Capital Income Shares and Income Inequality in the European Union

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Abstract

In this paper, we measure the effect of changing capital income shares upon inequality of gross household income. Using EU-SILC data covering 17 EU countries from 2005 to 2011 we find that capital income shares are positively associated with the concentration of gross household income. Moreover, we show that the transmission of a shift in capital income shares into the personal distribution of income depends on the concentration of capital income in an economy. Using fixed effect models we find that changing capital income shares play an important role in the development of household income inequality. Hence, in many industrialized countries income inequality has by no means evolved independently from the observed structural shift in factor income towards a higher capital income share over the last decades.

Keywords: Factor Shares, Income Inequality, EU-SILC, Fixed Effects
JEL code: D31, D33, E6, E25

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1 Introduction

Over the last decades capital income has gained in relevance vis-à-vis the distribution of economic resources in industrialized countries. This is not only due to the steady accumulation and concentration of private wealth in developed economies since the Second World War; it is also visible in the structural change in factor shares towards higher profit income reported in national accounts statistics. The latter point has been thoroughly documented by a large body of literature such as Arpaia et al. (2009), Ellis and Smith (2010), Giovannoni (2010) and ILO (2013). At the same time, in industrialized countries income inequality among individuals or households – either measured by Gini coefficients or top income shares of either net or gross household income – has increased. This phenomenon has been addressed for example by Atkinson et al. (2011), OECD (2008), OECD (2011) or Jenkins et al. (2013).

Against the backdrop of these two trends a small number of economists, such as e.g. Atkinson (2009) or Glyn (2009), raised the question of whether an increasing weight of capital income that might correspond to a shift in the functional distribution of income affects the development of income inequality among individuals or households. Indeed, the association of changes in capital income shares and the development of the personal distribution of income is a very topical and politically relevant subject as it touches upon issues such as social justice and poverty. In this paper we therefore address the following questions: How are capital income shares distributed in the countries of the European Union? Do capital income shares play a role in the development of personal income inequality? To what extent do countries within the European Union differ with regard to the relevance of capital income for income inequality?

To examine these issues we explore the link between the distribution of capital income and the concentration of gross household income, and we estimate the explanatory power of capital income shares for the evolution of household income inequality. The starting point of our analysis is the conceptual framework suggested by Adler and Schmid (2013). In their descriptive study, the authors connect the distribution of capital income shares and the relationship between capital income shares with levels of individual market income. In this way, the authors illustrate a positive association between capital income shares and market income concentration. Our analysis provides broad cross-country evidence for this basic result. Moreover, we can extend their study by using the data from EU-SILC, the only longitudinal survey that offers rich data for all EU member states and Norway since 2004. The number of observed households outnumbers all other existing studies. Therefore, EU-SILC does not only enable us to replicate major parts of the descriptive analysis of Adler and Schmid (2013) for 17 EU member states but we also show that capital income shares do indeed drive the concentration of household income using a fixed effects panel data model. This allows us to control for several other factors determining income inequality such as changes in the employment level or the employment structure, and to measure the explanatory power of capital income shares given the underlying distribution of capital income within a country.

Our findings reveal substantial differences in the concentration of capital income between countries. According to our results, changing capital income shares transmit differently into the

personal distribution of income. In particular, in Cyprus, Finland, Greece and the United Kingdom comparably high concentrations of capital income coincide with pronounced contributions to changes in capital income shares and changes in income inequality.

Our analysis contributes to the empirical literature on the relevance of variations in factor income shares for the personal distribution. On the one hand cross-country panel regressions, such as Daudey and García-Peñalosa (2007) or Checchi and García-Peñalosa (2010), provide evidence for the impact of factor income shares on the personal distribution. Daudey and García-Peñalosa (2007) identify the factor distribution of income as an essential determinant of the personal distribution of income. In their cross-country and panel estimations for 39 developed and developing countries between 1970 and 1994 the authors find that a larger labor share is associated with a lower Gini coefficient of personal incomes and that the top income quintile share is negatively affected by a rising labor share.[1] Checchi and García-Peñalosa (2010) show that variations in the factor distribution of income help explain changes in the personal distribution. The authors run panel regressions of the Gini index on labor shares, wage differentials and unemployment for 11 OECD countries from 1960 to 2000 and document a negative impact of the labor share on the Gini coefficient.[2]

On the other hand factor decomposition methods applied to micro data, as e.g. Fräßdorf et al. (2011) or García-Peñalosa and Orgiazzi (2013), illustrate the relevance of capital income for the evolution of income inequality. Fräßdorf et al. (2011) present a factor decomposition analysis for the UK, Germany and the US within the years between 1984 and 2004. The authors find an increasing role of capital income for and a high contribution of capital income to personal income inequality.[3] García-Peñalosa and Orgiazzi (2013) analyze factor components of inequality in a cross-country comparison covering Canada, Germany, Norway, Sweden, the UK and the US over the last three decades of the 20th century. They find that increases in inequality of capital income account for a substantial fraction of overall inequality changes.[4]

Besides our extension of Adler and Schmid (2013) our findings contribute to this literature in variety of ways: We provide new evidence for the impact of changing factor income shares on the personal distribution of income based on EU-SILC data for 17 EU countries from 2005 to 2011. In contrast to earlier research, such as Daudey and García-Peñalosa (2007) or Checchi and García-Peñalosa (2010), we use household capital income shares calculated from micro data rather than factor income shares reported in national accounts. Hence, our results do not directly rely on the assumption that varying factor income shares transmit largely proportionally into the factor income structure of households. Moreover, we not only illustrate the distribution of capital income shares within and across these countries, but we also consider the concentration of capital income in our regressions. This allows for a more detailed analysis of the relationship between

[1] For approximating personal income inequality the authors use Gini indices from the World Institute for Developments in Economic Research (WIDER) dataset. Data on labor shares in the manufacturing sector are from the United Nations Industrial Development Organization (UNIDO) database.

[2] Gini coefficients are either constructed in line with information from Brandolini (2003) or taken from the WIDER dataset. Labor shares are from the OECD Structural Analysis (STAN) database.

[3] Their analysis is based on the British Household Panel Survey (BHPS) for the UK, the Socio-Economic Panel (SOEP) for West Germany and the Panel Study of Income Dynamics (PSID) for the US provided by the Cross-National Equivalent File (CNEF).

[4] The authors use data from the Luxembourg Income Study dataset.

capital income shares, the concentration of capital income and personal income inequality. In addition, our results confirm and complement the findings of factor decomposition analyzes for household panel data, such as Fräßdorf et al. (2011) or García-Peñalosa and Orgiazzi (2013), who document the high relevance of capital income for personal income inequality.

The remainder of this paper is structured as follows: Section 2 introduces the data and explains the calculation of basic variables. Section 3 outlines the theoretical underpinnings and the estimation approach of our empirical analysis. The results are documented in section 4 and section 5 concludes.

2 Data Set and Construction of Basic Variables

We use data from the European Study on Income and Living Conditions (EU-SILC). This household survey is designed to describe and to explain living conditions in Europe. The European survey mainly provides data on social inclusion, poverty and living standards.[5]

Since 2004 the panel study EU-SILC has replaced the former European Household Panel. EU-SILC is based on the multidimensional Laeken indicators. These indicators were introduced by the Council of the European Union to improve comparison of the member states' progress in poverty reduction. Every year approximately 130,000 households in the current EU member states are interviewed for EU-SILC. Although the Statistical Office of the European Union (Eurostat) is responsible for providing EU-SILC data at the European level, the collection and preparation of the data is conducted by the individual countries' statistical offices. According to Hauser (2007) there exist concerns about the quality of the data from the first waves in 2004 and 2005 for Germany and other countries. Moreover, the list of countries participating in EU-SILC differs over the years for various reasons.[6] Despite its shortcomings, EU-SILC is the only longitudinal survey that offers comparable data for all EU member states with a large number of observations per country and year, and it includes detailed information on different types of household income. This data set is, therefore, the most adequate data set for the analysis of income inequality in the EU. For our analysis, we use data from the cross sectional files from the waves between 2005 until 2011.

We refer to the cross sectional data since longitudinal data of the EU-SILC for Germany is not available at all due to privacy regulations. We use cross sectional data to compute macroeconomic variables for each country and create a panel data set from these macroeconomic indicators. When interpreting the results it has to be kept in mind that the panel data set used does not stem from longitudinal data at the household level. However, we do not consider this a critical issue for the quality of our empirical conclusions on a country level because we only interpret the aggregate effects. These effects are not influenced because the sample of EU-SILC is representative of each country's population.

[5] For details see `http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/eu_silc`.

[6] The first EU-SILC wave in 2003 has only been conducted as an experiment in six European countries. The sample size is too small to apply our econometric analysis to this data set. In 2004, for example, Germany, the Netherlands and the United Kingdom did not take part in EU-SILC because their deadline to introduce EU-SILC was extended to 2005.

The starting point for the construction of our data set is the household data available in cross sectional waves of EU-SILC. We use total household gross income as our reference point. A household's gross capital income is computed as the sum of income from rents of a property or land and interest, dividends, and profits from capital investments in unincorporated business. For plausibility reasons we limit our data set to households with nonnegative values in these categories and compute the share of capital income for each household. Furthermore, the employment status, the year of birth, and the education level attained of the head of household (defined as the first interviewee) are kept as variables.

For the estimations we create a panel data set by computing the mean share of capital income per country and year. Additionally, the Gini-coefficient of total and capital income and the income share of the top decile group of total income are calculated per country and year. To control for the effects of the economic cycle on income inequality we consider an indicator for the unemployment rate per country and year in the data set. A household is defined as unemployed if the head of household has stated unemployment as the current economic status. The unemployment rate in our sample is taken to be the percentage of households with this statement from all households in the same country and the same year whose heads are neither in retirement nor disabled.

To not only control for the employment level we introduce an additional indicator for the employment structure which is taken as the percentage of part-time workers from all working people[7] per country and year. Finally, we compute the ratio of workers who either indicate at least lower tertiary education as highest ISCED level attained or at most primary education per country and year. This indicator incorporates the educational structure of the working population in a country.

Our final panel data consists of observations for 17 countries, namely Austria (AT), Belgium (BE), Cyprus (CY), Germany (DE), Denmark (DK), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Luxembourg (LU), the Netherlands (NL), Norway (NO), Portugal (PT), Sweden (SE) and the United Kingdom (UK) and covers the seven different years from 2005 to 2011. Due to limited data availability we miss some variables for different countries and years. Therefore, the final data set includes 106 observations. Basic summary statistics for all variables are reported in table 2 in the appendix. All further descriptive calculations and the panel estimations rely on this data set.

3 Methodology

As mentioned above, the conceptual background of our study has been suggested by Adler and Schmid (2013) who use household data from the German Socio-Economic Panel and carry out a descriptive analysis covering the years from 2002 to 2008. The authors examine the development of capital income shares, the distribution of capital income shares and the relationship between capital income shares and the level of individual market incomes. We extend their framework in two ways: First, while their analysis focuses on Germany, we cover 17 EU countries from 2005

[7] Working is defined as one of the following employment statuses: full-time worker (employee or self-employed), part-time worker or in compulsory military service.

to 2011 and provide broad cross country evidence for the link between capital income shares and household income inequality. Second, we extend their methodological approach by estimating the effect of capital income shares upon the concentration of household income in a panel regression setup. This not only allows us to consider a number of factors that affect income inequality, such as changes in the employment level, but to also control for country-specific concentration of capital income. Besides these extensions we differ from the approach of Adler and Schmid (2013) as we consider gross household income, whereas these authors use individual market income. In contrast to individual market income, gross household income contains transfer income and is calculated for the household as the unit of observation. There are two reasons for this approach: First, we want to address the effects with regard to the whole population, i.e. we do not only focus on the working population.[8] Second, our approach does not require us to assign household income components to single individuals which might be a potential source of arbitrariness.

3.1 Conceptual Links of the Transmission of Changing Capital Income Shares into the Distribution of Household Income

How changes in capital income shares are associated with the distribution of household income depends on the concentration of capital income as well as on the relationship between the share of capital income and the level of household income. Figure 1 (upper panel) illustrates the first aspect via three hypothetical cases of capital income concentration (A, B, C). The boxes represent the income structure of households.

