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Determinants of the wage share: a cross-country comparison using sectoral data

Alexander Guschanski and Özlem Onaran

Abstract

There has been a significant decline in the share of wages in GDP in both developed and developing countries since the 1980s. This paper analyses the determinants of the wage share (labour compensation as a ratio to value added) using sectoral data with country specific estimations for selected OECD countries.

We compile a comprehensive sector-level dataset of eight OECD countries (Denmark, France, Germany, Italy, Spain, Sweden, the UK, the US) for the period of 1970 to 2011, which allows us to trace the developments in the wage share across high and low skilled sectors and within manufacturing and service industries. Our findings provide new insights with regard to the drivers of falling wage share. By conducting country specific estimations, we analyse how institutional differences in industrial relations, as well as social security and welfare regimes affect the wage share.

Our findings lend strong support to the political economy approach to functional income distribution. Technological change had an impact, especially in Italy, the US and for the total country sample, but the effects are not robust with respect to the use of different specifications and the wage share in most countries in our sample appears to be driven by variables reflecting the bargaining power of labour such as union density, adjusted bargaining coverage and government spending. The relevance of these variables differs considerably across countries, lending support to our approach of country specific estimations.

We find that globalisation had a strong impact on the wage share in all countries. The effect of globalisation on the wage share was least strong in Denmark. In Germany, and to a lesser extent in the UK, the effect is due to outward FDI and intermediate import penetration which reflects the impact of international outsourcing practices. Intermediate imports penetrations had no significant impact in Spain while FDI played a smaller role in France and the US. Different institutional variables appear to be relevant for each country. Germany exhibits the most robust positive effect of union density on the wage share. Conversely, collective bargaining coverage, together with social government spending, plays a more important role in France, the UK and the US. Financialisation had the most pronounced effect in the UK and the US, while it appears to be also relevant in Germany. We find mixed results for the effect of personal income inequality on the wage share. However, there is indicative confirmation for a negative effect in Germany, the UK and the US.

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1. Introduction

There has been a significant decline in the share of wages in GDP in both developed and developing countries since the 1980s. This was accompanied by another trend towards greater inequality in personal income distribution, particularly by increases in income shares of the top 1% of the distribution (Atkinson, et al., 2011). These developments indicate a clear reversal of the trends towards relatively egalitarian income distribution during the post-war era. This paper analyses the determinants of the wage share (labour compensation as a ratio to value added) using sectoral data with country specific estimations for selected OECD countries.

Previous research has highlighted processes such as technological change, financialisation, globalisation, changes in government policy, personal income inequality, and labour market institutions to explain the decline in the wage share. Since many of those factors are either determined on a sectoral level or have developed differently across sectors and countries, a sector-by-country analysis has several advantages over previous research that uses country-level data or pools countries with different institutional frameworks. Furthermore, while country-level analysis always faces the question as to whether the decline in the wage share captures changes in sectoral composition rather than a simultaneous decline of the wage share in all sectors, we are able to isolate the within sector development of the wage share, and are able to abstract from changes in the sectoral composition. In fact, we find little evidence to attribute the decline in the country-level wage share to a change in the sectoral composition of the economy, since the wage share decreased in most of the sectors simultaneously.

We compile a comprehensive sector-level dataset of eight OECD countries (Denmark, France, Germany, Italy, Spain, Sweden, the UK, the US) for the period of 1970 to 2011[1], which allows us to trace the developments in the wage share across high and low skilled sectors and within manufacturing and service industries. Our findings provide new insights with regard to the drivers of falling wage share. By conducting country specific estimations, we analyse how institutional differences in industrial relations, as well as social security and welfare regimes affect the wage share.

We confirm previous research based on the analysis of pooled aggregate country data attributing the decline in the wage share to financialisation, globalisation and a decline in bargaining power of labour, however, we find that these factors impact countries and skill

[1] The time period is determined by data availability at a detailed sectoral level.

groups within countries differently. Thereby we confirm the upmost relevance of country specific institutional setting in determining income distribution. Although we also find evidence for some negative impact of technological change, albeit not robust, our results indicate that the increase in income inequality is not inevitable but can be altered by political and institutional decisions.

The remainder of the paper is organised as follows. Section 2 provides a short review of the theoretical literature the determinants of functional income distribution from the perspective of different schools of thought as well as an overview of the empirical literature. Section 3 introduces our data and the stylised facts. Section 4 presents our estimation methodology and expected results based on the theoretical considerations introduced in section 2. Section 5 presents the estimation results and section 6 concludes.

2. Literature review

The issue of increasing personal income inequality, in particular earnings inequality, has attracted a significant amount of research. In contrast, changes in functional income distribution, i.e. the fall in the share of wages in GDP have only recently been the subject of research with an aim to pin down the effects of technology, globalization, and changes in the bargaining power of labour. Different economic schools of thought developed distinct starting points for their analysis of functional income distribution.

The neoclassical approach, which also forms the basis for the New Keynesian analysis, starts with a production function with two factors: capital and labour. The relative income shares of labour and capital are determined by technology. If a firm produces in a fully competitive market with full-capacity utilisation and the production function is characterised by constant elasticities of substitution between capital and labour, the relative income shares of the productive factors are determined by their marginal productivity which is technologically given by the employment elasticity of output. Hence, the focus on technological change which characterises many studies in the mainstream economic tradition derives directly from their theoretical approach. There are two critical assumptions in this framework: fully competitive markets and full-capacity utilisation. As soon as the assumption of perfect competition is dropped, i.e. if firms and workers act in oligopolistic markets as is mostly the case, relative bargaining power is influenced by the price setting power (mark-up power) of firms (Stockhammer, 2009). There is a substantial literature in the New Keynesian tradition that derives from this (EC, 2009). Empirically, this approach is most prominently represented by the IMF (2007), EC (2007), Bassanini and Manfredi (2012), and Karabarbounis and Neiman (2012). Indeed, their findings indicate that technological change is the primary determinant of falling wage shares followed by globalisation. However, Stockhammer (2015) argues that a close examination of the reported findings reveals serious robustness issues regarding the effects of technology. While both the IMF (2007) and the EC (2007) report that the technology variables are not robust to the inclusion of time effects, they do not interpret the non-robust effects of technology with caution, but rather make a strong case that the fall in the wage share is an unavoidable outcome of technological progress.

Consistent with the nature of modern capitalist economies, the relaxation of the assumption of full-capacity utilisation gave birth to Keynesian macroeconomics which emphasise the role of effective demand in determining output, income and employment.

Consequently, functional income distribution is governed by consumption of workers and capitalists and, more importantly, by the propensity to invest which is driven by aggregate demand and business expectations, i.e. the animal spirits of the private investors (Kaldor, 1955). Most heterodox authors accept this analysis but augment the emphasis on animal spirits by additional factors governing the balance of power between employers and employees as suggested my Marxist or Institutionalist economists. Technology might affect the contributions of the factors of production but technological change itself is an endogenous outcome of conflict in the labour process. Wages are negotiated between employers and employees and are therefore subject to social norms and relative bargaining power. Consequently, scholars in this tradition have offered a more thorough analysis of the determinants of bargaining power. Marxist economists emphasise the sphere of production as the source of surplus and the core determinant of income distribution. Economists working in a post-Keynesian or Kaleckian tradition start directly from the assumption of oligopolistic markets and focus on the sphere of circulation. They emphasise the degree of monopoly in a market, which is determined by the degree of competition between firms, union power and, in a more recent interpretation of the literature by the strength of the financial sector (Kalecki, 1954; Hein, 2015). In the following, we refer to the Marxist, Institutionalist and post-Keynesian/Kaleckian analysis as the Political Economy approach.

Although the New Keynesian and the Political Economy approach to income distribution start from different assumptions, both arrive at a bargaining framework to analyse distribution of income, at least in the more recent studies in the New Keynesian tradition. The difference is rather that the New Keynesian approach discusses the effects in a rather technical manner driven by a production function approach, while studies following the bargaining approach would always relate the developments to changes in bargaining power. For example, New Keynesian scholars discuss how globalisation changed the factor supplies or costs of intermediate products, and how this technically affects parameters in the equation for the wage share. In contrast, political economists rather look at how globalisation and financialisation increase the fall-back options of capital while decreasing the fall-back options of labour and thereby change the relative bargaining power between the two factors.

Both the mainstream studies and the research in the tradition of political economy find substantial negative effects of globalisation on the wage share. IMF (2007) and EC (2007) employ import and export prices, immigration, offshoring, and trade openness (measured as

export plus imports as a ratio to value added) as measures of globalisation and find all of them to have the expected negative effect on the wage share. However, there is a difference in the interpretation of the results depending on the country group used.

Publications focusing on within sector wage shares find mixed results. Country-level analysis always faces the question as to whether the decline in the wage share captures changes in sectoral composition rather than a simultaneous decline of the wage share in all sectors; therefore, in order to abstract from mere reallocation effect and focus on a distributional analysis it is crucial to isolate the within sector development of the wage share. This can be illustrated simply by writing the aggregate wage share as a function of weighted sectoral wage shares (EC, 2009):

$$WS_t^C = \frac{LC_t^C}{VA_t^C} = \sum_{i=1}^{n} \frac{VA_{i,t}}{VA_t^C} * \frac{LC_{i,t}}{VA_{i,t}} \qquad Equation\ (1)$$

where i stands for the sector and t for the year. WS_t^C stands for the aggregate wage share of country C, which is defined by labour compensation LC_t^C as a ratio to total domestic value added (VA_t^C) or GDP, and can be expressed as the sum of within sector wage shares $\frac{LC_{i,t}}{VA_{i,t}}$ weighted by the sectors' contribution to total value added $\frac{VA_{i,t}}{VA_t^C}$. Consequently, a change in the aggregate wage share can results from changes in the sectoral composition, referred to as the between component, or changes in the sectoral wage shares, referred to as the within component.

$$\Delta WS_t^C = \sum_{i=1}^{n} \Delta\left(\frac{VA_{i,t}}{VA_t^C}\right) * \frac{LC_{i,t}}{VA_{i,t}} + \Delta\left(\frac{LC_{i,t}}{VA_{i,t}}\right) * \frac{VA_{i,t}}{VA_t^C} \qquad Equation\ (2)$$

Sector-level data allows to differentiate between the two processes and has thereby an advantage over country-level data. Bassanini and Manfredi (2012) fail to find a robust effect of sector specific import prices on the wage in all but one specification and do not obtain a significant coefficient for import penetration at all. They argue that the negative effect confirmed by country level studies result from a process of reallocation of production towards sectors with lower wage share brought about by increasing competition from abroad and confirm their hypothesis by additional estimations of low and high wage share sectors' share in total value added. Thereby they refer to the between component of the aggregate wage share. They do find, however, a negative impact of offshoring, especially in high wage share countries, while FDI appears to be insignificant in their analysis. The negative effect of offshoring is furthermore confirmed by Lin and Tomaskovic-Devey (2013) for the US.

Research in the tradition of political economy confirm these results, especially with respect to trade openness variables (Jayadev, 2007; Stockhammer, 2015), as well as intermediate import penetration and outward FDI for within sector wage shares in Austria (Onaran, 2011, 2012).

Interestingly, there is a difference regarding the interpretation of the results depending on the country group used. The IMF (2007) and the EC (2007) focus on the aggregated country-level wage share in advanced countries and interpret their findings as consistent with the traditional trade theory based on the Stolper-Samuelson Theorem, as well as skill biased trade induced technological change argument of the new trade theories. Bassanini and Manfredi (2012) include both rich and (formerly) poor OECD countries and find the effect of intermediate imports to be negative for rich and insignificant for poor countries. However, the findings in the political economy literature (e.g. Rodrik, 1997; Harrison, 2002; Onaran, 2009; Jayadev, 2007; Stockhammer, 2015), which cover also the developing countries, indicate that globalization has a negative effect on the wage share in the developing as well as developed countries; hence point at a contradiction to the predictions of the traditional trade theory.

Regarding the effects of the changes in the bargaining power of labour, the IMF (2007) and the EC (2007) both use standard indices for labour market institutions such as union density, employment protection legislation, unemployment benefit generosity and the tax wedge designed to measure labour market rigidities rather than to measure the bargaining power of labour (Stockhammer, 2015). EC (2007) finds that while minimum wages have a positive effect, higher employment protection legislation has negative effects on the wage

share; their interpretation of the results is that tighter employment protection legislation leads to higher bargaining power of workers and an increase in wages, but it does not increase the wage share, since the labour demand is very elastic. IMF (2007) finds negative effects of unemployment benefits and the tax wedge. Numerous studies also include direct bargaining variables such as union density, strike activity and collective bargaining regimes into their empirical analysis. Strike activity has been found to have a positive impact on the wage share (Kristal, 2012; Argitis and Pitelis, 2001), while ILO (2011) argues that collective bargaining arrangements and minimum wages could have positive effects on the wage share. Union density is the most commonly used variable with the best data availability and the most robust effect. It has been found to increase the real wage (Choi, 2001) – especially in countries with a low level of bargaining coordination (Nunziata, 2005), reduce wage dispersion, and limit the size of top income shares. Additionally, stronger labour unions are likely to exercise political pressure in favour of redistribution policies, thereby decreasing *net* income inequality (after taxes and transfers) (Jaumotte and Buitron, 2015).[2] Nevertheless, it has been argued that the actual effect of unions may be underestimated in empirical studies since collective bargaining coverage greatly exceeds union membership in some countries. However, poor data availability limits the employability of collective bargaining coverage (OECD, 2006), at least for the sectoral level. Stockhammer (2015) fails to find any statistically significant effect of the labour market institution variables such as employment protection legislation, minimum wages, unemployment benefit replacement ratio, unemployment benefit duration, and the tax wedge.

