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Abstract

This study assesses the role of social spending in relation to child poverty in European welfare states. Using macro-level panel data from EU SILC 2005-2012, we analyze the effect of the size of social spending and the effect of how those benefits are targeted. We separately estimate the effect of pension benefits on child poverty, as the prevalence of multigenerational families makes them a relevant income source for families with children, especially in Southern and Eastern European welfare states. Estimating a GLS model including time and country fixed effects and a large set of country characteristics, we find that both cash transfers and pensions substantially reduce child poverty. Increased pro-poorness also leads to lower poverty rates, but the effect sizes are more modest by comparison, and strongly depend on how targeting is defined. The estimates for social spending change little across various model specifications and we also obtain similar estimates when we use regional variation within countries to assess the same effects. Where social spending explains a large share of variation in poverty within countries over time, the explanatory power with respect to cross-sectional variation in poverty rates is limited. The complete model does explain a large share of cross-sectional disparities in poverty across European welfare states, but a sizable unexplained variation remains. This unexplained disparity likely relates to factors that are more invariable over time.

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1 Introduction

At-risk-of-poverty rates have received increasing attention from national governments, the European Union and academic scholars alike. Poverty rates vary substantially across European countries, and the evolutions of poverty over time are very different for the different welfare states as well. Figure 1 reports household poverty rates among those below the age of 18, for the years 2008 and 2012. The figure shows that the disparities in poverty are indeed substantial, not only between old and new member states but also within each set of countries. Furthermore, countries are affected very differently by the recent economic crisis. Figure 1 shows that the changes in poverty rates from 2008 to 2012 are modest for the majority of countries. Since these are relative poverty rates, periods of recession do not necessarily have to increase poverty. As such, the lack of strong changes in poverty could occur because the crisis had a homogeneous effect on market income. Alternatively, automatic stabilizers could have mitigated a heterogeneous impact of earnings losses on relative poverty rates.

This study executes a macro-level analysis to assess the determinants of child poverty, thereby mainly focusing on the role of social spending. Using data from EU SILC on 29 welfare states over the years 2005 to 2012, we estimate a GLS model using country and time fixed effects to identify these determinants. We find that social spending has a reducing effect on child poverty, which does not limit itself to spending on cash transfers targeted at working age families. Pension benefits are an important source of income for households with children in several European welfare states, and have an impact on poverty that is of similar magnitude. The estimates indicate that an increase in average social spending by 1 percentage point of mean equivalized disposable household income reduces the poverty rate by around 0.265. We find that higher targeting towards the poor is associated with lower poverty, but these effects are more modest in magnitude and also depend on how both pro-poorness and the measure of poverty or inequality are defined. Additionally, we find that poverty is not only influenced by individual employment rates, but also by how employment is distributed across households.

One goal of this study is to assess to what extent estimates of the effect of social spending on

poverty can be confounded by other factors that are related to both spending and poverty. We find that the effect of spending on cash transfers is very robust to including different sets of variables related to taxation, technological change, globalisation, education, demographics and labour market institutions, provided that one controls for country fixed effects as well as differences in household employment rates. We obtain similar results for the impact of social spending on poverty when using several alternative estimation methods (provided we include unit fixed effects) and also when we use regional variation within countries to estimate these same effects. The regional analysis is based on the assumption that benefits are at least partially based on country-wide eligibility rules. As such, regions with a lower median income will receive higher benefits, which effectively leads to income transfers from rich to poor regions. We can use this variation to assess the effect of benefit spending on within-region inequality. As the latter is not directly affected by the median income level of the region, we can obtain valid estimates provided that we control for other differences across regions that may affect internal regional inequality. This analysis relies on very different assumptions than the fixed effect country-level results, but the estimates for social spending are very similar.

The determination of poverty rates is a complex process that is the result of interactions between multiple variables, which can operate in multiple directions. Previous research in social policy has identified several other determinants of inequality and poverty, including demographic indicators, education and labour market institutions.[1] Many of these findings are based on cross-sectional variation or focus their analysis on market inequality (i.e. inequality in income pre-transfer and pre-tax) and total redistribution through transfers and taxes. However, unobserved cross-country differences can confound cross-sectional estimates of the determinants of poverty. Analyses on market inequality and redistribution are informative, but they are based on a counterfactual situation that do not arise in reality. In particular, redistribution policy can affect market inequality, e.g. through incentive effects. We are ultimately interested in the final outcome, and none of the determinants of that outcome can be evaluated strictly in isolation.

[1] See, e.g., Osberg et al. (2004); Smeeding (2005) for overviews.

The recent OECD report 'Divided we Stand' (OECD, 2011) conducts a very elaborate analysis that also uses post-transfer and -tax measures of inequality as outcomes and relies on variation over time to identify the effects of determinants of inequality. We conduct an empirical analysis that is similar in nature, but our focus is on assessing the impact of the size and pro-poorness of social spending in terms of both cash transfers and pensions. We still take differences in employment, demographics, labour market institutions, macro-economic forces and skill determinants into account, as a robust analysis of the role of spending cannot be executed without considering such factors. Still, our primary objective is to assess the role of spending, in terms of both size and targeting, in addressing household poverty rates. Thereby, we focus strictly on poverty among the child population. High poverty among children is especially alarming, as there are strong links between family resources early in a child's life and later school and labour market performance,[2] which could put welfare states in a vicious circle towards consistent inequality.

This paper is organized as follows. Section 2 will summarize findings from the inequality and poverty literature, after which we present a theoretical framework for poverty analysis in Section 3. Section 4 discusses data and shows descriptive statistics. Section 5 presents the methodological approach. The main results of our empirical analysis are discussed in Section 6, while Section 7 assesses the robustness of these results. Section 8 concludes.

2 Literature

This study analyzes the effect of social spending on child poverty, which is a specific measure of (income) inequality. The determinants of inequality have been studied from various perspectives and in different fields. There is an extensive literature in the field of economics that analyzes the increases in inequality that have been common in most industrialized countries since the 1980's, thereby focusing on how changes in income inequality are related to changes in employment shares in different industry sectors. In the 1990's, the most popular explanation of increasing inequality

[2]See, e.g., Duncan and Brooks-Gunn (1997); Heckman (2000).

was skill-biased technological change (SBTC), which refers to a shift in employment to more educated workers. An extensive overview of this literature is provided by Autor and Katz (1999). However, the competing routinization hypothesis has received more support in the last decade. The idea that technology largely replaces routine jobs in the middle of the skill distribution, first proposed by Autor et al. (2003), appears to fit the data better than a linear impact of technology across skill levels.[3] According to Goos and Manning (2007), 'job polarization' explains one third of the total rise in the log(50/10) wage differential in Britain.

Research in political economy and social policy has focused more on the role of government in the determination of inequality. This field of research relies both on differences across countries, as well as within countries over time. Analyses are generally based on either Gini coefficients or (relative) poverty rates, but the results for both outcomes show strong overlap. Extensive reviews are provided by Smeeding (2005) and Osberg et al. (2004).[4] The majority of these studies use market inequality and redistribution as outcomes, rather than post-transfer and -tax poverty or inequality. Studies that do assess 'final' inequality are predominantly cross-sectional. These studies identify social spending as one major predictor of inequality rates.[5]. Heady et al. (2001) specifically focus on the role of social transfers in addressing inequality and poverty. They use (cross-sectional) EHCP data to analyze the impact of spending and targeting on inequality and poverty reduction through transfers. Corak et al. (2005) and Chen and Corak (2008) specifically look at the effect of social spending on *child* poverty. The former study does so by using a EUROMOD microsimulation analysis, and finds that social spending reduces child poverty, and that a large share of that reduction occurs through transfers that are not directly targeted at children. Chen and Corak (2008) conduct a decomposition analysis of child poverty (based on a threshold that is fixed over time) on

[3]Evidence consistent with this hypothesis is found for the US (e.g. Autor et al. (2006)) Britain (Goos and Manning, 2007) and Germany (Spitz-Oener, 2006; Dustmann et al., 2009). Goos et al. (2009) find that the U-shaped pattern of employment changes across low-, medium, and high-skilled jobs is common to almost all European nations.

[4]The largest share of studies look at one particular aspect of governmental policy, but studies by Bradley et al. (2003) and Moller et al. (2003) conduct a more elaborate analysis with multiple explanatory variables, using market inequality and redistribution as two seperate outcomes.

[5]They also identify statistically significant effects for tax progressivity and size, size of the public sector, the relative supply of college educated workers, unemployment, unionization, degree of collective bargaining and left-wing government

the basis of LIS data from two different cohorts and conclude that the impacts of social spending can differ strongly across countries.

The OECD has conducted a recent and very comprehensive report on the determinants of inequality (OECD, 2011). The report systematically assesses the influence of factors such as globalisation, technological change, institutions, demographics and redistribution on dispersion of income in the form of wage inequality, unemployment, earnings inequality, market income inequality, household market income inequality and household disposable income inequality. One of the more prominent findings is that redistribution offset most of the increases in market inequality in the period 1985-1995, but a reduced redistributive capacity was a strong driver of increasing inequality in the 10 years thereafter.[6] Taxes play a much smaller role in explaining trends in inequality over time than do benefits.

3 Theoretical framework

3.1 Concept of poverty

Our analysis focuses on the at-risk-of-poverty rate of households with children as a measure of inequality. Poverty is conceptually different from common alternatives, such as the Gini coefficient or the 90/10 income or wage ratio. First of all, its focus is on the lower half of the distribution. A doubling of income for all those above the median would have no impact on the poverty rate, while it would significantly affect alternative measures. The upper half of the distribution is still relevant because its income affects the tax base, consumption, investment etc., but those movements have less weight in a poverty measure. This is especially relevant if we consider that a lot of the variation in inequality in the U.S. and Europe has been caused by a very strong gain in income of the top 1%.[7] OECD (2011) shows that the impact of key determinants of poverty can be very different for the 90/50 income percentile ratio than for the 50/10 ratio. This heterogeneity will also

[6] See Immervoll and Richardson (2011) for a more detailed discussion of this analysis.
[7] See, e.g., Atkinson et al. (2011) and Kenworthy and Smeeding (2014).

have consequences for the right functional form of some of our measures. When we measure the relevance of targeting, it might be that a measure of targeting that puts more weight on the bottom of the income distribution is more relevant. A second particular characteristic of poverty rates is that they are based on the share of the population that is below a particular threshold. The variation within the group that lives in poverty is not reflected in the poverty measure. One needs a poverty gap measure to capture that dynamic.

We employ a threshold of 60% of median equivalized household income in our main estimation. The threshold is determined separately for each year, which means that homogeneous increases in income over time will not impact the poverty rate, as they would have when one would opt for a poverty threshold that is fixed over time. We specifically focus on poverty among children. Since the poverty threshold is still based on the national median income, the child poverty rate is affected by income inequality among children as well as the relative income position of children relative to the rest of the population.

3.2 Determinants of poverty

Poverty rates and other measures of income inequality are a result of a large number of factors, which are difficult to disentangle. Systematic theoretical frameworks are not frequently used in such analyses, but they can be helpful in understanding the mechanisms behind poverty, and also in understanding possible threats in the identification process. We show such a framework in Figure 2. The figure bears a resemblance to the analytical framework from OECD (2011) (p.27), but it has a stronger focus on the connections that occur between each of the determinants of the poverty rate, whereas the focus of the figure in the OECD report is on the factors that are relevant when we switch between different measures of inequality (e.g. inequality in earnings of the working population, inequality in earnings of the total population, household income inequality before and after redistribution etc.).

The literature typically makes a distinction between market inequality, which is pre-tax and pre-transfer, and disposable income inequality. As Figure 2 depicts, the 'final' disposable income

inequality is ultimately the result of the inequality that results from market forces, and the government redistribution of those market earnings. *Market inequality* is essentially a result of inequality in hours worked (which includes unemployment, when hours worked are 0), inequality in hourly wages and inequality in other market income sources (e.g. income from capital). Previous research has shown that the relation between inequality and hours worked given employment is rather weak and suggests that employment and, especially, variation in hourly wages are the more dominant factors.[8] Because we are specifically looking at household income inequality in terms of at-risk-of-poverty rates, one final aspect is how individual inequality translates to household level inequality. Hence, family formation is another crucial factor. It can have a direct mechanical impact on poverty rates as it influences the equivalence scales that are used to calculate household equivalent income, but can also indirectly influence market inequality through, for example, labour force participation decisions.

Each of these components of market inequality is in turn affected by multiple other factors. Hourly wages will be strongly determined by the skill level of the population. In addition, *labour market institutions* have a (presumably equalizing) impact on the wage distribution, through, for example, centralized wage bargaining, unions and minimum wages. On the other hand, these institutions might have a negative impact on labour force participation. *Macro-economic forces* can impact market inequality through economic growth (Kenworthy, 2011) as well as globalisation and technological change (Autor and Katz, 1999). *Demographics* are another important determinant. We already referred to the crucial role of family formation. Additionally, age dependency ratios can strongly impact labour supply and therefore earnings from labour.

Governmental *redistribution* can take many forms, but centers around how much is collected in the form of taxes and from whom, and how much is distributed in the form of benefits and to whom. Demographic factors can impact income redistribution. Eligibility is often based on family-level measures. Additionally, spending on pensions will be higher if the share of elderly is higher, which might come at the expense of spending on benefits targeted to the working-age

[8] See, e.g., Smeeding (2005); Jacobs and Gornick (2002).

population. Interactions can also occur between labour market institutions and redistribution; they could both act as substitutes or as complements in reducing poverty. Governments might tailor the size and targeting of benefits to the strength of employment protection legislation, the existence of a minimum wage and other factors. This adjustment process can work both ways, as illustrated by the two-way arrow in Figure 2.

The latter signifies a crucial aspect of this framework: the connections between the different factors in the figure do not only go upwards, but can also work in reverse or horizontally. A large literature focuses on the effect that market inequality has on the size of income redistribution, and argues that higher pre-tax and pre-transfer inequality creates a stronger need and support for redistribution in society.[9] In fact, the existence of automatic stabilizers that respond to increases in market inequality leads to a direct link between market inequality and redistribution. The theoretical framework also contains many indirect forces that complicate analysis of poverty rates. These are indicated in dashed lines in Figure 2. Most prominently, redistribution can affect market inequality through incentive effects.[10] It can also affect demographic characteristics as, for example, low income redistribution can lead to the formation of extended families as an alternative protection to poverty risks.[11] A similar two-way causality can occur between market inequality and its determinants. Inequality in market income can affect *inequality in skills* through intergenerational connections between low family income and educational performance. Research has also shown that inequality can negatively affect economic growth.[12] Finally, indirect connections can form between the determinants on the 'third level' of Figure 2. Globalisation can affect demographics

[9] Similarly, high market income inequality can lead to more support for protective labour market institutions.

