Intergenerational mobility in Europe: evidence from ECHP*

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Abstract

In this paper I provide a new evidence on cross-country comparison of intergenerational mobility using the European Community Household Panel. Although this data-set produces estimation that suffer of many potential biases, such as life cycle bias due to the young age of children, if the distortions are similar across countries, then the results can be useful and produce a better understanding of the forces that shape different societies. Comparing 12 European countries, I found that Mediterranean countries together with Portugal and Ireland are more immobile both in earnings and education. I find no relation between the income elasticity and earnings returns to human capital of a country, but public expenditure in tertiary education seems to be negatively related to income elasticity and there seems to be a positive relationship between income elasticity and the strictness of the employment protection law. Educational mobility seems to be affected by the performance of the education system measured by the proportion of students fall below given benchmarks of educational achievement, it is not affected by the pupil teacher ratio in primary and secondary schools and by the percentage of students enrolled in private schools

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1.Introduction

During the second half of the last century, social science literature investigated the process that explains why some individuals achieve success in young adulthood while others do not. As Haveman and Wolfe (1995) summarized, success is typically measured by schooling attainment, occupation or earnings (income) level. Sociologists were the first to study this topics and economists came later. As it is synthetically explained in Liebovitz (1974) and later in Haveman and Wolfe (1995), ability is passed to children via heredity (genetic endowment)**.** Furthermore**,** parent's ability and educational attainment (via quantity and quality of time and money devoted to children) jointly with children's ability determine children's educational attainment. The latter (directly and via post-school investment), together with ability and family income, affects children's earnings and income. In this paper I will concentrate on two of the possible intergenerational correlations: earnings and education correlations.

Economists have mainly concentrated on the relation between fathers and off-springs' permanent income. Starting from the milestone of Becker and Thomes in 1979, economists have been trying to measure the link (if it exists) between an individual socio-economic position and his father's. The interest in the transmission of economic status from one generation to another is generally motivated by the wish to determine the degree of equality of opportunity of a country. From then onward, a large part of the literature has looked for an appropriate method to measure mobility[1]. As regards income, the most used measure of mobility is the regression coefficient relating a son's log earnings to his father's. A high value indicates a very rigid society, because an individual's position in the earnings distribution is largely a reflection of his father position in his own distribution. A low value indicates a very mobile society in which an individual's socio-economic position does not depend on his father's one. Data availability is a crucial key, in fact information about the income of the two generations is needed, and typically long panel data or cross-section with retrospective information about parents' income are used. Along the years, this literature has highlighted some crucial methodological issues. They are discussed in detail in section 2. The study of

[1] For a review see Solon (1999)

intergenerational correlations of educational attainment is done in many different ways, such as transition matrices (or some synthetic measures) and probit (or ordered probit) estimations.

Although a large body of the economic literature has studied the correlation between father and son socio-economic status, only fewer and more recent works have analysed the differences existing in intergenerational mobility in different countries or times. The evolution over time is studied by Blanden et al (2001), Mayers and Loopo (2001) and Ermisch and Francesconi (2002), the former finds that mobility decreased in Britain during the last 30 years while the other two papers find that British and American younger cohorts experienced greater mobility than older ones, and conclude that further investigation seems to be necessary.

Few studies analyse cross-country differences in intergenerational mobility. To exploit this issue, data requirements are even more stringent: in fact, similar information on both father and son income is needed for each country and, as I will explain in detail later, given that intergenerational income elasticity depends strongly on sample selection rules[2] applied to data-set, we need similarly selected sample for each country. Some studies draw the information for the sons from cross-sections, which are less sensible to sample selection rules than panel data, and use retrospective information on parental background for the fathers. Among the parental characteristics reported by the sons there are the occupation and the level of education but hardly ever the income. This information can be used, like in Checchi and Dardanoni (2002), to construct a similar index of socio-economic positions for both parents and children or, like in Bjorklund and Jantti (1997,) to infer income from a sample of older man (synthetic father) and estimate intergenerational correlation. In particular they compare Sweden to the US using a Two Sample Instrumental Variable (TSIV) methods and conclude that intergenerational mobility is higher in Sweden. Finally, also Ichino, Checchi and Rustichini (1999) compare Italy and US using parental background characteristics to build a variety of indicators, and conclude that Italy is less mobile than US.

Another and completely different way to solve the data requirement problem in cross-country comparison can be found in Couch and Dunn (1998). Using two very similar longitudinal data-sets, the GSOEP for Germany and the PSID for US, they focus on contemporary (on the same years window) observations of parents and children, apply the same selection rules and same methodology and conclude that there

[2] In particular, it decreases with sons' age and it is sensible to the inclusion/exclusion of zero earnings years (i.e. years of unemployment)..

is a remarkable similarity across the two countries. A similar approach is used by Grawe (2001). He produces a pair-wise comparison between US and many other countries for which he can find a similar longitudinal data-set, such as Germany, Canada, Uk Malaysia, Ecuador, Nepal, Pakistan and Peru, using a quantile regression approach.

Following the latter approach, in this paper I provide a new evidence on cross-country comparison using the European Community Household Panel. Although this data-set produces estimation that suffer of many potential biases, such as life cycle bias due to the young age of children, if the distortions are similar across countries, then the results can be useful and produce a better understanding of the forces that shape different societies. The European Community Household Panel (ECHP), in fact, is a large household survey that covers most members countries in the European Union. Rather than trying to harmonise output from national surveys, the European statistical agency (Eurostat) adopts an input oriented approach and uses the same community questionnaire as the base for the national versions of the survey. The data are collected by the National Collection Units and finally checked by Eurostat (European Community (1991)). A desirable feature of ECHP is that the definitions of and questions on earnings, the reference period and the survey methods are common across countries. This format increases comparability, but does not eliminate all problems, as the interpretation of common questions can vary across countries because of country – specific institutions and history (OECD, 1991). Educational attainment in ECHP is a categorical variable [3] and there's no information on years of schooling but it is still possible to study the way parents' education affects children's one. And in a cross-country comparison we can try to relate this process to the educational systems which, together with the costs of education, play a crucial role in intergenerational mobility. For instance, predominance of public schools and free of charge higher education tends to reduce the importance of family background.

This paper proceeds as follows. In section 2 I briefly discuss the econometric issues related to the measure of earnings intergenerational elasticity, in section 3 I describe the data and the sample I use and section 4 contains the results. Section 5 is devoted to the measure of educational mobility and finally in section 6 I summarize the results and try to find some correlations between the degree of earnings and educational intergenerational mobility and characteristics and institutional settings of each country.

[3] ISCED0-2, ISCED 3 –secondary , ISCED 4-7 or tertiary level education

2. Earnings elasticity: estimation methods

The economic literature on intergenerational mobility has faced along the years many estimation problems. Earlier studies simply estimated

$$Y_{1i} = \beta Y_{0i} + \varepsilon_i \qquad (1)$$

where Y_{1i} is a measure of the permanent economic status of the son and Y_{0i} is the corresponding measure for the father. Early works on this topic used a single year income as a proxy for permanent income but later it has been shown that this generated a downward bias estimation of β. First, if parents and children are observed at different points in their life-cycle then the age effect of parents and children should be removed (two possibility: putting age and age square of both children and fathers in (1) or regressing earnings on age and age2 and using residuals). And then, consider the following expressions:

$$Y_{0is} = y_{0i} + v_{0is} \qquad (2)$$

$$y_{1it} = y_{1i} + v_{1it} \qquad (3)$$

In equation (2) father earnings in year *s* is composed by a permanent component that reflects the true long-term earnings capacity (y_{0i}), a component that captures both transitory shock that might affect that particular year earnings and error due simply to inaccurate report of earnings (v_{0is}). Equation (3) does the same for son's earnings. If we are interested in the relation (1) but we estimate it using single-year measure the coefficient will be biased downward by the attenuation factor:

$$p\lim \hat{\beta} = \beta \left(\frac{\sigma^2_{y_0}}{\sigma^2_{y_0} + \sigma^2_{v0}} \right) \qquad (4)$$

To avoid this bias Solon (1992) proposes to use an average of father earnings (typically 5 years) because this will reduce (but not eliminate completely) the biases generated by both transitory shock and measurement error (σ_{v0}).[4]

Jenkins (1987) and Grawe (2001) show that the estimation may be sensitive to life cycle biases even after controlling for measurement error and age. In particular,

[4] For a discussion see Mazumder (2001)

Grawe (2001) points out that since income variance grows over the life cycle, estimates of income persistence based on data from mature fathers will naturally be lower than those based on young fathers and finds that a great part of the differences in estimated intergenerational correlations for the US is explained by the differences in the age of father and sons at the point of measurement. If the estimates are to be compared, the selection criteria must control for age of the father in all samples, and ECHP naturally allows to control for this problem. Reville (1995) shows that the intergenerational correlation decreases with son's age, and according to Solon (2002) this happens because the kind of measurement error in son's early earnings as a proxy for the permanent earnings is not of the same kind seen before. In fact, those young sons which will have the highest level of socio-economic status will have more rapid earnings growth than the ones that will be poorer in the future. This kind of measurement error is "mean reverting" and it is negatively correlated with long-run earnings. Bound et al. (1994) show that mean reverting measurement error in a regression dependent variable compresses its variation and consequently leads to a tendency to underestimate the magnitude of the regression slope coefficient. Solon (2002) concludes that averaging in this case will even worsen the estimation bias because in averaging I should use also the very early earnings. Given these considerations, with ECHP I expect to find low levels of intergenerational correlation because sons are observed in their early life and father in their later years of labour market experience.