The mainstream literature does not control for the effects of welfare state retrenchment or financialisation. In the political economy literature, welfare state retrenchment is found to be an important determinant of the fall in the wage share (e.g. Harrison, 2002; Jayadev, 2007; Onaran, 2009; Stockhammer 2015); however, the measure used is often only aggregate government spending as a ratio to GDP, and is too broad to reflect the details of the welfare reforms essential to the bargaining power of labour. Kristal (2012) uses government civilian spending, which nevertheless does not capture the details of spending that is particularly important for the social wage and bargaining power of labour such as public spending on social protection or health and education.

[2] Although some economists argued that stronger unions can lead to higher unemployment there is very little econometric evidence for this hypothesis (OECD, 2006; Jaumotte and Buitron, 2015) .

There have been only few studies investigating the impact of financialisation on functional income distribution. The term financialisation is not unambiguously defined, but encompasses the 'increased role of financial activity and rising prominence of financial institutions' (Stockhammer, 2015). Financialisation gained momentum since the 1980s. Similar to globalisation, it has increased the 'exit options' for capital which can now be invested in real as well as financial assets (Jayadev, 2007). Furthermore, it has been argued that financialisation changed industrial relations and led to a 'shareholder value orientation' as a consequence of hostile takeovers of listed companies (Lazonick and O'Sullivan, 2000). Financialised firms adopt a 'downsize and distribute' strategy, which reduces prospects for labour to agree on a beneficial compromise. Similarly, the self-perception of workers changed due to financialisation, resulting in an emergence of 'investor identities' (Langley, 2007). The main indicators of financialisation applied are financial globalisation calculated as foreign assets plus liabilities (Stockhammer, 2009, 2015), current account openness (Jayadev, 2007), and dividend and interest payments and income (Hein and Schoder, 2011; Dünhaupt, 2013). Interestingly, all studies obtain a significant negative effect of at least one of those variables. Kohler, Guschanski and Stockhammer (2015) offer a systematic analysis of different channels through which financialisation affects the wage share including all of these measure and augmenting them by variables measuring the competition on capital markets (stock market turnover ratio) and household debt. They find the latter variable to be most significant for the determination of the wage share among all financialisation variables as well as control variables. The only study on within sector wage shares including a measure of financialisation is Lin and Tomaskovic-Devey (2013) who account for the ratio of financial receipts of non-financial corporations (including interest, dividend and capital gains) to business receipts for the case of the US. The only paper, to the best of our knowledge, investigating the effect of financialisation on the wage share using firm level data is Alvarez (2015), who includes net financial income and interest payments as explanatory variables in his analysis of France.

Summing up, the research based on a political economy approach uses mostly aggregate country level panel data, which does not differentiate the results across skill groups and industries. Within the mainstream literature, which argues the primacy of technological change, Bassanini and Manfredi (2012) and Karabarbounis and Neiman (2012) use sectoral as well as country panel data; however they do not explicitly control for variables which would reflect the bargaining power of labour and labour market institutions, welfare state retrenchment or financialisation. IMF (2007) attempts to distinguish the effects on the wage share of the

workers in the skilled and unskilled industries; however the study claims that the income share of skilled workers rose by focusing on the share of wage bill in the industries using predominantly skilled labour as a ratio to the economy wide value added, rather than the share of wages in the skilled sectors as a ratio to the value added in those sectors, which is also mentioned in a figure in the paper. According to the latter indicator, which is reported but not discussed in the IMF study, the labour share of skilled workers is also falling in some major economies. Lin and Tomaskovic-Devey (2013) and Onaran (2011, 2012) are closest to our analysis, but while these studies focus on a single country, the US and Austria respectively, we perform our analysis for selected OECD countries and are therefore able to account for country specific differences in industrial relations. Furthermore, we incorporate a broader range of explanatory variables.

3. Data and Stylised Facts

3.1 Data

We have compiled a comprehensive database for eight OECD economies drawing on six publicly available international databases for sectoral data which we augmented by country level data.[3] We measure the wage share as labour compensation over value added with data obtained from the EU KLEMS database. Labour compensation includes the wage of self-employed workers, imputed based on the assumption that their wage is equal to the average hourly wage of the sector. Different concerns have been raised with regard to this imputation, as it is generally said to overestimate the wage share for sectors of predominantly low skilled workers while it underestimates high skilled sectors' wage shares. Indeed we find the wage share to exceed 1 in a total of 588 out of 13796 cases (4.26%) for data at 2 digits and 324 out of 10245 observation (3.16%) for the 1-digit level.[4] However, wage shares exceeding one are not generally a problem and can naturally arise for mainly two reasons which have nothing to do with overestimations of the imputed wages for self-employed workers: First, if a sector incurs heavy losses and second, if a sector receives significant subsidies (EU KLEMS, 2007). The second case arises because value added in KLEMS is calculated as compensation of employees plus operating surplus plus taxes minus subsidies (on labour and capital), i.e. at basic prices, and therefore can fall short of labour compensation if the subsidies exceed operating surplus and taxes in a particular period.[5] Since data from EU KLEMS is only available until 2009 we extrapolate through splicing. More specifically, we link the wage share from KLEMS with the growth rate of the wage share obtained from the OECD Structural Analysis database (OECD STAN).[6] Both series have a correlation of 0.91. We control for violent swings in the wage share by excluding years where the percentage change in the wage share exceeds 30% in absolute values, which mostly appear in Denmark, the UK and Sweden, but our results are robust to all these cleaning procedures.

[3] The use of an international database is instructional for making the variables and estimations comparable between countries. See table A1 in the appendix for further information on sector definitions and the skill taxonomy.

[4] This number excludes Agriculture, Fishing and Foresting. These sectors are repeatedly reported to have wage shares bigger than one because of poor data quality and because the imputation for self-employed workers largely overestimates the labour compensation for this low skilled sectors (EU KLEMS, 2007).

[5] It would be preferable to use value added at factor cost for the calculation of the wage share. Unfortunately, there are no long series on taxes and subsidies on production in EU KLEMS.

[6] Since self-employed are not included in the measure of labour compensation in OECD STAN we impute their wages by applying the same technique as used for the construction of the EU KLEMS database. We exclude observations where the number of self-employed suddenly falls to zero, assuming that it must be related to a measurement error.

In order to see how our results differ if we use the after-tax wage share we had to obtain measures for implicit tax rates on labour income, indicating the share of taxes paid out of wage income. The series are not readily available for many countries and for long periods; therefore we reconstructed the series using the technique proposed by Carey and Tchilinguirian (2000) with data from several sources of the OECD database.

We obtain measures of the capital stock from the EU KLEMS database. Unfortunately only aggregated capital stock data is available at the 2-digit level.[7] We extrapolate capital stock from KLEMS using the growth rate of the same measure from STAN. At the 1-digit level we are able to disaggregate ICT and non-ICT capital. ICT and non-ICT capital is reported as services (measured as an index) rather than stock in the newer versions of KLEMS. We prefer this measure over capital measured as stock because it is available for a more detailed sectoral disaggregation and more recent years in the newer versions of KLEMS. We do, however, use the stock measure for our descriptive statistics because it is impossible to aggregate indices by skill-groups. All measures enter our analysis as a ratio to GDP.

Our globalisation variables are obtained from the OECD. Import data disaggregated for intermediate import and other imports is from OECD STAN Bilateral Trade Database by Industry and End-Use Category. We calculate the ratio of intermediate and other imports to domestic absorption, i.e. value added plus total exports minus total imports.[8]

FDI is taken from the OECD FDI statistics database and measures FDI positions (stocks) as assets minus liabilities of all parent companies to their affiliates. The measure is organised according to the direction of investment of the reporting country and all "positions of direct investors resident [in the reporting country] are shown under outward investment and all […] positions for direct investment enterprises resident in that economy are shown under inward investment" (OECD, 2016).[9] We normalise the measure by the numbers of people engaged in the sector, which we consider to have advantage over other forms of normalization for two reasons: First, since we are interested in the effect of FDI on industrial relations, a

[7] We refer to our data as 'at the 2-digit level' if we use manufacturing sectors at 2-digits. Most service sectors are always used at the 1-digit level.

[8] It would be preferable to differentiate intermediate imports by origin. However, given that a significant part of information on bilateral trade data is withheld for data protection reasons we were not able to meaningfully aggregate this measure by groups of countries. Unfortunately, data for most countries includes re-export and re-imports as most countries do not report these series separately.

[9] Given the asset/liability principle of the measure negative FDI positions can result "when the loans from the affiliate to its parent exceed the loans and equity capital given by the parent to the affiliate" (OECD, 2016).

normalisation by people engaged in the production process seems reasonable. Second, since FDI is measured as a stock it is preferable to normalise it by another stock variable and not a flow variable like value added or output.

Our measure of migration is the stock of foreign labour by nationality taken from the OECD and we splice it with the growth rate of foreign population for the years for which data is not available (in line with IMF, 2007).[10] We include it in our estimations as a ratio to total employment of the country.

Finally, for robustness tests we use an aggregate index of economic globalisation supplied by Dreher (2006) and updated in Dreher, et al. (2008) which combines *de facto* data from trade flows, FDI stocks, Portfolio investment, income payments to foreign nationals with *de jure* measure of hidden import barriers, tariff rates, taxes on international trade and capital account restrictions.

Our only measures for labour market institutions available at the sectoral level is union density supplied by Ebbinghaus and Visser (2000) and Visser (2015). Data is only available on a very aggregated level of sectoral classification and not available for each year. Therefore, we interpolated the series between available years and extrapolated data for service sectors using the growth rate of country-level union density. Similarly, we extrapolated manufacturing sectors using the growth rate of the total manufacturing union density or country-level union density when the latter series was not available. Due to the large amount of data created by extra- or interpolation we have reasons to doubt the reliability of this variable, although this is more relevant for earlier years before 1995 which are included only in a limited number of our estimations. However, it is important to note that such interpolation smooths the data and thereby diminishes its ability to capture short-time adjustment in bargaining variables in reaction to certain political or economic events. Nevertheless, we think the results are indicative and important as this paper is the first attempt to analyse the impact of union density on sectoral wage share for several countries. We also check for robustness by using the country level aggregate union density variable supplied by the OECD. Our second measure of bargaining power is adjusted bargaining coverage[11] measuring the number of employees covered by

[10] Since data for foreign labour and population by nationality is not available for the US we use foreign labour and population differentiated by country of birth for the US only.

[11] The variable is adjusted for the possibility that some sectors or occupations are excluded from the right to bargain (removing such groups from the employment count before dividing the number of covered employees by the total number of dependent workers in employment).

collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining (Visser, 2015). This variable is only available at the country level.

Furthermore, we account for social government spending defined as social transfers in kind from government to households measuring expenditure by government on market goods and services provided to households such as health care, housing, recreational and cultural services, education and social protection. This measure excludes social transfers in cash (reflecting welfare benefits), which we add to the previous measure for robustness tests, but unfortunately the latter series is available from 1995 only for most countries. We extrapolate our measure using the growth rate of government consumption for early years. The variable is measured as percentage of GDP and obtained from the OECD National Accounts at a Glance database.

Additionally, we include the Gini-coefficient obtained from the "Standardized World Income Inequality Database" (Solt, 2014), and top 1 percent income shares from the "World Wealth and Income Database" Alvaredo, et al. (2015).

Our country-level financialisation variables include interest and dividend payments and income of nonfinancial corporations as a ratio to total resources of nonfinancial corporations obtained from the OECD Non-financial Accounts by Sectors Database which is part of the Annual Accounts statistics. Furthermore we augment our analysis by a variable measuring household debt as percentage of GDP from the Bank of International Settlements Total Credit Statistics.

3.2 Stylised Facts

While the observed decline in the aggregate country-level labour share is a well-documented fact, there is only limited analysis of dynamics in functional income distribution at the sectoral level. We find that the trend observed in the aggregate country level wage share is mirrored at the sectoral level, albeit with important differences between manufacturing and services sectors as well as high (HS) and low skilled (LS) sector groups and across countries as can be seen in Figure 1 below for selected countries.

<Figure 1 about here>

The wage share in France exhibits the strongest skill bias amongst the four countries. However, although there is a clear decline in the wage share of low skilled service and manufacturing sectors, high skilled services have lost out in comparison to their own position in the 1980s as well. In fact, the only sector group characterised by a slightly increasing wage share is high skilled manufacturing.

In Germany the wage share appears to be quite stable until the early 2000s, which marks the implementation of the Hartz reforms – one of the most drastic labour market policy packages to be implemented in Germany. Thereafter all sector groups besides high skilled services exhibit a strong decline in the wage share, a trend that is only momentarily changed during the crisis. Indeed, the wage share of high skilled manufacturing industries declined by more than 19 percentage-points between 1993 and 2008, the strongest reduction in all sector groups.

The UK presents a diverse picture in terms of wage share dynamics. While low skilled services experienced a steady reduction in the wage share since the mid-1990s, low skilled manufacturing sectors have increased their wage share in the same period, although they still lost out in relation to their position in the early 1980s. Turning to high skilled sectors, services show the steadiest wage share, which experienced a sharp decline by 9 percentage-points between 1984 and 1994 and afterwards stabilised at a lower level. The wage share in high skilled manufacturing is highly volatile and characterised by interchanging periods of increase and decline. However, it is 11 percentage-points lower than its peak in 1981 at 71 percent in 2009, the last year of our sample for the UK, and close to its lowest level of 67 percent in 1996.

<Figure 2 about here>

The dynamics of the other countries in our sample are similarly diverse as can be seen in Figure 2. The USA and Sweden experienced a steady decline in high and low skilled manufacturing as well as low skilled service wage shares, while high skilled service wage shares appear to be relatively stable – a sector dominated by high wages in the financial sector.