[10] A review by Krueger and Meyer (2002) on the labour supply effects of social insurance indicates that both incidence and duration of social security programs increase the length of time employees spend out of work. Bertrand et al. (2003) find that increased generosity in pensions in South-Africa reduce the labour supply of working age adults. Also see Bergh (2005) for a thorough discussion on the identification threats that can arise when assessing the impact of redistribution.

[11] Engelhardt et al. (2005) find that elderly living arrangements respond to the generosity of social security in the US, especially for the widowed and divorced. Again, a similar mechanism might occur between the strength of labour market institutions and such demographic factors.

[12] The effect of inequality on economic growth is much debated. Benabou (1996) summarizes evidence that indicates a negative relationship, but a more recent study by Forbes (2000) finds that using panel data estimation leads to opposite results. Barro (2000) estimates a positive relationship between growth and inequality for rich countries, but a negative relationship for poor countries.

through migration; single-parent families can increase inequality in skills;[13] the relative supply of high and low educated individuals could attract migration; the age structure of the population could determine where the interest of unions are concentrated etc.

The scheme in Figure 2 illustrates why an assessment of the determinants of poverty is difficult. An analysis of poverty cannot simply be decomposed into pre-transfer and post-transfer poverty, or in inequality in employment versus inequality in hourly wages versus government redistribution. Employers, employees and governments respond and anticipate to each others actions. Moreover, different governmental instruments, such as the size of transfer benefits, investments in active labour market policies, the setup of labour market institutions and the level of investment in education, all likely depend on each other. Although this study has a strong focus on assessing the effects of social spending on post-transfer poverty rates, we still incorporate measures of other determinants of poverty in our analysis, because the multitude of connections between the different components in Figure 2 imply that they can confound the estimates of the effect of social spending on poverty. By controlling for each set of determinants in turn, we can get an indication of the importance of each of these connections.

4 Data

Our analysis is predominantly based on micro-data from the EU Statistics on Income and Living Conditions (EU SILC) cohorts 2005 to 2012. Questions from the SILC micro-data generally apply to the previous year, so this is essentially an analysis for the years 2004 to 2011. The UK and Ireland are exceptions, as the data adhere to the current year. As we control for year fixed effects and also use alternative data sources, we take this difference in setup into account in our analysis by grouping all non-SILC measures not from Ireland and the UK under the year T+1. The dependent variable in the main analysis is child poverty, defined as the at-risk-of-poverty rate for individuals under the age of 18. The at-risk-of-poverty rate is measured as the share of the population below

[13] Moon (2012) shows that single-parent families provide less cognitive and emotional stimulation to children, which can affect future performance in school and other domains of life.

a threshold of 60% of median equivalized household income. Equivalized household incomes are constructed by dividing household income by an equivalence scale; we follow common practice in the EU and use the modified OECD scale, which attributes a weight of 1 to the first adult in the household, a weight of 0.5 to other individuals above age 15, and a weight of 0.3 to children of age 15 and younger.

We employ a large set of control variables in our empirical analysis. These variables are described in Table A1.[14] In this section, we will elaborate on those variables related to spending, employment and pro-poorness, as these are the key ingredients of our model.

4.1 Spending

As a measure of the size of social spending, we employ the share that (equivalized) cash transfers[15] and pensions represent relative to the country's mean equivalized disposable income, measured from the SILC microdata. SILC allows us to assess the importance of public spending for demographic subgroups of the population. Pensions are predominantly distributed to the elderly. However, we want to analyze the role of transfer and pension spending that is distributed to families with children.[16] Through the SILC microdata, we can retrieve exactly those pension benefits that end up in households with children.

Figure 3 shows the size of each type of spending benefit for all of the countries in our sample. Our approach leads to a different ranking by spending size than more traditional measures of spending generosity, for two main reasons. First of all, while Eastern-European countries have low cash transfer spending levels towards the population as a whole, their transfer systems are strongly

[14] We tested the impact of additional variables, such as minimum wages, replacement ratios, unionization, assortative mating, foreign direct investment and others. The table describes the variables that are most relevant in our analysis.

[15] When we refer to 'transfers' throughout the remainder of this paper, this refers to all cash benefits excluding pension benefits.

[16] Increases in general pension spending should increase child poverty, as they increase the poverty threshold. Empirical analysis confirms this; when we include general pension spending as an additional indicator, we obtain a strongly positive coefficient.

skewed towards families with children.[17] Additionally, countries with low transfer spending tend to have relatively high pension spending towards families with children. As such, the ranking of countries by spending level is much less polarized into countries with high poverty rates spending little and countries with low poverty rates spending a lot on cash transfers, although the cross-sectional correlation between poverty and transfers is still negative. The cross-sectional correlation between pension benefits and poverty, on the other hand, is strongly positive. When we sum spending over both transfers and pensions, the correlation with poverty is statistically insignificant.

Figure 4 presents descriptive statistics that already give some insights into the relation between social spending and child poverty in recent years. The figure shows trends in poverty and in spending on cash transfers, separately for those countries with a decrease in poverty between 2008 and 2012 and for those with increases in poverty over the same time period. The former group shows poverty rates that have been kept in check during the most severe years of the crisis, while there is a strong and continuous increase in poverty for the latter group. For countries with increasing poverty rates, the increase in social spending has been very modest. The increase in spending for the top panel is stronger by a factor 4, and the biggest surge occurs exactly at the moment the crisis has hit the hardest. Hence, welfare states that have kept their poverty rates from rising in the face of recession are also those countries that have seen a strong surge in spending on cash transfers in that period.[18]

4.2 Pro-poorness of spending

Aside from the size of spending, we also consider what we label 'pro-poorness of spending', which captures how benefits are targeted. We consider several measures of pro-poorness. Following Verbist and Matsaganis (2013), we calculate concentration coefficients (CC's). Concentration coeffi-

[17] Figure A1 shows how spending on transfers and pensions differs depending on whether we look at the population aged 0-17 or aged 0-59. The differences for transfer spending appear strongly linked to differences in the average work intensity of households by subpopulation; countries where household-level employment among families with children is relatively low also have relatively higher transfers in the subpopulation of children.

[18] Social spending on pensions changed only little over the same time period. It shows a modest increase for the countries with decreases in poverty and a steady decline for those countries with increases in poverty between 2008 and 2012.

cients indicate how income components are distributed, and are scale indifferent (i.e. multiplying all income components by a scalar does not change the concentration coefficient).[19] To calculate CC's for the population subgroup aged 0-17, we set transfers equal to 0 for all those older than 17. We then rank according to disposable household income and measure the inequality of transfers or pensions relative to that ranking.[20]

The conceptual similarity between concentration coefficients and Gini coefficients is one reason why they are often employed in analysis of inequality based on Gini coefficients. However, poverty is a difference conceptual measure and focuses on a different part of the distribution. To avoid that we fail to pick up an effect of pro-poorness because of such differences in functional form, we employ three main alternative measures for pro-poorness: concentration coefficients calculated for the lower half of the income distribution; ratios of transfers or pensions received for specific deciles of the income distribution; and the share of transfers and pensions received by the lowest two (labeled *share 0-20*) or lowest five (labeled *share 0-50*) deciles of the income distribution (following Marx et al. (2013)). Deciles are based on the post-tax pre-transfer income distribution.[21]

4.3 Taxation

We also include multiple measures of the taxation structure of welfare states. Unfortunately, SILC is not a very reliable source for measuring tax contributions. It does not distinguish between taxes

[19] Korpi and Palme (1998) also use concentration coefficients. The income concept they use to rank income units is gross income, whereas we rank income units on the basis of disposable income. A comparison of using either income concept to rank income units can be found in Marx et al. (2013), who demonstrate that using either gross or disposable income as ranking variable yields broadly similar outcomes.

[20] The concentration coefficients essentially measure 'pro-richness', as they are lower, or more negative, when benefits are distributed more towards the poor. We convert all measures so that higher values reflect stronger pro-poorness. We first standardize CC's to have a mean of 0 and standard deviation of 1, and then multiply by -1.

[21] We specifically define pro-poorness on the basis of a pre-transfer ranking as this is ultimately where benefits are targeted to. Moreover, when pro-poorness is measured relative to a post-transfer ranking, we would measure a variable that is affected by its own effectiveness. The post-measure of targeting would then also depend on spending size, while we want to separate size and targeting. This is especially relevant when we employ decile ratios. By construction, the lowest decile will not benefit from being targeted strongly in the post-measure in virtually all cases, as the poverty rate is above 10 in 95% of all observations. We execute the analysis with a pro-poorness measure based on post-transfer income for comparative purposes, in Section 6.2.

paid on income and taxes paid on social security for the majority of the countries in the sample. Moreover, data are largely self-reported. Therefore, we rely on data reported by Eurostat, which uses the method developed by the OECD in their 'Taxing Wages' reports to measure tax rates for families with different compositions and at different levels of earnings.[22]

We include the average *tax rate* and the degree of progressivity (labeled *tax prog*) For the former, we use the average implicit tax rate on labour (ratio of taxes and social security contributions on employed labour income to total compensation of employees).[23] We construct different measures of progressivity, all based on ratios of projected tax rates of a single person without children at different levels of average earnings.

4.4 Other determinants

Table A1 lists all other explanatory variables we include in the main empirical analysis. It is crucial that we control for differences in employment in the empirical analysis. Employment is a key determinant of poverty, but can also potentially correlate with spending size, as benefits are often based on income and employment status. Since poverty is defined at the household level, it is not only the level of employment that matters but also how employment is distributed across households. We distinguish two indicators of the household employment record of welfare states. The first indicator is the share of individuals living in households with very low work-intensity (between 0 and 20 per cent); we label these households as 'very work poor'. The second indicator is the share of individuals living in households with medium work-intensity or less (i.e. 55 per cent or less); we label these households as 'work poor'. This also includes the relatively large share of one-earner households. We use 'work poverty' as a shortcut for the share of individuals living in work-poor households, and 'severe work poverty' as a shortcut for the share of individuals living in very work-poor households. We include both measures in the analysis as this combination provides

[22] See OECD (2014) for the latest report and an explanation on the methodology.

[23] The data on the *tax rate* is retrieved from Eurostat, and uses the methodology discussed in the Eurostat Statistical Books 'Taxation trends in the European Union' (formerly 'Structures of the taxation systems in the European Union'). See European Union (2014) for the latest report.

the strongest explanatory power.[24] They jointly explain a substantially larger share of variation in poverty than individual employment, which indicates that the distribution of employment across households is an important factor.

Lohmann (2011) shows that analysis based on SILC can be biased because some countries collect data based on surveys while others rely on registered data (the Scandinavian countries, the Netherlands and Slovenia). He shows that this has only a marginal effect on regression estimates of the effect of social spending and unemployment on poverty risks. This should be further reduced in our case, as the country fixed effects largely capture this disparity. Nevertheless, the estimates can still be attenuated through the presence of measurement error. We will employ an extensive sensitivity analysis that excludes different (groups of) countries, which can provide some indication whether the different data collection methods matter for our estimation.

There are some instances where we do not have information on all variables for a specific country and year observation. In those cases, we impute missing values based on an estimated trend constructed on the non-missing values. We impute these values because missing observations in the middle of the time period can raise econometric issues for the GLS model, which would mean all observations for that country need to be dropped. We do not have information in any year for spending on active labour market policies (ALMP) for Iceland or the sector structure ratio for Malta. We set the former to 0 and the latter to 1 in all years, but note that the specific level is irrelevant given the fixed effect approach.[25]

5 Methodology

Empirical analysis using pooled cross-sectional data can be executed in a wide variety of ways. One fundamental question is whether to include fixed effects for time periods and/or countries.

[24] The GLS model does not allow for calculation of an R^2, but based on correlations between predicted and observed levels of poverty (corrected for degrees of freedom) and the R^2 of an equivalent OLS model, we obtain higher predictive power with this specification.

[25] We also conduct the analysis excluding all observations with missing variables. These results are very similar to those in the main analysis.

Other concerns relate to the specification of the error term, and the presence of nonstationarity. We rely on leading literature on panel data specifications, mainly from Baltagi (1995), Kittel and Winner (2005), and Beck and Katz (2011). The specification of the model depends on aspects of the data that are generally testable. The results from all tests are listed in Table A2. Based on these tests, we include time and unit fixed effects and correct for the presence of groupwise heteroskedasticity and serial correlation by specifying a GLS model with a heteroskedastic but uncorrelated error structure and an AR1 autocorrelation structure. We will employ models with alternative error specifications in our robustness section and see if our main conclusions remain intact.

As Kittel and Winner (2005) indicate, the presence of nonstationarity in the dependent variable is often neglected in pooled analysis in political economy. They find nonstationarity for an analysis on the determinants of social spending, which occurs because new governments can generally not immediately alter the social spending system, leading to persistence in measures of spending. Unit root tests reject nonstationarity in our context.[26] Nevertheless, unit root tests are known for their lack of power (Maddala and Kim, 1998; Maddala and Wu, 1999), and therefore we cannot fully rule out nonstationarity. When we include a lagged dependent variable in our model, the coefficient is statistically significant, although it is comparatively modest in magnitude (0.190). Section 7.2 will also present results for a first differences (FD) model and a lagged dependent variable (LDV) model. The main specification in our empirical analysis is a GLS specification with country (C_i) and time (T_t) fixed effects:

$$AROP_{it} = \alpha + \beta' S_{it} + \theta' T_{it} + \gamma' WI_{it} + \mu' Macro_{it} + \sigma' Skill_{it} + \lambda' LM_{it} + \delta' Demo + C_i + T_t + \epsilon_{it} \quad (1)$$

The indicator *i* identifies each country, while *t* denotes the time period. The outcome variable

[26] We employ the test from Levin et al. (2002) here, as the alternative test from Im et al. (2003) is more suited for models with panel-specific AR1 structures.

is the at-risk-of-poverty rate based on a 60% threshold of median equivalized household income (AROP). Equation 1 represents the full model, where all indicators of spending (*S*), taxation (*T*) work intensity (*WI*), macro-economic forces (*Macro*, skill determinants (*Skill*), labour market characteristics (*LM*) and demographics (*Demo*) are added. We estimate different reduced versions of this model as well, which will give an indication of the possible confounding effect of different groups of variables on the estimates for social spending.

6 Results

We will now present our empirical results. We will start out with a educed specification that only includes measures for social spending and household work intensity and add different sets of variables related to pro-poorness of transfers, taxation, macro-economic forces, education plus labour market characteristics, and demographics, in a stepwise manner. By analyzing how the estimates for social spending change for different specifications, we can assess to what extent the estimates in the reduced model are confounded by other factors. All results are summarized in Table 1.

