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What has driven the delinking of wages from productivity? A political economy-based investigation for high-income economies

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Abstract
The drop in the labor share experienced in high-income countries in the last three to four decades testifies to a general divergence in the growth rates of labor productivity and average wages. In this respect, we first quantify the magnitude of this decoupling; second, we inquire into the factors that prevented wage growth from keeping pace with productivity. We endorse a 'political economy' approach – a line of inquiry which has been recently fueled and followed by the post-Keynesian literature – focusing on the effects on wage dynamics of some macroeconomic and institutional factors in a panel of 22 OECD economies for the post-1970 period. We find that, on average and over the cycle, only 50% of increased productivity went to workers. Our empirics indicate that labor market slack and the weakening of pro-labor institutions have acted as wage-squeezing factors; a negative effect is also found for globalization, specifically for trade openness and international capital mobility. Other aspects of the process of financialization, such as market capitalization and the dynamics of the real interest rate, seem not to have exerted a substantial impact on real wage growth.

Keywords: political economy; income distribution; labor market institutions; labor market slack; globalization; financialization.

JEL classifications: E25; J30; P16.

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1. Introduction

The erosion of the labor share experienced in OECD countries in the last four decades testifies to a divergence in the growth rates of labor productivity and average wages. But which factors might have prevented the average wage from keeping pace with labor productivity?

The current debate involves the size of this decoupling, on the one side, and the possible causes behind the delinking of real wage growth from the dynamics of labor productivity, on the other. The topic is rather central to the economic and social debate as the erosion of the labor share may have important consequences for macroeconomics.[1] Moreover, this pattern is quite generalized in advanced capitalism: the recent trends of the worldwide labor income share indicate that such a decoupling has occurred in almost all mature economies (ILO, 2012, 2014). In this regard, the OECD (2015) states that the average adjusted labor share in the G20 countries fell by about 0.3 percentage points per year between 1980 and the late 2000s. In a study published some years previously, the OECD (2012) analogously observes that the share of labor compensation in the aggregate income declined in 26 out of 30 advanced countries over the period from 1990 to 2009, with a loss that, on average, is calculated as approximately 5 percentage points. Comparable trends are observed by other international institutions before the onset of the great financial crash (European Commission, 2007; IMF, 2007a), testifying that the reduction in the labor share is quite independent of the 2008–2009 great financial and real crisis and the subsequent period of economic stagnation.[2]

The interpretation of these trends began to gain momentum in the United States at the dawn of the new millennium and then attracted a number of scholars and contributors from different schools of thought. The literature approaches the subject from different broad analytical standpoints and, within each of these, a variety of factors is discussed at analytical and empirical levels as the root causes of the smaller slice of the pie being destined for workers.

Within a broad neoclassical approach, the most common interpretations relate to particular forms of technical change or, to a lesser extent, to the impact of international trade on relative factor scarcity. In more recent works, however, even within this analytical framework, other factors are discussed, such as increasing concentration and higher mark-ups or decreased bargaining power of workers in appropriating rents generated by imperfect competition.

In parallel with the explanations framed within the traditional neoclassical approach and the straitjacket of factor substitution and decreasing factor demand curves, the literature develops other lines of inquiry based on a 'political economy' approach to income distribution (among others, Stockhammer, 2013, 2017;

[1] Changes in income shares deserve attention for two main reasons: on the one side, the wage income share may relate to the personal income distribution, as demonstrated in the literature (Atkinson, 2009; Glyn, 2009; Jacobson and Occhino, 2012); on the other, for macroeconomic stability, changes in the labor share affect the aggregate demand—both its composition and its evolution (Onaran and Galanis, 2013; Hein, 2015)—and the composition of the tax base.

[2] On the contrary, in some mature economies (among which are France, Italy and Germany to a lesser extent), the adjusted labor share exhibits an upward trend after 2008–2009. This is ascribed principally to a slowdown in productivity.

Bengtsson and Ryner, 2016; Guschanski and Onaran, 2018; Pariboni and Tridico, 2019a; Hein et al., 2020). These emphasize the essentially institutional and conflict-driven nature of the latter even in competitive conditions and focus on the processes of macroeconomic and institutional change. In this regard, a variety of dimensions are taken into account by the theoretical and empirical literature as wage-moderating factors: the retrenchment of welfare states, intensified globalization, the increasing financialization of the economy, the decline of trade unions' political power, the increasing labor market flexibility, the weakening of protective labor laws for workers and greater slack in the labor market.

It is within this strand of the literature, broadly defined as the 'political economy' (henceforth, PE) approach to income distribution, a line of inquiry which has been recently fueled by the broadly defined post-Keynesian literature (on this intersection, see the recent work by Stockhammer, 2020, and also Onaran, 2011; Stockhammer 2013, 2017; Dünhaupt, 2017; Pariboni and Tridico, 2019a; Hein et al., 2020), that we wish to situate our contribution. We intend to investigate the role of a set of macroeconomic and institutional dimensions in affecting the rate of growth of the average labor compensation and accordingly to determine the likely causes of the delinkage from the pace of productivity. Of course, our exploration also relates to the literature on the determinants of the (decrease in the) labor share. In relation to these works, however, our analysis presents an element of distinction as we treat the pace of productivity and that of the average labor compensation separately, a methodology that allows us to deal better with issues connected to cyclical fluctuations.

With respect to the existing research, our work's main elements of novelty consist of providing a broader picture of the phenomenon as we make use of longitudinal data that allow us to investigate the average behavior of the wage–productivity link in mature countries. In fact, the current contributions on decoupling focus predominantly on country-based studies—first and foremost on the US—while we aim to offer a wider exploration by targeting a sufficiently extended set of developed economies. Specifically, our empirics focus on a panel of 22 high-income countries and cover the 1970–2018 period. Moreover, in our contribution, we use a plurality of indicators for each macroeconomic and institutional dimension; that is, we adopt a range of variables representing labor market slack, globalization, financialization and labor market institutions. This approach helps us in shedding light on the possible drivers of wage dynamics from different angles. A further important and distinct feature of our approach is that we are interested in focusing on the 'structural' (as opposed to the cyclical and short-run) effects of institutional and macroeconomic factors since we believe that the impact of institutional and economic changes on the workers' relative bargaining strength must take some time to develop.[3] In addition, we systematically include among our explanatory variables the unemployment rate or other indicators of labor market slack. We do so because we do not assume that there is a tendency of the economy to return to some 'equilibrium' unemployment, understood as an attractor for the economic system, and believe that insufficient aggregate demand may cause *persistent* labor market

[3] By contrast, many empirical works, which we review in Sections 2 and 3, only deal with short-run correlations.

slack, which in turn can affect workers' bargaining power.[4] Finally, we adopt some procedural and methodological refinements that can improve the reliability of our results.

The rest of our contribution goes as follows. In Section 2, we review the existing literature on the decoupling between productivity and pay. In Section 3, we introduce and discuss the set of dimensions and indicators to which our empirical exploration refers. We then turn to the econometric investigation: Section 4 introduces the data and methodology, while Section 5 is devoted to the findings and a discussion. Section 6 concludes.

2. An overview on the reference literature

Empirical research on the size and the determinants of the decoupling between productivity and wages is cross-fertilizing economics and social sciences. Before presenting a brief literature review of the most recent works on the topic, clarification is needed. Quantitative studies often focus on the aggregate decoupling of real *median* wage growth from labor productivity growth. Ideally, this decoupling can be decomposed into i) the decoupling of the real average wage from productivity growth and ii) the divergence between *average* and *median* wages. As we target a large number of countries for a long time span (starting in 1970), due to data availability, our exploration refers to the first component of such decoupling. Focusing on the average instead of the median wage makes our contribution closer to the literature on the determinants of the decreasing labor share (following Schwellnus et al., 2018).[5] This means that our research does not consider the issue of the decoupling of the real median wage growth from the real average wage growth, which is usually regarded as a measure of wage inequality (OECD, 2018), assuming that the median wage represents the pay of a typical worker.[6] Consistently, while we also mention contributions that focus on the decoupling of the real *median* wage from productivity when reviewing the literature, we report only the size of the decoupling of the real *average* wage growth from productivity growth.

Among these studies, an almost mandatory reference is the contribution by Stansbury and Summers (2017), which focuses on the US economy and estimates a coefficient of about 0.7 for the nexus between the pace of real average compensation and the productivity growth in the period 1974–2016, while the decoupling has been more intense in recent times (1999–2016): taking the average of different specifications, the estimated coefficient is 0.5. In the same work, the relationship between the average compensation and productivity is estimated for other major countries. The findings are mixed: on the one side, the UK, Canada and West Germany (pre-reunification) reflect a strong degree of linkage (1.55, 0.95 and 0.88, respectively);

[4] For some empirical evidence supporting this viewpoint, see Girardi et al. (2020) and Paternesi Meloni and Stirati (2020); in the former, further references can be found that provide analytical and empirical support.

[5] The decoupling of the real average wage growth from the labor productivity growth, as intended in this work, amounts to a decline in the (adjusted) labor share if productivity and wages are expressed in terms of output prices. Besides, expressing real wages in terms of consumer prices (as we do in most of our empirical analysis) rather than output prices typically implies slightly larger decoupling since the CPI has grown at a higher rate than the GDP deflator in most OECD countries (see Schwellnus et al., 2017; OECD, 2018).

[6] It should be pointed out that, when average wages grow more than median ones, the compensation in the higher part of the distribution increases the most.

on the other side, Japan (0.20), post-reunification Germany (0.23), France (0.32) and Italy (0.42) present smaller coefficients (i.e., larger decoupling).[7] Dixon and Lim (2020) estimate decoupling of a comparable magnitude in the US non-financial corporation sector from the early 2000s to recent times and attribute it to changes in production technology and in firms' market power. Evidence of decoupling between productivity and pay is also provided by Škare and Škare (2017) for ten selected OECD countries for the period 1950–2014; the study finds some country heterogeneity and identifies the 1980s as a dominant breaking point for the start of the phenomenon. Pasimeni (2018) studies the decoupling of productivity from the average compensation in European countries, finding that productivity gains have translated into wage growth at about 50%, with a stronger link in the period 1970–1998 than after the onset of the monetary union.

In addition, Schröder (2020) examines the decoupling of productivity from average wages in the period 2002–2017 in Europe, with a particular focus on the Central and East European countries: the survey concludes that the decoupling has been much less clear-cut than seems to have been the case in the US and therefore indicates relevant cross-country heterogeneity, in line with Criscuolo and Schwellnus (2018). Prenner (2018) finds that, for European countries, a 1% increase in productivity increases the real average compensation by 0.64%. Theodoropoulou (2019) presents country-specific evidence regarding the link between the average labor productivity and the average real compensation growth in 25 EU member states by using 3-year moving averages (controlling for the trend in unemployment). The results are quite mixed, but relevant decoupling is found in Portugal (0.46), Italy (0.50), the United Kingdom (0.54) and Spain (0.61). In almost all cases, the exploration testifies to a depressing effect of unemployment on the pace of real wages. A similar (negative) association between the real wage growth and the unemployment rate is found in other contributions, including those of Stansbury and Summers (2017) and Stirati and Paternesi Meloni (2018).