In Italy all sector groups experienced a steady decline since the early 1980s, a trend which has been slightly reversed in the early 2000s for high and low skilled manufacturing and low skilled services but not for high skilled services.

In Spain wage shares look fairly stable over the whole period, but this hides a persistent decline since the early 2000s. One exception is low skilled service industries which experienced a decline of the wage share by 27 percentage-points between 1970 and 2010.

Denmark is the only country where the wage share appears to have been increasing or at least stable in the low and high skilled services and low skilled manufacturing sectors, while high skilled manufacturing workers have lost out in terms of wage share in comparison to their position in the 1980s.

Looking at the crisis year shows some interesting dynamics. Unfortunately, our data quality is worse for those years given that we are employing an unbalanced panel and thereby face the risk of sectors dropping out of our sample at the beginning and end of the time period. Nevertheless, we can observe some interesting dynamics. Historically, the wage share tends to rise during recessions as companies hold on to workers and productivity falls more than real wages, then the wage share falls back in a recovery. But during the 2008 recession the labour share did the opposite in some countries: it fell soon after the initial year of the recession, and when the recovery began the aggregate wage share kept falling in most countries. This trend can clearly be observed in the US, France and Germany. Unfortunately, our sectoral data for the UK is limited and ends in 2009, but nevertheless we can observe a decline for manufacturing sectors in the last years of the sample while service sectors exhibit an increase

between 2008 and 2009; also the data for the aggregate economy which is available until 2015 confirms these trends.

Summing up, despite the diversity of wage share dynamics across countries and sector groups, there are no sectors which seem to be exempt from the rise in inequality in functional income distribution across countries, an observation which cast doubt on two most commonly used explanations to account for the decrease in the country-level wage share in the mainstream analysis. On the one hand, there is reason to question the argument of skill-biased technological change as the main driver of functional income inequality, since it predicts an increase in the wage share of skilled workers while the wage share of unskilled workers declines. If our sectoral skill disaggregation roughly reflects the share of skilled and unskilled workers we can decisively conclude that this trend is not apparent the OECD countries. On the other hand, several economists have attributed the decline of the country-level wage share to a change in the sectoral composition of the economy, maintaining that the observed decline is mainly the result of traditionally capital intensive sectors with a low wage share producing an increasing share of overall value added (EC, 2009). Although our observation of an overall decline in the wage share across skill groups does not invalidate this explanation, it nevertheless provides evidence to the fact that changing industrial composition cannot on its own explain the decline in the aggregate wage share. This confirms previous findings by Karabarbunis and Neiman (2012, 2014) and Rodriguez and Jayadev (2010). Therefore, the analysis of the causes of the decline in the wage share remains an important question which can't be merely attributed to technology driven changes in the sectoral composition of the economy.

<Table 1 about here>

Table 1 presents cumulative percentage changes of selected variables for non-overlapping five year periods. Variables accounting for globalisation shows similar pattern across all countries of our sample. Intermediate import penetration, depicted in Figure 3, increased in all countries in both high and low skilled manufacturing sectors.[12] The years of the crisis and shortly afterwards are the only exception to the otherwise increasing trend, which resumed latest in 2010 in all countries.[13] The highest total growth rates were achieved in the 1990s in Sweden and Germany, driven by high skilled manufacturing sectors which in general have a higher level of intermediate imports than low skilled manufacturing sectors. This is not surprising because our sample consists of high-income economies supplying high-skilled goods whose production process was characterised by outsourcing measures which substitute domestic production by imported intermediate goods.

<Figure 3 about here>

A similar pattern can be observed for outward foreign direct investment (FDI). Here we can see a strong skill bias in the sense that outward FDI per employee increased more for high skilled manufacturing and service sectors than for their low skilled counterparts in France, Germany and the US while the other countries experienced a rather balanced increase in outward FDI across sectors. The exceptions are always low-skilled service sectors which experience the least amount of outward FDI.

The share of migrant workers in the total labour force has been increasing in most countries with the noticeable exceptions of Sweden, where it has stagnated, and France where it declined. Nevertheless, the share of migrants is very small in all countries, exceed ten percent only the US where the data is not comparable because it is measured as foreign-born rather than foreign labour force.

The share of ICT capital in value added is usually applied as a measure of technological change in the literature (Bassannini and Manfredi 2012). We observe a steady increase in the

[12] We focus on the analysis of manufacturing sectors for intermediate imports because the only service sector for which we have data is Recycling.

[13] These years are the reason why several countries have a negative growth rate for the last period.

share of ICT capital measures across all sectors and countries. There is a slight bias in favour of high skilled sectors in the UK and the US, but the general positive and sometimes even exponential trend is common to all countries.

We observe a strong decline in union density for all sector groups in France, Germany, the UK and the US, while the decline is more moderate, albeit still visible, in Italy, Denmark and Sweden. Union density stagnated or even increased in Spain between 1980 and 2010, however not exceeding the comparatively low level of 20 percent. Since this can be attributed to a period of recovery after oppressed labour unions after Franco, we regard it as a special case. In most countries union density began to decrease in the 1980s, with the exception of France and the US where it has been declining throughout the whole sample period. Union density is highest in manufacturing sectors and lowest in low skilled service sectors. However, the latter group is also characterised by the smallest reduction in union density. Comparing countries amongst each other union density measured at the country level decline most strongly in the UK and Germany where the reduction constitutes 24 and 18 percentage-points respectively.

Adjusted collective bargaining coverage also falls in most countries. The most drastic reductions in bargaining coverage can be observed in the UK, Germany and the US where it declined by 48, 27 and 18 percentage-points between the 1970 and the 2010s.

We observe an increase in social government spending in our sample period in most countries with the exception of Sweden and Denmark where the measure stayed roughly constant. Interestingly, while social government spending increased or stagnated, its financing is more relying on workers' income as can be observed by the increasing implicit tax rates for labour and consumption for all our sample (Onaran and Bösch, 2014).

Personal inequality measured by the Gini coefficient increased in most countries with regard to its level in the 1980, with France as the only outstanding exception. A similar pattern can be observed for the income share of the top 1 percent, this time Denmark being the exception from the rule of increasing top income shares.

4. Estimation Methodology

Our basic specification of the within sector wage share has the following form:

$$WS_{i,t} = \alpha_i + \alpha_g GROWTH_{i,t} + \alpha_k KnonICT_{i,t} + \alpha_{kict} KICT_{i,t} + \alpha_{barg} BARGAINING_{i,t} + \alpha_{glob} GLOBAL_{i,t} + \alpha_{welfare} WELFARE_t + \alpha_{financial} FINANCIALISATION_t + \alpha_{ineq} INEQAULITY_t + \varepsilon_{i,t} \qquad Equation\ (3)$$

where i is the sector index; t is the time index; *WS* is the wage share in sector i. *GROWTH* is the growth of the value added of the sector in order to control for the counter-cyclical dynamics of the wage share. *KICT* and *KnonICT* are ICT (information and communication technology) and non-ICT capital services as a ratio to value added in sector i; these capture the effects of technological change. α_i is a sector specific coefficient. We do not include period effects in our baseline estimation since several of our bargaining variables are only available at the country level and are thereby statistically similar to year dummies while carrying more meaningful information.

GLOBAL is a set of variables which capture the effects of globalization, such as intermediate import penetration and inward and outward FDI intensity. Intermediate import penetration is clearly linked to the wage share insofar as intermediate imports are related to the process of outsourcing to foreign companies. However, our data for intermediate imports is based on the conversion of commodity indices to sector indices and thereby doesn't allow us to calculate how much of the imported product is actually used by each sector, which would constitute a proper outsourcing measure and requires the use of Input-Output tables. However, assuming that the use of imported goods stays relatively constant across sectors intermediate import penetration is a relevant measure for the reallocation of production abroad. We expect a negative effect on the wage share for low skilled sectors in capital abundant countries (as rich OECD countries are usually assumed to be), brought about either by downward pressure on wages to maintain competitiveness, through trade-induced labour-saving technological change, or a reallocation of employment abroad or towards more capital-intensive sectors in the economy (Onaran, 2011). The expected effect for high skilled sectors is more ambiguous, given that imports can also increase output if they are complementary to domestic production or reduce costs. The effect is theoretically even more ambiguous if one considers imports of final goods that are not produced domestically (Grossman and Rossi-Hansberg, 2006; Onaran, 2011). Therefore, effects are likely to differ across countries.

We focus on outward FDI since it is clearly linked to developments in the wage share while the effect of inward FDI is more ambiguous, and less relevant for developed economies. Furthermore, estimations with inward FDI didn't change our results for outward FDI and the coefficient was not robust. We generally expect the effect of outward FDI to vary across manufacturing and services and potentially across skill groups. FDI is generally classified into two categories: vertical or cost-seeking FDI leads to substitution of domestic, usually low skilled workers by foreign labour, thereby creating negative employment effects in the home country while also increasing intermediate imports. However, there might be a positive scale effect related to vertical FDI if it increases exports through cost advantages or to foreign affiliates. Additionally, cost-seeking FDI might have an impact on the factor composition since the type of jobs created abroad are potentially of a low skilled nature, thereby lowering the wage share of low skilled domestic workers and increasing it for high skilled workers. Furthermore, vertical FDI potentially induce downward pressure on wages as foreign workers can be argued to increase labour demand at lower wage rates. This channel is most likely to impact both skilled and unskilled workers alike. Horizontal, or market-seeking FDI can also have a negative effect to the extent that it replaces exports. More likely though it will have a positive effect for high skilled workers because of an increase in employment at headquarters situated in the home country (Onaran, 2012). Generally, we expect these effects to be less pronounced in services because of their non-tradable character.

Furthermore we test the robustness of our results with regard to globalisation with country-level variables like the KOF index supplied by Dreher (2006) and Dreher, et al. (2008). These controls, which are important because the variable constitutes an exogenous measure of globalisation, strongly confirm our results with sector level variables.[14]

Our final variable accounting for trends in globalisation is the share of migrant workers in total employment. Previous findings suggest the effect of migration on the wage share to be negligible (IMF 2007). Theoretically, it can be either positive or negative depending on whether foreign workers complement domestic workers and thereby increase labour productivity or replace domestic workers while receiving a lower wage (and/or lower social security contributions).

[14] Results available upon request.

BARGAINING is a set of variables related to the industrial relations and labour market institutions including union density (alternately at the country and sector level) and adjusted collective bargaining coverage at the country level. While union density measures 'potential union bargaining pressure', 'the effectiveness of unions in providing and defending minimum standards of income and employment' is argued to be better captured by bargaining coverage defined as employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining (Visser, 2006: 39). Furthermore, we experimented with a measure of minimum wages as a ratio to the sectoral average wage as well as the growth rate of real minimum wages. Theoretically, an increase in any of those measures is expected to increase the real wage which will lead to an increase in the wage share if the elasticity of substitution between capital and labour is less than unity.

FINANCIALISATION includes interest and dividend payments and income as a ratio to total resources of nonfinancial corporations, as well as household debt as a share of GDP at the country level. There are different channels through which financialisation is said to impact the wage share. Post-Keynesian literature emphasises the effect of financial payments of non-financial corporations and relate it to an increase in the mark-up of employers if the latter is cost-sensitive with respect to financial payments (Hein, 2015). Alternatively, one could argue that dividend payments are an indication of increasing 'shareholder value' orientation, inducing a 'downsize and distribute' strategy that will supress wages and employment (Lazonick and O'Sullivan, 2000; Stockhammer, 2004; Dallery, 2009). Household debt has been found to reduce wage share arguably through increasing financial vulnerability that has an adverse effect on workers' willingness to engage in collective action (Anderloni, et al., 2012; Barba and Pivetti, 2009; Kohler, et al., 2015).

WELFARE is social government spending at the individual level as explained in the previous section. This variable is measured at the country level and is the same for all sectors.

INEQUALITY is country level inequality measured as the Gini coefficient or the income share of the top one percentile, again the same for all sectors.

We apply two main estimation techniques. Our baseline estimation is performed using the within estimator (also referred to as Fixed Effects Estimator), while we estimate the variance-covariance-matrix of the remainder error term using the approach developed by Driscoll and Kraay (1998). Therefore, standard errors are fully robust with respect to serial

correlation within countries, cross-sectional correlation between countries as well as general heteroscedasticity. Our main robustness controls are conducted with a first difference estimator. This has the additional advantage that potential non-stationarity concerns are taken care of given that all our variables are unambiguously stationary in first differences.[15]

Since there is reason for concerns regarding the endogeneity and specifically reverse causality for our measures of globalisation, and because the effect of other variables will most likely be manifested with a time lag, all explanatory variables enter the equation with a lag. It would be preferable to employ a General method of moments (GMM) estimator to tackle the issue of endogeneity as well as the dynamic nature of distribution. However, due to the limited number of cross sections in our single country estimations this estimation method is not appropriate. Including our explanatory variables with a lag to mitigate potential endogeneity (or sequential exogeneity) can be seen as a 'second best approach' given our sample (Wooldridge, 2002).

In addition to the pool of all sectors, separate regression analyses are performed for sector groups disaggregated as high skilled and low skilled sectors in manufacturing and services separately.

In separate regressions we employ four alternative measures of the wage share for robustness checks: i) the after tax wage share calculated as explained in the previous section; ii) compensation of employees as a ratio to value added, i.e. the wage share without the adjustment for self-employed workers; iii) wages and salaries as a ratio to value added. This is a measure of primary market distribution since it excludes all redistribution measures including social security contributions; iv) a sample without the outliers in which we drop all observations where the wage share exceeds 1. If not otherwise mentioned in the text our estimations are confirmed by these robustness tests.

