value and to focus on their core activities while subcontracting labour-intensive activities (Weil, 2013; ILO, 2012). Some groups of workers, particularly top executives, may have benefited from this process of “financialization” through deferred salaries in the form of pension funds and other types of capital gains. For the

average worker, though, the evidence indicates that the extent and size of such gains are limited (Bell and Van Reenen, 2013). It has also been observed that capital account liberalization reforms increase inequality by reducing the labour income share (Furceri et al., 2015).

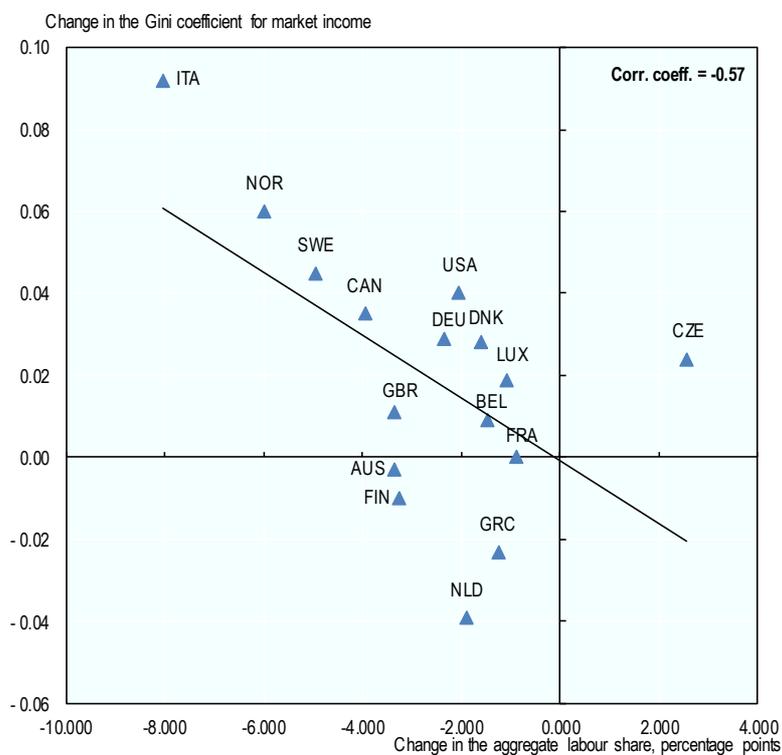
Institutional factors have also been explored. Labour market institutions, product market regulations, the extent of public ownership, the bargaining power of workers and the size of the welfare state are all among the variables that have been debated in the existing literature. Of particular attention have been factors such as union density, minimum wage legislation, unemployment benefits and coverage, severance pay and government consumption. The decline in union density – the number of trade union members as a percentage of total employees or as a percentage of total employment – in many developed economies has often been linked to the weakening of workers’ bargaining power, negatively affecting their ability to negotiate a larger share of productivity growth as labour compensation. The level of the minimum wage and other “intermediary” institutions, including employment protection legislation, the generosity of unemployment benefit and other benefits and contributions (the ‘tax wedge’), are among the institutional variables that have been widely used in empirical studies (ILO, 2012; IMF, 2007; European Commission, 2007; OECD, 2012). High unemployment can place downward pressure on wage demands and on the labour share, while the level of unemployment benefits can have an impact on the labour share by affecting workers’ “reservation wages”, that is, the level of pay workers would accept as a minimum. Among institutional factors, empirical evidence suggests that the role of factors that affect the bargaining power of workers is largest (OECD, 2012). As with other potential determining factors as discussed above, more empirical studies are needed to determine how labour market institutions affect the evolution of the labour share, particularly through influencing the bargaining power of workers. Better understanding is also needed on the interactions between labour market institutions and other markets (e.g., finance and product markets) in shaping the trends in the labour share (this issue will be discussed in depth in the third EWG meeting in July 2015).

