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**JEL Classification**: I32, I38, H5.

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# Poverty in adulthood: personal and context factors. Evidence from some European countries*

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**Abstract**

Living in poverty may have long-run negative effects. Children from poor families are more likely to be poor when adults. The interaction between families and public policies is crucial as it affects a child's opportunities. In this paper we focus on European countries and analyze why individuals from different countries and cohorts differ in the poverty status once we control for personal and family characteristics. We first isolate the impact of country-cohorts from regressions using individual-level data and then explain this residual country-cohort heterogeneity in poverty incidence with aggregate level indicators of social policies. We consider three different measures of social policies: a welfare state generosity index and two childhood-related policy: family allowances and expenditure in primary education. We find that these social policies' measures reduce poverty incidence in adulthood beyond personal and family characteristics. We find that individuals from country-cohorts with more generous welfare states, higher family allowances and expenditure in primary education show lower poverty incidence. In addition we find that they are more effective when initial GDP is low.

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# 1 Introduction

Growing evidence shows that inequality has increased during the last decades in many developed countries (see Piketty, 2014 or Atkinson, 2010 for the EU; Atkinson et al, 2011 or Jenkins et al, 2013 for the US). Recent OECD data (OECD, 2013) show that the global economic crisis has reduced incomes in most countries. However, this reduction is not shared evenly across the two extremes of the income distribution as there are larger reductions at the bottom part of the distribution, thus suggesting further increases in inequality and poverty. It is also well-known that living in poverty may have long-run negative effects. Children from poor families are more likely to be poor when adults, are also more prone to suffer health problems, and less likely to stay at school after compulsory education. Indeed, poverty alleviation is a central policy issue in all modern welfare democracies and this recent evidence has arguably turned it a priority among policy makers. To this aim, countries have developed extensive social transfer systems and spend considerable amounts on redistributive policies.[1]

The interaction between families and public policies affects a child's opportunities and therefore impacts her circumstances when adult, in particular her poverty status. In this study we analyze this interaction. Namely we explore the extent to which social policies reduce cross country-cohort differences in the incidence of poverty in adulthood once we control for personal and family characteristics. In other words, are, otherwise similar individuals, who belong to country-cohorts with more extensive public policies (ex. higher social spending) less likely to be poor when adults? We focus here on three measures of social public policies, a general index of welfare states' generosity and two specific childhood-related public policies: family allowances and primary education expenditure.

We explore these issues empirically and focus on European countries. To do so, we combine individual and aggregate data extracted from several databases. We use individual data from the European Union Statistics on Income and Living Conditions (EU-SILC), in particular the 2005 and 2011 cross-sections, which include a special module on "Intergenerational transmission of poverty". We combine it with data about expenditure in education at the country level from the United Nations Educational, Scientific and Cultural Organization (UNESCO) database and data about the other two social policies measures from the Comparative Welfare Entitlement Dataset (CWED).

Our empirical strategy follows to some extent Oswald and Wu (2010) who used data for the US to examine state effects (beyond the effects of personal characteristics) on the well-being of American residents. The explanatory variables in their well-being equation included socioeconomic characteristics of the sampled individuals, as well as dummy variables for the states of

[1] Combating poverty is among the main targets of the Europe 2020 strategy for "smart, sustainable and inclusive growth".

residence of the individuals. The standardized state dummy variables were then confronted with objective measures of US states. In particular in this study we analyze cross-country differences in poverty incidence using a two-step model similar to Bell et al (2002) or Markaki and Longhi (2012). As Oswald and Wu (2010) we first estimate a model including individual characteristics and a full set of country-cohort dummies which capture the residual impact of country characteristics on individuals' poverty incidence in adulthood. We then move forward Oswald and Wu (2010) and regress these estimated country-cohort differences in current poverty status on country-cohort social policy measures among other objective aggregate variables.

Our main results suggest that these social policies' measures reduce poverty incidence in adulthood beyond personal and family characteristics. We find that individuals from country-cohorts with more generous welfare states, higher family allowances and expenditure in primary education show lower poverty incidence. In particular we find that for each additional point in the generosity index for some country-cohort the probability of being poor reduces in 0.29 percentage points for its inhabitants (net of personal characteristics). Second, we find that increasing average public family allowances in 10% implies a reduction in the probability of being poor in 0.16 percentage points. Finally, considering public expenditure in primary education, we find that for each 10% increase in average public expenditure in primary education received by some country-cohort, the probability of being poor for some individual who belongs to it (and, again, after controlling for individual variables) drops by 0.32 percentage points. We also check whether these social policies have a similar impact on poverty reduction regardless of some contextual variables as country GDP or initial inequality. We find that their effect is more effective when initial GDP is low. In addition, the effect of states' welfare generosity and public expenditure in primary education is stronger when initial inequality is high. However, the effect of family allowances does not depend on country initial inequality.

This paper is related to several strands of the literature. First, the studies on the main determinants of poverty. Most of the literature focuses on either personal or aggregate characteristics that affect poverty. In the former studies, aggregate characteristics are generally included as the coefficients of country or region dummy variables, in a regression where controls for individual and family background variables have been introduced. In the latter, cross-national studies are much hampered by the lack of individual data. Fewer studies focus on the role of national characteristics in shaping poverty incidence in adulthood beyond the effects of personal and socioeconomic variables. Figari (2012) analyses the relationship between deprivation, income and other individual dimensions over time, in eleven European countries. He finds that a relevant part of the deprivation gap is attributable to a country specific effect revealing the importance of unobserved factors like cultural attitudes and institutions. More recently, Hidalgo and Iturbe (2014) find that public expenditure in education has a strong long-run effect on reducing incidence of poverty in adulthood and that this effect is concentrated mainly among individuals who have

parents with a low level of education. Some works studies the impact of country characteristics on poverty rates without taking into account the role of personal characteristics. Among others, Nelson (2004) find that the structure of non-means-tested benefits is more important than that of means-tested benefits in explaining differences in poverty alleviation across countries. Our paper contributes to the literature by disentangling the relative role of aggregate factors as social welfare policies in reducing poverty incidence in adulthood net of personal, either individual or family, characteristics.

Second, the literature on intergenerational income mobility. In particular, it is related to several works that estimate the relationship between parents' economic status and a child's economic status in adulthood. There have been some contributions in terms of measurement of correlations and the forces driving this relationship (see Black and Devereux, 2011). Recent research on intergenerational mobility has highlighted the relevance of public policies at aggregate level. Mayer and Lopoo (2008) provide an empirical contribution that takes into account government expenditure. They assess the relationship between government spending and intergenerational economic mobility using PSID data together with data on state spending from the U.S. Census of Governments. They find greater intergenerational mobility in high-spending states compared to low-spending ones. Jackson et al (2014) use US data and find a significant effect of increased school spending on children from poor families. This paper complements the existing body of empirical literature on intergenerational income mobility by exploring it among European countries.

The paper is organized as follows. Section 2 describes the data used in the paper. Section 3 presents the empirical strategy. Section 4 presents the results. Finally, Section 5 concludes.

# 2 Data and descriptive statistics

In order to study the impact of past personal and context factors on the incidence of poverty in adulthood we combine several databases. We use individual data from the EU-SILC database and combine it with data about social policies at the country level from the UNESCO database (data about expenditure in education) and data from CWED (data about family expenditure and welfare state generosity).