We aim at using our variables at the most disaggregated level for which data is available. While our dependent variable is available at the 2-digit level of ISIC 4 (International Standard Industrial Classification of All Economic Activities), most of our explanatory variables are available at the 1-digit level with the exception of total capital stock and

[15] Furthermore, we conducted robustness tests where we include a constant for the first difference estimations, which is equivalent to including a trend in our level estimations. Our results are robust to the inclusion of a constant and the constant appears to be insignificant in most specifications.

intermediate import penetration which are available at a 2-digit level. For this reason, we switch between the 2- and 1-digit level according to the specification as explained in the next section.

Estimation period differs due to data availability depending on the variables used in each specification and country. While the data for the wage share at a sectoral level is available for 1970-2011, the data for the FDI starts only in 1985 and detailed data on imports disaggregated as intermediate and final imports start in 1995. The estimation period for most countries for the specifications including intermediate import penetration is 1996-2010, while it is 1986-2010 for specifications including FDI. Furthermore, data for our measures of financialisation starts in 1995 for most countries with the exception of France where data is available from 1970. It is mostly data on the capital stock that constrains the end year of our sample, although for some countries, like the US, data for the sector-level wage share also ends in 2010.

We exclude the Agriculture, Hunting, Forestry and Fishing, and Mining and Quarrying sectors as well as mostly publicly owned sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities) from the reported estimations, as these sectors wage setting behaviour may constitute an outlier and may not be determined by the same forces as other sectors, but results are robust to the inclusion of these sectors.

5. Estimation Results

Our estimation results are reported in Tables 2 to 8.

<Table 2 about here>

<Table 3 about here>

<Table 4 about here>

<Table 5 about here>

<Table 6 about here>

<Table 7 about here>

<Table 8 about here>

We estimate the effect of intermediate import penetration on the wage share in specifications (1) to (3) at the 2-digit level, while specifications (4) to (8) include foreign direct investment and are estimated at the 1-digit level. Due to the different sectoral aggregation at which variables are available, we don't include intermediate import penetration and FDI in the same specification. To avoid multicollinearity we estimate specifications with union density and government spending separately and exclude union density from specifications (7) and (8) since it's strongly correlated with several country-level variables.[16]

[16] Data availability differs across countries, especially with regards to capital stock data for France and the UK where our cross sections are reduced to eight and eleven sectors as opposed to 18 for Germany for specifications (1) to (3). Furthermore, we lose 'the coke and refined petroleum products sector' when we apply the first difference estimator for the UK in specification (7) and (8) because it has only 1 observation where all the data is available after cleaning. Exclusion of this sector does however not alter out results. We are able to increase the number of our cross sections to 11 if we estimate specifications (1) to (3) for France using data at the 1-digit level. However, this poses a trade-off since our import data is available at the 2-digit level and therefore requires aggregation and because previous results have indicated that the effect of intermediate import penetration is better observed at a highly disaggregated sectoral composition. However, our results are robust for estimations at 1- or 2-digit levels with respect to intermediate import penetration. Similar considerations apply to the US, where availability of data on the capital stock for the service sectors limits our sample and Spain where there is only very limited data on FDI. In fact, for Spain our sample is reduced to two or three observations per sectors, which in turn creates collinearity between several of our country level variables. For this reason, we drop government spending from specification (7) and (8) while we estimate specification (8) without our

Globalisation

We find strong support for a negative effect of globalisation measured by intermediate import penetration in France, Germany and the US, while in the UK the coefficient is still negative but rarely significant. Besides robustness tests using different estimation techniques as described in section 3, we estimated our specifications for different sub-pools, i.e. only manufacturing or only service sectors.[17] This not only allows us to test the robustness of our results, but at the same time provides insights with regards to the variables that have potentially contrasting effects for manufacturing and services or across skill groups. However, since our cross sections are limited to a maximum of 20 sectors for the 1-digit estimations, specifications for individual skill groups can only provide indicative evidence. In the US and France, the negative effect of intermediate import penetration is mostly driven by low-skilled manufacturing sectors, while in Germany the effect is equally found in low as well as high skilled manufacturing sectors. However, it is not robust to estimations in first differences in the US and Germany.

Outward FDI has similar effects in Germany and France. When estimated in first differences we obtain an insignificant effect in France in the pool with all sectors, however the effect is positive for manufacturing sectors and negative for service sectors (albeit insignificant).[18] For Germany the impact of FDI does not appear to be robust for the pool of all sectors. However, the effect is negative and highly significant and doubles in size when we restrict our sample to manufacturing sectors only (first difference estimator), while it stays insignificant, albeit with a positive sign, if only service sectors are considered. In the UK there is no robust effect of outward FDI in first differences, however the coefficient turns negative and significant in specifications (7) and (8) for the within estimator. Interestingly, we find a positive impact of outward FDI in the US, driven by high-skilled manufacturing and service sectors alike, while the effect is negative for low skilled service sectors. However, the coefficient turns insignificant if the first difference estimator is applied. Furthermore, we obtain a highly robust negative impact of outward FDI in Spain, which however has to be interpreted with care given the limited data availability on FDI for this country. The impact of outward

financialisation variables. These data issues in combination with the limited availability of variables accounting for financialisation is also reason for the reduced number of cross-sections in our first difference estimations.

[17] Results available upon request. In the services sectors our data for intermediate import penetration is limited to one sector (recycling), but our results for the total economy are robust to the exclusion of this sector.

[18] Our measure of FDI is the variable for which we are most concerned about non-stationarity as our unit root test indicate that it's integrated of order one. Therefore, we prefer to rely on the estimations in first differences for the analysis of outward FDI.

FDI turns out to be mostly statistically insignificant or not robust in Denmark and Italy, especially applying the first difference estimator. Generally, it is plausible that there is a skill bias creating a higher demand for high skilled labour through outward FDI if it is of a vertical (cost-seeking) nature. It is also plausible that this effect is less strong in non-tradable service sectors with a more horizontal market seeking nature. Other mechanisms like the threat effects associated with a change in the fall back options for capital and labour are also expected to be less important for high skill labour and services than low-skill labour and manufacturing (Onaran 2012). Our results confirm the different effects between manufacturing and services in Germany, while the skill division seems to be more relevant for the US. In Spain potential beneficial effects seem to be outweighed by the threat effects or substitution effects even for high skilled workers.

Our country-level measure of migration has a positive effect in the UK, which points to the fact that migrant workers are complementary to domestic workers, while there is a negative effect in Germany. However, the negative effect in Germany is not robust in all specifications, and according to the estimations in first differences, the negative migration effect seems to be driven by low skilled manufacturing sectors. In France, the effect of migration is insignificant in the total pool, but is significantly positive in services; further disaggregation indicates that the positive effect in services is driven by high skilled services, whereas there is a negative effect in the low skilled manufacturing sectors. Turning to the other countries we find a positive effect of migration in Italy, clearly driven by manufacturing sectors, while there is no statistically significant effect in the US, Denmark or Spain.

Technology

Our technology variables aim at capturing the effect of skill-biased technological change on the wage share. We fail to find evidence for the mainstream hypothesis that technological change will decrease the wage share of low skilled workers and increase it for high skilled workers (EC, 2009; Bassanini and Manfredi, 2012). Indeed, we do not find a significant negative effect of ICT capital services on the wage share in France except for specification (5) when estimated using the within estimator only. Non-ICT capital has a positive effect in first differences but the sign switches to negative when the within estimator is applied. The effect of ICT capital is even less robust for Germany where the variable is found to be positive or statistically insignificant in basically all specifications except for the manufacturing sector sample only if estimated using the within estimator. The effect is confirmed for two

specifications for high skilled manufacturing in first difference estimations. The same applies to non-ICT capital services that exhibit a robust positive sign only for the manufacturing sector pool, which is however robust to the application of different estimation methodologies. Similarly, the variables appear to be insignificant for most of the specifications for the UK. ICT capital intensity appears to have a negative impact on the wage share in the US, Italy and Spain, although we do not find an indication of a skill bias for the effect of ICT in any of these countries. Furthermore, in the US and Spain the coefficient for ICT is statistically not different from zero when we include variables accounting for the effect of financialisation and migration. Additionally, ICT capital turns insignificant in Spain when the first difference estimator is applied. On the other hand, we find a robust positive impact of non-ICT capital in the US, Italy, Denmark and Spain.

Country–level variables and measures of bargaining power

Turning to our measures of bargaining power our results differ significantly across countries. We report estimation results using our sectoral measure of union density but results are robust to the application of the country-level variable. We find very strong, robust positive effects of union density for Germany, mainly driven by the manufacturing sector. This is not surprising given the long tradition of sector-level wage negotiations in Germany. Similarly, we obtain a positive impact of union density in Italy and Spain, while there is no statistically significant effect in Denmark. In France there is no robust effect of union density, and in fact the variable seems to have a perverse negative effect in some of the specifications using the within estimator. However, union density was always quite low in France and is arguably not the essential measure to reflect the impact of bargaining power. When we replace union density by adjusted collective bargaining coverage, we obtain a robust and strong positive effect in all specifications in levels (using the within estimator), while it turns insignificant in first differences.[19] Similarly we obtain an insignificant coefficient for union density in the UK and the US, while bargaining coverage appears to have a robust positive effect especially for manufacturing sectors in the UK and manufacturing as well as service sectors in the US. It is interesting to note that all three are characterised by a (relatively) low level of bargaining coordination and union density and higher level of bargaining coverage, which suggests that the characteristics of the bargaining environment are imperative when analysing the impact of

[19] We report estimations with collective bargaining coverage only for France, the UK and the US, but the specifications with union density are available upon request.

institutional variables. Since bargaining usually takes place at the firm level in most industries in these countries, sector level union density can be argued to have less relevance and a country level measure capturing the general bargaining power of labour and the impact of collective voice might be more appropriate. Indeed, we find highly statistically significant positive effect of country-level union density for the UK (estimations in first differences) and the US.

Social government spending has a statistically highly significant and robust positive coefficient for nearly all specifications in France and Italy, and is robust to the application of different estimation methodologies. The same holds for the UK although the results are not robust to estimations in first differences, and the US where we find a positive impact if we reduce our sample to manufacturing sectors only, while we obtain a perverse negative sign for service sectors. For Germany, Denmark and Spain the effect is not robust to the application of different estimation methodologies and the coefficient is mostly statistically insignificant. [20]

Since there are no measures of financialisation at the sectoral level we can only use country-level variables for which we obtain mixed results. In France household debt and financial payments have a perverse positive coefficient, while financial income has a robust negative effect. Similarly, we find a positive effect of household debt in Italy. However, all these variables become insignificant for estimations in first differences. In Germany financial income appears to have the strongest negative effect on the wage share, while the negative coefficient of household debt is not robust. Similarly, we obtain a negative impact of financial income in Denmark and of financial payments in Spain, albeit only for estimations applying the within estimator. However, in the UK, given the strong financial sector and the massive surge in household debt, financial payments and household debt both have a robust negative effect in all estimations using the within estimator, and these effects are mostly robust when estimated in first differences. All financialisation variables have a negative impact on the wage share in the US if the first difference estimator is applied.

Our specification (8) controls for the argument that personal income inequality is an indicator of the command over resources and power relations, hence we include the Gini coefficient in our set of explanatory variables. The Gini coefficient has a negative effect in the

[20] We have also experimented with an alternative measure of government spending: total social government spending comprising the sum of in kind and in cash social transfers as a ratio to GDP. Our results are largely robust to this alternative measure, but given that data for in cash benefits is available only from 1995 onwards we prefer our current measure comprising in kind transfers only.

UK and Germany, while we find it to be insignificant in France, the US, Italy and Spain. We obtain a perverse positive coefficient in Denmark.

6. Conclusion

Our findings lend strong support to the political economy approach to functional income distribution. Technological change had an impact, especially in France, Italy, Spain and the US, but the effects are not robust with respect to the use of different specifications and the wage share in most countries in our sample appears to be driven by different variables reflecting the bargaining power of labour such as union density, adjusted bargaining coverage and government spending. The relevance of these variables differs considerably across countries, lending support to our approach of country specific estimations.

We find that globalisation had a strong impact on the wage share in all countries. The effect of globalisation on the wage share was least strong in Denmark. In Germany and, less robust, in the UK, the effect is due to outward FDI as well as intermediate import penetration which reflects the impact of international outsourcing practices. Intermediate imports penetration had no significant impact in Spain while FDI played a smaller role in France and the US.

Different institutional variables appear to be relevant for each country. Germany exhibits the most robust positive effect of union density on the wage share, while collective bargaining coverage plays a more important role in France and the UK together with social government spending.

Financialisation had the most pronounced effect in the UK and the US, while it appears to be also relevant in Germany. Estimations for other countries are inconclusive and require analysis using data on a more disaggregated level.

We find mixed results for the effect of personal income inequality on the wage share. However, there is indicative confirmation for a negative effect in Germany and the UK.

We fail to find a robust negative effect of variables aiming to measure technological change, and we do not find any evidence of skill-bias in terms the effect of technological change, which constitutes the core of the mainstream explanation for increasing inequality. For some individual country estimations we observe that these variables are especially sensitive to the inclusion of country-level measures of financialisation or bargaining power. However,

these results are not robust to the application of different estimation methodologies. This suggests that while technological change surely has increased value added, the negative impact on the wage share is more likely to be an effect of reduced bargaining power of workers, enhanced by globalisation and a deterioration of bargaining conditions.

