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PREFERENCES FOR PUBLIC EDUCATION SPENDING IN HIERARCHICAL EDUCATION SYSTEMS: THEORY AND EMPIRICAL EVIDENCE FROM OECD COUNTRIES

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Abstract: This paper analyses the factors affecting preferences for public education spending, focusing on household income and other individuals' characteristics as well as on institutional features. Standard redistributive arguments à la Meltzer and Richard (1981) suggest that the impact of household income on preferences should be negative since richer families are likely to oppose the redistributive effect of public funding. However, the empirical evidence does not seem to confirm this prediction. To shed some light on this issue, our proposed interpretative key hinges on the hierarchical structure of the education system. To this purpose, we set up a model in which agents are heterogeneous in terms of income and education and human capital is produced in a two-tier education system. We show that individual preferences for public education spending are affected by household income and by variables related to the socioeconomic context, such as income inequality and social inclusiveness of the education system, which determine the ultimate redistributive effect of public spending. We are able to test some of the predictions of our model using individuals' data from ISSP (2006 wave). The econometric analysis points out that household income is, unambiguously, a negative predictor of preferences when considering openly redistributive education expenses. Differently, when considering general schooling expenses, the intensity and even the direction of the income effect is affected by income inequality and by the social inclusiveness of the education system. We also assess the presence of significant residual variability in the income coefficient, due to unobserved factors, which for the most part is due to the individual within-country rather than to the cross-country level.
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1. Introduction

Education systems vary considerably over the world, even among developed countries. Not only the share of GDP devoted to education is different, but also the composition of education expenditures by level of education (primary/secondary vs. tertiary), years of compulsory schooling and school tracking. Other important aspects of differentiation include, among others, financing (e.g. public vs private and thus the level of tuition fees as well as the presence of subsidies and financial aid to students).[1]

In recent decades, scientific as well as political debate has focused on the causes and consequences of different education systems. An important aspect of the discussion has been the relationship between the structure of the education system and its capacity of ensuring an inclusive and equitable quality of education to all. The question is important since the lower the degree of equality in education opportunities, the stronger pupils' educational attainments are determined by the family background. This dependency is in turn held responsible for lower intergenerational mobility of human capital (and hence of income) and persistent social inequality.

In this paper, we take the view that the education system observed in a country is the outcome of a political process that aggregates individuals' conflicting preferences for education policy. Understanding the determinants of these preferences is therefore essential to explain the variability in education systems across

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[1] See Di Gioacchino et al. (2016).

different societies. In this perspective, our aim is to investigate the individuals' characteristics and the country-level socio-economic factors that affect preferences for public education spending.

At the individual level, the literature has indicated household income as an important determinant of preferences for public education spending. Standard redistributive arguments à la Meltzer and Richard (1981) suggest that, the impact of income on preferences should be negative since richer families are likely to oppose the redistributive effect of public funding. However, the empirical evidence does not seem to confirm this prediction.[2] To shed some light on this issue, our proposed interpretative key hinges on the hierarchical structure of the education system. We argue that the allocation of Government funds between different tiers of education determines the ultimate redistributive impact of public education spending. In fact, even when education fully relies on public funding, children from lower socio-economic status have lower enrolment rates at increasing levels of education.[3] This evidence has been explained in the literature by the role of parental education in the children's human-capital production function, and by the effects of family connections, social relations and neighbourhood networks on the chances of being allocated into better paying jobs.[4]

At the macro level, the characteristics of the education system and other country-specific variables can also play a role in shaping preferences, accentuating or dampening the effects of individuals' characteristics. Here we focus on the social stratification (low inclusiveness) of tertiary education and on income inequality.

In line with the above arguments, our theoretical model describes how preferences for different levels of education are formed assuming that agents are heterogeneous in terms of income and education. In addition, the model takes into account the hierarchical nature of the education system by separating basic (K-12) from tertiary education.[5] We assume that the probability of acceding to university depends on parents' education, the more so the lower is the social inclusiveness of the education system. Moreover, we take into account the importance of family connections, by allowing returns from human capital accumulation to depend on family socio-economic background, with pupils coming from high-income families earning, ceteris paribus, higher returns than pupils from low-income families.

Theoretical results show that families whose income is below average support a higher spending in basic education and a lower level of public funding of tertiary education than "middle" income families. The latter oppose public spending in basic education (because of its redistributive effect) but are in favour of public spending in tertiary education, the more so the more important are family connections. As for very rich (top income) families, their position on the income ladder fully drives their preferences, since they oppose public funding of education whatever level is considered. Not considering top income families, the individual education level positively affects overall support to public spending in education**.** Our results also suggest that the intensity of preferences is influenced by institutional factors such as income inequality and the inclusiveness of the education system.

To test the results of our model, we rely on individuals' data from ISSP (2006 wave) for 20 OECD countries. Unfortunately, the data do not allow to discriminate preferences for basic and tertiary education. To isolate the pure redistributive motive from other factors related to income that might affect education preferences, we exploit two questions from the survey: the first considers broad support for public education expenditures. The second is focused on tertiary education and it explicitly inquiries about the provision of financial help for low-income students.

With the limits imposed by the available dataset, empirical results confirm the testable implications of our theoretical model: individuals' characteristics as well as the country specific context matter in shaping preferences for public education expenditures. Specifically, in line with previous literature, we show that support for education spending increases with the individual education, while the income effect seems, on

[2]See for example Busemayer (2012) and Busemayer and Iversen (2014).

[3]See De Fraja (2004) and Cunha et al. (2007). Moreover, children with highly educated parents are more likely to be educated in academically selective schools than those with less educated parents (Dustmann, 2004). On this point, Brezis and Hellier (2017) argue that the division between elite and standard universities is another factor that contributes in generating permanent social stratification.

[4]Glomm and Ravikumar (1992 and 2003) argue that a sufficiently high elasticity of parental human capital in the learning technology might be responsible for low intergenerational mobility of human capital. Bowles and Gintis (2002) and Goldthorpe and Jackson (2008) emphasize the impact of family models on the development of children's non-cognitive traits such as risk aversion, extroversion, the willingness to work in team, the sense of discipline or leadership. All these traits seem to be extremely relevant in determining labour market success. On the role of family ties, see also Alesina and Giuliano's (2014) and Franzini et al. (2013).

[5]K-12, from kindergarten to 12th grade, refers to primary and secondary education.

average, to be nil. The cross-country variability of the coefficient measuring the impact of income on preferences partially account for this last result. In the attempt to explain such variability, we interact household income with the two macro variables suggested by our model, namely income inequality and the social stratification in tertiary education.
We show that support for (overall) education expenditures increases (decreases) with income in countries where income inequality or the social inclusiveness of the education system are low (high).
Unfortunately, due to lack of comparable data on the role of family connections on the education premium, we are not able to test for this effect on preferences for education, this question being left to future research.
We also assess the presence of significant residual variability in the income coefficient, due to unobserved factors, which for the most part is due to the individual within-country rather than to the cross-country level. The joint effect of observable and unobservable factors may result in an income gradient that is weak or statistically non-significant across individuals and across countries, but it may well be either positive or negative in specific institutional context and/or in subgroup of a population.
The rest of paper is organized as follows: section 2 introduces the related literature; section 3 presents our theoretical model and its testable implications; section 4 contains empirical evidence; finally, section 5 offers some concluding remarks and indicates directions for future research.

2. Related literature

This paper relates to two strands of the literature: the literature that sees education as a hierarchical process and the literature that studies the micro-foundations of education policy in terms of individual policy preferences.
Much of the literature on education treats basic (K-12) and tertiary education symmetrically, or simply assumes a single type of education. However, some recent works have begun to model explicitly the two types of educational expenditures and to investigate the dynamic effects of allocating public funds between basic and advanced education. A strand of this literature explores how the allocation of resources, as opposed to the total resources allocated, affects growth and persistence in earnings.[6] Others have focused on the political economy of education. To this respect, Blankenau et al. (2007) show that innate abilities affect individual preferences over the optimal allocations of public funds within the education system. In the same line, Viane and Zilcha (2013) show that in a political equilibrium the distribution of skills among individuals matters for the composition of public education expenditures. In a society with a majority of low skilled workers, the median voter may oppose public funding of high education. Conversely, Di Gioacchino and Sabani (2009) argue that the joint distribution of income and wealth, by affecting individual preferences, might help to explain why societies that are more unequal tend to spend comparatively more on higher levels of education. In the same line of research, although not considering an explicit hierarchical education system, recent contributions (Ansell, 2008; Kitschelt and Rhem, 2006; Busemeyer, 2012; Busemeyer and Iversen, 2014) have recognised the importance of the interactions between individuals' characteristics and macro variables (representing the social, institutional and economic context) in shaping individual policy preferences. Busemeyer and Iversen (2014) and Busemeyer (2012), for example, analysing survey data for a large number of OECD countries, show that the impact of household income on preferences is on average nil. However, significant indirect effects emerge when considering its interaction with two aspects of the macro-level context, namely economic inequality and inequality in the distribution of human capital.[7]
In this paper, we add to this last strand of literature in two ways. First, we explicitly model individual preferences on the allocation of public resources across different levels of education. Second, we empirically investigate the cross-country variability of income effects on individual preferences by interacting this variable with macro-variables measuring the intergenerational persistence of human capital (used as an indicator of the social inclusiveness of the education system). Moreover, as a novelty compared to previous papers based on the same source of data, we exploit the information from two questions from the ISSP (2006 wave) survey; the first asks the respondent whether the Government should spend more on education; the second question asks whether the Government should give financial help to university students from low income families. The joint estimation aims at sharpening coefficients identification and efficiency by

[6]See Restuccia and Urrutia (2004) and Su (2004), Blankenau (2005), Arcalean and Schiopu (2010) and Sarid (2017).
[7]See Busemeyer et al. (2017) for a survey of the empirical evidence on what is known about public opinion on different topics of education policies, with a special focus on a cross-country perspective of European countries.

exploiting the correlation between the two error processes. At the same time, it helps to gain insights on the multidimensional shape of education preferences.

3. The model

In the economy, there is a continuum of families of measure one. A family consists of a parent (old agent) and a child (young agent). Old agents are endowed with an exogenous incomeY_j, consume and make educational transfers to their children.[8] Young agents get educated in a hierarchical schooling system in which basic (K-12) education might be followed by tertiary education. The educational transfer is distributed over the two educational stages and the family allocates the transfer in order to maximize expected utility derived from family consumption and returns from the human capital accumulated by the offspring.

Old agents are heterogeneous along two dimensions: income and human capital. Income is distributed in the old population according to a given distribution function with mean Y. Human capital, indexed by *i*, is high (*i=H*) if the parent has graduated from university and low (*i=L*) if the parent has not obtained a university degree. We assume that a fraction *k* of the old agents has a university degree.

