

# FUNCTIONAL INCOME DISTRIBUTION AND ITS ROLE IN EXPLAINING INEQUALITY

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*This paper is motivated by two parallel trends at the center of the policy debate – the declining labor share of income and increasing income inequality. We use samples drawn from both household surveys and macroeconomic data, covering up to 93 advanced, emerging and developing countries between 1970 and 2013, and assess whether the declining labor share of income has been a key factor driving growing inequality. The major conclusion is that the most important determinant of income inequality is not the share of the labor income, but inequality in wages, which has increased notably in the recent past. Behind the increase in the dispersion of wages, we find that financial globalization has played an important role. Industry unionization, higher educational attainment and larger welfare states help reduce wage dispersion.*

## 1 Introduction

In the years preceding the crisis, analysts and policy makers have wondered about diverging trends between aggregate measures of economic performance (such as economic growth) and stagnating wages and household incomes. This also revived public interest in the issue of whether capital was receiving too high a share of the economic pie.<sup>1</sup> In 2006 Ben Bernanke, the Chairman of the Federal Reserve, expressed the hope that “corporations would use some of those profit margins to meet demands from workers for higher wages” and in 2007, Germany’s finance minister asked European companies to “give a fairer share of their soaring profits.”<sup>2</sup> Interest in these contrasting trends has deepened since the onset of the financial crisis. It has been driven in part by the rescue of financial institutions by many governments juxtaposed with rising unemployment and inequality.<sup>3</sup>

A brief examination of the time series of income inequality (measured by the Gini index) and the labor share of income<sup>4</sup> in Group of Seven countries shows that the wage share has indeed been declining since the 1970s while inequality has been on the rise (Figure 1). On average, the wage share declined by 12 percent while income inequality increased by 25 percent in some advanced economies in barely three decades.

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The authors wish to thank Andrea Brandolini, Benedict Clements, and Sanjeev Gupta for their helpful comments and suggestions. They are also grateful to participants at the Fiscal Affairs Department seminar and at the 17<sup>th</sup> Banca d’Italia Workshop on Public Finance (Perugia, April 9-11, 2015) for their valuable feedback and to IMF colleagues for their comments. Ryan Espiritu and Louis Sears provided excellent research assistance. The views expressed in this paper are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

A version of this paper will be published as Chapter 6 in *Inequality and Fiscal Policy*, edited by Benedict Clements, Ruud de Mooij, Sanjeev Gupta, and Michael Keen (International Monetary Fund, 2015).

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<sup>1</sup> In this paper, capital incomes include both profits and rents, that is, all value added that does not accrue to labor (including self-employment).

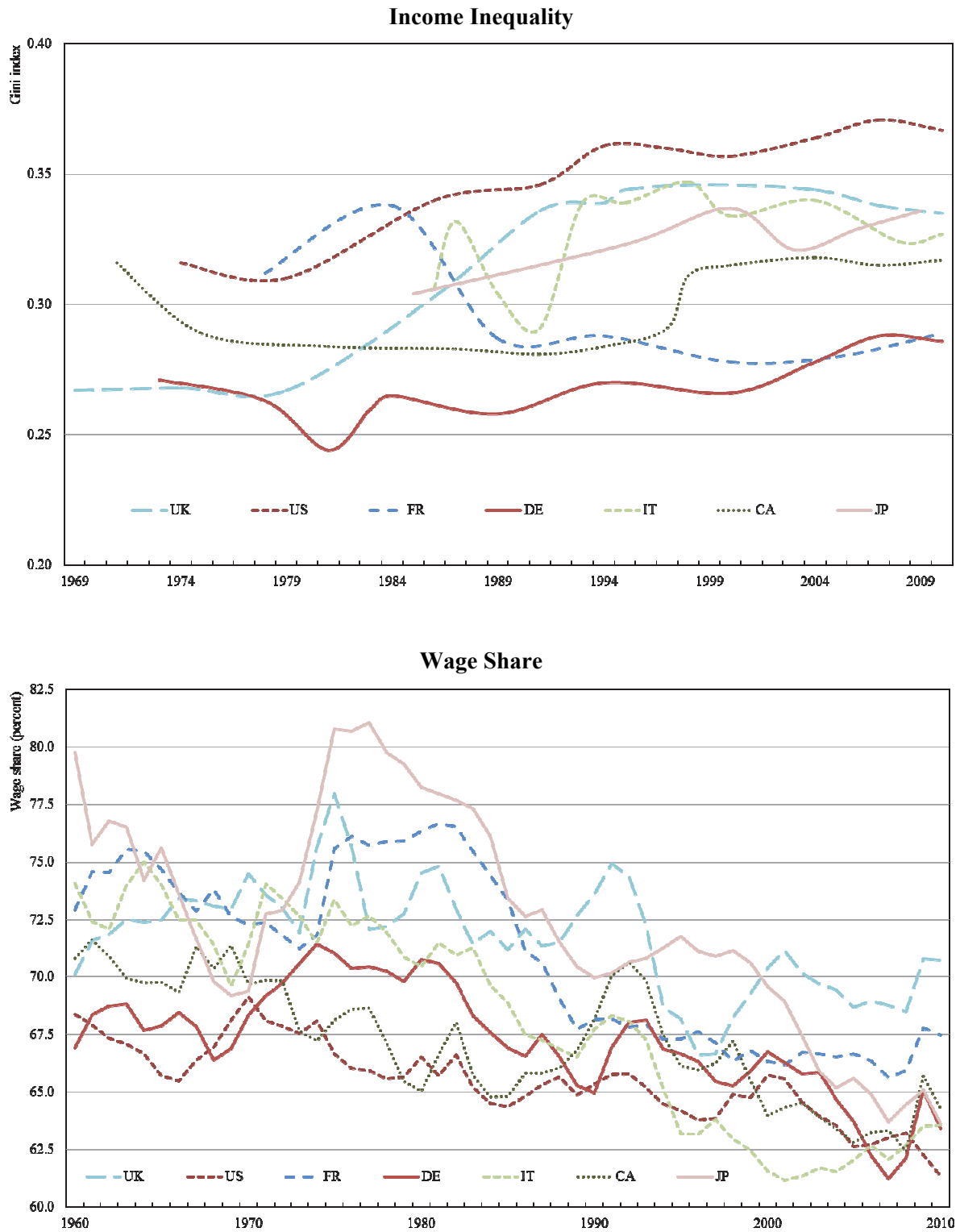
<sup>2</sup> See Glyn (2009) citing Bernanke’s statement reported by the New York Times (July 20, 2006), and Germany’s finance minister declaration reported by the Financial Times (February 28, 2007).

<sup>3</sup> The flurry of ensuing policy work and analysis has even caught Wall Street companies like Standard’s and Poor and Morgan Stanley, who released their first reports on inequality in the fall of 2014 (Rotondare 2014).

<sup>4</sup> For the rest of the paper, “labor share” of income and “wage share” of income are used as synonymous.

Figure 1

## Income Inequality and Wage Share in Group of Seven Countries



Sources: Luxembourg Income Study for Canada, France, Germany, Italy, United Kingdom, and United States and Organisation for Economic Co-operation and Development for Japan (panel 1). For the years in which the Gini coefficient is available both from the OECD and LIS, data are in line and show similar patterns; European Commission AMECO database (panel 2).

While apparently correlated, these two phenomena may not be directly linked in a causal relationship. Income inequality refers to the personal distribution of income, and the labor share refers to the remuneration of employees in total factor income (value added) in a given year. The classical economists of the 19<sup>th</sup> century took for granted that capitalists were rich and their income was solely based on the returns on capital, while laborers were poor and only relied on wages. But the world has evolved during the 20<sup>th</sup> century, and scholars working in this field acknowledged that the study of factor shares and inequality became more difficult as evidence started to show mixed realities where “many employees earn more than capitalists, many property owners work and many workers own property” (Lydall, 1968: 2).

In this paper, we test if the declining labor share of income has been a key driving factor for growing inequality. We conclude that it is not – the most important determinant of rising income inequality has been the growing dispersion of wages, especially at the top of the wage distribution. This echoes the results of Piketty (2014), who concludes that inequality of total income is closer to inequality of income from labor.

While these results confirm previous findings in the literature, the paper makes an important contribution by providing evidence from a wide sample of countries and simultaneously analyzing microeconomic data from household surveys and macroeconomic data from national accounts. As it is well known, micro and macro data do not always perfectly match. However, we find that they reveal broadly similar trends.

The remainder of the paper is organized as follows. Section 2 briefly reviews the relevant literature. Section 3 explains how the Gini index can be decomposed and linked to factor shares and pseudo-Gini indexes of the income sources, and applies this decomposition to available micro data. For this exercise we use the vast sample of income surveys made available to researchers by the Luxembourg Income Study (LIS) data center. Working on 231 household surveys covering 43 countries over the period 1978-2010, we compute the marginal effects of changes in factor shares and in the dispersion of labor and capital on the Gini index for market income. Section 4 broadens the scope of our analysis and uses macroeconomic data for a large set of 93 countries over the period 1970 to 2013, to explore the aggregate effect of the labor share on income inequality. Finally, Section 5 presents final remarks and our main conclusions.