Regarding the explorations of the decline of the labor share, all of them confirm that, in many countries, it has fallen since the 1970s, particularly since 2000 (Stockhammer, 2013, 2017; Karabarbounis and Neiman, 2014; Onaran and Galanis, 2014; Pariboni and Tridico, 2019a; Theodoropoulou, 2019). According to the OECD (2015), in the period 1970–2014, the most dramatic erosion of the adjusted share of labor occurred in Mediterranean countries (Spain, -14%; Italy, -12%), a milder drop has been experienced in the US (-11%) and Japan (-9%) and a smaller decline has occurred in Canada, Germany, France and the UK (about 6 to 7%). Confining the analysis to the private sector of the economy, net of the primary sector and real estate, the cross-country average labor share was about 70% in the G20 countries in the early 1990s, while it was 66% in 2007. Schwellnus et al. (2017) focus on a panel of 24 OECD countries and find that the labor shares have declined significantly in about two-thirds of the analyzed countries.

Concerning the interpretation of the phenomenon, as anticipated, the most widespread group of explanations for the decline in the labor share—and, hence, the most acknowledged reason behind the

[7] Concerning the case of the UK, this finding is confirmed by Pessoa and van Reenen (2013), who reveal no decoupling of the average compensation from productivity and thus no decreasing labor shares.

decoupling between productivity and average wages—probably refers to technological changes. It comprises a variety of analyses that are embedded in the neoclassical theory of distribution, which consistently must consider the (supposedly 'well-behaved') substitutability between production factors. The latter suggests relative stability of income shares over time, that is, an approximately one-to-one connection between the wage growth and the pace of productivity.[8] Thus, to explain the observed large changes in the income distribution, various contributions that belong to this broad group tend to emphasize unskilled-labor-saving technical progress (Hogrefe and Kappler, 2013; Bassanini and Manfredi, 2014; Grossman et al., 2017; IMF, 2017).[9] Karabarbounis and Neiman (2014) argue, consistently with a neoclassical approach, that the labor share has decreased in the US—and around the world—as a result of a fall in the price of investment goods. Combined with an elasticity of substitution between labor and capital greater than one, this would cause capital deepening and a reduction in the labor share.[10] Also rather common within this broad framework are explanations based on mainstream models of international trade, emphasizing relative factor scarcity as the driver of changes in income distribution. Hence, in advanced economies, unskilled labor would suffer the most from the integration of emerging economies into international trade while capital and skilled labor would benefit. The reverse is expected to happen in emerging, labor-abundant economies (e.g., IMF, 2007a). A relatively more recent development within this framework concerns the role of 'superstar firms', which exhibit very low wage shares owing to high mark-ups due to monopolies in technical knowledge and/or to specific technological features. The increasing weight—reflecting the increasing market concentration—of such very innovative firms is a major factor in the wage share decline (Autor et al., 2017; Calligaris et al., 2018; Schwellnus et al., 2018; Gutierrez Gallardo and Philippon, 2019).

Interestingly, a recent work by Stansbury and Summers (2020), while still framed within the neoclassical theory, emphasizes the decline in workers' bargaining power caused by institutional changes, which hamper workers' ability to obtain a share of the 'rents' generated (in some firms and industries) by imperfect competition. The main institutional changes behind this outcome, according to the authors, are fading unionization and union power and increased shareholder orientation in firms' governance. The broadly neoclassical analytical framework, however, still has some problematic implications, one of which is that such a decline in pro-workers institutions is expected to bring about a decline in the NAIRU (or average unemployment rates), which does not appear to fit the evidence for many European countries.

Indeed, several contributions, most often not endorsing a neoclassical framework, maintain that technological factors are not the primary driver of the decline in wages relative to productivity. For instance, Elsby et al. (2013) underline the effect of offshoring labor-intensive production tasks; other contributions emphasize the reduction of workers' bargaining power as a result of changing labor market institutions (Levy

[8] Within the neoclassical theory, any reduction in the return to a factor of production would cause greater intensity of its use, that is, in the case of labor, higher labor to capital and labor to GDP ratios (see Bentolila and Saint-Paul, 2003).

[9] Stockhammer (2013) offers a comprehensive survey of contributions belonging to this strand of the literature.

[10] See Lawrence (2015) for a critical discussion. Although remaining within the neoclassical framework, the author puts the emphasis on limited substitution possibilities between capital and labor.

and Temin, 2007; Bental and Demougin, 2010; Kristal, 2010; Bivens and Mishel, 2015). Among these interpretations, we can also include several works belonging to the broadly defined post-Keynesian tradition (among others Onaran, 2011; Stockhammer, 2017; Dünhaupt, 2017; Pariboni and Tridico, 2019a), which emphasize the role of labor market institutions, globalization and financialization in the process of erosion of the labor share.[11] Finally, Paternesi Meloni and Stirati (2020) highlight the effect of unemployment in depressing the labor share in the private sector of the economy for major OECD countries.

This preliminary overview indicates that macroeconomic and institutional dimensions may have been important in affecting the pace of real compensation in mature countries. In the next section, we shall explain in greater detail how they may have contributed to affecting wage dynamics.

3. Beyond productivity and technology: which factors may affect wage growth?

Even endorsing such a wider perspective, though, some analytical questions emerge. The primary set of enquiries concerns the main channels through which income distribution may be affected: should a major role be attributed to changes in labor market conditions and institutions causing a change in nominal and real wage dynamics and the inability of wages to grow along with productivity; should they mainly work through an increase in the interest rate, that is, the pure remuneration of capital affected in turn by changes in monetary policy or financial markets (Pivetti, 1991; and, with a different approach, Hein and Schoder, 2011; Hein, 2014); or should the main culprit be sought in the change in firms' governance and the balance of power among different stakeholders (Lazonick and O'Sullivan, 2000)? Furthermore, what has been the weight of the processes of globalization and financialization in affecting income distribution, taken alone or acting through these channels? The debate on the reasons and channels behind the decoupling between productivity and wages is far from reaching a unanimous conclusion, with the findings depending to a certain extent on the choice of variables and indicators used to represent the various dimensions. Our exploration will thus contribute to this line of inquiry by drawing from the PE approach to identify the factors that may have influenced the pace of average compensation in advanced capitalist countries. Specifically, we will make use of alternative indicators belonging to four extensive dimensions, discussed in the remainder of this section. In this way, and by adopting some methodological refinements, we will follow a procedure that we believe can contribute to clarifying and improving our understanding of the role and weight of various institutional and macroeconomic dimensions in affecting income distribution.

3.1 Labor market slack

According to some contributors, persistent unemployment and more generally greater labor market slack may have worked as a wage-moderating factor. This dimension has gained momentum only in the last years

[11] Although focusing on rising wage inequality (and not on the erosion of the labor share), the contribution by Kristal and Cohen (2017) deserves to be quoted as it juxtaposes technological and institutional factors.

since capitalist economies, and particularly European countries, have featured higher and persistent levels of unemployment. However, in the analyses of the classical economists and Marx, which can be regarded as the historical and analytical roots of the conflict theory of income distribution, labor market conditions are regarded as very relevant factors that can affect wages, along with, of course, other institutional, historical and political elements. This view finds empirical support in some recent works documenting a negative effect of labor market slack on the labor share (Kristal, 2010; Dünhaupt, 2017; Pariboni and Tridico, 2019a; Paternesi Meloni and Stirati, 2020). The downward pressure exerted on wages by unemployment is also found in the OECD's (2014a) study.

Here, a caveat might hold concerning the existing literature as labor market conditions and their impact on wage dynamics are usually described using the unemployment rate.[12] There are reasons, however, to regard unemployment as a useful but incomplete indicator of labor market conditions. For instance, the variability of the unemployment rate can be limited since a persistent lack of employment opportunities may induce adjustments on the supply side while a sustained labor demand can stimulate participation and reduce underemployment.[13] Indeed, the ECB (2017) documents a marked decline in unemployment rates across many euro area economies after 2010, combined with wage growth that remains subdued; this element suggests a degree of labor market slack that exceeds the level measured by the unemployment rate and that takes the form of inactivity and underemployment. On this basis, we include in our analysis not only the unemployment rate but also some enlarged metrics, which take into account the duration of unemployment, or other multidimensional indicators, including the participation rate, employment rate and employment growth, to represent the situation of the labor market.

3.2 Globalization

Increasing trade openness, more generally the intensified process of globalization, is often viewed as a driver of wage stagnation in high-income economies by contributions that endorse the PE approach. As a matter of fact, the possible role of globalization and global value chains' expansion in altering income distribution and fostering wage inequality is also considered by some mainstream contributions (Autor et al., 2015, 2016; Berlingieri et al., 2017; Schwellnus et al., 2018) and institutional research (European Commission, 2007).

On the one side, globalization is supposed to benefit capital in advanced economies and unskilled labor in developing countries, consistent with the Stolper and Samuelson (1941) theorem, grounded on the role of relative factor scarcity. In this regard, globalization is also seen as a possible cause of wage moderation reflecting the major increase in the worldwide (unskilled) labor supply resulting from the expansion of

[12] In this regard, an exception is the work by Paternesi Meloni and Stirati (2020), which also makes use of the index of unemployment intensity suggested by Shaikh (2016). Intuitively, the index combines the unemployment rate and the duration of unemployment.

[13] Some evidence vindicates the existence of a long-run relationship between unemployment and participation—and hence does not find support for the unemployment invariance hypothesis—for mature countries (Karanassou and Snower, 2004; Österholm, 2010; Emerson, 2011; Ozerkek, 2013; Tansel et al., 2016). Girardi et al. (2020) also find that economic expansions are followed by a persistent increase in participation rates.

international trade and the large newcomers —such as the BRICS countries—that have been integrating into global markets (Acemoglu, 1998, 2003).

On the other side, the PE approach argues that the main effect of trade on income distribution works by affecting the bargaining position of the parties (Rodrik, 1998); accordingly, globalization may contribute to weakening labor compared with capital in both mature and emerging countries (Stockhammer, 2017), and this mainly happens due to asymmetries in factor mobility. Redistribution from labor to capital—or, to put it differently, a slower pace of wages than of productivity—may be caused by offshoring practices (Onaran, 2011; Stockhammer, 2017) but also by a 'threat effect' as wage moderation can occur even without actual changes in production locations (Burke and Epstein, 2001; Tridico and Paternesi Meloni, 2018). In addition, the entry into global markets of economies with large labor reserves and low wages may have increased the competition in product markets, thus also favoring wage stagnation. According to the ILO (2008), "the intensification of competition—particularly the presence of large low-wage exporters in the market for labor-intensive products—has worked as a wage moderation factor" (p. 22). Existing works that try to document the effects of globalization on wages or income inequality typically make use of import and export data to describe trade openness (Rodrik, 1997; Stockhammer, 2013), while foreign direct investment (IMF, 2007b; Onaran, 2009) is considered to catch the aspects of globalization that are more related to capital mobility. Guschanski and Onaran (2018) clarify that "several empirical studies find substantial negative effects of variables measuring trade intensity (imports plus exports as a ratio to the GDP), foreign direct investment or offshoring, in line with the hypothesis that trade liberalization increases the fall-back options of capital" (p. 49). Among these works, IMF (2007a), Stockhammer (2013) and OECD (2015) find negative, albeit small, effects of globalization on the share of products going to wages in high-income countries. In this regard, besides the usual indicator based on the sum of exports and imports, we shall also control separately for each one. This may be useful since, while there could be reverse causation between wages and exports, an increase in the import propensity may more accurately reflect competitive pressures from import penetration in mature economies (Boulhol et al., 2011).

