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Intergenerational Persistence in Educational Attainment in Italy

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Abstract

In this paper we show that there is a reduction in the correlation coefficient between father and children schooling levels over time in Italy. However there is still a persistent difference in the odds of attaining a college degree between children of college educated parents and children of parents with lower secondary education attainment. The explanation of these trends lies in the persistent differential in college drop out rates and in the returns to college by father's education.

Keywords: educational attainment; Italy; family background

JEL codes: J62

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1 Introduction

The Italian Constitutional Law states that the state should remove any obstacle of social and economic nature that impedes social mobility and that the highest degrees of education should be attained on the basis of merit.[1]

In this paper we investigate whether there has been an effective reduction of the impact of parents education on children schooling choices over time. We interpret this reduction as a measure of increased equality of opportunity. Our results are easy to summarize. We find a reduction in the correlation coefficient between father and children schooling levels, which is associated to a convergence of schooling levels from all family backgrounds. The convergence is mostly attributable to a larger proportion of children from poorly educated parents obtaining an upper secondary school degree. However, when we look at college achievement by age cohort, we find that there is still a persistent difference in the odds of attaining a college degree between children of college educated parents and children of parents with completed compulsory education. Using data from different surveys, we show that the lack of convergence in educational achievements between children from different backgrounds is the combined outcome of a convergence in enrollment rates coupled with increasing divergence in the drop out rates.

2 Data

The only large data-set available in Italy and containing information on both parents and children schooling is the Survey on Household Income and Wealth

[1] The article 34 of the Italian Constitutional law states that "The school is open to everyone. Initial education, taught for at least eight years, is free and compulsory. The deserving ones, even if lacking economic means, are entitled to reach the highest level of education. The Italian Republic makes such right effective through scholarships, household subsidies and any other form of grants, which has to be assigned through public competition."

(SHIW henceforth), collected about biannually by the Bank of Italy. Unfortunately this data-set does not contain information on parents' income at the relevant age (typically when the child was 14) and therefore does not allow the direct estimation of intergenerational income correlations. For this reason, in the sequel we take education levels as (proxy) measure of permanent income. The SHIW surveys are conducted on a representative sample of the Italian population. From 1993 the SHIW surveys contain a section asking information on the householder's and spouse's parents when they were of the same age as the interviewees, including parents' education, occupation and industry. In order to increase the degrees of freedom available, we pool waves form 1993 to 2004 and group interviewees by age birth years. Every wave contains approximately 8,000 families, the whole dataset contains approximately 45,000 families after eliminating repeated observations which belong to the panel section of the data.

3 Descriptive Statistics

The average educational attainment of the Italian population has substantially grown over the years. Table 1 shows that more than 30% of individuals which belong to the cohorts born between 1915 and 1919 held no degree, 52% of them had an elementary school degree and only 2% held a college degree. The percentage of individuals with no education decreased rapidly in the past century, with a sharp drop visible after 1945, coinciding with the introduction of the Republican Constitution. The last column of Table 1 shows a constant increase in the average years of education. In the first decades of the last century there has been an increase in the number of individuals with an elementary school degree until the cohorts born between 1930-1934. When half the population achieved elementary school degree, the percentages started to decrease in favor of lower secondary schooling. The lower secondary school degree became compulsory in 1962. The percentage of population with a lower secondary school degree grew until the cohorts born between 1960 and 1964 and then decreased. The youngest cohorts show a tendency to move beyond lower secondary level, towards high school education and college. More than 50% of individuals of the youngest cohort in the table have achieved high school education and 10% of them hold a college degree.

Table 2 shows the average years of education of fathers, mothers, sons and daughters by children cohort of birth. We notice that while in the parent generation the wives' education lag behind the husbands' one, in the children generation daughters catch up sons and pass them starting from the cohorts born after 1960. If we measure the differential in years of education, the male component records a constant gap of three years of education between fathers and sons, while in the case of the female lineage we notice an increasing differential across cohorts.

To describe the raw correlation of the parents' and children education, Figure 1 shows the non-parametric estimate of the relationship between father and children education for the oldest (born between 1910-1914) and the youngest (born after 1975) cohort. The standard errors are produced with 999 bootstrap replications. The figure shows that in case of the oldest cohort most of the mass is concentrated in the combination (low father education-low children education). In the youngest cohort most of the mass seems attracted by a new equilibrium (father with high school education-children with high school education). This pattern underlines that the reduction of the coefficient of intergenerational transmission we describe in the next paragraph is related to rising average educational attainment over time.

4 The Model

There is a vast literature on the intergenerational correlation of educational achievements and/or incomes. Among the reasons for this correlation the literature considers genetic transmission, access to pre-school facilities, parental care, parental income and/or wealth, parental role model and out-of-school cultural environment. Due to the lack of retrospective information in our data, our study is limited to the correlation between parents' schooling and children schooling. This strategy is open to the criticism that parents' education is an inadequate measure of familiar background because it does not take into account the presence of liquidity constraints and of the out-of-school cultural environment. It also neglects the presence of peer effects and the quality of schooling. Unfortunately our data do not indicate the individuals' birth place or the school attended nor does it provide information on parents' income. Although we cannot improve our knowledge of these factors[2] we consider that the intergenerational transmission of education achievement partially includes all these aspects. We estimate separately for each cohort the following equation[3]:

$$\frac{S_i^c}{\sigma_c} = \alpha + \beta \frac{S_i^p}{\sigma_p} + \varepsilon_i \qquad (1)$$

where $\frac{S_i^c}{\sigma_c}$ and $\frac{S_i^p}{\sigma_p}$ indicates years of schooling divided by the standard error of child and parents, respectively. The variables are standardized because we focus on the evolution of the relationship over time. Differently from the

[2]Parental income could be estimated from alternative data sources (as in Björklund and Jäntti, 1997), but this would not capture temporary income variations that may be relevant for assessing liquidity constraints. This prediction of parental income can also be used to estimate the intergenerational income mobility (in the Italian case, see Mocetti, 2006; Piraino, 2006) but this procedure seem not appropriate to study across-cohort variations of this measure.