Case A assumes an identical income structure across all households. Here, changes in the functional distribution of income do not alter the personal distribution of income. Case B contrasts two extreme types of income structure. Households are supposed to earn either labor and transfer income or solely capital income. Here, changes in the functional distribution of income lead to strong changes in the personal distribution of income. Finally, case C combines the rather extreme setups A and B. Here, we assume that households gain labor and transfer income but also income from asset flows. However, the respective shares differ across households.

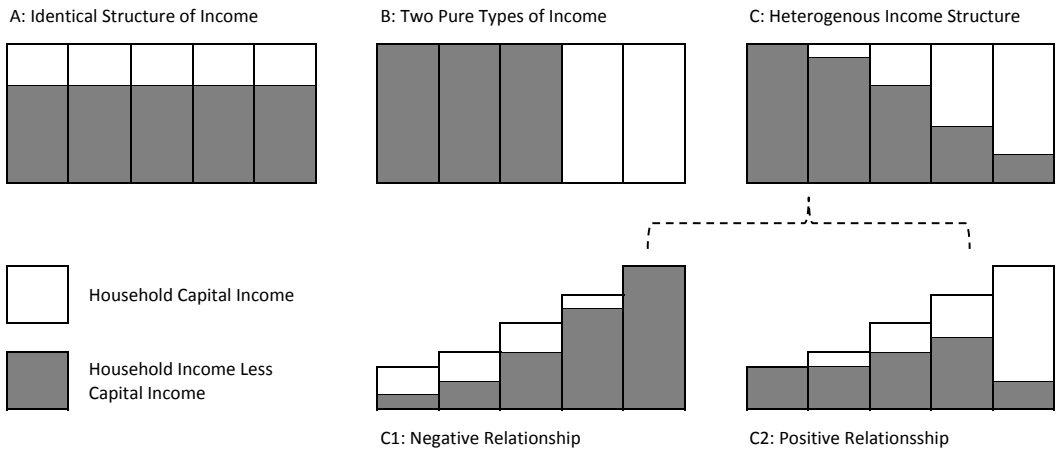
Additionally, one has to take into account the relationship between the level of household income and the share of capital income. The lower panel of figure 1 therefore contrasts two possible cases (both special cases of C). A negative relationship between the level of household income and the respective share of capital income (case C1) implies a reduction of the income concentration resulting from a rising average capital income share. In contrast to this, in the case of a positive relationship (case C2), rising capital income shares are associated with an increase in the concentration of household income.

3.2 Estimation of the Role of Capital Income

To assess the relevance of capital income shares for the inequality of gross household income we regress a measure of income inequality on the average capital income share within each country.

[8] Solely taking into account market income implies that households that live on transfer payments such as retirees cannot be included in the analysis as their market income only consists of capital income and is therefore close to zero in most cases.

Figure 1: Types of the Functional Distribution of Income



Note: This figure shows that the transmission of changing capital income shares depends on the concentration of capital income (illustrated by three hypothetical cases of income concentration A, B, C) and on the relationship between the share of capital income and the level of household income (illustrated by two cases C1, C2). Within each panel each of the five boxes on the horizontal axis represents the income structure of a household. The five households within each of the five panels constitute the income structure of hypothetical populations. In contrast to the upper panels (A, B, C) that only focus on the structure of income, within the lower panels (C1, C2) the height of the boxes reflects different levels of household income.

Source: Adler and Schmid (2013).

We apply panel estimation for our group of 17 countries covering the years 2005 to 2011. The basic regression equation reads:

$$\begin{aligned} INEQ_{it} &= \beta_1 + \beta_2\, CIS_{it} + \beta_3\, CIS_{it} \times GINICI_{it} + \\ &\quad \beta_4\, CONTR_{it} + YD_t + \beta_5\, TREND_{it} + u_i + \epsilon_{it}. \end{aligned} \tag{1}$$

Here, $INEQ$ denotes the measure of inequality in household gross income, CIS is the capital income share, $CONTR$ is a vector of control variables and YD is a yearly time dummy variable. $TREND$ is a country specific time trend. u_i denotes a country fixed effect and ϵ is a random error term. The subscript i corresponds to the country dimension of our panel and t is the corresponding time subscript.

Within our set of control variables we seek to capture factors other than capital income shares that influence the concentration of household income. The most important aspects concern employment changes over the business cycle. Authors such as Hoover et al. (2009), Heathcote et al. (2010) or Krueger et al. (2010) provide evidence that fluctuations in macroeconomic activity do not affect different segments within the income distribution equally. The impact of economic expansion and recession upon income inequality is rather asymmetric: An increase of income concentration in economic downturns works through the labor market as unemployment rises and hours worked disperse. This effect is most pronounced in the lower part of the income distribution as job lay offs are disproportionately distributed across the income distribution. We try to catch these effects through two control variables: The unemployment rate and a measure

for the percentage of atypical employment in the labor force.[9] The construction of these variables is explained in section 2. In addition, we consider the educational structure of the labor force. This is supposed to capture effects of skill-driven dispersion of labor income due to the rising percentage of academic job qualification and global factor competition, as argued by authors such as Katz and Autor (1999).

We use the Gini coefficient of gross household income as our basic inequality measure. For robustness we compare these results with regressions that include the income share of the top ten percent of the income distribution.[10]

We estimate specification (1) for both inequality measures by Fixed Effects. The corresponding results for the Gini coefficient as the dependent variable are presented in table 1. The results for the income share of the top 10 percent of the income distribution are reported in table 3 in the appendix.

4 Empirical Results

4.1 Capital Income Shares and Level of Gross Household Income

In the following we examine to what extent the results for the 17 EU countries reflect the relationships of the conceptual framework presented in subsection 3.1. Therefore, we illustrate how these countries differ with respect to the distribution of capital income shares and the association of capital income shares and the level of household income in different income groups. To this end, figure 2 shows the shares of capital income on gross household income sorted by capital income shares (left panels). This corresponds to the upper row of panels presented in figure 1. The right panels in figure 2 illustrate levels of gross household income by income classes. These correspond to the lower panels (cases C1 and C2) in figure 1. In addition we report capital income shares by income decile classes. The exposition is based on a pooled calculation for all available data covering 2005 to 2011.[11]

We see that the left panels in figure 2 resemble case C in figure 1. This shows that capital income shares are far from being distributed equally across households and that changing capital income shares affect the personal distribution of income. The right panels of figure 2 reveal that in the upper half of the income distribution capital income shares rise with the level of gross household income. According to our conceptual considerations, this suggests a positive relationship between changes in capital income shares and changes in the concentration of gross household income.[12]

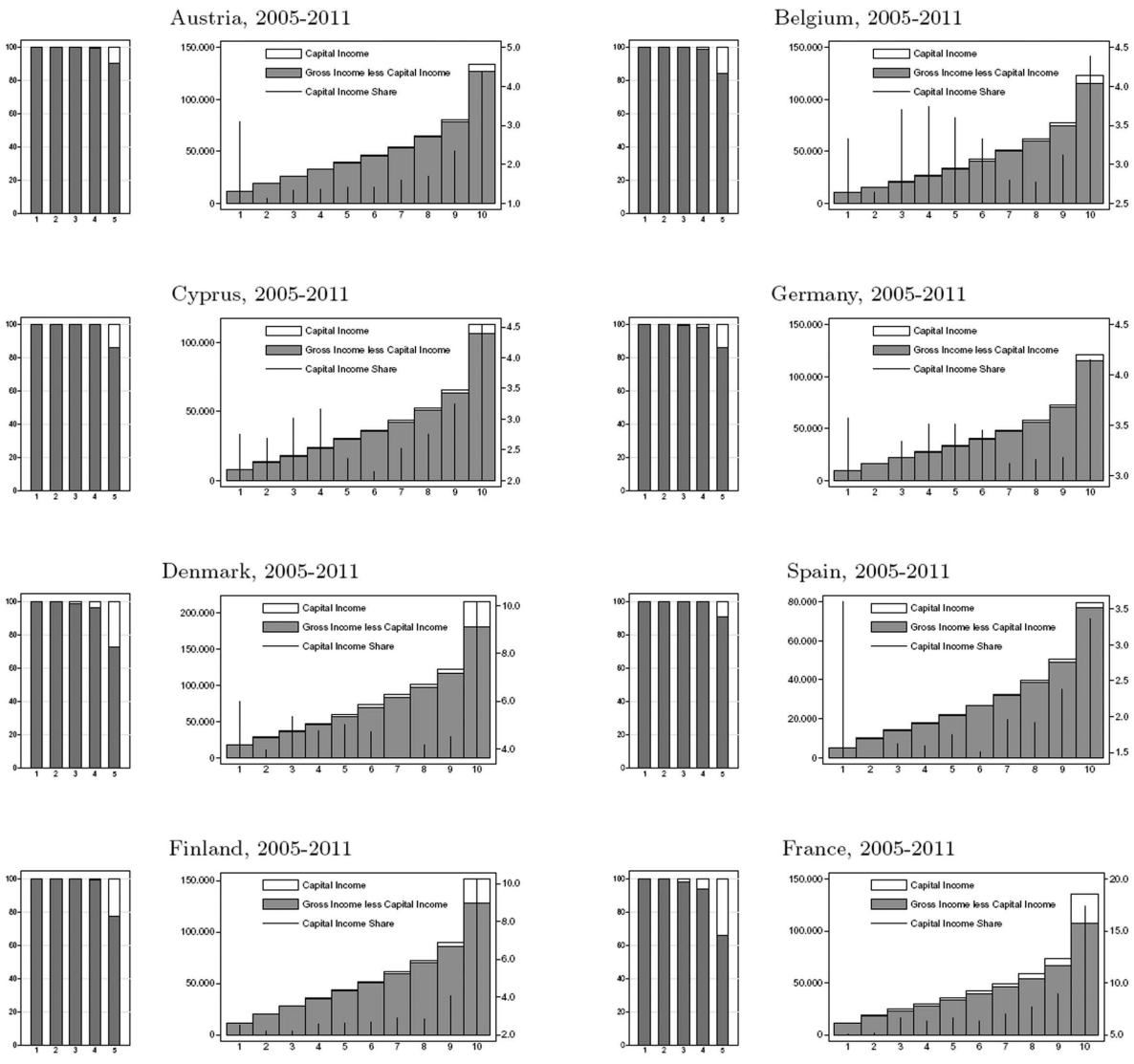
[9] As described in section 2 we approximate atypical employment with part-time job occupation.

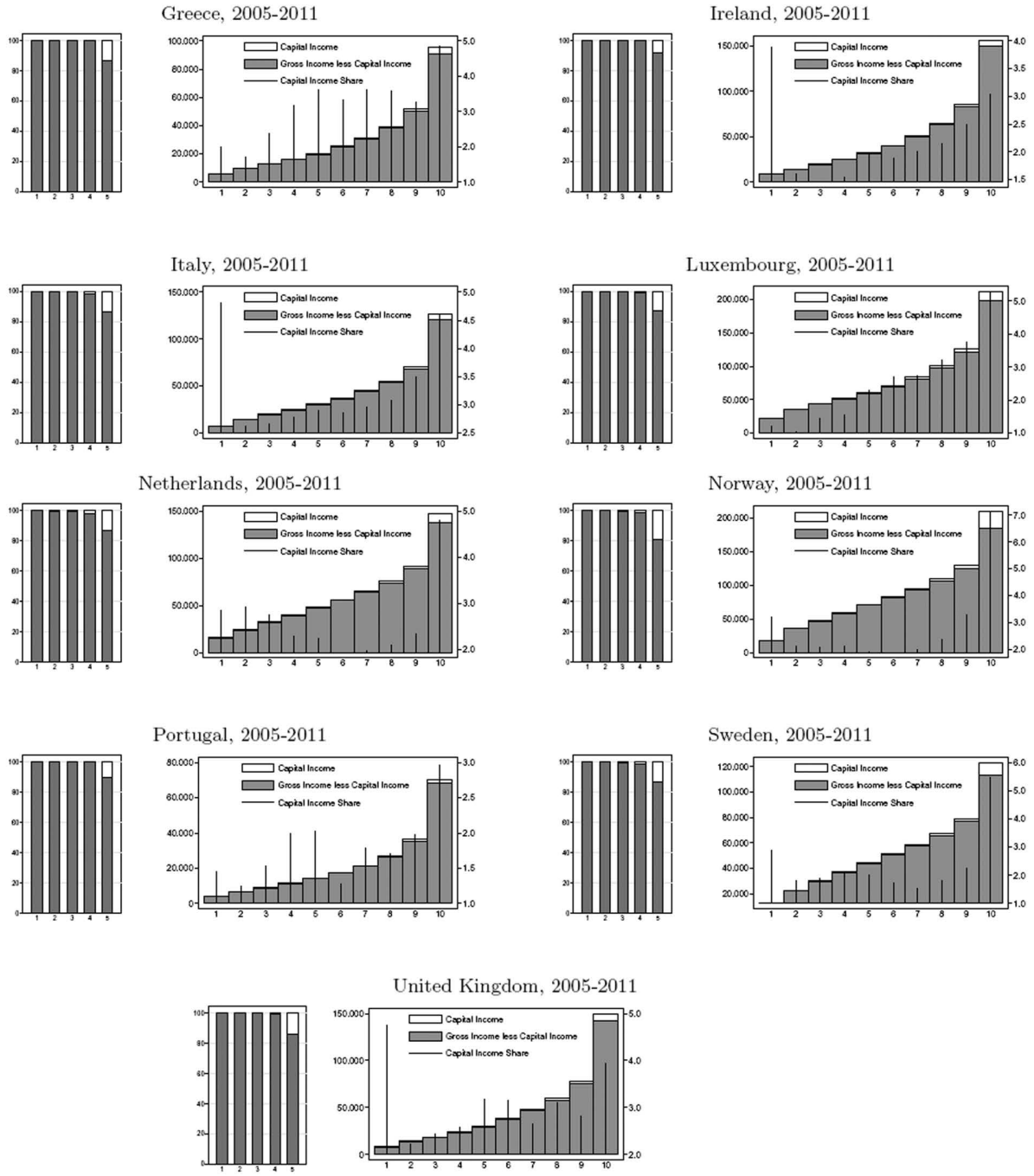
[10] For a discussion of the appropriateness of approximating developments in income concentration with changes in top income shares see for example Leigh (2007).