Another quite distinct aspect of external trade that may affect real wages is changes in the real exchange rate: real depreciation involves an increase in the price of imported inputs and consumption goods and, hence, if the nominal wage does not keep pace, a loss of workers' purchasing power (and *vice versa*) (Stirati and Paternesi Meloni, 2018). On the other hand, the real exchange rate may have indirect (opposite) effects on labor incomes if it stimulates (or depresses) net exports and hence employment growth and/or unemployment (included in our set of dimensions).

3.3 Financialization

Financial motives, actors and instruments are currently widely recognized as features of growing importance in advanced economies (Epstein, 2005). This process, broadly identified as financialization—or finance-

dominated capitalism, as defined by Hein (2015)—is often considered among the drivers of the decreasing labor share in advanced economies.[14] While Karwowski et al. (2020) elucidate that the process of financialization may assume heterogenous shapes across advanced countries, the PE approach as well as the post-Keynesian literature generally converge on the idea that financialization is an intrinsically "redistributive process" (Van der Zwan, 2014, p. 108).[15] Stockhammer (2013) deepens this argument and identifies two possible channels through which financialization may have relevant effects on the bargaining position of labor and hence may act as a wage moderation factor. First, businesses have gained more options for investing; specifically, they can invest locally or abroad, but they can also choose to invest in real or financial assets. Second, financialization has empowered shareholders relative to workers. According to the literature on financialization and corporate governance, one of the reasons why the latter would have adversely affected wage patterns is the reduced incentive to enhance long-term growth through real investment (Van Treeck, 2009; Tori and Onaran, 2017), with firms being more oriented toward short-term strategies and 'downsize and distribute' behavior (Lazonick and O'Sullivan, 2000; OECD, 2012; Lazonick, 2014; Van Treeck, 2015; Blecker, 2016; Palley, 2016).

Nevertheless, the effects of increasing financialization on wage dynamics are not so clear at the empirical level. Partially, this is because financialization is a phenomenon that can be observed from different perspectives (Hein, 2015; Dünhaupt, 2017; Pariboni and Tridico, 2019a; Pariboni et al., 2020), including the influence of the returns on financial assets on the profit rate (Pivetti, 1991; see Hein, 2014, for a different formulation). This makes it difficult to translate it into a single metric. Existing contributions make use of market capitalization (Pariboni and Tridico, 2019a) and credit from banks and other financial operators (Gouzoulis, 2020) as a proxy for financialization, finding a negative but moderate effect on the wage share. Moreover, foreign direct investment and foreign assets/liabilities are also used as a proxy for financial globalization (Stockhammer, 2017). Some other proxies used in the literature, such as distributed dividends over the GDP as an indicator of the change in firms' governance (Duménil and Lévy, 2001; Hein and Schoder, 2011; Onaran et al., 2011), may instead appear to be rather troublesome since lower wages relative to productivity involve by definition (are the same thing as) a larger profit share and, hence, under the assumption of a constant fraction of profits distributed as dividends, also involve by definition an increase in dividends over the GDP. In other words, the latter is an accounting counterpart of a decline in the wage share. To deal with this issue, we will use the dividend-profit share ratio as our proxy. At any rate, some of the above-listed contributions find a significant negative effect of financial variables—*not* including the

[14] For a definition of financialization in the broader domain of social and political sciences, see also Krippner (2005), according to whom financialization can be identified as the growing dominance of capital financial systems over bank-based financial systems. The interested reader may refer to Gospel and Pendleton (2003) for the effects of financial engagement on different types of corporate governance and their consequences on labour management. See also Soener (2020) for an in-depth analysis of financialization processes in the non-financial corporate sector of the economy.

[15] See also OECD (2014b). See Pariboni and Tridico (2019a) for a detailed analysis of the multiple channels through which financialization may curb workers' bargaining power and contribute to shifts in income distribution that are unfavorable to wages. On the same issue, see also Hein and Schoder (2011), Lin and Tomaskovic-Devey (2013) and Pariboni et al. (2020).

dividends-to-GDP ratio—on wage dynamics and the labor share (Stockhammer, 2017; Pariboni and Tridico, 2019a). In our empirics, we shall assess all of the above-listed variables.

3.4 Labor market institutions

Institutions operating in favor of workers are generally supposed to support wages inasmuch they tend to increase workers' bargaining power. Public policies and practices are also recognized in the process of "promoting a broader sharing of productivity gains, both by supporting wages at the bottom of the wage distribution and raising labour shares" (OECD, 2018, p. 60). Among these factors, the existing literature includes employment protection legislation (Tridico, 2013; Hein et al., 2020), trade union density (Kristal, 2010; Stockhammer, 2013; Bengtsson, 2014; Prenner, 2018; Tridico and Paternesi Meloni, 2018), collective bargaining coverage (Dell'Aringa and Pagani, 2007; Iversen et al., 2016), the generosity of unemployment benefits (Guichard and Rusticelli, 2010), strike activity (Dünhaupt, 2017) and the possibility to employ part-time and temporary contracts (Pariboni and Tridico, 2019b).[16]

Independently of measuring the strength of labor market institutions and policies, a general process of labor market flexibilization is documented in a variety of works (Deakin et al., 2014; Brancaccio et al., 2018; Tridico and Paternesi Meloni, 2018; Hein et al., 2020). The estimated effects of labor market institutions on wage dynamics and the wage share are, however, quite mixed among studies. Quite emblematic in this regard is what emerges from European Commission (2007): at the descriptive level, the work illustrates that "increases (decreases) in the trade union density are accompanied by increases (decreases) in the labour income change" (p. 250); meanwhile, at the empirical level, union power is likely to have, on aggregate, a null effect on income distribution (a positive effect is found for medium-to-high-skilled workers and even a negative effect is identified for low-skilled workers). Moreover, the same work testifies that changes in the labor income share do not correlate with the presence of minimum wage legislation, even though, on econometric grounds, the latter would exert upward pressure on the wage share. Similarly, the IMF (2007a) does not find a significant contribution of labor market policies and institutions to the labor share of income, contrary to what would be expected from analytical perspectives, such as the PE approach, which attribute an important role to the bargaining power of workers. Notably, Stockhammer (2013, 2017) reports that the only proxy for labor market institutions that presents a significant (positive) influence on the wage share is trade union density, while no significant effects are apparent for employment protection legislation, minimum wages and unemployment benefits. In contrast, Pariboni and Tridico (2019a) conclude that the index of employment protection is positively associated with the wage share in a panel of mature economies. Similarly, Ciminelli et al. (2020) find significant negative effects of job protection deregulation on the labor share, contributing

[16] Partially, the use of indicators representing the vulnerability and the shortness of labor contracts (part-time and temporary agreements) may also offer some insights into the relevance of the process of 'structural change' or tertiarization of the economy (Storm, 2017; Beqiraj et al., 2019; Pariboni and Tridico, 2019b) in depressing wage growth. The argument is that a shift toward the low-wage segments of the service sector may have contributed to amplifying the decoupling between productivity and pay at the aggregate level.

about a tenth of its decline, in a sample of 26 advanced economies after 1970. A positive correlation between employment protection and the wage share is also documented, among others, by Deakin et al. (2014) and Brancaccio et al. (2018). Such a variety of results, which might depend on a range of factors (the use of alternative indicators, estimation methods and panels of countries), makes us wonder about the effective impact of labor market institutions on income distribution. A possible explanation might, however, be found in the literature. In this regard, Pariboni and Tridico (2019a) indicate that, particularly in Europe, the policy agenda is moving toward so-called 'flexicurity', a paradigm that promotes some types of job and income security while taking into account the need for flexibility on the part of firms. The archetypical example is Denmark, where poor employment protection legislation is associated with sustained income and job security. While Baccaro and Howell (2011) claim that, in several countries in Europe, the neoliberal turn took place less by means of institutional change in a strict sense as by means of a changing role of existing institutions. For example, national wage contracts established by trade unions and employers' associations may still exist but at the same time now be subject to a number of derogation clauses that tend to depress their impact dramatically; alternatively, trade unions may have accepted a line of strong wage moderation and hence even generated a negative impact, as found by Dünhaupt (2017). Iversen et al. (2016) argue that, in nearly all advanced economies, union membership is in structural decline (as also documented by Meyer, 2019), but the coverage of union wage agreements has not fallen in line with the membership, suggesting that union density should be considered as a better candidate to capture the process of the labor movement's power erosion.[17] The conclusion is that a number of common indicators in empirical analyses that are based on the existence of certain institutions, policies and practices should be used with caution as they could be not particularly appropriate to register the changes that are actually taking place. Again, in our empirical analyses, we shall assess a wide range of indicators of the strength of labor market institutions.

4. Empirical investigation

The paper now turns to an econometric exploration. Intuitively, our investigation will assess the association between real wage growth (our dependent variable), on the one side, and labor productivity growth and a set of dimensions found to be relevant to our discussion, on the other side. This approach will allow us to elaborate on two distinct elements, both central to our research. First, by analyzing the coefficient for labor productivity growth, we will be able to quantify the extent to which productivity gains have translated into wage growth so far and by opposition to catch the magnitude of the decoupling. Second, as we are interested in explaining why income distribution is supposed to change, we will consider the effect of other dimensions

[17] A further argument can be found in the study by Baccaro and Pontusson (2019) with respect to the case of Germany. The authors notice that, starting in the 1990s, the "collective bargaining system ceased to redistribute productivity across sectors" (p. 22), a feature that had previously enhanced the establishment of a wage-led demand regime, the termination of which weakened the link between collective bargaining coverage and growth. Still, according to Pontusson (2013), different trends in unionization explain changes in income inequality (at the personal level) across countries.

on the pace of the average real wage; accordingly, next to productivity growth, we will include some variables that are consistent with the factors that we discussed in the previous section.

As regards the very mission of our work, the empirical exploration is confined to advanced economies. We therefore need a criterion for selecting countries. We follow Girardi et al. (2020) and define 'mature' countries as the ones that joined the OECD before 1973. We thus identify 22 capitalist economies.[18] The time span is from 1970 to 2018, and it is dictated by data availability.