[3]In this equation we neglect assortative mating which should reinforce the effect of parents' education and the so called children quantity-quality tradeoff according to which more educated parents have lees children but give them a better education.

literature on intergenerational transmission of income, there is no problem of measuring income at two different ages for parents and children yet the variances of education attainment for parents and children may change (and effectively does change) over time. We focus on the temporal evolution of the parameter, which should indicate whether there has been an increase in the equality of opportunity. A higher estimate of β would indicate that children schooling is heavily influenced by parents' schooling (which may capture cultural or financial constraints, as well as neighborhood effects), whereas an estimate close to zero would indicate that children schooling is independent of family background. Before proceeding to the empirical analysis we review the main econometric problems related to the estimation of equation 1.

The review of the literature on the intergenerational transmission of education by Haveman and Wolfe (1995) concludes that parents' education is the most important factor in explaining children success at school. The pervasive question in the literature is whether the high correlation between parents' and children schooling is attributable to the genetic transmission of ability (nature) or to parents' income which makes children schooling more accessible (nurture)? The literature does not provide a consensual answer but in our reading most of the authors agree that the explanation lies mostly in the economic and cultural resources of parents rather than in genetic transmission.

An OLS estimate of equation 1 may be biased due to at least two important omitted variables: parents' ability and parental care for their children. Only in the unlikely case that neither affects directly children schooling or if neither is correlated with parents' education, the estimate of β would be unbiased.[4]

[4] If we indicate with h_i^p and f_i^p the omitted variables in equation 1 (parents' ability and parents' care for their children), equation 1 becomes: $S_i^c = \alpha + \beta S_i^p + \gamma h_i^p + \delta f_i^p + \varepsilon_i$. The OLS bias is then $p\lim \widehat{\beta} = \beta + \gamma \frac{cov(S,h)}{Var(S)} + \delta \frac{cov(S,f)}{Var(S)}$. In general it os not possible to sign the bias as the sign of the covariances is not determined.

To identify the causal effect of parents' education on children education, the literature has adopted three different strategies involving IV estimation: 1) it has used samples of twins to difference out parents' ability, 2) it has used samples of families with adopted children, thus ruling out the effect of parents' ability, 3) has exploited various reforms of compulsory education which introduce exogenous variation in parents' education. In general the IV estimates tend to be lower than the corresponding OLS estimates.[5]

In this paper we do not have data which allow a proper IV estimation of the β coefficient and therefore the interpretation of β is descriptive and not causal. This is not necessarily an insurmountable problem because our main interest is on the changes of the estimates over time. Therefore, assuming that the factors potentially biassing the estimates were time invariant, our interpretation of the results would still be correct[6]

We estimate equation 1 separately for 13 five-year cohorts starting from 1910 onwards. We measure parents' and children highest degree of educational attainment, $S_i^p$and S_i^c respectively, by imputing the correspondent years of education (5, 8, 13, 18 years of education corresponding to elementary, lower secondary, high school and college respectively). The estimated β for each cohort is plotted in Figure 2. The three lines correspond to parental education S_i^p proxied by father's education, mother's education or most educated between the two. Figure 2 shows a significant reduction in β. The intergenerational

[5]The most recent examples of IV tecniques 1) and 2) are: Behrman and Rosenzweig (2002), Bjiörklund et al. (2006), Black et al. (2005), Dearden et al. (1997), Plug and Vijverberg (2003) and Sacerdote (2002). Some examples of the third approach are: Chevalier (2004), Oreopoulus et al. (2006).

[6]As an illustration of IV estimates we could use the reform of 1962 which made lower secondary school compulsory for all cohorts born after 1950. The OLS β obtained on the pooled data is $\beta = 0.548$. The IV estimate obtained instrumenting S_i^p with the grandfather's education and a dummy for the reform is $\beta = 0.540$. Similarly to most of the literature, IV estimates are lower than OLS estimates. One limitation of this strategy is that the reform applied uniformly on the whole Italian territory, therefore preventing any variation across parents who belong to the same cohort.

transmission of education between mother and children is higher than the corresponding measure obtained between father and children, in accordance with most of the literature. The convergence between the two estimates in the younger cohorts is probably due to the convergence of the average education of mothers and fathers over time (see Table 2).

Table 3 shows the estimates by cohort. Model (1) includes father's education only, model (2) mother's education only, model (3) includes the education of the parent with the highest degree attained and model (4) includes both father's and mother's education. The estimate declines from 0.66 for father's education and 0.79 for mother's education to 0.31 for both parents of children born after 1975. Since the different models yield analogous results, in the sequel we focus on the relationship between fathers' education and children (both sons and daughters) education.

Figure 2 and Table 3 suggest that on average children of families with different educational attainment tend to converge towards the same level of education i.e. the reduction in the correlation between parents and children education is achieved through a higher increase in educational attainment of children of lower background. However this average measure may hide differences among children of families with different degrees of education. The sociological literature (Schizzerotto and C., 2006, among others) shows that inequality across families of different backgrounds have disappeared when we consider lower levels of schooling, but is still persistent when we consider college attainment. They refer to this phenomenon as a *reduction in the absolute differences* and *maintenance of the relative differences*. Unlike the sociological tradition, which tends to define family background in terms of occupation and/or class, we stick to our approach in terms of permanent income, as proxied by parents' education attainment.[7]

5 Ordered probit estimates

In all models from here onwards for clarity reasons we consider only three levels of education attainment both for children and for parents: level 1=lower secondary education or less, level 2=high school, level 3=college or more. In order to assess relative differences in the convergence by family backgrounds, we estimate an ordered probit model for the children educational level over a set of individual characteristics and parents' education. Table 6 shows the results of the ordered probit.