### **3. The effects of declining labour shares**

Declining labour shares are frequently associated with more income inequality because capital is more concentrated than labour endowments. At the same time, the relationship between factor shares and personal distribution can be relatively complex because economic agents derive their earnings from several different sources (see Atkinson, 2009). Some studies have combined factor shares with distributional data. The ILO (2011) found falling labour shares for low- and medium-skilled workers, but increasing shares for highly skilled workers in sample of ten developed economies. The OECD (2012) showed that the labour share diminished for the bottom 99 per cent of income earners, but increased by 20 per cent for the top 1 per cent in countries for which data was available over the last two decades (OECD, 2012). Recent work (e.g. OECD, 2011a, Atkinson *et al.*, 2011) shows that top income earners have seen their share of national income increase. One study shows that in Europe, the top 10 per cent in the

wage distribution earns 25 per cent of the total wage bill while the top 10 per cent in the capital distribution owns 60 per cent of total capital, so that – ultimately - the top 10 per cent in the distribution of incomes (wages and capital) obtains 35 per cent of national income. In the U.S., these figures for the top 10 per cent are estimated, respectively, at 35 per cent for wages, 70 per cent for capital, and 50 per cent for incomes (wages and capital) (Piketty, 2013). Although not demonstrating causality, Figure 6 suggests that the decline of the labour share tended to evolve hand-in-hand with the widening of market-income inequalities. Fiscal consolidation in 17 OECD countries over the period 1978-2009 has also had distributional effects by raising inequality and decreasing labour income shares (Ball et al., 2013).

**Figure 6. Changes in the labour share and in income inequality in OECD countries, 1990s to mid-2000s<sup>a</sup>**



*Notes:* Labour share: 3-year moving averages centred around start and end dates. The wage of the self-employed is imputed assuming that their annual wage is the same as for the average employee of the whole economy. The Gini coefficient is based on pre-tax and transfer income of the population aged 18 to 65 years.

*a)* 1990-2004 for Canada; 1990-2005 for Denmark, Netherlands and the United States; 1991-2004 for Italy, Sweden and the United Kingdom; 1995-2004 for Australia, Belgium, Germany and Norway; 1995-2005 for Finland; 1996-2004 for Czech Republic, France and Luxembourg; 1999-2004 for Greece.

*Source:* OECD calculations based on the OECD income distribution database, OECD STAN and EUKLEMS.

In addition to affecting the personal distribution of income, labour shares also affect macroeconomic aggregates. At the level of enterprises, wages represent a cost to enterprises. At the household level, wages are a significant determinant of household consumption. At the country level, the sum of all enterprise-level wage changes can have complex effects. Recent research (Lavoie and Stockhammer, 2013) has shown that a falling wage share means growing constraints on consumption demands on the one hand,

but more exports and potentially more investment on the other. The positive effect on consumption of redistribution from the capital to the labour share has been attributed to the fact that the propensity to consume out of labour compensation is higher than the propensity to consume out of capital income, as the labour share goes to households with lower incomes and therefore able to save lower proportions of their income than wealthier people, who save a higher proportion of their total incomes.

It might be argued that lower wages are necessary to boost profits in order to increase investment and, in turn, job creation. However, in developed economies, the shift in income away from labour towards capital has not produced the expected results on investment. Between 2000 and 2007, the capital share in advanced G20 countries grew by close to 2 percentage points. In contrast, investment as percentage of GDP did not keep pace and remained stable (from 22.4 per cent in 2000 to 22.8 per cent in 2007). Since the onset of the global crisis, investment as a percentage of GDP in advanced G20 countries has declined steeply. In 2012, the most recent year with available information, investment as percentage of GDP was, on average, 20 per cent, almost 3 percentage points below the peak reached just before the crisis. It is important to note that investment decreased much more than what had been expected on the basis of the stability in capital as percentage of GDP (Figure 7, panel A).