## 2 Review of the literature

The analysis of factor shares of income was considered the principal problem of political economy by classic economists like David Ricardo. Up until the 1960s, this topic was given great preeminence in economic textbooks and academic research. When Kaldor famously summarized the long term properties of economic growth (Kaldor, 1961), he stated that the shares of national income received by labor and capital were roughly constant over long periods of time. The analysis of factor income shares was the subject of ninety percent of the papers presented at the conference of the International Economic Association in 1965 (Marchal and Ducros, 1968; Glyn, 2009). The dominant theme was that factor shares were important for the macroeconomic performance of economies, as they are linked to the potential problem of profits squeeze or real wages growing above productivity (Glyn and Sutcliffe, 1972; Bruno and Sachs, 1985; Eichengreen, 2007).

Since the 1970s, however, the analysis of factors shares has no longer been at the center of economic debates, given their lack of volatility and reflecting the fact that “the division of income could be easily explained by a Cobb-Douglas production function” (Makiw, 2007: 55). Those concerned with personal income distribution emphasized that there was no direct (or mechanical) link with factors shares, and that difference in personal income were related to differences in educational attainment (Stigler, 1965; Goldfarb and Leonard, 2005). In addition, a broader share of

the population was starting to enjoy some kind of capital income. As home ownership, financial assets holdings and capital-funded pensions expanded in advanced economies, the division into (pure) workers receiving only wages and (pure) capitalists/landlords receiving only profits/rents became blurred, thus contributing to the decline in attention paid to this theme.

Interest in the analysis of factors shares returned in the early 2000s. Atkinson (2009) cites three reasons to explain this growing attention: first, the analysis of factors shares is useful for understanding the link between incomes at the macroeconomic level (national accounts) and incomes at the individual/household level; second, factor shares can potentially help explain inequality in the personal income (at least partly, if certain types of income are mainly received by some type of economic agents); and last “they address the concern of social justice with the fairness of different sources of income” (Atkinson 2009, 5).

Initially, researchers returning to work in this area focused on explaining the shifts in the labor share (Bentolila and Saint Paul, 2003), its gradual but constant decline (De Serres and others, 2001; Gollin, 2002) and the relationship between wages and productivity (Dew-Becker and Gordon, 2005; Feldstein, 2008). The perception that citizens were not fully enjoying the fruits of the long period of economic expansion of the late 1990s and early 2000s attracted the attention also of national policy-makers and international organizations. The IMF (2007, 2014), the European Commission (2007), the Bank for International Settlements (Ellis and Smith, 2007) and the OECD (2008) all published reports that documented the decline in the labor share of income and provided several explanations of this trend, mainly linked to the impact of globalization and technological change on labor skills, international capital mobility, and wage bargaining.

Since then, contributions in this field can be divided into two groups: a group of papers that document the recent and constant decline in the labor share and seek to explain the main drivers of this decline; and another group of studies that focuses more on its consequences for economic inequality. In the first group of papers, most researchers have used survey data and focused on single countries – mainly the US (Gomme and Rupert, 2004; Harris and Sammartino, 2011; Elsby and others, 2013); others have analyzed instead macroeconomic data and cross-country developments (ILO, 2011 and 2012). In particular, the ILO contributions have highlighted the impact of capital mobility on the evolution of factors shares over the last decades. Stockhammer’s report published by ILO (Stockhammer, 2013) finds a strong negative effect of financial liberalization on the wage share and documents the consequences of cutbacks in welfare payments and globalization. The available evidence on the effects of technological change on labor income shares are mixed (positive in developing economies and modestly negative in advanced ones). Recently, Karabarbounis and Neiman (2014) attribute the declining share of labor income to the decrease in the relative price of investment goods, often ascribed to advances in information technology and the computer age, which have induced firms to shift away from labor and towards capital. According to these authors “the lower price of investment goods explains roughly half of the observed decline in the labor share, even when we allow for other mechanisms influencing factor shares such as increasing profits, capital-augmenting technology growth, and the changing skill composition of the labor force” (Karabarbounis and Neiman, 2014, 16).

In the second group of studies, mostly focused on the interplay between functional income distribution and income inequality, researchers have also worked with survey household data from single countries. This is the case of Adler and Schmid (2012) who find that declining labor income shares are associated with growing inequality and an increasing concentration of market income in Germany. Similarly, Jacobson and Occhino (2012a, 2012b) follow Lerman and Yitzhaki (1985) and decompose the Gini coefficient into the weighted average of the pseudo-Gini indexes of labor and capital income, with the weights equal to the two income shares. Using household data for the US, they confirm that the decline in the labor share made total income less evenly distributed and more concentrated at the top of the distribution, thus increasing income inequality in the US.

According to their results, a 1 percent decrease in the labor share of income increases the Gini coefficient in the US by 0.15-0.33 percent. A recent ILO report addresses the relation between wages and inequality using several sources, and it comes to the conclusion that “inequality starts in the labor market” (ILO, 2015: xvii), meaning that developments in the distribution of wages have been key factors for inequality dynamics.

In this context, the major contribution of this paper is that we perform a deeper empirical analysis than previous studies, by using more micro and macro data sources and pooling them across a larger set of countries.

### 3 Income shares or the distribution of income? A look at household data

In this section we explore how changes in labor and capital income shares and their distribution have impacted on the dynamics of income inequality. The inequality measure that we use is the Gini index because it is the most widely income inequality measure used both in the literature and in policy analysis. The data source is the Luxembourg Income Study Database (LIS). We use a very wide set of household surveys covering a large sample of economies and spanning more than three decades. This allows us to look for regularities that are supported by a broad empirical base.

We start by writing down a decomposition of the Gini index which can then be applied to micro-data. Our decomposition analysis follows an established path in the literature (Lerman and Yitzhaki, 1985 and CBO, 2011) and breaks down changes in the Gini index into changes in the income components and variations in their pseudo-Gini (or concentration) indices. In particular, assuming that household’s income ( $y$ ) comes from  $K$  sources, the following relation applies (see Appendix A for details on how the decomposition is obtained):

$$G_y = \sum_{k=1}^K C_{y_k} S_k \quad (1)$$

where  $G_y$  is the Gini index for total income  $y$ , and  $C_{y_k}$  and  $S_k$  are respectively the pseudo-Gini (or concentration) indexes and the shares of each income component (given that  $y = \sum_{k=1}^K y_k$ ). Pseudo-Gini indexes capture the level of ‘unevenness’ of the distribution of each income component and are proportional to the Gini index of the income category ( $C_{y_k} = \rho_k^{Gini} G_{y_k}$ ).<sup>5</sup> As equation (1) indicates the Gini index can therefore be represented as a weighted average of the pseudo-Gini indexes of income components, where the weights are the income shares.

Changes in the overall Gini index occurring over a period starting at time  $t=t_0$  can therefore be summarized as follows:

$$\Delta G_y = \underbrace{\sum_{k=1}^K \Delta s_k C_{y_k}^0}_{\text{impact of changes in the incomes shares}} + \underbrace{\sum_{k=1}^K \Delta C_{y_k} s_k^0}_{\text{impact of changes in the concentration of the income components}} + \underbrace{\sum_{k=1}^K \Delta s_k \Delta C_{y_k}}_{\approx 0} \quad (2)$$

where the third addend can safely be assumed to be close to zero.

<sup>5</sup> See Appendix A also for a discussion of the relation between Gini and pseudo-Gini indexes and its interpretation.

Given equation (1) it is also possible to recover the marginal impact of changes in pseudo-Gini indices:

$$\frac{\delta G_y}{\delta C_{y_k}} = s_k \quad (3)$$

As to the impact of changes in the income shares, assuming that a variation in labor income ( $l$ ) is compensated by an opposite change in capital income ( $c$ ), while everything else stays the same, we have:

$$\frac{\delta G_y}{\delta s_l} = C_l - C_c \quad (4)$$

If the pseudo-Gini index of capital is higher than that of labor, an increase in the labor share reduces inequality (while a reduction raises the Gini index). This condition requires the Gini index for capital income to be ‘sufficiently’ higher than that of labor.

We compute empirical values for the decomposition of the Gini index using the LIS database; Appendix B presents how the breakdown is computed.

In terms of analysis, we start first by considering a small sample of advanced countries: the United States, the United Kingdom, Germany and France. These countries are the Group of Seven members with the highest and the lowest income inequality level (Figure 1); in addition, we can exploit longer series, allowing us to consider developments over an extended period, which is useful given that inequality tends to move slowly.