As estimation strategy, I consider the model introduced and incorporate age profile in equations (2) and (3):

$$Y_{0is} = y_{0i} + \alpha_0 + \gamma_0 A_{0is} + \phi_0 A^2_{0is} + v_{0is} \quad (5)$$

$$y_{1it} = y_{1i} + \alpha_1 + \gamma_1 A_{1it} + \phi_1 A^2_{1it} + v_{1it} \quad (6)$$

where A_{0is} is the age of the father from family i in year s and A_{1it} is the age of son from family i in year t. Solving (5) and (6) for y_{0i} and y_{1i} and substituting them into equation (1), I get:

$$Y_{1it} = (\alpha_1 - \beta\alpha_0) + \beta Y_{0is} + \gamma_1 A_{1it} + \phi_1 A^2_{1it} - \gamma_0 \beta A_{0is} - \\ -\phi_0 \beta A^2_{0is} - \beta v_{0is} + v_{1it} + \varepsilon \quad (7)$$

Equation (7) relates son's observed earnings in year t to father's observed earnings in year s and to age controls for both father and son. As we have seen, the

estimation of (7) generates a biased $\hat{\beta}$ and that's why, as Solon (1992) suggests, in addition to (7) I estimate also:

$$Y_{1it} = (\alpha_1 - \beta\alpha_0) + \beta\bar{Y}_{0i} + \gamma_1 A_{1it} + \phi_1 A^2_{1it} - \gamma_0\beta\bar{A}_{0i} - \\ - \phi_0\beta\bar{A}^2_{0i} - \beta\upsilon_{0is} + \nu_{1it} + \varepsilon \qquad (8)$$

where, for any variable m_{0is}, $\bar{m}_{0i} = \sum_{j=s}^{s+T} m_{0ij} / T$

In equation (8) the averages over T years of father age and earnings are used instead of their single-year measures. Solon (1989) shows also that the bias decreases as T increases.

Finally, if the variance in log earnings is the same for both generation then the intergenerational elasticity obtained, $\hat{\beta}$, is also the intergenerational correlation, which is the measure of intergenerational mobility mainly used in sociology literature. The two measures are roughly comparable even if the variance in income differs substantially across generations as shown by Solon (1992). Bowles and Gintis (2001) suggest that the regression coefficient is a preferred measure since it does not conflate changes in cross-sectional inequality with the association in earnings across generation.

3.Earnings elasticity: Data and sample selection

The data-set used in this study is the European Community Household Panel (ECHP), up to now 5 waves have been released from 1994 to 1998. As pointed out in the introduction, the main advantage of these data is that the same "community" questionnaire is adopted by the national data collection units in each participating country, which increases comparability. The survey is composed of a household and a personal file, and the same individuals and families are interviewed over time. In the first wave (in 1994) a sample of some 60,500 nationally representative households - i.e. approximately 130,000 adults aged 16 years and over - were interviewed in the 12 Member States. Austria (in 1995) and Finland (1996) have joined the project since then, Sweden remaining the only exception. For the fourth wave of the ECHP, i.e. in

1997, the original ECHP surveys were stopped in three countries, namely Germany, Luxembourg and in the United Kingdom. In these countries, existing national panels were used and comparable data were derived from the GSOEP and BHPS - back from 1994 onwards, and I use these samples. I excluded Luxembourg and Finland from my study because of their small size.

In this paper I consider son –father and daughter- father pair and allow families to contribute as many father-child pairs to each sample as meet my screening rules. Sons and daughters are matched to their father using the relational file provided in every waves. So I include in the sample every individual that in at least a wave was linked to somebody as a child, aged between 16 and 35 and his/her father (i.e. every male that in at least a wave was coded as parent and that has an age between 35 and 70). This is my starting sample, and as it can be seen in table one it consists of 50709 son-father pairs and 39269 daughter- father pairs. I exclude observations during any year in which the child was enrolled in school or the parent to whom he or she is matched was enrolled in school or retired. Finally I exclude both self-employed and unemployed children and fathers. In calculating averages of earnings across years, I include as many years of valid data as were available for each individual. After exclusions, I have a total of 15011 pairs and in this sample I have fathers and children employed that reported a positive earnings.

Table 1: Starting and final samples for earnings estimation: numbers of pairs by country.

Country	Starting sample			Final Sample		
	Son-father pairs	Daughter-father pairs	Total pairs	Son-father pairs	Daughter-father pairs	Total pairs
Germany (Gsoep)	4000	2772	6772	1373	890	2263
Denmark	852	654	1506	293	157	450
Netherlands	1997	1520	3517	522	301	823
Belgium	1698	1407	3105	266	129	395
France	4000	3144	7144	540	257	797
Uk (Bhps)	1885	1325	3210	646	523	1169
Ireland	4458	3544	8002	842	631	1473
Italy	10030	7970	18000	1158	630	1788
Greece	5269	3729	8998	439	284	723
Spain	8584	7071	15655	1166	686	1852
Portugal	5332	4280	9612	1265	659	1924
Austria	2604	1853	4457	792	562	1354
Total	50709	39269	89978	9302	5709	15011

The first concern that arises in selecting the samples is that countries included in this paper have different social habits as regards cohabitation with parents and home leaving ages (Soro-Bonmati, 1999). This evidence exposes my results to a possible sample selection bias. Since in Northern countries children leave home to go to college and never come back while in Southern countries they stay with their parents till they are 30, I will possibly observe many more children in southern countries samples and only the few that stay at home in northern countries. Table 2 shows the average age of children and fathers in different countries. The existing differences may reflect differences in educational system and enrolment rates of countries rather than a self-selection in moving from home before I can match them to their parents. In the last column of table 2 I report the expected years in education for a 15 years old in each country. As my sample only includes sons and daughters already in the labor market, countries in which the youth population tends to stay longer in education and enter the labor market later in their life exhibit an higher average age of children.

Table 2: Average Age of the samples. By country.

Country	Son-father pairs		Daughter- father pairs		Expected years in education for 15 years old*
	Average age of sons	Average age of fathers	Average age of daughters	Average age of fathers	
Germany (Gsoep)	22,7	50,2	21,5	49,5	4.5
Denmark	20,5	48,9	20,4	48,4	3.7
Netherlands	22,0	50,4	21,1	49,1	2.7
Belgium	24,3	51,1	23,8	50,9	6,2
France	23,6	50,1	23,6	49,5	6,8
Uk (Bhps)	21,8	49,9	21,4	50,1	2,7
Ireland	22,5	52,3	22,8	52,9	4,8
Italy	23,9	52,3	23,5	52,6	5,8
Greece	24,0	52,6	23,5	53,2	6,0
Spain	23,4	52,7	23,8	53,2	5,2
Portugal	22,6	52,1	23,1	51,5	4,8
Austria	21,3	48,9	20,7	47,7	3,9
Total	22,7	51,2	22,4	51,2	-

*Education at a glance 2001[5].

Furthermore, to avoid measurement errors Solon (1992) suggests to take averages over different years of earnings data in order to obtain better estimates of permanent earnings capacity, and to do so, he includes observation only if fathers and

[5] OECD calculates the age –specific proportion of young people still in education and then total it to 15-29 years old to yield the expected years in education.

sons are continuously employed over the entire period. In this way sons and fathers that report only one year of zero are removed from the sample creating an additional selection bias with an unclear direction (for a discussion see Couch and Lillard, 1998). In fact, it is more common that low income earners become unemployed, and so their exclusion will increase the average income in the sample. And since unemployment is a national phenomenon also a cross-country selection bias will be added if I exclude unemployed. Following Counch and Lillard's procedure, in the next section I will try both alternatives and provide results for fathers earning averaged excluding and including years of unemployment.

Another possible selection bias is due to the exclusion of self-employed from the sample. Dunn (1996) studies the intergenerational persistence of self-employment and finds that the intergenerational link is strong. But self –employment reported earnings are far more exposed to measurement error than employees' and the earnings variable I use is the monthly gross salary and which is not available for self-employed[6] in ECHP. Table 3 contains the proportion of self-employed in each sample, and it highlights two different trend : first, the proportion is always bigger in father samples, and secondly, southern countries have an higher share of self-employed than northern ones. But standard analyses of intergenerational mobility exclude self-employed from the sample, and I will do the same to produce comparable results.