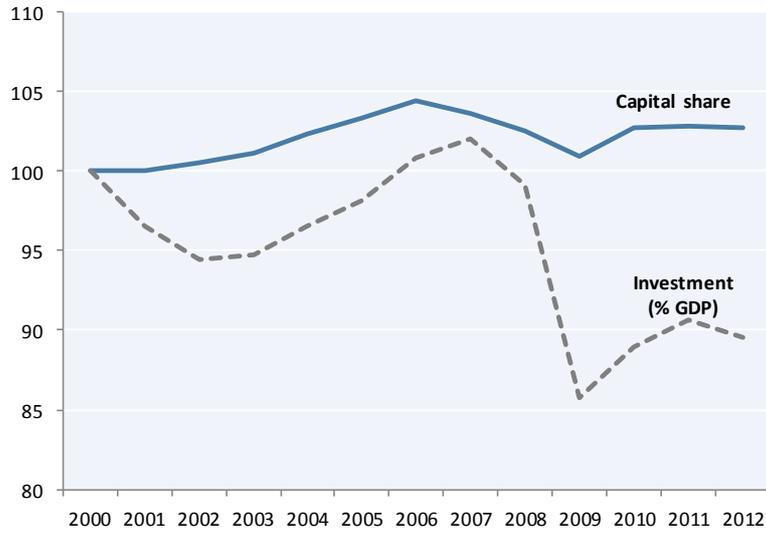
However, there is a stark contrast between advanced and emerging countries. Although in the emerging countries profit shares rose at similar pace than advanced countries, investment increased by close to 7 percentage points between 2000 and 2007. Moreover, investment in emerging G20 countries continued to increase over the crisis period, by 2.5 percentage points between 2007 and 2012 (Figure 7, panel B).

There are three main factors explaining the disconnection between growing profits and productive investment in advanced G20 countries. First, much of the increase in profits accrued in the financial sector. Secondly, in advanced economies, profits of non-financial corporations have increasingly been used to pay dividends and to invest in financial assets rather than to make productive investments. Finally, more recently, productive investment in advanced economies has been hampered by weak household, government and trade demand, combined in many countries with tight credit conditions, affecting small and medium-sized enterprises disproportionately (ILO, 2011).

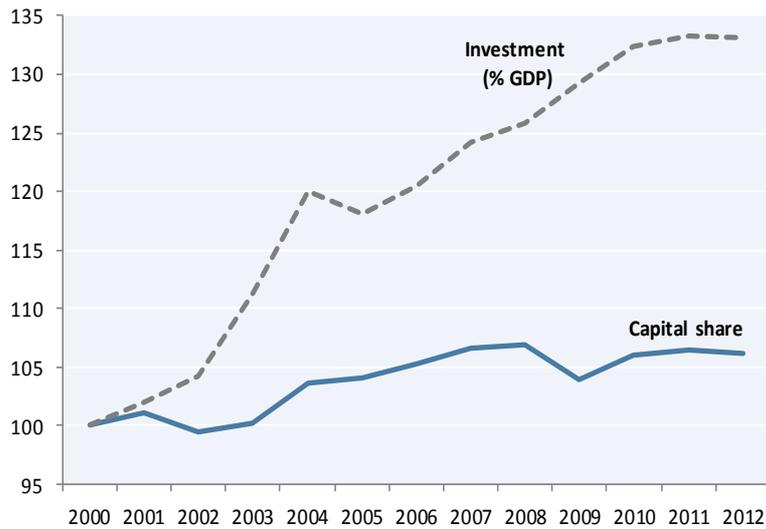
It is important to note that, when the negative impacts of falling labour share on private consumption are not offset by investment, countries tend to rely more on credit (household debts) and/or net exports in order to maintain aggregate demand. This may contribute to increasing economic instability and global imbalances. If many countries simultaneously pursue policies of wage moderation (as defined by wage growth lower than labour productivity growth), the result is likely to be a shortfall in global aggregate demand, with negative effects on most countries. If this occurs within a trading bloc with close economic ties, such as the European Union, the results can depress demand throughout the bloc and beyond.