Table 1 reports the results of decomposing the change in the Gini index (according to the breakdown described in (2)) observed in these countries over the last three decades.<sup>6</sup> We start by considering disposable income  $y_{net}$  (market income plus transfers and minus taxes); the increase in inequality has been significant: more than 25 per cent and 35 per cent respectively in the US and the UK, almost 10 per cent in Germany. In France, inequality is lower than in the seventies and mid eighties, and has been substantially stable since the mid nineties with a slight pickup in recent years.<sup>7</sup> If we look at market income  $m$ , for all the countries the increase in inequality has also been substantial.

Given the wealth of data offered by the LIS database, the empirical decomposition of the Gini index for market income can be extended to a larger sample of countries (43 in total) that includes not only advanced economies (26) but also emerging ones (17). Selecting as a starting year the oldest available income survey in each country since the late 1970s, the analysis can be expanded to include a total of 231 income surveys covering the past three decades (Appendix Table 7).<sup>8</sup>

Once we have calculated the components of the Gini index, we can compute for each country the average marginal effects of changes in the income composition and the pseudo-Gini

<sup>6</sup> The results presented here are robust to using alternative decomposition measures to calculate the contribution of income components to overall inequality. See the discussion in Appendix A and in footnote 30.

<sup>7</sup> The Gini index for disposable income for France published by the OECD, which covers the period 1996-2011, displays values close to those that can be computed using LIS data. For the most recent years it shows that inequality has been slightly increasing also in this country.

<sup>8</sup> Household surveys over such a long period and covering a broad set of countries are obviously heterogeneous. Of course, pooling all the data would not be advisable. The analysis therefore proceeds by considering each survey separately (taking into account whether income and income components are recorded net or gross of taxes), then assessing the impact on inequality of the different factors for each country and finally across the entire sample.

Table 1

## Decomposition of Changes in Inequality (Measured by the Gini Index)

	US 1979-2013	UK 1979-2010	DE 1978-2010	FR 1978-2010
$DG_{ynet}$	0.08	0.10	0.03	-0.01
Impact of changes in taxation	0.01	0.00	-0.02	0.00
$DG_y$	0.07	0.10	0.05	-0.01
Impact of changes in transfers	-0.03	-0.03	-0.03	-0.03
$DG_m$	0.10	0.13	0.08	0.02
Impact of changes in income shares				
<i>labour</i> $DS_l(C_l^0 - C_c^0)$	0.00	0.00	0.01	0.00
Impact of changes in pseudo-Gini indexes				
<i>labour</i> $s_l^0 DC_l$	0.09	0.13	0.06	0.03
<i>capital</i> $s_c^0 DC_c = -s_l^0 DC_c$	0.01	0.00	0.02	0.00
Residual	0.00	0.00	0.00	0.00
$G_{ynet}^0$	0.31	0.27	0.26	0.33
$G_{ynet}$ in the final year	0.40	0.36	0.29	0.31
$G_y^0$	0.36	0.30	0.29	0.34
$G_y$ in the final year	0.43	0.40	0.34	0.33
$G_m^0$	0.41	0.39	0.42	0.44
$G_m$ in the final year	0.51	0.52	0.49	0.47
$G_l^0$	0.44	0.43	0.45	0.46
$G_l$ in the final year	0.53	0.57	0.54	0.53
$G_c^0$	0.92	0.88	0.61	0.97
$G_c$ in the final year	0.94	0.97	0.87	0.88

Source: authors calculations on LIS data. The decomposition of changes in market income inequality (lines 6 to 9 in the table) follows equation (19) in Appendix B. Appendixes A and B detail the methodology used for the Gini index decomposition.

indices for labor and capital. The results we obtain from this extended sample mirror those described for the US, UK, Germany and France. The main hypothesis is confirmed. The variable that has had the most sizeable impact on market income inequality (as measured by Gini coefficients) is the change in the pseudo-Gini index of labor income; increases in the unevenness of capital income also raise inequality, but by a much smaller degree given that wages represent the lion's share of market income for the vast majority of the surveyed households (see Table 2 and Figure 2 which report average marginal effects on inequality). Computed at sample average values, we find that a 10 per cent increase in the pseudo-Gini index of labor income would increase the Gini index for market income by more than 9 per cent.

Table 2

## Average Effects on the Gini Index for Market Income

	All countries	St. Dev	T	P> t
<b>Impact of a 0.01 change in the share of labor income</b>				
$dG_m/ds_l$	-0.0004 **	0.0012	-2.2889	0.0272
<b>impact of a 0.01 increase in the pseudo-Gini index</b>				
$dG_m/dC_l$	0.0096 ***	0.0003	250.3138	0.0000
$dG_m/dC_c$	0.0004 ***	0.0003	9.8787	0.0000
Significance levels are computed using standard deviations calculated over the sample of 43 countries (26 advanced and 17 emerging) considering the available income surveys since the late 1970s.				
Significance level: * 10%, ** 5%, *** 1%				
Subsamples	Advanced economies	Emerging economies		
<b>Impact of a 0.01 change in the share of labor income</b>				
$dG_m/ds_l$	-0.0001	-0.0010		
<b>impact of a 0.01 increase in the pseudo-Gini index</b>				
$dG_m/dC_l$	0.0096	0.0097		
$dG_m/dC_c$	0.0004	0.0003		

Source: authors calculations on LIS data.

Consistent with previous studies, we find that on average increases (reductions) in the wage share reduce (raise) the Gini index. In our sample, however, this effect is small but statistically significant. For the average values observed in our sample, a 10 per cent decline in the labor share would increase the inequality index of market income by about 0.9 per cent. This result is mostly driven by emerging market economies, due to the larger difference between the pseudo-Gini index of capital and labor income relative to advanced countries.<sup>9</sup> The overall picture, in terms of magnitude and relevance, of the marginal effects of changes in income shares and pseudo-Gini indices, however, is not very different in the two subsamples of countries (Figure 3).

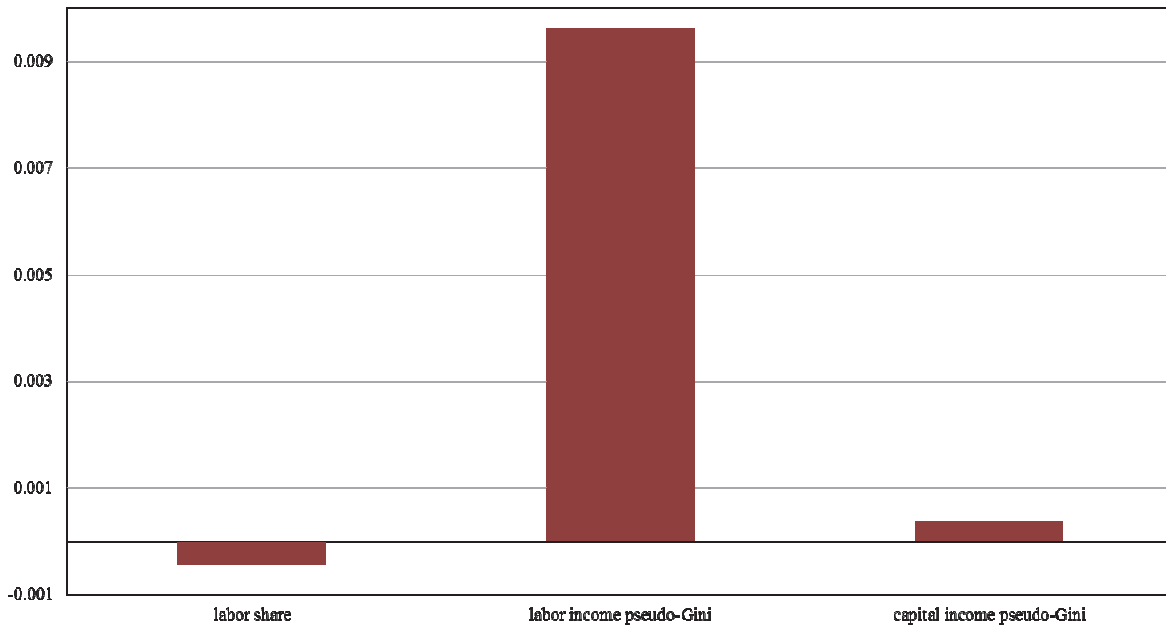
A few remarks may also help qualify our findings and underscore some important aspects. As observed, our micro data analysis suggests that shifts in functional income distribution have an effect, even though a small one, that depends on the difference between the unevenness of the distribution of labor and capital incomes. If the 'unevenness' in the distribution of labor income approaches that of capital income (which has historically been higher), then how income is functionally distributed no longer matters for inequality.

<sup>9</sup> The pseudo-Gini index for capital income in emerging economies is on average higher (by 0.16) than in advanced economies, the difference for labor income is less than half (0.07).



Figure 2

**Marginal Impact on the Gini index for Market Income of Changes in the Labor Share and Pseudo-Gini Indexes for Labor and Capital**



Source: authors' calculation on LIS data.