6.1 Social spending

The first four rows of Table 1 show the effects of our spending and work poverty measures on at-risk-of-poverty rates. The analysis essentially requires one to control for differences in household employment. Because automatic stabilizers respond to increases in (work) poverty, there is a strong collinearity between changes in work poverty and changes in social spending. Failing to control for work intensity therefore results in a positive bias. This leads, in this case, to insignificant coefficients for transfer and pension spending (not shown). Once we control for work poverty, the coefficient for transfers is very robust to the inclusion of additional variables related to macro-economic forces, education, labour market institutions and characteristics, and demographics. Spending coefficients change little when we include country-specific (linear) time trends or

country-specific dummies for the crisis year 2009 (2010 in SILC).[27]

These estimates are net of a possible adverse labour supply effect of increased spending, as we include controls for household work intensity in all models. When we estimate the model from column (6) without both work intensity controls, the estimate still decreases (to -0.138) but is now statistically significant at the 5% level. Assuming that the bias from the effect of work poverty on spending through automatic stabilizers drives a large share of this difference, the underestimation of the effect because of potential labour supply effects of spending is likely not very large, given that we control for multiple other country characteristics. The magnitude of the effect of social spending in column (6) of Table 1 is relatively strong; it suggests that a one standard deviation increase in spending reduces the poverty rate by around 1.5 percentage points.

The effect for pension spending is somewhat more sensitive across specifications than the estimates for transfer spending. Presumably, the formation of extended families that is behind the existence of pension benefits in households with children is a response to perceived poverty risks. As such, pension benefits can respond strongly to, for example, reduced protection from labour market institutions or transfer spending. Results show that changes in pension benefits are correlated with changes in taxation, which explains the change in the pension coefficient when we compare column (1) to column (2).

The level of pension spending distributed to families with children is strongly connected to the prevalence of multigenerational households (*multigen*). Extended families can also have an independent effect on poverty, because resources are pooled while the equivalence factor increases less than proportionally. This potential effect will be incorporated in our pension coefficient. However, the coefficient for pension spending only reduces marginally when we add *multigen* and it remains statistically significant. The coefficient for *multigen* has a negative sign, but is statistically not significant. Hence, the pension coefficient appears to predominantly reflect the effect of increased benefits rather than the resource-sharing component. Because *multigen* does not have an independent effect on poverty, we exclude it from further analyses.

[27] These results are not shown but available on request.

The coefficients for pension and transfer spending lie relatively close to each other and are not statistically significantly different from each other. The slightly stronger estimated impact for pensions could be because the average pro-poorness for pensions is higher. Additionally, the size of households with high pension benefits and those with high transfer benefits can differ.[28] In a larger family, one equivalized euro of benefits can simultaneously lift multiple people out of poverty, which are each separately counted in the calculation of the poverty outcome. However, although families with pension benefits are larger as a whole, we observe that 'transfer-heavy' households and 'pensions-heavy household' tend to have roughly the same average amount of children. When evaluating the effectiveness of each type of spending, one has to keep in mind that pension benefits are mitigated more by the equivalence factor, as it is based on *total* household size, which is larger in 'pension-heavy' households with children. Thus, one euro of equivalized pension benefits requires more actual spending than one euro of equivalized transfer benefits.

6.2 Pro-poorness and taxes

6.2.1 Main results

The results from Table 1 show that the pro-poorness of both transfer spending and pension spending has a statistically significant and negative impact on child poverty. All results are standardized so that the coefficients represent the effect of an increase in pro-poorness by one standard deviation. The specific measures we employ in Table 1 are the 50/0 percentile ratio for transfer pro-poorness and the *share 0-50* measure for pensions. Table 1 also shows the effect of taxation measures on poverty. Tax rates and progressivity are negatively related to poverty, but only the progressivity effect is statistically significant. Progressivity is based on the 167/50 ratio of projected tax rates. The coefficients reflect the effect of a one percentage point increase in the tax rate and a one standard deviation increase in tax progressivity, respectively.

[28] It is also possible to obtain different coefficients when the adverse incentive effects of each type of spending differ. There is empirical evidence of potential adverse labour-supply effects for both transfer spending (Krueger and Meyer, 2002) and pension spending (Bertrand et al., 2003), but little is known about how they compare to each other in magnitude. Moreover, we control for differences in work intensity, which should largely capture such disparities.

The magnitude of these effects is relatively modest; an increase by one standard deviation reduces the poverty rate by 0.435 for transfer pro-poorness, 0.170 for pensions pro-poorness and 0.442 for tax progressivity. Adding the different sets of control variables in columns (3) to (6) in Table 1 has a modest impact on the coefficient for pro-poorness of transfers. The coefficient for transfer pro-poorness and tax progressivity both reduce somewhat when we control for education and labour market characteristics. The estimate for pro-poorness of pensions reduces slightly when we control for demographic characteristics.

6.2.2 Changing the pro-poorness and progressivity measures

We assess whether we obtain different results for alternative measures of pro-poorness or progressivity. Table 2 provides results for a range of alternatives. We vary the pro-poorness measures but keep the same measures for taxation in the top panel. Pro-poorness of transfers has a negative sign in all cases and is also statistically significant in the majority of alternatives. Variables that measure pro-poorness relative to the lowest decile exhibit larger estimates. For the pro-poorness of pensions, we employ the share of benefits going to the lowest 50% in all decile ratio alternatives, as we obtain unreliable values in other decile ratio alternatives for countries where pension spending is very low.[29] Most of these estimates are statistically significant at a 10% level.

In the lower panel, we vary the measure of tax progressivity, holding the pro-poorness measures constant. The estimates are only statistically significant in the cases where we use 50% of average earnings as the lower measure. Hence, it appears that tax progressivity at the bottom of the earnings distribution is mainly relevant. Note that the estimate for the 100/50 ratio is slightly larger than for the 167/50 measure we employ in the main analysis. We ultimately choose the 167/50 measure because it provides the highest total explanatory power for the model. The same applies for the 50/0 pro-poornerness measure for transfers, which has a lower coefficient that the *CC low* measure but also provides more total explanatory power.

The estimates of the effect of pro-poorness and progressivity on poverty can also depend on the

[29] In those cases, the values for a specific decile can be dominated by one or a few families.

definition of the poverty or inequality outcome used. Concentration coefficients might match better with Gini coefficients, as they are conceptually very similar. However, we do not find statistically significant estimates in that scenario or for any other measure of transfer pro-poorness when we use the Gini coefficient as an outcome. The *share 0-20* measure for pro-poorness of transfers is the strongest predictor among all alternatives when we employ the poverty gap as an outcome. For pro-poorness of pensions, the concentration coefficient alternative is a strong predictor of both poverty gaps and Gini coefficients.

The analysis defines pro-poorness based on a ranking on pre-transfer income. A possible concern with this approach is that taxes on transfers are already deducted for pre-transfer income (as they cannot be distinguished from taxes on income). To assess whether this can partly drive our estimates, we also conduct the analysis when we define pro-poorness based on post-transfer income. This leads to a very similar coefficient for pro-poorness of transfers. The pro-poorness of pension effect is somewhat more sensitive and is not statistically significant anymore.

6.2.3 Spending size and pro-poorness

Korpi and Palme (1998) indicate that increased targeting comes at the expense of benefit size. Correlational results between size and pro-poorness of benefits are shown in Figures A2 and A3. The figures portray concentration coefficients, which are essentially inverse measures of pro-poorness. Hence, pro-poorness of transfers is positively related to the size of transfers, which is in contrast with Korpi and Palme (1998), but more in line with recent research (Kenworthy, 2011; Marx et al., 2013). On the other hand, the relation is negative for pensions. This discrepancy likely reflects the different nature of each type of benefit. Where targeting of transfers is mainly decided by government policy, pension benefits for families with children are the result of the formation of extended families. The negative correlation for pensions indicates that when extended families are rare (i.e. when mean pension income for families with children is low) they form among very poor families.

We also estimate the relation between the size and the pro-poorness of spending using a similar fixed effect GLS model as in the main analysis. We identify a negative coefficient for both transfers

and pensions. Hence, positive changes in the size of spending are related to negative changes in pro-poorness, which is more in line with the claims from Korpi and Palme (1998) that there is a tradeoff between these two aspects of social spending, while it contrasts with the cross-sectional correlation from Figure A2. The negative estimate is obtained for both the concentration coefficient and the 50/0 ratio, and is identified both with a fixed effect and a first differences model. The relationship is marginally stronger in the pre-crisis period, but is negative and statistically significant within the crisis period (SILC 2009-SILC 2012) as well. The result also appears consistent across geographical areas.[30]

The positive cross-sectional relationship between spending size and pro-poorness originates mainly from the earliest SILC waves. The negative inter-temporal relationship leads to a weakening correlation over time, which is no longer statistically significant in later waves.[31] Hence, the cross-sectional pattern appears to move somewhat back in the direction of that found by Korpi and Palme (1998). The differences in the cross-sectional correlations across different time periods and the contract between cross-sectional and inter-temporal correlation suggest a constantly changing dynamic between size and pro-poorness of spending. We can only assess this relationship over a relatively short period of 8 years. Further research that assesses a longer time frame is needed to analyze this dynamic from a broader perspective.

6.3 Additional variables

Here, we briefly discuss the results for other variables than those related to redistribution. All columns in Table 1 contain controls for work poverty and severe work poverty. The estimates from the latter columns are sizable, suggesting that an increase in work poverty by 1 standard deviation (around 10 percentage points) increases the poverty rate by more than 2 percentage points. The coefficient for severe work poverty is larger, but expressed in standard deviations the coefficient is

[30] When we include interactions between pro-poorness and geographical area, we obtain negative coefficients for all areas and statistically significant estimates for all but the Southern and Central European welfare states.

[31] The cross-sectional correlation becomes statistically insignificant from SILC 2007 on, hence before the advent of the crisis already.

less than 1.

In columns (3) to (5) of Table 1, we add sets of variables related to macro-economic forces, characteristics of the labour force (including educational attainment) and demographics, respectively.[32] Column (3) shows that GDP growth has a negative impact on poverty. A larger high-skilled relative to medium-skilled industry sector is strongly related to higher poverty. This result relates to findings from Autor et al. (2003) and others that job losses in the medium-skilled sector are responsible for increases in inequality in recent decades. We also obtain statistically significant and negative coefficients for business expenditures in R&D and for imports from less developed nations. No statistically significant effects are identified for inward or outward foreign direct investment.

Column (4) identifies a negative effect for educational attainment. The effect of education is strongest when defined as a ratio of high to low educational attainment (but also statistically significant for alternative definitions).[33] The fact that education matters even when we control for work intensity is a strong result, as the level of educational attainment likely affects employment positively as well (the coefficient indeed increases somewhat when we exclude controls for work poverty). Moreover, our estimation approach measures the impact of short-term changes in the relative level of education in the country. It is likely that the impact is larger in the long run, as individuals become fully integrated in the labour market.[34] We also identify a positive effect for female labour force participation, the share of self-employed and use of child care services.[35]

No statistically significant effects were identified for the degree of unionization, degree of centrality of wage bargaining, level of minimum wage or level of replacement wages. Excluding controls for work poverty does not change this result. Multiple of these variables change little over

[32] Not all these effects are included in Table 1 for practical reasons, but they are available on request.

[33] The effect of education is stronger when defined for the sample as a whole than when defined strictly for families with children. This strongly suggests that we mainly measure a labour supply effect here; the earnings of the high-skilled are lower when there is a higher supply of high-skilled individuals in society.

[34] High school dropout can even have a short-time negative effect on poverty, if the dropout starts earning an income for his family.

[35] The effect for female labour force participation is conditional on controlling for overall work poverty. Hence, it signals that work poverty increases when the relative contribution of women to the labour market increases, holding total work intensity constant.

the time frame under examination which could possibly explain the low coefficients. Although these results are therefore inconclusive, adding institutional measures serves as a good robustness check, as institutional changes can be correlated with changes in spending levels. Adding these variables to the model leaves the coefficient for transfers unchanged, while the effect for pension spending modestly increases.

Column (5) adds demographic characteristics. Migration from non-EU countries is related to higher poverty. Higher young age dependency ratios also lead to higher poverty, possibly because they imply that resources need to be shared across more household members; more children implies that one needs to earn a higher (unequivalized) income to stay above the same poverty threshold. We find no statistically significant estimates for old age dependency. The estimate for the share of single parent families is statistically significant in the specification in column (5), but not anymore in column (6).[36]

6.4 Decomposing cross-country differences in poverty

The analysis has identified several significant determinants of poverty. These determinants are identified through exploiting changes in each indicator over time. An interesting separate question is to what extent these identified effects can explain *cross-sectional* differences in poverty rates, and how relevant social spending is in that context. For this purpose, we execute a simple decomposition analysis, using the coefficients from column (6) of Table 1 and the values of each relevant country-level characteristic to assess how they can explain disparities in poverty. We start out with the deviation between the country's mean poverty rate and the poverty rate in the sample and then account for each group of indicators step by step, by subtracting the product of the estimated coefficient and the difference between the country-mean and the sample-mean for each indicator. The remaining or conditional deviations from the mean are conceptually equivalent to country fixed

[36] A possible explanation for the lack of a statistically significant impact of single parent families could lie in the fact that the average income of single parent families increases over time in our data. Hence, it appears that 'new' single parent families are not necessarily poor families.

effects.[37] We split up the sample in countries that formerly had a communist regime and countries that did not and define the deviation from the sample mean in every variable relative to the specific group one belongs to. This prevents that the size of the bars is strongly dominated by the fact that both mean poverty levels and mean levels of other country-level indicators are very different between the two groups of countries. The coefficients are still based on the estimates from the total sample.

We emphasize that this is a simplified exercise that does not take into account heterogeneity in impacts across countries or interactions between the different explanatory variables,[38] and also assumes that we can evaluate each of these components in isolation. Moreover, data collection in SILC is executed in different ways in different countries, which should be largely captured by the country fixed effects in our regression analysis, but will have much more pronounced effects in the decomposition analysis presented here. Additionally, explanatory factors of cross-country differences in poverty that are structural and invariant over time are difficult to identify. The design of labour market institutions is one typical example. The same holds true for variables that only have effects on poverty in the long run. Nevertheless, this analysis reveals some interesting insights.

Figures 5 and 6 show the results for this decomposition exercise for each group of countries. The black bars indicate the deviation from the mean poverty rate. When the coloured bars are on the opposite side of the x-axis than the baseline bar, they highlight components that can explain (part of) that deviating poverty record (i.e. low work poverty for countries with low poverty rates or low social spending for countries with high poverty rates). When the coloured bars are on the same side of the x-axis as the black bars, they highlight components that further increase the unexplained (conditional) deviation from the mean poverty rate (i.e. high spending in a country with a high poverty rate, such as in Ireland).

Starting with the group of 'Western' countries (Figure 5), this exercise shows that above-average poverty rates can partially be explained by low social spending and high work poverty

[37] With the exception that the fixed effects are calculated with respect to a certain benchmark, while our values are calculated relative to an average.