Our findings have important policy implications. Rising inequality is not an inevitable outcome of technological change. Tackling income inequality requires a restructuring of the institutional framework in which bargaining takes place and a levelled play-ground where the bargaining power of labour is more in balance with that of capital. The impact of globalisation is likely to be significantly moderated and/or offset by stronger bargaining power of labour via an improvement in union legislation, increasing the coverage of collective bargaining, increasing the social wage via public goods and social security and international labor standards embedded in a broader strategy of global cooperation for high road labour market policies and macroeconomic policy coordination. Each country would have to address specific issues supporting the strongest positive drivers of the wage share while addressing possible issues that make other instruments of workers bargaining power ineffective. Furthermore, our results suggest that a simple attempt to reduce income inequality through skill-upgrading will not work as technological change does not seem to be the most relevant factor determining the distribution between labour and capital.

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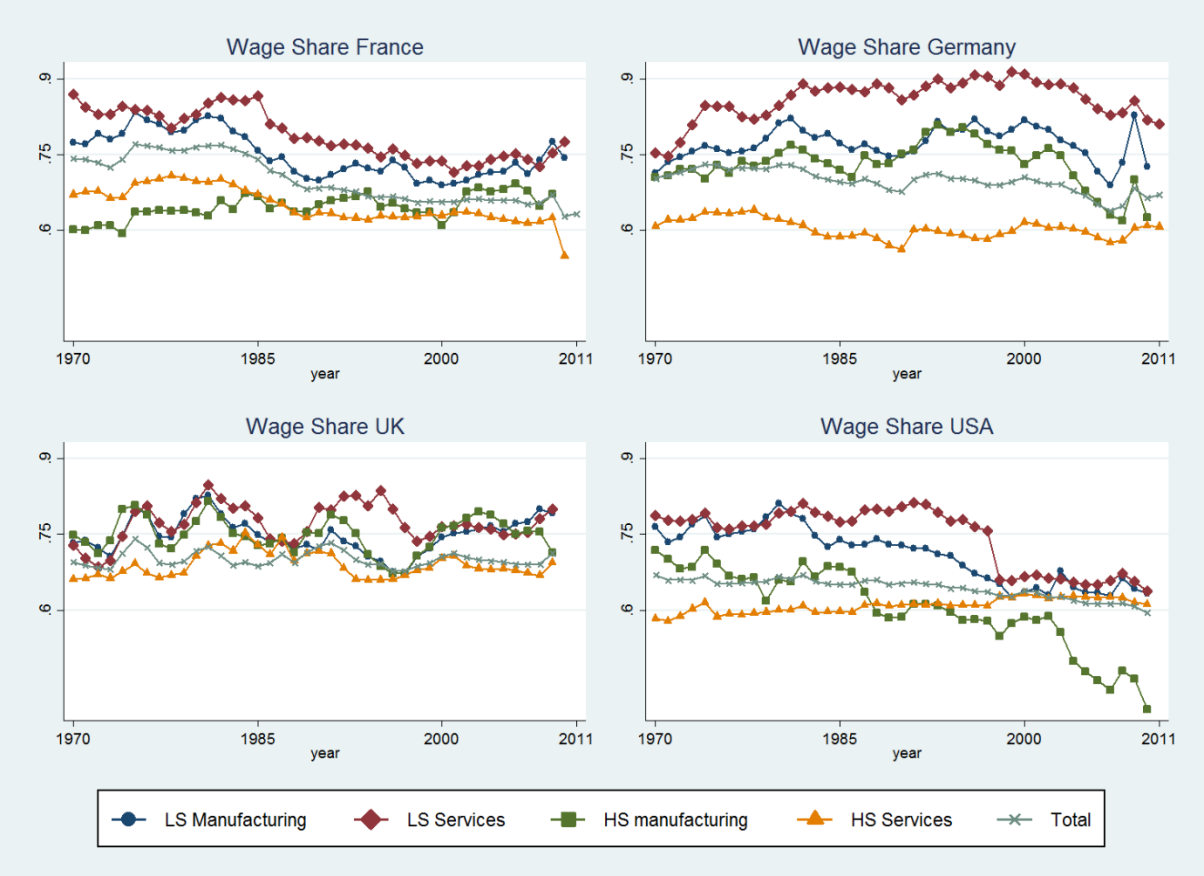
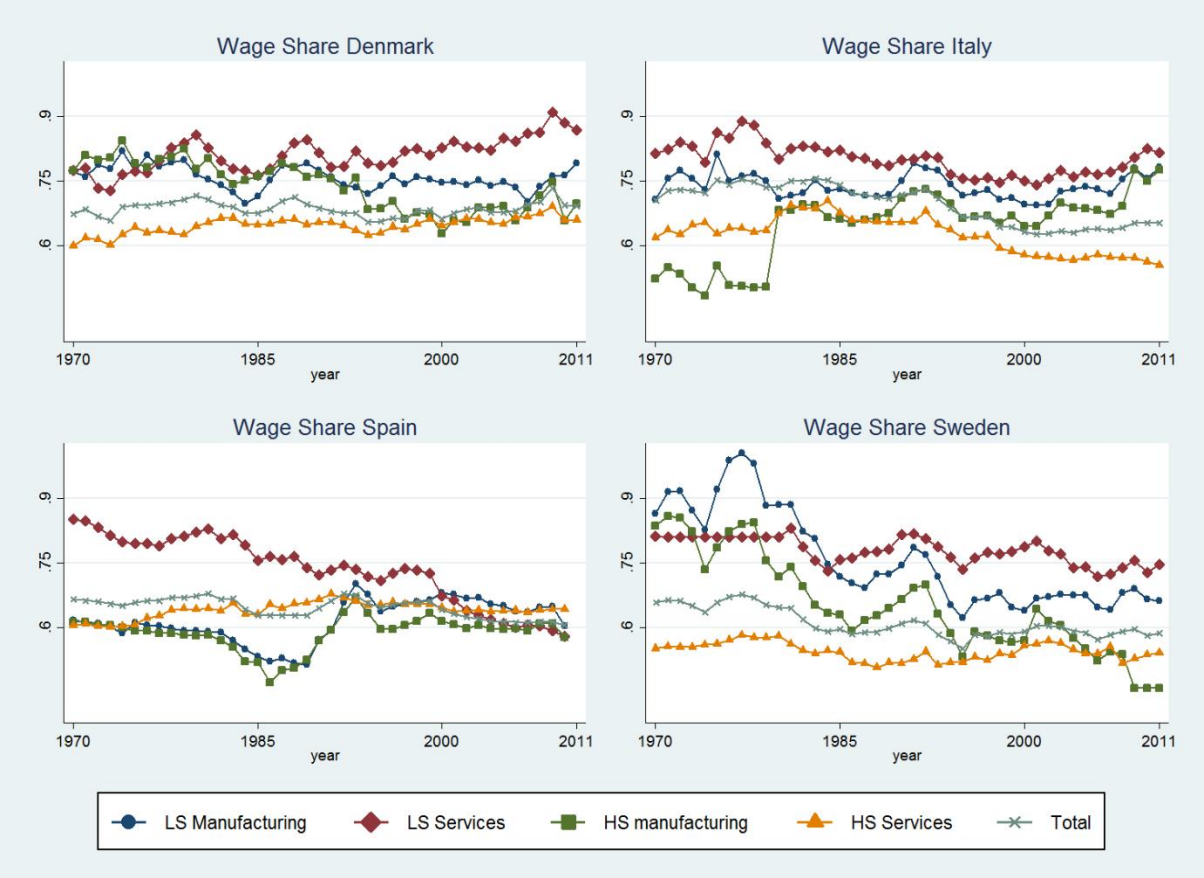
Figures and Tables

Figure 1: wage share in France, Germany, the UK and the US



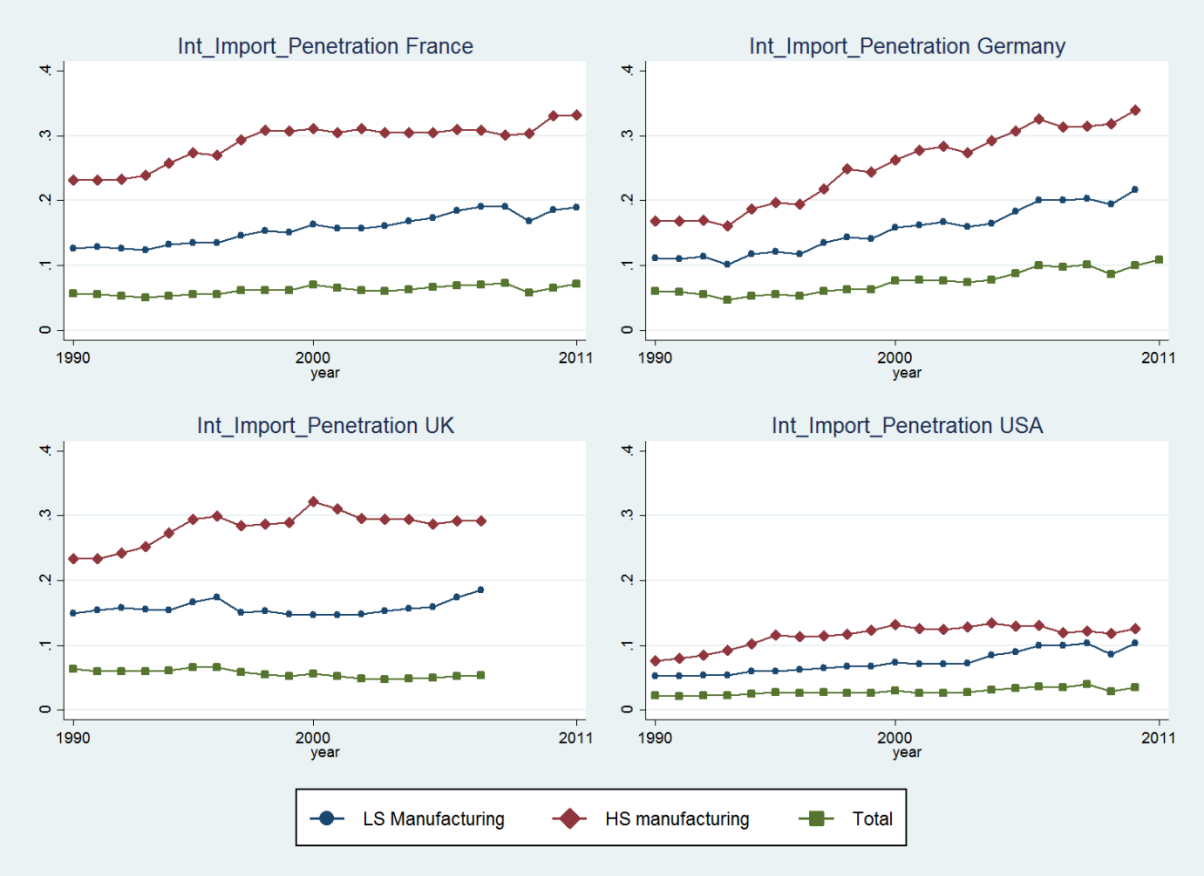
Source: Own calculations; see Section 3.1 for detailed sources. Total excludes "Agriculture, Hunting, Forestry and Fishing" sector.

Figure 2: wage share in Denmark, Italy, Spain and Sweden



Source: Own calculations; see Section 3.1 for detailed sources. Total excludes "Agriculture, Hunting, Forestry and Fishing" sector.

Figure 3: Intermediate Import Penetration in selected OECD countries



Source: Own calculations; see Section 3.1 for detailed sources. Total excludes "Agriculture, Hunting, Forestry and Fishing" sector.