## 2.1 Individual and family factors

Our objective is to study the extent to which different country-cohort social policies helps to mitigate the effects on adult circumstances of being raised in a disadvantaged household. In particular, we focus on individual's current poverty status. In order to do so, in this study we use data drawn from both the 2005 and 2011 cross sections of the EU-SILC database. We build a database comprising 14 European countries. These are the countries in the EU-SILC

database for which we have enough historical data on the country-specific aggregate measures.[2] The reason for using the 2005 and 2011 cross sections of the EU-SILC database is that they include special modules on inter-generational transmission of poverty. In addition, by including both cross sections we increase our database. As we use these modules, we exclude from the 2005 and 2011 cross sections all individuals who are not in the age range (25-65) or are not the selected respondent.[3]

The information regarding individual's current poverty status is contained in the variable HX080, which is an indicator of whether the individual lives in a family with income below the poverty threshold.[4] The argument for using a relative measure of poverty is that individuals sometimes think of themselves as poor when they compare themselves with their neighbors. We define a dummy variable called "*poor*" which is 1 whenever HX080 is 1. The mean value of *poor* in our final sample is 12.05%. It is 11.99% in the 2005 wave and 12.11% in the 2011 wave. We represent in Figure 1 below the percentage of individuals below the poverty line in each country for the two waves. The maximum value corresponds to Greece and the minimum to Denmark (18.05% and 3.54% on average, respectively). It is important to mention here that these numbers are not representative of the whole population, as we are considering only those individuals who at the time of the survey were 25-45 in the 2005 wave or 25-51 in the 2011 wave. In particular, the elderly are excluded from our sample.[5]

Figure 1

Estimating long-run determinants of poverty requires individual-level data on adult's poverty status together with information on the characteristics of the household where that adult grew up. The intergenerational modules contain retrospective information on parental background and childhood circumstances. This information includes family composition, year of birth of parents, occupation and level of education of parents. To assess the long-run effect of household characteristics, we also have to exclude those individuals who lived in a collective house or in some institution when young. We propose to use parental education as a measure of individuals' childhood circumstances. Individuals report the highest level of education attained by the mother and the father. We summarize this information building a dummy variable called "*educated_family*"

[2] In particular those for which we have al least two out of three aggregate measures. The list of countries is: Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and United Kingdom.

[3] For an overview of EU-SILC, see Wolff et al (2010). To access further information about EU's regulations concerning the SILC, data documentation provided by Eurostat, and SILC variable lists, we recommend the EU-SILC web portal provided by the GESIS research institute at http://www.gesis.org/.

[4] The poverty line corresponds to 60% of equivalized household disposable income and corresponds to the standard measure of poverty in the European Union. Equivalized household disposable income (HX090) is equal to the product of total disposable household income (HY020), multiplied by an inflation factor for within-household non-response (HY025), divided by equivalized household size (HX050). That is, $HX090 = \frac{HY020 * HY025}{HX050}$.

[5] Due to availability of data on aggregate variables, we have to restrict our sample to include individuals born between 1960 and 1980 (2005 cross section) and between 1960 and 1986 (2011 cross section).

that takes value 1 when at least one of the parents has secondary education.[6] In addition to parental education, we consider a set of household characteristics when the individual was young (unemployed father, number of siblings, etc.).[7] Table 1 shows the main descriptive statistics. A complete description of all the variables used in this analysis can be found in the Appendix.

Table 1

## 2.2 Context factors: social policies

We examine here the effect of government social policies during childhood on poverty incidence in adulthood. The impact of government social policies may occur through two mechanisms. First, social expenditure consisting of direct transfers to poor families, acts by increasing their income and thus reducing the intergenerational transmission of poverty. Second, social expenditure may promote access for the poor to education and other human capital-enhancing activities (ex. health care), thus reducing the long-run effects of poverty.[8] We consider three possible measures of social expenditure.

We first consider a variable that captures the extent of general public programmes and it is a welfare state generosity index. We retrieve the generosity index from the Comparative Welfare Entitlement Dataset 2 (CWED2, see Scruggs et al, 2014). It captures welfare benefit generosity in major social insurance programs: unemployment insurance, sick pay insurance and public pensions. For each of these three programs, there is data on benefit replacement rates, qualifying conditions, and elements of the insurance coverage or take-up rates. Unemployment insurance covers national insurance provisions earned without income testing. Sick pay insurance covers benefits paid in the event of short-term non-occupational illness or injury. This includes provisions for mandatory private (employer-paid) benefits in addition to public insurance. Public pensions considered in this dataset include only mandatory public programs.

Next we consider two specific childhood-related public programmes: family benefits and public education. The first variable is the benefit expenditure on family allowances. Child or family allowances are regular payments made to families on behalf of their children. Usually, they are available to all households with children below a certain age. Their purpose is to raise household income, helping families support their children and keeping families from being penalized

[6] Requiring tertiary education would be too restrictive, since only a 14.02% of individuals in the sample have at least one parent with tertiary education. We have also explored the possibility of introducing separately the educational levels of both parents. The results are very similar, although the sample size gets much lower because of the large increase in missing values: the dummy variable "*educated_family*" is missing only when the education level of both the father and the mother is missing.

[7] We do not use information on parents occupation, since these variables contain a large fraction of missing values.

[8] De Gregorio and Lee (2002), in a cross-country empirical study, find that social expenditure raises the average educational attainment of the population and contributes to a more equal distribution of income. In an empirical analysis focused in US, Mayer and Lopoo (2008) find greater intergenerational mobility in high-spending states compared to low-spending states.

economically because they have children. We use data provided by CWED (Huber et al, 2004) whose original source is the International Labor Organization (ILO). This data refers to benefit expenditures on families, that is, child allowances, parental leave support payments or childcare subsidies. This variable expresses the public resources dedicated to families as a fraction of total social expenditure. We cannot use directly these ratios because a large value in this ratio can be due either to high spending on family allowances or to low total social expenditure. What we do is to use data on total social expenditure to recover data on expenditure family allowances for every country and year (see the Appendix for more details on the definition of this variable). Solon (2004) suggests that intergenerational mobility is promoted by public programs that are of relatively more benefit to the relatively less well-off. For instance, public actions that influence the relationship between families and the labor market, which include health care, taxes and transfers, as well as regulations and policies helping parents to balance work and family life.[9]

The literature emphasizes education as one of the major factors affecting the degree of intergenerational mobility (see Black and Devereux, 2011 and references therein). As a result, policymakers usually justify higher educational spending as a highly effective tool for promoting equality of opportunities. In this paper we focus on expenditure in primary education. The reason to focus on primary schooling is that as primary education was compulsory in all countries in the sample during the period considered here, we are confident that all individuals in our sample must have benefitted from this type of expenditure.[10] We retrieve this data from the UNESCO Database for Education. The UNESCO Database for Education contains, for several years, country data on public expenditure in education per student as a % of per capita GDP at three levels (primary, secondary, tertiary).[11] As commented above, we cannot use directly these ratios because a large value in this ratio can be due either to high spending or to low per head GDP. What we do is to use data on per capita GDP to recover data on expenditure in primary education for every country and year. Since data on per capita GDP are in US dollars of year 2000, the same applies to the resulting expenditure per individual.

To illustrate the data we use, we plot in Figure 2 our measures of social policies for the set of countries in our sample: welfare state generosity, per capita expenditure on family allowances and per capita expenditure in primary education.

Figure 2

First, it can be observed that there is variation both across countries and through time for each of the measures. In addition, there is not a strong relationship among the patterns over time

[9] See Corak (2013) for an extensive review on this issue.

[10] In contrast, expenditure in secondary education corresponds to an education level that was not compulsory for all individuals in our sample. This problem exacerbates with expenditure in tertiary education, since we cannot assume that attendance to post-compulsory levels of education is an exogenous decision.

[11] See http://www.uis.unesco.org/Education/Pages/default.aspx

by country of these measures. If we focus on welfare states' generosity index we see that Italy and Greece are the least generous countries, while Sweden, Denmark and Norway are the most generous ones. With respect to expenditure on family allowances, Ireland is the lowest spending country, while France and Sweden are the largest spending ones. Finally, regarding expenditure in primary education, Greece and Norway are the lowest and highest spending countries in this period, respectively.

We want to construct variables reflecting the exposure to social policies for each individual during childhood in our sample. As we include spending in primary education, we consider the period of primary school attendance and, for the sake of comparison and coherence in the analysis, we consider the same period for the other social policy variables: generosity and family allowances. We illustrate how we build our measures of exposure to social benefits as follows. Suppose that a given individual in the sample attended primary education from 6 to 11 years old. For instance, an individual born in Spain in 1970 was in primary education between 1976 and 1981. Using our data on welfare state generosity, family allowance and expenditure in primary education for Spain corresponding to the years 1976 to 1981, we calculate the average of these six numbers for each particular measure.[12] To allow for a marginal increase in both family allowances and primary education spending having a realistic interpretation we take the natural log of this average. Thus, a 0.1 increase of this average can be interpreted as a 10 percent increase in per-student spending for all years of individual's school attendance.[13] We call *GEN*, *PEF* and *PEE* the variables we construct in this way for welfare generosity, public expenditure in families and public expenditure in primary education, respectively.