Let us start with our dependent variable (ΔR_COMP), which is the yearly rate of change of the average labor compensation per employed person. In all our specifications, earnings are considered in real terms. We alternatively deflate them by means of the CPI index, as it is more representative of the trends of prices in the basket consumed by workers, and the GDP deflator, so that we use the same deflator of labor productivity.[19] Our main regressor is the annual rate of growth of labor productivity (ΔR_PROD), measured as the rate of change of the real GDP per person employed. We then draw from the literature reviewed in Section 3 to identify some variables that represent the macroeconomic and institutional dimensions discussed above.[20] A detailed definition of the variables and sources is provided in Appendix 1. Besides productivity growth, each model may alternatively or jointly include the following regressors:

- An index of labor market slack (LMS), the coefficient of which we expect to be negative. In addition to the unemployment rate (UN), we will pay attention to the duration of unemployment by considering the short-term (STU) and the long-term (LTU) unemployment rate, as well as an index of unemployment intensity ($UNINT$) constructed in the spirit of Shaikh (2016).[21] Moreover, we will assess the potential effect on wages of enlarged measures of slack in the labor market, that is, the missing employment rate (ER), the employment growth with the opposite sign (EG) and the missing participation rate (PR). Finally, we will make use of two original multidimensional indicators of labor market slack that condense three measures of underemployment: $UND1$ combines UN, ER and PR; while $UND2$ combines UN, EG and PR. Multidimensional indicators are constructed by means of a principal component analysis, as detailed in Appendix 2.[22]

[18] Specifically, the panel includes Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK and the US.

[19] As discussed in Section 2, the decoupling between average pay and productivity exactly represents the erosion of the labor share when both variables are deflated using the same price index (that is, the GDP deflator). Otherwise, they may not overlap if the trend of the CPI index differs systematically from that of the GDP deflator.

[20] To consider a large number of dimensions, in the spirit of the PE approach, we choose from a variety of sources and databases (see Appendix 1). The variables used are all those that are available for a sufficiently long time and for a sufficiently large number of countries. Moreover, the reader should note that, when these variables are considered simultaneously, the number of observations may decrease due to data limitations.

[21] Technically, $UNINT$ is computed by multiplying the unemployment rate by an index of unemployment duration obtained by dividing the actual duration of unemployment (expressed in months) by the country-specific minimum duration, following Paternesi Meloni and Stirati (2020).

[22] All the enlarged measures of LMS are standardized (min.–max.) on a common scale (0–10) for coefficient comparison. For the sake of comparability, we also calculate a standardized rate of unemployment (UN_N) on the same scale, considering all observations with an unemployment rate lower than 4% (assuming that as a threshold of 'frictional' unemployment) to be a full employment situation (that is, with UN_N equal to 0).

- A metric of globalization ($GLOB$) intended as trade openness. This dimension will be alternatively represented by the shares in the GDP of exports of goods and services (EXP), imports of goods and services (IMP) and trade openness ($OPEN$), the latter expressed as the sum of the import and export shares.
- An index of financialization (FIN). We will refer to pure financial variables related to the domestic economy, such as credit provision ($CRED$) and market capitalization (MKT), and to variables that may provide some indications concerning the effects of financialization intended as international finance and capital mobility, such as an index of financial globalization (FGL), which is the sum of foreign assets and liabilities (share of the GDP), and foreign direct investment (FDI), expressed as inflows plus outflows (share of the GDP). We also make use of a variable representing the 'downsize and distribute' behavior of businesses: specifically, to avoid a spurious representation of the phenomenon (see Section 3 above), we will refer not to the total dividends as a share of the GDP but to the distributed dividends as a share of profits, both in the total economy (DIV) and in non-financial corporations (DIV_NFC).
- A variable representing the vigor of labor market institutions (LMI). Specifically, institutions operating in favor of workers, the coefficient of which we expect to be positive, will be alternatively represented by trade union density (TU), an index measuring the strength of employment protection legislation for both regular contracts (EPL) and temporary contracts (EPL_T), and collective bargaining coverage (BC). Within this class of variables, we also include the shares of part-time contracts (PT) and temporary contracts ($TEMP$), the coefficients of which we conversely expect to be negative.
- Among our regressors, we shall also consider the real interest rate (RIR) and the dynamics of the real effective exchange rate ($\Delta REER$, an increase meaning real appreciation). This will allow us to investigate further the possible effects on wage growth of some general features of financialization and globalization. Specifically, the inclusion of RIR reflects the possibility that the income distribution will be affected by the interest rate levels, whereby a high interest rate would be associated with a higher rate of profit and hence higher profit shares, while $REER$ captures the evolution of relative prices of imports, which may have effects on the income distribution.

The nature of our research question leads us to follow the approach of panel analysis. This strategy is commonly used in the literature on the determinants of the labor share (Stockhammer, 2013, 2017; Dünhaupt, 2017; Pariboni and Tridico, 2019a) as well as in works in which the regressing variable is wage growth instead of the labor share, as is the case of our exploration (see among others Stirati and Paternesi Meloni, 2018; Kiss and Van Herck, 2019). The model can generally be expressed as shown in Equation (1):

$$\Delta R\_COMP_{i,t} = \alpha_i + \delta_t + \beta_D \Delta R\_PROD_{i,t} + \varepsilon_{i,t} \quad (1).$$

The intuition behind this extremely simplified model is rather immediate: the size of the decoupling between productivity and pay is expressed by the coefficient β_D, which allows us to assess the extent to which productivity gains translate, on average, into growing wages. With this coefficient equal to one, productivity growth would completely translate into higher wages and no changes in the labor share would be detected. In the words of Stansbury and Summers (2017), we shall see the 'strongest linkage' between productivity and average compensation. In contrast, we shall witness the 'strongest delinkage' if the coefficient is virtually zero. Reasonably, and according to the existing literature and evidence, we can expect β_D to range between zero and one.

As we are also interested in understanding why wage growth has been prevented from keeping pace with productivity, we include the variables described above, as shown in Equation (2):

$$\Delta R\_COMP_{i,t} = \alpha_i + \delta_t + \beta_D \Delta R\_PROD_{i,t} + \beta_R RIR_{i,t} + \beta_C \Delta REER_{i,t} + \beta_U LMS_{i,t} + \beta_F FIN_{i,t} + \\ + \beta_G GLOB_{i,t} + \beta_L LMI_{i,t} + \varepsilon_{i,t} \quad (2).$$

Notably, in all our specifications, we make use of both country (α_i) and time (δ_t) fixed effects, which will enable us to control explicitly for spatial heterogeneity, specific time effects and/or coordinated business cycles (Girardi et al., 2020). In addition, time fixed effects may reduce the risk of errors due to omitted variables. All the variables have been checked to be panel stationary by means of a Fisher-type unit-root test based on augmented Dickey-Fuller tests (Choi, 2001).[23] As our principal tool, we will use the feasible generalized least squares (FGLS) estimator. This estimator is particularly appealing in our framework as it allows robust estimations in the presence of autocorrelation within panels as well as cross-sectional correlation and heteroskedasticity across panels. Moreover, we will test the robustness of our reference model to alternative estimators, namely: i) an autoregressive AR-FGLS estimator (with AR(1) disturbance); ii) an Arellano–Bond estimator for dynamic panel data; iii) a linear GMM (generalized method of moments) estimator; and iv) a system GMM estimator. On the one side, the main advantage of AR-FGLS is that it explicitly considers the possible autoregressive component of wage growth; on the other side, the remaining estimators (namely linear GMM, system GMM and Arellano-Bond) are more likely to address potential endogeneity problems.

Importantly, in our analyses, we will also consider 5-year fixed or moving averages to deal with the documented cyclicality of labor productivity (Basu, 1996) and wages (Stirati, 2016) and to capture the 'structural' effects of our variables, most of which must be supposed to display their impact on the bargaining power of the parties and on wages over time.

[23] Being aware of the potential limitations of stationarity tests in a panel framework, we will make use of time fixed effects in all our specifications.

5. Findings and discussion

Our findings are presented in four sequential steps. Through Equation (1), we first estimate a 'simple model' (henceforth, SM) aiming to quantify the size of the decoupling between productivity and pay. Accordingly, here we consider exclusively the rate of growth of the average compensation per employee (in real terms) and the rate of growth of labor productivity (Table 1).[24] Second, we estimate a 'baseline model' (henceforth, BM) by adding a set of regressors to the SM, as in Equation (2). Specifically, we consider the effects on compensation growth stemming from the unemployment rate or enlarged measures of LMS (Table 2) along with the dynamics of the real exchange rate ($\Delta REER$) and the real interest rate (RIR). Third, we estimate three 'extended models' (henceforth, EMs) by adding to the BM one further dimension at a time, namely $GLOB$ (Table 3.1), FIN (Table 3.2) and LMI (Table 3.3). Fourth, we build a 'general model' (henceforth, GM) by taking stock of what emerged from the EMs: here, we focus on variables that are proven to be relevant to the pace of real compensation and consider them simultaneously by estimating a far-reaching model (Table 4).

5.1 Findings

Decoupling between the pace of productivity and that of average compensation clearly emerges from the SM. The coefficient β_D is lower than one and decreases over time: it settles at about 0.4 when considering the whole time span while diminishing if the analysis is confined to more recent periods, namely after 1980 and 1999 (see Table 1). When using 5-year averages (MA or FA) to avoid cyclicality issues, the decoupling is lower, as the coefficient β_D is approximately 0.55. The estimated decoupling is slightly lower (with a coefficient of 0.6) when the compensation is deflated using the same deflator as labor productivity (i.e., the GDP deflator), reflecting the fact that consumer prices have grown at a higher rate than product prices in most OECD countries (cf. OECD, 2018). Moreover, we do not find a significant association between productivity and pay in the period 1999–2018 when operating with GDP deflator-based compensation instead of the CPI-index (cf. Table 1.1 and 1.2). When using moving averages, the estimated size of the decoupling is quite in line with the prevailing empirical works reviewed in Section 2, while it is higher when we do not average over the cycle. The finding of larger decoupling in the most recent decades is also consistent with the literature.

[24] It should be noted that, in our SM, we also include both country and time fixed effects.