[38] Although the sensitivity analysis in Section 7.4 suggests that both heterogeneity and the size of the interactions are not that large.

levels. The weak performance of Spain, Greece and Italy is largely related to low social spending, while Ireland's and the UK's above-average poverty rates are mainly related to work poverty, and, to a lesser extent, demographics. Among those with low poverty rates, spending and work poverty explain some but not all of the good records of Denmark, Finland, Iceland and Norway, while they more than explain the below-average poverty rate of Sweden. Accounting for differences in pro-poorness and taxes reduces the conditional deviations from the mean poverty rate in most countries in Figure 5, but not by a large margin.

For the ex-communist countries in Figure 6, the total explanatory power of spending and work poverty is comparably lower. Low work poverty explains a large part of the good record of Slovenia and, to a lesser extent, Slovakia. Pro-poorness and taxation are important factors for several ex-communistic welfare states. High average educational attainment explains some of the good record of the Czech Republic. For Hungary, its average record becomes 'below average' when we take their high level of social spending into account, but that can largely be explained again by high work poverty. Spending, work poverty and taxation each explain a part of Bulgaria's poor record.

Accounting for differences in macro-economic variables increases the poverty disparities in the majority of countries. This increase is rather modest because accounting for GDP growth decreases the disparities, which partially offsets the increasing impact from BERD, imports from less developed countries and, especially, sector structure differences. If we would isolate the effect of these three characteristics in the figures, there would be a substantial increase in the conditional disparities in virtually all welfare states. Moreover, these increases would be much stronger if we would group all countries together, as the difference in macroeconomic variables between ex-communist countries and the rest of the sample is very large. The result illustrates the different nature of variation in poverty over time and variation in poverty across countries. A relatively shrinking medium-skilled sector increases poverty over time but a relatively large high-skilled sector also likely reflects a good infrastructure, high worker productivity and other characteristics that can have positive spillovers to equality. It also suggests that unexplained factors that lead to differences in poverty rates across countries might be the same factors that have led to strong

cross-country differences in the relative size of the high-skilled sector, given how strong the cross-sectional correlation is with the poverty rate.[39] Part of these characteristics should be reflected in the human capital level of the population, but with our method we can only infer the effect of changes in average educational attainment in the short run. Moreover, educational attainment levels are standardized across countries, while a higher education degree will probably not reflect the very same skill level across all European countries.

We can conclude from Figures 5 and 6 that the factors we include in the model explain large shares of cross-country differences. However, because several indicators increase the (conditional) deviation from the mean poverty rate, there still remain substantial unexplained disparities (also because in some cases the variables 'more than explain' the deviation from the poverty rate). These likely relate to characteristics that are more structural over time and therefore difficult to assess in this model. Additionally, the unexplained disparities are higher when we would group all countries together. Hence, the substantial difference in poverty rates *between* the ex-communist countries and the rest of the sample remains largely unexplained. This indicates that there is some unobserved factor or combination of factors that reflects a structural difference between the average poverty rates of each set of countries.

Although the effect of social spending in the fixed effect analysis is rather strong, it only has limited explanatory power with respect to cross-sectional differences in poverty rates across Europe (it reduces conditional disparities only by around 2% on average). This is mainly because countries with higher poverty rates do not necessarily have low transfer spending (for families with children) and vice versa, as Figure 3 already showed. Moreover, countries with low transfer benefits often distribute more pension benefits to families with children. The explanatory power of social spending with respect to *changes over time*, on the other hand, is relatively strong. Since a GLS model does not allow for the calculation of a traditional R^2, we rely on results from an equivalent OLS fixed effect model here. The within-R^2 of that model is 0.45.[40] A large share of that

[39] The cross-sectional correlation between the mean poverty level and the mean sector structure equals -0.63.

[40] Since the estimates are slightly lower in this model than in the main GLS model, it is likely that the explanatory power of the latter is somewhat higher, but this difference should not be large.

variation is explained by spending and work intensity; a fixed effect model including only these variables explains 23% of all variation over time. This increases to 29% when we add pro-poorness and taxes.

7 Robustness

In this section, we will analyze how robust the main findings from Model 1 are. We conduct an estimation based on regional-level data as an alternative approach, and also assess sensitivity to different econometric models and sample compositions. Furthermore, we estimate the effects of our main explanatory variables on alternative measures of poverty and inequality, and assess whether the estimated impacts inhibit heterogeneity.

7.1 Region Analysis

We conduct an analysis of the effect of social spending on poverty based on regional-level, rather than country-level, macro-data. There are eight countries for which SILC distinguishes (the same) regions in every cohort (Austria, Belgium, Czech Republic, France, Italy, Hungary, Poland and Spain). Six other countries only distinguish regions for some years or they change the exact regions they distinguish at a certain point in time (Finland, Germany, Greece, Romania, Sweden and the UK). All other countries only have country-level identifiers in all SILC waves. We conduct the analysis for those eight countries where regions are reported consistently through all cohorts. In some cases, we merge (geographically adjacent) regions because they have too few observations when included individually. The total sample consists of 31 regions, and a total of 214 observations. We ensure that each region has at least 500 observations in every SILC wave, and conduct also an alternative approach where the threshold lies at 1,000 observations.

Relying on regions provides a different source of variation than the country-analysis does. There are two estimation approaches we can take. In a within-region analysis, we rely on variation over time and there is no conceptual difference with our country approach, apart from having a

different unit of observation and sample composition. The model is equal to Model 1, only now *i* indicates regions. As we do not have data on macro-economic forces and labour market institutions at the regional level, these variables (size of vocational education, BERD, imports; i.e. measures not derived from EU SILC) are entered into the model as measured on a country-level. We do include measures of regional GDP and GDP growth, as these are reported by Eurostat by NUTS region.

An alternative approach would be to execute a between-region analysis, where we control for every possible interaction between country dummies and time dummies. This results in a model that strictly uses variation across regions in a given country, at a given point in time. One of the benefits of this model is that effects are less likely to be confounded by differences in institutions, as these are (predominantly) equal across the country. Variation in spending levels occurs because eligibility is at least partly based on country-wide conditions, while regions can strongly differ in mean and median income. When we define poverty based on a region-specific threshold (which is more a measure of inequality rather than of poverty), differences in median income should not affect poverty rates directly. Essentially, the (partial) homogeneity of the ex-ante system ensures that richer regions 'transfer' income to poorer regions. Given that we control for other determinants of poverty that can differ across regions, such as work intensity, demographics, level of education and the relative size of industry sectors, we can exploit this occurrence of inter-regional transfers to assess the effect of spending on internal inequality. We do not include pro-poorness measures in this model, as the concept of region-specific pro-poorness is difficult to grasp. Although the rankings on household income will be different when executed on a regional level, the resulting variation in concentration coefficients is still very small, and likely dominated by measurement error.[41] Additionally, all variables for which we do not have measures on a regional level are not included in the between-region analysis. The within model includes several additional variables that are not included in Model 1: old age dependency, the share of single parents, the share of workless households and average hours worked above full-time.

[41] Including such measures does not affect the coefficient for spending but leads to very large coefficients and standard errors for the pro-poorness estimates.

The regional analysis mainly serves as an additional robustness exercise. The within-region analysis assesses whether the results are sensitive to employing a different unit of observation, and can also indicate how results change if the sample size of the micro-data becomes smaller. The between-region analysis assesses whether a method that relies on a different source of variation gives similar results. Where the fixed effect country analysis assumes that there are no unobserved changes over time within countries that can confound the estimates of the effect of social spending on poverty, the between-region analysis assumes that there are no confounding unobserved differences between regions at a given point in time. One particular aspect of the between-region analysis is that it implicitly controls for changes in institutional variables over time. Such (unobserved) changes in institutional characteristics are a serious identification threat to our (country-level) fixed effect estimates.

Results for this analysis are presented in Table 3. The dependent variable is based on a region-specific poverty threshold, and benefits are expressed as a share of mean regional income, as we strictly focus on internal regional inequality. The first row of Table 3 shows results for the within-region analysis. The results are very similar to the country-level results in Table 1. The transfer coefficient is very similar, while the pension coefficient is somewhat larger. The latter is mainly due to the sample composition, as the pension effects is also somewhat stronger for this group of countries in the country-level analysis. The standard errors are slightly larger than in Table 1. Hence, relying on smaller micro-samples has an impact on the precision of the estimates, but it is relatively modest in magnitude.

The next row of Table 3 reports results for the between-region analysis. Again, we obtain very comparable coefficients for our spending variables. Hence, estimates based on variation in poverty and spending levels over time, provided that they are controlled for work poverty, give very similar results as estimates based on variation between regions in a country at a given point in time, controlled for work poverty and additional variables related to demographics and the labour market structure of the region. In panel B, we reproduce this analysis when we merge certain geographically adjacent regions to ensure that each region has at least 1,000 observations in every

wave rather than 500. This sample contains 26 regions and 182 total observations. Results for spending are very similar to what we obtain in panel A and also to the results from Table 1.

The similarity between the results from the fixed effect country analysis and the between-region analysis can be interpreted in two ways. Either both models estimate the true effect of social spending very accurately, or the bias from unobserved changes within countries over time and the bias from unobserved differences between regions at a given point in time are of equal sign and size. The consistency in the estimates for social spending across the specifications in Table 1 furthermore suggests that this would require that the bias from unobserved changes within countries is not correlated with other observable determinants of poverty included in our model, other than work poverty.

7.2 Sensitivity analysis

7.2.1 Sensitivity to model specification

We address sensitivity to model specifications and sample composition here. Table A3 shows that the transfer coefficient is very consistent across all possible specifications. The slightly lower estimates from the FD and LDV models is largely because we lose the first observation for each country; executing the base model on the same sample gives a a coefficient of -0.179. The lagged dependent variable carries a statistically significant coefficient, but it is not large in magnitude. The variation for the pension coefficient is also moderate. We include the model without fixed effects to illustrate how neglecting to take into account such effects changes the picture for especially pension spending dramatically. The effect for transfers is only marginally higher without unit fixed effects.

7.2.2 Sensitivity to sample composition

Table A4 shows a similar pattern when we look at sensitivity towards sample composition. We exclude certain time periods and country groups, and also conduct a jackknife exercise where

we drop each country in turn and report the minimum and maximum estimate for each spending coefficient. The coefficients for the spending size effects are very robust, and the pro-poorness estimates are also rather consistent. The estimated tax effects are more volatile. The impact of the tax rate is larger when we drop early time periods and if we drop small countries from the sample. The impact of tax progressivity as well as transfer pro-poorness appears stronger when we drop crisis years. We will further elaborate on such heterogeneity in Section 7.4.

The estimates of the size of social spending change only very little when we exclude the crisis years. Hence, although the variation over time in our measures will largely be driven by cyclical forces, the estimated effects for spending size are not very different when estimated in periods with very different economic circumstances.[42]

Finally, choosing a different equivalence scale has a minimal effect on the transfer size coefficient, but increases the pension size coefficient. The alternative equivalence scale is lower for larger families, especially when they include elderly family members. Because the income of (large) families with children and pension income is mitigated less under the alternative equivalence scale, they are less likely to fall far below the poverty line before benefits, which might explain why pension benefits are more effective in lifting such families out of poverty. Nevertheless, the difference in coefficients is rather limited. The effects for pro-poorness and taxation are very similar under the alternative equivalence scale.

7.3 Alternative outcomes

Table A5 shows results for the same specification as in column (6) from Table 1 using alternative measures of poverty and inequality as outcome variables. The first two columns show results for pre-transfer poverty and poverty reduction. These results are shown for illustrative purposes, as they should be interpreted with caution. Both outcomes are based on a counterfactual situation

[42]This can be partly because the poverty rate we employ is a relative measure, based on a floating threshold. Figure 1 has already shown that the difference in poverty rates between SILC 2008 en SILC 2012 are modest in the majority of European countries. When we use a poverty rate based on a fixed threshold over time instead, the effect of social spending is much more volatile across the defined time frames.

that will not exist in practice. This is exacerbated in analyses based on SILC data, as pre-transfer income already subtracts taxes on transfers (which cannot be distinguished from taxes on income). As this especially lowers the income of poor families, this will lead to an overestimation of both pre-transfer poverty and poverty reduction levels. This will also lead to direct reverse causality between spending and pre-transfer poverty; if benefits increase, so do (absolute) taxes paid on benefits. This will decrease pre-transfer income and increase at-risk-of-poverty rates. This could explain the positive coefficients for social spending in the first column, although they can potentially be caused by disincentive effects (which would have to be net of work poverty effects) as well.

The impact of social spending is substantially stronger for the work poor, which naturally face a higher risk of ending up in poverty in absence of transfers. There is no statistically significant effect of either spending variable on poverty among the work rich. Pro-poorness effects are stronger when poverty among the work rich is used as an outcome, however. Social spending for both cash transfers and pensions also affects deeper measures of poverty, i.e. the poverty gap and the poverty rate with a 40% threshold of median income. Pension spending appears especially effective in reducing the Gini coefficient (which is calculated among those aged below 18). There is no statistically significant impact from pro-poorness of transfers on the Gini, for any of the alternatives we employ.

7.4 Interaction effects

Table A4 already showed that heterogeneity towards the defined timeframe is low, and that the results also change little when we exclude certain (groups of) countries. In this section, we analyze whether estimates are heterogeneous with respect to certain country characteristics (Table 7.4). In general, there is not enough statistical power to estimate heterogeneity across different dimensions, which is reflected in the large standard errors of the interaction terms, but some interesting results still emerge.

As mentioned before, the effects for social spending do not differ much in either the pre- or

post-crisis period. This does not apply to the effect of pro-poorness of transfers. The estimate for transfer pro-poorness is strong in pre-crisis years but non-existent during the crisis period. However, we do obtain statistically significant negative estimates for most other measure of pro-poorness than the 50/0 percentile ratio. It appears that increased targeting of the poor at the expense of the rich is mainly effective in reducing poverty rates in crisis years, while increased targeting of the poor at the expense of median earners is more effective in pre-crisis years.

Table 7.4 further shows that pro-poorness of pensions is more effective in ex-communist countries and that the impact of transfer size is stronger in countries with high mean poverty rates. The interaction between transfer spending and high poverty, which is marginally significant, is largely driven by Ireland and Hungary. These are two countries with high pre-transfer poverty that appear to rely strongly on social spending to address poverty. Adding interactions between our spending variables and whether the country uses data from administrative sources produces coefficients that are very low and statistically insignificant.[43]

In the lower panel of Table 7.4, we estimate interactions between our main explanatory variables. Interactions between our main explanatory variables show that the impact of pension spending is weaker when work poverty is high. Naturally, pension benefits are not designed to protect families with children from income losses from unemployment. The result could suggest that pension benefits, which generally have to be spread across more family members, are not sufficient to completely rely upon when there is no supplementary income from labour. The interactions between pro-poorness and size of transfers and progressivity and the tax rate have a positive sign and are statistically significant, which suggests that each component works as a substitute for the other; e.g. the impact of transfer spending becomes weaker when pro-poorness is high.