We exclude those individuals who were not born in the country, since we do not know whether they were exposed to public policies during childhood in a different country. Our final sample consists of 128,461 individuals from 14 countries. A 48.05% belong to the 2005 wave (61,728 individuals) and the remaining 51.95% (66,733 individuals) to the 2011 wave. The bottom part of Table 1 shows the main descriptive statistics of these measures at country-cohort level. In addition, Table 2 below shows the descriptive statistics of these aggregate variables at country level. As can be observed, the number of observations for each period depends on the number of countries with all the data available.

Table 2

[12] Since entry and exit ages in primary education may vary across countries, we compute average spending for different age intervals in each country. In particular we consider 11 as the exit age of primary education for all countries during the period analyzed: 1960-1990. The entry age of primary education is 6 for all countries with some exceptions. In Denmark, Sweden and Netherlands till 1978 it is 7. Finally, in United Kingdom, and Netherlands since 1980, it is 5.

[13] In addition, we express spending in logs because both family allowances and school spending likely exhibit diminishing marginal returns (see Figure 3 below). Similar results are obtained when spending is expressed in levels.

Before going into the details of the results, it is useful to look at the simple cross-correlation between the different measures of social policies in the past and poverty rates today. Figure 3 represents the connection between both. In Figure 3a we represent average poverty rates and generosity index (*GEN*) for each country. More generous governments in the past have typically lower poverty rates. Figure 3b presents average poverty rates and public family expenditure (*PEF*) for each country. As can be observed higher family allowances are associated with lower poverty rates. Finally, Figure 3c shows average poverty rates and public expenditure in primary education (*PEE*). We see that countries that spent more in primary education in the past present lower poverty rates. In addition we also fit a quadratic line to illustrate the fact that the effect of these two public spending measures has decreasing returns.

Figure 3

In the rest of the paper we analyze whether these relationships observed at the country level hold at the cohort-country level after controlling for individual factors affecting poverty incidence.

# 3 Empirical strategy: Two-steps model

We analyze country-cohort differences in the impact of social policies on poverty reduction using a two-step model similar to Bell et al. (2002) or Markaki and Longhi (2012). This empirical approach allows us to overcome the problem of biased standard errors in individual level models including aggregate characteristics (Moulton, 1990). In the first step we run an OLS regression in which the dependent variable is the poverty status and the regressors include all individual and family background variables, plus a set of dummies to capture year-country fixed effects. Then, in the first step we estimate:

$$poor_i = \beta_0 + X_i\gamma + \beta_{ct} + u_i, \tag{1}$$

where $poor_i$ is an indicator that equals 1 if individual $i$ belongs to a household that has disposable income below the poverty line.[14] The vector $X_i$ contains the set of explanatory variables. First, there are variables that capture current circumstances (gender, non-citizen status). Second, we include a set of parental background variables (parental education, single mother family, number of siblings and whether the father was unemployed). And finally this vector also includes a dummy variable called "*Year 2011*" which is 1 whenever the individual was interviewed in the 2011 cross-section.

[14]Note that this measure of disposable income might well be affected by current redistributive policies, in which case the effect of past social policies could be biased. In order to address this limitation we construct an alternative measure of current poverty status, using disposable household income before social transfers other than old-age and survivors' benefits and check the robustness of our result to this alternative measure. In particular this alternative measure considered is equal to the product of total disposable household income before social transfers other than old-age and survivors' benefits (HY022), multiplied by an inflation factor for within-household non-response (HY025), divided by equivalized household size (HX050). That is, HY022*HY025/HX050. The results obtained (available upon request) are qualitatively very similar to the ones found with our measure of poverty status.

The term $\beta_{ct}$ represents the country-cohort dummies, which capture remaining differences across countries and over time in the probability of being poor.[15] These dummies will be negative (resp. positive) for those country-cohorts in which the probability of being poor today is lower (resp. higher) than what we would expect given individual and family background variables.

Similarly to Oswald and Wu (2010) we next confronted these country-cohort dummies to aggregate measures. In the second step we use the estimated coefficients of these country-cohort dummies, $\widehat{\beta}_{ct}$, as the dependent variable of an aggregated model. We model these country-cohort differences in average residual current poverty status as a function of aggregate level measures of country-cohort variables. Thus, we move forward Oswald and Wu (2010) methodology and, in particular, we regress them on each of our measures of social policy in country $c$ in year $t$, denoted by $SP_{ct}$ (i.e. welfare state generosity, public expenditure in family allowances and public expenditure in education) plus other variables of interest, denoted by $Z_{ct}$ that characterize these countries and years. First, we include a measure of average per capita GDP at the time the individual benefitted from each particular social policy. This variable is called $GDP_{ct}$. If we do not do this, the impact of social policy might be biased. Rich countries raise more revenue from taxes and can dedicate more resources to social policies. At the same time, they have lower poverty rates. Then, the impact of public expenditure in social policies will be overestimated. The idea is that average per capita GDP may capture the general effect of government expenditure, while $SP_{ct}$ captures only specific dimensions of government social policies. Not surprisingly, the two variables $SP$ and $GDP$ are strongly correlated.[16] However, this is not a problem because of our large sample size. Fourth, we also include a measure of "initial inequality" (denoted by $INEQ_{ct}$). It is well known that some forms of spending are entitlements. But then, countries that are initially more unequal or with many poor households will need to spend more than countries with fewer poor families. If it is so, and we do not account for this effect, the impact of $SP_{ct}$ could be underestimated.[17] We computed the country average inequality during the previous years (3-5) to the period of individuals' primary school attendance and assign this measure to each individual. See the Appendix for a detailed description of all the variables we use. The estimated coefficient we get for $SP_{ct}$ in this second regression is the relevant part of the dummy effect in the first equation, since we have controlled for other observable characteristics of each year and country:

$$\widehat{\beta}_{ct} = \alpha_0 + SP_{ct}\alpha + Z_{ct}\delta + \eta_{ct}, \tag{2}$$

[15] Since we have 14 countries and 27 years, in principle we should have to estimate up to 378 parameters corresponding to dummy variables. However, we lack data corresponding to 16 of these country-cohorts. This can be due to the fact that EU-SILC did not collect data on every variable considered in Equation (1) for them.

[16] The correlation between *GEN* and *GDP* in 0.714, between *PEF* and *GDP* is 0.378 and between *PEE* and *GDP* is 0.801.

[17] Sylwester (2000) in a cross-country analysis finds that higher levels of initial income inequality are associated with higher public education expenditure.

We estimate Equation (2) separately for each measure of social policy and for the three measures jointly.[18]

The crucial issue for identification is the assumption regarding exogeneity of the different measures of social policy. Variation in these variables arises because of differences in expenditure across countries at the same point in time and differences in country expenditure over time. Either difference could be partly endogenous with respect to the poverty rate and related to both country expenditure and children's eventual income. The inclusion of $GDP$ and $INEQ$ as regressors helps to correct this endogeneity problem. However, there are many other factors that may have changed within particular countries between the time the individual was a teenager and the time of the survey. The inclusion of a time trend can capture an overall trend, but cannot capture differences across countries over time. To address partially this problem we propose to include two additional controls that capture the change in GDP and the change in inequality from the individual childhood period until the year of survey response. Finally, we could include additional controls for other economic factors as the area where people reside should also play a role in determining poverty status apart from national income and inequality. In particular we consider both the unemployment rate when the individual was about entering the labor market, together with the change in the unemployment level between that time and the year of survey response. We decided not to do so in our main specification because there are many missing data in the unemployment variable. In fact, sample size reduces by almost a half. Nevertheless we check the robustness of our results to the inclusion of these variables. In Section 4 we comment on this.