**Figure 7. Capital share and investment developments in G20 countries**  
(percentages of GDP)

**Panel A. Advanced G20 countries**



**Panel B. Emerging G20 countries**



*Note:* The sample analyzed comprises 17 G20 countries, namely Australia, Brazil, Canada, China, European Union, France, Germany, India, Italy, Japan, Mexico, Republic of Korea, Russian Federation, Saudi Arabia, South Africa, United Kingdom and United States. Data for Brazil refer to 2000-2009; China: 2000-2011; European Union: 2002-2012; India: 2000-2011; Mexico: 2003-2012; Republic of Korea: 2000-2011; Russia Federation: 2002-2012; and Saudi Arabia: 2002-2009. Income groups are based on gross national income (GNI) per capita, according to the World Bank country classification. High-income countries are those countries with a GNI per capita of USD 12,476 or more. Averages are weighted based upon 2013 GDP at purchasing power parity.

*Source:* ILO calculations based on the OECD and UN National Accounts databases and IMF (2014).

## Annex A. What is the labour share and how is it measured?

The labour share measures the fraction of national income accruing to labour (Krueger, 1999). Although the idea is simple, there are challenges involved in measuring the labour share. The unadjusted labor share is usually calculated as the ratio of total compensation of employees – wages and salaries before taxes, plus employers’ social contributions – over a national product or income aggregate (Luebker, 2007). Regarding the numerator, issues arise as to who exactly is an employee (should CEOs be included?) and what should be counted as compensation (should stock options be counted as labour income?); the denominator can be measured for example as gross national income (GNI) or gross domestic product (GDP), and it may be measured at market prices or factor costs. Because measurement of value added is problematic in some sectors (particularly public administration, where value added in National Accounts is often just the sum of labour costs), the analysis sometimes focuses on the “corporate sector” (Karabarbounis and Neiman, 2013), or a subset of the economy (OECD, 2012).

However measured, the unadjusted labour share is a lower estimate of the true share of labour income because compensation of employees excludes the income from self-employment, which is recorded as “mixed income” in systems of National Accounts and may thus implicitly be recorded as capital income. Yet, at least part of mixed income should be seen as return to labour input, and hence as a relevant part of the labour share. Various methods to adjust the labour share have been tried in the literature. One simple method of adjustment assumes that two-thirds of mixed income can be attributed to the labour share; another method is to attribute to the self-employed the same wage as the average wages of employees; yet another method is to attribute earnings to the self-employed equal to wages of employees with similar industry- and personal characteristics<sup>6</sup>.

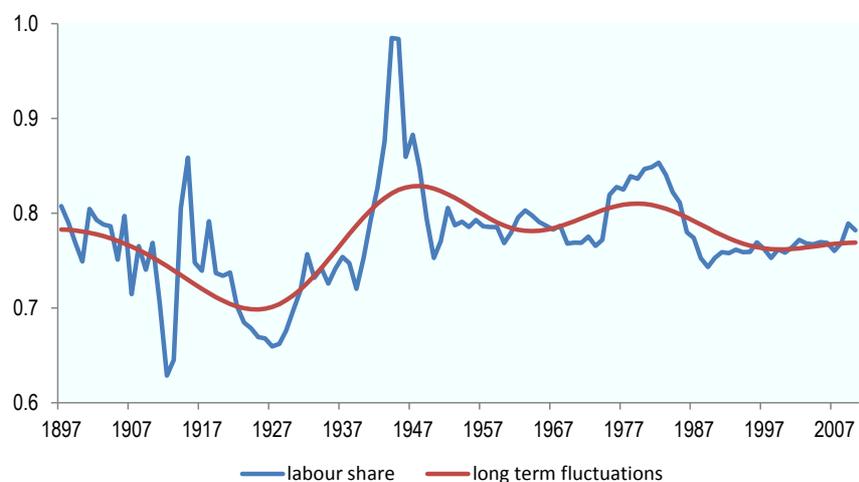
While these differences in the way adjustments can be made affect the level of the labour share, they do not generally affect trends (ILO, 2010; Guerriero, 2012). It is important however to carefully interpret adjusted and unadjusted labour shares. Structural shifts from self-employment (like family farming) to wage employment tend to raise the unadjusted labour share more than the adjusted one. This should be kept in mind, particularly when looking at trends in emerging and developing countries where the share of self-employed workers and unincorporated enterprises is larger than in advanced economies, and where the unadjusted labour income share is thus generally lower than in more developed countries. Once labour shares are adjusted for self-employment, it is not obviously the case anymore that labour shares are lower in poorer countries (Gollin, 2002; Guerriero, 2012).