Child's future income is determined by his accumulated human capital, which depends on public and private expenditures on education.[9] We assume that the elasticity of the child's income with respect to his human capital is higher for rich families. The idea is that for a given level of human capital, the chances of finding a job, and a well-paid job, are higher for "connected" families, where family connections are supposed to be positively correlated with parent's income.

3.1 Human capital formation

Human capital formation is modelled as a two-stage process. The first stage (basic education) is mandatory and corresponds to primary and secondary education. Parent's investment (B_{ij}) and Government's expenditures (B_G) are substitutes in the formation of a child's basic education.[10] Access to the second stage (tertiary education) requires the successful completion of a basic education final exam.[11] We assume that the minimum amount of basic education necessary to take the final exam ($\bar{B}$) is provided by public expenditures. This assumption simplifies our analysis and can be justified appealing to as a minimum provision of public education guaranteed by the Constitution.

Tertiary education expenditures, both private (T_{ij}) and public (T_G) augment basic education. Again, parent's investment and public expenditures are substitutes.

The probability of passing the basic education final exam and entering university is not the same for all children. We assume that children whose parent has a university degree pass the final exam with probability p_H,while if the parent is not graduated from university, the probability of successful completion of the final exam is p_L, with $0 \leq p_L < p_H < 1$.[12] The ratio $\frac{p_H}{p_L}$ can be interpreted as an indicator of the inclusiveness of the

[8]The educational transfer might be thought of as goods or time. In this last case, increased time with children reduces income endowment and, as in the case of investment in goods, reduce disposable income for consumption.

[9]Since our focus is on the role of the family and its social status, we assume all children to be alike. Adding children's heterogeneity in innate abilities or talent would not change preferences, on average, if talent is randomly distributed among families. Note that, in the empirical estimates we argue that unobserved talent is one possible explanations for the variability in the income coefficient.

[10]Parents' investment in education could be substitutes or complements with public expenditures. Glomm and Ravikumar (1992) and Kaganovich and Zilcha (1999) assume that public and private investment are complements, whereas Becker and Tomes (1986) that they are substitute. See Nordblom (2003) for a discussion and further references. In line with this literature, we assume that public education is the same for all children, that is we are excluding the possibility of "opting out". As will become clear below, since we are interested in preferences for public education expenditures, adding opting out would not alter the ranking of preferences. In fact, the first to opt out would be those with higher income who, in our model, always prefer zero public expenditures.

[11]We do not distinguish between access to tertiary education and its completion. In other words, for simplicity we assume that entering university implies that the degree is eventually obtained with certainty.

[12]We are aware that these probabilities should depend on the quantity (and the quality) of public and private investment in basic education. For analytical tractability, we skip this aspect and assume exogenous probabilities. This assumption is less strong than it might seem. In fact, time and money on children's education are not wasted as their human capital positively depends on it. Moreover, if the probability of access to university increases with private expenditures, which in turn increase with income, this would imply that the gap in access probabilities between children of highly educated and those of low educated parents would decrease with income. Even if this gap were to close at the high end of the

education system: the closer this ratio is to one, the less access to tertiary education is correlated to parents' education and the higher is the equality of opportunity in education.
Each child accumulates human capital according to the following production function, where, for simplicity, we assume the same elasticity (α) of basic and tertiary education:

$$h_{ij} = \begin{cases} (B_{ij} + B_G + \bar{B})^{\alpha}(T_{ij} + T_G)^{\alpha} & if\ tertiary\ education\ is\ completed \\ (B_{ij} + B_G + \bar{B})^{\alpha} & otherwise \end{cases} \quad (3.1)$$

where the indexes *i* and *j* identify, respectively, parent's education and income.
Given human capital, child's future income is given by

$$y_{ij} = {h_{ij}}^{\mu_j} \quad (3.2)$$

where, as discussed above, the elasticity $\mu_j \geq 1$ is higher for richer families.

3.2 Public and Private educational expenditures

Total public education expenditures (TEE) are financed by a proportional income tax (τ) so the Government budget constraint can be written as:

$$TEE = \bar{B} + B_G + aT_G = \tau Y \quad (3.3)$$

where Y is the average income in the old population and $a = kp_H + (1-k)p_L$ indicates the fraction of the young population acceding to tertiary education.[13]
Following Glomm and Kaganovich (2003), we assume that the family utility function is logarithmic in consumption and child's future income, with relative weight γ measuring parent's altruism:[14]

$$U_{ij} = lnc_{ij} + \gamma lny_{ij} \quad (3.4)$$

Utility is maximised under the family budget constraint and the non-negativity constraints:

$$c_{ij} + B_{ij} + T_{ij} = (1-\tau)Y_j \quad (3.5)$$

$$B_{ij}, T_{ij}, c_{ij} \geq 0 \quad (3.6)$$

In Appendix A, we solve the family optimal choices of consumption and private investment in basic and tertiary education. At the optimum$(c_{ij}^*, B_{ij}^*, T_{ij}^*)$, families choose private expenditures to balance marginal benefit from basic and tertiary education, thus they spend relatively more on the level of education in which the Government spends less. Moreover, we show that (i) as income and connections increase, families spend more on both education levels; (ii) highly educated parents, spend more on tertiary education and less on basic education than low-educated parents do.

3.3 Preferences for education

To derive preferences for public education expenditures, we write the family indirect utility as a function of the Government's choice variables:[15]

$$W_{ij}(B_G, T_G) = lnc_{ij}^* + \alpha\gamma\mu_j ln\left(B_{ij}^* + B_G + \bar{B}\right) + \alpha\gamma\mu_j p_i ln\left(T_{ij}^* + T_G\right) \quad (3.7)$$

Substituting the optimal solution $(c_{ij}^*, B_{ij}^*, T_{ij}^*)$ found in Appendix A [equation (A.4)], we can compute net benefits from basic and tertiary public education:

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income distribution this would not change preferences for public education spending of the rich, as they always prefer zero spending (although it would change their private expenditures).

[13]In a dynamic model, we would have

$$a = k_{t+1} = k_t p_H + (1-k_t)p_L$$

which converges to

$$k^* = \frac{p_L}{1-(p_H - p_L)}$$

[14]See also Zilcha (2003), Bernasconi and Profeta (2012), Viane and Zilcha (2013) and Sarid (2017) for the same assumptions about the family's utility function.

[15]Given its budget constraints, the Government can choose only two variables.

$$\frac{\partial W_{ij}}{\partial B_G} = \left(1 - \frac{Y_j}{Y}\right) \frac{\left(1+\alpha\gamma\mu_j(1+p_i)\right)}{\left[Y_j + \left(1-\frac{Y_j}{Y}\right)(B_G+\bar{B}) + \left(1-\frac{aY_j}{Y}\right)T_G\right]} \tag{3.8}$$

$$\frac{\partial W_{ij}}{\partial T_G} = \left(1 - \frac{aY_j}{Y}\right) \frac{\left(1+\alpha\gamma\mu_j(1+p_i)\right)}{\left[Y_j + \left(1-\frac{Y_j}{Y}\right)(B_G+\bar{B}) + \left(1-\frac{aY_j}{Y}\right)T_G\right]} \tag{3.9}$$

From (3.8), we see that net benefits from basic education are positive (negative) for families whose income is below (above) the average, suggesting that public spending in basic education is a way of redistributing income.

From (3.9), we see that net benefits from tertiary education are positive (negative) if income is lower (higher) than a threshold level $\frac{Y}{a}$, which depends positively on parents' average income and negatively on university enrolment in the young population (*a*).[16] As for the intensity of preferences, it is easy to check that net benefits (losses) from basic education increase with the distance between family income and average income, and for tertiary education they increase with the distance between family income and the threshold level $\frac{Y}{a}$.

Thus, with regard to income, we have three groups of families: low ($Y_j < Y$), middle ($Y \leq Y_j < \frac{Y}{a}$) and high ($Y_j \geq \frac{Y}{a}$).[17] For simplicity, we set $\mu_j = \mu_L$, for $Y_j < Y, \mu_j = \mu_M$ for $Y \leq Y_j < \frac{Y}{a}$ and $\mu_j = \mu_H$ for $Y_j \geq \frac{Y}{a}$ $with\ \mu_L < \mu_M < \mu_H$.

Matching education (*i= H, L)* and income *(j=L, M, H),* we have six groups of families. For each one of them, in Appendix A, we derive the preferences shown in Table 1 below, where $g_{ij} = \frac{\alpha\gamma\mu_j}{1+\alpha\gamma\mu_j(1+p_i)}$.

Table 1: Individual preferences for basic, tertiary and total education

	High education *(i=H)*	Low education *(i=L)*
Low-income ($Y_j < Y$) $\mu_j = \mu_L$	$B_G = g_{HL}Y - \bar{B}$ $aT_G = g_{HL}p_H Y$ $TEE = g_{HL}(1+p_H)Y$	$B_G = g_{LL}Y - \bar{B}$ $aT_G = g_{LL}p_L Y$ $TEE = g_{LL}(1+p_L)Y$
Middle-income ($Y \leq Y_j < \frac{Y}{a}$) $\mu_j = \mu_M$	$B_G = 0$ $aT_G = g_{HM}p_H Y$ $TEE = \bar{B} + g_{HM}p_H Y$	$B_G = 0$ $aT_G = g_{LM}p_L Y$ $TEE = \bar{B} + g_{LM}p_L Y$
High-income ($Y_j \geq \frac{Y}{a}$) $\mu_j = \mu_H$	$B_G = 0$ $aT_G = 0$ $TEE = \bar{B}$	$B_G = 0$ $aT_G = 0$ $TEE = \bar{B}$

As expected, middle and high-income families, whose net benefits from basic education are negative, prefer no additional expenditures on this tier of education, beside the minimum guaranteed by the Constitution. Differently, low-income families prefer to increase basic education expenditures beyond this minimum. As for tertiary education, high-income families, whose net benefits are negative, prefer zero public expenditures. Differently, middle and low-income families, whose net benefits from tertiary education are positive, support public spending on tertiary education. Thus, a clear redistributive effect is at work. Nevertheless, other factors contribute to families' support for public education expenditures and might even reverse this result when considering total expenditures.

Keeping fixed the level of income, we see that while parents' education negatively affects support for basic education, the effect is reversed in case of tertiary education expenditures.[18] Since access to tertiary education is higher for children from highly educated families, they tend to prefer a higher level of tertiary education expenditures and a lower level of basic education expenditures. Nevertheless, the effect of parents'

[16]Being connected and/or highly educated does not change preferences, but it increases net benefits (or losses) from each education level.