As we mentioned before, it is crucial in this analysis that one controls for work poverty, as it correlates significantly with levels of social spending. However, controlling for work poverty is done through one homogeneous technology, while the effect of work poverty on at-risk-of-poverty rates can strongly differ across countries. We assessed whether this affects the estimates for social

[43]These results are not shown but available in request.

spending by adding interactions between every individual country indicators and work poverty. This leads to a very similar coefficient for transfer spending (-0.218) and pension spending (-0.293).

8 Conclusion

This paper has shown that social spending is an important determinant of child poverty. Reductions in social spending size would, ceteris paribus, lead to increased poverty risks among children. More specifically, the results suggest that an increase in average social spending as a share of equivalized household income by 1 percentage point would reduce poverty rates by around 0.265. We show that pension benefits should also be taken into account when analyzing the impact of spending on child poverty. Such benefits constitute a significant share of income for households with children in multiple European welfare states, and they are similarly effective in reducing poverty as cash transfers that are specifically designed for children and the working-age population. This contrasts with the cross-sectional observation that those countries that have high pension spending, both when measured within the child population and within the total population, have high poverty rates. It is possible that the 'pension-heaviness' of these welfare states has a crowding-out effect on spending and investments in alternative policies (e.g. cash transfers, investments in education, child care, active labour market policies etc.) which, in the long run, might be more effective in addressing child poverty. Additionally, there is a direct positive effect from increased overall pension spending on child poverty as it increases the poverty threshold. These welfare states face the challenge to improve the structure of their spending, while at the same time preventing short-term increases in child poverty from families that currently rely on pension spending.

Increased pro-poorness also reduces child poverty, but this effect is relatively more modest in magnitude and depends on both the exact definition of pro-poorness and the employed measure of poverty or inequality. We also analyze how size and pro-poorness of spending relate to each other, in light of the Korpi-Palme paradox that states that targeting towards the poor leads to a reduced

size of total benefits (Korpi and Palme, 1998). When we look at the cross-sectional relationship between size and pro-poorness, we see that the correlation has reversed; countries with higher (cash transfer) spending levels are also more pro-poor. However, *changes* in spending and *changes* in pro-poorness are negatively related. The discrepancy between the cross-sectional and the inter-temporal result suggest that the dynamic between spending size and pro-poorness changes over time. Additional research that incorporates a longer time frame is needed to further explore this relation.

The connections between the different components and subcomponents of poverty can confound the estimation of the effect of social spending on poverty. Therefore, we employ an extensive analysis that assesses to what extent estimates change when we add different sets of variables or employ other model specifications. Because automatic stabilizers directly respond to changes in employment levels, it is crucial that the analysis controls for work intensity of households. However, the coefficient for cash transfers is very robust to the inclusion of other controls or other specifications. We also conduct a similar analysis based on regional-level data. Controlling for differences in labour market characteristics, industry structure, demographics and educational attainment, we obtain coefficients for spending that are very similar to those in the country-level analysis.

Spending, work poverty, pro-poorness and taxation explain roughly 30% of the total variation in child poverty rates over time (of which 23% can be attributed to spending and work poverty), while the complete model explains roughly 46%. Although social spending is identified as a strong determinant of poverty in an analysis that controls for unit fixed effects, its explanatory power with respect to cross-sectional differences in poverty is relatively limited. Using SILC data on the child population and incorporating pension income weakens the traditional picture that countries with high poverty rates have low social spending. This automatically implies that spending can only explain a limited share of the total disparity in poverty. Still, differences in spending explain a substantial share of the above-average at-risk-of-poverty rates of Southern European countries. Variables related to household work intensity, pro-poorness, taxation, macro-economic forces, de-

mographics and education and labour market characteristics jointly explain a large share of cross-sectional disparities, but sizable unexplained differences remain. This unexplained cross-sectional variation in poverty rates across Europe likely relates to more structural country-level characteristics, which are difficult to identify in an analysis predominantly based on short-term variation over time.

There are limitations to each of the methods we employ in this paper. The country-level analysis can be confounded by unobservable factors that change over time and are also correlated with both spending and poverty. The regional analysis can be biased when there are unobserved differences between regions that affect both poverty and the measured size of social spending. However, the fact that two models relying on very different assumptions provide very similar findings lends additional validity to our estimation results. One would ideally want to estimate these effects based on data over a longer time period than eight years, both to improve precision and the assess whether they are robust across different macro-economic circumstances. Future research can analyze to what extent these results hold when we can estimate them data that covers a longer time period. Moreover, current macro-level estimation methods cannot reliably assess the impacts of variables that change little over time, or variables whose effect mainly lies in the long run. The best approach for identifying such effects would be to use longitudinal micro-data to exploit exogenous variation, for example though a policy change in a particular country.

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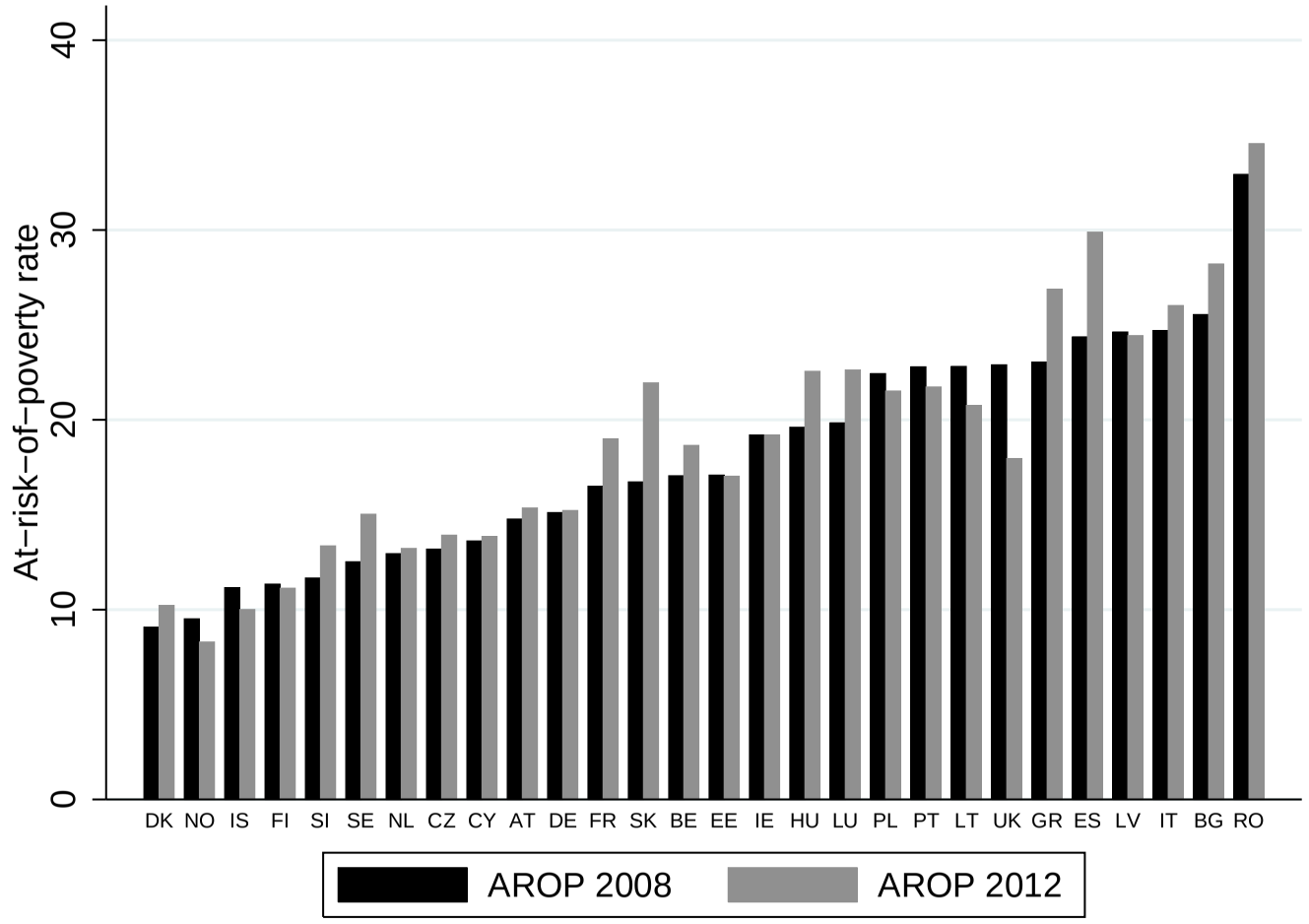
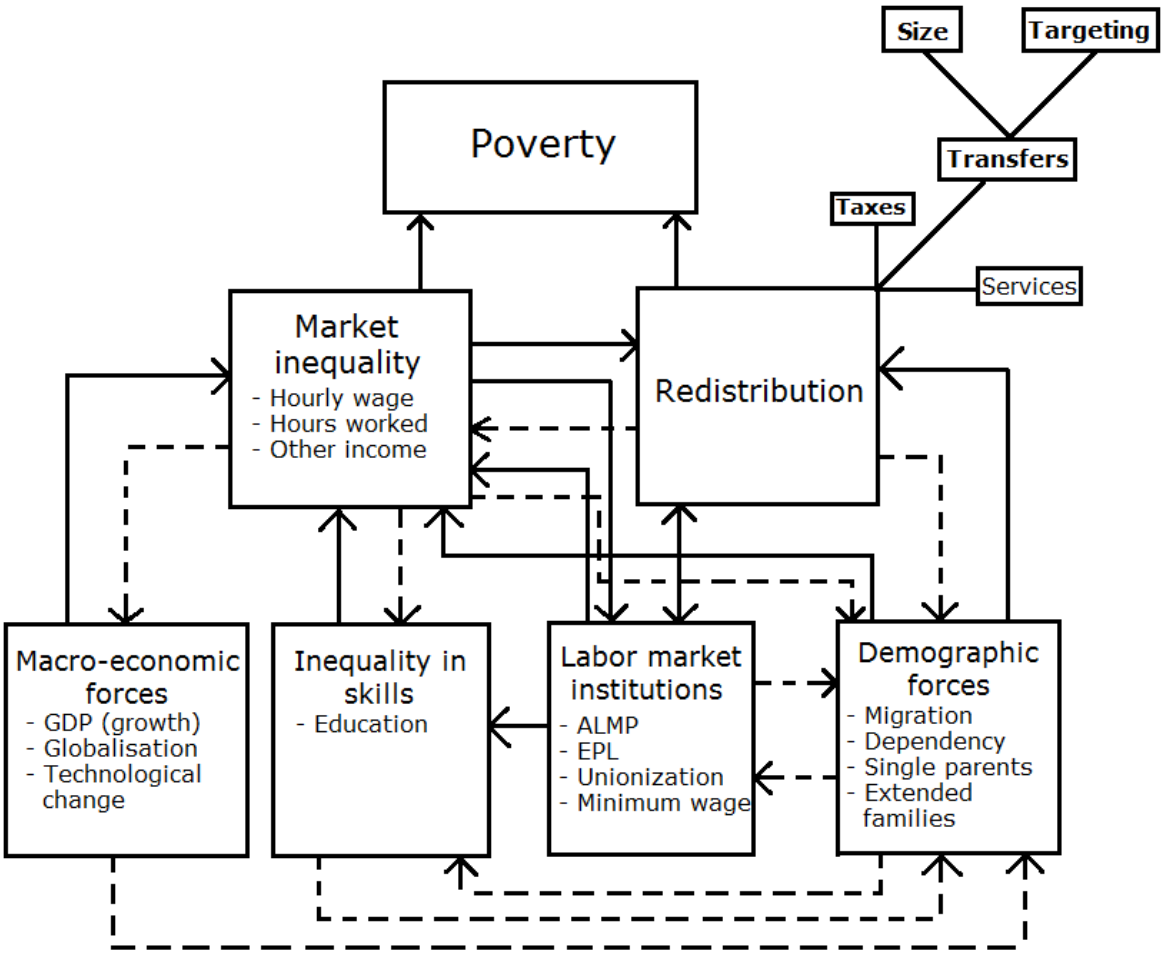
Figure 1: Poverty rates across Europe: SILC 2008 and 2012



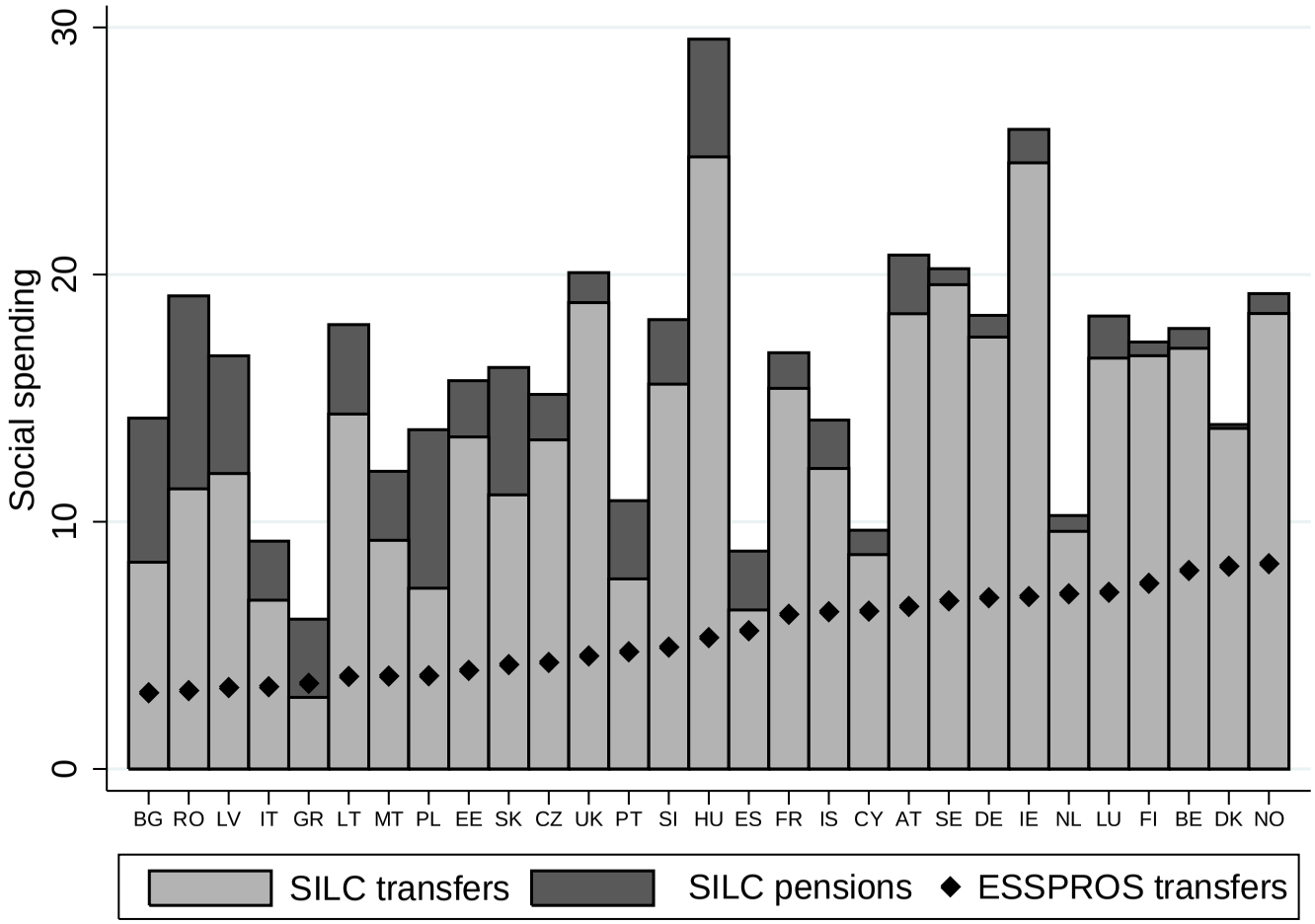
Notes: The figure shows at-risk-of-poverty rates (AROP), based on a threshold of 60% of median equivalized household income, for the EU SILC waves of 2008 and 2012. The figures are based on reported income on the years 2007 and 2011, respectively, as SILC contains incomes from the previous year for all countries but England and Ireland. Figures for England and Ireland are based on SILC 2007 and SILC 2011, as these countries report incomes over the current year.