Table 1: Descriptive statistics of our sample

		Cumulative percentage change in the Wage Share					Cumulative percentage change in Union Density				
country	year	HS_MANU	HS_SERV	LS_MANU	LS_SERV	TOT	HS_MANU	HS_SERV	LS_MANU	LS_SERV	TOT
France	1970-1974	-0.01	-0.01	0.02	-0.03	0.00	0.04	0.00	-0.05	0.10	0.00
	1975-1979	0.00	0.01	-0.04	-0.02	-0.02	-0.16	-0.14	-0.16	-0.15	-0.14
	1980-1984	0.06	-0.03	-0.04	0.03	-0.02	-0.21	-0.18	-0.28	-0.19	-0.18
	1985-1999	-0.05	-0.07	-0.07	-0.10	-0.08	-0.22	-0.23	-0.18	-0.19	-0.22
	1990-1994	0.04	-0.02	0.03	-0.02	-0.02	-0.19	-0.08	0.08	-0.12	-0.09
	1995-1999	-0.01	0.01	-0.02	-0.01	-0.01	-0.07	-0.10	-0.06	-0.06	-0.07
	2000-2004	0.11	-0.01	0.04	0.00	0.01	-0.05	-0.07	-0.06	0.03	-0.03
	2005-2011	-0.01	0.01	0.08	0.01	0.02	0.00	0.00	0.01	0.00	0.00
Germany	1970-1974	0.00	0.05	0.08	0.12	0.04	0.13	0.02	0.13	0.09	0.05
	1975-1979	0.01	-0.01	0.03	-0.02	-0.01	0.11	0.01	0.11	0.09	0.02
	1980-1984	-0.03	-0.06	-0.03	0.04	-0.04	0.03	0.00	0.03	0.06	0.00
	1985-1999	0.02	-0.03	-0.03	0.00	-0.02	-0.05	-0.08	-0.05	-0.07	-0.07
	1990-1994	0.06	0.05	0.06	0.03	0.04	0.05	-0.04	0.05	-0.07	-0.03
	1995-1999	-0.06	0.01	0.00	0.02	-0.01	-0.12	-0.14	-0.12	-0.15	-0.13
	2000-2004	-0.03	-0.02	-0.06	-0.03	-0.04	-0.10	-0.10	-0.10	-0.12	-0.10
	2005-2011	0.03	0.01	0.10	0.00	0.02	-0.13	-0.13	-0.13	-0.13	-0.13
United Kingdom	1970-1974	0.07	0.02	0.02	0.02	0.03	0.04	0.03	0.04	0.04	0.04
	1975-1979	-0.07	-0.03	-0.02	-0.03	-0.06	0.16	0.15	0.16	0.15	0.16
	1980-1984	-0.04	0.07	-0.06	-0.01	-0.03	-0.06	-0.07	-0.06	-0.07	-0.06
	1985-1999	0.03	-0.02	-0.03	-0.03	0.04	-0.10	-0.12	-0.10	-0.08	-0.10
	1990-1994	-0.05	-0.08	-0.02	0.00	-0.05	-0.08	-0.08	-0.08	-0.12	-0.08
	1995-1999	0.05	0.04	0.04	-0.11	0.00	-0.12	-0.10	-0.12	-0.11	-0.09
	2000-2004	0.03	-0.03	0.03	-0.01	-0.01	-0.11	-0.04	-0.11	-0.07	-0.04
	2005-2011	-0.07	0.02	0.05	0.07	0.03	-0.16	-0.04	-0.16	0.08	-0.05
Italy	1970-1974	-0.07	0.06	0.03	-0.03	0.02	0.25	0.24	0.25	0.23	0.25
	1975-1979	-0.09	0.01	-0.08	-0.03	-0.02	0.03	0.03	0.03	0.02	0.03
	1980-1984	-0.03	0.04	0.03	0.02	0.02	-0.11	-0.12	-0.11	-0.12	-0.09
	1985-1999	0.02	-0.03	-0.02	-0.04	-0.04	-0.04	-0.08	-0.04	0.00	-0.07
	1990-1994	-0.02	-0.03	-0.01	-0.04	-0.04	-0.13	-0.05	-0.13	-0.09	0.00
	1995-1999	0.01	-0.05	-0.01	0.01	-0.04	-0.03	-0.08	-0.03	-0.01	-0.07
	2000-2004	0.07	-0.02	0.05	0.01	0.00	-0.05	-0.03	-0.05	0.06	-0.02
	2005-2011	0.13	0.00	0.06	0.04	0.03	0.00	0.03	0.00	0.08	0.03
Spain	1970-1974	-0.02	0.00	-0.05	-0.06	-0.02					
	1975-1979	-0.02	0.06	-0.03	0.02	0.02					
	1980-1984	-0.10	-0.02	-0.07	-0.04	-0.04	0.06	-0.01	0.06	-0.05	-0.09
	1985-1999	0.01	0.04	-0.04	-0.02	0.00	0.26	0.10	0.26	0.11	0.02
	1990-1994	0.11	-0.02	0.19	-0.01	0.02	0.09	0.26	0.09	0.16	0.31
	1995-1999	0.06	0.00	0.04	0.02	0.02	-0.02	0.00	-0.02	-0.07	0.00
	2000-2004	-0.03	-0.01	-0.04	-0.08	-0.04	-0.02	-0.04	-0.02	-0.12	-0.06
	2005-2011	0.02	0.01	0.00	-0.03	0.00	-0.02	-0.05	-0.02	-0.01	0.20
Sweden	1970-1974	-0.12	0.02	-0.04	0.00	-0.03	0.05	0.07	0.05	0.01	0.09
	1975-1979	-0.04	0.03	-0.04	0.00	-0.01	0.05	0.03	0.05	0.06	0.04
	1980-1984	-0.12	-0.06	-0.16	-0.10	-0.09	0.04	0.03	0.04	0.02	0.04
	1985-1999	0.02	-0.05	0.01	0.03	0.00	-0.01	-0.01	-0.01	0.00	-0.01
	1990-1994	-0.12	0.00	-0.12	-0.06	-0.07	-0.06	0.02	-0.06	0.00	0.05
	1995-1999	0.06	0.03	0.04	0.05	0.06	-0.06	-0.04	-0.06	0.03	-0.03
	2000-2004	0.01	-0.01	0.06	-0.06	0.00	-0.01	-0.02	-0.01	-0.02	-0.01
	2005-2011	-0.17	-0.02	0.02	0.02	0.01	-0.04	-0.09	-0.04	-0.12	-0.11
United States	1970-1974	0.00	0.06	0.03	0.01	0.00	-0.08	-0.11	-0.08	-0.07	-0.06
	1975-1979	-0.11	0.02	0.05	0.01	0.01	-0.09	-0.12	-0.09	-0.14	-0.12
	1980-1984	0.04	-0.01	-0.11	-0.01	-0.02	-0.25	-0.18	-0.25	-0.35	-0.17
	1985-1999	-0.14	0.02	-0.01	0.03	0.00	-0.13	-0.06	-0.13	-0.09	-0.09
	1990-1994	0.02	0.00	-0.03	-0.04	-0.01	-0.12	-0.04	-0.12	-0.10	-0.03
	1995-1999	-0.01	0.02	-0.09	-0.15	-0.03	-0.12	-0.07	-0.12	-0.02	-0.07
	2000-2004	-0.15	-0.01	0.02	-0.02	-0.03	-0.13	-0.01	-0.13	-0.14	-0.07
	2005-2011	-0.03	-0.02	0.01	0.01	-0.01	-0.16	0.00	-0.16	-0.02	-0.01
Denmark	1970-1974	0.09	0.05	0.06	-0.01	0.03	0.07	0.06	0.07	0.10	0.08
	1975-1979	0.04	-0.03	0.03	0.09	0.02	0.09	0.08	0.09	0.20	0.12
	1980-1984	-0.03	0.01	-0.09	-0.10	-0.06	0.04	0.06	0.04	-0.03	0.00
	1985-1999	0.00	0.00	0.11	0.11	0.03	-0.03	-0.03	-0.03	0.01	-0.03
	1990-1994	-0.11	-0.05	-0.07	-0.03	-0.05	-0.12	0.13	-0.12	0.14	0.03
	1995-1999	-0.02	0.05	0.02	0.03	0.04	0.00	-0.01	0.00	-0.03	-0.02
	2000-2004	0.10	0.01	-0.01	-0.01	0.02	-0.02	-0.03	-0.02	-0.04	-0.05
	2005-2011	0.08	0.06	0.02	0.07	0.08	0.00	0.00	0.00	-0.03	-0.04

Source: Own calculations; see Section 3.1 for detailed sources. Total excludes "Agriculture, Hunting, Forestry and Fishing" sector.

Table 1 Continued

		Cumulative percentage change in outward FDI as a ratio to employment					Cumulative percentage change in ICT capital stock as a ratio to Value added			
country	year	HS_MANU	HS_SERV	LS_MANU	LS_SERV	TOTAL	LS_SERV	HS_MANU	HS_SERV	TOTAL
France	1990-1994	-0.05	-0.01	-0.18	0.32	0.62				
	1995-1999	3.64	0.27	2.22	1.81	1.00				
	2000-2004	-0.14	0.17	0.27	0.20	0.24				
	2005-2011	0.26	0.31	-0.08	0.03	0.23				
Germany	1970-1974						1.01	0.67	1.03	0.90
	1975-1979						0.29	0.16	0.30	0.28
	1980-1984						0.28	0.30	0.27	0.29
	1985-1999	0.17	0.37	0.06	0.29	0.28	0.28	0.39	0.16	0.19
	1990-1994	-0.38	0.16	0.47	-0.08	0.30	0.35	0.85	0.42	0.21
	1995-1999	0.79	0.79	0.77	0.62	1.04	0.56	0.39	0.65	0.42
	2000-2004	-0.02	-0.21	0.10	0.16	0.09	0.19	0.16	0.44	0.31
	2005-2011	-0.04	0.06	-0.06	0.31	0.09	0.72	0.78	0.70	0.62
United Kingdom	1970-1974						1.06		0.63	0.30
	1975-1979						0.29		0.52	0.27
	1980-1984						0.20	0.43	0.76	0.32
	1985-1999						0.28	0.37	0.56	0.63
	1990-1994	0.07	-0.20	0.35	0.07	0.37	0.28	0.27	0.15	0.26
	1995-1999	2.14	0.75	0.16	0.04	0.85	0.72	1.34	0.74	0.83
	2000-2004	-0.19	-0.27	-0.08	0.50	-0.08	0.68	0.25	0.67	0.50
	2005-2011									
Italy	1970-1974						0.30	-0.32	0.14	0.24
	1975-1979						0.09	-0.15	0.48	0.20
	1980-1984						0.18	0.18	0.61	0.26
	1985-1999	1.20	0.59	0.37	1.68	0.52	0.50	0.32	0.54	0.34
	1990-1994	0.58	0.81	2.23	0.12	0.80	0.17	-0.04	1.80	0.21
	1995-1999	1.01	0.85	1.50	0.92	0.80	0.97	0.57	0.44	0.47
	2000-2004	-0.17	-0.85	0.13	-0.41	-0.11	0.55	0.24	0.30	0.32
	2005-2011	-0.50	0.46	-0.13	1.49	0.22	0.53	0.44	0.31	0.33
Spain	1970-1974									
	1975-1979									
	1980-1984						0.96	0.03	0.15	0.31
	1985-1999						0.55	0.19	0.38	0.34
	1990-1994						0.20	0.05	0.14	0.15
	1995-1999					2.47	0.86	0.45	0.44	0.44
	2000-2004					0.47	0.64	0.31	0.31	0.31
	2005-2011	7.27	-0.08	3.53	1.80	0.47	0.42	0.52	0.44	0.40
Sweden	1970-1974									
	1975-1979									
	1980-1984									
	1985-1999									
	1990-1994					0.58				
	1995-1999	2.01	0.00	2.76	0.44	0.79	0.60	0.25	0.53	0.41
	2000-2004	0.16	0.94	0.25	0.07	0.12	0.13	-0.05	0.23	0.11
	2005-2011	0.46	0.48	0.56	0.53	0.35				
United States	1970-1974									
	1975-1979									
	1980-1984						1.86	0.79	0.95	0.36
	1985-1999	0.67	1.97	0.95	0.51	0.56	0.49	0.51	0.62	0.30
	1990-1994	0.44	0.51	0.60	-0.26	0.41	0.58	0.52	0.39	0.34
	1995-1999	0.23	1.15	0.43	0.36	0.74	0.75	1.04	1.03	0.83
	2000-2004	0.36	0.94	0.46	0.23	0.60	0.51	0.15	0.49	0.33
	2005-2011	0.23	0.68	0.25	0.24	0.50				
Denmark	1970-1974						0.24	-0.02	0.09	0.12
	1975-1979						0.31	0.73	0.67	0.53
	1980-1984						1.60	1.40	1.13	1.20
	1985-1999						0.69	0.79	0.80	0.75
	1990-1994						0.37	0.94	0.69	0.55
	1995-1999						0.96	1.20	1.04	1.17
	2000-2004	-0.05	-0.69	0.25	0.12	0.16	0.48	0.91	1.12	0.82
	2005-2011	1.97	0.92	3.24	0.77	0.16				

Source: Own calculations; see Section 3.1 for detailed sources. Excluding "Agriculture, Hunting, Forestry and Fishing" sector.

Table 2: Estimation results for France, all sectors

	Within Estimator								First Difference Estimator							
	FRA_1	FRA_2	FRA_3	FRA_4	FRA_5	FRA_6	FRA_7	FRA_8	FRA_1	FRA_2	FRA_3	FRA_4	FRA_5	FRA_6	FRA_7	FRA_8
growth	-0.045	-0.036	-0.007	-0.253***	-0.263***	-0.209***	-0.194***	-0.194***	-0.182***	-0.183***	-0.180***	-0.263***	-0.274***	-0.260***	-0.269***	-0.268***
	(0.515)	(0.604)	(0.925)	(0.002)	(0.002)	(0.008)	(0.009)	(0.009)	(0.004)	(0.003)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
capital stock_t-1	0.119***	0.111***	0.116***						0.276***	0.273***	0.275***					
	(0.002)	(0.003)	(0.002)						(0.001)	(0.001)	(0.001)					
int. imports_t-1	-0.420***	-0.631***	-0.629***						-0.486*	-0.473*	-0.487*					
	(0.006)	(0.003)	(0.000)						(0.083)	(0.094)	(0.085)					
other imports_t-1	0.637***	0.557***	0.522***						0.292***	0.277***	0.283***					
	(0.000)	(0.000)	(0.000)						(0.001)	(0.002)	(0.003)					
social government_t-1		0.022***			0.026***		0.010**	0.009**		0.008			0.017***		0.012***	0.011**
		(0.001)			(0.001)		(0.013)	(0.035)		(0.382)			(0.000)		(0.009)	(0.032)
bargaining cov_t-1			0.010***			0.009***					0.005			0.004		
			(0.001)			(0.005)					(0.441)			(0.110)		
ICT capital_t-1				0.017	-0.023*	-0.023	-0.002	-0.002				0.002	0.004	-0.010	-0.001	0.001
				(0.183)	(0.070)	(0.114)	(0.907)	(0.911)				(0.877)	(0.807)	(0.540)	(0.957)	(0.944)
non-ICT capital_t-1				-0.075**	-0.043*	-0.036	-0.069***	-0.069***				0.141***	0.107***	0.154***	0.110***	0.106***
				(0.013)	(0.057)	(0.147)	(0.002)	(0.002)				(0.000)	(0.003)	(0.000)	(0.003)	(0.006)
outward FDI_t-1				0.281***	0.261***	0.236**	0.234**	0.233**				-0.038	-0.025	-0.035	-0.033	-0.037
				(0.001)	(0.006)	(0.013)	(0.024)	(0.025)				(0.707)	(0.807)	(0.731)	(0.751)	(0.728)
hh debt_t-1							0.078***	0.069***							0.073**	0.067*
							(0.001)	(0.002)							(0.045)	(0.052)
fin. income_t-1							-0.057***	-0.053**							-0.016	-0.010
							(0.003)	(0.014)							(0.510)	(0.678)
fin. payments_t-1							0.134***	0.139***							0.035	0.033
							(0.000)	(0.000)							(0.377)	(0.407)
migration_t-1							0.041	-0.065							-0.513	-0.481
							(0.925)	(0.901)							(0.480)	(0.507)
gini_t-1								0.001								0.003
								(0.479)								(0.481)
constant	0.458***	0.200***	-0.438**	0.330***	-0.089	-0.557*	-0.154	-0.131								
	(0.000)	(0.003)	(0.024)	(0.006)	(0.656)	(0.097)	(0.475)	(0.537)								
withR2	0.560	0.594	0.610	0.234	0.311	0.280	0.368	0.368	0.338	0.336	0.336	0.288	0.322	0.290	0.329	0.328
F-test	74.130	70.228	143.113	14.990	23.231	14.254	1064.448	1108.347	13.186	12.708	10.418	14.833	15.723	13.259	11.576	10.525
obs	138	138	138	391	391	391	391	391	125	125	125	367	367	367	367	367
number of sectors	8	8	8	20	20	20	20	20	8	8	8	20	20	20	20	20