Note: average values across countries (43 countries; 231 observations/income surveys).

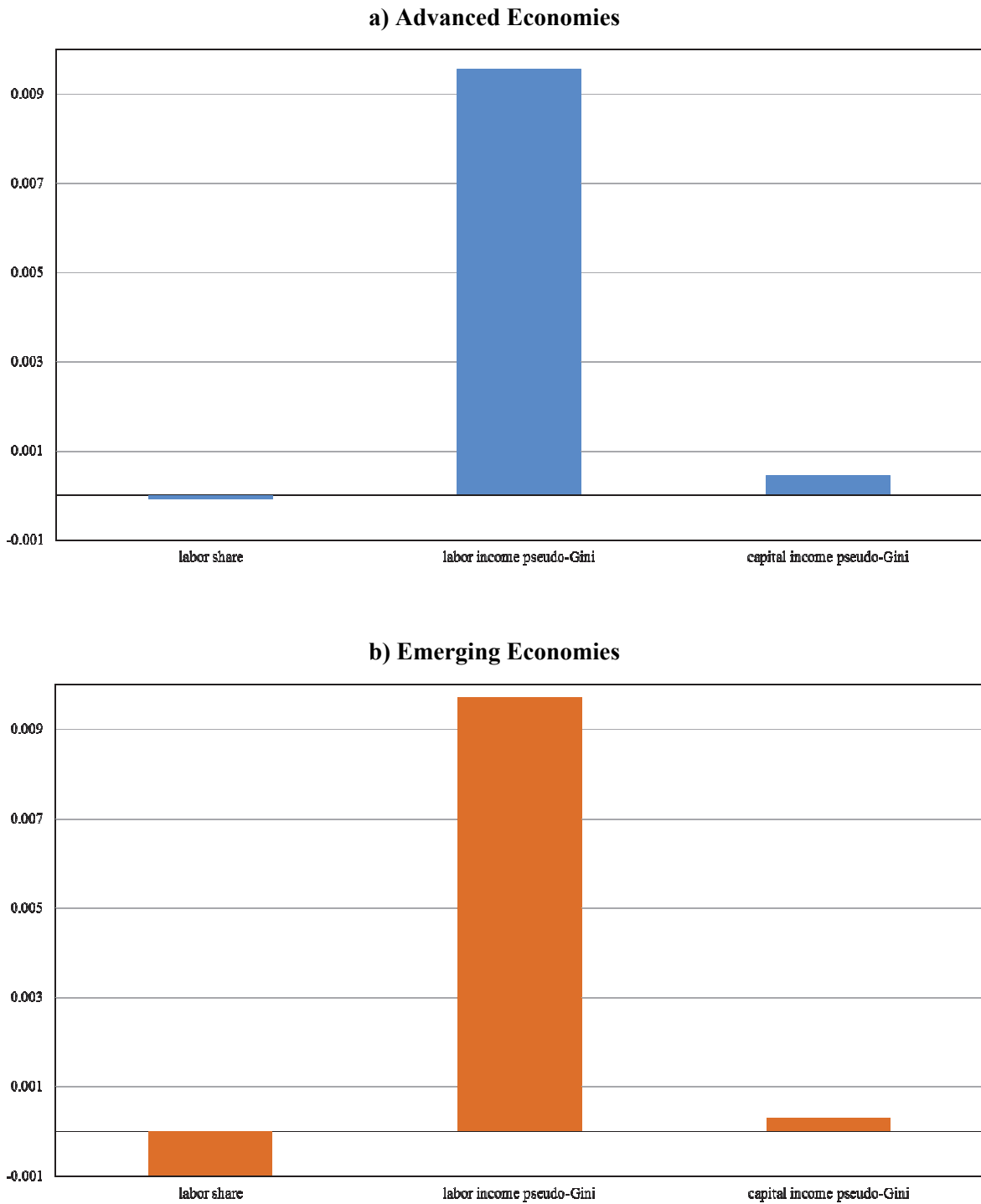
As to the estimates obtained in our empirical exercise, it is worth remembering that they are affected by the weaknesses traditionally associated with income surveys: the latter generally underreport the extent of capital income; they also do not capture very accurately the tail of the income distribution (generally, the exceptionally rich are poorly represented). Our analysis therefore likely underestimates what has been happening at the top of the income scale and the relevance of developments concerning capital earnings. Recent work (Alvaredo *et al.*, 2013) on the top 1 per cent (or even smaller groups of very rich earners) would suggest that the share of income accruing to top earners has been increasing even more rapidly than that appropriated by other (less) rich percentiles. Even though our estimates may not appropriately incorporate these developments, we think, however, that our empirical results capture well the general trends.

#### 4 Labor share and inequality in a macro framework

This section addresses the same issue (the link between functional income distribution and inequality) in a different framework. We move to a macro framework to verify whether the main findings (that the increasing inequality of labor income is more important than the declining labor share to explain the observed increase in total income inequality) still hold. The estimations presented in this section have the purpose to ascertain if robust correlations exist, while a fully-fledged analysis of the determinants of income shares and inequality is beyond the scope of this paper. The framework also controls for simultaneous additional factors that affect the labor share and the Gini index.

Figure 3

**Marginal Impact on the Gini Index for Market Income of Changes in the Labor Share and Pseudo-Gini Indexes for Labor and Capital**



Note: average values across countries (panel a: 26 countries; 174 observations/income surveys; panel 2: 17 countries; 57 observations/income surveys)

Source: authors' calculations on LIS data.

To preserve continuity with the definition we used in Section 3, we write the Gini coefficient for disposable income as:

$$G_{y^{net}} = C_c + (C_l - C_c)s_l + r \quad (5)$$

where  $r$  is the redistributive impact of the tax/welfare system (which we proxy by public revenues to GDP, and social protection and health spending to GDP).<sup>10</sup> It should be noted that government action may also have an indirect impact on inequality, via an effect on market income allocation. In the analysis presented here, we do not aim at disentangling the direct and indirect effects, but at controlling for this factor when estimating the correlation between inequality and the wage share.

From (5) we derive an equation that we estimate for a sample of 93 advanced, emerging and low income countries. We recognize that the labor share reflects underlying economic developments (mainly in the labor market) and end up with the following specification:

$$\begin{cases} G_{y^{net},it} = \alpha_i + \beta s_l + \gamma_{it} + \varepsilon_{it} \\ s_{l,it} = a_i + \sum_{j=1}^J \theta_j x_{j,it} + v_{it} \end{cases} \quad (6)$$

where  $\varepsilon_{it}$  and  $v_{it}$  are error terms;  $i$  and  $t$  are indices for country and time;  $x_j$  are  $J$  factors that impact the labor share of income, such as the rate of unemployment, the share of employment in the services sector, and the type and intensity of wage-setting coordination.

The dataset we use in our empirical exercise (an unbalanced panel) covers a large sample of countries; the number of observations drops when we add control variables and when we move to a structural model that allows simultaneous estimation of the wage share and Gini equations as in (6).<sup>11</sup> The period covered is from the 1970s to 2013, although the coverage for each country varies (Appendix Table 8 reports the earliest and latest value for the Gini index for the countries included in our sample). The database is explained in detail in Appendix C. As to the estimation methodology we start exploring separately the wage share and Gini equations using panel techniques.<sup>12</sup> We then run a structural model which includes simultaneously both equations (to account for the endogeneity of the wage share in the Gini equation).<sup>13</sup> Our interest is in the Gini equation, to ascertain whether the small effect of the wage share is confirmed.

Table 3 presents the results we obtain when estimating separately a wage share equation. Our preferred specification (columns 4 and 5)<sup>14</sup> captures the effect of labor market indicators and

<sup>10</sup> The analysis on micro data (also reflecting data limitations for tax and transfers for our very wide sample of countries) allowed us to recover marginal effects on market income inequality. Since here we use the Gini index for disposable income as a dependent variable, the impact of the tax/transfers system must be taken into account in order to present a framework which is as consistent as possible with that of section 3.

<sup>11</sup> The sample includes about 800 observations for our preferred specification of the wage share equation (Table 3, columns 4 and 5) and 350 for our preferred specification of the Gini equation (Table 4, columns 6 and 7). When the two equations are estimated together the sample size drops to 300 and 150 observations (Table 5, columns 5 and 6); the largest fall in the number of observations is caused by the addition of the variables that capture the wage bargaining set up, which are available for a reduced number of countries. Another factor that reduces the sample size is related to the Gini coefficient not being available for all the years but at a lower frequency.

<sup>12</sup> We run both a fixed and a random effect model. The Breusch and Pagan LM test suggests that a fixed effect model is appropriate.

<sup>13</sup> Our model includes two linear simultaneous equations. The labor income share is treated as an observed endogenous variable in the Gini equation. The model is estimated using a (full information) maximum likelihood estimator.