Table 1. Simple model of decoupling

Table 1.1. CPI-deflated compensations

Variables	Model 1	Model 2 (5y-MA)	Model 3 (5y-FA)	Model 4 (1980-2018)	Model 5 (1999-2018)
ΔR_PROD	0.381*** (0.046)	0.586*** (0.039)	0.555*** (0.093)	0.288*** (0.048)	0.143*** (0.056)
Constant	4.158*** (0.662)	2.667*** (0.333)	2.263*** (0.586)	-0.414 (0.609)	1.772*** (0.562)
Obs. (Countries)	904 (22)	904 (22)	190 (22)	731 (22)	396 (22)
Adjusted R2	0.301	0.658	0.595	0.195	0.254
Wald statistic	χ2(67) = 370.31	χ2(71) = 1732.70	χ2(31) = 279.23	χ2(58) = 177.34	χ2(39) = 134.76
Prob > χ^2	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. MA = moving averages; FA = fixed averages. Timespan: 1970–2018 (unless specified differently). All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

Table 1.2. Product price-deflated compensations

Variables	Model 6	Model 7 (5y-MA)	Model 8 (5y-FA)	Model 9 (1980-2018)	Model 10 (1999-2018)
ΔR_PROD	0.338*** (0.043)	0.601*** (0.040)	0.594*** (0.091)	0.239*** (0.048)	0.075 (0.060)
Constant	3.858*** (0.625)	1.961*** (0.331)	1.719*** (0.517)	0.514 (0.619)	1.392** (0.609)
Obs. (Countries)	904 (22)	904 (22)	190 (22)	731 (22)	396 (22)
Adjusted R2	0.257	0.580	0.558	0.151	0.112
Wald statistic	χ2(67) = 301.07	χ2(69) = 1249.07	χ2(31) = 242.64	χ2(58) = 131.95	χ2(39) = 50.07
Prob > χ^2	0.000	0.000	0.000	0.000	0.110

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the GDP deflator. MA = moving averages; FA = fixed averages. Timespan: 1970–2018 (unless specified differently). All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

When adding some regressors (that is, when estimating our BM), the picture becomes more comprehensive. While estimating a similar coefficient for the decoupling (β_D is approximately 0.35 in all the specifications presented in Table 2), we find a positive coefficient for $\Delta REER$ (about 0.10, indicating that real appreciation is associated with compensation growth) and a non-significant coefficient for the real interest rate. Furthermore, almost all the LMS indicators negatively affect the pace of real compensation: the coefficient for the unemployment rate (UN) is negative and presents the expected sign, standing at about -0.2. If we

consider that the unemployment rates settled at about 3 to 4% during the 1970s (panel average), while they were approximately 7% in the post-2000 period, the estimated coefficient indicates that labor market slack may have contributed, other things being equal, to cutting back the annual growth rate of real wages by about 0.55%. We estimate a negative and statistically significant effect regardless of the duration of unemployment, that is, for LTU (-0.15) and STU (-0.28): this finding partially contrasts with the New Keynesian literature, which regards long-term unemployment as not causing downward pressure on wages (Layard et al., 1991; Rusticelli, 2015). Moreover, the larger size of the coefficient for $UNINT$ (-0.92) testifies that the depressing effects on wages become more intense when the duration of unemployment increases, in line with Shaikh (2016). We also estimate the BM using enlarged metrics of LMS and find a negative and significant coefficient for the missing employment rate (the coefficient for ER is equal to -0.11, which is quite comparable with the one for the normalized unemployment rate, UN_N) and a virtually null effect associated with the missing participation rate (PR), while we estimate a sizeable coefficient for EG (-0.226), testifying to a positive and stronger association between employment growth and compensation growth. Concerning our multidimensional indicators of LMS, both the coefficients are negative and significant, while the coefficient for $UND1$ is in line with the one for the unemployment rate and $UND2$ exhibits the most depressing effect on wages, which is likely to be due to the effect of low and/or negative employment growth.

Table 2. Baseline model, considering alternative indicators of labour market slack

Table 2.1. Unemployment, long- and short-term unemployment, unemployment intensity

Variables	**Model UN**	**Model UN with 5y-MA**	**Model LTU**	**Model STU**	**Model UNINT**
ΔR_PROD	0.359*** (0.042)	0.616*** (0.039)	0.264*** (0.041)	0.273*** (0.041)	0.271*** (0.041)
$\Delta REER$	0.098*** (0.014)	0.155*** (0.015)	0.102*** (0.013)	0.097*** (0.013)	0.097*** (0.014)
RIR	0.018 (0.025)	-0.016 (0.016)	-0.113*** (0.029)	-0.105*** (0.028)	-0.119*** (0.027)
LMS	-0.212*** (0.033)	-0.153*** (0.018)	-0.155*** (0.049)	-0.284*** (0.059)	-0.923*** (0.280)
Constant	4.426*** (0.628)	2.968*** (0.330)	1.751 (1.668)	3.036* (1.677)	1.148 (1.209)
Obs. (Countries)	825 (22)	891 (22)	673 (22)	673 (22)	684 (22)
Adjusted R2	0.379	0.666	0.343	0.355	0.334
Wald statistic	χ2(69) = 504.37	χ2(72) = 1777.32	χ2(69) = 351.77	χ2(69) = 371.43	χ2(69) = 344.08
Prob > χ^2	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. Timespan: 1970–2018. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses;* *** *p<0.01,* ** *p<0.05,* * *p<0.1.*

Table 2.2. Enlarged measures of labour market slack

Variables	Model UN_N	Model ER	Model EG	Model PR	Model UND1	Model UND2
ΔR_PROD	0.363*** (0.043)	0.370*** (0.043)	0.411*** (0.045)	0.352*** (0.044)	0.352*** (0.046)	0.374*** (0.043)
$\Delta REER$	0.098*** (0.014)	0.106*** (0.014)	0.100*** (0.014)	0.109*** (0.014)	0.105*** (0.015)	0.094*** (0.014)
RIR	-0.011 (0.024)	-0.025 (0.024)	-0.003 (0.023)	-0.040* (0.023)	-0.026 (0.025)	-0.013 (0.024)
LMS	-0.165*** (0.028)	-0.111*** (0.036)	-0.280*** (0.044)	-0.028 (0.026)	-0.105*** (0.039)	-0.268*** (0.035)
Constant	4.113*** (0.630)	4.532*** (0.646)	3.299*** (0.640)	4.757*** (1.004)	4.605*** (0.758)	4.428*** (0.664)
Obs. (Countries)	825 (22)	831 (22)	831 (22)	822 (22)	816 (22)	816 (22)
Adjusted R2	0.375	0.367	0.392	0.346	0.339	0.377
Wald statistic	χ2(69) = 495.76	χ2(69) = 483.43	χ2(69) = 536.13	χ2(69) = 435.27	χ2(69) = 419.88	χ2(69) = 494.54
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. UN_N = unemployment rate (standardized); ER = missing employment rate; EG = employment growth (opposite sign); PR = missing participation rate; UND1 = composite index of underemployment, version 1 (including UN, ER, PR); UND2 = composite index of underemployment, version 2 (including UN, EG, PR). Note: all coefficients on enlarged measures of LMS are comparable as variables have been standardized. Timespan: 1970–2018. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

Subsequently, we estimate three EMs.

In the first one, we also consider $GLOB$ (Table 3.1). While corroborating the size of the decoupling, we find a negative and significant effect of all our variables (EXP, IMP and $OPEN$) on compensation growth only when considering 5-year moving averages, while no statistically significant effects are detected for rough data. To give an idea, trade openness increased, on average across our panel of countries, from 40% in 1970 to 102% in the last years of the sample. Given the estimated coefficient for $OPEN$ (-0.52 using MAs), trade globalization may have decreased, *ceteris paribus*, the annual growth rate of real wages of about 0.3%.

In the second one, we include FIN (Table 3.2); here, too, the magnitude of the decoupling is confirmed, while the only variables exhibiting a negative association with the pace of compensation are $CRED$ and FDI, with the latter being statistically significant only in the 5-year moving average specification.[25] We do not find statistically significant effects for MKT and FGL, even when averaging over the cycle. While the negative effect on wages of capital mobility is quite standard in the literature, as discussed in Section 2.2, the effect of credit provision has to be taken with caution as reverse causation may apply: households might resort to bank loans to a greater extent when wages are low and stagnating (see Barba and Pivetti, 2009). Concerning distributed dividends, we do not find a statistically significant effect on wage dynamics either when

[25] It is worth specifying that, in the specifications with $CRED$, we do not include RIR due to potential collinearity.

considering the economy as a whole or when confining the analysis to dividends in non-financial corporations.[26] Referring to the estimated effect of FDI (-0.89 in the MA specification), and given that this indicator stands at about 16.5% in the latest years of our exploration (while it is 1.5% in the first half of the 1970s), increasing capital mobility is likely to have had an impact, on average, of about -0.13% yearly on the real wage dynamics.

In the third EM, we include LMI (Table 3.3). All the coefficients associated with the proxies for institutions, policies and practices related to the labor market have the expected sign: trade unions (TU), employment protection (both EPL and EPL_T) and collective bargaining coverage (BC) have a positive effect on wage growth and high statistical significance, while indicators of precarious jobs ($TEMP$ and PT), despite presenting a negative sign, are not significant. The positive and statistically significant effect of pro-labor institutions is also confirmed when using 5-year moving averages. Overall, these findings confirm that a decrease in labor rigidities and in the power of institutions in favor of workers enhances capital's bargaining power, making workers reluctant to engage in workplace struggles (in line with Pariboni and Tridico, 2019a). Since our proxies for LMI are constructed on different scales, the coefficients are not directly comparable. However, it has to be noted that the average unionization rate decreased from 45% in 1970 to 30% in 2018. Similarly, the average EPL was about 2.4 at the beginning of the 1980s, while it was approximately 2.0 in the last observed year. Given the estimated semi-elasticities, those losses may have contributed, on average and taken alone, to decelerating the yearly pace of real wages by about 0.45% and 0.2%, respectively.

[26] We also check the robustness of these findings to the exclusion of countries with very high values of DIV and DIV_NFC (i.e., Luxembourg). The results are virtually unchanged.