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 3: Estimation results for Germany, all sectors

	Within Estimator								First Difference Estimator							
	DEU_1	DEU_2	DEU_3	DEU_4	DEU_5	DEU_6	DEU_7	DEU_8	DEU_1	DEU_2	DEU_3	DEU_4	DEU_5	DEU_6	DEU_7	DEU_8
growth	-0.233***	-0.225***	-0.261***	-0.230***	-0.229***	-0.250***	-0.203**	-0.212**	-0.302***	-0.303***	-0.301***	-0.302***	-0.302***	-0.302***	-0.333***	-0.334***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.018)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
capital stock_t-1	0.016	0.038	0.024						0.193***	0.184***	0.184**					
	(0.719)	(0.372)	(0.369)						(0.007)	(0.009)	(0.011)					
int. imports_t-1	-0.254***	-0.207**	0.075						-0.035	-0.038	-0.013					
	(0.007)	(0.043)	(0.296)						(0.740)	(0.721)	(0.910)					
other imports_t-1	0.019	0.039	0.137*						0.009	0.005	0.015					
	(0.774)	(0.622)	(0.084)						(0.868)	(0.916)	(0.769)					
social government_t-1		-0.029**			-0.003		-0.001	0.005		0.005			-0.001		-0.001	-0.001
		(0.023)			(0.512)		(0.956)	(0.713)		(0.423)			(0.840)		(0.909)	(0.931)
sec. union density_t-1			0.009***			0.009***					0.003			0.002		
			(0.000)			(0.000)					(0.187)			(0.295)		
ICT capital_t-1				-0.017	-0.015	0.069***	0.090**	0.139**				0.020	0.021	0.041	0.017	0.003
				(0.168)	(0.285)	(0.002)	(0.026)	(0.029)				(0.474)	(0.456)	(0.308)	(0.607)	(0.924)
non-ICT capital_t-1				0.059	0.059	-0.031	0.007	-0.058				0.150***	0.152***	0.126**	0.226***	0.239***
				(0.118)	(0.118)	(0.401)	(0.925)	(0.571)				(0.001)	(0.001)	(0.020)	(0.000)	(0.000)
outward FDI_t-1				0.659**	0.668**	0.508**	0.849***	0.848***				-0.388*	-0.388*	-0.389	0.372*	0.372*
				(0.015)	(0.011)	(0.033)	(0.002)	(0.003)				(0.098)	(0.099)	(0.103)	(0.070)	(0.068)
hh debt_t-1							-0.098	-0.298							-0.000	0.044
							(0.253)	(0.116)							(0.999)	(0.583)
fin. income_t-1							-0.083**	-0.022							-0.043***	-0.044***
							(0.024)	(0.243)							(0.007)	(0.006)
fin. payments_t-1							-0.097	-0.157							0.120**	0.128***
							(0.432)	(0.187)							(0.015)	(0.007)
migration_t-1							-12.318***	-7.317***							-3.918***	-4.497***
							(0.001)	(0.007)							(0.001)	(0.000)
gini_t-1								-0.056*								0.009
								(0.098)								(0.272)
constant	0.770***	1.067***	0.273***	0.959***	1.004***	0.661***	2.655***	4.509***								
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.006)								
withR2/adjR2	0.185	0.205	0.434	0.2	0.2	0.324	0.296	0.325	0.455	0.454	0.456	0.428	0.427	0.428	0.504	0.504
F-test	13.374	11.114	57.872	13.023	12.692	28.836	533.101	307.947	11.244	9.451	12.384	21.094	16.905	18.429	10.492	10.988
obs	340	340	340	407	407	407	281	281	318	318	318	380	380	380	256	256
number of sectors	18	18	18	20	20	20	20	20	18	18	18	20	20	20	20	20

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 4: Estimation results for the United Kingdom, all sectors

	Within Estimator								First Difference Estimator							
	GBR_1	GBR_2	GBR_3	GBR_4	GBR_5	GBR_6	GBR_7	GBR_8	GBR_1	GBR_2	GBR_3	GBR_4	GBR_5	GBR_6	GBR_7	GBR_8
growth	-0.341**	-0.380**	-0.333**	-0.264**	-0.265**	-0.275**	-0.125*	-0.117	-0.154***	-0.153***	-0.160***	-0.235***	-0.234***	-0.238***	-0.073	-0.073
	(0.017)	(0.014)	(0.009)	(0.015)	(0.015)	(0.012)	(0.098)	(0.114)	(0.003)	(0.003)	(0.002)	(0.000)	(0.000)	(0.000)	(0.245)	(0.256)
capital stock_t-1	0.118**	0.114***	0.130**						0.185***	0.189***	0.196***					
	(0.012)	(0.006)	(0.012)						(0.006)	(0.005)	(0.003)					
int. imports_t-1	-0.197	-0.259	-0.113						-0.254	-0.237	-0.230*					
	(0.464)	(0.330)	(0.622)						(0.101)	(0.118)	(0.111)					
other imports_t-1	0.114***	0.044	0.143***						0.032	0.038	0.041					
	(0.005)	(0.399)	(0.004)						(0.477)	(0.407)	(0.351)					
social government_t-1		0.020**			0.001		0.020*	0.018*		-0.005			-0.006		0.002	0.002
		(0.010)			(0.801)		(0.052)	(0.061)		(0.498)			(0.400)		(0.920)	(0.927)
bargaining cov_t-1			0.003			0.003*					0.005**			0.001		
			(0.123)			(0.079)					(0.012)			(0.392)		
ICT capital_t-1				-0.001	-0.002	0.019**	-0.012	-0.019				0.016	0.019	0.024	0.030	0.031
				(0.865)	(0.802)	(0.045)	(0.706)	(0.584)				(0.292)	(0.224)	(0.143)	(0.481)	(0.392)
non-ICT capital_t-1				-0.033	-0.033	-0.062	0.058	0.064				0.110*	0.112*	0.099*	0.027	0.026
				(0.449)	(0.447)	(0.202)	(0.296)	(0.270)				(0.070)	(0.067)	(0.100)	(0.764)	(0.752)
outward FDI_t-1				0.097	0.094	0.107	-0.125**	-0.118**				-0.006	-0.007	-0.004	-0.069	-0.070
				(0.557)	(0.578)	(0.520)	(0.017)	(0.020)				(0.943)	(0.937)	(0.966)	(0.418)	(0.438)
hh debt_t-1							-0.283***	-0.268***							-0.226	-0.226
							(0.004)	(0.002)							(0.210)	(0.209)
fin. income_t-1							0.030*	0.020***							0.023*	0.023*
							(0.055)	(0.001)							(0.079)	(0.093)
fin. payments_t-1							-0.102***	-0.103***							-0.089*	-0.089**
							(0.000)	(0.000)							(0.052)	(0.042)
migration_t-1							1.425***	2.080***							1.436*	1.403*
							(0.000)	(0.000)							(0.072)	(0.085)
gini_t-1								-0.008**								0.001
								(0.028)								(0.945)
constant	0.626***	0.454***	0.493***	0.501**	0.478*	0.350	1.873***	2.062***								
	(0.000)	(0.000)	(0.000)	(0.039)	(0.065)	(0.207)	(0.000)	(0.000)								
withR2	0.208	0.248	0.225	0.077	0.077	0.106	0.092	0.097	0.087	0.084	0.116	0.093	0.093	0.092	0.011	0.001
F-test	11.944	10.223	10.797	5.476	6.224	5.228	5561.640	1071.984	4.783	3.699	4.957	4.756	3.899	3.872	1.567	1.463
obs	182	182	182	266	266	266	132	132	169	169	169	247	247	247	114	114
number of sectors	11	11	11	18	18	18	18	18	11	11	11	18	18	18	17	17

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 5: Estimation results for the United States, all sectors

	Within Estimator								First Difference Estimator							
	USA_1	USA_2	USA _3	USA _4	USA _5	USA _6	USA _7	USA _8	USA _1	USA _2	USA _3	USA _4	USA _5	USA _6	USA _7	USA _8
growth	-0.233***	-0.236***	-0.230***	-0.279***	-0.278***	-0.270***	-0.283***	-0.283***	-0.228***	-0.232***	-0.225***	-0.309***	-0.304***	-0.303***	-0.345***	-0.345***
	(0.004)	(0.003)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
capital stock_t-1	0.241***	0.245***	0.218***						0.121***	0.136***	0.120***					
	(0.000)	(0.000)	(0.000)						(0.003)	(0.001)	(0.004)					
int. imports_t-1	-0.520***	-0.429**	-0.017						-0.509	-0.532	-0.394					
	(0.010)	(0.033)	(0.950)						(0.284)	(0.268)	(0.467)					
other imports_t-1	-1.176***	-1.092***	-0.990***						-0.387	-0.376	-0.332					
	(0.000)	(0.001)	(0.001)						(0.216)	(0.251)	(0.251)					
social government_t-1		-0.032			0.008		-0.008	-0.007		-0.021			0.023		-0.037	-0.037
		(0.375)			(0.750)		(0.758)	(0.858)		(0.418)			(0.154)		(0.133)	(0.141)
bargaining cov_t-1			0.009**			0.019***				h	0.005			0.012**		
			(0.015)			(0.000)					(0.501)			(0.032)		
ICT capital_t-1				-0.036***	-0.037***	-0.000	0.021	0.022				-0.020**	-0.024**	-0.000	0.059*	0.059
				(0.000)	(0.000)	(0.955)	(0.145)	(0.154)				(0.041)	(0.021)	(0.999)	(0.097)	(0.136)
non-ICT capital_t-1				0.209***	0.211***	0.142***	0.119***	0.119***				0.227***	0.220***	0.197***	0.124	0.124
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				(0.000)	(0.000)	(0.000)	(0.100)	(0.117)
outward FDI_t-1				0.849**	0.834**	1.305***	0.958***	0.958***				0.139	0.143	0.194	0.232	0.232
				(0.030)	(0.027)	(0.001)	(0.000)	(0.000)				(0.517)	(0.503)	(0.380)	(0.360)	(0.352)
hh debt_t-1							-0.150	-0.150							-0.215*	-0.215
							(0.190)	(0.188)							(0.072)	(0.114)
fin. income_t-1							-0.013	-0.013							-0.030**	-0.030**
							(0.314)	(0.280)							(0.012)	(0.011)
fin. payments_t-1							-0.031	-0.032							-0.102***	-0.102***
							(0.256)	(0.139)							(0.005)	(0.005)
migration_t-1							0.702	0.667							1.194	1.195*
							(0.522)	(0.598)							(0.114)	(0.097)
gini_t-1								0.001								-0.000
								(0.943)								(0.997)
constant	0.659***	0.844***	0.479***	1.964***	1.924***	1.407***	2.187***	2.142**								
	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.037)								
withR2	0.558	0.565	0.576	0.503	0.504	0.561	0.462	0.462	0.333	0.332	0.330	0.342	0.344	0.351	0.488	0.482
F-test	75.900	70.075	96.864	485.939	388.970	201.519	6662.180	1899.821	20.768	17.150	17.135	12.809	10.311	10.515	4.139	3.907
obs	146	146	146	257	257	257	122	122	134	134	134	241	241	241	107	107
number of sectors	8	8	8	13	13	13	13	13	8	8	8	13	13	13	13	13

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 6: Estimation results for Denmark, all sectors