<sup>14</sup> The first 3 columns report results of parsimonious specifications that have been our starting point. They show that signs and significance of coefficients are robust when explanatory variables are added. We compute robust standard errors to determine statistical significance of coefficients.

institutional characteristics on the labor share;<sup>15</sup> results are in line with those generally found in the literature (Stockhammer, 2013). The wage share does not display large and erratic changes from one year to the other and its lagged value is significant. The lagged value is included because the objective here is to obtain a good explanatory power for the wage share which can then be exploited to solve the simultaneity problem in the Gini equation. As expected the wage share is negatively related to unemployment: a large slack on the labor market negatively affects the income share flowing to workers. With regard to structural indicators, the labor share is lower when the share of employment in the services sector is higher, since unionization is typically higher in the industry and lower among service workers. The wage bargaining framework matters: more centralized and coordinated set ups (including social dialogue with government participation) are associated with higher aggregate income from work.<sup>16</sup>

Results for the Gini equation, when estimated separately, are reported in Table 4. The preferred specifications, the most complete ones, are reported in columns 6 and 7.<sup>17</sup> As to the relationship between the labor income share and the Gini index, the analysis indicates that inequality declines when the wage share increases, however the estimated coefficient is significant only when the dispersion of labor income is not taken into account. When we add a proxy for the dispersion of wages (measured by the ratio of top 10 percent salaries to bottom 90 percent salaries), the wage share seems to no longer matter, whereas the dispersion variable turns out to be positively (and significantly) related to inequality.<sup>18</sup> As to the other control variables, all proxies aimed at capturing the redistributive impact of public policies have the expected negative effect on the Gini index (revenues and health spending display a significant coefficient, while social protection spending does not).<sup>19</sup>

The outcome of the estimation remains stable when we turn to estimating (6) with a structural model that treats the labor share as an endogenous variable (Table 5). The dispersion of labor income remains more important than the wage share to explain income inequality; the estimated coefficient of the wage share continues to be negative, and even if small in magnitude, it is now statistically significant. Government action keeps playing a role; government revenue (as a proxy for redistributive tax policies), social protection spending and health expenditure all contribute significantly to reducing income inequality.<sup>20</sup> Finally in line with the literature we find that economic and financial globalization lead to higher income inequality. As to the wage share equation, control variables are now not significant.<sup>21</sup>

<sup>15</sup> Since we use a panel estimator, other country specific factors (such as for example technology) are absorbed by country effects and in our set up we are not explicitly singling out all determinants of the labor share or inequality (even though they are taken care of by country dummies).

<sup>16</sup> This is consistent with results obtained by Checci and García-Peñalosa (2010). On a smaller sample of OECD economies they study in detail the role of market institutions on personal income distribution and conclude that greater unionization and greater wage bargaining are important factors affecting inequality.

<sup>17</sup> Again the first columns report results of parsimonious specifications that have been our starting point. Also in this case signs and significance of coefficients are robust when we start adding explanatory variables.

<sup>18</sup> Note that the variable that measures the ratio of the top 10 percent of salaries to the bottom 10 percent reported in table 4 reflects total income dispersion. This choice guarantees a larger number of observations which is consistent with our large dataset of countries. The 10-to-90 income ratio of labor income (that would capture directly wage dispersion) is only available for OECD countries. Nonetheless, both variables are highly correlated. Estimation results are the same when the model is run using the reduced sample of OECD countries and the 10-to-90 income ratio of labor income.

<sup>19</sup> These results are robust to the inclusion of the unemployment rate as control variable, as in Checci and García-Peñalosa (2010). The inclusion of the unemployment rate in the Gini equation takes into account that labor income is nil for the unemployed. The structural model presented in Table 5 duly takes into account the impact of the unemployment rate; for consistency we maintain the same specification both for the fixed effect and structural model estimations.

<sup>20</sup> Revenue is always significant; health and social protection spending are significant when our complete set of explanatory variables is taken into account.

<sup>21</sup> To verify that the adopted specification is suitable, we also estimate the model using instrumental variables panel techniques for the Gini equation (instruments for the wage share are the explanatory variables used in the labor share equation, i.e. the lagged wage  
(continues)

Table 3

## Determinants of Labor Share, Fixed Effects

Labor Share	(1)	(2)	(3)	(4)	(5)
Labor Share (t-1)	0.8074 *** (62.33)	0.7788 *** (55.78)	0.7493 *** (42.23)	0.8134 *** (41.4)	0.7748 *** (36.5)
Unemployment (t-1)		-0.197 *** (10.28)	-0.1587 *** (6.95)	-0.151 *** (8.33)	-0.133 *** (6.07)
Employment Service Sector			-0.0655 *** (5.90)	-0.064 *** (5.59)	-0.07 *** (5.3)
Type of Wage Setting Coordination				0.0887 ** (2.28)	
Intensity of Wage Setting Coordination					0.1976 ** (2.11)
Constant	9.8812 *** (14.64)	13.441 *** (16.53)	18.568 *** (13.37)	16.041 *** (9.51)	18.767 *** (10.23)
Observations	2184	1845	1305	775	856
Number of Country	106	83	80	31	38
R-squared	0.6516	0.6824	0.6753	0.8193	0.7441

Absolute value of t statistics in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 4

## Determinants of Income Inequality, Fixed Effects

Gini Disposable Income	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Labor Share	-0.0008 *** (2.70)	-0.0006 (1.50)	-0.0003 (0.69)	-0.0001 (0.30)	0.0000 (0.02)	0.0004 (1.03)	0.0006 (1.21)
Dispersion of Labor		0.0242 *** (4.77)	0.0203 *** (4.23)	0.0174 *** (3.80)	0.0173 *** (3.80)	0.0173 *** (3.83)	0.0161 *** (3.54)
Public Revenues			-0.0011 *** (3.40)	-0.0008 ** (2.28)	-0.0007 ** (2.19)	-0.0008 ** (2.39)	-0.0008 ** (2.29)
Public Social Protection Spending				-0.0011 (1.24)	-0.0006 (0.67)	-0.0009 (0.98)	-0.0007 (0.74)
Public Health Spending					-0.0046 * (1.89)	-0.0055 ** (2.25)	-0.0070 *** (2.67)
Economic Globalization						0.0007 *** (2.80)	
Financial Globalization							0.0094 ** (2.38)
Constant	0.3847 *** (25.89)	0.3888 *** (22.28)	0.4158 *** (19.26)	0.4129 *** (19.32)	0.4231 *** (19.28)	0.3650 *** (12.18)	0.4051 *** (17.58)
Observations	683	445	393	353	353	352	353
Number of Countries	93	84	83	71	71	70	71
R-squared	0.2817	0.4626	0.6363	0.6609	0.5810	0.3756	0.4252

Absolute value of t statistics in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

share, lagged unemployment, the share of employment in the services sector, the proxy for the coordination of the wage setting set up). Results are in line with those reported in the paper (i.e. that while the labor share has small effect on inequality, the impact of the unevenness of labor income is sizeable and dominant). Results are confirmed also when we expand the set of control variables in the Gini equation to include the whole set of explanatory factors for the labor share (to control for an indirect effect on inequality).

Table 5

## Determinants of Labor Share and Income Inequality, Structural Model

	(1)	(2)	(3)	(4)	(5)	(6)
	<b>Labor Share</b>					
Labor Share (t-1)	0.9796 *** (95.44)	0.9631 *** (87.00)	0.9809 *** (80.56)	0.9809 *** (80.56)	0.9809 *** (80.56)	0.9256 *** (33.48)
Unemployment (t-1)		-0.0561 *** (2.92)	-0.0574 *** (2.87)	-0.0574 *** (2.87)	-0.0574 *** (2.87)	-0.1330 *** (3.56)
Employment Service Sector			-0.0093 (0.85)	-0.0093 (0.85)	-0.0093 (0.85)	-0.0035 (0.16)
Intensity of Wage Setting Coordination						-0.0733 (0.56)
Constant	0.7250 (1.43)	2.1850 *** (3.53)	0.7235 (0.91)	0.7235 (0.91)	0.0723 (0.91)	5.6232 ** (2.80)
	<b>Gini Disposable Income</b>					
Labor Share	-0.0027 *** (10.41)	-0.0013 *** (4.75)	-0.0012 *** (3.80)	-0.0013 *** (3.98)	-0.0012 *** (3.59)	-0.0015 *** (3.68)
Dispersion of Labor income	0.1619 *** (14.46)	0.1772 *** (14.95)	0.1668 *** (13.71)	0.1626 *** (12.84)	0.1623 *** (12.99)	0.6036 *** (19.38)
Public Revenues		-0.0038 *** (14.18)	-0.0039 *** (9.75)	-0.0040 *** (9.82)	-0.0037 *** (8.90)	-0.0014 *** (3.16)
Public Social Protection Spending			-0.0006 (0.79)	-0.0011 (1.17)	-0.0013 (1.42)	-0.0039 * (1.76)
Public Health Spending				-0.0028 (1.17)	-0.0038 * (1.59)	-0.0039 * (1.78)
Economic Globalization					0.0007 ** (2.72)	0.0003 * (1.61)
Constant	0.4628 *** (34.06)	0.5275 *** (38.13)	0.5386 *** (32.85)	0.5384 *** (32.91)	0.5671 *** (30.00)	0.0459 *** (14.51)
Observations	425	351	309	309	309	148
Chi2	0.08	4.93	15.66	14.58	21.38	33.39
Prob>Chi2	0.9613	0.2943	0.0157	0.0418	0.0062	0.0001