Figure 3 plots the predicted probabilities of obtaining a lower secondary school degree (panel A), a high school degree (panel B) and a college degree (panel C) conditional on father's education. In the figure father with high school education is the omitted category therefore we compare the predicted probabilities conditional on having a father with lower secondary schooling with the probability conditional on having a father with college or more.

Despite the reduction in absolute numbers of this group, panel A shows that there is little convergence over time in the predicted probabilities of obtaining a lower secondary school degree as the highest degree by family background. The difference in the predicted probabilities between children of parents with lower secondary and children of parents with college remain stable over time.

Panel B shows that there is divergence in the predicted probabilities of obtaining a high school degree. While children of poorer background have gained more and more easily access to upper secondary school, the children from college educated parents have moved a step ahead by entering college in

[7] Breen et al. (2005) in a cross-country study also find a decline of relative inequality in 6 countries over 8, however excluding Italy and Ireland.

larger numbers.

Panel C shows that the probability of achieving a college degree is increasingly lower for children of families with a lower education degree, and the difference with their counterparts whose parents have a college degree has become larger over time.

Figure 3 allows us to interpret the evidence reported in Figure : the reduction of the correlation between father's and children education is mainly due to the larger proportion of children of families with lower educational degrees who attain the high school diploma. However the convergence towards the high school diploma hides a stable difference both in the probabilities of stopping at a lower secondary school degree and in the probabilities of achieving college education.

The evidence of a glass ceiling in educational attainment and/or the maintenance of relative inequalities brings us to explore data on dropout form secondary school and from college. Unfortunately the SHIW dataset does not contain information on failed attempts, and we resort to another dataset. We now explore a representative sample of the Italian population collected by ISFOL, an agency connected to the Italian Ministry of Labor and Social Affairs. The survey ISFOL-Plus 2005 contains information for 40.386 individuals, corresponding to a population of approximately 35 millions of inhabitants (excluding people younger than 15 year old or older than 65). The main advantage of this survey is the richness of retrospective information about the educational career of the individuals, including marks obtained at different stages of schools, possible repetitions, type of school attended, failed attempts, in addition to labor market outcomes (employment status, job satisfaction, perception of overeducation). Sample distribution by age and educational attainment is reported in Table 4, which confirms the rise of educational attainment we have already commented in previous sections.[8] In particular we exploit information about the failed attempts to complete secondary or tertiary education, which corresponds to approximately to 10% of completed degrees at secondary level, but reach 50% at tertiary level (see Table 5).

In Figure 4 we replicate the estimation of an ordered probit model over the maximum educational attainment of the children, analogous to that reported in Figure 3. Since the survey was collected in 2005 and restricted to people aged 65 or below, we do not have information on people born before 1940. We find confirmation of the stable difference in the odds of stopping at lower secondary education (panel A) and a progressive shift of the chances of children from college educated parents from high school to college (panels B and C). Contrary to the SHIW results, in the ISFOL dataset we record an initial reversal in the behavior of children from low educated parents:especially in the youngest cohorts, they are relatively less likely to stop at higher secondary, while moving towards college entrance. The estimated coefficients of the ordered probit over the entire SHIW and ISFOL samples are reported in Table 6. As far as family background coefficients they are consistent across samples, but they diverge with respect to gender and geographical areas. This is possible due to the different coverage of the two samples: the larger one (SHIW) include older cohorts, where women and/or people living in Souther regions were at a relative disadvantage with respect to men living in Northern regions, whereas these differences have attenuated or reverted in younger cohorts. However, when we restrict the SHIW sample in order to make it comparable to the ISFOL one, the differences for gender and regional area coefficient still remain.

We can exploit the ISFOL dataset to decompose the probability of attaining

[8]Since the main purpose of the survey was to investigate the specific problems connected to the entrance and the exit in the labor market, sample weights were necessary to make inference to the entire population.

a secondary or tertiary degree into the probability of enrolling (conditional on completing the previous stage of education) and the complement of the probability of dropping out. The estimate of these probit models over the entire sample are reported in Table 7, while the estimated marginal effect by age cohorts are reported in Figure 5 (high school education) and Figure 6 (college education). Children from poorer educational backgrounds suffer a double disadvantage: they are less likely to enter these two stages of education, and even when enrolled they are more likely to drop out. Conversely, children from college educated parents enjoy a double support: they are more likely to enter college, and once in they are more likely to achieve it.

By looking at these coefficients, we find support to the idea that parental education provides an implicit insurance against the risk of educational failure. Its "coverage" is slightly higher at secondary level, where a graduate parent is sufficient to almost halve the risk of non completing this level. Since the enrolment chances are still different by parental backgrounds, the odds ratio between alternative backgrounds are larger in tertiary education than in secondary one.

When we move to the trends in these effects, we find an interesting outcome: while enrolment probabilities by family backgrounds have converged, both at secondary and tertiary levels, this has not occurred for drop out probabilities at tertiary level. Children from poorer background still face a higher risk of failure when undertaking the college investment. Therefore, the impression of a glass-ceiling at tertiary level for children from poorly educated parents find support also from ISFOL dataset, and contributes to the explanation of the incomplete attainment of equality of opportunity in the Italian educational system over the last century.