[17]The gross enrolment rate in 2006 ranges from 46% in Switzerland to 93% in Finland (OECD 2012). Accordingly, while definition of middle income for Switzerland would include families whose income is between the average and twice the average, for Finland, this group would include families with income around the mean.

[18]For each tier of education, this is true unless the preferred expenditure level is nil.

education on total education expenditures is unambiguous: for any given level of income, parents' education positively affects support for total education expenditures.
Keeping fixed parents' education, we see that, excluding high-income families, whose preferences are fully driven by their position on the income ladder, the effect of income on preferences depends on which education level is considered: low-income families prefer comparatively more spending on basic education, while middle-income families prefer comparatively more spending in tertiary education. The total effect is ambiguous and depends on parameters value. The reason is that, differences in the premium for education, which is positively related to family income, mitigate the redistributive content of education expenditure and thus the negative effect of income on preferences. In a more complex (and realistic) setting in which the probability of access to university would depend not only on parental education but also on family income (through private expenditures on education) an additional effect would increase middle-income families' support for education expenditures.
Note that, although not affecting the ranking of preferences in our model, the human-capital formation technology parameter (α) and the inclusiveness of the education system ($\frac{p_H}{p_L}$) influence the intensity of preferences for public expenditures in education (see equations 3.8 and 3.9). These parameters are, at least partially, country-specific being related to the productive and social structure of the country itself. Similarly, income inequality, as in the standard Meltzer and Richard's framework, affects the intensity of preference (see equations 3.8 and 3.9)

3.4 Testable implications

In the next section, we estimate the determinants of education preferences on data from ISSP (2006 wave). This survey does not contain specific questions about preferences for basic and for tertiary education. Therefore, we follow a more indirect approach and rely on two questions included in the survey: the first is about overall public education spending; the second question is clearly about redistribution, although focused on tertiary education. By combining the answers to these two questions we investigate the individual and the country characteristics that affect education preferences. In particular, exploiting the answers to the second question, we aim to disentangle the redistributive motive that shapes preferences for public education spending from other (counteracting) factors, and thus provide a rationale for why a clear-cut and unambiguous role for income does not emerge in most empirical works on this topic. To grasp a better understanding of the role of household income on preferences, we explore how it is related to the country-level characteristics considered in the theoretical model, namely income inequality and inclusiveness of the education system. Moreover, we allow for residual variability in the income effect due to unobserved factors.[19]
In brief, based on our model's results and given data constraints, we are going to test the following hypotheses:
1. highly educated individuals unambiguously prefer higher levels of public spending on education;
2. the effect of household income on preferences for education expenditures is negative when a clear redistributive issue is at stake;
3. the effect of household income on preferences for total education expenditures, and even its sign, varies both across individuals and across countries, although its overall influence might be weak or non-significant. At the country level, the effect is negatively related to income inequality and inclusiveness of the education system.

4. Empirical Analysis

4.1 Data and methodology

We use individual-level data from the International Social Survey Programme (ISSP); specifically, the 2006-wave, which is the more recent available module focused on the 'Role of Government'. This survey mainly deals with attitudes towards State intervention, Government responsibilities and Government spending; it contains individual/household socio-economic information including the respondent's political orientation. The 2006 wave contains 43,620 observations across 33 countries with formal democratic institution. As the data do not allow distinguishing between preferences for basic and tertiary education, our dependent

[19]These are either features included in the model for which information is missing (μ_j) or elements not included in the model that might be relevant, such as individuals' abilities and talent.

variables are derived from the answer to two questions that are present in the survey, both of which inquire about public education expenditures:
1. $Pref_{TEE}$: "*Should the Government spend money on...education? Remember that if you say "much more", it might require a tax increase to pay for it*";
2. $Pref_{HELP}$: "Do you think it should or should not be the government's responsibility to give financial help to university students from low income families?"
$Pref_{TEE}$ corresponds to a preference for the overall level of education spending (*i.e.* increasing TEE in our model); $Pref_{HELP}$ should isolate the redistributive component of preferences for public expenditures in education, although focusing on tertiary education.
Both original variables are multimodal with a natural ordering: however, to reduce the number of parameters in presence of little variation among categories, we collapse them into binomial choices whose overall and across-country distribution is reported in Table B.2. $Pref_{TEE}$ is equal to one if the respondent answer is "more" or "much more" (as opposed to zero which collapses "same", "less" and "much less" modalities); $Pref_{HELP}$ is set to one if the respondent's answer is "Definitely should be" (as opposed to zero if she answers probably should be/should not be or Definitely should not be).[20] Although the former preference is skewed towards 1 (73% the overall mean), for both variables there is significant across countries variability (see Table B2).
Formally, we specify the following two nonlinear equations:

$$Pref_{i,TEE} = \boldsymbol{X'_{i1}\beta_1} + \varepsilon_{i1} \tag{4.1}$$

$$Pref_{i,HELP} = \boldsymbol{X'_{i2}\beta_2} + \varepsilon_{i2} \tag{4.2}$$

where $Pref_{i,}$. are dichotomic representations of endogenous continuous latent variables reflecting preference intensity and direction for individual i, $\boldsymbol{X_{i1}}$ and $\boldsymbol{X_{i2}}$ are vectors of predictors that may have elements in common. The random terms ε_i. are assumed to be normally distributed, bringing to the estimation of probit models.
As explanatory variables we consider household income - measured by a self-placement in a scale from 1 (lowest) to 10 (highest)[21] - and the respondent's level of education achieved [in a scale from 0 (no qualification) to 5 (university or above)]. In recognising the relevance of other motives in determining such preferences, we control for political orientation, the degree of interest in politics and other socio-demographic variables such as age, gender and household size. We also augment the equations with macro-level covariates included in our theoretical model, namely country disposable income Gini (GINI) as a proxy for economic inequality and the intergenerational persistence of education (used as an indicator of the social inclusiveness of the education system, given in the model by the p_H/p_L ratio). For this latter variable, we consider the ratio between the "odds of being a student in higher education if parents have high levels of education" and the "odds of being a student in higher education if parents have low levels of education" (ODDSACCESS).[22] The higher this variable the less inclusive and the more stratified is the education system. To operationalize the country-level part of hypothesis 3) in section 3.4, these two variables are also interacted with household income.[23]
As a further country-level control, we include the share of public education spending on GDP (EDUCEXP) and the public spending on tertiary education to GDP (TERSGDP), for equation (4.1) and (4.2), respectively.[24]
Due to limited coverage of country level covariates (mainly ODDSACCESS), the estimation sample includes 24,464 and 24,015 households - for equation (4.1) and (4.2), respectively - spread among 20 countries.[25]

[20]This partition is because, in terms of explanatory capacity of the model, "probably should be" individuals are more similar to "probably should not be" than to "definitely should be" ones.
[21]For UK, which lacks this information, it is replaced with a comparable discretization of the self-reported monetary household income. Measurement errors should not be a serious concern since this information is clearly subjective and self-perception most likely drives the expression of the preferences we are analysing.
[22]This variable, hardly ever characterised by abrupt changes over time, is taken from OECD Education at a Glance, 2012, and is relative to the period 2008-2010, as near as possible to the survey interview period.
[23]In the estimation phase, country-level variables are centered at their across-country mean to clearly interpret interactions and average effects.
[24]A list of variables (Table B.1) and summary statistics (Table B.2) are shown in Appendix B.

All models are augmented with country-specific intercepts to avoid omitted variable bias related to the potential effect of country-level unobservable variables. This also serves the purpose of limiting an overstatement of estimates precision related to the presence of country-level regressors. Further statistical inference problems related to individual-level cross-section data grouped in countries are also addressed by calculating robust standard errors clustered at the country level.[26]

To sharpen identification and improve on the precision of the estimates, in a second specification we apply an extension of Zellner's (1962) Seemingly Unrelated Regression estimator to binary dependent variables by considering simultaneously $Pref_{TEE}$ and $Pref_{HELP}$. The reason is that if there is significant correlations between the error processes – which is testable - the joint estimates, exploiting this further correlation, will be more efficient than those derived from single-equation regressions. Moreover, if the vector of predictors in the two equations do not coincide, also the estimated coefficients can result slightly adjusted. Finally, we think that in this context a significant correlation between the two error processes would also suggest the existence of a meaningful relationship (or common root) in economic terms between the two preferences. This in turn should strengthen our line of reasoning in the attempt to disentangle the redistributive motive that shapes preferences for public education spending.

We thus estimate the following seemingly unrelated bivariate probit (SUBP).

$$\begin{aligned} Pref_{i,TEE} &= \boldsymbol{X'_{i1}\gamma_1} + \epsilon_{i1} \\ Pref_{i,HELP} &= \boldsymbol{X'_{i2}\gamma_2} + \epsilon_{i2} \end{aligned} \tag{4.3}$$

where

$$\begin{bmatrix}\epsilon_{i1}\\ \epsilon_{i2}\end{bmatrix} \sim \text{Bivariate Normal}\left(\begin{bmatrix}0\\0\end{bmatrix}, \sigma_i^2 \begin{bmatrix} I & \rho I \\ \rho I & I \end{bmatrix}\right)$$

σ_i^2 is the variance of the error terms, that can be heteroscedastic, and ρ is the correlation coefficient between the errors. To check whether the two outcomes are correlated, we test the significance of ρ.

In a final specification, we account for possible residual variability in the income effect due to unobserved factors, as discussed in section 3.4 footnote 19, and thus operationalize the individual-level part of hypothesis 3. Starting from model (4.3), we relax the assumption that all individuals within the same country come from a population with a single slope by adding random income slopes at the individual level in both equations. We will refer to this set of estimates as model (4.4).

All estimates are obtained by applying a maximum-likelihood conditional mixed-process estimator (CMP), which produces heteroscedasticity-consistent standard errors under the hypothesis of normality.

4.2 Results

This section presents main empirical findings with a focus on the three hypotheses sketched in section 3.4. Table 2 shows the estimates of equation (4.1) in the first two columns and of equation (4.2) in the second two ones. Moreover, odd-numbered columns report estimated coefficients while even-numbered ones show related marginal effect (ME).[27]

With reference to the education parameters of equation (4.1), we are able to confirm the first hypothesis according to which highly educated individuals prefer higher levels of overall public spending on education. The result is clear-cut, as we will further argue later on, but in terms of size, it is limited. To provide a concrete measure of its marginal effect, a shift from the lower secondary level (Educ=2) to the highest

[25]In the specific, from the original dataset we lose observations from Chile, Croatia, Dominican Republic, Israel, Japan, Latvia, Philippines, Russia, South Africa, South Korea, Taiwan, Uruguay and Venezuela. To temper concerns of sample selection bias, the Appendix C shows the estimates of equations (4.1) and (4.2) - without country-level predictors - both on the overall sample and on the estimation subsample, side by side. Table C.4 reveals that the latter sample replicate closely the correlation structure of the former for both equations. This evidence should rule out serious concerns of sample selection bias.