Absolute value of z statistics in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 6

## Determinants of Dispersion of Labor Income

	(1)	(2)	(3)	(4)	(5)
Financial Globalization	0.0719 ** (2.07)	0.0701 * (1.69)	0.037 * (1.79)	0.1531 * (1.74)	0.0788 *** (2.62)
Unemployment		0.0082 * (1.65)	0.0066 * (1.69)	0.0231 ** (2.05)	0.0075 ** (2.25)
Industry Unionization			-0.0118 *** (2.86)	-0.024 *** (2.72)	-0.01 *** (3.39)
Tertiary Education				-0.018 *** (2.96)	-0.009 *** (4.47)
Government Spending					-0.009 *** (5.22)
Constant	0.2295 *** (9.73)	0.1601 *** (2.89)	0.5643 *** (3.72)	1.0694 *** (3.31)	0.8488 *** (6.86)
Observations	1,045	810	785	405	342
Number of countries	142	91	90	74	67
R-squared	0.004	0.006	0.017	0.062	0.257

Absolute value of z statistics in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

If the major conclusion that can be extracted from the previous empirical analysis is that higher income inequality is more driven by wage dispersion rather than by the wage share of national income, then the question becomes, what explains that dispersion? This is not the major focus of the paper and could be a topic for further analysis. Without aiming at providing a comprehensive analysis, Table 6 shows the results of simply regressing the dispersion of wages on different factors.<sup>22</sup> We recognize that this exercise is very simple and that a fully-fledged analysis would require a more sophisticated discussion. Column 5 shows that higher financial globalization and higher unemployment levels are associated with higher dispersion of wages. In contrast, higher unionization in the industry,<sup>23</sup> higher share of educated workers and higher primary government spending (as a proxy for the size of the state) are factors that help reduce the distance between higher and lower wages.

<sup>22</sup> Again we estimated this model using both versions of income dispersion (total and wage). Results reported in table 6 are those from total dispersion to guarantee a larger sample. As noted in a previous footnote, these results are very similar when we estimate the model on a subsample of OECD countries and using wage dispersion.

<sup>23</sup> Jaumotte and Osorio Buitron (2015) also find evidence that a decline in union density – the fraction of union members in the workforce – affects inequality, in particular that it is associated with the rise of top income shares.

## 5 Conclusion

This paper analyzes the relationship between functional and personal income distributions, which has returned to center stage in the academic and policy discussion. In the advanced world, the wage share and inequality have shown opposite trends in recent decades: the share of factor income to labor has been declining, while inequality has risen. This paper has addressed this issue from different angles, first by analyzing what is behind widely used inequality measures based on micro data (i.e. Gini indices), and second by running regression analysis on macro data.

Empirical evidence suggests that the most important determinant of income inequality is not the share of income that accrues to labor or capital, but the dispersion of labor income. This result reflects the fact that the lion's share of household income is labor earnings and its distribution has become more unequal. The increase in wage dispersion has been associated with growing financial globalization, a decrease in industry unionization and a decline in the size of the state.

From a policy perspective our results suggest that to avoid unfavorable (or undesired) distributional consequences, policymakers will have to pay attention to labor market outcomes and to the dispersion of wages, including distortions induced in the labor market by different policy interventions or by changes in labor market institutions.<sup>24</sup> Public policies that support inclusive growth (by for example promoting participation in the labor market and strengthening the human capital of low-income groups) may prevent the rise in economic disparities. In addition, tax and transfer policies should be properly assessed in terms of their costs and the relative effectiveness in correcting market income inequalities while minimizing distortions.

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<sup>24</sup> These indications are also in line with findings from recent research on Latin America (the most unequal region in the world), where the recent decline in inequality appears to be mostly related to labor income developments (Lustig *et al.*, 2015).



## APPENDIX A GINI COEFFICIENTS, PSEUDO-GINI (OR CONCENTRATION) INDEXES AND GINI CORRELATIONS

The Gini coefficient for income  $y$  can be written as:

$$G_y = \frac{2 \operatorname{cov}(y, F(y))}{\bar{y}} \quad \text{or:} \quad (7)$$

$$\operatorname{cov}(y, F(y)) = \frac{\bar{y} G_y}{2} \quad (8)$$

The Gini index captures the distance of the observed income distribution from a hypothetical condition of perfect equality in which each individual would be endowed with exactly the same income (in this case the Gini index would be equal to zero).<sup>25</sup>

If income  $y$  comes from  $K$  sources, the Gini index can be decomposed as follows:<sup>26</sup>

$$G_y = \sum_{k=1}^K \underbrace{\left[ \frac{\operatorname{cov}(y_k, F(y))}{\operatorname{cov}(y_k, F(y_k))} \right]}_{\text{Gini correlation } \rho_k^{Gini}} \underbrace{\left[ \frac{2 \operatorname{cov}(y_k, F(y_k))}{\bar{y}_k} \right]}_{\text{Gini index for income component k}} \underbrace{\left[ \frac{\bar{y}_k}{\bar{y}} \right]}_{\text{component k's share of total income}} \quad (9)$$

pseudo-Gini (or concentration) index for income component k

$$G_y = \sum_{k=1}^K \underbrace{\rho_k^{Gini}}_{\text{Gini correlation}} \underbrace{G_{y_k}}_{\text{Gini index for income component k}} \underbrace{S_k}_{\text{component k's share of total income}} = \sum_{k=1}^K C_{y_k} S_k \quad (10)$$

pseudo-Gini index for income component k

where the pseudo-Gini (or concentration) index is given by:

$$C_{y_k} = \rho_k^{Gini} G_{y_k} = \frac{2 \operatorname{cov}(y_k, F(y))}{\bar{y}_k} \quad (11)$$

and the Gini correlation index is:

$$\rho_k^{Gini} = \frac{\operatorname{cov}(y_k, F(y))}{\operatorname{cov}(y_k, F(y_k))} = \frac{2 \operatorname{cov}(y_k, F(y))}{\bar{y}_k G_{y_k}} \quad (12)$$

As equation (10) indicates, the Gini index is a weighted average of the pseudo-Gini indexes of income components, where the weights are the income shares. But what is the difference between a Gini and a pseudo-Gini index for an income component  $y_k$ ? As can be seen by comparing (7) and (11) the difference is due to the reference ranking of individuals used in the two calculations. For the pseudo-Gini index  $C_{y_k}$  the weights attached to each individual correspond to the ranking in the distribution of total income ( $F(y)$ ), while for the Gini index  $G_{y_k}$  the reference

<sup>25</sup> A Gini index equal to 1 would be instead observed in the case of extreme inequality in which one individual would appropriate all available income leaving nothing to the others.

<sup>26</sup> See Lerman and Yitzhaki (1985) and CBO (2011).

ranking would be that of the distribution of the  $k$ th income component ( $F(y_k)$ ). The two indexes would be the same if the ranking of individuals in the two distributions was the same, that is if no re-ranking would take place when moving from the income component distribution to the total income distribution. It should also be noted that the higher an income component share (on total income) is, the lower the possibility of re-ranking (and therefore the closer  $C_{y_k}$  and  $G_{y_k}$  would be).<sup>27</sup>

**BOX 1**  
**DIFFERENCE BETWEEN THE GINI CORRELATIONS**  
**AND CORRELATION COEFFICIENTS**

The standard (Pearson) correlation coefficient ( $\rho$ ) and the Gini correlation index have the same numerator:  $\text{cov}(y_k, F(y))$ . But while the correlation coefficient denominator is the product of the standard deviations, the denominator of the Gini correlation index is half the product between the Gini coefficient and the average for the income component under consideration:

$$\rho = \frac{\text{cov}(y_k, F(y))}{\sigma_{y_k} \sigma_{F(y)}} \quad (\text{i})$$

$$\rho_k^{\text{Gini}} = \frac{\text{cov}(y_k, F(y))}{\text{cov}(y_k, F(y_k))} = \frac{\text{cov}(y_k, F(y))}{\frac{\bar{y}_k G_{y_k}}{2}} = \frac{2 \text{cov}(y_k, F(y))}{\bar{y}_k G_{y_k}} \quad (\text{ii})$$

The decomposition of the Gini index presented here has been used in many empirical studies. We use the Gini index because it is the most widely used inequality measure used both in the literature and in policy analysis. The literature has however shown that the classical Gini decomposition suffers some limitations. In particular Shorrocks (1982) and (1983) show that there is no unique way to decompose inequality, and proposes an alternative decomposition rule that satisfies a set of desirable properties<sup>28</sup> and delivers contributions for each income component to inequality, which are not anchored to the use of a specific measure. The measure proposed by Shorrocks is:

$$SH_k = \frac{\text{cov}(y_k, y)}{\text{var}(y)} \quad (13)$$

<sup>27</sup> See Pyatt, Chen and Fei (1980).