Table 3. Extended model

Table 3.1. With globalization (GLOB)

Variables	Model EXP	Model IMP	Model OPEN	Model EXP with 5y-MA	Model IMP with 5y-MA	Model OPEN with 5y-MA
ΔR_PROD	0.360*** (0.043)	0.359*** (0.044)	0.359*** (0.043)	0.614*** (0.039)	0.616*** (0.041)	0.614*** (0.039)
$\Delta REER$	0.098*** (0.014)	0.097*** (0.015)	0.098*** (0.014)	0.157*** (0.015)	0.156*** (0.016)	0.156*** (0.015)
RIR	0.015*** (0.025)	0.022 (0.026)	0.019 (0.025)	-0.023* (0.016)	-0.023 (0.017)	-0.024 (0.016)
UN	-0.205*** (0.034)	-0.215*** (0.033)	-0.214*** (0.034)	-0.145*** (0.019)	-0.148*** (0.019)	-0.145*** (0.019)
$GLOB$	-0.684 (0.932)	1.605 (1.095)	0.151 (0.525)	-0.792*** (0.441)	-1.256** (0.559)	-0.525** (0.249)
Constant	4.428*** (0.628)	4.370*** (0.628)	4.421*** (0.628)	2.980*** (0.329)	3.014*** (0.344)	2.995*** (0.329)
Obs. (Countries)	825 (22)	825 (22)	825 (22)	891 (22)	891 (22)	891 (22)
Adjusted R2	0.379	0.381	0.380	0.667	0.668	0.667
Wald statistic	χ2(70) = 505.24	χ2(70) = 507.83	χ2(70) = 504.50	χ2(73) = 1786.97	χ2(73) = 1793.77	χ2(73) = 1790.55
Prob > χ^2	0.000	0.00	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. Timespan: 1970–2018. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

Table 3.2. With financialization (FIN)

Variables	Model CRED	Model MKT	Model FGL	Model FDI	Model DIV	Model DIV_NFC	Model CRED, 5y-MA	Model FDI, 5y-MA
ΔR_PROD	0.367*** (0.059)	0.289*** (0.038)	0.414*** (0.051)	0.303*** (0.043)	0.301*** (0.041)	0.281*** (0.045)	0.500*** (0.047)	0.539*** (0.039)
$\Delta REER$	0.112*** (0.019)	0.054*** (0.013)	0.099*** (0.015)	0.100*** (0.013)	0.052*** (0.016)	0.075*** (0.016)	0.157*** (0.018)	0.147*** (0.014)
RIR	-	-0.051** (0.026)	0.031 (0.027)	-0.073*** (0.027)	-0.074*** (0.028)	-0.083*** (0.030)	-	-0.090*** (0.017)
UN	-0.155*** (0.049)	-0.163*** (0.028)	-0.226*** (0.042)	-0.183*** (0.032)	-0.183*** (0.030)	-0.177*** (0.033)	-0.139*** (0.022)	-0.136*** (0.018)
FIN	-1.743*** (0.390)	0.230 (0.266)	-0.890 (1.049)	-0.462 (0.397)	0.004 (0.022)	0.007 (0.056)	-1.547*** (0.194)	-0.893** (0.338)
Constant	5.630*** (0.961)	4.682*** (0.615)	4.353*** (0.651)	4.238*** (0.633)	1.083 (0.861)	3.299*** (0.817)	2.988*** (0.453)	2.981*** (0.3259
Obs. (Countries)	553 (22)	643 (21)	733 (22)	763 (22)	498 (19)	537 (20)	553 (22)	763 (22)
Adjusted R2	0.395	0.388	0.376	0.350	0.472	0.437	0.676	0.668
Wald statistic	χ2(79) = 361.59	χ2(65) = 407.25	χ2(66) = 441.28	χ2(70) = 470.78	χ2(67) = 445.70	χ2(68) = 417.85	χ2(72) = 1253.39	χ2(73) = 1676.34
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. Timespan: 1970–2018. The FGL specification refer to the period 1970–2011 due to data availability. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

Table 3.3. With labour market institutions (LMI)

Variables	Model TU	Model EPL	Model EPL_T	Model BC	Model TU with 5y-MA	Model EPL with 5y-MA	Model BC with 5y-MA	Model TEMP	Model PT
ΔR_PROD	0.322*** (0.041)	0.284*** (0.040)	0.303*** (0.052)	0.597*** (0.056)	0.605*** (0.040)	0.462*** (0.039)	0.597*** (0.037)	0.238*** (0.046)	0.237*** (0.048)
$\Delta REER$	0.090*** (0.013)	0.093*** (0.013)	0.088*** (0.014)	0.081*** (0.016)	0.155*** (0.016)	0.151*** (0.014)	0.145*** (0.014)	0.117*** (0.016)	0.116*** (0.017)
RIR	0.023 (0.024)	-0.064** (0.025)	-0.092*** (0.030)	-0.011 (0.034)	-0.033* (0.017)	-0.101*** (0.018)	-0.072*** (0.019)	-0.083** (0.032)	-0.082** (0.034)
UN	-0.234*** (0.032)	-0.155*** (0.031)	-0.180*** (0.035)	-0.217*** (0.038)	-0.161*** (0.019)	-0.112*** (0.019)	-0.148*** (0.018)	-0.159*** (0.036)	-0.158*** (0.039)
LMI	4.699*** (1.278)	0.513* (0.342)	0.238* (0.129)	2.672** (1.046)	3.009*** (0.660)	0.251* (0.183)	0.823** (0.430)	-1.883 (3.793)	-0.983 (4.246)
Constant	2.841*** (0.738)	4.139*** (0.801)	1.807*** (0.596)	0.788 (1.685)	1.989*** (0.400)	2.965*** (0.421)	2.512*** (0.442)	2.908*** (0.696)	3.040*** (1.163)
Obs. (Countries)	799 (22)	741 (22)	543 (22)	407 (22)	799 (22)	741 (22)	407 (22)	531 (22)	531 (22)
Adjusted R2	0.406	0.404	0.404	0.547	0.677	0.684	0.705	0.367	0.366
Wald statistic	χ2(70) = 546.49	χ2(70) = 503.60	χ2(55) = 366.09	χ2(70) = 491.35	χ2(73) = 1870.12	χ2(73) = 1744.66	χ2(73) = 2043.57	χ2(51) = 307.91	χ2(51) = 307.61
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. Timespan: 1970–2018. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses;* *** *p<0.01,* ** *p<0.05,* * *p<0.1.*

Finally, we estimate a GM by including the most relevant variables after having examined the results that emerged from the various specifications of the EM. Table 4 presents six different model specifications, which, together with the pace of productivity, consider $\Delta REER$, RIR, $UND2$ as indicators of LMS, alternative indicators for both $GLOB$ and LMI, and FDI for financialization. Importantly, in all the specifications estimated here, we consider 5-year moving averages. As expected, the explanatory power of our models is systematically higher when averaging over the cycle, as can be seen from the size of the R-squared across alternative specifications.

The first six columns considering $GLOB$ broadly confirm the presence of decoupling (which is lower than in the models in which we do not use averages, analogously to the results presented in Table 1), but some differences hold with respect to the previous models: we find slightly higher (positive) effects of $\Delta REER$ and a negative coefficient associated with RIR. The negative effect of all our proxies for trade globalization (EXP, IMP and $OPEN$) is confirmed when averaging the data, and, interestingly, import penetration exhibits a higher coefficient than exports. The increase in the coefficients for the variables in this estimation, listed above, compared with the previous ones is most likely to depend on the use of MA: on the one side, trade shares may present high cyclicality, while trade openness is likely to affect wage bargaining 'structurally' only if it is persistent and acts over time; on the other, a depressing effect on wages may be attributed to a *persistently* higher RIR and is also likely to occur only with a certain delay, since it involves price adjustments.

The two GM specifications that consider financialization confirm the negative effect of FDI on the pace of the average compensation, even when included with the unemployment rate (instead of $UND2$) and the two selected variables designated to represent LMI.[27]

Table 4. General model

Variables	Model I (EPL and OPEN, 5y-MA)	Model II (EPL and EXP, 5y-MA)	Model III (EPL and IMP, 5y-MA)	Model IV (TU and OPEN, 5y-MA)	Model V (TU and EXP, 5y-MA)	Model VI (TU and IMP, 5y-MA)	Model VII (EPL and FDI, 5y-MA)	Model VIII (TU and FDI, 5y-MA)
ΔR_PROD	0.497*** (0.039)	0.491*** (0.039)	0.498 (0.041)	0.621*** (0.039)	0.619*** (0.039)	0.624*** (0.039)	0.464*** (0.041)	0.566*** (0.039)
$\Delta REER$	0.149*** (0.014)	0.151*** (0.014)	0.147*** (0.015)	0.160*** (0.015)	0.161*** (0.015)	0.160*** (0.015)	0.148*** (0.014)	0.150*** (0.014)
RIR	-0.115*** (0.018)	-0.118*** (0.018)	-0.108*** (0.018)	-0.049*** (0.016)	-0.049** (0.015)	-0.048*** (0.016)	-0.104*** (0.018)	-0.095*** (0.016)
$UND2$	-0.143*** (0.020)	-0.134*** (0.020)	-0.156*** (0.021)	-0.181*** (0.021)	-0.179*** (0.021)	-0.183*** (0.021)	-0.146*** (0.021)	-0.181*** (0.021)
LMI	0.352** (0.169)	0.353** (0.170)	0.375** (0.177)	2.956*** (0.637)	2.978*** (0.638)	2.922*** (0.636)	0.561*** (0.172)	1.969*** (0.677)
$GLOB$	-1.529*** (0.293)	-2.407*** (0.508)	-3.292*** (0.658)	-0.512*** (0.255)	-0.849*** (0.452)	-1.099** (0.546)	-	-
FIN	-	-	-	-	-	-	-0.955*** (0.322)	-1.162*** (0.342)
Constant	2.813*** (0.402)	2.798*** (0.403)	2.795*** (0.422)	2.152*** (0.391)	2.036*** (0.387)	2.079*** (0.388)	2.523*** (0.423)	2.320*** (0.416)
Obs. (Countries)	807 (22)	807 (22)	807 (22)	882 (22)	882 (22)	882 (22)	774 (22)	826 (22)
Adjusted R2	0.693	0.696	0.698	0.671	0.672	0.671	0.677	0.664
Wald statistic	$\chi2(74)$ = 1863.17	$\chi2(74)$ = 1848.13	$\chi2(74)$ = 1864.55	$\chi2(74)$ = 1764.73	$\chi2(74)$ = 1802.78	$\chi2(74)$ = 1804.39	$\chi2(74)$ = 1624.25	$\chi2(74)$ = 1635.72
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. All specifications include country and year fixed effects. All variables are expressed as 5-years moving averages. Timespan: 1970–2018. Robust standard errors clustered by countries in parentheses;* *** *p<0.01,* ** *p<0.05,* * *p<0.1.*

5.2 Robustness checks

We test the robustness of our findings by modifying our reference models in three directions. The results can be found in Appendix 3. Specifically, in Table A3.1, we consider different time spans, we focus exclusively on the private sector of the economy, we include the unemployment rate in the specification with GDP-deflated compensation and we refer to the annual rate of change of the average gross wage only—that is, excluding the value of social contributions paid by employers. In Table A3.2, we run our BM by making use of different

[27] The remaining indicators of financialization prove not to be significant even when averaging over the cycle. Moreover, in our GM, we do not include $GLOB$ and FIN simultaneously due to the systematic presence of collinearity between the indicators representing the two dimensions. Finally, we will focus on EPL uniquely due to the lower number of observations of EPL_T.

estimators. Finally, in Table A3.3, we estimate some amended versions of our GM with both 5-year MA and 5-year FA.