[26]It is well-known that failure to control for within-cluster error correlation can lead to misleadingly small standard errors. It is also known that with few clusters the variance estimator can be biased downward, although there is no clear-cut definition in the literature on how few is "few": "depending on the situation "few" may range from less than 20 to less than 50 clusters […]" (Cameron and Miller, 2015). A full analysis of this issue goes beyond the scope of this study, however as a precautionary approach and to limit over-rejections of (true) null hypotheses, we opted for the cluster-robust estimate of the variance matrix in presence of 21 (large) clusters. The reason for the 21 clusters is that West and East Germany were still separately sampled in the 2006 survey.

[27]We compute the ME as the increase in the expected conditional probability.

educational level (Educ=5) increases the average predicted probability of preferring an increase in overall public education spending from 72.5% to about 75%.
Concerning the effect of household income on preferences (hypotheses 3) for total education expenditures, we first look at the direct effect given by the income parameters of equation (4.1). As suggested by the model - that justifies an ambiguous overall effect – its average effect appears to be nil both in size and in terms of statistical significance. However, statistically significant (at 5% or 10% level) indirect effects emerge once we consider its interactions with the income distribution (GINI) - which proves to be negative - and with the intergenerational persistency in education (ODDSACCESS), positive. In other words, where income inequality is higher than the average, high income individuals tend to be less in favour of increasing education spending compared to lower income individuals and the other way around where income inequality is lower than the average. The opposite pattern is found in terms of exclusiveness of the education system, *i.e.* the richer are more likely to be more in favour of a public spending expansion compared to low income individuals when tertiary education is less accessible for individuals from less educated families. Such empirical evidence is consistent with the theoretical analysis of section 3.
To give a measure of the variability in income ME explained by the country-level dimensions under scrutiny, moving from the 10th to the 90th percentile of the across-country GINI income distribution, this gradient reverses from a statistically significant (+.034) to a statistically significant (-.028). On the contrary, moving between the same percentiles of the ODDSACCESS distribution, it passes from a statistically non-significant (-.01) to a statistically significant (.031).[28]
Looking at the role of other micro-level controls, being a woman, a parent or still in education increases the likelihood to be in favour of an expansion of public education expenditures. Political orientation matters, with support for education increasing as one moves left on the political spectrum and, in general, with the degree of political interest. To give a measure of this effect, self-placing on the far left increases the probability of $Pref_{TEE}$=1 by 8 percentage points.
At the country-level, unexpectedly, EDUCEXP does not appear to be statistically significant. While GINI and ODDSACCESS correlate positively and negatively, respectively, with $Pref_{TEE}$. In particular, the predicted probability skyrockets from 58% to an impressive 88% if one moves from the 10th to the 90th percentile of the across-country GINI income distribution.
As for the income effect in the second equation ($Pref_{HELP}$), the negative and significant coefficient and ME clearly confirm the second hypothesis and in this case the effect is also substantial in magnitude. In fact, the estimated ME implies that climbing up the (self-perceived) income ladder the average probability of strongly agreeing to the financial help to university students decreases from 54% at the bottom to 40% at the top of the income scale. This result, though not surprising, to the best of our knowledge has not been found in the empirical literature. The income effect in the second equation does not show any significant variability across-country over the two dimensions of GINI and ODDSACCESS, as confirmed by the very low statistical significance of the two interaction terms.
Apart from the relevant negative role of household income (and education), in this equation other controls show a similar pattern to $Pref_{TEE}$. The variation of the average probability over GINI is even more impressive, increasing from 26% to 77% if one moves from the 10th to the 90th percentile. Differently from $Pref_{TEE}$, the actual aggregate level of expenditures seems to matter, with TERSPGDP that negatively and significantly correlates with the dependent variable.
Most of country-specific intercepts (though not shown because of space limitation) are statistically significant at the 1% level, thus confirming the presence of unexplained cross-country variation in both preferences.[29]
The estimates of model (4.3), where the residual correlation of the two error processes is also exploited, do not alter the substance of the results presented so far and the relative regression table is shown Table C.1. In

[28]To have an idea of the overall across-country income effect variability, we have also run separate regressions of equation (4.1) for each of the 20 countries of our estimation sample. The country-specific coefficients are shown, separately, in figures C.1 (see Appendix C). They prove to be quite heterogeneous around their (roughly) zero average, though hardly statistically different from zero, which is not shown. This evidence - confirmed by running a pooled regression that includes interactions between household income and country dummies – suggests to check also for residual variability at individual level.
[29] A linear version of these estimates is reported in Table C.5, as a robustness check. In this case ME are not required to give an interpretation of predictors' effects. Estimated coefficients are comparable, although, clearly, not the same, to the Probit MEs.

addition, the estimation for ρ is positive (.24) and highly statistically significant.[30] According to the econometric theory, the joint estimation of the two preferences improves on the precision of the estimates (Greene, 2012) although in this specific case such refinement is only marginal.[31] Perhaps and most importantly, this evidence corroborates our indirect strategy for identifying the latent redistributive motive that shapes preference for public education spending.

Finally, Table C.2 shows the estimates for model (4.4) consisting in a random income slopes version of model (4.3). Overall, previous results are confirmed, but an additional relevant feature is revealed by the estimated standard deviations of the income coefficients for both equations (see Table 3). The estimated standard deviations (.058 (.016) in the $Pref_{TEE}$ equation and .058 (.013) in the $Pref_{HELP}$ equation) clearly bring to a refusal of the null hypothesis of fixed income slope once controlling for the two country-level interactions (GINI and ODDSACCESS). This further evidence of the income effect variability as opposed to a more stable and unambiguous education effect is in line with model predictions.[32]

For the residual income effect variability, there is more than interactions with other individual micro predictors (which, if added in the r.h.s. explain a negligible share of the observed variability) while there is room for unexplained country-level variability. In fact, focusing on $Pref_{TEE}$, a version of the model that includes interactions of income with country-dummies (instead of GINI and ODDSACCES) would bring about an estimated standard deviation of .055 (.020), while a model with no country-level explanation of the income slope variability would provide an estimation of .061 (.019) (see Table C.3).

Simple calculations thus reveal that approximately 10% of the overall income slope variability refers to the country-level. The two margins of country-level variation suggested by our model – GINI and ODDSACCESS - explain about a fifth of this level variability. The remaining 90% refers to the individual-level, thus suggesting that - at this level - other interacting factors may change the intensity and even the direction of the standard redistributive (negative) effect.[33]

To the best of our knowledge, this is a novel result in the literature on this topic, which instead so far has focused on possible heterogeneity determined by macro-institutional factors.[34]

With reference to our theoretical model, the above-mentioned interacting factors could include the premium to education, which is related to family connections, and other features that could explicitly emerge by letting the access probabilities also depend on family income and individual talent.

Table 2: Probit estimates of preferences equations

	$Pref_{TEE}$		$Pref_{HELP}$	
	(1)	(2)	(3)	(4)
VARIABLES	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Micro level (1)				
Education	0.0254**	0.00809**	-0.0461***	-0.0183***
	(.0123)	(.0039)	(.0159)	(.0063)
Income	0.00766	0.00244	-0.0404***	-0.0161***
	(.0085)	(.0027)	(.0108)	(.0043)
Ineduc	0.247***	0.0789***	0.232***	0.0922***
	(.0790)	(.0252)	(.0622)	(.0248)
Age	-0.000151	0.00	-0.00155	-0.000617
	(.0012)	(.0004)	(.0013)	(.0005)
Parent	0.126***	0.0402***	-0.0633***	-0.0252***
	(.0448)	(.0143)	(.0224)	(.0089)

[30]This correlation is slightly higher than the overall correlation between $Pref_{TEE}$ and $Pref_{HELP}$ (.18).

[31]For example, for the $Pref_{TEE}$ equation it provides a bit higher estimated coefficient and a slightly greater standard error.

[32]The same test conducted on the education coefficients of both equations does not allow to refuse the null hypothesis of fixed parameter.

[33]The relative strength of the individual-level variability may well change in a more heterogeneous sample of countries.

[34]See for example Busemayer (2012) and Busemayer and Iversen (2014).

Female	0.105***	0.0336***	0.0971***	0.0386***
	(.0293)	(.0093)	(.0163)	(.0065)
Hompop	0.0240***	0.00765***	0.0289***	0.0115***
	(.0079)	(.0025)	(.0105)	(.0042)
Micro level (2): political interest and orientation				
Interest	0.0542***	0.0173***	0.0777***	0.0309***
	(.0180)	(.0058)	(.0108)	(.0043)
Far-left	0.271***	0.0865***	0.350***	0.139***
	(.0751)	(.0240)	(.0798)	(.0317)
Left	0.122***	0.0390***	0.0921**	0.0367**
	(.0446)	(.0142)	(.0376)	(.0150)
Right	-0.104**	-0.0331**	-0.257***	-0.102***
	(.0436)	(.0139)	(.0459)	(.0183)
Macro level				
GINI	0.103***	0.0250***	0.106***	0.0478***
	(.0244)	(.0068)	(.0162)	(.0019)
ODDSACCESS	-0.0795*	-0.00961	0.0416	0.0086
	(.0451)	(.0092)	(.0446)	(.0068)
EDUCEXP	-0.175	-0.0559	-	-
	(.2510)	-0.0018	-	-
TERSPGDP	-	-	-0.437***	-0.174***
	-	-	(.0883)	(.0351)
Cross Level				
i.Income*GINI	-0.00449**	-	0.00265	-
	(.0018)	-	(.0022)	-
i.Income*ODDSACCESS	0.00912*	-	-0.00369	-
			(.0060)	
Country dummies	Yes	Yes	Yes	Yes
N. of cases	24,464		24,015	

Notes: Probit estimates of equations (1) and (2) on ISSP data (2006). Macro level variable are taken from The World Bank, World Development Indicators 2006 (GINI, EDUCEXP, TERSGDP) and from OECD, Education at a Glance 2012 (ODDSACCESS). Standard errors, between parentheses, are clustered at the country level (21 clusters). *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

Table 3: Random effects parameters of model 4.4. Income standard deviations.