# 4 Main results

Table 3 shows the estimated coefficients of Equation (1), except for those of the parameters corresponding to dummy variables. The estimates we obtain show that women are more likely to be poor. Not being a citizen also increases the probability of being poor. All variables measuring parental background have the expected sign. In particular, having an unemployed father while young heavily increases the probability of being poor when adult. The impact of having educated parents is also very strong: having at least one parent with secondary education reduces the probability of being below the poverty line in more than 6 percentage points.

Table 3

The F-test at the bottom of the table shows that the year-country dummies are jointly statistically significant. This means that there are residual (non-random) differences across countries

[18] Mayer and Lopoo (2008), in a similar analysis, also estimate separately the impact of each category of public spending.

and cohorts in the probability of being poor today that cannot been explained by the set of individual variables we are using. Figure 4a shows the mean residual impact of country-cohort on poor.

Figures 4a and 4b

We see in that figure that the residual impact of country-cohort dummies varies widely. The reference group is compound by those born in Austria in 1960. Thus, positive country-cohort dummy coefficients are capturing two effects. The first is that Austria has a poverty rate below average. The second one is the fact that younger cohorts have higher poverty rates than older ones (the reference group). In Figure 4b we show the distribution of country-cohort dummies at the country level. As it can be observed, poverty incidence levels vary from country-cohort to country-cohort. This heterogeneity might be due to economic differences across countries and cohorts including differences in social policies. We address this point in the second step.

The results of the estimation of Equation (2) are shown in Table 4. Since we want to concentrate on the effects of our main variables of interest, we present in Table 4 the marginal effects corresponding to the different government social policies. We present here the results of several specifications. We estimate each model by OLS. The first specification of Equation (2) contains only welfare state generosity as a measure of social policy, this is column 2. The second specification contains only family allowances, this is column 3. The third specification contains only primary expenditure in education, this is column 4. The fourth specification contains both family allowances and primary education expenditure. Finally, we consider the three measures of social policy and present the results in column 5. We lose some observations in the first two specifications (and the last two) as the generosity index and family allowances data are not available for some countries. In order to get comparable estimations and check the robustness of our results, we estimate the same model as in the first three cases but using only those observations for which the three measures of social policy are available. These results are shown in the center part of Table 4. Finally we consider two additional regressors: these are the unemployment rate when the individual was 16, together with the change in the unemployment rate since that moment till that of survey response. As there are many missing data for unemployment, sample size reduces significantly. Nevertheless, we find that the results are in the same line as those in the upper part of the table. These results are reported in the bottom part of Table 4.

Table 4

The different measures of past social policies have the hypothesized effect on the probability of being poor today net of past and present personal characteristics. The estimate of the vector components of $\alpha$ in Equation (2) are negative in most cases, that is social policies reduce the

probability of being poor. Nevertheless, this association vanishes when we consider only public expenditure in primary education (model 3). Interestingly, when we consider expenditure in education together with other social policy indicator or when we restrict the estimation to those country-cohorts for which the three measures of social policy are available we find that primary education spending is again associated with a reduction in adult poverty. A possible explanation could be related to sample selection. That is, observe that by restricting the sample to observations with data on family allowances we are excluding country-cohorts from Greece, Portugal and Spain characterized by very low expenditure levels in primary education for which it might be very difficult to observe any impact on poverty reduction (see Table 2). Finally note that both the sign and the magnitude of the vector components of $\alpha$ remain very similar when we consider the impact of all social policies (last column). This might reflect the fact that each measure captures different dimensions of social policy.[19]

To illustrate the size of the effects we obtain consider first the impact of our more general measure of social policies: the welfare state generosity index. The marginal effect is between -0.0022 and -0.0035. To illustrate the size of its effect take the coefficient -0.0029 corresponding to the baseline Model 1. This means that for each additional point in the generosity index for some country-cohort the probability of being poor reduces in 0.29 percentage points for its inhabitants (net of personal characteristics). This is exactly the difference in the welfare generosity index, for example, between the 1976 cohort from Austria and that of 1977 from Finland (with 28.9 and 29.9 points, respectively) or the 1975 and 1978 cohorts from Italy (with a welfare generosity index of 23.5 and 24.5, respectively).

We comment next on the impact of our two childhood-related public policies. As can be observed from Table 4 the marginal impact of family allowances lies in the interval (-0.0104, -0.0189). Let us take for example the intermediate coefficient from baseline Model 2, -0.0173. Since expenditure in family allowances is in logs, this means that a 10% increase in expenditure in family allowances implies a reduction in the probability of being poor in 0.164 percentage points.[20] Alternatively, an increase of one standard deviation ($106,170) in family allowances is associated with a reduction of 1.04 percentage points in adult poverty (as the mean of PEF is $128,742 and the standard deviation is $106,170 an increase of a one standard deviation corresponds to a value Z=82.46%). Finally, the marginal impact of public expenditure in primary education belongs to the interval (-0.0288, -0.0387), when significant. To illustrate the size of the effects we obtain, take -0.0335 in baseline Model 5. This means that for each 10% increase in average PEE received by some country-cohort, the probability of being poor for someone who belongs to it (and after

[19] The correlation coefficients are as follows: between *GEN* and *PEF* is 0.617, between *GEN* and *PEE* is 0.635 and between *PEF* y *PEE* is 0.279.

[20] Recall that in a linear-log model $Y = \alpha + \beta LogX + e$ the expected change in $Y$ when $X$ increases by $Z\%$ can be calculated as $\widehat{\beta} \times Log((100 + Z)/100)$.

controlling for individual variables) drops by 0.319 percentage points.[21] This is a very large effect, as it represents a 2.64% of the mean value of the variable poor (the mean of poor is 12.05%).

Finally, we check whether these social policies' measures have a similar impact on poverty reduction regardless of some contextual variables as country GDP or initial inequality. In order to do, so we modify Equation (2) above including two additional interaction terms of the social policy variable: one with the variable GDP and the other with the variable INEQ. In Table 5 below we calculate the average marginal effects corresponding to the social policy variables.

Table 5

As can be observed, results are very similar to those presented in Table 4. We plot the average marginal effect of each social policy measure on the probability of being poor today (after controlling for personal characteristics) for different values of GDP and INEQ. This is done in Figure 5.

Figure 5

In the left part of Figure 5 we see that the effect of these social policies' measures on reducing poverty at country-cohort level seems to be affected by country-cohort income. In particular, the effect of any of these measures on poverty reduction is more effective in those country-cohorts with low initial GDP. In the right part of Figure 5 it is plotted the effect of these social policies' measures on poverty reduction by country-cohort initial inequality. As can be observed the effect of states' welfare generosity and public expenditure in primary education on poverty reduction is stronger among those country-cohorts where initial inequality is high. However, the impact of family allowances does not depend on country-cohort initial inequality.

# 5 Concluding remarks

Being raised in a poor household may have negative long-run effects on individual welfare. In this paper, instead of just analyzing individual determinants of poverty, we use a two-stage estimation approach which helps us to focus the study on the role of social policies in explaining country-cohorts heterogeneity in poverty incidence. In other words, we study to what extent aggregate context factors can explain individual poverty status once we control for personal and family characteristics. We consider here three possible measures of social expenditure: a welfare state generosity index and two specific childhood-related public programs: family allowances and public expenditure in primary education.

[21] These findings partially contradicts Fanti and Gori (2011) who show that public allowances reduce human capital accumulation whereas the financing of public education systems is beneficial to human capital.

The main finding of this paper is that these social policies' measures reduce poverty incidence in adulthood once we control for personal and family characteristics. We find that for each additional point in the generosity index for some country-cohort the probability of being poor reduces in 0.29 percentage points for its inhabitants (net of personal characteristics). Increasing average public family allowances in 10% implies a reduction in the probability of being poor in 0.16 percentage points. Finally, considering public expenditure in primary education, we find that for each 10% increase in average public expenditure in primary education received by some country-cohort, the probability of being poor for some individual who belongs to it (and, again, after controlling for individual variables) drops by 0.32 percentage points. We also find that they are more effective when initial GDP is low. In addition, the effect of states' welfare generosity and public expenditure in primary education is stronger when initial inequality is high. However, the effect of family allowances does not depend on country initial inequality.