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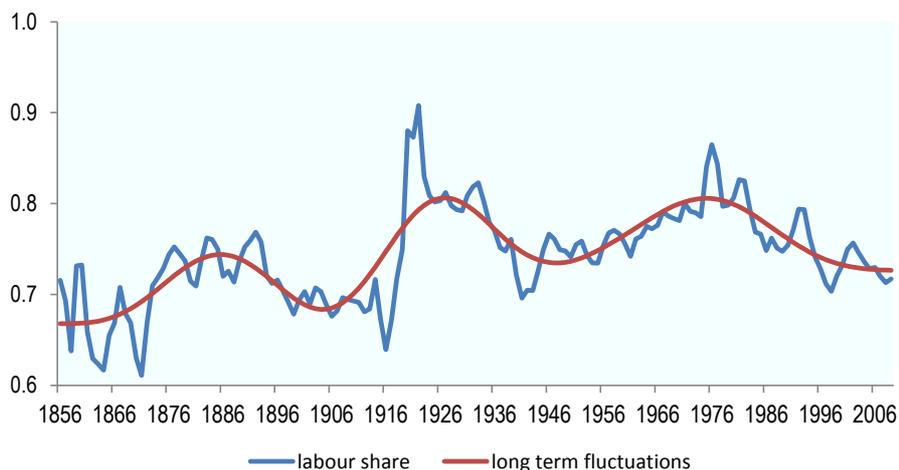
<sup>6</sup> See Guerriero, 2012; Gollin, 2002, Arpaia *et al.*, 2009, or Freeman, 2011