Table 3: Share of self-employment. By country.

Country	**Son-father pairs**		**Daughter- father pairs**	
	Sons' sample	**Fathers' sample**	**Daughters' sample**	**Fathers' sample**
Germany (Gsoep)	2,3	11,0	1,2	8,5
Denmark	2,7	19,5	0,0	10,7
Netherlands	3,6	13,2	0,0	13,0
Belgium	9,9	19,9	3,7	31,4
France	3,1	19,5	1,0	16,5
Uk (Bhps)	7,3	27,9	2,7	21,4
Ireland	10,1	50,9	1,6	40,6
Italy	25,5	42,6	11,0	42,7
Greece	50,1	70,7	22,0	56,3
Spain	20,5	35,5	9,7	29,1
Portugal	16,5	42,2	13,6	41,5
Austria	5,5	27,6	1,5	23,1

[6] Self employed income is the yearly (not monthly) income of the previous year.

The earnings variable I use in all the specification is the current gross monthly earnings which is almost directly collected (not imputed) and is not distorted by the national taxation systems.

4. Earnings elasticity: estimates

Table 3 and 4 present OLS estimations of equation (7) and (8) for son-father pairs and daughter-father pairs. In each table I report the estimated regression coefficient $\hat{\beta}$ and its Huber –White standard error (to account for the fact that there are instances in both data sets where more than one child is matched to the same parent) obtained with clustering on individuals (because observations are independent across individual but not necessarily independent within the history of the same individual).

Table 4: Son-father pairs: $\hat{\beta}$ from the regression of equations (7) and (8).

Country	OLS Pooled		Father earnings averaged excluding years of unemployment		Father earnings averaged including years of unemployment	
	$\hat{\beta}$	Sample	$\hat{\beta}$	Sample(1)	$\hat{\beta}$	Sample(1)
Germany	.18 (.052)	1373	.16 (.053)	1502	.13 (.034)	1509
Denmark	-.09 (.09)	293	-.09 (.089)	316	-.055 (.084)	316
The Netherlands	-.067 (.071)	522	-.03 (.058)	555	-02. (.058)	552
Belgium	.21 (.084)	266	.21 (.082)	277	.10 (.051)	278
France	.12 (.049)	540	.11 (.051)	568	.08 (.043)	567
Uk	.10 (.052)	646	.12 (.051)	718	.12 (.048)	716
Ireland	.03 (.034)	842	.01 (.035)	998	.04 (.025)	992
Italy	.27 (.040)	1158	.24 (.046)	1261	.20 (.034)	1259
Greece	.16 (.053)	439	.11 (.046)	539	.11 (.036)	534
Spain	.17 (.037)	1166	.17 (.035)	1370	.095 (.026)	1370
Portugal	.20 (.033)	1265	.18 (.033)	1456	.12 (.025)	1466
Austria	.02 (.061)	792	.03 (.064)	836	.02 (.051)	836

Notes: (1) samples are different because of the exclusion of some outliers from the regressions. Outliers are detected using the Hadi procedure

These coefficients are very low if compared to other results obtained for the same countries (see Solon(2002) for a review) but the few studies that use contemporaneous data for fathers and children have results within the same range. Couch and Dunn (1996) with a similar structure of data for Germany find results between 0.08- 0.28 for sons, while Francesconi and Ermisch's results obtained from a British Matched sample with the same structure as mine, range from 0.048 to 0.059 for sons and from 0.067 to 0.070 for daughters.

Table 5: Daughter-father pairs: $\hat{\beta}$ from the regression of equations (7) and (8)

Country	OLS Pooled		Father earnings averaged excluding years of unemployment		Father earnings averaged including years of unemployment	
	$\hat{\beta}$	Sample	$\hat{\beta}$	Sample (1)	$\hat{\beta}$	Sample (1)
Germany	.36 (.070)	890	.33 (.066)	957	.26 (.052)	955
Denmark	.09 (.15)	157	.055 (.154)	160	.05 (.145)	160
The Netherlands	-.029 (.106)	301	.03 (.104)	380	.047 (.088)	309
Belgium	.19 (.16)	129	.16 (164)	135	.06 (.140)	135
France	.28 (.091)	257	.28 (.089)	268	.27 (.085)	268
UK	.024 (.058)	523	.025 (.064)	585	.045 (.057)	584
Ireland	.13 (.035)	631	.15 (.036)	717	.13 (.036)	714
Italy	.27 (.054)	630	.26 (.048)	714	.22 (.028)	709
Greece	.20 (.075)	284	.07 (.07)	343	.08 (.063)	337
Spain	.24 (.048)	686	.20 (.043)	814	.09 (.034)	818
Portugal	.15 (.043)	659	.18 (.050)	755	.11 (.037)	766
Austria	.15 (.063)	562	.12 (.061)	584	.07 (.051)	581

Notes: (1) see table 4

From table 3 and 4 it is possible to conclude that there are significant cross country differences within Europe in the degree of intergenerational income mobility. In particular, examining my results more in detail, I find that: 1) the earnings elasticity is

always lower when children earnings are estimated on averages of father earnings, except UK in father-son pairs and Ireland and Portugal in daughter-father pairs 2) Estimation of $\hat{\beta}$ using average of father earnings including years of unemployment are lower than estimation excluding years of unemployment, as pointed out by Couch and Lillard(1998), except for the father-son sample in Spain.

I stress three results in particular. First, the link between father and son earnings is relatively high in Italy, Belgium and Portugal and relatively low in France and the UK; second, the link between father and daughter earnings is relatively high in Germany, Italy, France and Spain and relatively low in Ireland, Austria and Portugal. Finally, the estimated elasticity is never significant in The Netherlands and Denmark. This means that in my sample it is difficult to identify a significant relation between the two generations' earnings, but I can't conclude anything about the degree of mobility in these two countries.

The observed heterogeneity in the degree of intergenerational earnings mobility among countries, begs the question whether these differences can be associated to differences in educational system and institutional setups. I address this question and discuss it in the last section.

5. Educational mobility

A strong positive association between a child school attainment and its parents' has been consistently documented in many empirical studies (see Haveman and Wolfe for a review). The most important among parental characteristics in children educational choice is the human capital of the parents.

In analysing educational mobility I use all the children –parent pairs I can match to have greater sample sizes. I put an age cut-off at 20 excluding younger individuals (possibly still enrolled in school) and I drop those individuals with a missing observation in education. But differences in school leaving ages in the 12 countries may make comparisons unreliable because I have samples with an underestimate proportion of children with a tertiary degree and to avoid this distortion I impute a tertiary degree to children still enrolled in schooling when they are more than 20 years old[7].

[7] In all countries the school leaving age from secondary education is between 18 and 19. And if someone is still enrolled after 20 he has an higher probability to get a tertiary degree. Other problems may arise with different rate of drops out from tertiary education by countries.

In ECHP education is classified in three categories on the basis of the ISCED classification scheme: less than secondary (ISCED 0-2), second stage of secondary level (ISCED 3) and tertiary level (ISCED 5-7). Many problems arise trying to classified some vocational tracks in countries as Germany and Austria according to the ISCED classification scheme. For example, advanced vocational training is allocated by the OECD to tertiary level even though it is not a tertiary level qualification (and nobody in Germany would consider it as such), since it does not require the "Abitur" (Baccalaureate, or O-level)[8]. In countries where compulsory school lasts until 17-18 years (UK, for examples), the first educational class contains mainly drop-outs from education (a very small sample) while in the second class there is the vast majority of the population that completed compulsory school.

Table 6 : Intergenerational Education mobility: Father and Mother-son pairs.