<sup>28</sup> For example symmetry (meaning that the order of the income components does not affect the decomposition results) and continuity (which requires that for each income component the results do not depend on the number of other income components).

In the framework set forth in this paper, the contributions to inequality of each income component are instead given by:

$$SH_k^G = \frac{\text{cov}(y_k, F(y))}{\text{cov}(y, F(y))} \quad (14)$$

There are several reasons why the standard Gini decomposition is appropriate in the analysis presented in this paper. First, since we decompose market income into only two exhaustive components (see Appendix B), the Gini decomposition is unique (Shorrocks, 1982). Second as also highlighted by Lerman and Yitzhaki (1985) this approach provides an economic interpretation of the empirical results and allows to derive marginal effects of changes in the income sources (wage and capital shares) and their distributional characteristics (pseudo-Gini indexes). Finally, the standard Gini decomposition and the Shorrocks measure provide very close results.<sup>29</sup>

<sup>29</sup> If we consider the four countries whose results are summarized in Table 1, the standard Gini decomposition and the Shorrocks' measure provide very similar assessments of the contribution of each income component to inequality. In particular for the observed period for the US the average contribution of labor income to inequality is 0.94 (0.6 for capital income) using the standard Gini decomposition; the corresponding Shorrocks measure is 0.92 (0.8). For the UK the corresponding average values are:  $SH_l^G = 0.97$  ( $SH_c^G = 0.03$ ) and  $SH_l = 0.95$  ( $SH_c = 0.05$ ); for France:  $SH_l^G = 0.96$  ( $SH_c^G = 0.04$ ) and  $SH_l = 0.94$  ( $SH_c = 0.06$ ); and for Germany:  $SH_l^G = 0.94$  ( $SH_c^G = 0.06$ ) and  $SH_l = 0.83$  ( $SH_c = 0.17$ ).

The results therefore confirm that the largest impact on inequality is to be expected from labor income variations.

## APPENDIX B INEQUALITY DECOMPOSITION USING THE LIS DATASET

Bringing equation (1) and (2) to the LIS data implies singling out the empirical counterparts of total income and of income components. The reference unit in calculations is the household and the income definition is the per capita equivalent income computed using LIS equivalence scale.<sup>30</sup> The list of countries considered in the analysis is reported in Table 7.

We define total gross income as market  $m$  income plus transfers  $g$ :

$$y = m + g \quad (15)$$

Transfer income is given by both private (such as alimony, remittances, transfers from non-profit institutions) and public transfers (such as pensions, unemployment benefits, disability benefits). Public transfers makeup the bulk of transfer income.

Gross market income  $m$  is the sum of labor<sup>31</sup>  $l$  and capital income  $c$  (from financial or non financial types of investments):

$$m = l + c \quad (16)$$

Net (or disposable) household income is obtained by subtracting taxes from total income:

$$y^{net} = y - t \quad (17)$$

Using (10), the breakdown of changes in inequality in market income over a certain period can be obtained as:

$$\Delta G_m = \underbrace{[\Delta s_l C_l^0 + \Delta s_c C_c^0]}_{\text{incomesharesimpact}} + \underbrace{[s_l^0 \Delta C_l + s_c^0 \Delta C_c]}_{\text{concentration indexesimpact}} + \underbrace{[\Delta s_l \Delta C_l + \Delta s_c \Delta C_c]}_{\approx 0} \quad (18)$$

where  $s_l$ ,  $s_c$  and  $C_l$ ,  $C_c$  are, respectively, the income shares and pseudo-Gini indexes for  $l$  and  $c$  and 0 is the base year (or the initial year in our analysis, which varies depending on the country).

Given that income shares add up to 1, it follows that  $\Delta s_c = -\Delta s_l$  (changes in the labor share are absorbed by an opposite change in the capital share), so that (18) can be rewritten as:

$$\Delta G_m = \underbrace{\Delta s_l [C_l^0 - C_c^0]}_{\text{incomesharesimpact}} + \underbrace{[s_l^0 \Delta C_l + s_c^0 \Delta C_c]}_{\text{concentration indexesimpact}} + \underbrace{\Delta s_l [\Delta C_l - \Delta C_c]}_{\approx 0} \quad (19)$$

and the observed impact of changes in income composition on inequality will depend on the initial values of the pseudo-Gini indexes for labor and capital.

The impact of transfers and taxation on inequality can be measured respectively by:

$$\Delta G_y - \Delta G_m \quad (20)$$

$$\Delta G_{y^{net}} - \Delta G_y \quad (21)$$

<sup>30</sup> The LIS equivalence scale is defined as the square root of the number of individuals in the household.

<sup>31</sup> The labor income definition we use includes both wages from paid employment and income from self employment.

Marginal effects on income inequality can be calculated from the following equation for the Gini index for gross market income:

$$G_m = C_l s_l + C_c s_c \quad (22)$$

Remembering that:

$$s_c = 1 - s_l \quad (23)$$

we have that at any point in time the marginal impact from a variation in market income composition is expressed by:

$$\frac{\delta G_m}{\delta s_l} = C_l - C_c \quad (24)$$

If the pseudo-Gini index for capital is higher than that for labor, then an increase (reduction) in the labor share reduces (raises) inequality. In terms of Gini indexes of the income components this requires that:

$$G_c > \frac{\rho_l^{Gini}}{\rho_c^{Gini}} G_l \quad (25)$$

which implies that the Gini index for capital has to be ‘sufficiently’ larger than the Gini index for labor.

Condition (25) can also be written in terms of average labor and capital incomes:

$$\bar{l} > \frac{\text{cov}(l, F(m))}{\text{cov}(c, F(m))} \bar{c} \quad (26)$$

which requires average labor income to be ‘sufficiently’ higher than average capital income.

Table 7

**List of Countries Considered**

*(and indication if income components are recorded gross or net of taxes;  
definition may vary by year of survey, in this case both gross, net or mixed are listed)*

Australia (gross)	1981; 1985; 1989; 1995; 2001; 2003; 2008; 2010
Austria (net; gross)	1994; 1997; 2000; 2004
Belgium (net; gross)	1985; 1988; 1992; 1995; 1997; 2000
Brazil (gross)	2006; 2009; 2011
Canada (gross)	1981; 1987; 1991; 1994; 1997; 1998; 2000; 2004; 2007; 2010
China (gross)	2002
Colombia (gross)	2004; 2007; 2010
Czech Republic (gross)	1992; 1996; 2004
Denmark (gross)	1987; 1992; 1995; 2000; 2004; 2007; 2010
Egypt (net)	2012
Estonia (mixed, gross)	2000; 2004; 2007; 2010
Finland (mixed, gross)	1987; 1991; 1995; 2000; 2004; 2007; 2010
France (mixed; gross)	1978; 1984; 1989; 1994; 2000; 2005; 2010
Germany (gross)	1978; 1981; 1983; 1984; 1989; 1994; 2000; 2004; 2007; 2010
Greece (net; gross)	1995; 2000; 2004; 2007; 2010
Guatemala (gross)	2006
Hungary (net)	1991; 1994; 1999; 2005; 2007; 2009; 2012
Iceland (gross)	2004; 2007; 2010
India (net)	2004
Ireland (gross; net)	1987; 1994; 1995; 1996; 2000; 2004; 2007; 2010
Israel (gross)	1979; 1986; 1992; 1997; 2001; 2005; 2007; 2010
Italy (net; mixed)	1986; 1987; 1989; 1991; 1993; 1995; 1998; 2000; 2004; 2008; 2010
Japan (gross)	2008
Luxembourg (net; gross)	1985; 1991; 1994; 1997; 2000; 2004; 2007; 2010
Mexico (net)	1984; 1989; 1992; 1994; 1996; 1998; 2000; 2002; 2004; 2008; 2010
Netherlands (gross)	1983; 1987; 1990; 1993; 1999; 2004; 2007; 2010
Norway (gross)	1979; 1986; 1991; 1995; 2000; 2004; 2007; 2010
Peru (net)	2004
Poland (net; mixed; gross)	1992; 1995; 1999; 2004; 2007; 2010
Romania (gross)	1995; 1997
Russia (net)	2000; 2004; 2007; 2010
Serbia (net)	2006; 2010; 2013
Slovak Republic (gross; net)	1992; 1996; 2004; 2007; 2010
Slovenia (net)	1997; 1999; 2004; 2007; 2010
South Africa (gross)	2008; 2010
South Korea (Gross)	2006
Spain (net; gross)	1980; 1985; 1990; 1995; 2000; 2004; 2007; 2010
Sweden (gross)	1981; 1987; 1992; 1995; 2000; 2005
Switzerland (gross)	1982; 1992; 2000; 2002; 2004
Taiwan (gross)	1981; 1986; 1991; 1995; 1997; 2000; 2005; 2007; 2010
United Kingdom (gross)	1979; 1986; 1991; 1995; 1994; 1999; 2004; 2007; 2010
United States (gross)	1979; 1986; 1991; 1994; 1997; 2000; 2004; 2007; 2010; 2013
Uruguay (net)	2004

Source: LIS database. Cut off date for data February 24, 2015.