[11] Calculations for single years yield qualitatively identical results.

[12] These findings are in line with the evidence provided by Adler and Schmid (2013) for the German economy.

Figure 2: Capital Income Shares and Gross Household Income by Income Class

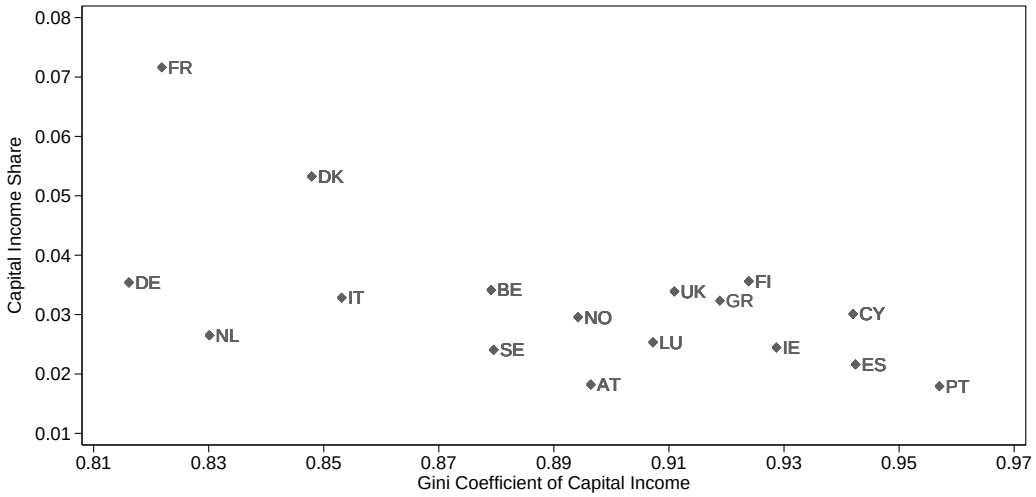




Note: This figure shows the relationship between the share of capital income and the level of household income per country in our data set. The left panels show the shares of capital income on gross household income sorted by capital income shares while the right panels include the information on capital income shares by income decile classes. The calculation for each country is based on pooled data for 2005-2011.

Moreover, figure 3 illustrates to what extent capital income shares and capital income inequality vary across countries. The Gini coefficient of capital income ranges from approximately 0.82 in the case of Germany to 0.96 for Portugal. For most countries capital income shares lay between 0.18 and 0.36, which are the shares found in Austria and Finland, respectively. Remarkable exceptions to this are France and Denmark which show considerably higher capital income shares than the remaining countries. As will be explained below, this pattern helps in explaining the impact of capital income shares upon income inequality.

Figure 3: Capital Income Shares Against the Concentration of Capital Income



Note: This graph illustrates the distribution of the capital income share and the concentration of capital income, measured by the Gini-coefficient of capital income in our data set. The values for each country are computed based on pooled data for 2005-2011.

4.2 Estimation Results

Now we turn to the discussion of the results obtained from the estimations that were motivated and explained in subsection 3.2. Table 1 reports the results for fixed effects panel regressions of the Gini-coefficient of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 contain the results for different sets of control variables.

Table 1: Estimation Results (Dependent Variable: GINI of Total Income)

	(1)	(2)	(3)	(4)
Capital Income (CI) Share	-5.429***	-5.521***	-5.527***	-5.215***
	(0.763)	(0.754)	(0.761)	(0.723)
Gini CI x CI Share	6.963***	7.136***	7.146***	6.844***
	(0.868)	(0.861)	(0.871)	(0.824)
Unemployment Rate		0.223*	0.226*	0.154
		(0.131)	(0.134)	(0.128)
Parttime Rate			0.00748	0.0119
			(0.0524)	(0.0492)
Job Qualification				0.122***
				(0.0398)
Obs.	106	106	106	106
r2	0.704	0.717	0.717	0.754

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports results from a fixed effects regression of the Gini-coefficient of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 compare the results of specification for different sets of control variables. All four regressions include year dummies and a country specific time trend. The total effect of capital income shares is calculated according to the formula in equation 2.

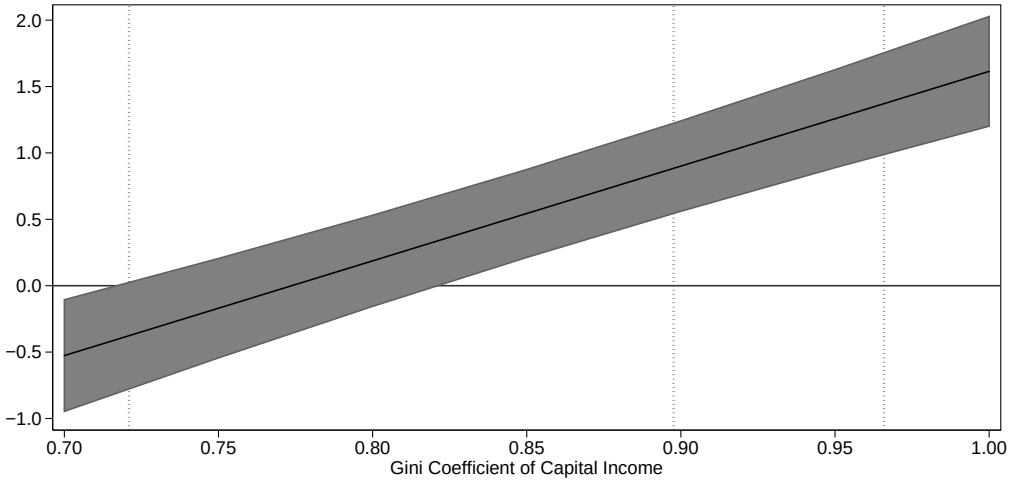
The total effect of capital income shares upon the concentration of gross household income results from the sum of the basic coefficient β_2 and the coefficient for the interaction with each country's Gini-coefficient of capital income β_3 multiplied with the respective level of capital income concentration. The formula reads

$$\frac{\partial INEQ}{\partial CIS} = \beta_2 + \beta_3 \times GINICI. \tag{2}$$

This total effect is positive across all four regressions implying that a rising capital income share is associated with an increase in income inequality. Furthermore, the partial effect of the interaction of capital income shares and the Gini-coefficient of capital income suggests that increasing concentration of capital income enlarges the capital share's total effect on income inequality. This result is in line with our theoretical considerations described in section 3 and is further illustrated in figure 4. In this figure, we depict the total effects of capital income shares upon the concentration of gross household market income across different degrees of capital income concentration. The estimates correspond to the model in column 4, table 1. The dotted vertical lines represent the minimum, median and maximum value of the concentration of capital income measured by the Gini-coefficient in our data set.

We see that the effect of capital income shares is statistically significant only above a certain threshold of capital income inequality. For our sample, given a 95 percent confidence interval, this threshold corresponds to a Gini coefficient of capital income of about 0.83. Above this value,

Figure 4: Marginal Effects of Capital Income Share for Different Degrees of Capital Income Inequality



Note: This graph illustrates the marginal effects of capital income shares across different degrees of capital income concentration. The dotted vertical lines represent the minimum, median and maximum value of the concentration of capital income measured by the Gini-coefficient. The total effect of capital income shares is calculated according to the formula in equation 2.

a more pronounced concentration of capital income is associated with a stronger impact of capital income shares upon the distribution of gross household market income.

The different sets of control variables used in the regressions do not change the estimated total effect of the capital income share significantly. Not even the estimated magnitudes of the two partial effects differ significantly between the regressions presented in columns 1-4. For the applied covariates we find a weakly significant and positive effect of unemployment on income inequality. This can be explained by the fact that high unemployment rates tend to be a heavier burden for people at lower income levels and income inequality therefore increases in times of economic recession and high unemployment. This finding confirms the evidence provided by the above-cited studies (see section 3.2). In contrast to the significant effect of unemployment we do not find empirical evidence for the influence of the employment structure: The coefficient of the ratio of part-time workers is not significant in columns 3 and 4. However, even though the estimated coefficient is not statistically significant and small in size, the sign is positive as expected since a higher percentage of workers in atypical jobs may be a potential driver of income inequality in a society, as posited by Grabka and Frick (2011) or Schmid and Stein (2013).[13] A further explanatory factor of the level of income inequality in a society is the educational structure of the workforce as skill-biased technological change and global factor competition increase wage dispersion: Column 4 shows a significantly positive effect of the indicator for job qualification. We find that the Gini-coefficient of total household income increases if the percentage of workers with an intermediate level of education increases.

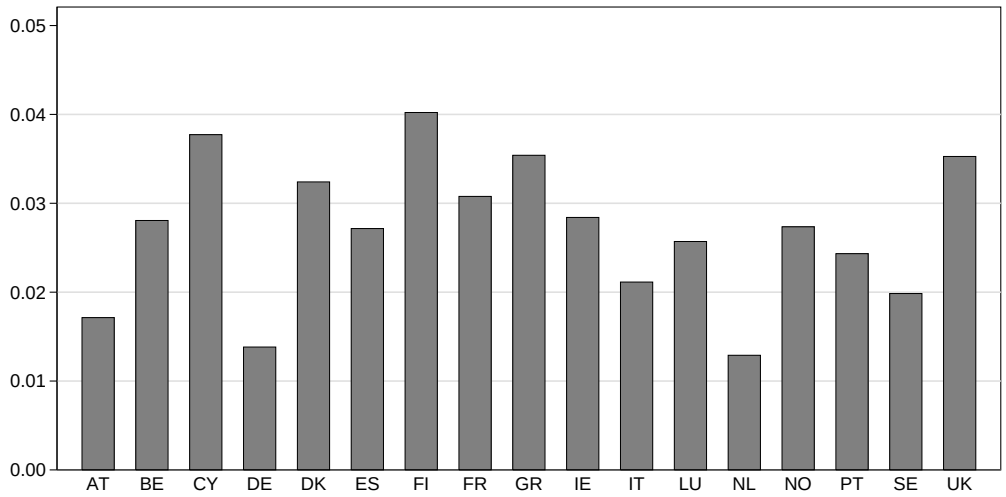
[13] While with regard to individual earnings this mechanism is straightforward, it is less clear on the basis of household income. This is because a rising proportion of part-time occupation in the labor force may rather reflect additional labor income than a substitution of full-time occupation within households.

For robustness purposes we additionally ran the four specifications presented in table 1 for the income share of the richest ten percent of the population. This serves as an alternative measure of income inequality. These regressions yield qualitatively identical results and are reported in table 3 in the appendix. The only obvious difference in the estimations run for the top decile group income share is that the effect of the unemployment rate is no longer statistically significant. This finding, however, can be explained by the fact that top earners are not hit by unemployment to the same degree as workers in low paid jobs. Therefore, the top income decile is not significantly influenced by the level of unemployment.