Future research should proceed by studying the specific mechanisms underlying the relationship between these social policies' measures and poverty reduction within a theoretical model. Another interesting extension could be to study the impact on intergenerational income mobility of the measures proposed here.

To conclude, we believe our results on the role of social policies' on poverty reduction are of value and seem relevant to several key issues currently under debate among economists. Motivated by the increase in poverty rates across OECD countries (see OECD, 2013), there is a renewed interest in understanding the determinants of poverty together with finding policy implication that would help to reduce it. In this paper we find support for policies that promote increasing expenditure in basic education and family allowances to reduce future poverty incidence.

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## Appendix: Variable Description

- *Parental education*: It is a binary variable that captures if either the education the father or mother had attained when the individual was around 14 years old is at least upper secondary education. Source: EU-SILC

- *Father unemployed*: It is a binary variables that captures if the father was unemployed when the individual was 14 years old. Source: EU-SILC.

- *Siblings*: It is the number of siblings the individual's had when he/she was around 14 years old. Source: EU-SILC.

- *Citizenship*: It generally corresponds to the country issuing the passport. It shall refer to current (at the time of survey) national boundaries. It is a binary variable that indicates if the citizenship corresponds to the same country as the country of residence. Source: EU-SILC

- *Generosity index*: This index categorizes countries according to their welfare state tradition. The index relies on data on replacement rates, qualifying conditions and coverage rates in OECD countries' major insurance programs. The higher the value of the index the larger the generosity of the social insurance system. Source: CWED2.

- *Family allowances*: It is family allowances divided by population under 15. Family allowances can include very different provisions, from birth grants, maternal and child health services to supplements for adult dependents. The database has mainly collected information on the most common family benefits, which are children's allowances. The CWED contains data on family allowances as percentage of total social insurance benefit expenditure. Thus, we use data on social benefit expenditure to recover data on family allowances for every country and year. This includes benefit expenditure on sickness and maternity, employment injuries, pensions, unemployment and family allowances. Excluded are special schemes, like benefits for war victims, public employees etc. Total benefit expenditure was initially in millions of current price national currency units and thus, we first derive family allowances at constant prices in national currency units of year 2000 using Consumer Price Index (CPI) from OECD CPI series (see http://stats.oecd.org/index.aspx?DatasetCode=MEI_PRICE
Next, national currency in 2000 constant price data are converted to 2000 US dollars using, first for euro-zone countries, the official exchange rate national currency units to euro and then, for all countries, the exchange rate national currency units per US dollar for 2000 from OECD PPPs and exchange rate series (see http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TAI
Thus, data are in constant 2000 US dollars. Source: CWED.

- *Expenditure per student, primary, secondary and tertiary (% of GDP per capita)*: Public expenditure per student is the public current spending on education divided by the total number of students at that level, as a percentage of GDP per capita. Public expenditure (current and capital) includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other privates entities). Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

- *GDP per capita*: It is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2000 U.S. dollars. Source: World Bank national accounts data, and OECD National Accounts data files.

- *Inequality*: It is the country average inequality during the previous years (3-5) to the period of individual's primary school attendance. Source: Estimated Household Income Inequality Data Set (EHII), global dataset on inequality derived by the University of Texas Inequality Project (UTIP).

- *Unemployment*: It is the average regional (NUTS2) youth unemployment rate during the years the individual had to decide whether to attend post-compulsory education (16-21). Source: EU Labor Force Survey, Eurostat and US Bureau of Labor Statistics, International Comparisons.

## Table 1: Summary Statistics

| Variable | Mean | Std.Dev. | Min | Max | Obs |
|---|---|---|---|---|---|
| | | **Individual variables** | | | |
| Poor | 0.121 | 0.326 | 0 | 1 | 128,445 |
| Female | 0.507 | 0.500 | 0 | 1 | 128,461 |
| Non citizen | 0.003 | 0.054 | 0 | 1 | 128,273 |
| Year 2011 | 0.519 | 0.500 | 0 | 1 | 128,461 |
| Educated Family | 0.366 | 0.482 | 0 | 1 | 120,443 |
| Single mother family | 0.077 | 0.267 | 0 | 1 | 123,705 |
| Number of siblings | 2.229 | 1.566 | 0 | 41 | 122,001 |
| Father unemployed | 0.010 | 0.101 | 0 | 1 | 115,977 |
| | | **Context variables (country-cohort level)** | | | |
| Generosity Index | 33.203 | 6.105 | 22.300 | 46 | 289 |
| PEF (thousand US$) | 128.742 | 106.170 | 5.042 | 644.370 | 252 |
| PEE (thousand US$) | 3.138 | 2.553 | 0.259 | 10.443 | 337 |
| GDP (thousand US$) | 14.747 | 5.093 | 4.931 | 30.696 | 362 |
| Inequality index | 34.900 | 3.853 | 27.533 | 43.271 | 355 |
| Unemployment | 29.221 | 16.768 | 3.830 | 77.408 | 313 |

## Table 2: Mean values context variables (country level)

| Country | Generosity | PEF | PEE | Obs |
|---|---|---|---|---|
| AT | 30.774 | 159.797 | 2.619 | 6,889 |
| BE | 37.677 | 194.278 | 2.477 | 6,391 |
| DK | 36.166 | 94.647 | 8.500 | 3,439 |
| ES | 29.419 | . | 1.081 | 19,039 |
| FI | 31.641 | 50.296 | 3.491 | 5,884 |
| FR | 35.475 | 194.510 | 1.877 | 12,881 |
| GR | 25.735 | . | 0.552 | 7,799 |
| IE | 24.315 | 32.236 | 1.314 | 5,308 |
| IT | 24.904 | 40.198 | 1.878 | 28,691 |
| NL | 37.562 | 133.621 | 2.286 | 7,082 |
| NO | 38.051 | 94.207 | 6.540 | 3,505 |
| PT | 29.400 | . | 0.743 | 6,468 |
| SE | 41.821 | 214.266 | 7.823 | 4,988 |
| UK | 28.537 | 68.131 | 2.333 | 10,097 |

**Table 3: Poverty: impact of individual variables**

| Variable | Poor |
|---|---|
| Female | 0.0136*** |
| | (0.0019) |
| Non citizen | 0.0453** |
| | (0.0210) |
| Year 2011 | -0.0039* |
| | (0.0021) |
| Family educated | -0.0630*** |
| | (0.0019) |
| Single mother family | 0.0322*** |
| | (0.0057) |
| Number of siblings | 0.0192*** |
| | (0.0008) |
| Father unemployed | 0.1496*** |
| | (0.0131) |
| Constant | 0.0732*** |
| | (0.0145) |
| Index dummies | 362 |
| F-statistic | 7.62 |
| Prob>F | 0.0000 |
| Observations | 111,797 |
| R-squared | 0.0415 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 4: Poverty: Impact of (past) social variables**

| | I Baseline model | | | | |
|---|---|---|---|---|---|
| VARIABLES | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
| Generosity | -0.0029*** | | | | -0.0022*** |
| | (0.0005) | | | | (0.0006) |
| PEF | | -0.0173*** | | -0.0189*** | -0.0104*** |
| | | (0.0031) | | (0.0032) | (0.0036) |
| PEE | | | -0.0133 | -0.0335*** | -0.0301** |
| | | | (0.0099) | (0.0101) | (0.0120) |
| Observations | 288 | 246 | 331 | 227 | 215 |

| | II Same country-cohorts | | | |
|---|---|---|---|---|
| VARIABLES | Model 1 | Model 2 | Model 3 | Model 4 |
| Generosity | -0.0035*** | | | |
| | (0.0005) | | | |
| PEF | | -0.0170*** | | -0.0184*** |
| | | (0.0033) | | (0.0032) |
| PEE | | | -0.0299** | -0.0387*** |
| | | | (0.0116) | (0.0103) |
| Observations | 215 | 215 | 215 | 215 |

| | III Adding unemployment and its change | | | | |
|---|---|---|---|---|---|
| VARIABLES | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
| Generosity | -0.0032*** | | | | -0.0028*** |
| | (0.0005) | | | | (0.0007) |
| PEF | | -0.0176*** | | -0.0182*** | -0.0068 |
| | | (0.0035) | | (0.0037) | (0.0047) |
| PEE | | | -0.0117 | -0.0288** | -0.0206 |
| | | | (0.0115) | (0.0122) | (0.0139) |
| Observations | 256 | 205 | 287 | 189 | 186 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 5: Differential impact of (past) social policies by country income and inequality**

| VARIABLES | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Generosity | -0.0044*** | | | | -0.0028*** |
| | (0.0004) | | | | (0.0006) |
| PEF | | -0.0194*** | | -0.0167*** | -0.0021 |
| | | (0.0026) | | (0.0034) | (0.0038) |
| PEE | | | -0.0279*** | -0.0150 | 0.0118 |
| | | | (0.0103) | (0.0112) | (0.0149) |
| Observations | 288 | 246 | 331 | 227 | 215 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Figure 1: Poverty across European countries**