## Annex B. The labour share in historical perspective: France, United Kingdom and United States

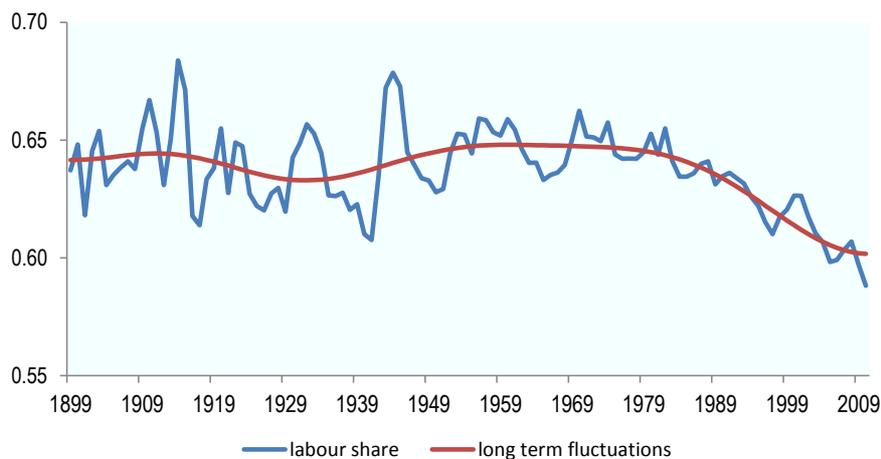
Panel A: France



Panel B UK



Panel C: United-States



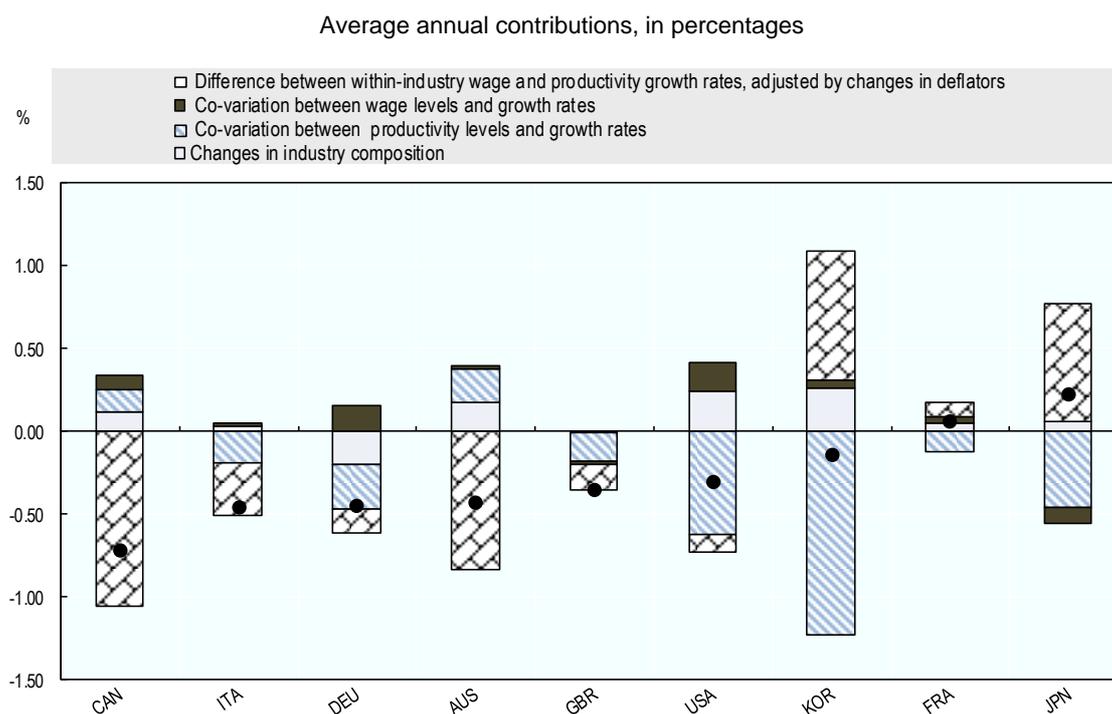
*Note:* The long term fluctuations are obtained performing a frequency analysis using a maximum overlap discrete wavelet transform. For details about the methodology see Charpe and Bridji (2015).

*Source data:* Piketty and Zucman (2014) and Groth and Madsen (2013).

## Annex C

In Figure A.3, percentage changes in the labour share are decomposed into the contributions of: *i*) within-industry average growth differences between real wages and productivity, measured using a common deflator; *ii*) the reallocation across industries (towards or away from high-labour-share industries – the standard static composition effect discussed in subsection 1.2 above); and *iii*) the correlations between *growth rates* and *levels* of real wages and productivity (see OECD, 2012, Box 3.3 for the detailed methodology). The latter terms capture cross-industry convergence or divergence patterns of wages and productivity. In fact, if wages diverge – that is, larger growth rates occur in high-wage industries – aggregate wage growth will be faster and, *ceteris paribus*, the labour share will increase. By contrast, the converse holds for productivity. For example, when productivity increase faster in high-productivity industries, but the growth rate of wages is more homogeneous across industries, aggregate real wages grow less than aggregate productivity, even taking into account the dynamics of different deflators, and the labour share will decrease.

Figure A.3. **The role within- and between-industry changes in productivity and wages in explaining trends in the private-sector labour share, 1990<sup>a</sup>-2007<sup>b</sup>**



*Notes:* Extended shift-share decomposition of the percentage change of the labour share in the private or business sector, i.e. those industries where most firms are privately-owned, partitioned in 20 industries, excluding agriculture, mining, fuel manufacturing and real estate. The wage of the self-employed is imputed assuming that in each industry their hourly wage is the same as for the average employee of the industry. The difference in the growth rate in consumption and industry-specific output deflators has been subtracted from the difference in the growth rate of industry-specific real wages and productivity.