4.3 Explanatory Power and Role of Capital Income Concentration

Next, we examine to what extent variations in capital income shares explain the level of income inequality, and we look at the role of differing degrees of concentration of capital income across countries. To assess the actual impact of capital income shares upon the concentration of gross household income we compute the contribution of this regressor to the explanation of our measure of income inequality. The contribution of the capital income share is calculated by multiplying its average sample value with the estimated total effect derived according to equation 2. Figure 5 contrasts absolute contributions of capital income shares based on our estimation summarized in column 4, table 1 for all 17 countries.

Figure 5: Contribution of Capital Income Shares to the Concentration of Gross Household Income

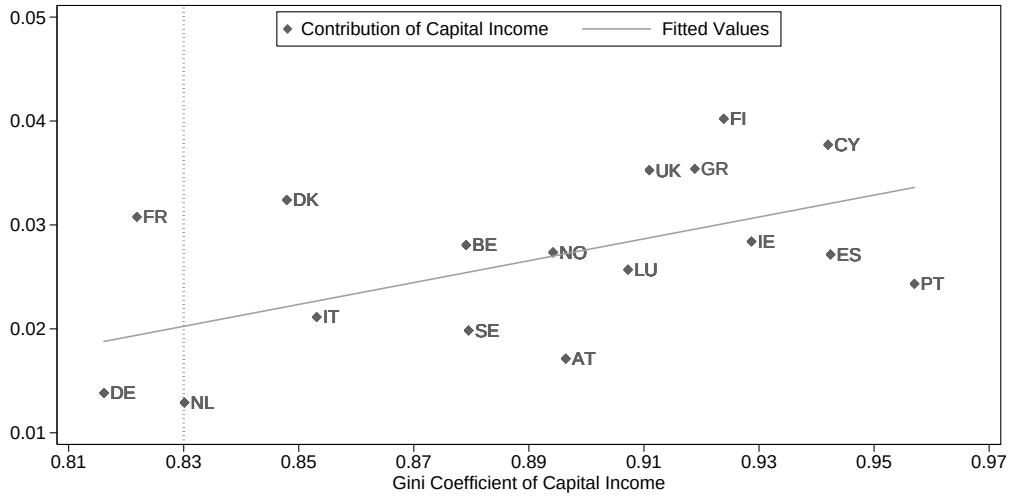


Note: This graph illustrates the explanatory power of capital income shares with respect to the concentration of household gross income by country. Calculations are based on the estimation results presented in table 1, column 4.

We see that depending on the country the impact of capital income shares ranges from approximately 0.015 to 0.04 in terms of variations of the Gini coefficient of gross household income. The highest contributions are visible for Finland, Cyprus, Greece and the United Kingdom. In contrast, for Germany and the Netherlands the explanatory power of capital income shares is rather small. These differences are closely connected to the distribution of capital income within

the respective economies. The higher the concentration of capital income, the stronger is the effect of developments in capital income shares on the concentration of gross household income. This relationship is illustrated in figure 6. Here, we scatter the above derived contributions of capital income shares against the Gini coefficient of capital income for each country.

Figure 6: Contribution of Capital Income Shares to Income Inequality Against Capital Income Concentration



Note: This graph shows the association of capital income concentration measured by the Gini coefficient and the absolute contribution of capital income shares to market income inequality for different countries. Calculations of contributions are based on the estimation results presented in table 1, column 4. The simple linear regression line corresponds to a regression yielding a coefficient of 0.105 significant at the 1 percent level and an R^2 of 30 percent. The vertical dotted line corresponds to the threshold for the significance of marginal effects of capital income shares derived from figure 4.

We observe a positive relationship of the explanatory power of capital income shares and inequality of capital income. Whereas Finland, Cyprus, Greece and the United Kingdom are among the group of countries with the highest concentration of capital income, Germany and the Netherlands show comparably small values for the Gini coefficient of capital income.

The comparably high contribution of the capital income share for France and Denmark is noteworthy as both countries are characterized by a Gini coefficient of capital income that is clearly below average. The reason for this is that these countries have by far the highest level of capital income shares. This is documented in figure 3. Therefore, even relatively equal distributions of capital income coincide with a comparably pronounced contribution of capital income shares.

5 Conclusion

We examine the impact of changes in capital income shares upon the distribution of gross household income. Using EU-SILC data we cover 17 countries from 2005 to 2011 and estimate fixed effect panel data models. We find that, when controlling for other inequality drivers, capital income shares are positively associated with the concentration of gross household income. Moreover, our estimation results show that the transmission of changes in capital income shares into the distribution of gross household income depends on the concentration of capital income in an economy.

Although a clear connection of aggregate movements in profit shares reported in national account statistics to changes in the income structure of households is subject to a number of limitations[14], our study provides valuable insights into the role of the distribution of capital income for the development of income inequality across households. As both the development of capital income shares as well as the concentration of capital income constitute stable links from the functional income distribution to income inequality across households, shifts in the functional distribution of income affect the personal income distribution. This link suggests a connection between two trends that many industrialized economies have been subject to during the last decades: Shifts within factor shares towards a higher percentage of capital income and the rise of top income shares, which reflects increasing income concentration across households.

Further research could focus on two aspects: First, a more explicit consideration of the influence of the business cycle on both, the development of factor shares and on the personal distribution of income. Such analysis requires a longer time span than EU-SILC offers and will therefore have to be based on country-specific household surveys as for example the German Socio-Economic Panel. Second, the distribution of household wealth underlying the concentration of capital income might be taken into account. In a cross-country perspective this might be approached by using the recently released Household and Consumer Finance (HFCS) data or on the basis of data from the Luxembourg Wealth Study (LWS). A better understanding of the mechanisms addressed in this paper crucially depends on the further collection and preparation of high quality household data in the future.

[14] For a discussion of this issue see, for example Adler and Schmid (2013) and Ryan (1996).

References

Adler, M., Schmid, K. D., 2013. Factor Shares and Income Inequality - Evidence from Germany 2002-2008. Journal of Applied Social Science Studies 2 (133), 121–132.

Arpaia, A., Pérez, E., Pichelmann, K., 2009. Understanding Labour Income Share Dynamics in Europe. Economic Papers 379, European Comission.

Atkinson, A. B., 2009. Factor Shares: The Principal Problem of Political Economy? Oxford Review of Economic Policy 25 (1), 3–16.

Atkinson, A. B., Piketty, T., Saez, E., March 2011. Top Incomes in the Long Run of History. Journal of Economic Literature 49 (1), 3–71.

Brandolini, A., 2003. A Bird's-eye View of Long-run Changes in Income Inequality. Mimeo, Bank of Italy.

Checchi, D., García-Peñalosa, C., 2010. Labour Market Institutions and the Personal Distribution of Income in the OECD. Economica 77 (307), 413–450.

Daudey, E., García-Peñalosa, C., 2007. The Personal and the Factor Distributions of Income in a Cross-section of Countries. Journal of Development Studies 43 (5), 812–829.

Ellis, L., Smith, K., 2010. The Global Upward Trend in the Profit Share. Applied Economics Quarterly 56 (3), 231–256.

Fräßdorf, A., Grabka, M., Schwarze, J., 2011. The Impact of Household Capital Income on Income Inequality - A Factor Decomposition Analysis for the UK, Germany and the USA. Journal of Economic Inequality 9 (1), 35–56.

García-Peñalosa, C., Orgiazzi, E., 2013. Factor Components of Inequality: A Cross-Country Study. Review of Income and Wealth 59 (4), 689–727.

Giovannoni, O., 2010. Functional Distribution of Income, Inequality and the Incidence of Poverty: Stylized Facts and the Role of Macroeconomic Policy. Inequality Project Working Paper 58, The University of Texas.

Glyn, A., 2009. Functional Distribution and Inequality. In: W. Salverda, B. N., Smeeding, T. M. (Eds.), Oxford Handbook of Economic Inequality. Oxford University Press.

Grabka, M. M., Frick, J. R., 2011. Country Case Study - Germany. In: Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B. (Eds.), The Great Recession and the Distribution of Household Income. A report prepared for, and with the financial assistance of, the Fondazione Rodolfo Debenedetti, Milan, Ch. 3, pp. 3.1–3.36.

Hauser, R., 2007. Probleme des deutschen Beitrags zu EU-SILC aus der Sicht der Wissenschaft - Ein Vergleich von EU-SILC, Mikrozensus und SOEP. SOEP Papers 69, German Institute of Economic Research (DIW).

Heathcote, J., Perri, F., Violante, G., 2010. Unequal We Stand: An Empirical Analysis of Economic Inequality in the United States. Review of Economic Dynamics 13, 15–51.

Hoover, G. A., Giedeman, D. C., Dibooglu, S., 2009. Income Inequality and the Business Cycle: A Threshold Cointegration Approach. Economic Systems 33, 278–293.

ILO, 2013. Global Wage Report 2012/13: Wages and Equitable Growth. Tech. rep., International Labour Office, Geneva.

Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B., 2013. Introduction: Scope, Review of Analytical Approaches, and Evidence from the Past. In: Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B. (Eds.), The Great Recession and the Distribution of Household Income. Oxford University Press.

Katz, L., Autor, D., 1999. Handbook of Labor Economics. No. 3A. North Holland, Amsterdam, Ch. Changes in the Wage Structure and Earnings Inequality, pp. 1463–1555.

Krueger, D., Perri, F., Pistaferri, L., Violante, G. L., 2010. Cross Sectional Facts for Macroeconomists. Review of Economic Dynamics 13, 1–14.

Leigh, A., 2007. How Closely Do Top Income Shares Track Other Measures of Inequality? Economic Journal 117 (524), F619–F633.

OECD, 2008. Growing Unequal? Income Distribution and Poverty in OECD Countries. Tech. rep., Organisation for Economic Co-operation and Development, Paris, France.

OECD, 2011. Divided We Stand, Why Inequality Keeps Rising. Tech. rep., Organisation for Economic Co-operation and Development, Paris, France.

Ryan, P., 1996. Factor Shares and Inequality in the UK. Oxford Review of Economic Policy 12 (1), 106–127.

Schmid, K. D., Stein, U., 2013. Explaining Rising Income Inequality in Germany, 1991-2010. IMK Study, Macroeconomic Policy Institute at the Hans-Boeckler Foundation.

Appendix

Table 2: Summary Statistics of Main Variables.

	N	mean	p25	p50	p75	stdev	min	max
Gini coefficient of Gross Income	106	0.38	0.36	0.38	0.40	0.04	0.32	0.46
Top Decile Group Income Share	106	0.28	0.26	0.27	0.29	0.03	0.23	0.34
Capital Income Share	106	0.03	0.02	0.03	0.03	0.01	0.01	0.08
Gini coefficient of Capital Income	106	0.89	0.86	0.90	0.93	0.05	0.72	0.97
Unemployment Rate	106	0.06	0.04	0.06	0.08	0.03	0.01	0.14
Part-time Rate	106	0.18	0.12	0.16	0.24	0.09	0.04	0.45
Job Qualification	106	0.44	0.38	0.44	0.51	0.10	0.22	0.68

Note: This table reports summary statistics of the variables used within our regressions. The construction of these variables is described in section 2.

Table 3: Estimation Results (Dependent Variable: Top Decile Group Income Share)

	(1)	(2)	(3)	(4)
Capital Income (CI) Share	-6.497***	-6.575***	-6.569***	-6.200***
	(0.842)	(0.841)	(0.849)	(0.797)
Gini CI x CI Share	8.411***	8.556***	8.547***	8.190***
	(0.958)	(0.960)	(0.971)	(0.909)
Unemployment Rate		0.187	0.184	0.0995
		(0.146)	(0.150)	(0.141)
Parttime Rate			-0.00696	-0.00175
			(0.0584)	(0.0543)
Job Qualification				0.144***
				(0.0439)
Obs.	106	106	106	106
r2	0.691	0.699	0.699	0.743

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports results for a pooled regression of the income share of the richest ten percent of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 contain the results of specification and use different sets of control variables. All four regressions include year dummies and a country specific time trend. The total effect of capital income shares is calculated according to the formula in equation 2.