In addition to confirming the existence and size of the decoupling, these tests generally corroborate i) the negative impact of LMS, ii) the positive effect of LMI and iii) a significant impact of trade openness when using the 5-year MA. Moreover, some specific indications emerge. The most significant is the one related to the private sector taken alone (Table A3.1). Although the analysis here is confined to a shorter time span (for most countries, data are available only after 1995) and to a lower number of economies,[28] the evidence indicates a virtually null effect of the unemployment rate and a negative effect of precarious jobs (notably, the coefficient for $TEMP$ is negative and statistically significant, contrary to the remaining model specifications). This may indicate a transformation of the labor market in the private sector, which is currently characterized by a larger share of workers whose job has a predetermined termination date, with the ensuing negative effect on wage growth. Not by chance, in the private sector taken alone, we see a larger decoupling between productivity and pay (with β_D approximately equal to 0.2). With respect to the use of different estimators (Table A3.2), the size of the decoupling is confirmed, while the evidence indicates a moderate (albeit statistically significant) autoregressive component of real wage growth (about 0.2 when using the Arellano–Bond and system GMM estimators).[29] Finally, estimations grounded on the 5-year MA and FA confirm the smaller size of the decoupling when using averaged data (about 0.5) and (marginally) when deflating compensation with the same price index of productivity, the negative effect of unemployment, trade openness and foreign direct investment (although it is not significant in the FA specification due to the low number of observations) and the positive effect of unionization.

5.3 General considerations, comparison with the existing literature and limitations

Our findings indicate that productivity gains did not translate completely into wage growth: depending on the different specifications, the pass-through coefficient is about 0.3 on a yearly basis and reaches 0.5 when averaging over the cycle. The coefficient is found to be lower in recent times and when confining the analysis to the private sector of the economy. The analysis confirms that institutional and macroeconomic factors have contributed to wage stagnation: specifically, our findings indicate that the emphasis should be put on labor market slack, worsening labor market institutions, trade openness and capital mobility.

A comparison with the results from similar studies on the topic is also useful to assess our work and to situate it within the existing literature. Concerning the effects of the unemployment rate, our findings are almost completely in line with other explorations (cf. Stansbury and Summers, 2017; Paternesi Meloni and Stirati, 2018), while the estimated effect of enlarged measures of labor market slack represents an element of

[28] Due to data availability, the analysis of the private sector of the economy does not include Canada, Greece, New Zealand and Switzerland.

[29] We also test the robustness of our findings to the use of alternative estimators in all the remaining models. As expected, the results do not present relevant discrepancies. For reasons of space, we therefore present only the FGLS-based results.

novelty. Similar to our findings are also the negative effects of globalization on the pace of wages documented by the literature reported in Section 3.2. Nonetheless, some disagreements emerge with respect to the existing works concerning the role of financialization and labor market institutions. In relation to the financial variables, the most immediate discrepancy concerns the null role of market capitalization in affecting the pace of real wages, while other works document a depressing effect on the labor share of increasing marketization (Stockhammer, 2013, 2017; Pariboni and Tridico, 2019a) and financial globalization (Stockhammer, 2017). This remains an open point, although some methodological issues (see below) may contribute to explaining that discrepancy. Another element of disagreement regards the non-significant effect of dividends on real wages: here, the explanation may be associated with the fact that we make use of a different representation of that variable, which we consider to be more appropriate (i.e., we use the dividend-to-profit ratio instead of the dividend-to-GDP ratio; see Section 3.3 above for our motivation). As far as LMI is concerned, our findings do not confirm the nuanced picture suggested by some of the literature (as discussed in Section 3.4). In our investigation, *all* the selected proxies for the institutions operating in favor of laborers turn out to exert a positive effect on wage dynamics. A different illustration emerges, for instance, from the study by Stockhammer (2017), in which the only institutional variable capable of significantly affecting the wage share is the rate of unionization. However, that exploration is confined to the pre-2008 period and refers to a wider panel of countries comprising developing economies as well, while we focus only on mature economies. Besides, the indices of employment protection used are slightly different from ours as we use the standard OECD indicators for both regular and temporary contracts while Stockhammer (2017) refers to labor market institution data from Aleksynska and Schindler (2011) because the study also targets non-OECD countries.[30]

In addition, all the documented discrepancies might relate to two further matters. First, we consider the pace of average real wages as our dependent variable (controlling of course for the dynamics of labor productivity) and our main focus is on persistent, average changes, while the existing literature often investigates the determinants of the wage share and its dynamics, focusing on short-run effects. Second, a methodological refinement characterizes our empirics as we always make use of a full set of country and year fixed effects while other studies control for country (but not time) heterogeneity only. Accordingly, our exploration is more capable of i) capturing the influence of aggregate (time series) trends, if any, or possibly omitted variables and ii) dealing with the coordinated macroeconomic cyclical effects in advanced economies.

We are aware, however, of some limitations of our reference model. As we consider the pace of wages for given productivity growth, we are not in a position to exclude the possibility that, a priori, our set of regressors is associated with the dynamics of the output per worker. For instance, labor market slack may relate to productivity dynamics as the latter generally presents a pro-cyclical trend and hence is supposed to

[30] Interestingly, Pariboni and Tridico (2019a), who focus on mature economies exclusively and make use of the same kind of employment protection index that is considered in the present work, find a positive effect of EPL on the wage share.

decrease in the case of a downturn (we partially mitigate this concern by averaging over the cycle). Still, our explanatory variables may be considered to be related to some degree. One might argue that increasing financialization and the 'downsize and distribute' behavior of big firms may involve a higher degree of job insecurity, an increase in bad jobs compared with relatively good ones and higher unemployment, which thus could be one of the channels through which those changes affected distribution (González and Sala, 2013). Still, it has been argued that increasing financialization and offshoring, on the one side, and the process of deunionization, on the other side, are not independent from each other (Peters, 2011; McCann, 2014; Pariboni et al., 2020). Furthermore, insofar as financialization is regarded by some scholars as crowding out accumulation and productive investments (Stockhammer, 2004; and, from a different perspective, Kliman and Williams, 2015), it may hamper productivity and employment dynamics. Similarly, increasing globalization and international capital mobility may not only have a threat effect of potential offshoring but may also have involved actual de-industrialization and thus higher unemployment (Van Neuss, 2018). Finally, capital mobility—stimulated by the process of financialization—may have led to greater labor market flexibility by exacerbating international competition (Tridico and Pariboni, 2018). Further research on the interplay between our explanatory variables will thus contribute to overcoming the likely limitations of our work.

6. Concluding remarks

The evidence that we provide in this paper confirms that the growth of the average compensation lagged significantly behind productivity growth after 1970 in high-income economies: the 'one-to-one' connection between labor productivity and average pay, which would assure quasi-stability of the labor share, did not hold in recent decades. Through the lens of the PE approach, we deviate from the traditional technologically based explanations and investigate the possible reasons behind this decoupling. Specifically, we assess the potential effect of some macroeconomic and institutional factors on the pace of average real wages. Our findings confirm that productivity gains did not translate completely into wage growth, consistent with the evidence of decreasing labor shares in advanced countries. We find that, on average and over the cycle, only 50% of increased productivity goes to workers. The decoupling between average pay and productivity is more intense in the private sector of the economy and when we confine the analysis to the more recent decades. We also find marginally greater divergence between the growth of the average real wage and that of productivity when considering CPI-deflated instead of GDP deflator-deflated average compensation, confirming that consumer prices have grown at a higher rate than product prices in mature economies.

We seek to explain this decoupling by means of some dimensions that may have concurred in the erosion of the share of income going to workers. Chiefly, higher labor market slack and worsening institutions and practices operating in favor of workers (particularly, trade union power and labor protection legislation) appear to have played a role as wage-squeezing factors. Moreover, the increasing process of globalization,

which translated into increasing trade openness and capital mobility in the form of foreign direct investments, have contributed to the slowdown of the average labor compensation, while the process of increasing financialization, alternatively intended as increasing market capitalization, increasing foreign assets and liabilities or an increasing share of distributed dividends, seems not to have exerted a significant impact on real wage growth. Finally, we generally find a positive effect on wages of real appreciation of the domestic currency while the role of the real interest rate is not clear-cut. Although they are in line with the existing literature concerning the effects of labor market slack and globalization, our results present some differences *vis à vis* some of the existing contributions with respect to the impact of financialization and labor market institutions on the pace of real wages. Such divergences may depend on the use, in some instances, of somewhat different variables to represent those dimensions and on differences in estimation methodologies. We believe, however, that our procedure for selecting relevant variables and the introduction of some methodological refinements render our results a rather reliable assessment of 'structural' average effects (across countries and over the cycle) of the wide set of dimensions that we have analyzed.

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APPENDICES

Appendix 1. Variables and sources

Average labour compensation ($COMP$)	The average labour compensation per employed person includes the gross wage and the value of social contributions payable by employers. Source: OECD.Stat, Productivity, total economy and private sector.
Average gross wage ($WAGE$)	The average gross wage includes uniquely wages and salaries paid in cash or in kind. Source: OECD.Stat, Labour, Earnings.
Labour productivity ($PROD$)	Labour productivity is defined as real GDP per person employed. Real GDP is nominal GDP deflated by the product price index. Source: OECD.Stat, Productivity, total economy and private sector.
CPI index	Source: OECD.Stat, Economic Outlook No 106, November 2019.
GDP deflator	Source: OECD.Stat, Economic Outlook No 106, November 2019.
Real interest rate (RIR)	Real interest rate is defined as the lending interest rate adjusted for inflation as measured by the GDP deflator. Source: OECD.Stat, Key Economic indicators.
Real effective exchange rate ($REER$)	Nominal effective exchange divided by a price deflator or index of costs. Index (2010=100). Source: World Bank, World Development Indicators.
Unemployment rate (UN)	Unemployment rate (as a percentage of active labour force). Source: OECD.Stat, Labour Force Statistics.
Short-term unemployment rate (STU)	Author calculation on short-term unemployment (persons, less than 6 months) and active labour force (15-64 years). Source: OECD.Stat, Labour force statistics.
Long-term unemployment rate (LTU)	Author calculation based on long-term unemployment (persons, 6 months or more) and active labour force (15-64 years). Source: OECD.Stat, Labour force statistics.
Unemployment duration	Average duration of unemployment (expressed in months). Source: OECD.Stat, Labour Force Statistics, Unemployment by duration.
Employment	Employment, all persons. Source: OECD.Stat, Labour force statistics, Employment by activities.
Working age population	Working age population (15-64 years). Source: OECD.Stat, Labour force statistics.
Participation rate	Active labour force as a percentage of working age population (15-64 years). Source: OECD.Stat, Labour force statistics.
Export (EXP)	Export of goods and services (% of GDP). Source: World Bank.
Import (IMP)	Import of goods and services (% of GDP). Source: World Bank.
Credit provision ($CRED$)	Domestic credit provided by the financial sector (% of GDP). Source: World Bank.
Market capitalization (MKT)	Market capitalization of listed domestic companies (% of GDP). Source: World Bank.
Distributed dividends (DIV)	Ratio of distributed income of corporations to gross operating surplus. Source: own calculation on OECD.Stat (Dataset: 14A. Non-financial accounts by sectors).
Distributed dividends in non-financial corporations (DIV_NFC)	Ratio of distributed income of non-financial corporations to gross operating surplus of non-financial corporations. Source: own calculation on OECD.Stat (Dataset: 14A. Non-financial accounts by sectors).
Financial globalization (FGL)	Financial globalization is external assets plus external liabilities (% of GDP). Source: Lane and Milesi-Ferretti (2007).
Foreign direct investment (FDI)	Foreign direct investment (inward plus outward) share of GDP. Source: OECD.Stat, FDI flows (total and by industry).
Trade union density (TU)	Trade union density (administrative data, survey data when administrative data are not available). Source: OECD.Stat, Trade unions and collective bargain.
Employment protection legislation (EPL)	Strictness of employment protection – individual and collective dismissals (regular contracts), version 1. Source: OECD.Stat, Labour, Employment protection.
Employment protection legislation, temporary (EPL_T)	Strictness of employment protection – individual and collective dismissals (temporary contracts), version 1. Source: OECD.Stat, Labour, Employment protection.
Collective bargaining coverage (BC)	Percentage of employees with the right to bargain. Source: OECD.Stat, Trade unions and collective bargain.
Part-time contracts (PT)	Share of employed in part-time employment. Source: OECD.Stat, Labour force statistics (Full-time Part-time employment).
Temporary contracts ($TEMP$)	Share of temporary employment. Temporary employment includes wage and salary workers whose job has a pre-determined termination date. Source: OECD.Stat, Labour force statistics (Incidence of permanent employment).