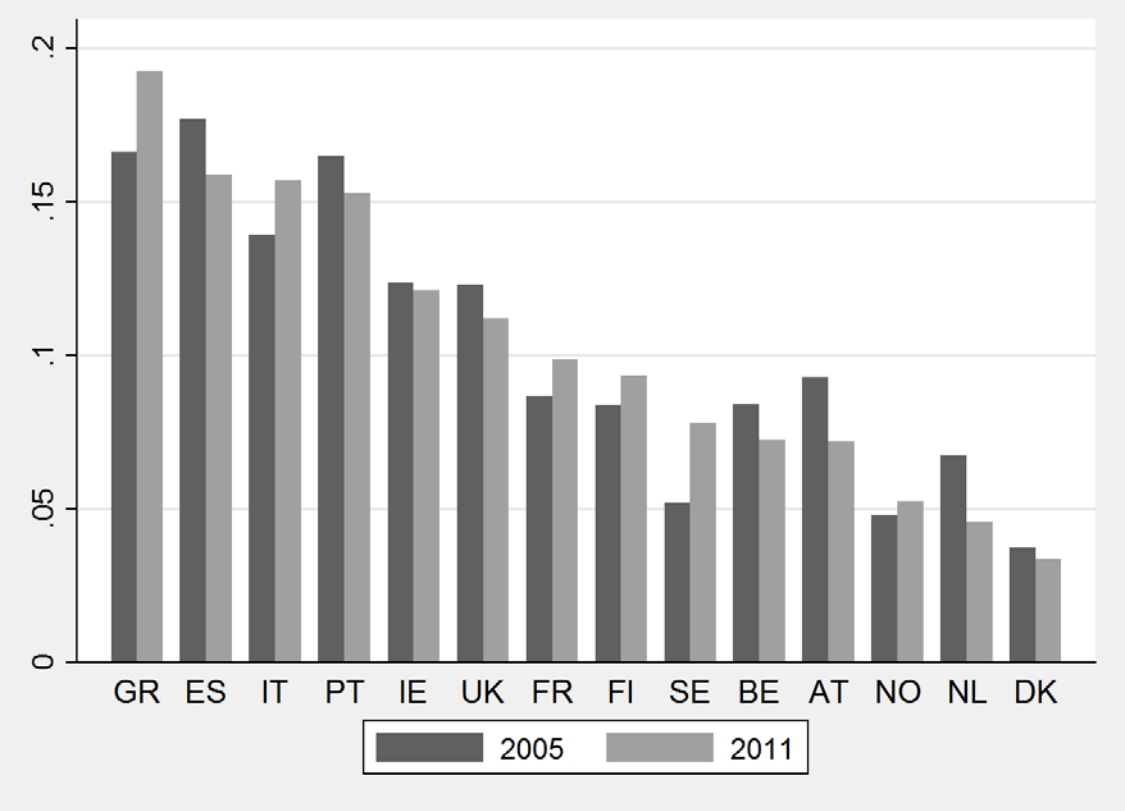
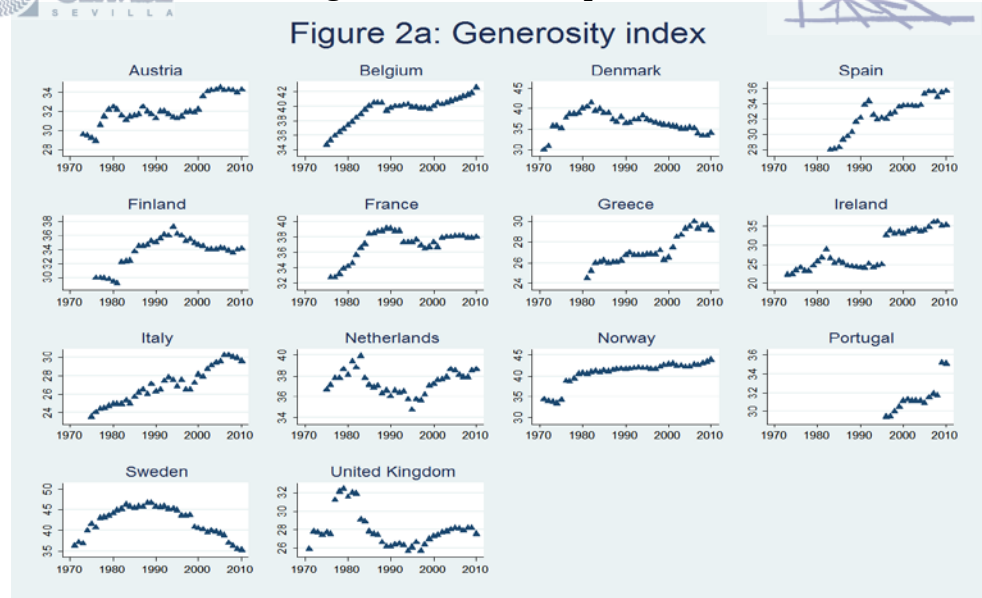
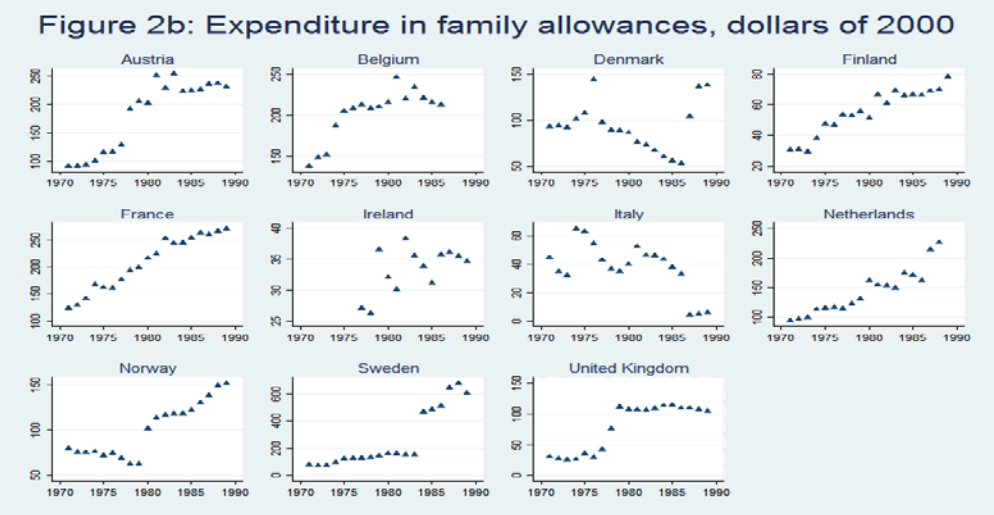