Capital Income Shares and Income Inequality in the European Union

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Abstract

In this paper, we measure the effect of changing capital income shares upon inequality of gross household income. Using EU-SILC data covering 17 EU countries from 2005 to 2011 we find that capital income shares are positively associated with the concentration of gross household income. Moreover, we show that the transmission of a shift in capital income shares into the personal distribution of income depends on the concentration of capital income in an economy. Using fixed effect models we find that changing capital income shares play an important role in the development of household income inequality. Hence, in many industrialized countries income inequality has by no means evolved independently from the observed structural shift in factor income towards a higher capital income share over the last decades.

Keywords: Factor Shares, Income Inequality, EU-SILC, Fixed Effects
JEL code: D31, D33, E6, E25

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1 Introduction

Over the last decades capital income has gained in relevance vis-à-vis the distribution of economic resources in industrialized countries. This is not only due to the steady accumulation and concentration of private wealth in developed economies since the Second World War; it is also visible in the structural change in factor shares towards higher profit income reported in national accounts statistics. The latter point has been thoroughly documented by a large body of literature such as Arpaia et al. (2009), Ellis and Smith (2010), Giovannoni (2010) and ILO (2013). At the same time, in industrialized countries income inequality among individuals or households – either measured by Gini coefficients or top income shares of either net or gross household income – has increased. This phenomenon has been addressed for example by Atkinson et al. (2011), OECD (2008), OECD (2011) or Jenkins et al. (2013).

Against the backdrop of these two trends a small number of economists, such as e.g. Atkinson (2009) or Glyn (2009), raised the question of whether an increasing weight of capital income that might correspond to a shift in the functional distribution of income affects the development of income inequality among individuals or households. Indeed, the association of changes in capital income shares and the development of the personal distribution of income is a very topical and politically relevant subject as it touches upon issues such as social justice and poverty. In this paper we therefore address the following questions: How are capital income shares distributed in the countries of the European Union? Do capital income shares play a role in the development of personal income inequality? To what extent do countries within the European Union differ with regard to the relevance of capital income for income inequality?

To examine these issues we explore the link between the distribution of capital income and the concentration of gross household income, and we estimate the explanatory power of capital income shares for the evolution of household income inequality. The starting point of our analysis is the conceptual framework suggested by Adler and Schmid (2013). In their descriptive study, the authors connect the distribution of capital income shares and the relationship between capital income shares with levels of individual market income. In this way, the authors illustrate a positive association between capital income shares and market income concentration. Our analysis provides broad cross-country evidence for this basic result. Moreover, we can extend their study by using the data from EU-SILC, the only longitudinal survey that offers rich data for all EU member states and Norway since 2004. The number of observed households outnumbers all other existing studies. Therefore, EU-SILC does not only enable us to replicate major parts of the descriptive analysis of Adler and Schmid (2013) for 17 EU member states but we also show that capital income shares do indeed drive the concentration of household income using a fixed effects panel data model. This allows us to control for several other factors determining income inequality such as changes in the employment level or the employment structure, and to measure the explanatory power of capital income shares given the underlying distribution of capital income within a country.

Our findings reveal substantial differences in the concentration of capital income between countries. According to our results, changing capital income shares transmit differently into the

personal distribution of income. In particular, in Cyprus, Finland, Greece and the United Kingdom comparably high concentrations of capital income coincide with pronounced contributions to changes in capital income shares and changes in income inequality.

Our analysis contributes to the empirical literature on the relevance of variations in factor income shares for the personal distribution. On the one hand cross-country panel regressions, such as Daudey and García-Peñalosa (2007) or Checchi and García-Peñalosa (2010), provide evidence for the impact of factor income shares on the personal distribution. Daudey and García-Peñalosa (2007) identify the factor distribution of income as an essential determinant of the personal distribution of income. In their cross-country and panel estimations for 39 developed and developing countries between 1970 and 1994 the authors find that a larger labor share is associated with a lower Gini coefficient of personal incomes and that the top income quintile share is negatively affected by a rising labor share.[1] Checchi and García-Peñalosa (2010) show that variations in the factor distribution of income help explain changes in the personal distribution. The authors run panel regressions of the Gini index on labor shares, wage differentials and unemployment for 11 OECD countries from 1960 to 2000 and document a negative impact of the labor share on the Gini coefficient.[2]

On the other hand factor decomposition methods applied to micro data, as e.g. Fräßdorf et al. (2011) or García-Peñalosa and Orgiazzi (2013), illustrate the relevance of capital income for the evolution of income inequality. Fräßdorf et al. (2011) present a factor decomposition analysis for the UK, Germany and the US within the years between 1984 and 2004. The authors find an increasing role of capital income for and a high contribution of capital income to personal income inequality.[3] García-Peñalosa and Orgiazzi (2013) analyze factor components of inequality in a cross-country comparison covering Canada, Germany, Norway, Sweden, the UK and the US over the last three decades of the 20th century. They find that increases in inequality of capital income account for a substantial fraction of overall inequality changes.[4]

Besides our extension of Adler and Schmid (2013) our findings contribute to this literature in variety of ways: We provide new evidence for the impact of changing factor income shares on the personal distribution of income based on EU-SILC data for 17 EU countries from 2005 to 2011. In contrast to earlier research, such as Daudey and García-Peñalosa (2007) or Checchi and García-Peñalosa (2010), we use household capital income shares calculated from micro data rather than factor income shares reported in national accounts. Hence, our results do not directly rely on the assumption that varying factor income shares transmit largely proportionally into the factor income structure of households. Moreover, we not only illustrate the distribution of capital income shares within and across these countries, but we also consider the concentration of capital income in our regressions. This allows for a more detailed analysis of the relationship between

[1] For approximating personal income inequality the authors use Gini indices from the World Institute for Developments in Economic Research (WIDER) dataset. Data on labor shares in the manufacturing sector are from the United Nations Industrial Development Organization (UNIDO) database.

[2] Gini coefficients are either constructed in line with information from Brandolini (2003) or taken from the WIDER dataset. Labor shares are from the OECD Structural Analysis (STAN) database.

[3] Their analysis is based on the British Household Panel Survey (BHPS) for the UK, the Socio-Economic Panel (SOEP) for West Germany and the Panel Study of Income Dynamics (PSID) for the US provided by the Cross-National Equivalent File (CNEF).

[4] The authors use data from the Luxembourg Income Study dataset.

capital income shares, the concentration of capital income and personal income inequality. In addition, our results confirm and complement the findings of factor decomposition analyzes for household panel data, such as Fräßdorf et al. (2011) or García-Peñalosa and Orgiazzi (2013), who document the high relevance of capital income for personal income inequality.

The remainder of this paper is structured as follows: Section 2 introduces the data and explains the calculation of basic variables. Section 3 outlines the theoretical underpinnings and the estimation approach of our empirical analysis. The results are documented in section 4 and section 5 concludes.

2 Data Set and Construction of Basic Variables

We use data from the European Study on Income and Living Conditions (EU-SILC). This household survey is designed to describe and to explain living conditions in Europe. The European survey mainly provides data on social inclusion, poverty and living standards.[5]

Since 2004 the panel study EU-SILC has replaced the former European Household Panel. EU-SILC is based on the multidimensional Laeken indicators. These indicators were introduced by the Council of the European Union to improve comparison of the member states' progress in poverty reduction. Every year approximately 130,000 households in the current EU member states are interviewed for EU-SILC. Although the Statistical Office of the European Union (Eurostat) is responsible for providing EU-SILC data at the European level, the collection and preparation of the data is conducted by the individual countries' statistical offices. According to Hauser (2007) there exist concerns about the quality of the data from the first waves in 2004 and 2005 for Germany and other countries. Moreover, the list of countries participating in EU-SILC differs over the years for various reasons.[6] Despite its shortcomings, EU-SILC is the only longitudinal survey that offers comparable data for all EU member states with a large number of observations per country and year, and it includes detailed information on different types of household income. This data set is, therefore, the most adequate data set for the analysis of income inequality in the EU. For our analysis, we use data from the cross sectional files from the waves between 2005 until 2011.

We refer to the cross sectional data since longitudinal data of the EU-SILC for Germany is not available at all due to privacy regulations. We use cross sectional data to compute macroeconomic variables for each country and create a panel data set from these macroeconomic indicators. When interpreting the results it has to be kept in mind that the panel data set used does not stem from longitudinal data at the household level. However, we do not consider this a critical issue for the quality of our empirical conclusions on a country level because we only interpret the aggregate effects. These effects are not influenced because the sample of EU-SILC is representative of each country's population.

[5] For details see `http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/eu_silc`.

[6] The first EU-SILC wave in 2003 has only been conducted as an experiment in six European countries. The sample size is too small to apply our econometric analysis to this data set. In 2004, for example, Germany, the Netherlands and the United Kingdom did not take part in EU-SILC because their deadline to introduce EU-SILC was extended to 2005.

The starting point for the construction of our data set is the household data available in cross sectional waves of EU-SILC. We use total household gross income as our reference point. A household's gross capital income is computed as the sum of income from rents of a property or land and interest, dividends, and profits from capital investments in unincorporated business. For plausibility reasons we limit our data set to households with nonnegative values in these categories and compute the share of capital income for each household. Furthermore, the employment status, the year of birth, and the education level attained of the head of household (defined as the first interviewee) are kept as variables.

For the estimations we create a panel data set by computing the mean share of capital income per country and year. Additionally, the Gini-coefficient of total and capital income and the income share of the top decile group of total income are calculated per country and year. To control for the effects of the economic cycle on income inequality we consider an indicator for the unemployment rate per country and year in the data set. A household is defined as unemployed if the head of household has stated unemployment as the current economic status. The unemployment rate in our sample is taken to be the percentage of households with this statement from all households in the same country and the same year whose heads are neither in retirement nor disabled.

To not only control for the employment level we introduce an additional indicator for the employment structure which is taken as the percentage of part-time workers from all working people[7] per country and year. Finally, we compute the ratio of workers who either indicate at least lower tertiary education as highest ISCED level attained or at most primary education per country and year. This indicator incorporates the educational structure of the working population in a country.

Our final panel data consists of observations for 17 countries, namely Austria (AT), Belgium (BE), Cyprus (CY), Germany (DE), Denmark (DK), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Luxembourg (LU), the Netherlands (NL), Norway (NO), Portugal (PT), Sweden (SE) and the United Kingdom (UK) and covers the seven different years from 2005 to 2011. Due to limited data availability we miss some variables for different countries and years. Therefore, the final data set includes 106 observations. Basic summary statistics for all variables are reported in table 2 in the appendix. All further descriptive calculations and the panel estimations rely on this data set.

3 Methodology

As mentioned above, the conceptual background of our study has been suggested by Adler and Schmid (2013) who use household data from the German Socio-Economic Panel and carry out a descriptive analysis covering the years from 2002 to 2008. The authors examine the development of capital income shares, the distribution of capital income shares and the relationship between capital income shares and the level of individual market incomes. We extend their framework in two ways: First, while their analysis focuses on Germany, we cover 17 EU countries from 2005

[7] Working is defined as one of the following employment statuses: full-time worker (employee or self-employed), part-time worker or in compulsory military service.

to 2011 and provide broad cross country evidence for the link between capital income shares and household income inequality. Second, we extend their methodological approach by estimating the effect of capital income shares upon the concentration of household income in a panel regression setup. This not only allows us to consider a number of factors that affect income inequality, such as changes in the employment level, but to also control for country-specific concentration of capital income. Besides these extensions we differ from the approach of Adler and Schmid (2013) as we consider gross household income, whereas these authors use individual market income. In contrast to individual market income, gross household income contains transfer income and is calculated for the household as the unit of observation. There are two reasons for this approach: First, we want to address the effects with regard to the whole population, i.e. we do not only focus on the working population.[8] Second, our approach does not require us to assign household income components to single individuals which might be a potential source of arbitrariness.

3.1 Conceptual Links of the Transmission of Changing Capital Income Shares into the Distribution of Household Income

How changes in capital income shares are associated with the distribution of household income depends on the concentration of capital income as well as on the relationship between the share of capital income and the level of household income. Figure 1 (upper panel) illustrates the first aspect via three hypothetical cases of capital income concentration (A, B, C). The boxes represent the income structure of households.

Case A assumes an identical income structure across all households. Here, changes in the functional distribution of income do not alter the personal distribution of income. Case B contrasts two extreme types of income structure. Households are supposed to earn either labor and transfer income or solely capital income. Here, changes in the functional distribution of income lead to strong changes in the personal distribution of income. Finally, case C combines the rather extreme setups A and B. Here, we assume that households gain labor and transfer income but also income from asset flows. However, the respective shares differ across households.