Figure 2: Theoretical framework: determinants of poverty



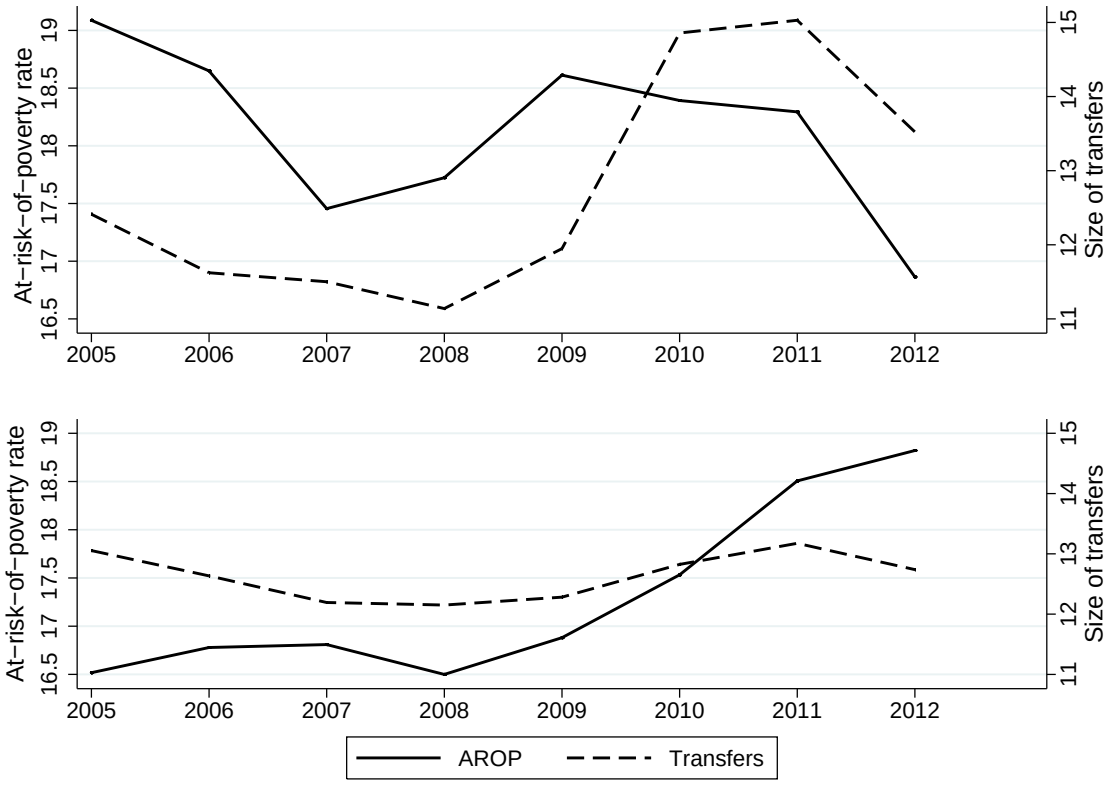
Notes: The figure portrays a theoretical framework of the determinants of poverty. ALMP = active labour market policies. EPL = employment protection legislation.

Figure 3: SILC spending vs. ESSPROS spending



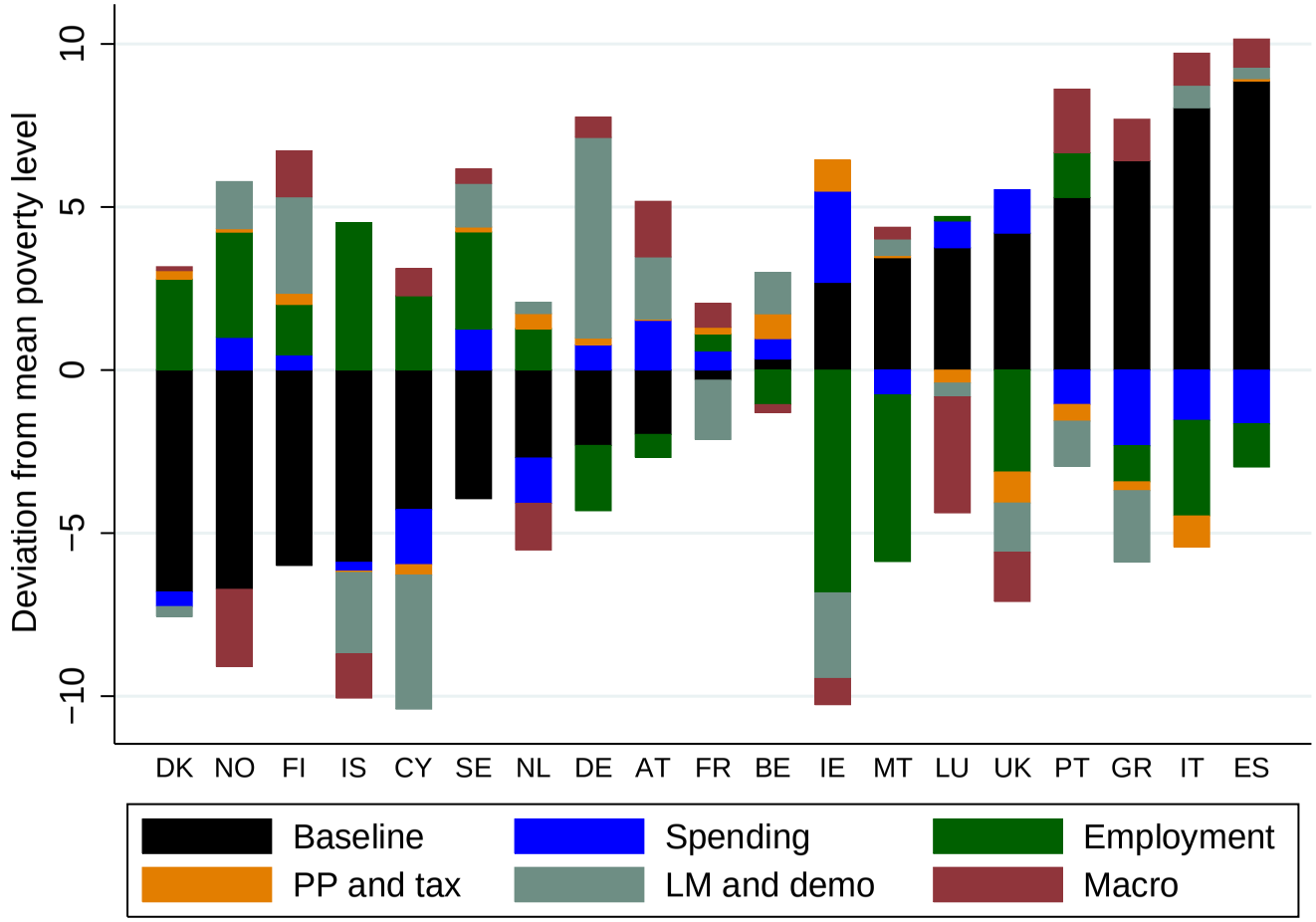
Notes: The figure shows a comparison between (administrative) ESSPROS data on spending (working age cash benefits; WACB) for the population as a whole versus SILC data on spending on both transfers and pensions for those aged 0-17. Both WACB and transfers include benefits for unemployment, sickness, disability, education, families and children, and non-elsewhere classified benefits. Pensions include old age and survivor benefits. ESSPROS data is expressed as a % of GDP, SILC data as a % of mean equivalized household income. Countries are ranked based on ESSPROS spending.

Figure 4: Trends in poverty and transfer spending



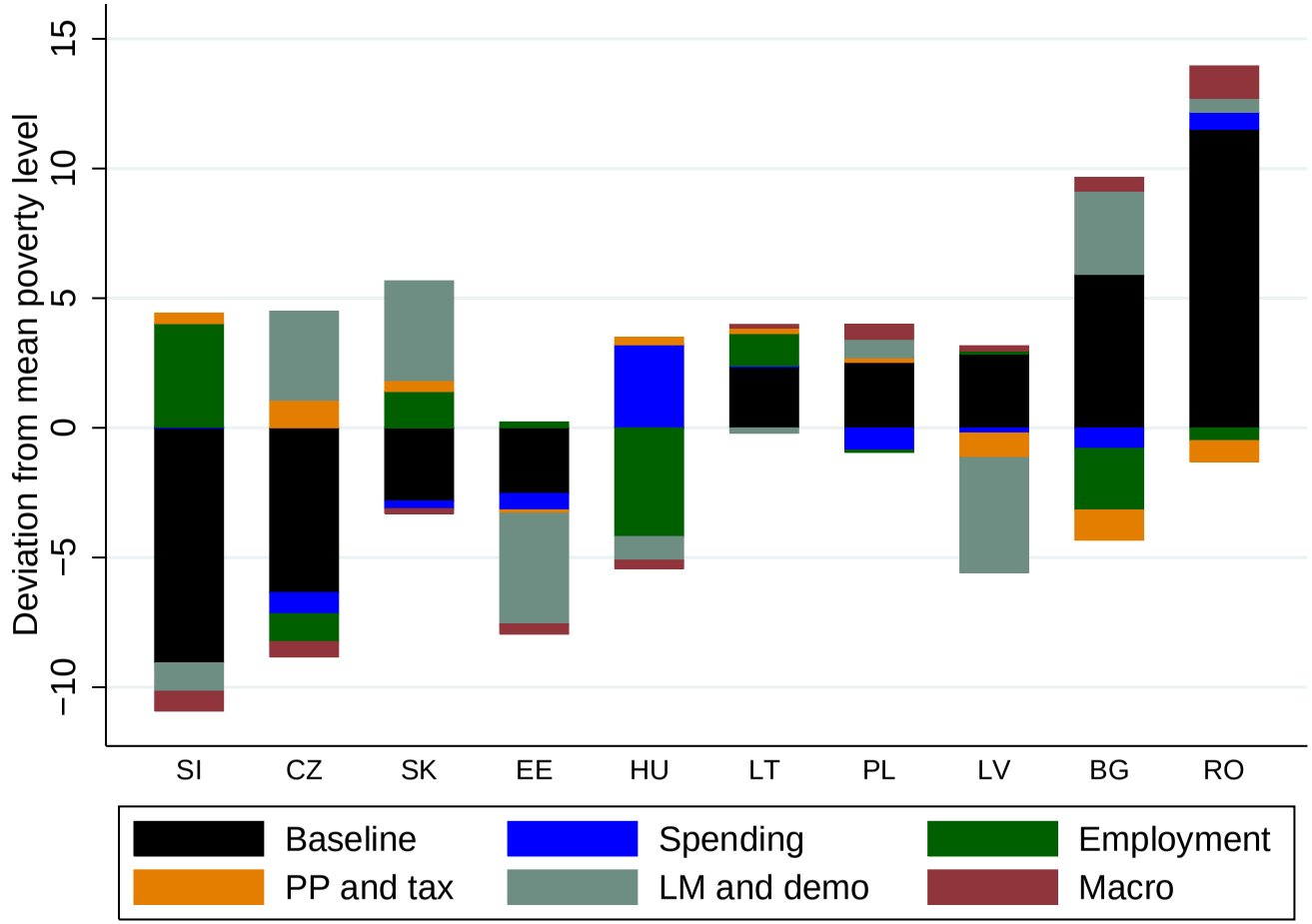
Notes: The figure shows trends in the at-risk-of-poverty rate (AROP; based on a threshold of 60% of median equivalized household income) and in the size of transfer spending distributed to those aged 0-17 (expressed as a share of mean equivalized household income) for SILC 2005-2012. The top panel shows trends for those countries with a decrease in the poverty rate between 2008 and 2012, while the bottom panel shows trends for countries with an increase in the poverty rate from 2008 to 2012. All data are based on EU SILC 2005-2012.

Figure 5: Decomposition of country fixed effects: non ex-communist countries



Notes: The figure shows how differences in variables related to spending, household employment (Employment), pro-poorness and taxes (PP and tax), labour market institutions, education, and demographics (LM and demo) and macro-economic forces (Macro) can explain differences in poverty rates. The black bars show the difference between the country mean poverty rate and the mean poverty rate of the sample of non ex-communist countries over SILC 2005-2012. The other bars show the explained disparity in poverty when we account for each set of variables. We therefore multiply the difference in the observed variable, taken relative to the mean value in the sample of non ex-communist countries, with the effect sizes we estimated in column (6) of Table 1. Bars on the opposite side of the baseline bar help to explain the deviations from mean poverty. Bars on the same side as the baseline bar means that accounting for these variables increases the disparity.

Figure 6: Decomposition of country fixed effects: ex-communist countries



Notes: The figure shows the same decomposition exercise as in Figure 5, but now for the sample of ex-communist countries. The first column shows the difference between the country mean poverty rate and the mean poverty rate of the sample of ex-communist countries over SILC 2005-2012.