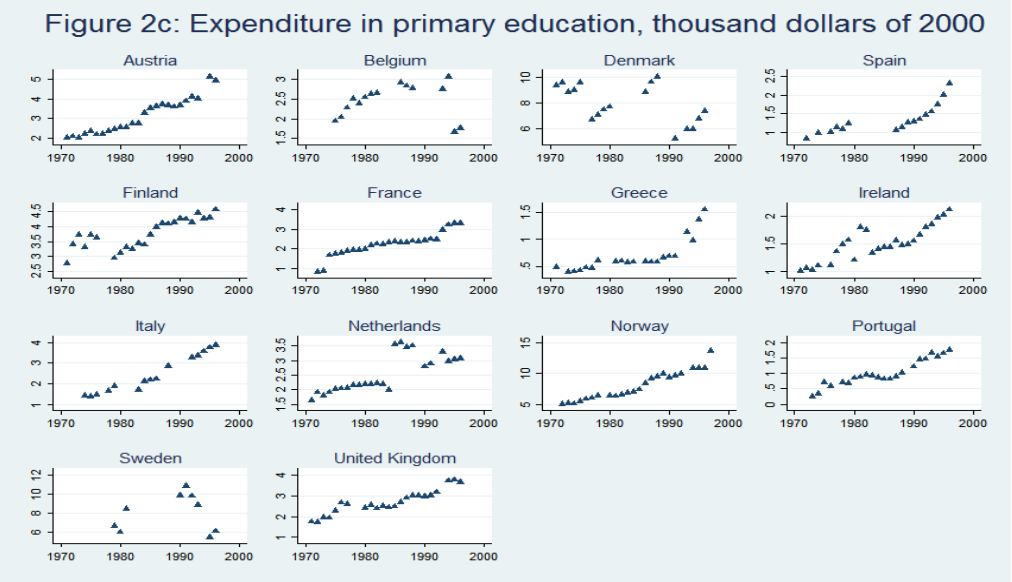
**Figure 2: Past social policies**




Source: CWED2 database




Source: CWED database




Source: UNESCO database

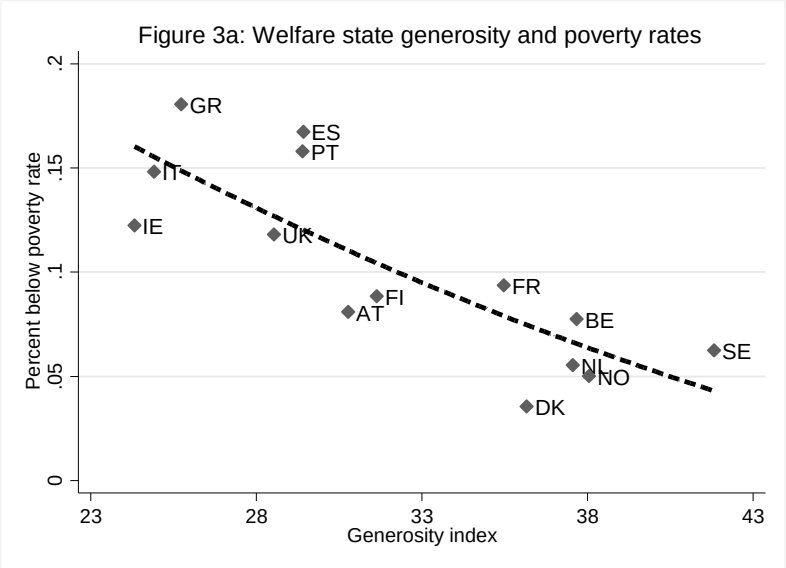


Figure 3a: Welfare state generosity and poverty rates
Percent below poverty rate
0
.05
.1
.15
.2
GR
ES
PT
IT
IE
UK
FR
FI
AT
BE
SE
NL
NO
DK
23
28
33
38
43
Generosity index

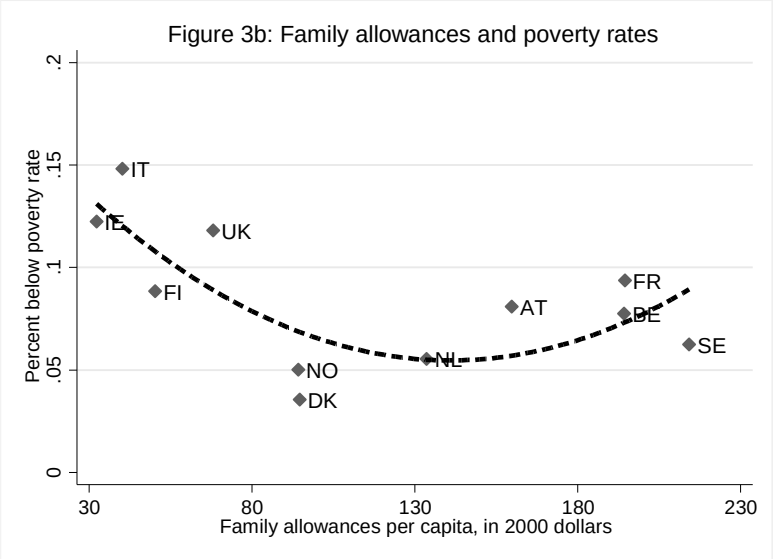


Figure 3b: Family allowances and poverty rates
Percent below poverty rate
0
.05
.1
.15
.2
IT
IE
UK
FI
FR
AT
BE
SE
NO
NL
DK
30
80
130
180
230
Family allowances per capita, in 2000 dollars

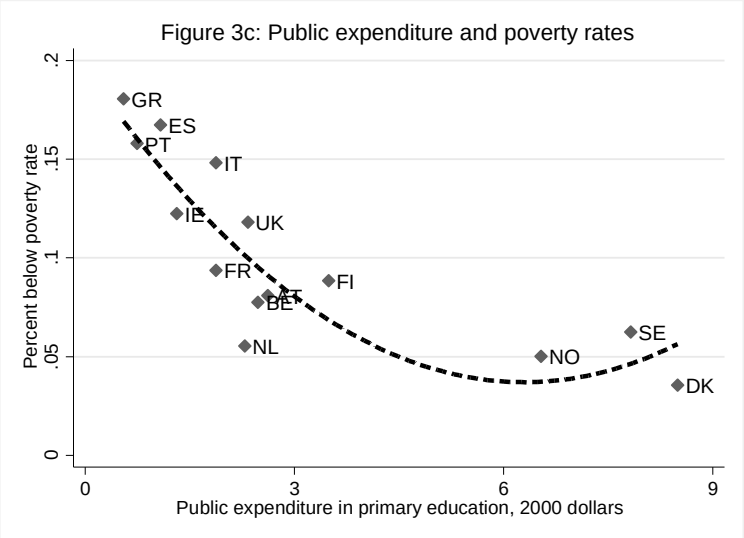


Figure 3c: Public expenditure and poverty rates
Percent below poverty rate
0
.05
.1
.15
.2
GR
ES
PT
IT
IE
UK
FR
FI
AT
BE
SE
NL
NO
DK
0
3
6
9
Public expenditure in primary education, 2000 dollars