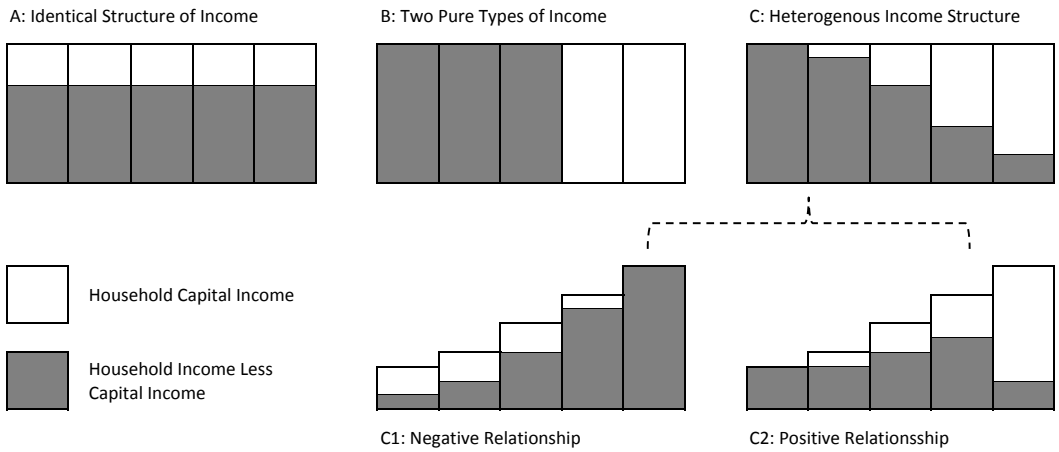
Additionally, one has to take into account the relationship between the level of household income and the share of capital income. The lower panel of figure 1 therefore contrasts two possible cases (both special cases of C). A negative relationship between the level of household income and the respective share of capital income (case C1) implies a reduction of the income concentration resulting from a rising average capital income share. In contrast to this, in the case of a positive relationship (case C2), rising capital income shares are associated with an increase in the concentration of household income.

3.2 Estimation of the Role of Capital Income

To assess the relevance of capital income shares for the inequality of gross household income we regress a measure of income inequality on the average capital income share within each country.

[8] Solely taking into account market income implies that households that live on transfer payments such as retirees cannot be included in the analysis as their market income only consists of capital income and is therefore close to zero in most cases.

Figure 1: Types of the Functional Distribution of Income



Note: This figure shows that the transmission of changing capital income shares depends on the concentration of capital income (illustrated by three hypothetical cases of income concentration A, B, C) and on the relationship between the share of capital income and the level of household income (illustrated by two cases C1, C2). Within each panel each of the five boxes on the horizontal axis represents the income structure of a household. The five households within each of the five panels constitute the income structure of hypothetical populations. In contrast to the upper panels (A, B, C) that only focus on the structure of income, within the lower panels (C1, C2) the height of the boxes reflects different levels of household income.

Source: Adler and Schmid (2013).

We apply panel estimation for our group of 17 countries covering the years 2005 to 2011. The basic regression equation reads:

$$\begin{aligned} INEQ_{it} &= \beta_1 + \beta_2\, CIS_{it} + \beta_3\, CIS_{it} \times GINICI_{it} + \\ &\quad \beta_4\, CONTR_{it} + YD_t + \beta_5\, TREND_{it} + u_i + \epsilon_{it}. \end{aligned} \tag{1}$$

Here, $INEQ$ denotes the measure of inequality in household gross income, CIS is the capital income share, $CONTR$ is a vector of control variables and YD is a yearly time dummy variable. $TREND$ is a country specific time trend. u_i denotes a country fixed effect and ϵ is a random error term. The subscript i corresponds to the country dimension of our panel and t is the corresponding time subscript.

Within our set of control variables we seek to capture factors other than capital income shares that influence the concentration of household income. The most important aspects concern employment changes over the business cycle. Authors such as Hoover et al. (2009), Heathcote et al. (2010) or Krueger et al. (2010) provide evidence that fluctuations in macroeconomic activity do not affect different segments within the income distribution equally. The impact of economic expansion and recession upon income inequality is rather asymmetric: An increase of income concentration in economic downturns works through the labor market as unemployment rises and hours worked disperse. This effect is most pronounced in the lower part of the income distribution as job lay offs are disproportionately distributed across the income distribution. We try to catch these effects through two control variables: The unemployment rate and a measure

for the percentage of atypical employment in the labor force.[9] The construction of these variables is explained in section 2. In addition, we consider the educational structure of the labor force. This is supposed to capture effects of skill-driven dispersion of labor income due to the rising percentage of academic job qualification and global factor competition, as argued by authors such as Katz and Autor (1999).

We use the Gini coefficient of gross household income as our basic inequality measure. For robustness we compare these results with regressions that include the income share of the top ten percent of the income distribution.[10]

We estimate specification (1) for both inequality measures by Fixed Effects. The corresponding results for the Gini coefficient as the dependent variable are presented in table 1. The results for the income share of the top 10 percent of the income distribution are reported in table 3 in the appendix.

4 Empirical Results

4.1 Capital Income Shares and Level of Gross Household Income

In the following we examine to what extent the results for the 17 EU countries reflect the relationships of the conceptual framework presented in subsection 3.1. Therefore, we illustrate how these countries differ with respect to the distribution of capital income shares and the association of capital income shares and the level of household income in different income groups. To this end, figure 2 shows the shares of capital income on gross household income sorted by capital income shares (left panels). This corresponds to the upper row of panels presented in figure 1. The right panels in figure 2 illustrate levels of gross household income by income classes. These correspond to the lower panels (cases C1 and C2) in figure 1. In addition we report capital income shares by income decile classes. The exposition is based on a pooled calculation for all available data covering 2005 to 2011.[11]

We see that the left panels in figure 2 resemble case C in figure 1. This shows that capital income shares are far from being distributed equally across households and that changing capital income shares affect the personal distribution of income. The right panels of figure 2 reveal that in the upper half of the income distribution capital income shares rise with the level of gross household income. According to our conceptual considerations, this suggests a positive relationship between changes in capital income shares and changes in the concentration of gross household income.[12]

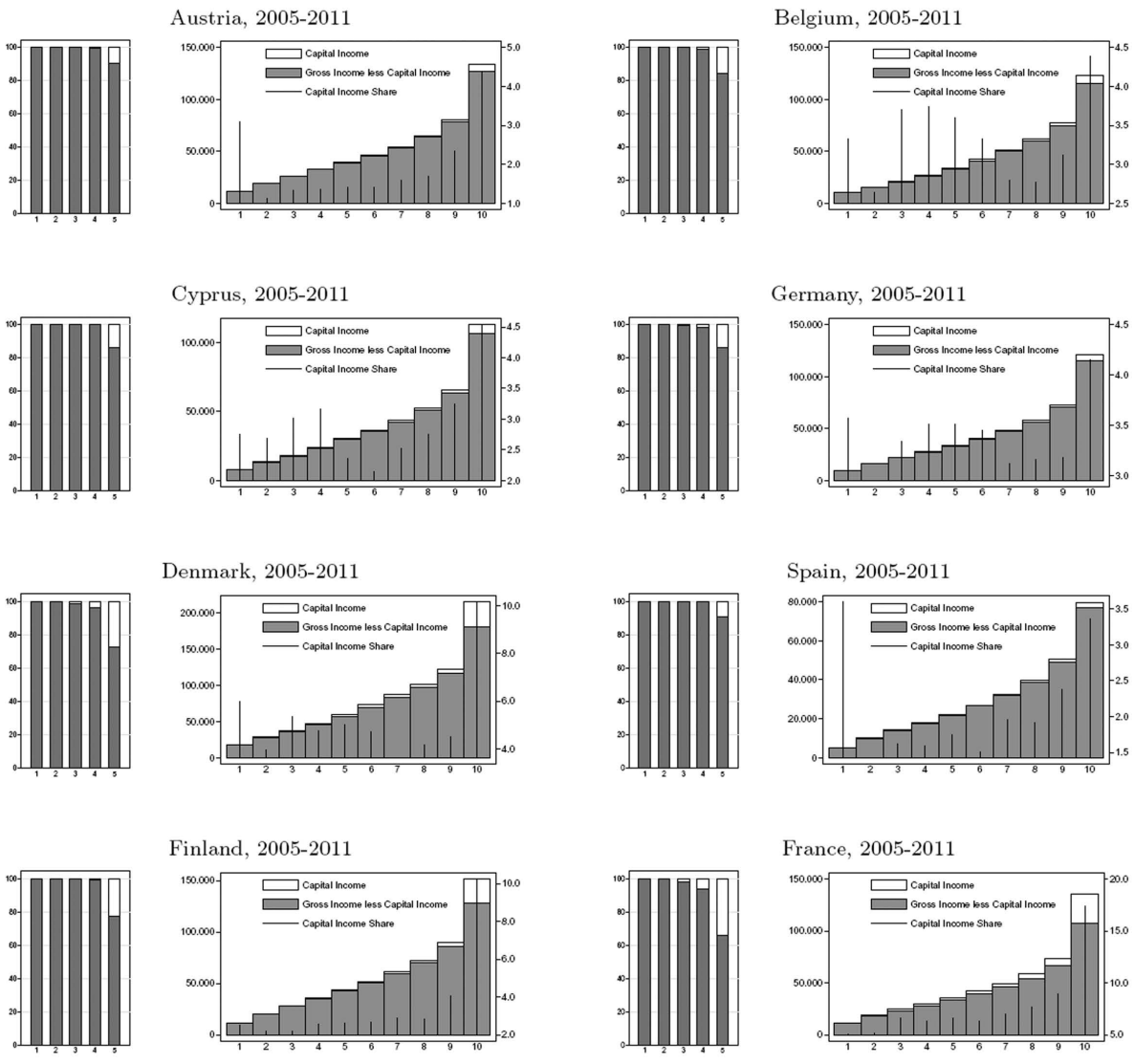
[9] As described in section 2 we approximate atypical employment with part-time job occupation.

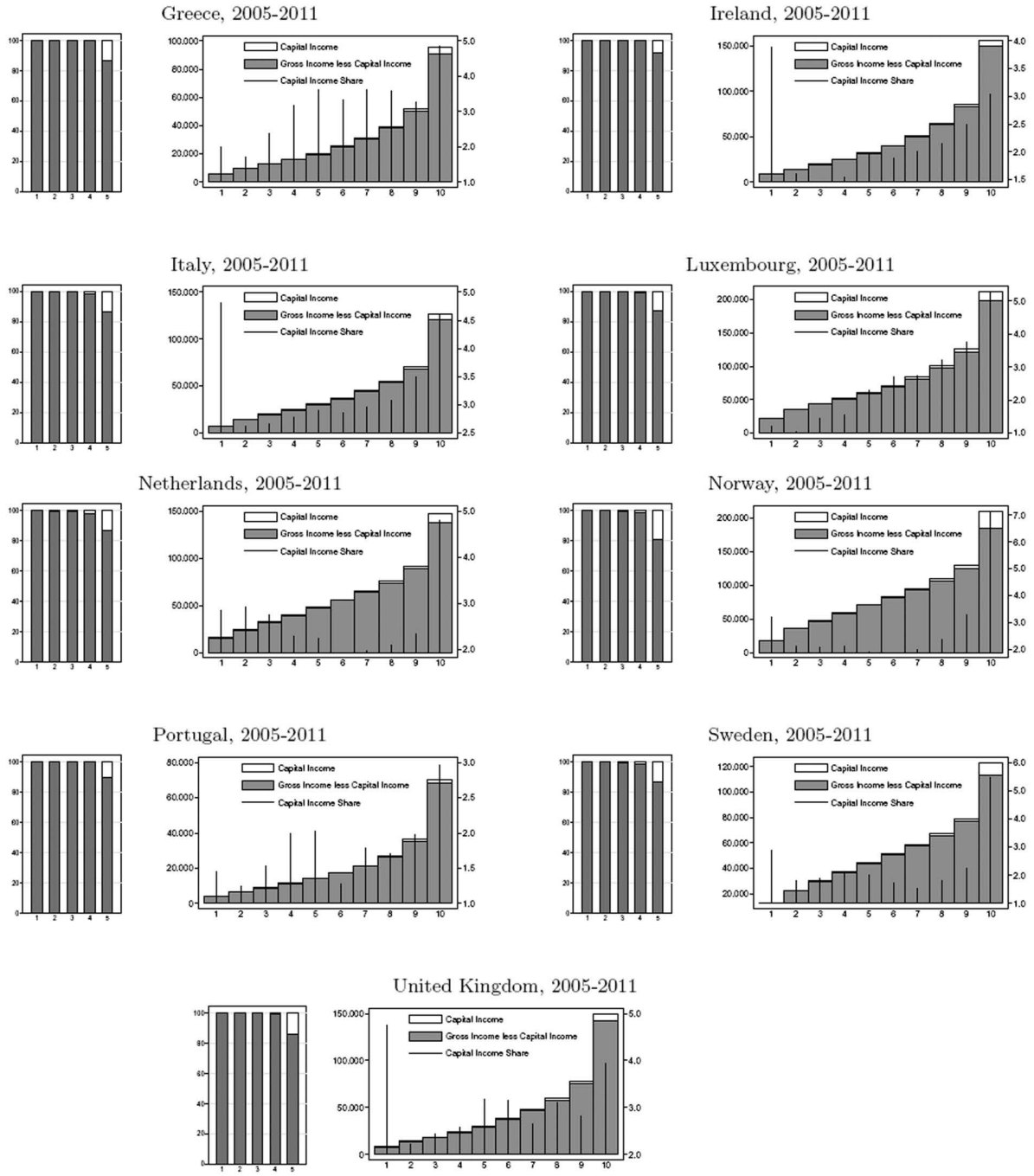
[10] For a discussion of the appropriateness of approximating developments in income concentration with changes in top income shares see for example Leigh (2007).