Equation	Estimate	Std. Err.	[95% Conf.	Interval]
$Pref_{TEE}$	0.058	0.017	0.033	0.102
$Pref_{HELP}$	0.058	0.013	0.038	0.091

5. Concluding remarks

Education systems vary considerably over the world, even among developed countries. In this paper, we take the view that the education system observed in a country is the outcome of a political process that aggregates individuals' conflicting preferences for education policy. Thus, our analysis concentrates on the determinants of individual preferences for public education spending, as a first step to explain education systems'

variability. Following the recent literature on hierarchical education, that portraits human capital accumulation as a two-stage process, we set up a model to describe how preferences for different levels of education are formed assuming that agents are heterogeneous in terms of income and human capital. We show that household income is related to individual preferences for public education expenditures in a way that is not as clear-cut as the standard Metzler-Richard's (1981) model would suggest. Individual preferences are also affected by the education level of the agent and by variables related to the socioeconomic context, such as income inequality and social inclusiveness of the education system, which determine the ultimate redistributive effect of public spending.

Empirical evidence supports theoretical results. Specifically, we point out that household income is, unambiguously, a negative predictor when considering openly redistributive education expenses, i.e. financial help to university students from low-income families. Differently, when considering general schooling expenses, the intensity and even the direction of the income effect is affected - negatively - by income inequality and by the social inclusiveness of the education system. We also assess the presence of significant residual variability in the income coefficient, due to unobserved factors, which for the most part is due to the individual within-country rather than to the cross-country level. The joint effect of observable and unobservable factors may result in an income gradient that is weak or statistically non-significant across individuals and across countries, but it may well be either positive or negative in specific institutional context and/or in subgroup of a population. On the other hand, individual education is a clear-cut positive predictor in explaining preferences towards general schooling expenses not targeted at specific socio-economic groups.

All these findings seem to point to the result that in a political equilibrium the amount of resources devoted to education spending might be lower in poorly educated societies, the more so the lower is the social inclusiveness of the education system in being. In other words, low educated countries can remain trapped in a "low education" state, because of the lack of political support to increase education spending. To this respect, it might be worthwhile to investigate whether education systems reforms pointing towards an increase in social inclusiveness could be a drive to increase general support to public education spending. As for the allocation of public resources between different stages of education, limits in data availability, did not allow us to estimate separately preferences for basic vs tertiary education and the role of family connections in determining preferences. Therefore, this important aspect of the analysis is left to future research, as well as the analysis of the political game that allows to relate the individual preference to a specific political equilibrium.[35]

[35]A preliminary discussion of these aspects can be found in Di Gioacchino et al. (2016)

Appendix A: Private expenditures in education and Preferences for public education expenditures

To find the family optimal choices of consumption and private investment in basic and tertiary education, write the family (expected) utility function:

$$EU_{ij} = lnc_{ij} + \gamma\left\{p_i ln\left[(B_{ij} + \bar{B} + B_G)^{\alpha}\left(T_{ij} + T_G\right)^{\alpha}\right]^{\mu_j} + (1 - p_i) ln\left[(B_{ij} + \bar{B} + B_G)^{\alpha}\right]^{\mu_j}\right\} =$$
$$= lnc_{ij} + \alpha\gamma\mu_j ln\left(B_{ij} + \bar{B} + B_G\right) + \alpha\gamma\mu_j p_i ln\left(T_{ij} + T_G\right)$$

This utility function is maximised under the family budget constraint and the non-negativity constraints:

$$c_{ij} + B_{ij} + T_{ij} = (1 - \tau)Y_j$$
$$B_{ij}, T_{ij}, c_{ij} \geq 0$$

The first order conditions are:

$$\frac{\partial EU_{ij}}{\partial B_{ij}} = \frac{-1}{c_{ij}} + \frac{\alpha\gamma\mu_j}{B_{ij} + \bar{B} + B_G} \leq 0 \qquad \text{(A.1)}$$

$$B_{ij} \geq 0, \qquad \frac{\partial EU_{ij}}{\partial B_{ij}} B_{ij} = 0$$

$$\frac{\partial EU_{ij}}{\partial T_{ij}} = \frac{-1}{c_{ij}} + \frac{\alpha\gamma\mu_j p_i}{T_{ij} + T_G} \leq 0 \qquad \text{(A.2)}$$

$$T_{ij} \geq 0, \qquad \frac{\partial EU_{ij}}{\partial T_{ij}} T_{ij} = 0$$

If $Bij > 0$ condition (A.1) holds with equality: the marginal utility loss from reduced consumption is equal to the marginal utility gain from increased child's income. If condition (A1) holds as inequality, we have a corner solution in which $B_{ij} = 0$. The family would reduce B_{ij} because $\bar{B} + B_G$ provides enough education for the child.

Analogously, if $T_{ij} > 0$ condition (A.2) holds with equality: the marginal utility loss from reduced consumption is equal to the marginal utility gain from increased child's income. If condition (A.2) holds as inequality, then we have a corner solution in which $T_{ij} = 0$. The family would reduce T_{ij} because T_G provides enough education for the child.

In case of an interior solution ($B_{ij} > 0, T_{ij} > 0$), it can easily be shown that the optimal choice is:

$$\begin{aligned} B_{ij}^* &= g_{ij}\left[(1 - \tau)Y_j + T_G\right] - \left(1 - g_{ij}\right)(\bar{B} + B_G) \\ T_{ij}^* &= g_{ij}p_i\left[(1 - \tau)Y_j + \bar{B} + B_G\right] - \left(1 - g_{ij}p_i\right)T_G \\ c_{ij}^* &= \left[1 - g_{ij}(1 + p_i)\right]\left[(1 - \tau)Y_j + \bar{B} + B_G + T_G\right] \end{aligned} \qquad \text{(A.3)}$$

with $g_{ij} = \frac{\alpha\gamma\mu_j}{1 + \alpha\gamma\mu_j(1 + p_i)}$.

To derive preferences for public education, write the family indirect utility as a function of Government's choice variables

$$W_{ij}(\tau, B_G, T_G) = lnc_{ij}^* + \alpha\gamma\mu_j ln\left(B_{ij}^* + \bar{B} + B_G\right) + \alpha\gamma\mu_j p_i ln\left(T_{ij}^* + T_G\right) \qquad \text{(A.4)}$$

Given its budget constraint, the Government can choose only two variables. Substituting for $\tau = \frac{\bar{B} + B_G + aT_G}{Y}$ in the optimal solution $(c_{ij}^*, B_{ij}^*, T_{ij}^*)$, gives

$$B_{ij}^* + \bar{B} + B_G = g_{ij}\left[Y_j + \left(1 - \frac{Y_j}{Y}\right)(\bar{B} + B_G) + \left(1 - \frac{aY_j}{Y}\right)T_G\right]$$
$$T_{ij}^* + T_G = g_{ij}p_i\left[Y_j + \left(1 - \frac{Y_j}{Y}\right)(\bar{B} + B_G) + \left(1 - \frac{aY_j}{Y}\right)T_G\right]$$
$$c_{ij}^* = \left[1 - g_{ij}(1 + p_i)\right]\left[Y_j + \left(1 - \frac{Y_j}{Y}\right)(\bar{B} + B_G) + \left(1 - \frac{aY_j}{Y}\right)T_G\right]$$

which substituted in equation (A.4) gives

$$W_{ij}(B_G, T_G) = ln\left[1 - g_{ij}(1 + p_i)\right]\left[Y_j + \left(1 - \frac{Y_j}{Y}\right)(\bar{B} + B_G) + \left(1 - \frac{aY_j}{Y}\right)T_G\right]$$
$$+ \alpha\gamma\mu_j ln\left\{g_{ij}\left[Y_j + \left(1 - \frac{Y_j}{Y}\right)(\bar{B} + B_G) + \left(1 - \frac{aY_j}{Y}\right)T_G\right]\right\} +$$

$$+\alpha\gamma\mu_j p_i ln\left\{g_{ij}p_i\left[Y_j+\left(1-\frac{Y_j}{Y}\right)(\bar{B}+B_G)+\left(1-\frac{aY_j}{Y}\right)T_G\right]\right\}$$

The net benefits from public education expenditures are easily computed:

$$\frac{\partial W_{ij}}{\partial B_G}=\left(1-\frac{Y_j}{Y}\right)\frac{\left(1+\alpha\gamma\mu_j(1+p_i)\right)}{\left[Y_j+\left(1-\frac{Y_j}{Y}\right)(\bar{B}+B_G)+\left(1-\frac{aY_j}{Y}\right)T_G\right]} \tag{A.5}$$

$$\frac{\partial W_{ij}}{\partial T_G}=\left(1-\frac{aY_j}{Y}\right)\frac{\left(1+\alpha\gamma\mu_j(1+p_i)\right)}{\left[Y_j+\left(1-\frac{Y_j}{Y}\right)(\bar{B}+B_G)+\left(1-\frac{aY_j}{Y}\right)T_G\right]} \tag{A.6}$$

From (A.5) and (A.6), we see that, for any given level of education (characterised by p_i), we have three groups of families: low-income ($Y_j < Y$), middle-income ($Y < Y_j < \frac{Y}{a}$) and high-income ($Y_j > \frac{Y}{a}$).

Since their net benefits are positive, *low-income families* prefer the maximum level of public expenditures in both basic and tertiary education (see A.5 and A.6). To compute these preferred values, note that increasing B_G and T_G would imply a corner solution for private expenditures, that is: $B_{ij}^* = T_{ij}^* = 0$.

In this case, $c_{ij}^* = (1-\tau)Y_j = \left(1-\frac{\bar{B}+B_G+aT_G}{Y}\right)Y_j$ and

$$W_{ij}(B_G,T_G) = ln\left(1-\frac{\bar{B}+B_G+aT_G}{Y}\right)Y_j + \alpha\gamma\mu_j ln(\bar{B}+B_G) + \alpha\gamma\mu_j p_i lnT_G$$

To find the preferred level of public education expenditures write the first order conditions:

$$\frac{\partial W_{ij}}{\partial B_G}=\frac{-1}{\left(1-\frac{\bar{B}+B_G+aT_G}{Y}\right)Y}+\frac{\alpha\gamma\mu_j}{\bar{B}+B_G}=0$$

$$\frac{\partial W_{ij}}{\partial T_G}=\frac{-a}{\left(1-\frac{\bar{B}+B_G+aT_G}{Y}\right)Y}+\frac{\alpha\gamma\mu_j p_i}{T_G}=0$$

Solving, gives $aT_G = g_{ij}p_iY$ and $\bar{B}+B_G=\frac{aT_G}{p_i}=g_{ij}Y$.

Middle-income families prefer $B_G=\bar{0}$ and the maximum level of public expenditures in tertiary education (see A.5 and A.6). That is, they prefer to privately provide basic education to their children and have the Government pay for tertiary education. To compute their preferred level of public expenditure in tertiary education, notice that increasing T_G would imply a corner solution for private expenditures in tertiary education: $T_{ij}^* = 0$.