Country	Transitional educational matrices Father-son					Transitional educational matrices Mother-son				
	Nobs	*eigenvalues (1)*	*rank*	*Pearson's Chi2(2)*	*rank*	*Nobs*	*eigenvalues (1)*	*rank*	*Pearson's Chi2 (2)*	*rank*
Germany	1136	0,095 (0,23)	4	21,98 (0,00)	5	1116	0,052 (0,027)	4	6,54 (0,16)	4
Denmark	329	0,114 (0,54)	5	6,68 (0.15)	2	311	0,033 (0,075)	2	0,45 (0,97)	1
Netherlands	707	0,061 (0,033)	2	8,53 (0,07)	4	690	-0,0055 (0,045)	1	3,61 (0,46)	2
Belgium	546	0,185 (0,053)	8	24,31 (0,00)	6	517	0,135 (0,055)	6	13,23 (0,01)	5
France	1054	0,298 (0,035)	12	77,08 (0,00)	8	1033	0,224 (0,045)	10	70,24 (0,00)	9
UK	637	0,089 (0,061)	3	5,56 (0,23)	1	597	0,136 (0,45)	7	16,39 (0,00)	6
Ireland	1510	0,276 (0,034)	10	85,29 (0,00)	9	1460	0,271 (0,041)	11	94,18 (0,00)	10
Italy	2758	0,210 (0,019)	9	175,14 (0,00)	11	2698	0,167 (0,025)	8	105,01 (0,00)	11
Greece	1568	0,149 (0,020)	6	56,25 (0,00)	7	1545	0,118 (0,027)	5	31,46 (0,00)	7
Spain	2780	0,160 (0,025)	7	164,06 (0,00)	10	2706	0,168 (0,025)	9	63,43 (0,00)	8
Portugal	1626	0,296 (0,043)	11	176,47 (0,00)	12	1587	0,274 (0,060)	12	133,23 (0,00)	12
Austria	884	0,045 (0,044)	1	6,87 (0,14)	3	852	-0,044 (0,053)	3	4,24 (0,37)	3

(1) Standard errors in parenthesis (2) p value in parenthesis

This picture is very different in countries where compulsory school lasts until 15-16 years (Italy); the second class contains individuals with an upper degree, that for the

[8] And furthermore, educational variable descriptions in ECHP are in original languages.

father generation has also an higher market value. That's why in some countries the transitions matrices may not be reliable. But still it is worth to try to analyse education transmission from a generation to the other.

A commonly used method to measure the link existing between educational attainment of father and children is the transitional matrix where the percentage on the main diagonal represents the number of dynasties almost immobile. I compute the country matrices and report them in appendix B while I focus here on two synthetic measures from these matrices, the second eigenvalue and the Pearson's chi-squared, which test the hypothesis that education level of the two generations are independent. The eigenvalues are calculated bootstrapping from the original samples 100 times the matrix, allowing in this way the calculation of the standards errors. The lower is the second eigenvalue the more the society is mobile. The lower is the Pearson's Chi2 test, the more independent is the level of education of the children from their parents'.

Table 7 : Intergenerational Education mobility: Father and Mother-daughter pairs.

Country	**Transitional educational matrices Father-daughter**					**Transitional educational matrices Mother-daughter**				
	Nobs	*eigenvalues (1)*	*rank*	*Pearson's Chi2(2)*	*rank*	Nobs	*eigenvalues (1)*	*rank*	*Pearson's Chi2(2)*	*rank*
Germany	811	0,082 (0,031)	4	14,34 (0,00)	6	796	0,061 (0,030)	5	6,38 (0,17)	6
Denmark	277	0,071 (0,067)	3	4,61 (0,33)	2	266	0,145 (0,078)	8	5,64 (0,22)	5
Netherland	597	0,061 (0,043)	2	5,28 (0,26	3	584	-0,023 (0,051)	1	2,69 (0,61)	3
Belgium	431	0,085 (0,104)	5	8,87 (0,06)	4	401	0,059 (0,074)	4	2,67 (0,61)	2
France	900	0,146 (0,037)	8	16,24 (0,00)	7	880	0,102 (0,052)	6	27,1 (0,00)	7
Uk	507	0,051 (0,052)	1	1,66 (0,78)	1	477	0,034 (0,056)	3	0,66 (0,95)	1
Ireland	1263	0,293 (0,035)	12	71,42 (0,00)	10	1224	0,292 (0,047)	11	85,33 (0,00)	12
Italy	2215	0,152 (0,020)	9	90,72 (0,00)	11	2176	0,126 (0,025)	7	55,63 (0,00)	9
Greece	1246	0,117 (0,031)	7	31,78 (0,00)	8	1228	0,159 (0,023)	9	35,52 (0,00)	8
Spain	2312	0,170 (0,028)	11	126,45 (0,00)	12	2246	0,194 (0,024)	10	62,61 (0,00)	10
Portugal	1313	0,169 (0,042)	10	58,77 (0,00)	9	1276	0,303 (0,053)	12	66,82 (0,00)	11
Austria	693	0,108 (0,066)	6	12,12 (0,01)	5	671	0,029 (0,046)	2	4,55 (0,33)	4

See table 6.

Economic and sociologic literatures in intergenerational mobility agree in considering mother's human capital more closely related to the attainment of the child than that of the father. Table 6 and 7 present results also for mother-son and mother-daughter pairs.

Table 8: Ordered probit estimation, coefficients, marginal effects and elasticity(1). Dependent variable: son's level of education. Standard errors in parenthesis

Country		Father Secondary	Father Tertiary	Mother secondary	Mother tertiary	Log Family income	Nobs
Germany (GSOEP)	Coeff	.15 (.11)	.32(.13)	.18(.10)	.29(.12)	.14.(06)	1093
	Marg Eff	.015(.021)	.037(.017)	.019 (.011)	.036(.017)	.014(.006)	
	Elasticity	.144(.11)	.194(.079)	.164(.094)	.121(.051)	3.13(1.13)	
Denmark	Coeff	.39 (.20)	.55(.22)	.17(.19)	.005 (.20)	.33 (.15)	307
	Marg Eff	.037(.021)	.053(.026)	.016(.018)	.004(.017)	.029(.013)	
	Elasticity	.344(.180)	.468 (.195)	.126(.139)	.004(.182)	9.05(4.13)	
Netherland	Coeff	.13 (.15)	.44 (.19)	.16 (.12)	.02(.20)	.04 (.09)	670
	Marg Eff	.002(.002)	.01(.006)	.002(.002)	.0002(.003)	.0007(.001)	
	Elasticity	.22(.25)	.29(.12)	.27(.21	.006(.0726)	1.47(2.77)	
Belgium	Coeff	.38(.14)	.49(.15)	.28(.13)	.34(.16)	.04(.06)	503
	Marg Eff	.149(.054)	.193(.060)	.112(.052)	.133(.062)	.014(.026)	
	Elasticity	.115(.043)	.171(.054)	.093(.043)	.093(.043)	.014(.026)	
France	Coeff	.10(.08)	.44(.13)	.27(.09)	.25(.13)	.02(.04)	983
	Marg Eff	.041(.035)	.174(.051)	.108(.035)	.100(.052)	.009(.018)	
	Elasticity	.037(.031)	.071(.021)	.075(.018)	.036(.0188)	.241(.462)	
UK (BHPS)	Coeff	.15(.17)	.19(.11)	.19(.14)	.25(.12)	.15(.06)	583
	Marg Eff	.059(.067)	.74(.046)	.072(.056)	.098(.046)	.057(.026)	
	Elasticity	.012(.014)	.072(.045)	.022(.018)	.066(.031)	.997(.44)	
Ireland	Coeff	.28(.07)	.42(.11)	.38(.07)	.55(.12)	.08(.04)	1429
	Marg Eff	.094 (.02)	.147(.04)	.128(.023)	.196(.046)	.025(.012)	
	Elasticity	.11(.027)	.067(.017)	.157(.03)	.064(.014)	1.00(.46)	
Italy	Coeff	.53(.06)	.65(.11)	.29(.07)	.53(.14)	.02(.03)	2601
	Marg Eff	.058(.009)	.090(.023)	.029(.008)	.069(.025)	.001(.002)	
	Elasticity	.294(.034)	.096(.017)	.126(.03)	.051(.013)	.298(.628)	
Greece	Coeff	.46(.08)	.45(.11)	.21(.09)	.17(.14)	.04(.04)	1503
	Marg Eff	.122(.025)	.120(.034)	.051(.025)	.042(.036)	.009(.009)	
	Elasticity	.138(.025)	.100(.025)	.055(.025)	.021(.017)	1.00(1.01)	
Spain	Coeff	.31(.07)	.60(.07)	.15(.08)	.12(.09)	.09(.03)	2622
	Marg Eff	.09(.02)	.19(.03)	.04(.02)	.04(.03)	.025(.007)	
	Elasticity	.05(.01)	.14(.02)	.02(.01)	.01(.01)	1.86(.51)	
Portugal	Coeff	.65(.14)	.82(.18)	.32(.18)	.65(.17)	.15(.05)	1555
	Marg Eff	.08(.03)	.12(.04)	.03(.02)	.08(.03)	.011(.004)	
	Elasticity	.073(.016)	.078(.017)	.023(.012)	.071(.018)	4.82(1.59)	
Austria	Coeff	.57(.12)	.53(.24)	.21(.11)	.13(.29)	.13(.07)	839
	Marg Eff	.004(.001)	.009(.007)	.002(.001)	.001(.003)	.001(0008)	
	Elasticity	1.14(.28)	.105(.05)	.34(.18)	.014(.03)	5.25(2.87)	

Notes: The elasticity and the marginal effects are calculated at the mean of the independent variables.