*a)* Germany: 1992.

*b)* Canada: 2004; Korea: 2005; Japan: 2006.

*Source:* OECD calculations based on EUKLEMS.

## Annex D

According to OECD estimates (OECD, 2012) based on a wide arrays of econometric methods for the analysis of cross-industry/cross-country/time-series data (including different types of dynamic GMM estimators), total factor productivity (TFP) growth and capital deepening – the key drivers of economic growth – are estimated to jointly account for as much as 80 per cent of the average within-industry decline of the labour share in OECD countries between 1990 and 2007. What explains this strong negative effect of technical change and capital accumulation? One possible explanation has to do with the diffusion of information and communication technologies (ICT), which in turn has created opportunities for unprecedented advances in innovation and invention of new (increasingly cheaper) capital goods and production processes. This has boosted productivity but also allowed extensive automation of production and high substitution between capital and labour (see e.g. Greenwood and Jovanovic, 1999; Brynjolfsson and McAfee, 2011). This conclusion is confirmed by Arpaia et al. (2009) who, using a structural model, suggest that in the past twenty years, technical change was in fact *capital-augmenting* (while it was labour-augmenting, thereby pushing up the labour share, in the first half of the twentieth century). By contrast, they argue that the high degree of substitution between capital and labour was in fact due to high substitution between capital and low-skilled labour and complementarity between capital and high-skilled labour. Other scholars have advanced the possibility that, within this context, technical change could be even *labour-replacing*, in the sense that technological progress takes the form of machines replacing tasks previously performed by labour. In turn, this would especially reduce job opportunities for low-educated workers and, in practice, dampen the aggregate productivity of low-skilled labour (see Zeira, 1998; Arthur, 2011; and the survey on machine-replacing-labour technical change in Acemoglu, 2011).

Both interpretations appear consistent with two additional pieces of empirical evidence emerging from OECD research (OECD, 2012). First, in the last decades, labour productivity growth has been associated with increases in the share of those with tertiary education in labour compensation and contractions of the shares of those with lower levels of education, and particularly those with less than upper secondary education. Second, decomposing further the association between productivity growth and the decline of the share of the low-educated in total compensation, ICT capital accumulation appears to have had an especially negative effect on the lowest educated, while TFP growth has affected particularly the share of those with intermediate education. These two results taken together suggest that, in the period under analysis, technical change embodied in ICT capital was strongly biased *against* the low-educated, while disembodied technical change was strongly biased *towards* high-skilled labour. While the first result is fully consistent with the literature on skill-biased technical change, one possible explanation of the latter is that disembodied technical progress reflects embodiment in intangible capital (entrepreneurship, output from R&D departments, better management, high-performing human resource practices) – that is improvements that are essentially incorporated in highly-qualified personnel.

From a policy perspective, however, it is not possible with the available data to assess whether the negative relationship between technical progress and changes in the labour share is a long-lasting relationship or is specific to the past decades and will progressively disappear when the process of diffusion of ICT-based technologies slows down. On the one hand, the standard view in the theory of economic growth is that, in the long-run, capital and labour are complements and technical change augments the factor that cannot be accumulated (that is labour, see e.g. Acemoglu, 2002). Hence, capital-augmenting technical change and substitutability between capital and labour are likely to be only a temporary phenomenon due to the rapid diffusion of ICT-based technologies and related innovations. By contrast, within this view, to the extent that the skilled labour supply increases faster, thereby increasing incentives to create capital goods complementary to skilled labour, technical change would remain biased against the unskilled. On the other hand, a more pessimistic view considers that ICT has changed the nature of technological advances, making them more rapid but incorporated in machines whose main purpose is to replace jobs previously held by certain categories of workers (Brynjolfsson and McAfee, 2011; Acemoglu, 2011). If this were the case, most workers, and in particular the least educated, would find themselves in a “race against the machine”, thereby increasingly worsening their relative position.

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