6 Possible explanations

In this section we put forth some tentative explanations of the patterns of educational attainment described above. Figure 6 points out that the divergence in the attainment rates by fathers' education are due to the combination of converging enrollment rates but diverging (or approximately stable) differentials in drop out rates. The higher (and stable over time) drop out rates of children from families with low education degrees explain why their probability of attaining college are still much lower than for children of parents with a college degree (panel C of Figures 3 and 4) and why more of them get a high school degree as the highest completed level of education (panel B of Figures 3 and 4). Focussing on tertiary education, when the educational investment corresponds to a rational choice, we should find that the expected gain of college enrolment over the outside option (holding a secondary school degree) should increase with parental background. This require considering differentials in average wages by fathers' education, differentials in opportunity costs and the differences in risk aversion. Assuming a CARA utility function, a very stylized model posits that risk averse individuals would face the following expected gain of completing college compared to holding a secondary school diploma:

$$\begin{aligned} E(U_i^c) &= (1-p_i)\frac{(w_i^c)^{(1-\alpha_i)}}{1-\alpha_i} + p_i\frac{(w_i^{hs})^{(1-\alpha_i)}}{1-\alpha_i} - \frac{(w_i^{hs})^{(1-\alpha_i)}}{1-\alpha_i} \\ &= (1-p_i)\frac{(w_i^c)^{(1-\alpha_i)} - (w_i^{hs})^{(1-\alpha_i)}}{1-\alpha_i} \qquad (2) \end{aligned}$$

where the subscript i indicates father's education, w_i^c is the expected average wage of an individual with college education whose father holds education i, w_i^{hs} is the the expected average wage of an individual with high school education, α_i is absolute risk aversion and p_i is the probability of drop out. Notice that here we collapse the educational process into a single instant, thus neglecting opportunity costs associated to foregone income. We also abstract from direct costs, since in Italy they are rather low.[9] We will use equation 2 in order to check whether the expected gain can mimic the patterns of college achievement of Figures 3 and 4. Due to data availability in SHIW surveys, we are able to build measures of average wages w_i^c and w_i^{hs} which vary by cohort and father's education i, whereas the degree of risk aversion α_i and the probability of drop out p_i only vary by father's education (i.e. they are cohort-invariant).

A first potential explanation of different college achievement rates lies in the differential average wages of college graduates with different father's education (w_i^c with $i =$ father's education). At equal attained degree, family networking may still give access to different opportunities according to parents' education. Other things constant, children from poorly educated and poorly connected families do have lower incentives to terminate college if children of college educated parents get better paid jobs at equal educational attainments.

Table 8 (columns 1 to 3) shows average wages of college graduates w_i^c by father's education. The wage data come from SHIW data between 1993 and 2004 because 1993 is the first year in which father's education is available and 2004 is the last available year. Our cohorts of interest were born between 1940 until 1975 therefore they are at different ages in the years 1993-2004. To be able to reproduce the incentives to go to college for each cohort starting from the cohort born in 1940-1945, we purge all variables form the effect of age regressing annual labor incomes, gender, region of residence and sector on

[9] In most Italian universities tuitions are conditional on parental income, and therefore correlated with parental education. However, since the range of variation in public universities is limited (comprised between a minimum of €750per year and a maximum of €2000), we leave them aside in these back of the envelope calculations.

age, age squared. Average wages of college graduates w_i^c are then predicted on the basis of the characteristics purged of age. We predict w_i^c for each cohort and each level of father's education. Table 8 shows that average wages of college graduates w_i^c are increasing in father's education (last row of Table 8): those whose fathers hold a college degree gain on average 4% (6%) more than those children from fathers with high school education (with lower secondary education). The differential (between column 1 and column 3) appears to be larger in more recent cohorts, net of sample variability.

A second explanation lies in the differential opportunity costs of college education. Terminating college implies approximately equal forgone wages w_i^{hs} for children of educated parents and for children of families with lower education achievement. Table 8 (column 3 to 6) shows average wages of high school graduates w_i^{hs} by father's education. This measure of opportunity costs is fraught by self selection: children of college-educated fathers who stop their schooling at high school are likely to be of lower ability compared with the majority of their peers who achieve the college degree. Notwithstanding self-selection issues, the data in Table 8 show that opportunity costs w_i^{hs} of children of fathers with lower secondary schooling and with high school degree) are approximately equal to those of children from college-educated families.

Finally a third explanation takes into account the differences in risk. If college education is to be considered as a risky investment, then the differential in enrolment rates may be explained by differences in risk aversion (Belzil and Leonardi, 2006).

Typically the extent of risk implied in the investment in college education can be thought of as the earnings uncertainty upon college completion, conditional on father's education. In Table 9 we measure this risk using the standard deviation of log wages in absolute terms $sd\log(w_i^c)$. On the basis of the information provided in the Table, it is also possible to build a measure of risk in relative terms $\frac{sd \log(w_i^c)}{sd \log(w_i^{hs})}$ i.e. relative to the uncertainty of high school graduate earnings.

The results of Table 9 are excessively variable when considered by cohort. The pooled sample of survey years (last row of Table 9) however yields a measure of risk which is approximately similar among individuals from different family background. If we accept the idea that they face approximately the same extent of risk, another relevant factor of the differential in college attainment rates may be related to differences in the degree of risk aversion α between individuals of different family background.

The 1995 wave of the Bank of Italy Survey of Income and Wealth (SHIW) contains a question on household willingness to pay for a lottery which can be used to build a measure of individual risk attitudes.[10] At a theoretical level, it is easy to show that there is a one-to-one correspondence between the value attached to the lottery and the degree of risk aversion. For a given level of wealth, w_i, and a potential gain (g_i), the optimal bet, bet_i, must solve the expected utility equation:

[10] The lottery question is worded as follows: "We would now like to ask you a hypothetical question that we would like you to answer as if the situation was a real one. You are offered the opportunity of acquiring a security permitting you, with the same probability, either to gain a net amount of Lit. 10 million (roughly \$5,000) or to lose all the capital invested. What is the most you are prepared to pay for this security?"