[11] Calculations for single years yield qualitatively identical results.

[12] These findings are in line with the evidence provided by Adler and Schmid (2013) for the German economy.

Figure 2: Capital Income Shares and Gross Household Income by Income Class

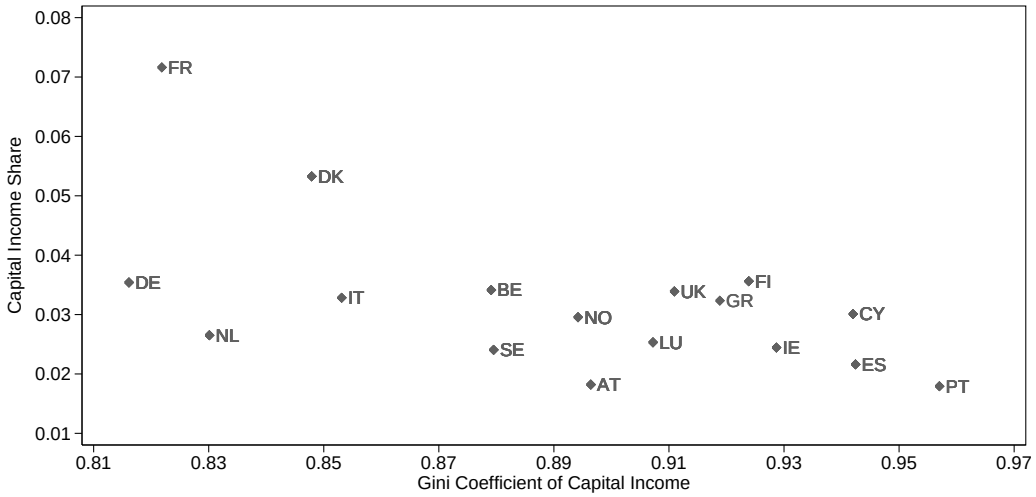




Note: This figure shows the relationship between the share of capital income and the level of household income per country in our data set. The left panels show the shares of capital income on gross household income sorted by capital income shares while the right panels include the information on capital income shares by income decile classes. The calculation for each country is based on pooled data for 2005-2011.

Moreover, figure 3 illustrates to what extent capital income shares and capital income inequality vary across countries. The Gini coefficient of capital income ranges from approximately 0.82 in the case of Germany to 0.96 for Portugal. For most countries capital income shares lay between 0.18 and 0.36, which are the shares found in Austria and Finland, respectively. Remarkable exceptions to this are France and Denmark which show considerably higher capital income shares than the remaining countries. As will be explained below, this pattern helps in explaining the impact of capital income shares upon income inequality.

Figure 3: Capital Income Shares Against the Concentration of Capital Income



Note: This graph illustrates the distribution of the capital income share and the concentration of capital income, measured by the Gini-coefficient of capital income in our data set. The values for each country are computed based on pooled data for 2005-2011.

4.2 Estimation Results

Now we turn to the discussion of the results obtained from the estimations that were motivated and explained in subsection 3.2. Table 1 reports the results for fixed effects panel regressions of the Gini-coefficient of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 contain the results for different sets of control variables.

Table 1: Estimation Results (Dependent Variable: GINI of Total Income)

	(1)	(2)	(3)	(4)
Capital Income (CI) Share	-5.429***	-5.521***	-5.527***	-5.215***
	(0.763)	(0.754)	(0.761)	(0.723)
Gini CI x CI Share	6.963***	7.136***	7.146***	6.844***
	(0.868)	(0.861)	(0.871)	(0.824)
Unemployment Rate		0.223*	0.226*	0.154
		(0.131)	(0.134)	(0.128)
Parttime Rate			0.00748	0.0119
			(0.0524)	(0.0492)
Job Qualification				0.122***
				(0.0398)
Obs.	106	106	106	106
r2	0.704	0.717	0.717	0.754

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports results from a fixed effects regression of the Gini-coefficient of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 compare the results of specification for different sets of control variables. All four regressions include year dummies and a country specific time trend. The total effect of capital income shares is calculated according to the formula in equation 2.

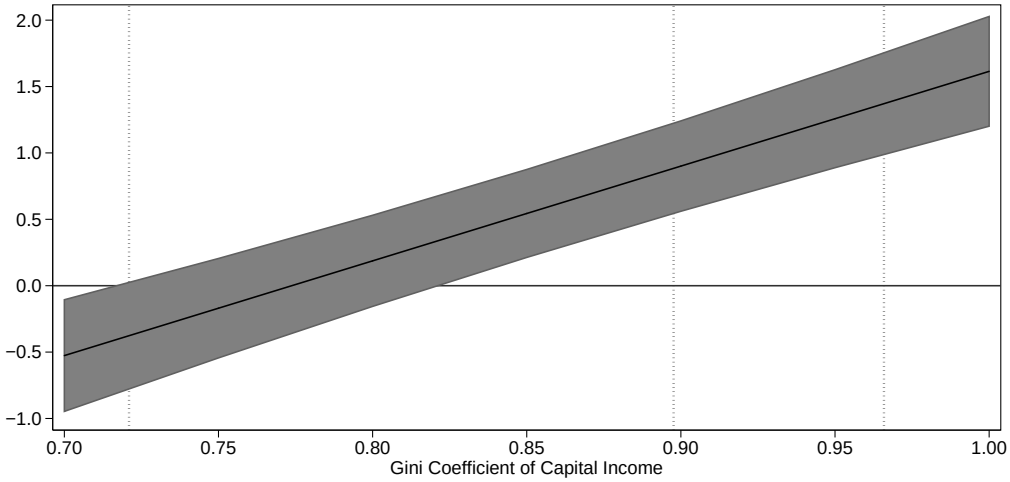
The total effect of capital income shares upon the concentration of gross household income results from the sum of the basic coefficient β_2 and the coefficient for the interaction with each country's Gini-coefficient of capital income β_3 multiplied with the respective level of capital income concentration. The formula reads

$$\frac{\partial INEQ}{\partial CIS} = \beta_2 + \beta_3 \times GINICI. \tag{2}$$

This total effect is positive across all four regressions implying that a rising capital income share is associated with an increase in income inequality. Furthermore, the partial effect of the interaction of capital income shares and the Gini-coefficient of capital income suggests that increasing concentration of capital income enlarges the capital share's total effect on income inequality. This result is in line with our theoretical considerations described in section 3 and is further illustrated in figure 4. In this figure, we depict the total effects of capital income shares upon the concentration of gross household market income across different degrees of capital income concentration. The estimates correspond to the model in column 4, table 1. The dotted vertical lines represent the minimum, median and maximum value of the concentration of capital income measured by the Gini-coefficient in our data set.

We see that the effect of capital income shares is statistically significant only above a certain threshold of capital income inequality. For our sample, given a 95 percent confidence interval, this threshold corresponds to a Gini coefficient of capital income of about 0.83. Above this value,

Figure 4: Marginal Effects of Capital Income Share for Different Degrees of Capital Income Inequality



Note: This graph illustrates the marginal effects of capital income shares across different degrees of capital income concentration. The dotted vertical lines represent the minimum, median and maximum value of the concentration of capital income measured by the Gini-coefficient. The total effect of capital income shares is calculated according to the formula in equation 2.

a more pronounced concentration of capital income is associated with a stronger impact of capital income shares upon the distribution of gross household market income.

The different sets of control variables used in the regressions do not change the estimated total effect of the capital income share significantly. Not even the estimated magnitudes of the two partial effects differ significantly between the regressions presented in columns 1-4. For the applied covariates we find a weakly significant and positive effect of unemployment on income inequality. This can be explained by the fact that high unemployment rates tend to be a heavier burden for people at lower income levels and income inequality therefore increases in times of economic recession and high unemployment. This finding confirms the evidence provided by the above-cited studies (see section 3.2). In contrast to the significant effect of unemployment we do not find empirical evidence for the influence of the employment structure: The coefficient of the ratio of part-time workers is not significant in columns 3 and 4. However, even though the estimated coefficient is not statistically significant and small in size, the sign is positive as expected since a higher percentage of workers in atypical jobs may be a potential driver of income inequality in a society, as posited by Grabka and Frick (2011) or Schmid and Stein (2013).[13] A further explanatory factor of the level of income inequality in a society is the educational structure of the workforce as skill-biased technological change and global factor competition increase wage dispersion: Column 4 shows a significantly positive effect of the indicator for job qualification. We find that the Gini-coefficient of total household income increases if the percentage of workers with an intermediate level of education increases.

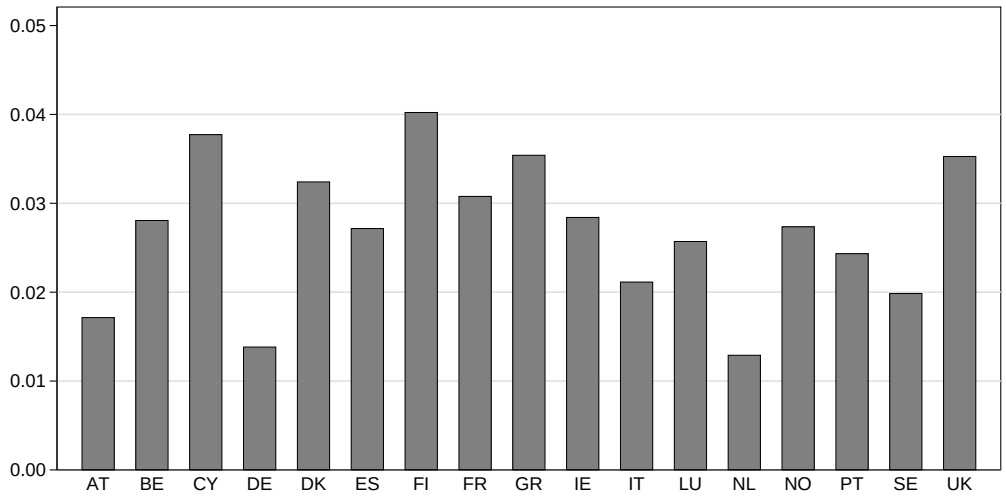
[13] While with regard to individual earnings this mechanism is straightforward, it is less clear on the basis of household income. This is because a rising proportion of part-time occupation in the labor force may rather reflect additional labor income than a substitution of full-time occupation within households.

For robustness purposes we additionally ran the four specifications presented in table 1 for the income share of the richest ten percent of the population. This serves as an alternative measure of income inequality. These regressions yield qualitatively identical results and are reported in table 3 in the appendix. The only obvious difference in the estimations run for the top decile group income share is that the effect of the unemployment rate is no longer statistically significant. This finding, however, can be explained by the fact that top earners are not hit by unemployment to the same degree as workers in low paid jobs. Therefore, the top income decile is not significantly influenced by the level of unemployment.