Appendix 2. Multidimensional indicators of labour market slack

Our multidimensional measures of LMS are constructed by means of Principal Component Analysis (PCA) techniques. $UND1$ and $UND2$ condense the variables reported in Tables A2.1 and A2.2; while Tables A2.3 and A2.4 report the details of each PCA.

Table A2.1. Components of UND1

Index of underemployment version 1 ($UND1$)
Unemployment rate (UN)
Missing employment rate (ER)
Missing participation rate (PR)

Table A2.2. Components of UND2

Index of underemployment version 2 (UND2)
Unemployment rate (UN)
Employment growth with opposite sign (EG)
Missing participation rate (PR)

The missing participation rate (PR) is defined as 100 minus the participation rate; EG is employment growth with opposite sign; the missing employment rate (ER) is defined as 100 minus the employment rate (see Appendix 1 for variables detail).

Table A2.3. Principal Component Analysis for the calculation of UND1
Correlation matrix of MVs

Variable	UN	ER	PR
UN	1.000	-	-
ER	0.4727	1.000	-
PR	0.1671	0.8847	1.000

Principal components/correlation (rotation: varimax)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.0981	1.2037	0.6994	0.6994
Comp2	0.8943	0.8869	0.2981	0.9975
Comp3	0.0074	-	0.0025	1.0000

Principal components (eigenvectors) Standardized variables	Comp1	Comp2	Comp3	Un-explained
UN	0.3646	0.8976	0.2477	0
ER	0.6871	-0.0798	-0.7222	0
PR	0.6285	-0.4335	0.6458	0

Table A2.4. Principal Component Analysis for the calculation of UND2
Correlation matrix of MVs

Variable	UN	EG	PR
UN	1.000	-	-
EG	0.2321	1.000	-
PR	0.1671	0.0212	1.000

Principal components/correlation (rotation: varimax)

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.2555	0.2502	0.4185	0.4185
Comp2	1.0053	0.2661	0.3351	0.7536
Comp3	0.7391	-	0.2464	1.0000

Principal components (eigenvectors) Standardized variables	Comp1	Comp2	Comp3	Un-explained
UN	0.7107	0.0084	-0.7034	0
EG	0.5877	-0.5567	0.5871	0
PR	0.3866	0.8307	0.4006	0

Appendix 3. Robustness

Table A3.1. Alternative specifications

Variables	Model A 1980-2018	Model B 1999-2018	Model C PR_S (1)	Model D PR_S (2)	Model E PR_S (3)	Model F PR_S (4)	Model G PR_S (5)	Model H GDP-deflated compensation	Model W Average gross wage
ΔR_PROD	0.331*** (0.046)	0.202*** (0.051)	0.192*** (0.040)	0.143*** (0.045)	0.144*** (0.045)	0.194*** (0.039)	0.203*** (0.040)	0.356*** (0.042)	0.361*** (0.038)
$\Delta REER$	0.104*** (0.015)	0.128*** (0.020)	0.064*** (0.018)	0.065*** (0.019)	0.066*** (0.019)	0.065*** (0.017)	0.061*** (0.018)	0.085*** (0.014)	0.059*** (0.012)
RIR	0.036 (0.027)	-0.066* (0.038)	-0.047 (0.032)	0.008 (0.036)	0.005 (0.037)	-0.055* (0.032)	-0.040 (0.034)	-	-0.057** (0.025)
UN	-0.202*** (0.035)	-0.175*** (0.044)	-0.119*** (0.044)	-0.044 (0.051)	-0.034 (0.052)	-0.094** (0.045)	-0.130*** (0.046)	-0.156*** (0.030)	-0.167*** (0.029)
$TEMP$	-	-	-	-0.185*** (0.046)	-0.174*** (0.047)	-	-	-	-
EPL	-	-	-	-	-	-	0.370* (0.220)	-	-
$OPEN$	-	-	-	-	-0.965 (0.935)	-2.186*** (0.867)	-	-	-
Constant	0.249 (0.602)	2.956*** (0.566)	3.182*** (1.325)	2.543*** (0.897)	2.554*** (0.896)	3.082*** (1.315)	2.593* (1.422)	4.198*** (0.623)	4.100*** (0.536)
Obs. (Countries)	709 (22)	374 (22)	379 (18)	291 (18)	291 (18)	379 (18)	366 (18)	863 (22)	787 (21)
Adjusted R2	0.285	0.399	0.482	0.427	0.429	0.490	0.460	0.303	0.412
Wald statistic	$\chi2(60)$ = 282.83	$\chi2(41)$ = 284.50	$\chi2(62)$ = 352.14	$\chi2(43)$ = 217.61	$\chi2(44)$ = 219.47	$\chi2(63)$ = 364.39	$\chi2(63)$ = 312.18	$\chi2(69)$ = 375.63	$\chi2(68)$ = 550.81
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP *in Models A, B, C, D, E, F, G and H; while* ΔR_WAGE *in Model W. Labour compensations or alternatively gross wages are deflated by means of the CPI index in all Models except Model H, where we use GDP-deflated compensation. Timespan: 1970–2018 (unless specified differently). All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses;* *** *p<0.01,* ** *p<0.05,* * *p<0.1.*

Table A3.2. Baseline model with alternative estimators

Variables	**Model AR-FGLS**	**Model Arellano-Bond**	**Model Linear GMM**	**Model System GMM**
ΔR_COMP (-1)	-	0.269*** (0.033)	-	0.280*** (0.028)
ΔR_PROD	0.302*** (0.044)	0.323*** (0.044)	0.359*** (0.039)	0.325*** (0.044)
$\Delta REER$	0.083*** (0.014)	0.100*** (0.014)	0.098*** (0.013)	0.103*** (0.014)
RIR	0.043 (0.028)	0.019 (0.025)	0.017 (0.023)	0.003 (0.025)
UN	-0.231*** (0.042)	-0.144*** (0.035)	-0.214*** (0.030)	-0.142*** (0.035)
Constant	4.587*** (0.703)	3.626*** (0.613)	2.794*** (0.382)	3.154 (3.554)
Obs. (Countries)	825 (22)	794 (22)	825 (22)	816 (22)
Wald statistic	$\chi2(70)$ = 339.55	$\chi2(50)$ = 493.69	$\chi2(48)$ = 513.13	$\chi2(71)$ = 649.10
Prob > χ^2	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP. *Labour compensations are deflated by means of the CPI index. Model AR-FGLS estimated by means of cross-sectional time-series FGLS regression with AR(1) disturbance. Model Arellano-Bond estimated by means of dynamic panel-data estimation. Model Linear GMM estimated with linear dynamic panel-data estimation. Model System GMM estimated by means of system dynamic panel-data estimation. Timespan: 1970–2018. All specifications include country and year fixed effects. Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*

Table A3.3. General model with 5-years moving and fixed averages

Variables	Moving averages							Fixed averages		
	CPI-deflated compensation				GDP-deflated compensation			CPI-deflated compensation		
	1980-2018	1999-2018	With TU and OPEN	With TU and FDI	With TU	With TU and OPEN	With TU and FDI	Baseline model	General Model with OPEN	General Model with FDI
ΔR_PROD	0.580*** (0.044)	0.498*** (0.049)	0.603*** (0.039)	0.527*** (0.039)	0.615*** (0.036)	0.616*** (0.036)	0.555*** (0.038)	0.562*** (0.083)	0.545*** (0.084)	0.456*** (0.087)
$\Delta REER$	0.147*** (0.017)	0.183*** (0.019)	0.156*** (0.015)	0.147*** (0.014)	0.108*** (0.014)	0.108*** (0.014)	0.099*** (0.014)	0.160*** (0.032)	0.158*** (0.031)	0.158*** (0.031)
RIR	-0.013 (0.017)	-0.059** (0.024)	-0.040** (0.016)	-0.089** (0.017)	0.035** (0.015)	0.030* (0.016)	0.025 (0.016)	-0.034 (0.034)	-0.048 (0.035)	-0.050 (0.035)
UN	-0.149*** (0.020)	-0.150*** (0.021)	-0.153*** (0.019)	-0.147*** (0.018)	-0.145*** (0.017)	-0.141*** (0.017)	-0.155*** (0.017)	-0.134*** (0.037)	-0.139*** (0.038)	-0.153*** (0.038)
TU	-	-	3.000*** (0.631)	1.992*** (0.668)	2.192*** (0.587)	2.155*** (0.587)	1.996*** (0.643)	-	2.290** (1.332)	2.526** (1.469)
$OPEN$	-	-	-0.520** (0.245)	-	-	-0.392* (0.221)	-	-	-0.510 (0.496)	-
FDI	-	-	-	-0.856** (0.337)	-	-	-1.030*** (0.323)	-	-	-0.223 (0.778)
Constant	0.573* (0.301)	1.734*** (0.332)	2.019*** (0.382)	2.333*** (0.390)	1.890*** (0.373)	1.924*** (0.357)	1.828*** (0.376)	2.737*** (0.474)	2.036*** (0.641)	1.976*** (0.673)
Obs. (Countries)	745 (22)	578 (22)	890 (22)	830 (22)	890 (22)	890 (22)	830 (22)	187 (22)	187 (22)	176 (22)
Adjusted R2	0.511	0.600	0.679	0.672	0.655	0.656	0.615	0.690	0.696	0.667
Wald statistic	χ2(61) = 779.49	χ2(51) = 868.41	χ2(73) = 1884.06	χ2(74) = 1703.13	χ2(73) = 1709.93	χ2(74) = 1719.07	χ2(74) = 1339.61	χ2(34) = 416.56	χ2(36) = 425.55	χ2(36) = 353.94
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: ΔR_COMP *(different deflators). All specifications include country and year fixed effects. Timespan: 1970–2018 (unless specified differently). Robust standard errors clustered by countries in parentheses; *** p<0.01, ** p<0.05, * p<0.1.*