Note: for a detailed definition of the recording method (gross, net or mixed) of taxes see <http://www.lisdatacenter.org/>

## APPENDIX C DESCRIPTION OF THE DATABASE

Annex Table 8 reports the earliest and latest value for the Gini index for the countries included in the estimation sample.

The data sources for the estimation analysis are the following:

- 1) For the disposable Gini index (which is a discontinuous variable observed only in some years that vary depending on the country) we use data from various sources with the aim of covering the largest possible sample. The sources are the OECD, Eurostat, the World Bank's World Development Indicators, LIS, and the Socio-Economic Database for Latin America and the Caribbean.
- 2) For the wage share, the main data source is the ILO database. When available the adjusted wage share is used. For many countries longer time series for wage shares are also published in the European Commission's Annual Macroeconomic Database (AMECO). For these countries the two datasets display similar patterns, and AMECO data can be used to extrapolate developments over a longer time period.
- 3) The unemployment rate has been taken from the IMF *World Economic Outlook*.
- 4) The employment rate in the services sector come from ILO.
- 5) For the variables capturing the wage setting set up we have used the Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts dataset, 1960-2011 (ICTWSS) (produced by Jelle Visser, Amsterdam Institute for Advanced Labour Studies). The variable used (ictwss\_Coord and ictwss\_Type) capture the following aspects: coordination of wage-setting, and the type, or the modality or mechanism through which coordination of wage bargaining behavior is produced. The higher the value of the variable the higher is degree of coordination/centralization of the wage bargaining framework.
- 6) The dispersion of labor income is measured as the ratio of total income of the top 10 percent to the bottom 10 percent and data are taken from the World Bank's World Development Indicators;
- 7) The ratios of public revenue, social protection spending and health expenditure to GDP are taken from IMF *World Economic Outlook*, Eurostat, OECD, World Health Organization, the United Nations Educational, Scientific and Cultural Organization; CEPALSTAT; the Asian Development Bank; the World Bank; and the IMF International Financial Statistics.
- 8) Economic globalization is measured as a score based on actual flows and trade restrictions, and the data are drawn from KOF Index of Globalization (Dreher, Gaston, and Martens 2008).
- 9) Financial globalization is proxied by the log of total foreign assets and liabilities divided by GDP, which is computed from data from updated and extended versions of the dataset constructed by Lane and Milesi-Ferretti (2007).

Table 8

## Countries Considered in the Estimation and Descriptive Statistics for Inequality

Country		Earliest Observation		Latest Observation	
		Gini	Year	Gini	Year
Argentina	EME	0.46	1995	0.44	2007
Armenia	EME	0.34	2003	0.31	2008
Australia	ADV	0.28	1981	0.34	2008
Austria	ADV	0.23	1987	0.27	2011
Azerbaijan	EME	0.35	1995	0.34	2008
Belarus	EME	0.29	1995	0.27	2008
Belgium	ADV	0.23	1985	0.24	2011
Bhutan	LIDC	0.47	2003	0.38	2007
Bolivia	LIDC	0.56	1997	0.44	2009
Bosnia and Herzegovina	EME	0.36	2007	0.36	2007
Brazil	EME	0.55	2004	0.52	2008
Bulgaria	EME	0.31	1995	0.26	2012
Burkina Faso	LIDC	0.40	2003	0.40	2003
Burundi	LIDC	0.33	2006	0.33	2006
Cameroon	LIDC	0.41	1996	0.40	2001
Canada	ADV	0.32	1971	0.32	2008
Chile	EME	0.54	1996	0.51	2009
China	EME	0.36	1996	0.42	2005
Colombia	EME	0.55	2000	0.53	2009
Costa Rica	EME	0.43	1995	0.49	2009
Côte d'Ivoire	LIDC	0.37	1995	0.44	1998
Croatia	EME	0.27	1998	0.37	2011
Cyprus	ADV	0.29	1997	0.31	2012
Czech Republic	ADV	0.26	1996	0.27	2004
Denmark	ADV	0.26	1987	0.27	2012
Dominican Republic	EME	0.46	1996	0.46	1996
Egypt	EME	0.30	1996	0.31	2008
Estonia	ADV	0.36	2000	0.30	2012
Finland	ADV	0.21	1987	0.26	2012



France	ADV	0.29	1979	0.31	2012
Gabon	EME	0.41	2005	0.41	2005
Georgia	EME	0.40	2003	0.41	2008
Germany	ADV	0.27	1973	0.28	2012
Greece	ADV	0.35	1995	0.35	2012
Guatemala	EME	0.56	2002	0.53	2006
Honduras	LIDC	0.52	2001	0.58	2005
Hong Kong SAR	ADV	0.43	1996	0.43	1996
Hungary	EME	0.29	1999	0.28	2012
India	EME	0.33	2005	0.33	2005
Iran	EME	0.44	1998	0.38	2005
Ireland	ADV	0.33	1987	0.30	2011
Israel	ADV	0.34	1997	0.36	2008
Italy	ADV	0.31	1986	0.34	2012
Japan	ADV	0.30	1985	0.33	2008
Jordan	EME	0.36	1997	0.34	2008
Kazakhstan	EME	0.35	1996	0.29	2009
Kenya	LIDC	0.43	1997	0.48	2005
Korea	ADV	0.31	2006	0.31	2006
Kyrgyz Republic	LIDC	0.36	1998	0.36	2009
Latvia	ADV	0.27	1993	0.35	2012
Lesotho	LIDC	0.53	2003	0.53	2003
Lithuania	EME	0.34	1993	0.36	2012
Luxembourg	ADV	0.24	1985	0.28	2012
Macedonia, FYR	EME	0.28	1998	0.43	2009
Malta	ADV	0.30	2000	0.27	2012
Mexico	EME	0.52	1996	0.45	2010
Moldova	LIDC	0.37	1997	0.33	2010
Mongolia	LIDC	0.33	2002	0.37	2008
Morocco	EME	0.39	1999	0.41	2007
Mozambique	LIDC	0.47	2003	0.46	2008
Namibia	EME	0.64	2004	0.64	2004
Nepal	LIDC	0.44	2003	0.33	2010

Netherlands	ADV	0.25	1983	0.22	2012
New Zealand	ADV	0.32	1990	0.33	2008
Niger	LIDC	0.44	2005	0.35	2008
Nigeria	LIDC	0.43	2004	0.43	2004
Norway	ADV	0.22	1979	0.23	2012
Panama	EME	0.55	1997	0.50	2008
Papua New Guinea	LIDC	0.51	1996	0.51	1996
Philippines	EME	0.46	1997	0.43	2009
Poland	EME	0.26	1992	0.32	2004
Portugal	ADV	0.35	1975	0.34	2012
Romania	EME	0.28	1995	0.28	1997
Senegal	LIDC	0.41	2001	0.39	2005
Serbia	EME	0.33	2002	0.28	2009
Sierra Leone	LIDC	0.43	2003	0.43	2003
Singapore	ADV	0.42	1998	0.42	1998
Slovak Republic	ADV	0.25	1996	0.26	2012
Slovenia	ADV	0.23	1997	0.23	2004
South Africa	EME	0.57	1995	0.63	2009
Spain	ADV	0.32	1980	0.34	2012
Sri Lanka	EME	0.41	2002	0.40	2007
Sweden	ADV	0.26	1967	0.25	2011
Switzerland	ADV	0.31	1992	0.27	2012
Tajikistan	LIDC	0.33	2003	0.33	2007
Tanzania	LIDC	0.35	2000	0.38	2007
Tunisia	EME	0.41	2000	0.41	2005
Turkey	EME	0.42	1994	0.39	2008
Ukraine	EME	0.39	1995	0.26	2009
United Kingdom	ADV	0.27	1969	0.36	2011
United States	ADV	0.32	1974	0.37	2010
Uruguay	EME	0.42	1998	0.44	2005
Venezuela	EME	0.46	1997	0.39	2007

Sources: see text of this Appendix.

Note: ADV = advanced economy; EME = emerging market economy; LIDC = low-income and developing countries.

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