Table 1: The determinants of poverty: country-level analysis

	(1)	(2)	(3)	(4)	(5)	(6)
Transfers	-0.270***	-0.257***	-0.277***	-0.274***	-0.257***	-0.265***
	(0.055)	(0.058)	(0.056)	(0.057)	(0.056)	(0.050)
Pensions	-0.407**	-0.491***	-0.584***	-0.503***	-0.404**	-0.335**
	(0.180)	(0.189)	(0.186)	(0.185)	(0.187)	(0.169)
PP transfers	-0.400***	-0.355***	-0.478***	-0.282**	-0.436***	-0.435***
	(0.134)	(0.133)	(0.152)	(0.130)	(0.138)	(0.137)
PP pensions	-0.156	-0.175*	-0.235**	-0.219**	-0.118	-0.170*
	(0.105)	(0.100)	(0.110)	(0.106)	(0.098)	(0.103)
Work poverty	0.058	0.058	0.042	0.098*	0.128***	0.205***
	(0.033)	(0.042)	(0.041)	(0.056)	(0.042)	(0.052)
Severe work	0.379***	0.381***	0.455***	0.413***	0.261***	0.238***
poverty	(0.069)	(0.072)	(0.069)	(0.072)	(0.076)	(0.073)
Tax rate		0.047	0.023	0.011	-0.023	-0.067
		(0.068)	(0.067)	(0.066)	(0.069)	(0.063)
Tax prog.		-0.668***	-0.673***	-0.497**	-0.616**	-0.442*
		(0.228)	(0.220)	(0.219)	(0.251)	(0.236)
GDP growth			-0.121***			-0.114***
			(0.026)			(0.024)
Sector			0.909			2.75***
structure			(0.835)			(0.826)
Education				-2.81***		-2.22***
				(0.752)		(0.756)
Self-empl.				0.114*		0.183***
				(0.067)		(0.061)
Migration					0.278***	0.304***
					(0.065)	(0.061)
Young age					0.299**	0.423***
dependency					(0.140)	(0.133)

Notes:*Significant at 10% level **Significant at 5% level ***Significant at 1% level
The table shows estimated effects of different variables on the at-risk-of-poverty rate (based on a threshold of 60% of median equivalized household income) for those aged 0-17, across different model specifications. All models include country and time fixed effects, and use a heteroskedastic error structure and AR1 autocorrelation structure. Transfer and pension spending size measure the average transfers and pensions received relative to mean equivalized household income. Pro-poorness (PP) measures are standardized with mean 0 and standard deviation 1. 'PP transfers' is measured by the ratio of transfer received by those with 0 pre-transfer income relative to those with median pre-transfer income and 'PP pensions' by the share of pensions going to the lower half of the pre-transfer income distribution. 'Tax rate' measures the implicit tax rate on labour. Tax progressivity (*Tax prog*) divides the projected tax rate at 167% of average earnings by the projected tax rate at 50% of average earnings (single with no children). For a description of other variables, see Table A1. Column (3) also includes GDP per capita, imports from less developed nations (both are also included in the models for column (6), patent applications and inward and outward foreign direct investment, column (4) also includes the size of vocational education, female labour force participation and use of child care (which are all also included for columns (6), column (5) also includes controls for old age dependency, assortative mating and share of single parent families.

Table 2: The effect of pro-poorness and progressivity on child poverty under different measures

Panel A: pro-poorness of spending								
	CC's	CC low	Share 0-20	Share 0-50	90/0	50/0	50/25	25/0
Transfer PP	-0.222	-1.04***	-0.538**	-0.568**	-0.305*	-0.435*	-0.074	-0.330**
	(0.308)	(0.306)	(0.242)	(0.248)	(0.179)	(0.137)	(0.087)	(0.148)
Pension PP	-0.086	-0.110	-0.059	-0.188*	-0.188*	-0.170*	-0.183*	-0.178*
	(0.109)	(0.174)	(0.121)	(0.108)	(0.106)	(0.103)	(0.107)	(0.107)
Panel B: tax progressivity								
	167/50	125/50	100/50	125/67	100/67	167/100		
Tax prog	-0.442*	-0.421*	-0.454**	0.243	0.158	-0.100		
	(0.236)	(0.232)	(0.230)	(0.189)	(0.151)	(0.303)		

Notes: The table shows the effects of pro-poorness of transfers and pensions and progressivity of taxes on child poverty (based on a threshold of 60% of median equivalized household income), under different definitions of the explanatory variables. All models further include all variables from the model in column (6) of Table 1. All variables are standardized with mean 0 and standard deviation 1, and are converted when necessary to reflect that higher values represent higher pro-poorness or progressivity. The first entry has concentration coefficients (CC) for both variables. 'CC half' uses CC's calculated on the bottom half of the distribution. 'Share 0-20' measures the share of benefits received by the lowest two deciles; 'share 0-50' measures the share received by the lowest five deciles. All other entries in panel A use ratios of benefits received for specific percentiles in the (pre-transfer) income distribution (where 0 refers to those with 0 pre-transfer earnings). For pensions, we use 'share 0-50' in all of the last 4 entries. Panel B reports tax progressivity for ratios using different levels of average earnings (all for a single person with no children). Taxes include income taxes and employees' social security contributions.

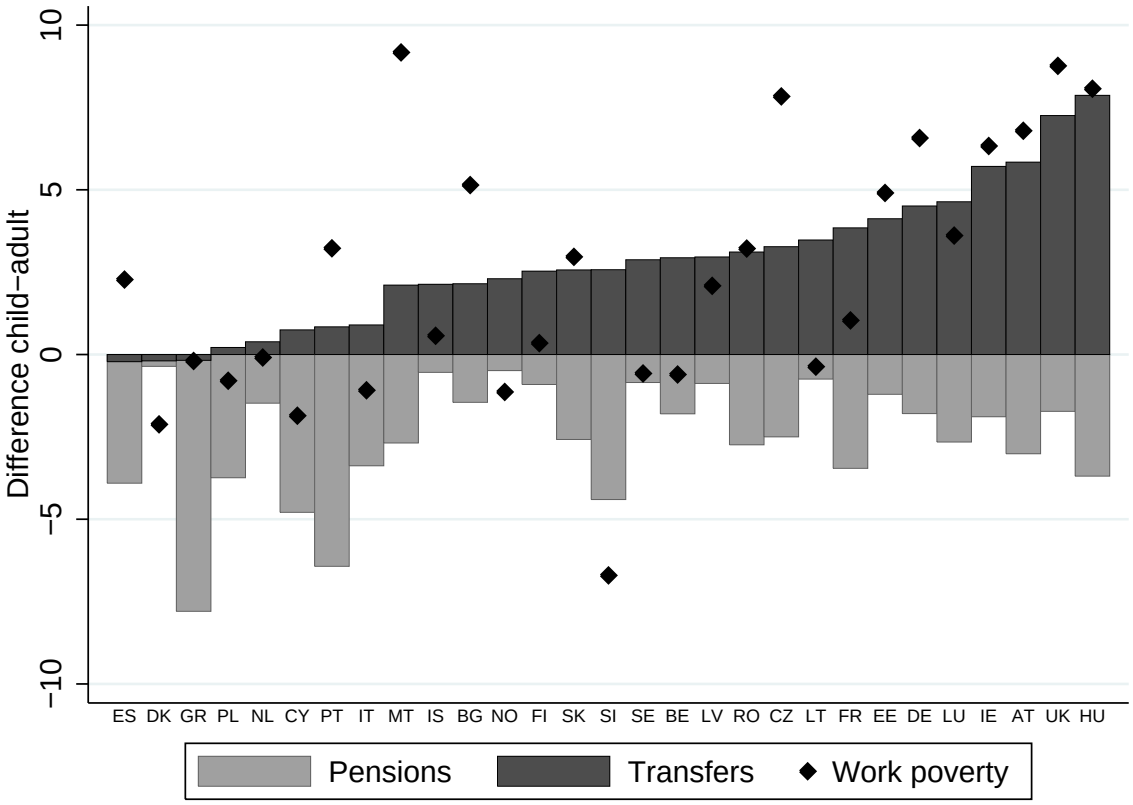
Table 3: The determinants of poverty: regional-level analysis

	Transfers	Pensions	PP transfers	PP pensions	Taxes	Tax prog.
Sample A						
Within	-0.224***	-0.724***	-0.260	0.010	0.084	-0.991
analysis	(0.081)	(0.206)	(0.262)	(0.255)	(0.140)	(0.619)
Between	-0.274**	-0.504***	-	-	-	-
analysis	(0.116)	(0.163)				
Sample B						
Within	-0.302***	-0.534***	-0.372	-0.042	0.188	-0.435
analysis	(0.087)	(0.261)	(0.272)	(0.254)	(0.136)	(0.372)
Between	-0.235***	-0.334**	-	-	-	-
analysis	(0.127)	(0.177)				

Notes: The table shows results from an analysis that measures variables defined on a regional level. We use a region-specific poverty threshold and also express transfers, pensions and taxes relative to mean regional equivalized household income. The two within analyses employ region fixed effects, while the between analyses employ dummies for every interaction between country and time period. Sample A is based on a regional composition where every region should contain at least 500 observations in every wave. Sample B employs a threshold of 1,000 observations instead. We use the variables included in the model from column (6) of Table 1 as a benchmark, but all macro-economic variables (except the relative size of different industry sectors and GDP) could not be measured on a regional level. These variables are excluded in the between analysis and entered as country-level variables in the within analysis. The between analysis additionally includes controls for female labour force participation, share of self-employed, old age dependency, share of single parents and share of workless households.

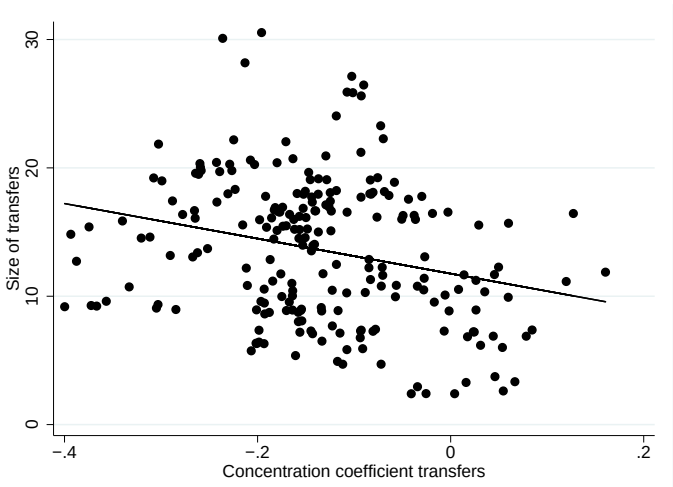
A Appendix figures and tables

Figure A1: Spending and work poverty: child vs. non-elderly population



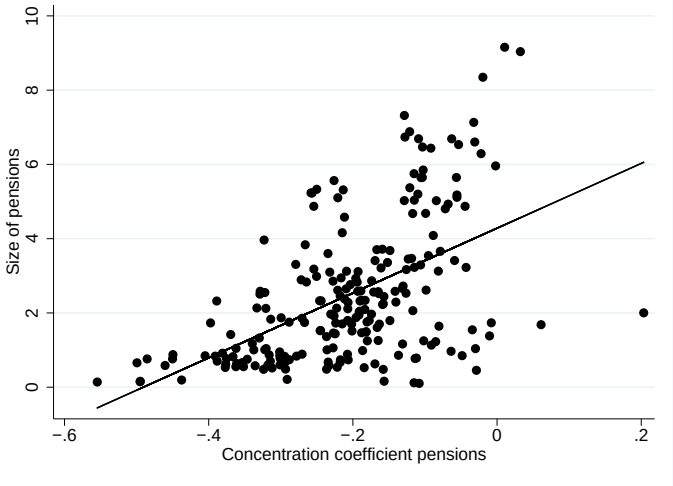
Notes: The figure shows differences in transfer spending, pension spending and household work poverty (work intensity below 55%) when they are calculated on the population 0-17 versus versus they are calculated based on the population 0-59. Spending levels are averaged over SILC 2005-2012 and are expressed as a share of mean equivalized household income.

Figure A2: Correlation between size and pro-poorness of transfers



Notes: The figure shows the correlation between the level of transfer spending expressed as a % of mean equivalized household income and the concentration coefficients (CC's) that measure the targeting of transfer spending, for all data points in our sample. CC's measure how transfers are distributed relative to the ranking on pre-transfer income and are essentially an inverse of pro-poorness; more negative values indicate that benefits are more targeted towards the poor.

Figure A3: Correlation between size and pro-poorness of pensions



Notes: The figure shows the correlation between the level of pension spending expressed as a % of mean equivalized household income and the concentration coefficients (CC's) that measure the targeting of pension spending, for all data points in our sample. CC's measure how pensions are distributed relative to the ranking on pre-transfer income and are essentially an inverse of pro-poorness; more negative values indicate that benefits are more targeted towards the poor.

Table A1: Description of control variables

Share work poor: share of households with work intensity below 55%. Individual work intensity is based on the number of months spent working, corrected for number of hours worked. It excludes full-time students between age 18 and 24. This is summed up for all working age adults in the household and divided by the total number of working age adults (age 18-59) in the household. This value is then averaged across the population aged 0-17. Source: SILC microdata (refers to own calculations based on SILC microdata throughout this table)

Share very work poor: share of households with work intensity below 0.2. Source: SILC microdata

GDP/capita: gross domestic product per capita in purchasing power parity. Source: Eurostat

GDP growth: % change in GDP from previous year. Source: Eurostat

Sector structure: share of employment in the high-skilled sector (legislators, managers, professionals, technicians and associate professionals) divided by the share of employment in the medium-skilled sector (craft and related trade workers, plant and machine operators and assemblers, skilled agricultural and fishery workers, service workers, shop and market sales workers, clerks). Source: SILC microdata

R&D expenditures: gross domestic expenditure on research and development, as a percentage of GDP. R&D comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications. Source: Eurostat.

Imports from less developed countries: value (at market prices) of imports from low and middle income countries, as a percentage of GDP. Low and middle income countries are those with per-capita gross national income below 12.275 US dollar in 2010 (which includes China). Source: own calculations based on Eurostat.

Education: ratio of population with high educational attainment (ISCED level 5-6) to population with low educational attainment (ISCED 0-2). Calculated on total population. Source: SILC microdata.

Vocational education: share of pupils in upper secondary education enrolled in a vocational stream. Source: Eurostat

Self-employment: share of those in employment that report being self-employed. Source: SILC microdata

Female labour force participation: average work intensity of women. Work intensity is based on the number of months spent working, corrected for number of hours worked. It excludes those below the age of 18 and above the age of 59 as well as full-time students between age 18 and 24. Source: SILC microdata.

Use of child care: average number of hours spent in center-based child care services for those aged under the age of 13. Source: SILC microdata.

Migration: share of households with at least one member born not in the reporting nation and not in another EU country. Calculated on the population as a whole. Source: SILC microdata

Young age dependency: ratio of population aged 0-14 to population 15-64 years. Source: Eurostat

Table A2: Panel data test statistics

	χ^2	p-value
F country	1290.42	0.000
F time	25.15	0.000
Heterosk.	1627.69	0.000
Autocorr.	31.08	0.000
CSD	0.859	0.390
	stat	p-value
LLC	-5.7992	0.000
LLC, trend	-6.1479	0.000
LLC, demean	-10.9243	0.000
LLC, demean trend	-14.9045	0.000

Notes: The table reports test statistics and p-values for: an F-test for country and time fixed effects, a modified Wald test for groupwise heteroskedasticity (Greene, 2000: 598), an LM test for AR1 autocorrelation (Baltagi, 2001: 95), and a Pesaran test for cross-sectional dependence (Pesaran, 2004). In panel B, we test for nonstationarity based on Levin et al. (2002). H_0 = nonstationarity. The test-statistic (*stat*) reports the adjusted t statistic. All tests are conducted on the model from column (6) of Table 1.