The respondent can answer in three possible ways: 1) give the maximum price he/she is willing to pay, which we denote as *bet*; 2) don't know; 3) don't want to participate. Of the 8,135 heads of household, 3,288 answered they were willing to participate and reported a positive maximum price they were willing to bet (prices equal to zero are not considered a valid response). The valid responses to the question - *bet* - range from Lit. 1,000 to Lit. 100 million. Of the 3,288 heads, 3,131 reported a maximum price *bet* less than Lit. 10 million which implies that they are risk averse individuals, 117 reported *bet* exactly equal to Lit. 10 million (i.e. they are risk neutral) and 40 reported *bet* more than 10 million indicating that they are risk lovers.

$$U_i(w_i) = \frac{1}{2}U_i(w_i + g_i) + \frac{1}{2}U_i(w_i - bet_i) = EU(w_i + R_i) \quad (3)$$

where R_i represents the (random) return of the lottery. Taking a second-order expansion, and noting that R_i is also the maximum purchase price (bet_i), we get that

$$EU(w_i + R_i) \approx U_i(w_i) + U_i'(w_i)E(R_i) + \frac{1}{2}U_i''(w_i)E(R_i)^2 \quad (4)$$

It is therefore possible to express risk aversion (say the Arrow-Pratt measure given by $\alpha = \frac{-U_i''(w_i)}{U_i'(w_i)}$) as a function of the parameters of the lottery and the the value of the bet of each individual. In Table 10 we notice that the degree of absolute risk aversion α decreases the higher father's education.

Finally the drop out rates by father's education p_i come from the predicted probability of the model estimated in column 4 Table 7.

We now combine all these elements (average wages of college graduates w_i^c, average opportunity cost w_i^{hs}, different degree of risk aversion α_i and different probability of drop out p_i) to construct the expected gain of college by fathers's education, using equation 2. Figure 7 shows a stable differential in the expected gain associated to college enrolment that favors children of parents with high education.

7 Concluding remarks

In this paper we have shown that the degree of intergenerational mobility in educational attained has significantly increased in Italy over the last century. As such, we can infer that the equality of opportunity of the average individual has increased over time. However the average hides differences. In the general increase in educational attainment, the relative disadvantage of children from poorer background has remained stable, especially when considering both tails of the educational distribution. People from poorly educated parents are at higher risk of not going beyond compulsory education (corresponding to 8 years of education). They also suffer a disadvantage in achieving college education. According to our estimates, they tried to "jump" Gambetta (1987) but experienced higher rates of failure.

We provide a suggested interpretation of the persistence of differences in the odds of higher educational attainment based on differences in returns and differences in degree of risk aversion. We show that the expected gain of college completion remains stable for the most recent cohorts and is increasing in parental education. We argue that this outcome may be related to non competitive working of the Italian labor market, where the allocation of good jobs follows family networking.[11] The differences in the degree of risk aversion can be related to wealth distribution, since richer people are less risk adverse If these are potential explanations for the intergenerational persistence of inequality of opportunities, there is some scope for policies aiming to reverse the situation. One set of policies could increase the fluidity of the labor market by improving the efficiency in job matching: better access to information, meritocratic screening of job applicants, improved certification of competences could represent a partial solution to the excessive reliance on personal relationships. Another set of policies should address the issue of insurance against the risk of investment failure. Some sort of graduate tax (like those existing in Australia or in Sweden), whose repayment is conditional on achieving a minimum threshold of earnings, can provide such insurance, thus reducing the influence of risk aversion in preventing college enrolment.

[11] It is sufficient to remember that more than 50% of jobs are obtained through indications of family members or friends.

Additional policies, not considered in the present framework, deal with institutional reforms of the educational system. The introduction of the so-called "Bologna system", which push all European countries to reorganize their higher education system by creating the possibility to obtain a degree (equivalent to a BA degree) after three years of enrolment, should reduce the drop out rates, that affect disproportionately students from poorer background. We have also neglected differences in competences taught at school. The Italian secondary school system is organized according to different tracks (academic, technical and vocational), and students are selected into different tracks at the age of 14 mostly on family background. If different schools teach different abilities, then even when correcting previous factors (labor and financial markets) the situation could not improve, because students from less educated parents would more frequently end up in vocational schools, which do not provide an academic oriented education. In such a case, the only possible solution would be a comprehensive secondary school (in the line of the reforms experienced by many European countries in the 70's). If none of these reforms will be undertaken in the near future, we do not expect a persistent decline of the correlation in educational attainment across Italian generations.

8 Figures and tables

Cohort	no degree	primary	lower secondary	high school	college	average years of education
1915-19	31.40%	52.10%	9.30%	5.20%	2.00%	4.39
1920-24	25.90%	53.90%	10.70%	6.90%	2.60%	4.92
1925-29	21.80%	53.50%	13.40%	8.80%	2.50%	5.34
1930-34	19.00%	54.20%	15.60%	8.70%	2.50%	5.54
1935-39	12.80%	52.10%	19.70%	12.20%	3.20%	6.34
1940-44	8.20%	46.10%	24.50%	16.90%	4.30%	7.24
1945-49	5.00%	36.00%	28.90%	22.80%	7.30%	8.39
1950-54	2.70%	24.20%	33.70%	29.30%	10.10%	9.53
1955-59	1.10%	14.10%	35.40%	38.70%	10.70%	10.49
1960-64	0.80%	7.50%	40.20%	41.60%	9.90%	10.78
1965-69	0.70%	6.00%	38.90%	43.60%	10.80%	11.02
1970-74	0.90%	5.30%	37.60%	44.60%	11.60%	11.16
1975-79	0.30%	2.80%	36.00%	50.80%	10.10%	11.44

Source: Our calculation on SHIW

Table 1: Highest degree completed by birth cohort.