In this case, $c_{ij}^* = (1-\tau)Y_j - B_{ij}^*$ and $B_{ij}^* = g_{ij}\left[(1-\tau)Y_j + T_G\right] - \left(1-g_{ij}\right)\bar{B}$

and

$$W_{ij}(\bar{B},T_G) = lnc_{ij}^* + \alpha\gamma\mu_j lnB_{ij}^* + \alpha\gamma\mu_j p_i lnT_G$$

Substituting c_{ij}^* and B_{ij}^*, the first order condition $\left(\frac{\partial W_{ij}}{\partial T_G}=0\right)$ gives

$$aT_G = g_{ij}p_iY$$

Lastly, *high-income families* prefer $B_G=0$ and T_G=0, because they prefer to privately provide basic and tertiary education to their children (see A.5 and A.6).

Appendix B: Data appendix

Table B.1: List of variables

	Description	*Source*
Household level		
$Pref_{TEE}$	Preference for variation in the overall level of education spending (binary)	ISSP 2006
$Pref_{HELP}$	Preference for financial help to university students from low income families (binary)	ISSP 2006
Education	Respondent's level of education achieved in a scale from 0 (no qualification) to 5 (University or above)	ISSP 2006
Income	Respondent's household income self-placement in a scale from 1 (lowest) to 10 (highest)	ISSP 2006
Ineduc	Respondent is still in education (dummy)	ISSP 2006
Age	Respondent's age	ISSP 2006
Parent	Respondent has children (dummy)	ISSP 2006
Female	Respondent's gender (dummy)	ISSP 2006
Hompop	Household size	ISSP 2006
Interest	Respondent's degree of interest in politics (0, 1,...,4)	ISSP 2006
Far-left	Respondent's self-placement in the political spectrum (dummy)	ISSP 2006
Left	""	ISSP 2006
Right	""	ISSP 2006
Country level		
EDUCEXP (%)	Household's country share of public education spending on GDP. Total	The World Bank, World Development Indicators (2006)
TERSPGDP (%)	Household's country share of public education spending on GDP. Tertiary	The World Bank, World Development Indicators (2006)
GINI (%)	Household's country disposable income Gini	The World Bank, World Development Indicators (2006)
ODDSACCESS	Country-level ratio of "odds of being a student in higher education if parents have high levels of education" to "odds of being a student in higher education if parents have low levels of education"	OECD, Education at a Glance (2012)

Table B.2: Descriptive statistics of models' variables. Total and by country

Country	*Mean*	*sd*	*Min*	*Max*	*Country*	*Mean*	*sd*	*Min*	*Max*
Australia					**New Zealand**				
$Pref_{TEE}$	0.80	0.40	0	1	$Pref_{TEE}$	0.69	0.46	0	1
$Pref_{HELP}$	0.40	0.49	0	1	$Pref_{HELP}$	0.27	0.44	0	1
Education	3.48	1.54	0	5	Education	3.03	1.74	0	5
Income	4.94	1.51	1	10	Income	5.96	1.65	1	10
Ineduc	0.03	0.17	0	1	Ineduc	0.04	0.20	0	1

Age	49.58	16.29	17	97	Age	49.34	17.44	18	92
Parent	0.28	0.45	0	1	Parent	0.28	0.45	0	1
Female	0.51	0.50	0	1	Female	0.51	0.50	0	1
Hompop	2.89	1.38	1	11	Hompop	2.90	1.48	1	16
Interest	2.40	1.05	0	4	Interest	2.30	1.03	0	4
Far left	0.00	0.00	0	0	Far left	0.01	0.12	0	1
Left	0.38	0.48	0	1	Left	0.14	0.34	0	1
Right	0.38	0.49	0	1	Right	0.21	0.41	0	1
EDUCEXP (%)	4.74	-	-	-	EDUCEXP (%)	5.93	-	-	-
TERSPGDP (%)	1.04	-	-	-	TERSPGDP (%)	1.47	-	-	-
GINI (%)	34.00	-	-	-	GINI (%)	44.20	-	-	-
ODDSACCESS	3.95	-	-	-	ODDSACCESS	9.37	-	-	-
N	2,247				N	1,043			
Canada					**Norway**				
$Pref_{TEE}$	0.66	0.48	0	1	$Pref_{TEE}$	0.63	0.48	0	1
$Pref_{HELP}$	0.41	0.49	0	1	$Pref_{HELP}$	0.37	0.48	0	1
Education	3.80	1.15	0	5	Education	3.43	1.30	1	5
Income	5.98	1.74	1	10	Income	6.26	1.55	1	10
Ineduc	0.01	0.12	0	1	Ineduc	0.08	0.27	0	1
Age	51.18	15.44	18	90	Age	46.71	15.47	18	79
Parent	0.27	0.45	0	1	Parent	0.31	0.46	0	1
Female	0.48	0.50	0	1	Female	0.52	0.50	0	1
Hompop	2.63	1.39	1	10	Hompop	2.75	1.61	1	34
Interest	2.28	1.11	0	4	Interest	2.41	0.88	0	4
Far left	0.00	0.00	0	0	Far left	0.01	0.12	0	1
Left	0.16	0.37	0	1	Left	0.25	0.44	0	1
Right	0.32	0.47	0	1	Right	0.37	0.48	0	1
EDUCEXP (%)	4.79	-	-	-	EDUCEXP (%)	6.38	-	-	-
TERSPGDP (%)	1.76	-	-	-	TERSPGDP (%)	2.01	-	-	-
GINI (%)	33.90	-	-	-	GINI (%)	28.10	-	-	-
ODDSACCESS	7.27	-	-	-	ODDSACCESS	3.52	-	-	-
N	743				N	1,225			
Czech_Republic					**Poland**				
$Pref_{TEE}$	0.66	0.47	0	1	$Pref_{TEE}$	0.80	0.40	0	1
$Pref_{HELP}$	0.40	0.49	0	1	$Pref_{HELP}$	0.59	0.49	0	1
Education	2.63	1.10	1	5	Education	2.68	1.29	0	5
Income	4.50	1.59	1	10	Income	5.06	1.80	1	10
Ineduc	0.06	0.23	0	1	Ineduc	0.07	0.26	0	1
Age	49.50	17.27	18	94	Age	47.50	17.75	18	88
Parent	0.21	0.41	0	1	Parent	0.25	0.43	0	1
Female	0.58	0.49	0	1	Female	0.51	0.50	0	1
Hompop	2.51	1.18	1	7	Hompop	3.23	1.62	1	13
Interest	1.90	1.15	0	4	Interest	1.67	0.98	0	4
Far left	0.08	0.27	0	1	Far left	0.06	0.24	0	1
Left	0.14	0.35	0	1	Left	0.05	0.21	0	1
Right	0.27	0.44	0	1	Right	0.01	0.12	0	1
EDUCEXP (%)	4.22	-	-	-	EDUCEXP (%)	5.22	-	-	-
TERSPGDP (%)	1.13	-	-	-	TERSPGDP (%)	0.96	-	-	-
GINI (%)	26.70	-	-	-	GINI (%)	34.70	-	-	-
ODDSACCESS	7.66	-	-	-	ODDSACCESS	4.54	-	-	-
N	1,081				N	1,218			

Denmark					**Portugal**				
$Pref_{TEE}$	0.62	0.49	0	1	$Pref_{TEE}$	0.86	0.35	0	1
$Pref_{HELP}$	0.41	0.49	0	1	$Pref_{HELP}$	0.62	0.49	0	1
Education	3.56	1.03	1	5	Education	1.65	1.44	0	5
Income	6.18	1.60	1	10	Income	4.25	1.53	1	10
Ineduc	0.06	0.25	0	1	Ineduc	0.04	0.20	0	1
Age	49.85	15.98	18	90	Age	47.96	18.09	18	90
Parent	0.26	0.44	0	1	Parent	0.26	0.44	0	1
Female	0.52	0.50	0	1	Female	0.59	0.49	0	1
Hompop	2.50	1.28	1	13	Hompop	2.80	1.29	1	9
Interest	2.45	0.94	0	4	Interest	1.23	1.07	0	4
Far left	0.17	0.37	0	1	Far left	0.07	0.26	0	1
Left	0.22	0.41	0	1	Left	0.25	0.43	0	1
Right	0.31	0.46	0	1	Right	0.01	0.12	0	1
EDUCEXP (%)	7.72	-	-	-	EDUCEXP (%)	4.90	-	-	-
TERSPGDP (%)	2.19	-	-	-	TERSPGDP (%)	0.93	-	-	-
GINI (%)	27.10	-	-	-	GINI (%)	38.10	-	-	-
ODDSACCESS	2.12	-	-	-	ODDSACCESS	5.01	-	-	-
N	1,192				N	1,482			
Finland					**Slovenia**				
$Pref_{TEE}$	0.44	0.50	0	1	$Pref_{TEE}$	0.81	0.40	0	1
$Pref_{HELP}$	0.34	0.47	0	1	$Pref_{HELP}$	0.72	0.45	0	1
Education	2.83	1.51	0	5	Education	2.51	1.36	0	5
Income	5.39	1.97	1	10	Income	5.26	1.62	1	10
Ineduc	0.11	0.32	0	1	Ineduc	0.11	0.32	0	1
Age	46.03	16.06	15	75	Age	46.16	17.66	18	94
Parent	0.21	0.41	0	1	Parent	0.21	0.41	0	1
Female	0.54	0.50	0	1	Female	0.53	0.50	0	1
Hompop	2.45	1.31	1	13	Hompop	3.37	1.46	1	13
Interest	1.94	0.95	0	4	Interest	1.54	1.09	0	4
Far left	0.00	0.00	0	0	Far left	0.06	0.25	0	1
Left	0.22	0.42	0	1	Left	0.10	0.29	0	1
Right	0.17	0.38	0	1	Right	0.08	0.27	0	1
EDUCEXP (%)	5.93	-	-	-	EDUCEXP (%)	5.57	-	-	-
TERSPGDP (%)	1.88	-	-	-	TERSPGDP (%)	1.21	-	-	-
GINI (%)	28.00	-	-	-	GINI (%)	24.50	-	-	-
ODDSACCESS	3.39	-	-	-	ODDSACCESS	5.24	-	-	-
N	983				N	901			
France					**Spain**				
$Pref_{TEE}$	0.60	0.49	0	1	$Pref_{TEE}$	0.87	0.33	0	1
$Pref_{HELP}$	0.55	0.50	0	1	$Pref_{HELP}$	0.71	0.45	0	1
Education	3.06	1.54	0	5	Education	2.32	1.41	0	5
Income	5.22	1.59	1	10	Income	4.94	1.20	1	10
Ineduc	0.03	0.17	0	1	Ineduc	0.04	0.19	0	1
Age	49.66	15.81	18	92	Age	46.30	17.31	18	97
Parent	0.32	0.47	0	1	Parent	0.28	0.45	0	1
Female	0.47	0.50	0	1	Female	0.51	0.50	0	1
Hompop	2.70	1.36	1	8	Hompop	3.21	1.38	1	17
Interest	2.40	1.01	0	4	Interest	1.56	1.24	0	4
Far left	0.05	0.22	0	1	Far left	0.06	0.24	0	1
Left	0.36	0.48	0	1	Left	0.28	0.45	0	1