Ireland, Italy, Portugal and Spain are the most immobile countries in education in every measure of mobility. Italy and Portugal are also the European countries with the lowest level of tertiary educational attainment in the population and their intergenerational earnings elasticity is relatively high: in these two countries, few people have a tertiary degree and they seem to transmit this high level of education to their offspring while upward mobility is still limited. France is immobile as regards the education of sons but more mobile for daughters.

Being the level of education a categorical variable, another way to control for the influence of parental characteristics together with family income on the level of education of children is to estimate an ordered probit model. In table 8 and 9 I estimate the impact of father and mother level of education and (log) family income on the level of education both for sons and daughter.

When considering the more immobile countries in sons education, we can see that in Italy and France the level of education of sons is strongly affected by the parental education and less (or not at all) by parental income, while in Spain, Ireland and Portugal the family income plays a crucial role in determine the sons' level of education. Furthermore, in mobile countries the effects of family income are very large (i.e. in Austria, Germany etc.).

In the Mediterranean countries, Italy, France, Spain and Greece family income has a greater effects on the level of education of daughters than sons, and this is probably due to cultural and social habits.

The observed heterogeneity in the degree of intergenerational educational mobility among countries begs the question whether these differences can be associated to differences in educational system and institutional set-ups. Looking for explanatory factors at the cross-national and statistical level is a complex exercise but still it is worth trying and I address this question and discuss it in the last section.

Table 9: Ordered probit estimation, coefficients, marginal effects and elasticity(1). Dependent variable: daughter's level of education

Country		Father Secondary	Father Tertiary	Mother secondary	Mother tertiary	Log Family income	Nobs
Germany	Coeff	.04(.13)	.15(.15)	.24(.12)	.33(.15)	.07(.07)	782
	Marg Eff	.005(.01)	.022(.02)	.03(.018)	.052(.027)	.01(.009)	
	Elasticity	.032(.11)	.09(.09)	.21(.11)	.13(.06)	1.54(1.47)	
Denmark	Coeff	.73(.29)	.98(.30)	.15(.23)	.24(.24)	-.12(.17)	260
	Marg Eff	.08(.04)	.12(.05)	.01(.02)	.02(.03)	-.01(.01)	
	Elasticity	.67(.27)	.84(.27)	.11(.17)	.20(.20)	-3.3(4.55)	
Netherland	Coeff	.24(.16)	.43(.21)	.07(.14)	.12(.22)	-.002(.08)	577
	Marg Eff	.002(.001)	.006(.005)	.0006(.001)	.001(.003)	-.00002(0.007)	
	Elasticity	.46(.305)	.248(.129)	.118(.252)	.047(.083)	-.068(2.60)	
Belgium	Coeff	.41(.16)	.38(.18)	.15(.16)	.13(.18)	.06(.09)	384
	Marg Eff	.163(.06)	.153(.07)	.06(.06)	.05(.07)	.02(.03)	
	Elasticity	.11(.04)	.12(.06)	.04(.04)	.04(.05)	.74(1.16)	
France	Coeff	-.08(.10)	.05(.06)	.31(.10)	.26(.15)	.11(.05)	854
	Marg Eff	-.03(.04)	.02(.06)	.12(.04)	.10(.06)	.04(.02)	
	Elasticity	-.02(.03)	.008(.02)	.06(.02)	.03(.01)	.93(.41)	
UK	Coeff	.11(.19)	.11(.13)	.04(.15)	.12 :(13)	.02(.08)	464
	Marg Eff	.04(.07)	.04(.05)	.02(.06)	.05(.05)	.008(.03)	
	Elasticity	.01(.02)	.05(.05)	.007(.03)	.04(.04)	.15(.63)	
Ireland	Coeff	.14(.07)	.43(.11)	.34(.07)	.51(.13)	.09(.04)	1195
	Marg Eff	.05(.03)	.15(.04)	.12(.03)	.19(.05)	.03(.01)	
	Elasticity	.05(.03)	.07(.02)	.13(.03)	.06(.02)	1.00(.46)	
Italy	Coeff	.37(.07)	.55(.12)	.25(.07)	.47(.14)	.06(.03)	2097
	Marg Eff	.04(.009)	.08(.02)	.03(.008)	.06(.02)	.005(.003)	
	Elasticity	.21(.03)	.08(.01)	.12(.03)	.05(.01)	1.24(.67)	
Greece	Coeff	.29(.09)	.27(.12)	.26(.09)	.18(.14)	.07(.05)	1186
	Marg Eff	.08(.03)	.08(.04)	.08(.03)	.05(.04)	.02(.012)	
	Elasticity	.09(.03)	.06(.03)	.08(.03)	.02(.02)	1.57(.98)	
Spain	Coeff	.26(.08)	.48(.08)	.28(.09)	.11(.10)	.11(.03)	2170
	Marg Eff	.09(.03)	.17(.03)	.098(.03)	.03(.03)	.036(.009)	
	Elasticity	.04(.01)	.09(.016)	.033(.01)	.011(.01)	1.95(.49)	
Portugal	Coeff	.32(.15)	.48(.19)	.39(.17)	.47(.19)	.13(.04)	1254
	Marg Eff	.058(.03)	.094(.04)	.073(.04)	.09(.04)	.019(.006)	
	Elasticity	.036(.01)	.05(.(018)	.03(.01)	.05(.02)	3.55(1.21)	
Austria	Coeff	.14(.12)	.15(.28)	.45(.11)	.27(.33)	.14(.07)	666
	Marg Eff	.003(.003)	.004(.010)	.012(.004)	.009(.015)	.003(.002)	
	Elasticity	.25(.23)	.02(.04)	.66(.17)	.03(.04)	4.93(2.47)	

Notes: see table 8

6. Accounting for differences

Theoretical models of intergenerational mobility provide the simplest framework for considering possible reasons for cross-country differences in both income and education intergenerational mobility. Solon (2002) suggests that cross country differences in the degree of mobility should be correlated with differences in earnings returns to education. Correlation does not imply a causal relationship, however, because relative prices and quantities are jointly determined and institutions themselves could vary in response to price and quantity signal. In figure 1 I cross-examine the estimated intergenerational earnings elasticity (pooled) against the tertiary/secondary wage gap as it is measured by OECD (2002). Although raw comparisons of this type should not be expected to reveal the impact of marginal differences in the tertiary/secondary wage gap, the results nonetheless show that there is no relationship obvious enough to offer an explanation of the observed cross-country heterogeneity. Indeed, it can be observed that the college wage gap is the same for male in Italy and Netherlands while they have a completely different degree of income mobility. This does not mean that the earnings returns to human capital is not important. But it is clearly not the all-dominant factor in explaining the observed income elasticity.

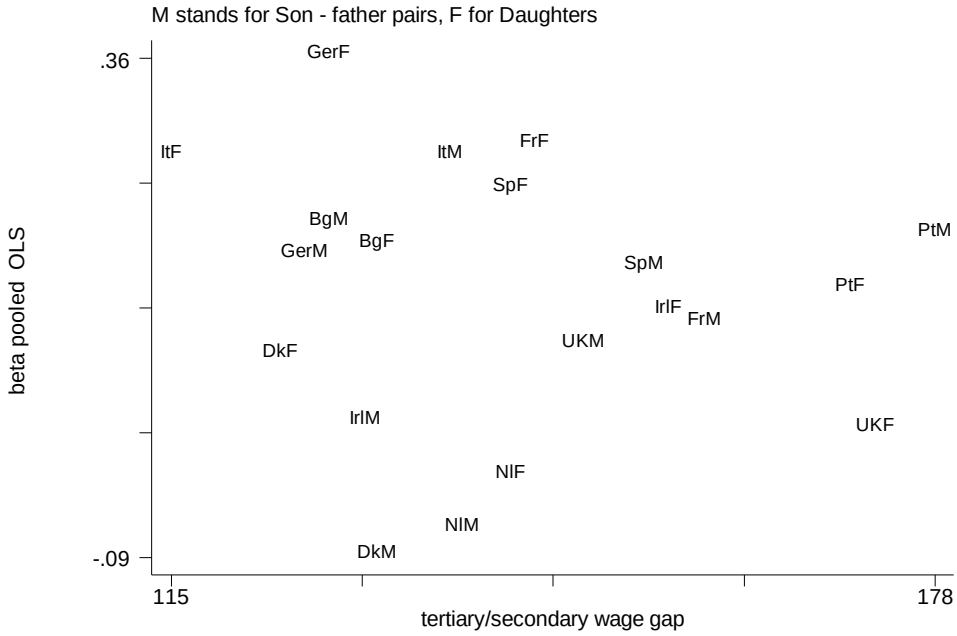

Figure 1: Son –father(M) and daughter-father(F) earnings elasticity and college wage gap[9]