Cohort	father	mother	son	daughter
1914 and before	2.27	1.65	5.27	3.61
1915-1919	2.36	1.69	5.75	3.95
1920-1924	2.55	2.08	6.25	4.53
1925-1929	3.06	2.48	6.56	5.29
1930-1934	3.34	2.72	6.75	5.38
1935-1939	3.70	3.06	7.62	6.14
1940-1944	4.23	3.56	8.61	7.08
1945-1949	4.56	3.86	9.55	8.27
1950-1954	4.99	4.27	10.18	9.44
1955-1959	5.26	4.54	10.84	10.27
1960-1964	5.90	5.10	10.66	10.82
1965-1969	6.32	5.67	10.77	11.13
1970 and after	7.01	6.56	10.86	11.03

Source: our calculations on SHIW

Table 2: Average years of education of parents and children, by children birth cohort.

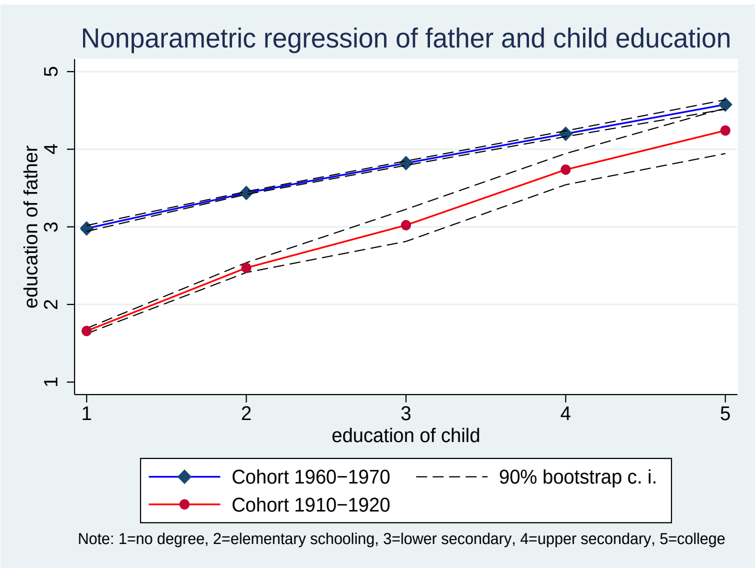

Figure 1: Nonparametric estimation of child over father highest degree completed.

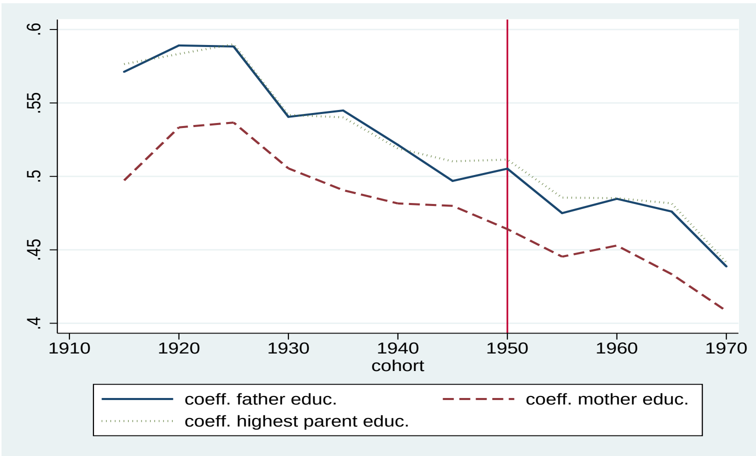

Figure 2: Standardized β coefficient.

Cohort	1 Father (excl. mother)	2 Mother (excl. father)	3 most educated parent	4 Father	 Mother
1915-1919	0.659	0.779	0.658	0.525	0.245
	(0.031)	(0.044)	(0.031)	(0.048)	(0.065)
1920-1924	0.718	0.772	0.687	0.522	0.324
	(0.020)	(0.024)	(0.019)	(0.030)	(0.035)
1925-1929	0.653	0.715	0.643	0.474	0.276
	(0.016)	(0.020)	(0.016)	(0.025)	(0.031)
1930-1934	0.602	0.661	0.594	0.399	0.314
	(0.015)	(0.019)	(0.015)	(0.023)	(0.027)
1935-1939	0.587	0.639	0.582	0.425	0.268
	(0.014)	(0.017)	(0.014)	(0.020)	(0.024)
1940-1944	0.566	0.620	0.562	0.388	0.281
	(0.013)	(0.016)	(0.013)	(0.020)	(0.024)
1945-1949	0.559	0.622	0.570	0.359	0.312
	(0.013)	(0.015)	(0.013)	(0.019)	(0.022)
1950-1954	0.544	0.566	0.544	0.395	0.233
	(0.013)	(0.015)	(0.013)	(0.019)	(0.022)
1955-1959	0.461	0.484	0.466	0.327	0.203
	(0.013)	(0.015)	(0.012)	(0.019)	(0.022)
1960-1964	0.423	0.446	0.419	0.286	0.213
	(0.013)	(0.015)	(0.012)	(0.019)	(0.021)
1965-1969	0.442	0.437	0.436	0.320	0.183
	(0.016)	(0.018)	(0.015)	(0.022)	(0.024)
1970 and after	0.360	0.356	0.356	0.241	0.167
	(0.018)	(0.019)	(0.017)	(0.026)	(0.028)
Obs	45057	45359	45872	44544	
R^2	0.869	0.862	0.869	0.873	

Source: our calculations on SHIW.
Note: All regressions include controls for sex and geographical areas.
Model 1 controls for education of father only, model 2 for education of mother only, model 3 for education of most educated parent and model 4 for education of both father and mother.