4.3 Explanatory Power and Role of Capital Income Concentration

Next, we examine to what extent variations in capital income shares explain the level of income inequality, and we look at the role of differing degrees of concentration of capital income across countries. To assess the actual impact of capital income shares upon the concentration of gross household income we compute the contribution of this regressor to the explanation of our measure of income inequality. The contribution of the capital income share is calculated by multiplying its average sample value with the estimated total effect derived according to equation 2. Figure 5 contrasts absolute contributions of capital income shares based on our estimation summarized in column 4, table 1 for all 17 countries.

Figure 5: Contribution of Capital Income Shares to the Concentration of Gross Household Income

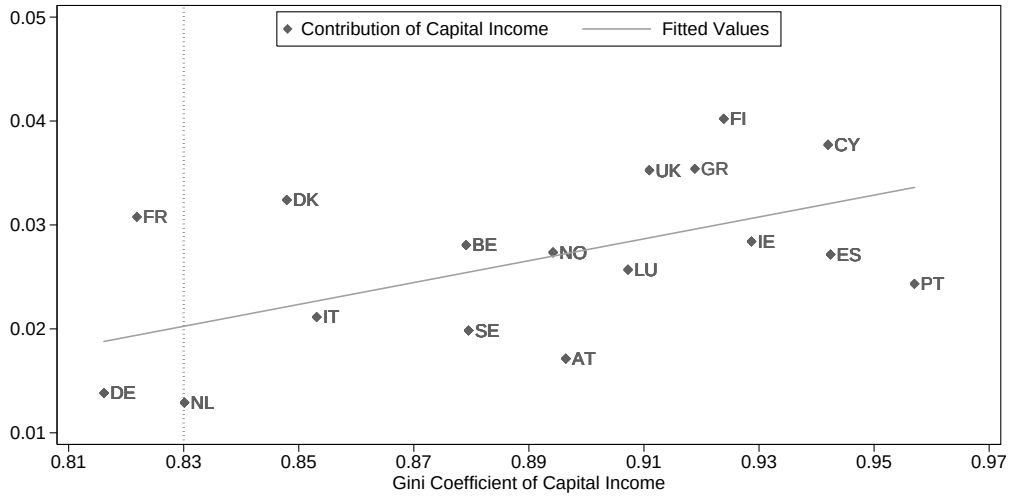


Note: This graph illustrates the explanatory power of capital income shares with respect to the concentration of household gross income by country. Calculations are based on the estimation results presented in table 1, column 4.

We see that depending on the country the impact of capital income shares ranges from approximately 0.015 to 0.04 in terms of variations of the Gini coefficient of gross household income. The highest contributions are visible for Finland, Cyprus, Greece and the United Kingdom. In contrast, for Germany and the Netherlands the explanatory power of capital income shares is rather small. These differences are closely connected to the distribution of capital income within

the respective economies. The higher the concentration of capital income, the stronger is the effect of developments in capital income shares on the concentration of gross household income. This relationship is illustrated in figure 6. Here, we scatter the above derived contributions of capital income shares against the Gini coefficient of capital income for each country.

Figure 6: Contribution of Capital Income Shares to Income Inequality Against Capital Income Concentration



Note: This graph shows the association of capital income concentration measured by the Gini coefficient and the absolute contribution of capital income shares to market income inequality for different countries. Calculations of contributions are based on the estimation results presented in table 1, column 4. The simple linear regression line corresponds to a regression yielding a coefficient of 0.105 significant at the 1 percent level and an R^2 of 30 percent. The vertical dotted line corresponds to the threshold for the significance of marginal effects of capital income shares derived from figure 4.

We observe a positive relationship of the explanatory power of capital income shares and inequality of capital income. Whereas Finland, Cyprus, Greece and the United Kingdom are among the group of countries with the highest concentration of capital income, Germany and the Netherlands show comparably small values for the Gini coefficient of capital income.

The comparably high contribution of the capital income share for France and Denmark is noteworthy as both countries are characterized by a Gini coefficient of capital income that is clearly below average. The reason for this is that these countries have by far the highest level of capital income shares. This is documented in figure 3. Therefore, even relatively equal distributions of capital income coincide with a comparably pronounced contribution of capital income shares.

5 Conclusion

We examine the impact of changes in capital income shares upon the distribution of gross household income. Using EU-SILC data we cover 17 countries from 2005 to 2011 and estimate fixed effect panel data models. We find that, when controlling for other inequality drivers, capital income shares are positively associated with the concentration of gross household income. Moreover, our estimation results show that the transmission of changes in capital income shares into the distribution of gross household income depends on the concentration of capital income in an economy.

Although a clear connection of aggregate movements in profit shares reported in national account statistics to changes in the income structure of households is subject to a number of limitations[14], our study provides valuable insights into the role of the distribution of capital income for the development of income inequality across households. As both the development of capital income shares as well as the concentration of capital income constitute stable links from the functional income distribution to income inequality across households, shifts in the functional distribution of income affect the personal income distribution. This link suggests a connection between two trends that many industrialized economies have been subject to during the last decades: Shifts within factor shares towards a higher percentage of capital income and the rise of top income shares, which reflects increasing income concentration across households.

Further research could focus on two aspects: First, a more explicit consideration of the influence of the business cycle on both, the development of factor shares and on the personal distribution of income. Such analysis requires a longer time span than EU-SILC offers and will therefore have to be based on country-specific household surveys as for example the German Socio-Economic Panel. Second, the distribution of household wealth underlying the concentration of capital income might be taken into account. In a cross-country perspective this might be approached by using the recently released Household and Consumer Finance (HFCS) data or on the basis of data from the Luxembourg Wealth Study (LWS). A better understanding of the mechanisms addressed in this paper crucially depends on the further collection and preparation of high quality household data in the future.

[14] For a discussion of this issue see, for example Adler and Schmid (2013) and Ryan (1996).

References

Adler, M., Schmid, K. D., 2013. Factor Shares and Income Inequality - Evidence from Germany 2002-2008. Journal of Applied Social Science Studies 2 (133), 121–132.

Arpaia, A., Pérez, E., Pichelmann, K., 2009. Understanding Labour Income Share Dynamics in Europe. Economic Papers 379, European Comission.

Atkinson, A. B., 2009. Factor Shares: The Principal Problem of Political Economy? Oxford Review of Economic Policy 25 (1), 3–16.

Atkinson, A. B., Piketty, T., Saez, E., March 2011. Top Incomes in the Long Run of History. Journal of Economic Literature 49 (1), 3–71.

Brandolini, A., 2003. A Bird's-eye View of Long-run Changes in Income Inequality. Mimeo, Bank of Italy.

Checchi, D., García-Peñalosa, C., 2010. Labour Market Institutions and the Personal Distribution of Income in the OECD. Economica 77 (307), 413–450.

Daudey, E., García-Peñalosa, C., 2007. The Personal and the Factor Distributions of Income in a Cross-section of Countries. Journal of Development Studies 43 (5), 812–829.

Ellis, L., Smith, K., 2010. The Global Upward Trend in the Profit Share. Applied Economics Quarterly 56 (3), 231–256.

Fräßdorf, A., Grabka, M., Schwarze, J., 2011. The Impact of Household Capital Income on Income Inequality - A Factor Decomposition Analysis for the UK, Germany and the USA. Journal of Economic Inequality 9 (1), 35–56.

García-Peñalosa, C., Orgiazzi, E., 2013. Factor Components of Inequality: A Cross-Country Study. Review of Income and Wealth 59 (4), 689–727.

Giovannoni, O., 2010. Functional Distribution of Income, Inequality and the Incidence of Poverty: Stylized Facts and the Role of Macroeconomic Policy. Inequality Project Working Paper 58, The University of Texas.

Glyn, A., 2009. Functional Distribution and Inequality. In: W. Salverda, B. N., Smeeding, T. M. (Eds.), Oxford Handbook of Economic Inequality. Oxford University Press.

Grabka, M. M., Frick, J. R., 2011. Country Case Study - Germany. In: Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B. (Eds.), The Great Recession and the Distribution of Household Income. A report prepared for, and with the financial assistance of, the Fondazione Rodolfo Debenedetti, Milan, Ch. 3, pp. 3.1–3.36.

Hauser, R., 2007. Probleme des deutschen Beitrags zu EU-SILC aus der Sicht der Wissenschaft - Ein Vergleich von EU-SILC, Mikrozensus und SOEP. SOEP Papers 69, German Institute of Economic Research (DIW).

Heathcote, J., Perri, F., Violante, G., 2010. Unequal We Stand: An Empirical Analysis of Economic Inequality in the United States. Review of Economic Dynamics 13, 15–51.

Hoover, G. A., Giedeman, D. C., Dibooglu, S., 2009. Income Inequality and the Business Cycle: A Threshold Cointegration Approach. Economic Systems 33, 278–293.

ILO, 2013. Global Wage Report 2012/13: Wages and Equitable Growth. Tech. rep., International Labour Office, Geneva.

Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B., 2013. Introduction: Scope, Review of Analytical Approaches, and Evidence from the Past. In: Jenkins, S. P., Brandolini, A., Micklewright, J., Nolan, B. (Eds.), The Great Recession and the Distribution of Household Income. Oxford University Press.

Katz, L., Autor, D., 1999. Handbook of Labor Economics. No. 3A. North Holland, Amsterdam, Ch. Changes in the Wage Structure and Earnings Inequality, pp. 1463–1555.

Krueger, D., Perri, F., Pistaferri, L., Violante, G. L., 2010. Cross Sectional Facts for Macroeconomists. Review of Economic Dynamics 13, 1–14.

Leigh, A., 2007. How Closely Do Top Income Shares Track Other Measures of Inequality? Economic Journal 117 (524), F619–F633.

OECD, 2008. Growing Unequal? Income Distribution and Poverty in OECD Countries. Tech. rep., Organisation for Economic Co-operation and Development, Paris, France.

OECD, 2011. Divided We Stand, Why Inequality Keeps Rising. Tech. rep., Organisation for Economic Co-operation and Development, Paris, France.

Ryan, P., 1996. Factor Shares and Inequality in the UK. Oxford Review of Economic Policy 12 (1), 106–127.

Schmid, K. D., Stein, U., 2013. Explaining Rising Income Inequality in Germany, 1991-2010. IMK Study, Macroeconomic Policy Institute at the Hans-Boeckler Foundation.

Appendix

Table 2: Summary Statistics of Main Variables.

	N	mean	p25	p50	p75	stdev	min	max
Gini coefficient of Gross Income	106	0.38	0.36	0.38	0.40	0.04	0.32	0.46
Top Decile Group Income Share	106	0.28	0.26	0.27	0.29	0.03	0.23	0.34
Capital Income Share	106	0.03	0.02	0.03	0.03	0.01	0.01	0.08
Gini coefficient of Capital Income	106	0.89	0.86	0.90	0.93	0.05	0.72	0.97
Unemployment Rate	106	0.06	0.04	0.06	0.08	0.03	0.01	0.14
Part-time Rate	106	0.18	0.12	0.16	0.24	0.09	0.04	0.45
Job Qualification	106	0.44	0.38	0.44	0.51	0.10	0.22	0.68

Note: This table reports summary statistics of the variables used within our regressions. The construction of these variables is described in section 2.

Table 3: Estimation Results (Dependent Variable: Top Decile Group Income Share)

	(1)	(2)	(3)	(4)
Capital Income (CI) Share	-6.497***	-6.575***	-6.569***	-6.200***
	(0.842)	(0.841)	(0.849)	(0.797)
Gini CI x CI Share	8.411***	8.556***	8.547***	8.190***
	(0.958)	(0.960)	(0.971)	(0.909)
Unemployment Rate		0.187	0.184	0.0995
		(0.146)	(0.150)	(0.141)
Parttime Rate			-0.00696	-0.00175
			(0.0584)	(0.0543)
Job Qualification				0.144***
				(0.0439)
Obs.	106	106	106	106
r2	0.691	0.699	0.699	0.743

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: This table reports results for a pooled regression of the income share of the richest ten percent of gross household income on the average capital income share of all households. The sample comprises all countries for the years 2005-2011. Columns 1-4 contain the results of specification and use different sets of control variables. All four regressions include year dummies and a country specific time trend. The total effect of capital income shares is calculated according to the formula in equation 2.