[9] Data for the college wage gap are from OECD Education at a glance 2002. Data are missing for Greece and Austria

Solon (2002) also predicts that intergenerational elasticity increase when the public investment in children's human capital is less progressive. To address this issue estimated $\hat{\beta}$ are plotted against the public expenditure in tertiary education. From figure 2 it seems that, in European countries, they are negatively correlated. [10] Again, it is just a correlation and it is impossible at this stage to conclude that there exists a casual relation

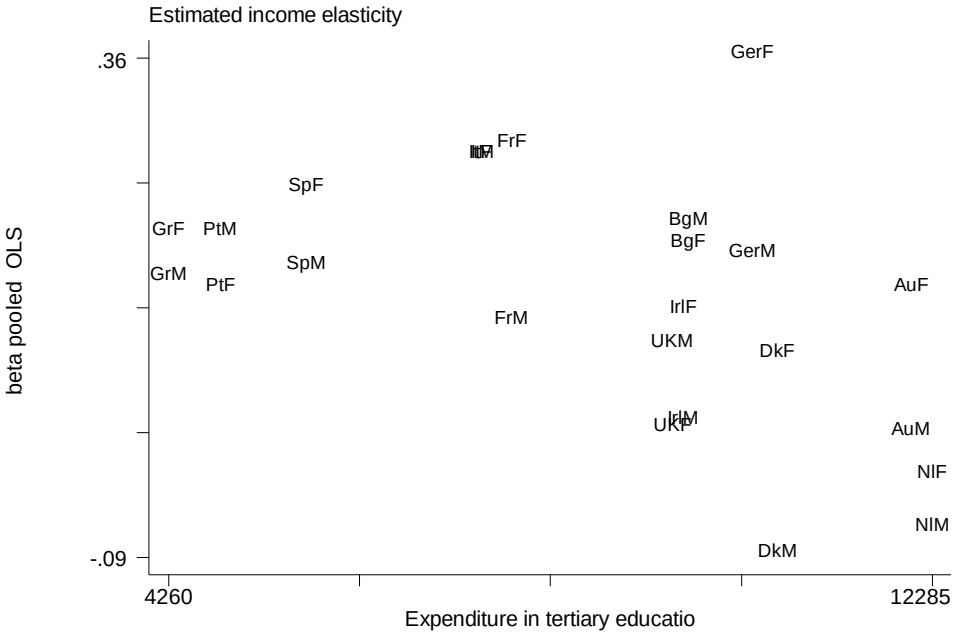

Figure 2: Son –father(M) and daughter-father(F) earnings elasticity and public expenditure in tertiary education

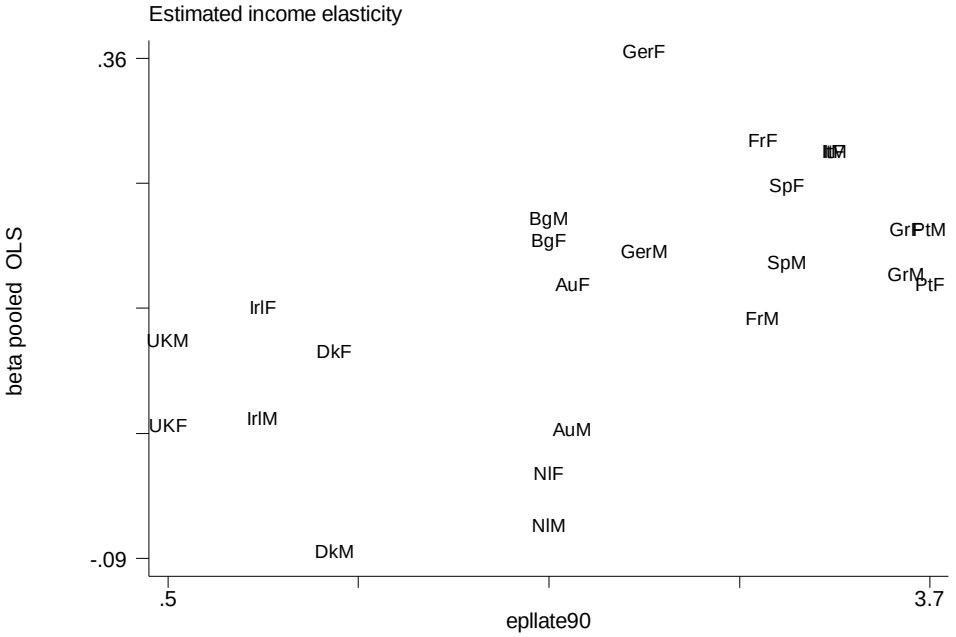

Figure 3: Son –father(M) and daughter-father(F) earnings elasticity and strictness of employment protection law in the late 90's.

[10] Expenditure in primary and secondary education does not show any relevant pattern

Finally, figure 3 questions another plausible factor that can affect intergenerational mobility, the relative strictness of employment protection measures in late 90(EPL90). In figure 3 it is possible to see that higher levels of income elasticity are typically associated with higher level of employment protection.

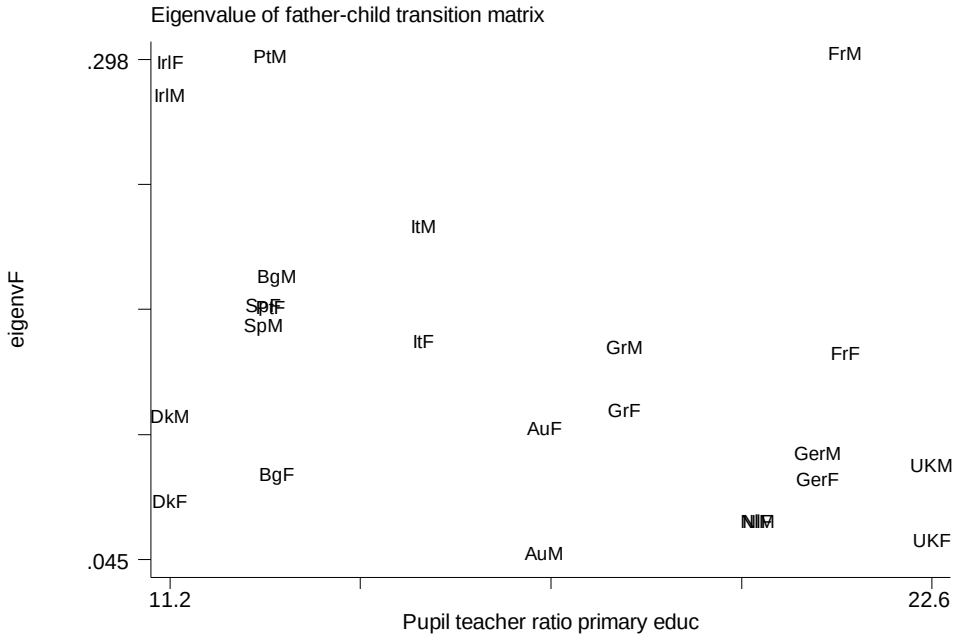

Figure 4: Eigenvalues of father-child transition matrices and Pupil-teacher ration in primary education. (M stands for son, F for daughter)

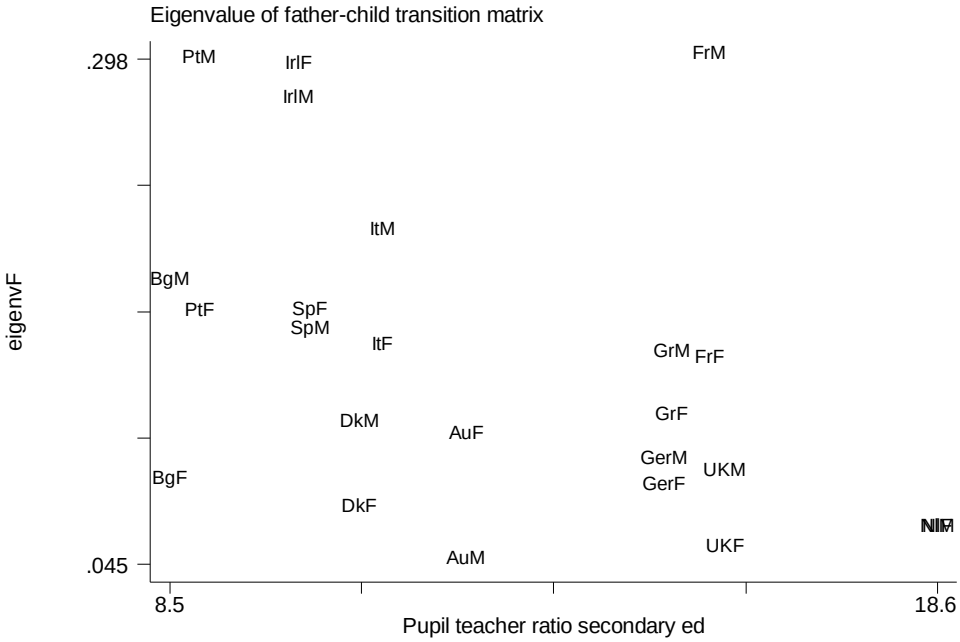

Figure 5: Eigenvalues of father-child transition matrices and Pupil-teacher ration in secondary education. (M stands for son, F for daughter)

Explaining cross-country differences in educational mobility is even more complicated. The first attempt that is worth trying is to look whether there might be a relationship between intergenerational education mobility and the quality of education provided in a country. The most used measure of school quality is the pupil-teacher ratio and figure 4 and 5 plot this ratio relative to primary and secondary education against the eigenvalue of the father - son/daughter transition matrices.[11] But again no obvious pattern emerges. Portugal, for example, is one of the country with the lowest pupil-teacher ratio in primary education together wit Belgium yet it is far more immobile in education.