Table A3: Sensitivity with respect to model specification

	Transfers	Pensions	PP transfers	PP pensions	Tax rate	Tax prog	Lagged poverty
Base model	-0.265***	-0.335**	-0.435***	-0.170*	-0.067	-0.442*	-
	(0.050)	(0.169)	(0.137)	(0.103)	(0.251)	(0.236)	
No country FE	-0.261***	1.17***	-0.602***	-0.015	0.0029	-0.487**	-
	(0.056)	(0.179)	(0.167)	(0.117)	(0.047)	(0.216)	
OLS with FE	-0.295***	-0.255	-0.289	-0.199	-0.117	-0.580***	-
	(0.065)	(0.229)	(0.232)	(0.151)	(0.091)	(0.215)	
First differences	-0.198***	-0.267	-0.196	-0.110	-0.157*	-0.209	-
	(0.070)	(0.204)	(0.164)	(0.101)	(0.087)	(0.242)	
LDV model	-0.155***	-0.292*	-0.113	-0.256**	-0.152***	-0.583***	0.206***
	(0.054)	(0.165)	(0.135)	(0.115)	(0.059)	(0.205)	(0.049)
Prais-Winsten	-0.295***	-0.255	-0.291	-0.204	-0.116	-0.586**	-
	(0.061)	(0.192)	(0.185)	(0.133)	(0.076)	(0.268)	
Panel-spec. AR1	-0.254***	-0.346**	-0.379***	-0.091	-0.107**	-0.129	-
	(0.045)	(0.139)	(0.127)	(0.087)	(0.054)	(0.205)	
No error corr.	-0.295***	-0.255	-0.289	-0.199	-0.117	-0.580***	-
	(0.056)	(0.195)	(0.198)	(0.129)	(0.078)	(0.183)	
Lag sample	-0.179***	-0.252	-0.234*	-0.326***	-0.150**	-0.527**	
	(0.052)	(0.166)	(0.124)	(0.106)	(0.059	(0.221)	

Notes: The table shows results when we employ alternative model specifications. All cases include the same variables as in the model from column (6) of Table 1. 'FE' = fixed effects. 'LDV' = lagged dependent variable. 'Prais-Winsten' uses a Prais-Winsten transformed specification. 'Panel-spec. AR1' uses a panel-specific AR1 autocorrelation structure. 'No error corr.' means we do not correct for heteroskedasticity or autocorrelation. 'Lag sample' shows results for the main model when we exclude observations without a lagged observation, which is the same sample that is used for the FD and LDV models.

Table A4: Sensitivity with respect to sample composition

	Transfers	Pensions	PP transfers	PP pensions	Tax rate	Tax prog
Drop 2005	-0.261***	-0.318*	-0.207	-0.288**	-0.092	-0.542**
	(0.050)	(0.172)	(0.142)	(0.113)	(0.065)	(0.217)
Drop 2006	-0.230***	-0.310*	-0.435***	-0.233**	-0.073	-0.380
	(0.059)	(0.179)	(0.151)	(0.116)	(0.068)	(0.260)
Drop 2007	-0.212***	-0.311*	-0.406***	-0.175	-0.125**	-0.388*
	(0.051)	(0.174)	(0.158)	(0.111)	(0.062)	(0.207)
Drop 2008	-0.288***	-0.343**	-0.433***	-0.170	-0.056	-0.431
	(0.052)	(0.188)	(0.150)	(0.115)	(0.067)	(0.265)
Drop 2009	-0.294***	-0.336**	-0.366***	-0.205	-0.142**	-0.276
	(0.047)	(0.161)	(0.141)	(0.119)	(0.065)	(0.237)
Drop 2010	-0.252***	-0.448**	-0.503***	-0.113	-0.030	-0.609***
	(0.053)	(0.176)	(0.152)	(0.087)	(0.065)	(0.246)
Drop 2011	-0.261***	-0.337*	-0.518***	-0.124	-0.044	-0.626***
	(0.051)	(0.183)	(0.145)	(0.112)	(0.069)	(0.240)
Drop 2012	-0.263***	-0.267	-0.594***	-0.164	-0.104	-0.328
	(0.049)	(0.163)	(0.137)	(0.105)	(0.063)	(0.341)
Drop 2009-2012	-0.335***	-0.295*	-0.770***	0.102	-0.135*	-0.272
	(0.054)	(0.155)	(0.191)	(0.133)	(0.081)	(0.321)
Jackknife: Min. effect	-0.218***	-0.216	-0.440***	-0.143	-0.031	-0.480**
	(0.056)	(0.184)	(0.138)	(0.102)	(0.066)	(0.233)
Jackknife: Max. effect	-0.307***	-0.471***	-0.407***	-0.183***	-0.010	-0.517**
	(0.058)	(0.176)	(0.137)	(0.104)	(0.068)	(0.240)
Drop small	-0.343***	-0.392**	-0.491***	-0.298**	-0.129*	-0.658***
	(0.058)	(0.188)	(0.188)	(0.146)	(0.075)	(0.246)
Drop Scan.	-0.231***	-0.526***	-0.428***	-0.297*	0.011	-0.576**
	(0.056)	(0.179)	(0.151)	(0.174)	(0.072)	(0.223)
Alternative eq. scale	-0.231***	-0.526***	-0.428***	-0.297*	0.011	-0.576**
	(0.056)	(0.179)	(0.151)	(0.174)	(0.072)	(0.230)

Notes: The table shows results when we employ an alternative sample composition. All cases include the same variables as in the model of column (6) of Table 1. Jackknife means we discard each country from the sample in turn, and then report the minimum and maximum coefficients of all those 29 cases. For transfers and pensions we report a separate individual minimum and maximum. For all other variables, we report the coefficients from the case where the pension effect (which has most variation) is at its minimum or maximum. Small countries are Cyprus, Luxembourg, Iceland and Malta. Scandinavian (*Scan.*) countries are Denmark, Finland, Iceland, Norway and Sweden. The alternative equivalence scale uses $\sqrt{n}$ for household size rather than the OECD equivalence scale.

Table A5: Estimates of determinants for different definitions of poverty

	Pre-transfer poverty	Poverty reduction	Poverty work poor	Poverty work rich	Poverty gap	Poverty 40TH	Gini
Transfers	0.726***	1.03***	-0.667***	-0.0075	-0.459***	-0.217***	-0.317***
	(0.051)	(0.045)	(0.111)	(0.037)	(0.102)	(0.044)	(0.058)
Pensions	0.816***	1.08***	-0.251	-0.178	-0.560*	-0.323**	-0.438**
	(0.151)	(0.144)	(0.405)	(0.122)	(0.326)	(0.134)	(0.177)
PP transfers	0.040	0.526***	-0.286	-0.643***	-0.166	-0.313**	-0.168
	(0.140)	(0.121)	(0.343)	(0.101)	(0.325)	(0.133)	(0.155)
PP pensions	-0.027	0.233*	-0.491	-0.168**	-0.604**	-0.122	-0.552***
	(0.093)	(0.123)	(0.309)	(0.070)	(0.237)	(0.086)	(0.112)
Tax rate	-0.080	0.011	-0.310**	-0.109**	-0.344**	-0.090*	-0.0079
	(0.062)	(0.054)	(0.150)	(0.145)	(0.138)	(0.053)	(0.062)
Tax progr.	-0.068	-0.611***	-0.756	-0.392***	-0.379	0.045	0.164
	(0.163)	(0.190)	(0.489)	(0.127)	(0.474)	(0.168)	(0.0.206)
Work poverty	0.191***	-0.0052	-0.202*	-0.020	-0.077	0.041	-0.070
	(0.049)	(0.042)	(0.118)	(0.038)	(0.104)	(0.041)	(0.045)
Severe work	0.081	-0.143**	0.798***	0.224***	0.648***	0.329***	0.279***
poverty	(0.070)	(0.063)	(0.163)	(0.052)	(0.149)	(0.059)	(0.078)

Notes: The table shows results when we employ alternative measures of inequality than our standard child poverty measure. The model of column (6) of Table 1 is applied in all cases. Pre-transfer poverty is calculated after taxes. Poverty reduction measures poverty reduction through transfers, but not taxes. 'Poverty work poor' and 'poverty work rich' measure poverty among work poor (work intensity below 55%) and work rich (work intensity above 55%) families, respectively. Poverty 40TH refers to the poverty rate based on a threshold of 40% of median equivalized household income rather than the standard of 60%. The Gini coefficient is calculated within the population aged 0-17. Coefficients are multiplied by 100 in the Gini column.

Table A6: Interaction effects

		Transfers	Pensions	PP transfers	PP pensions	Tax rate	Tax prog
Crisis	Base	-0.403***	-0.427**	-0.974***	0.196	-0.157	-0.375
		(0.078)	(0.213)	(0.220)	(0.164)	(0.105)	(0.372)
	IA	0.226	-0.070	0.886***	-0.399*	0.039	0.132
		(0.121)	(0.290)	(0.278)	(0.207)	(0.142)	(0.413)
Ex-comm.	Base	-0.208**	-0.167	-0.422**	-0.030	-0.317***	-0.411*
		(0.087)	(0.305)	(0.180)	(0.113)	(0.102)	(0.239)
	IA	0.032	-0.499	0.397	-0.643*	0.248**	-0.436
		(0.108)	(0.364)	(0.326)	(0.364)	(0.123)	(0.624)
High pov.	Base	-0.131	-0.545*	-0.467**	-0.173	-0.184*	0.126
		(0.084)	(0.291)	(0.216)	(0.115)	(0.101)	(0.504)
	IA	-0.207**	0.425	0.102	0.066	0.196	-0.865
		(0.102)	(0.355)	(0.302)	(0.255)	(0.138)	(0.572)
	Trans* WP	Trans* VWP	Pens* WP	Pens* VWP	Trans* PP	Pens* PP	Tax* Prog
IA between	-0.0037	-0.0053	0.053**	-0.043	0.081***	-0.087	0.102**
	(0.0042)	(0.0070)	(0.014)	(0.028)	(0.025)	(0.072)	(0.048)

Notes: The table shows the baseline (*Base*) effect and interaction (*IA*) effect when we interact all listed variables with dummies for crisis years (SILC 2009-2012), whether the country had a communist regime (*ex-comm.*) and whether the mean poverty rate of the country over the whole period is above average (*high pov.*). The bottom panel shows effects for interactions between transfers (*Trans*) and pensions (*Pens*) on the one hand and the share of work poor (*WP*) or very work poor (*VWP*) on the other, and for interactions between the pro-poorness (*PP*) or progressivity (*Prog*) of transfers, pensions and taxes and the size of each component.

Table A7: Summary statistics

	Child poverty	Pre-transfer poverty	Transfers	Pensions	Work poverty	Severe work poverty	PP transfers	PP pensions	Implicit tax rate	Tax prog.	Multigen. households
Austria	14.94	39.18	18.38	2.40	38.30	5.92	2.21	3.09	40.84	1.77	4.45
Belgium	17.25	32.68	17.02	0.801	33.08	11.89	3.10	10.20	42.76	1.88	1.34
Bulgaria	27.30	38.35	8.36	5.83	39.05	12.18	1.67	1.53	26.88	1.34	16.08
Cyprus	12.64	22.85	8.12	0.932	26.83	3.27	3.43	2.88	24.91	2.77	0.689
Czech Rep.	15.04	31.06	13.31	1.84	38.95	7.68	3.17	3.79	40.08	1.67	1.93
Denmark	10.11	24.38	13.78	0.154	20.49	6.59	5.25	7.21	36.09	1.31	0.266
Estonia	18.87	32.17	13.43	2.28	32.84	6.58	1.80	2.59	34.86	1.39	3.18
Finland	10.92	30.15	16.72	0.555	27.15	6.05	3.08	2.76	40.75	1.93	0.448
France	16.61	36.03	16.02	1.47	30.65	7.33	2.99	2.96	38.85	1.81	0.381
Germany	14.60	32.23	17.47	0.879	41.37	8.72	3.40	5.08	37.58	1.46	0.475
Greece	23.33	28.46	2.90	3.16	41.61	4.73	3.26	3.84	31.19	1.66	1.62
Hungary	21.20	49.88	24.67	4.62	45.60	12.09	1.81	1.79	39.49	1.91	3.89
Iceland	11.02	27.70	12.15	1.96	15.17	3.88	3.84	1.91	34.24	2.13	0.523
Ireland	19.60	45.05	24.52	1.35	52.14	19.71	2.53	2.07	25.83	6.13	0.566
Italy	24.96	34.26	6.83	2.39	48.19	6.74	1.15	2.82	42.04	1.79	2.59
Latvia	24.23	37.31	11.95	4.76	31.76	7.96	1.57	1.66	32.09	1.14	11.00
Lithuania	23.72	38.99	14.36	3.62	27.33	7.08	2.93	2.25	33.13	1.40	4.88
Luxembourg	20.66	39.74	16.62	1.70	37.16	3.35	2.33	2.85	30.90	2.21	0.910
Malta	20.36	32.86	9.25	2.79	56.54	8.69	6.72	3.89	21.80	2.86	3.17
Netherlands	14.21	25.59	9.61	0.641	28.15	6.35	4.99	5.22	35.26	1.86	0.119
Norway	10.19	30.75	18.43	0.805	19.48	5.61	3.30	4.55	36.44	1.60	0.239
Poland	23.91	39.29	7.31	6.41	35.00	6.01	3.21	2.24	32.63	1.15	6.45
Portugal	22.21	32.89	7.69	3.16	28.10	5.98	3.74	3.04	23.56	2.15	4.80
Romania	32.90	48.40	11.33	7.81	38.05	5.12	1.74	1.69	29.60	1.19	14.52
Slovakia	18.57	33.82	11.09	5.15	28.15	5.72	2.91	2.99	32.25	1.76	5.75
Slovenia	12.33	31.25	15.57	2.61	18.03	3.62	2.48	2.63	36.20	1.50	4.44
Spain	25.78	33.46	6.43	2.38	40.58	6.55	2.75	3.26	32.58	2.62	2.68
Sweden	12.97	33.51	19.59	0.646	20.85	5.47	2.45	3.47	41.29	1.64	0.099
Un. Kingdom	21.11	42.73	19.24	1.17	39.24	15.26	3.28	1.91	26.20	1.54	0.874

Notes: The table shows summary statistics of the main variables in our analysis. Pre-transfer poverty measures the share of children living in households that are below the poverty line before social transfers (after taxes). Multigen. households refers to households with at least one member below age 18, one aged 18-59 and one aged above 59. For a description of the measurement of other variables, see Tables 1 and A1.