**Figure 4a: Residual impact of country-cohort on poor**

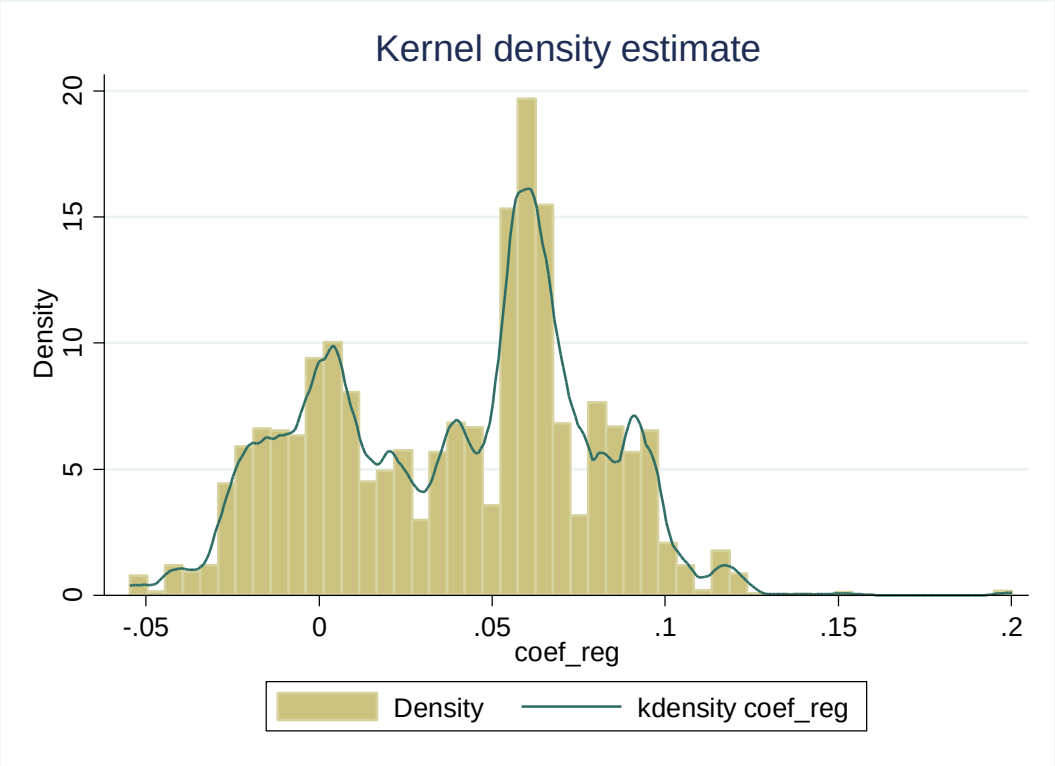
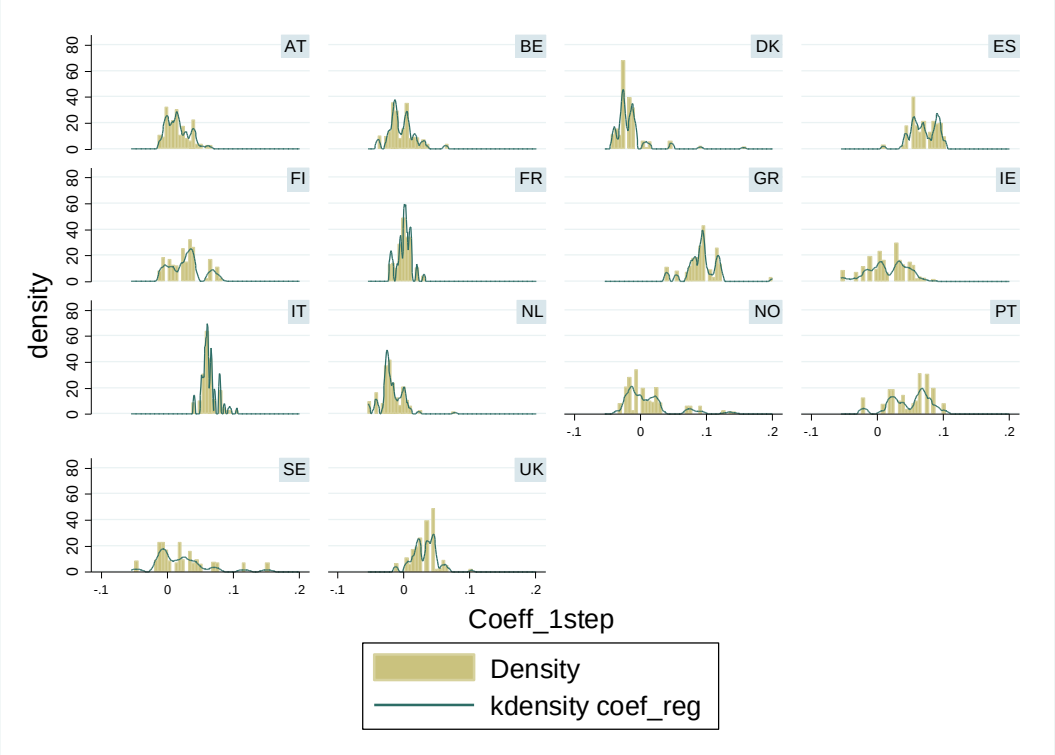
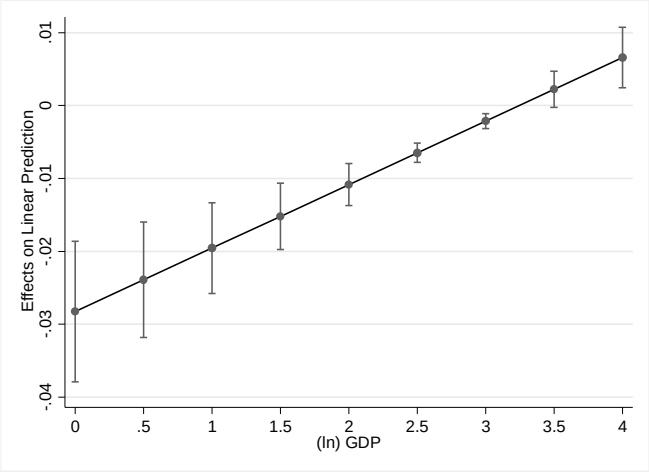


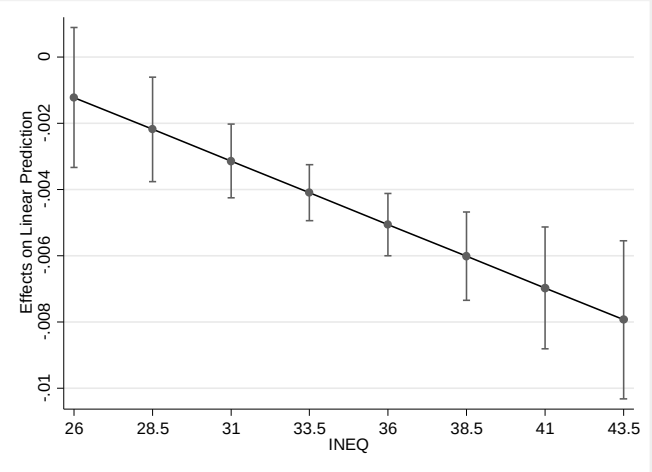

**Figure 4b: Mean residual impact of country-cohort by country**



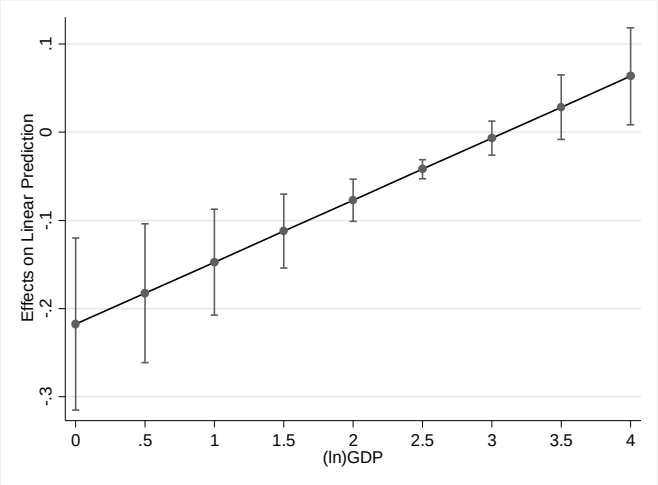
## Figure 5. Marginal effects for different levels of GDP

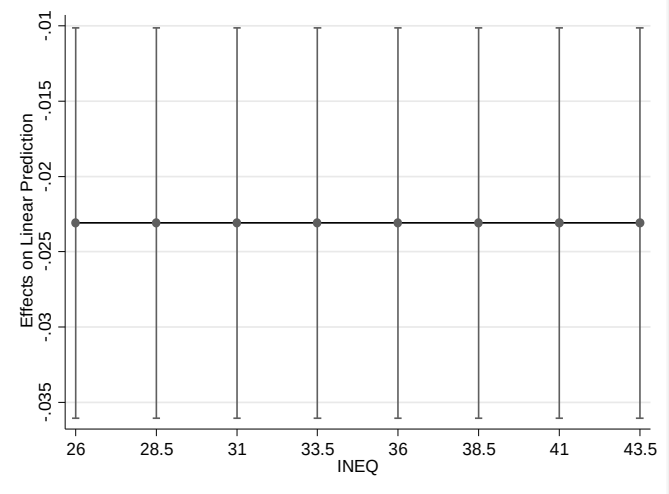
### 5a. Generosity




### 5b. PEF




### 5c. PEE