Right	0.21	0.41	0	1	Right	0.09	0.28	0	1
EDUCEXP (%)	5.44	-	-	-	EDUCEXP (%)	4.16	-	-	-
TERSPGDP (%)	1.17	-	-	-	TERSPGDP (%)	0.93	-	-	-
GINI (%)	30.80	-	-	-	GINI (%)	32.70	-	-	-
ODDSACCESS	5.20	-	-	-	ODDSACCESS	4.46	-	-	-
N	1,370				N	2,328			
Germany					**Sweden**				
$Pref_{TEE}$	0.83	0.38	0	1	$Pref_{TEE}$	0.52	0.50	0	1
$Pref_{HELP}$	0.40	0.49	0	1	$Pref_{HELP}$	0.30	0.46	0	1
Education	2.09	1.31	0	5	Education	2.96	1.47	1	5
Income	5.41	1.61	1	10	Income	6.02	1.61	1	10
Ineduc	0.05	0.21	0	1	Ineduc	0.07	0.25	0	1
Age	48.89	17.16	18	94	Age	47.92	15.69	17	79
Parent	0.23	0.42	0	1	Parent	0.29	0.45	0	1
Female	0.51	0.50	0	1	Female	0.54	0.50	0	1
Hompop	2.54	1.26	1	8	Hompop	2.58	1.30	1	8
Interest	2.03	1.01	0	4	Interest	2.15	1.04	0	4
Far left	0.07	0.25	0	1	Far left	0.05	0.23	0	1
Left	0.28	0.45	0	1	Left	0.37	0.48	0	1
Right	0.24	0.43	0	1	Right	0.20	0.40	0	1
EDUCEXP (%)	4.27	-	-	-	EDUCEXP (%)	6.41	-	-	-
TERSPGDP (%)	1.08	-	-	-	TERSPGDP (%)	1.72	-	-	-
GINI (%)	32.80	-	-	-	GINI (%)	26.50	-	-	-
ODDSACCESS	4.04	-	-	-	ODDSACCESS	2.73	-	-	-
N	1,469				N	982			
Hungary					**Switzerland**				
$Pref_{TEE}$	0.74	0.44	0	1	$Pref_{TEE}$	0.71	0.45	0	1
$Pref_{HELP}$	0.39	0.49	0	1	$Pref_{HELP}$	0.28	0.45	0	1
Education	2.36	1.29	0	5	Education	2.52	1.20	0	5
Income	4.31	1.52	1	9	Income	5.65	1.69	1	10
Ineduc	0.05	0.22	0	1	Ineduc	0.02	0.14	0	1
Age	48.60	18.36	18	97	Age	50.04	17.46	18	96
Parent	0.26	0.44	0	1	Parent	0.27	0.45	0	1
Female	0.55	0.50	0	1	Female	0.57	0.50	0	1
Hompop	2.95	1.39	1	10	Hompop	2.40	1.40	1	9
Interest	1.63	1.11	0	4	Interest	1.93	1.15	0	4
Far left	0.01	0.07	0	1	Far left	0.01	0.08	0	1
Left	0.32	0.47	0	1	Left	0.20	0.40	0	1
Right	0.29	0.45	0	1	Right	0.30	0.46	0	1
EDUCEXP (%)	5.33	-	-	-	EDUCEXP (%)	4.98	-	-	-
TERSPGDP (%)	1.02	-	-	-	TERSPGDP (%)	1.32	-	-	-
GINI (%)	30.00	-	-	-	GINI (%)	34.50	-	-	-
ODDSACCESS	7.27	-	-	-	ODDSACCESS	4.60	-	-	-
N	961				N	936			
Ireland					**United Kingdom**				
$Pref_{TEE}$	0.88	0.32	0	1	$Pref_{TEE}$	0.74	0.44	0	1
$Pref_{HELP}$	0.72	0.45	0	1	$Pref_{HELP}$	0.36	0.48	0	1
Education	2.81	1.38	0	5	Education	2.47	1.77	0	5
Income	5.87	1.26	1	10	Income	5.99	2.58	1	10
Ineduc	0.05	0.21	0	1	Ineduc	0.02	0.15	0	1
Age	46.51	17.22	18	93	Age	47.97	17.17	18	91

Parent	0.31	0.46	0	1	Parent	0.24	0.43	0	1
Female	0.57	0.49	0	1	Female	0.57	0.50	0	1
Hompop	2.97	1.62	1	14	Hompop	2.35	1.28	1	8
Interest	1.89	1.20	0	4	Interest	2.07	1.15	0	4
Far left	0.00	0.00	0	0	Far left	0.03	0.17	0	1
Left	0.06	0.24	0	1	Left	0.35	0.48	0	1
Right	0.00		0	0	Right	0.27	0.45	0	1
EDUCEXP (%)	4.54	-	-	-	EDUCEXP (%)	5.23	-	-	-
TERSPGDP (%)	1.09	-	-	-	TERSPGDP (%)	1.05	-	-	-
GINI (%)	32.70	-	-	-	GINI (%)	34.80	-	-	-
ODDSACCESS	2.85	-	-	-	ODDSACCESS	2.62	-	-	-
N	863				N	733			
Netherlands					**United States**				
$Pref_{TEE}$	0.72	0.45	0	1	$Pref_{TEE}$	0.82	0.38	0	1
$Pref_{HELP}$	0.37	0.48	0	1	$Pref_{HELP}$	0.55	0.50	0	1
Education	3.03	1.43	0	5	Education	3.51	1.21	0	5
Income	6.28	1.71	1	10	Income	6.51	1.84	1	10
Ineduc	0.03	0.17	0	1	Ineduc	0.00	0.00	0	0
Age	48.48	15.25	18	92	Age	47.42	16.17	18	89
Parent	0.27	0.44	0	1	Parent	0.25	0.43	0	1
Female	0.44	0.50	0	1	Female	0.53	0.50	0	1
Hompop	2.50	1.33	1	9	Hompop	2.46	1.36	1	9
Interest	2.43	0.95	0	4	Interest	2.16	1.28	0	4
Far left	0.17	0.37	0	1	Far left	0.00	0.00	0	0
Left	0.24	0.43	0	1	Left	0.32	0.47	0	1
Right	0.18	0.38	0	1	Right	0.23	0.42	0	1
EDUCEXP (%)	5.09	-	-	-	EDUCEXP (%)	5.38	-	-	-
TERSPGDP (%)	1.40	-	-	-	TERSPGDP (%)	1.42	-	-	-
GINI (%)	30.80	-	-	-	GINI (%)	40.60	-	-	-
ODDSACCESS	3.01	-	-	-	ODDSACCESS	5.42	-	-	-
N	850				N	1,408			
Total									
$Pref_{TEE}$	0.74	0.44	0	1					
$Pref_{HELP}$	0.47	0.50	0	1					
Education	2.82	1.50	0	5					
Income	5.41	1.76	1	10					
Ineduc	0.05	0.21	0	1					
Age	48.23	16.85	15	97					
Parent	0.26	0.44	0	1					
Female	0.53	0.50	0	1					
Hompop	2.77	1.41	1	34					
Interest	2.01	1.14	0	4					
Far left	0.05	0.21	0	1					
Left	0.25	0.43	0	1					
Right	0.21	0.41	0	1					
EDUCEXP (%)	5.23	0.87	4	8					
TERSPGDP (%)	1.30	0.38	1	2					
GINI (%)	32.58	4.66	25	44					
ODDSACCESS	4.67	1.72	2	9					
N	24,015								

Appendix C: Further estimates and robustness checks

Figure C.1: Income effect by country

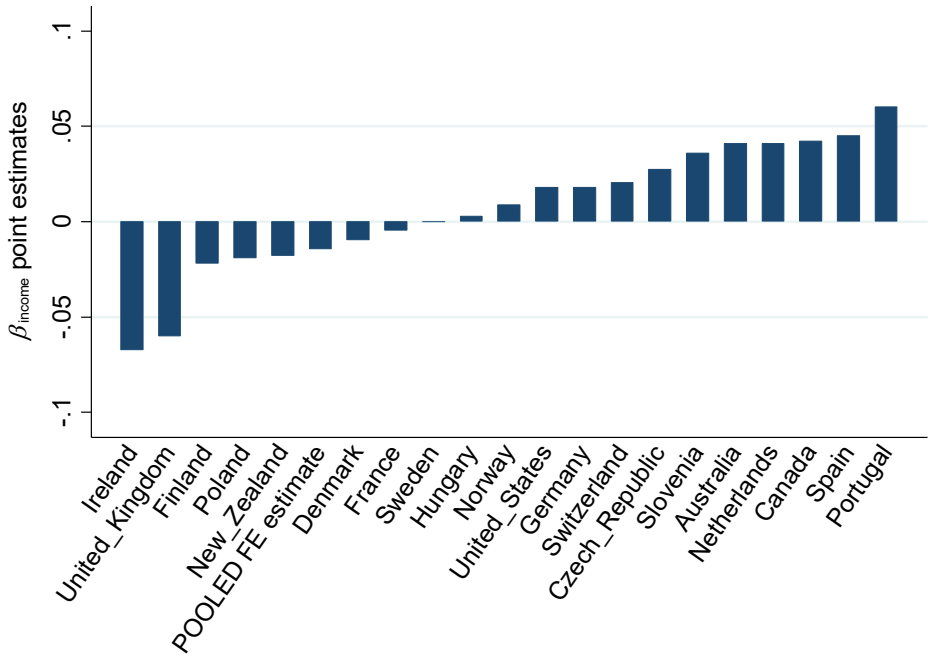

Table C.1: Seemingly unrelated bivariate probit estimates of preferences

	$Pref_{TEE}$		$Pref_{HELP}$	
	(1)	(2)	(3)	(4)
VARIABLES	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Micro level (1)				
Education	0.0261**	0.00834**	-0.0456***	-0.0181***
	(.0124)	(.0040)	(.0158)	(.0063)
Income	0.00785	0.0025	-0.0403***	-0.0160***
	(.0086)	(.0027)	(.0108)	(.0043)
ineduc	0.245***	0.0783***	0.234***	0.0930***
	(.0788)	(.0251)	(.0617)	(.0245)
Age	-0.000146	0.00	-0.00154	-0.000613
	(.0012)	(.0004)	(.0013)	(.0005)
Parent	0.127***	0.0405***	-0.0622***	-0.0247***
	(.0448)	(.0143)	(.0227)	(.0090)
Female	0.105***	0.0334***	0.0959***	0.0382***
	(.0294)	(.0094)	(.0163)	(.0065)
Hompop	0.0231***	0.00737***	0.0288***	0.0115***
	(.0079)	(.0025)	(.0104)	(.0041)
Micro level (2): political interest and orientation				
Interest	0.0542***	0.0173***	0.0777***	0.0309***