Table 3: Corrected β coefficient for models of intergenerational education transmission, by birth cohort of child.

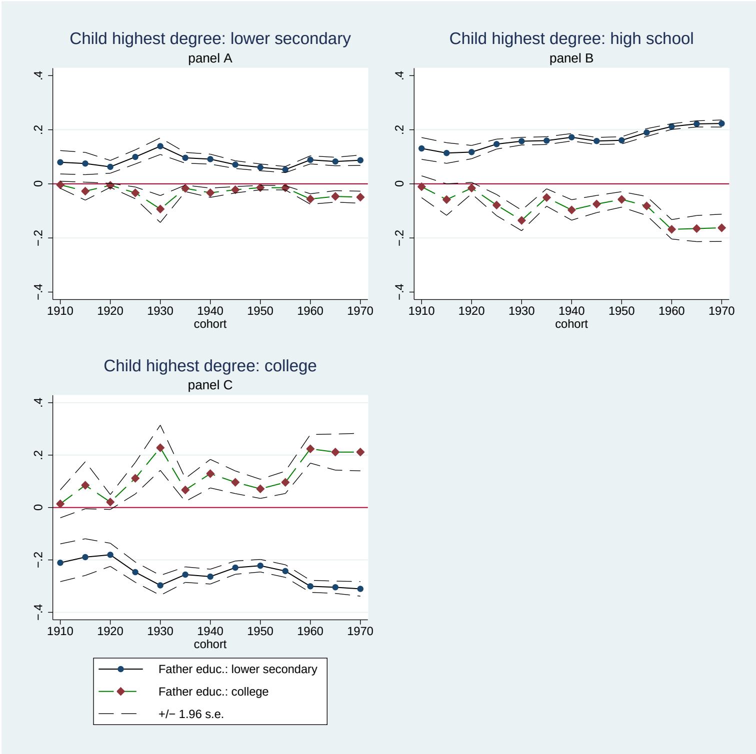

Figure 3: Average partial effect of ordered probit: SHIW sample

cohort	no degree	primary completed	lower secondary completed	upper secondary completed (3 yrs)	upper secondary completed (5 yrs)	college degree	post-graduate studies	Total
1940-44	33	680	791	126	911	476	19	3036
1945-49	26	656	1163	209	1499	751	29	4333
1950-54	13	340	999	218	1475	799	67	3911
1955-59	11	243	997	201	1138	458	31	3079
1960-64	6	137	1031	219	1068	326	23	2810
1965-69	3	101	1319	295	1804	690	42	4254
1970-74		44	847	167	1501	685	51	3295
1975-79	3	33	829	221	2984	1435	87	5592
Total	95	2234	7976	1656	12380	5620	349	30310

Source: Our calculations on ISFOL sample.

Table 4: Sample distribution be age cohort and educational attainment.

	secondary education	tertiary education
not entitled	2329	10305
never attempted	5870	10030
attempted and drop out	2073	3368
attempted and succeded	20038	6607
Total	30310	30310

Source: Our calculations on ISFOL sample.

Table 5: Success and drop outs by education level.

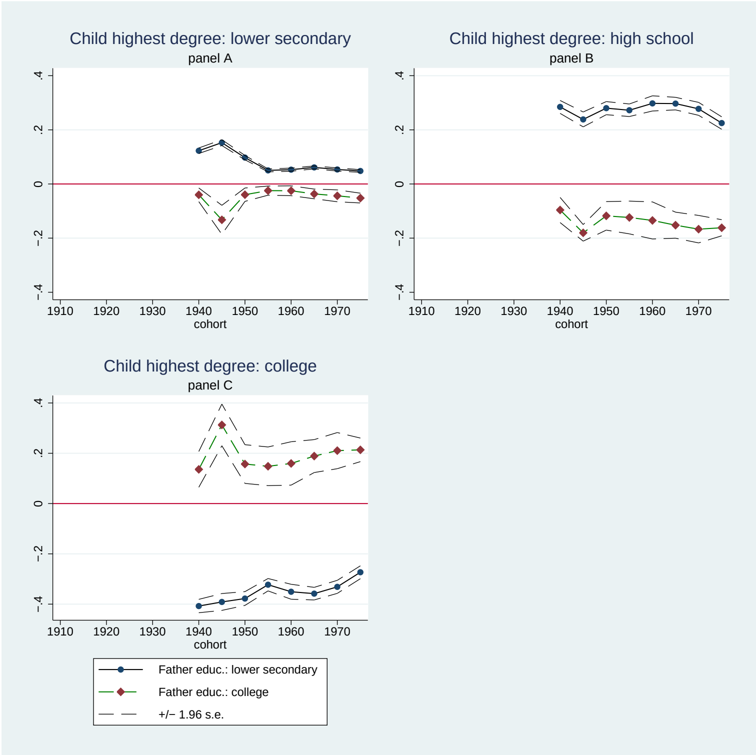

Figure 4: Average partial effect of ordered probit: ISFOL sample

	SHIW pooled sample. Child birth cohorts since 1915 Highest degree of child	SHIW pooled sample Child birth cohorts since 1940 Highest degree of child	ISFOL sample Child birth cohorts since 1940 Highest degree of child
Father lower secondary	-1.365	-1.280	-0.782
	(0.022)	(0.025)	(0.017)
Father college	0.625	0.650	0.430
	(0.042)	(0.049)	(0.030)
Female	-0.166	-0.099	0.096
	(0.012)	(0.014)	(0.012)
Area: Center	-0.050	-0.030	0.175
	(0.015)	(0.019)	(0.016)
Area: South	-0.171	-0.222	0.039
	(0.014)	(0.016)	(0.014)
cut1	-0.978	-1.129	-0.575
	(0.023)	(0.027)	(0.018)
cut2	0.218	0.187	0.792
	(0.022)	(0.026)	(0.018)
Obs	45146	28650	37317
Log-likelihood	-3.37e+04	-2.40e+04	-3.39e+04
Pseudo-R^2	0.094	0.090	0.056
P-value	0.000	0.000	0.000