The educational systems, together with the costs of education, may play a crucial role in the intergenerational transmission of education. For instance, predominance of public schools and free of charge higher education tends to reduce the importance of parental education. Figure 6 and 7 plot the percentage of students enrolled in private schools against the eigenvalue of the father and mother-son/daughter transition matrices. Yet, it should not be concluded that differences in the private enrolment have an impact on intergenerational educational mobility.

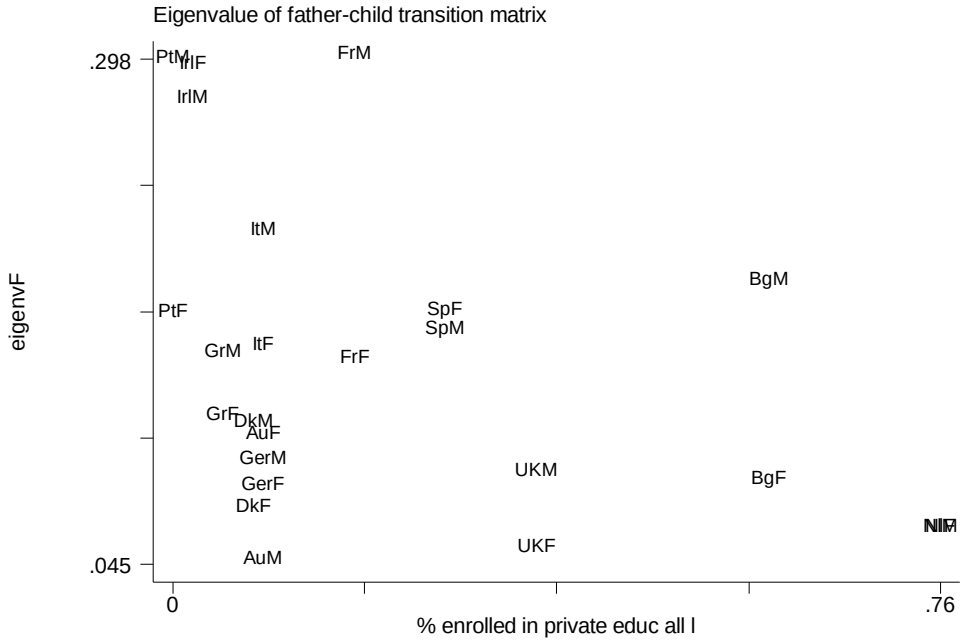

Figure 6: Eigenvalues of father-child transition matrices and the percentage of children enrolled in private schools. (M stands for son, F for daughter)

[11] The same picture for mother-child transition matrices are in Appendix B

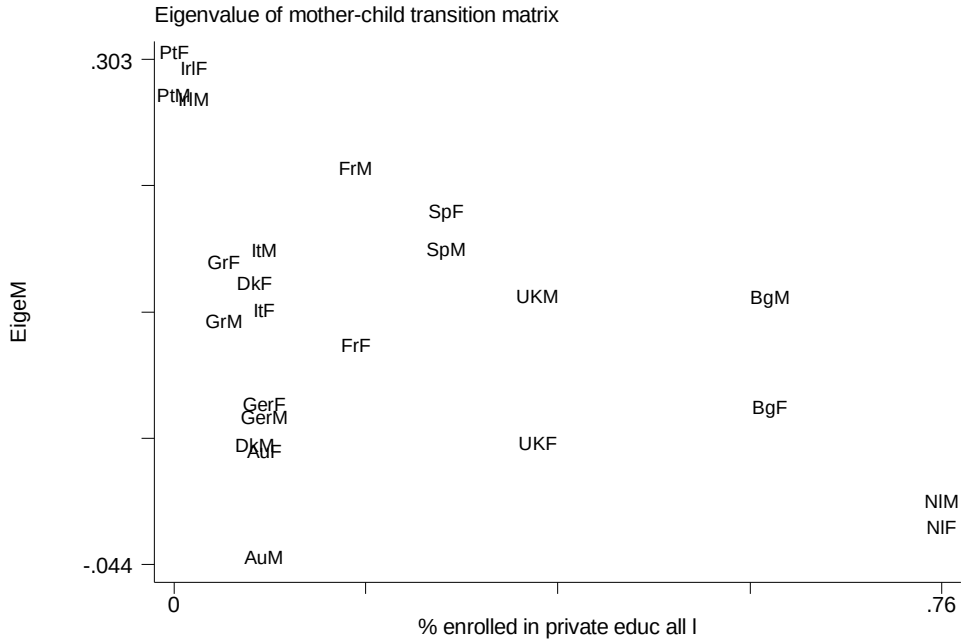

Figure 7: Eigenvalues of mother-child transition matrices and the percentage of children enrolled in private schools. (M stands for son, F for daughter)

Finally, another possible relationship might exist with the relative effectiveness of educational system measured testing what students are able to do. For this purpose, I use the index computed by the *Innocenti Report Card 2002* (UNICEF)[12], that is the average rank scored by nations in five different tables showing the percentage of 14 and 15 year-olds who fall below fixed international benchmark of competence in reading, maths and science.

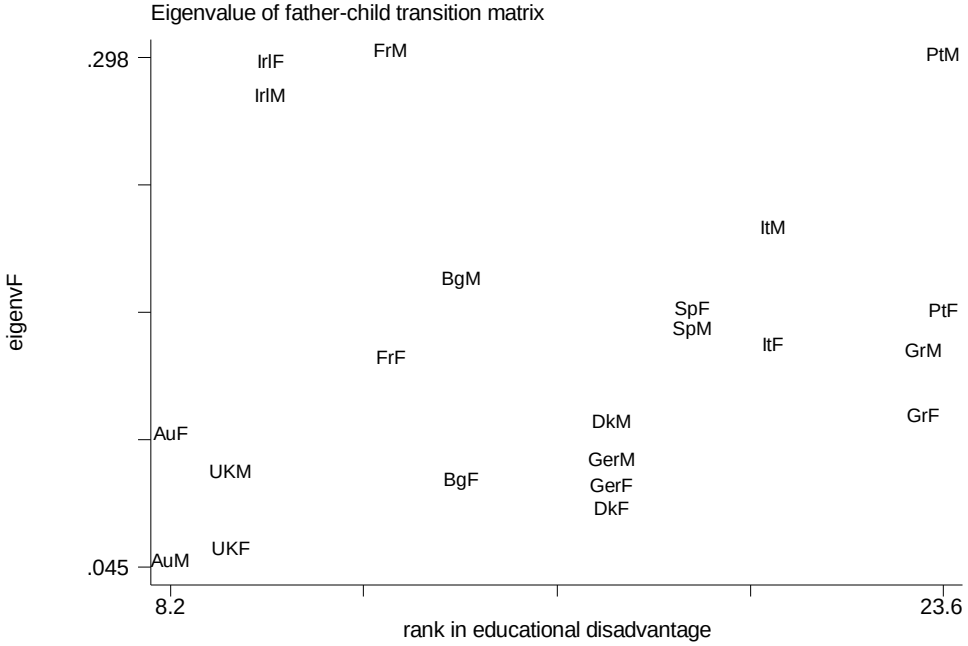

Figure 8: Pearson's chi2 of fa**ther-child transition matrices and the relative effectiveness of education system index. (M stands for son, F for daughter)**

[12] The index is not computed for The Netherlands so it is excluded from the figure.

The lower is the index, the better the nation performs. Table 8 and 9 plot this index against the Pearson's chi2 computed respectively from father-child and mother – child transition matrices.