	(.0181)	(.0058)	(.0108)	(.0043)
Far-left	0.268***	0.0856***	0.352***	0.140***
	(.0740)	(.0236)	(.0794)	(.0316)
Left	0.120***	0.0383***	0.0936**	0.0372**
	(.0441)	(.0141)	(.0373)	(.0148)
Right	-0.104**	-0.0333**	-0.256***	-0.102***
	(.0439)	(.0140)	(.0460)	(.0183)
Macro level				
GINI	0.103***	0.0251***	0.106***	0.0480***
	(.0248)	(.0069)	(.0162)	(.0019)
ODDSACCESS	-0.0781*	-0.00931	0.0405	0.00847
	(.0460)	(.0093)	(.0444)	(.0067)
EDUCEXP	-0.173	-0.0552		-
	(.2520)	(.0806)		
TERSPGDP			-0.441***	-0.176***
			(.0879)	(.0350)
Cross Level				
i.Income*GINI	-0.00447**	-	0.00261	-
	(.0018)	-	(.0022)	-
i.Income*ODDSACCESS	0.00904*	-	-0.00355	-
	(.0054)	-	(.0060)	-
Country dummies	Yes	Yes	Yes	Yes
ρ	0.238***			
	(.0189)			
N. of cases	24,464		24,015	
Log-pseudolikelihood	-28,293			

Notes: Seemingly Unrelated Bivariate Probit (SUBP) estimates of model (4.3) on ISSP data (2006). Macro level variable are taken from The World Bank, World Development Indicators 2006 (GINI, EDUCEXP, TERSGDP) and from OECD, Education at a Glance 2012 (ODDSACCESS). Standard errors, between parentheses, are clustered at the country level (21 clusters). *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

Table C.2: Seemingly unrelated bivariate probit estimates of preferences with random income slopes

	$Pref_{TEE}$		$Pref_{HELP}$	
	(1)	(2)	(3)	(4)
VARIABLES	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Micro level (1)				
Education	0.0248*	0.00789*	-0.0438***	-0.0174***
	(.0131)	(.0042)	(.0162)	(.0064)
Income	0.00642	0.00204	-0.0422***	-0.0168***
	(.0085)	(.0027)	(.0112)	(.0045)
ineduc	0.257***	0.0816***	0.251***	0.0997***
	(.0743)	(.0236)	(.0646)	(.0257)

Age	0.0000395	0.00	-0.000963	-0.000383
	(.0012)	(.0004)	(.0014)	(.0006)
Parent	0.139***	0.0442***	-0.0520**	-0.0207**
	(.0432)	(.0137)	(.0220)	(.0087)
Female	0.0954***	0.0303***	0.0990***	0.0394***
	(.0295)	(.0094)	(.0178)	(.0071)
Hompop	0.0212***	0.00672***	0.0248**	0.00988**
	(.0078)	(.0025)	(.0105)	(.0042)
Micro level (2): political interest and orientation				
Interest	0.0555***	0.0177***	0.0745***	0.0296***
	(.0187)	(.0060)	(.0106)	(.0042)
Far-left	0.281***	0.0893***	0.353***	0.140***
	(.0866)	(.0276)	(.0799)	(.0318)
Left	0.122***	0.0389***	0.101***	0.0401***
	(.0466)	(.0148)	(.0365)	(.0145)
Right	-0.136***	-0.0431***	-0.261***	-0.104***
	(.0410)	(.0130)	(.0414)	(.0164)
Macro level				
GINI	0.101***	0.0256***	0.119***	0.0517***
	(.0255)	(.0072)	(.0144)	(.0016)
ODDSACCESS	-0.0894*	-0.0157*	0.0071	-0.00285
	(.0491)	(.0094)	(.0411)	(.0059)
EDUCEXP	-0.237	-0.0753		
	(.2650)	(.0841)		
TERSPGDP	-	-	-0.492***	-0.196***
			(.0909)	(.0362)
Cross Level				
i.Income*GINI	-0.00381*		0.00204	
	(.0021)		(.0020)	
i.Income*ODDSACCESS	0.0074		-0.00264	
	(.0063)		(.0060)	
Country dummies	Yes	Yes	Yes	Yes
ρ	0.242***			
	(.1790)			
N. of cases	24,464		24,015	
Log-pseudolikelihood	-28,268			

Random effects parameters. Standard deviations

Equation	Estimate	Std. Err.	[95% Conf.	Interval]
$Pref_{TEE}$				
Income	**0.058**	**0.017**	**0.033**	**0.102**
Intercept	0.414	0.069	0.299	0.574
$Pref_{HELP}$				

Income	**0.058**	**0.013**	**0.038**	**0.091**
Intercept	0.333	0.069	0.221	0.501

Notes: Seemingly Unrelated Bivariate Probit (SUBP) estimates of model (4.4 - random income slopes) on ISSP data (2006). Macro level variable are taken from The World Bank, World Development Indicators 2006 (GINI, EDUCEXP, TERSGDP) and from OECD, Education at a Glance 2012 (ODDSACCESS). Standard errors, between parentheses, are clustered at the country level (21 clusters). *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

Table C.3: Random effects parameters for alternative SUPB models. Standard deviations

	Within-country heterogeneity				Total heterogeneity			
Equation	Estimate	Std. Err.	[95% Conf.	Interval]	Estimate	Std. Err.	[95% Conf.	Interval]
$Pref_{TEE}$								
Income	**0.055**	**0.020**	**0.027**	**0.112**	**0.061**	**0.019**	**0.033**	**0.111**
Intercept	0.390	0.086	0.254	0.601	0.423	0.077	0.297	0.603
$Pref_{HELP}$								
Income	0.063	0.015	0.040	0.100	0.060	0.013	0.039	0.091
Intercept	0.331	0.080	0.206	0.533	0.342	0.068	0.232	0.505

Table C.4: Probit estimates of preferences equations without country-level predictors, full Vs estimation sub-sample

	$Pref_{TEE}$		$Pref_{HELP}$	
	(1)	(2)	(3)	(4)
VARIABLES	Coeff.	Coeff.	Coeff.	Coeff.
Micro level (1)				
Education	0.0292***	0.0261**	-0.0434***	-0.0464***
	(.0096)	(.0122)	(.0130)	(.0161)
Income	0.00394	0.00734	-0.0403***	-0.0394***
	(.0064)	(.0086)	(.0087)	(.0117)
Ineduc	0.165**	0.254***	0.166***	0.228***
	(.0647)	(.0805)	(.0409)	(.0607)
Age	-0.000443	-0.000145	-0.00154*	0.00
	(.0009)	(.0012)	(.0009)	(.0013)
Parent	0.139***	0.127***	-0.0216	-0.0640***
	(.0272)	(.0448)	(.0238)	(.0223)
Female	0.0868***	0.104***	0.0663***	0.0974***
	(.0205)	(.0292)	(.0174)	(.0162)
Hompop	0.0196***	0.0239***	0.0228***	0.0289***
	(.0057)	(.0079)	(.0075)	(.0105)
Micro level (2): political interest and orientation				
Interest	0.0497***	0.0547***	0.0524***	0.0774***
	(.0133)	(.0183)	(.0190)	(.0106)
Far-left	0.233***	0.266***	0.296***	0.352***

	(.0707)	(.0784)	(.0662)	(.0797)
Left	0.133***	0.122***	0.122***	0.0923**
	(.0393)	(.0445)	(.0309)	(.0376)
Right	-0.0802**	-0.101**	-0.201***	-0.258***
	(.0376)	(.0444)	(.0449)	(.0455)
Constant	0.815***	0.549***	0.681***	0.379***
	(.1510)	(.1300)	(.1700)	(.1310)
Country dummies	Yes	Yes	Yes	Yes
N. of cases	43,620	24,464	43,592	24,015

Notes: Probit estimates of equations (1) and (2) on ISSP data (2006), without country-level predictors. Columns (1) and (3) refer to the full ISSP (2006) sample covering 33 countries, columns (2) and (4) refer to the sub-sample of 20 countries. Standard errors, between parentheses, are clustered at the country level. *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

Table C.5: Linear estimates of preferences equations

	$Pref_{TEE}$	$Pref_{HELP}$
	(1)	(2)
VARIABLES	Coeff.	Coeff.
Micro level (1)		
Education	0.00753**	-0.0169***
	(.0038)	(.0058)
Income	0.00295	-0.0147***
	(.0027)	(.0040)
Ineduc	0.0743***	0.0850***
	(.0231)	(.0229)
Age	-0.000042	-0.00057
	(.0004)	(.0005)
Parent	0.0382***	-0.0228***
	(.0123)	(.0081)
Female	0.0315***	0.0355***
	(.0085)	(.0061)
Hompop	0.00738***	0.0106***
	(.0022)	(.0038)
Micro level (2): political interest and orientation		
Interest	0.0164***	0.0283***
	(.0058)	(.0040)
Far-left	0.0781***	0.129***

	(.0239)	(.0296)
Left	0.0358***	0.0353**
	(.0138)	(.0143)
Right	-0.0344**	-0.0926***
	(.0141)	(.0166)
Macro level		
GINI	-0.00152**	0.0411***
	(.0006)	(.0059)
ODDSACCESS	0.00315*	-0.0353**
	(.0019)	(.0163)
EDUCEXP	-1.332***	-
	(.0805)	-
TERSPGDP	-	0.208***
	-	(0.0328)
Cross Level		
i.Income*GINI	-0.00449**	0.000969
	(.0018)	(.0008)
i.Income*ODDSACCESS	0.00912*	-0.00129
		(.0021)
Country dummies	Yes	Yes
N. of cases	24,464	24,015

Notes: Linear regressions of equations (1) and (2) on ISSP data (2006). Macro level variable are taken from The World Bank, World Development Indicators 2006 (GINI, EDUCEXP, TERSGDP) and from OECD, Education at a Glance 2012 (ODDSACCESS). Standard errors, between parentheses, are clustered at the country level (21 clusters). *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

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