	Within Estimator								First Difference Estimator							
	DNK_1	DNK _2	DNK _3	DNK _4	DNK _5	DNK _6	DNK _7	DNK _8	DNK _1	DNK _2	DNK _3	DNK _4	DNK _5	DNK _6	DNK _7	DNK _8
growth	-0.117**	-0.115**	-0.118**	-0.277***	-0.277***	-0.276***	-0.312***	-0.317***	-0.257***	-0.260***	-0.256***	-0.292***	-0.303***	-0.291***	-0.291***	-0.295***
	(0.024)	(0.024)	(0.023)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
capital stock_t-1	0.064	0.043	0.066						0.161***	0.178***	0.159***					
	(0.129)	(0.292)	(0.121)						(0.000)	(0.000)	(0.000)					
int. imports_t-1	0.152	-0.047	0.168						-0.099	-0.092	-0.095					
	(0.175)	(0.754)	(0.143)						(0.579)	(0.614)	(0.596)					
other imports_t-1	0.402**	0.161	0.419**						0.010	0.015	0.016					
	(0.030)	(0.463)	(0.027)						(0.965)	(0.946)	(0.944)					
social government_t-1		0.017***			0.005		-0.008	0.010		-0.011**			-0.016		-0.007	0.001
		(0.002)			(0.488)		(0.338)	(0.116)		(0.031)			(0.158)		(0.604)	(0.955)
sec. union density_t-1			0.000			-0.002					0.001			-0.004		
			(0.647)			(0.170)					(0.595)			(0.581)		
ICT capital_t-1				0.006	0.005	0.001	0.001	0.014				0.019	0.030	0.009	0.017	0.035
				(0.102)	(0.264)	(0.691)	(0.934)	(0.125)				(0.394)	(0.215)	(0.772)	(0.587)	(0.305)
non-ICT capital_t-1				0.057**	0.056**	0.054**	0.126***	0.125***				0.175***	0.182***	0.185***	0.196***	0.186***
				(0.027)	(0.028)	(0.040)	(0.000)	(0.000)				(0.004)	(0.003)	(0.005)	(0.003)	(0.003)
outward FDI_t-1				0.023*	0.022	0.021	0.068***	0.066***				0.030	0.026	0.029	0.025	0.022
				(0.098)	(0.113)	(0.111)	(0.000)	(0.000)				(0.267)	(0.310)	(0.277)	(0.335)	(0.396)
hh debt_t-1							0.111	0.004							-0.142	-0.197
							(0.111)	(0.949)							(0.410)	(0.270)
fin. income_t-1							-0.020**	-0.012							-0.001	0.004
							(0.033)	(0.271)							(0.957)	(0.783)
fin. payments_t-1							-0.004	0.002							-0.010	-0.009
							(0.645)	(0.797)							(0.330)	(0.422)
migration_t-1							-0.868	-0.643							5.374	4.446
							(0.621)	(0.714)							(0.172)	(0.250)
gini_t-1								0.010***								0.011*
								(0.005)								(0.061)
constant	0.740***	0.489***	0.700***	1.041***	0.950***	1.132***	0.998***	1.027***								
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)								
withR2/adjR2	0.131	0.156	0.131	0.246	0.247	0.251	0.324	0.336	0.399	0.405	0.397	0.349	0.352	0.345	0.345	0.355
F-test	7.749	52.674	6.438	89.572	90.042	86.888	89067.965	600.337	24.388	21.279	20.836	11.734	9.331	10.094	7.072	7.023
obs	339	339	339	152	152	152	127	127	318	318	318	111	111	111	111	111
number of sectors	17	17	17	15	15	15	15	15	17	17	17	14	14	14	14	14

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 7: Estimation results for Italy, all sectors

	Within Estimator								First Difference Estimator							
	ITA_1	ITA _2	ITA _3	ITA _4	ITA _5	ITA _6	ITA _7	ITA _8	ITA _1	ITA _2	ITA _3	ITA _4	ITA _5	ITA _6	ITA _7	ITA _8
growth	-0.176**	-0.177**	-0.189**	-0.290***	-0.278***	-0.286***	-0.230***	-0.241***	-0.135**	-0.137***	-0.146***	-0.252***	-0.248***	-0.254***	-0.222***	-0.222***
	(0.025)	(0.023)	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.009)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
capital stock_t-1	0.051	0.031	0.084*						-0.006	-0.022	0.004					
	(0.133)	(0.327)	(0.057)						(0.945)	(0.797)	(0.967)					
int. imports_t-1	-0.263	-0.297	0.591*						-0.702*	-0.637	-0.532					
	(0.500)	(0.385)	(0.065)						(0.073)	(0.108)	(0.211)					
other imports_t-1	0.275**	0.121	0.211**						0.244**	0.238**	0.215*					
	(0.013)	(0.184)	(0.050)						(0.021)	(0.031)	(0.051)					
social government_t-1		0.014**			0.023***		-0.003	0.006		0.012*			0.014***		0.001	0.001
		(0.023)			(0.000)		(0.710)	(0.504)		(0.065)			(0.003)		(0.936)	(0.945)
sec. union density_t-1			0.005**			-0.002					0.004**			0.004		
			(0.017)			(0.478)					(0.044)			(0.117)		
ICT capital_t-1				-0.028**	-0.043***	-0.040**	-0.088***	-0.080**				-0.006	-0.024	0.006	-0.076*	-0.076*
				(0.018)	(0.000)	(0.016)	(0.003)	(0.014)				(0.776)	(0.372)	(0.788)	(0.059)	(0.099)
non-ICT capital_t-1				0.190***	0.193***	0.210***	0.290***	0.278***				0.203***	0.175***	0.174***	0.201***	0.201***
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				(0.000)	(0.007)	(0.004)	(0.009)	(0.010)
outward FDI_t-1				-0.202	-0.303**	-0.125	-0.247	-0.272				-0.266	-0.385	-0.310	-0.270	-0.270
				(0.111)	(0.039)	(0.417)	(0.256)	(0.214)				(0.368)	(0.174)	(0.295)	(0.317)	(0.304)
hh debt_t-1							0.070***	0.073***							0.046	0.046
							(0.001)	(0.002)							(0.280)	(0.272)
fin. income_t-1							0.000	-0.007							0.021	0.021
							(0.978)	(0.723)							(0.128)	(0.288)
fin. payments_t-1							0.037	0.082							-0.075	-0.076
							(0.505)	(0.154)							(0.151)	(0.333)
migration_t-1							0.738***	0.433							0.198	0.200
							(0.005)	(0.114)							(0.447)	(0.497)
gini_t-1								0.009								-0.000
								(0.123)								(0.981)
constant	0.604***	0.482***	0.340***	1.627***	1.302***	1.726***	1.630***	1.240**								
	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.015)								
withR2	0.205	0.232	0.270	0.472	0.594	0.478	0.535	0.541	0.247	0.256	0.257	0.229	0.261	0.232	0.277	0.271
F-test	12.028	28.471	16.892	62.314	117.719	61.857	291.066	723.246	11.218	10.987	10.595	12.325	10.762	11.179	4.152	4.026
obs	139	139	139	239	218	239	166	166	130	130	130	215	194	215	142	142
number of sectors	8	8	8	21	21	21	21	21	8	8	8	21	21	21	21	21

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Table 8: Estimation results for Spain, all sectors

	Within Estimator								First Difference Estimator							
	ESP_1	ESP _2	ESP _3	ESP _4	ESP _5	ESP _6	ESP _7	ESP _8	ESP _1	ESP _2	ESP _3	ESP _4	ESP _5	ESP _6	ESP _7	ESP _8
growth	-0.147***	-0.135*	-0.165***	-0.094**	-0.237***	-0.046	-0.243***	-0.099***	-0.178***	-0.197***	-0.178***	-0.110	-0.182	-0.107	-0.188	-0.127
	(0.006)	(0.097)	(0.006)	(0.023)	(0.000)	(0.166)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.316)	(0.192)	(0.356)	(0.193)	(0.264)
capital stock_t-1	0.086***	0.091**	0.088***						0.179***	0.161**	0.179***					
	(0.002)	(0.036)	(0.002)						(0.001)	(0.018)	(0.001)					
int. imports_t-1	0.467*	0.477	0.577**						0.105	-0.301	0.107					
	(0.095)	(0.124)	(0.041)						(0.725)	(0.360)	(0.722)					
other imports_t-1	-0.050	-0.151***	0.014						-0.000	-0.128	-0.000					
	(0.596)	(0.001)	(0.895)						(0.998)	(0.134)	(0.995)					
social government_t-1		-0.030**			-0.042***					-0.013			-0.024			
		(0.027)			(0.000)					(0.357)			(0.107)			
sec. union density_t-1			0.008**			0.003***					-0.000			0.000		
			(0.021)			(0.000)					(0.958)			(0.907)		
ICT capital_t-1				-0.081***	-0.043*	-0.088***	0.004	-0.091***				0.019	0.047	0.018	0.075	0.000
				(0.000)	(0.077)	(0.000)	(0.852)	(0.000)				(0.774)	(0.492)	(0.785)	(0.377)	(0.997)
non-ICT capital_t-1				0.368***	0.398***	0.355***	0.367***	0.378***				-0.024	0.011	-0.022	0.018	0.002
				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				(0.805)	(0.925)	(0.821)	(0.873)	(0.988)
outward FDI_t-1				-0.133*	-0.174**	-0.174**	-0.112	-0.145**				-0.218*	-0.228**	-0.219*	-0.180	-0.233*
				(0.084)	(0.039)	(0.019)	(0.168)	(0.046)				(0.078)	(0.042)	(0.077)	(0.188)	(0.061)
hh debt_t-1							0.156								0.161	
							(0.220)								(0.394)	
fin. income_t-1							0.007								0.026	
							(0.846)								(0.663)	
fin. payments_t-1							-0.532**								-0.417	
							(0.011)								(0.233)	
migration_t-1								0.480								0.845
								(0.345)								(0.247)
constant	0.508***	0.809***	0.303***	2.146***	2.947***	1.979***	1.424**	2.104***								
	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.026)	(0.000)								
withR2	0.222	0.324	0.304	0.656	0.694	0.666	0.709	0.657	0.149	0.145	0.143	0.089	0.114	0.060	0.065	0.079
F-test	17.374	32.767	28.689	236.139	17.204	290.222	67.474	335.133	4.145	4.419	3.297	1.204	1.375	0.943	0.953	1.122
Obs	152	115	152	53	53	53	53	53	142	105	142	36	36	36	36	36
number of sectors	9	9	9	15	15	15	15	15	9	9	9	13	13	13	13	13

Notes: The dependent variable is the within sector wage share. All estimations exclude Agriculture, Hunting, Forestry and Fishing; and Mining and Quarrying sectors as well as public sectors (Public Administration and Defence; Compulsory Social Security; Education; Human Health and Social Work Activities). Estimation methods in column titles. P-values below the estimation coefficients in parenthesis. *, **, *** denote statistical significant at the 1%, 5% and 10% level, respectively.

Appendix

Table A1: Sectoral classification (based on isic4) and skill taxonomy – 2 digits

isic4 code	sector description	manufacturing	services	high-skilled	low-skilled
TOTAL	total				
01-03	agriculture, hunting, forestry and fishing				x
05-09	mining and quarrying				x
10-12	food products, beverages and tobacco	x			x
13	textiles	x			x
14	wearing apparel	x			x
15	leather and related products	x			x
16	wood and products of wood and cork, except furniture	x			x
17	paper and paper products	x		x	
18	printing and reproduction of recorded media	x		x	
19	coke and refined petroleum products	x		x	
20	chemicals and chemical products	x		x	
21	pharmaceutical products and pharmaceutical preparations	x		x	
22	rubber and plastics products	x			x
23	other non-metallic mineral products	x			x
24	basic metals	x			x
25	fabricated metal products, except machinery and equipment	x			x
26	computer, electronic and optical products	x		x	
27	electrical equipment	x		x	
28	machinery and equipment n.e.c.	x		x	
29	motor vehicles, trailers and semi-trailers	x			x
30	other transport equipment	x			x
31-33	furniture; other manufacturing; repair and installation	x			x
35-39	electricity, gas, steam, etc.; sewerage, waste management, etc.		x	x	
41-43	construction		x		x
45-47	wholesale and retail trade, repair of motor vehicles and motorcycles		x	x	
49-52	transportation and storage		x	x	
53	postal and courier activities		x	x	
55-56	accommodation and food service activities		x	x	
58-60	publishing, audiovisual and broadcasting activities		x	x	
62-63	it and other information services		x	x	
64-66	financial and insurance activities		x	x	
68	real estate activities		x	x	
69-82	professional, scientific and technical activities; administrative, etc.		x	x	
84	public administration and defence; compulsory social security		x	x	
85	education		x	x	
86-88	human health and social work activities		x	x	
90-96	arts, entertainment and recreation; other service activities		x	x	
97-98	activities of households as employers		x	x	
99	activities of extraterritorial organizations and bodies		x	x	

Table A1 continued: Sectoral classification (based on isic4) and skill taxonomy – 1 digit

isic4 code	sector description	manufacturing	services	high-skilled	low-skilled
TOTAL	total				
01-03	agriculture, hunting, forestry and fishing				x
05-09	mining and quarrying				x
10-12	food products, beverages and tobacco	x			x
13-15	textiles, wearing apparel, leather and related products	x			x
16-18	wood and paper products, and printing	x		x	
19	coke and refined petroleum products	x			
20-21	chemical and pharmaceutical products	x			
22-23	rubber and plastics products; non-metallic mineral products	x			x
24-25	metals and metal products, except machinery and equipment	x			x
26	computer, electronic and optical products	x			
27	electrical equipment	x		x	
28	machinery and equipment n.e.c.	x		x	
29-30	transport equipment	x			x
31-33	furniture; other manufacturing; repair and installation	x			
35-39	electricity, gas, steam, etc.; sewerage, waste management, etc.		x	x	
41-43	construction		x		x
45-47	wholesale and retail trade, repair of motor vehicles and motorcycles		x	x	
49-52	transport and storage		x	x	
53	Postal and courier activities		x	x	
55-56	accommodation and food service activities		x	x	
58-60	publishing, audiovisual and broadcasting activities		x	x	
61	telecommunications		x	x	
62-63	it and other information services		x	x	
64-66	financial and insurance activities		x	x	
68	real estate activities		x	x	
69-82	professional, scientific and technical activities; administrative, etc.		x	x	
84	public administration and defence; compulsory social security		x	x	
85	education		x	x	
86-88	human health and social work activities		x	x	
94-96	arts, entertainment and recreation; other service activities		x	x	
97-98	activities of households as employers		x	x	
99	activities of extraterritorial organizations and bodies		x	x	