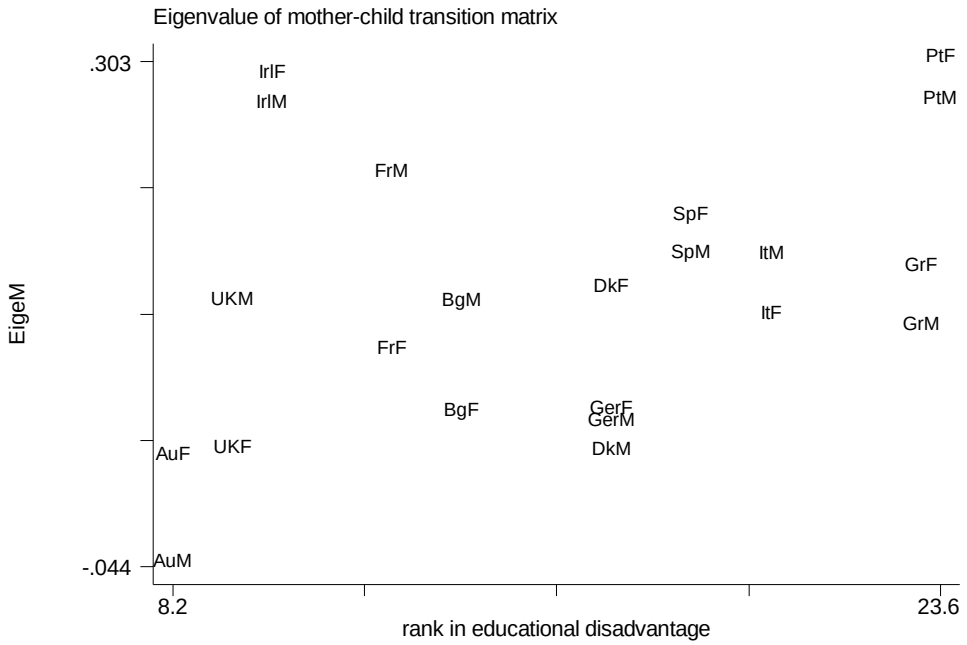

Figure 9: Pearson's chi2 of mo**ther-child transition matrices and the relative effectiveness of education system index. (M stands for son, F for daughter**

It seems that a slightly positive relationship exists between the educational mobility of a country and his education performance In fact all the country with a high value of the index have are among the more immobile countries, and I can conclude that when the education system fails to guarantee equality of opportunity the societies seem to be more immobile in education.

7. Concluding remarks

In this paper I provide a new evidence on cross-country comparison of intergenerational mobility using the European Community Household Panel. Although this data-set produces estimation that suffer of many potential biases, such as life cycle bias due to the young age of children, if the distortions are similar across countries, then the results can be useful and produce a better understanding of the forces that shape different societies.

I find that the link between father and son earnings is relatively high in Italy, Belgium and Portugal and relatively low in France and the UK, while the link between father and daughter earnings is relatively high in Germany, Italy, France and Spain and relatively low in Ireland, Austria and Portugal. The estimated income elasticity is never significant in The Netherlands and Denmark. This means that in my sample it is difficult to identify a significant relation between the two generations' earnings, but I can't conclude anything about the degree of mobility in this two countries.

It seems that Italy and Portugal are the most immobile countries also in education with every measures considered. They are also the European countries with the lowest level of tertiary educational attainment in the population: in these two countries, few people have a tertiary degree and they tend to transmit it to their offspring while upward mobility is still limited.

When I try to explain the observed differences, I find no relation between the income elasticity and earnings returns to human capital, but public expenditure in tertiary education seems to be negatively related to income elasticity. Furthermore there seems to be a positive relationship between income elasticity and the strictness of the employment protection law. This is just a preliminary analysis of the differences existing in intergenerational mobility across countries, and further investigation is still to be done.

Educational mobility seems to be affected by the performance of the education system measured by the proportion of students fall below given benchmarks of educational achievement, it is not affected by the pupil teacher ratio in primary and secondary schools and by the percentage of students enrolled in private schools

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APPENDIX A : Sample means

Country	Son-father pairs		Daughter- father pairs	
	Father earnings averaged including years of unemployment	**Father earnings averaged excluding years of unemployment**	**Father earnings averaged including years of unemployment**	**Father earnings averaged excluding years of unemployment**
Germany (Gsoep)	4028	4282	4027	4186
Denmark	20832	21191	23355	23436
Netherlands	6125	6176	5784	5708
Belgium	87253	89477	95592	96597
France	11690	11944	12416	12704
Uk (Bhps)	1403	1446	1523	1572
Ireland	1376	1445	1439	1509
Italy	2353	2389	2682	2744
Greece	230902	237101	240851	247954
Spain	178962	196697	185602	198936
Portugal	95079	98296	106244	107357
Austria	26995	27644	24931	25355

Appendix B: Eigenvalues of mother-child transition matrices and pupil teacher ratio

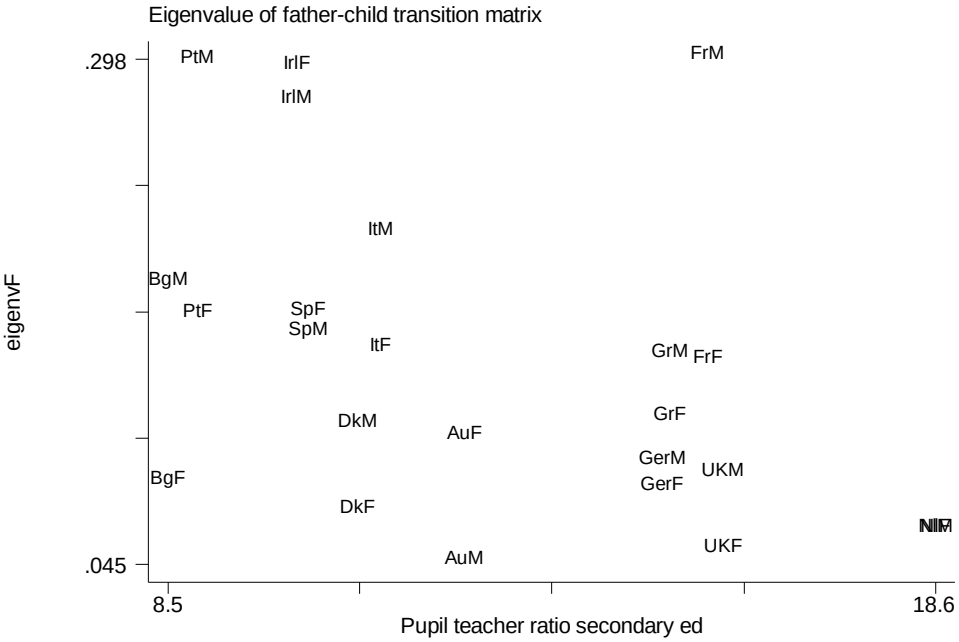

Figure 1B: Eigenvalue of mother-child transition matrices and Pupil-teacher ration in primary education.

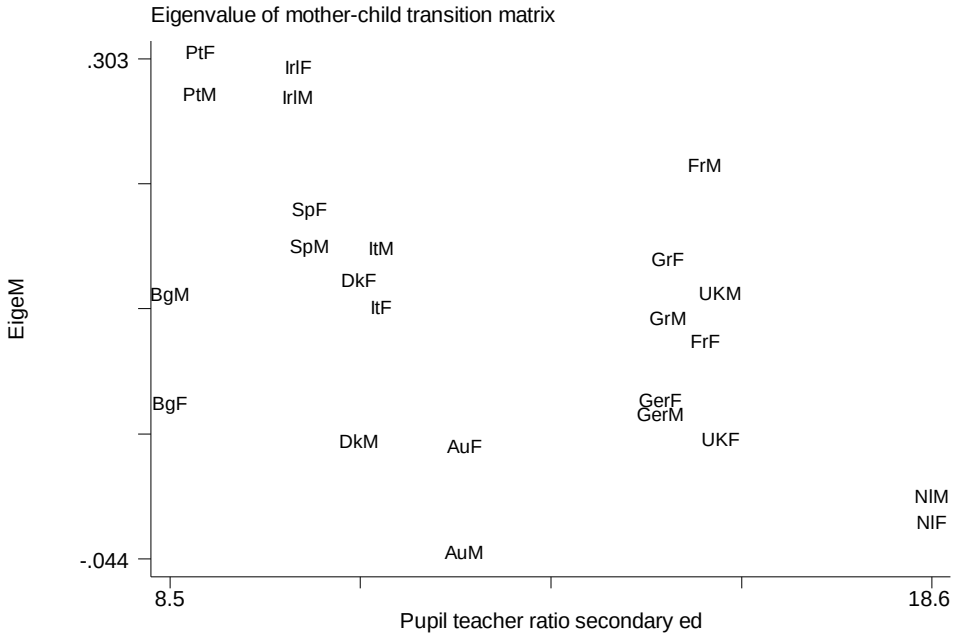

Figure 2B: Eigenvalue of mother-child transition matrices and Pupil-teacher ration in secondary education.