Source: Our calculations on pooled SHIW sample and pooled ISFOL sample.
Note: Ordered probit for higest completed education (lower secondary, high school, college) of child. Standar errors in parenthesis. Omitted variables are father high school, male, area: North.

Table 6: Coefficients of ordered probit models using full SHIW, restricted SHIW and ISFOL data.

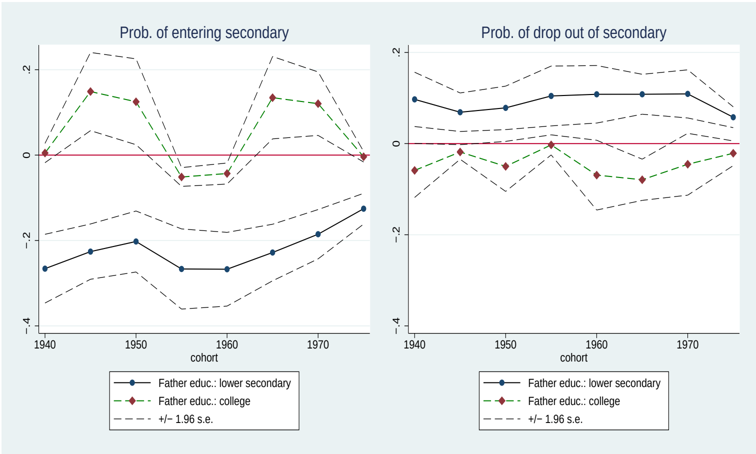

Figure 5: Sequential probit estimation of dropping out of high school.

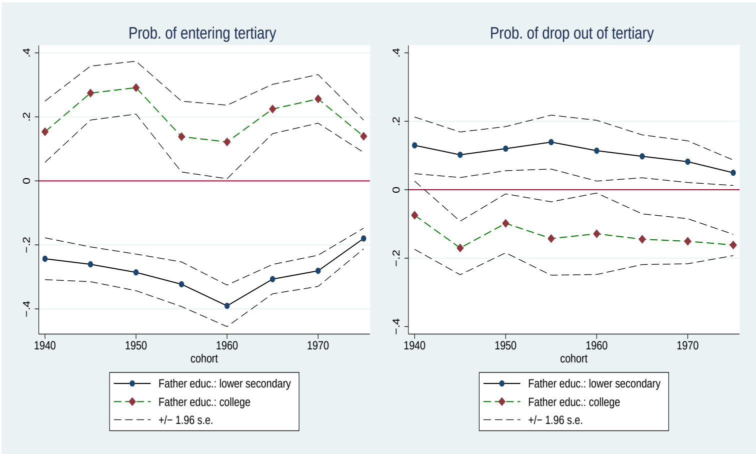

Figure 6: Sequential probit estimation of dropping out of college.

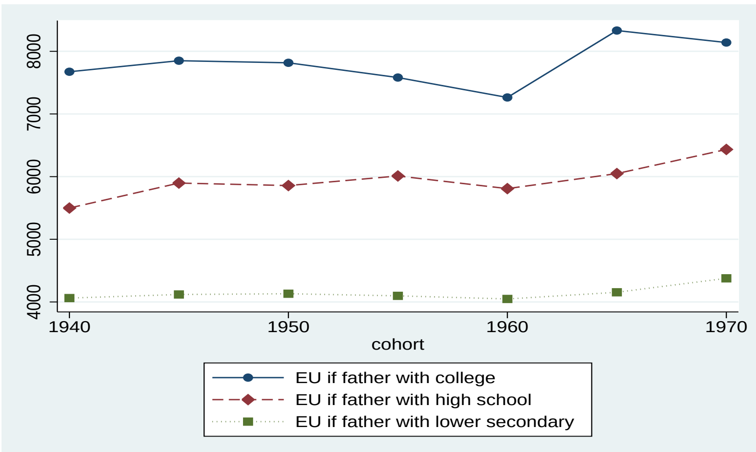

Figure 7: Expected gain of college degree by father education.

	Prob. of entering high school	Prob. of drop out of high school, conditional on enrollment	Probability of entering college	Prob. of drop out of college, conditional on enrollment
	coeff.	coeff.	coeff.	coeff.
Father primary completed	-0.380	0.739	-0.418	0.319
	(0.020)	(0.036)	(0.019)	(0.029)
Father college completed	0.055	-0.490	0.302	-0.424
	(0.034)	(0.091)	(0.031)	(0.046)
Number of failure	-0.029	-0.022	-0.201	0.362
	(0.011)	(0.017)	(0.013)	(0.022)
Female	0.017	-0.083	-0.172	-0.142
	(0.015)	(0.023)	(0.017)	(0.026)
Area: Center	0.065	-0.104	0.118	0.097
	(0.021)	(0.032)	(0.022)	(0.035)
Area: South	-0.021	-0.028	0.141	0.119
	(0.017)	(0.025)	(0.018)	(0.029)
Constant	1.019	-1.859	0.176	-0.674
	(0.022)	(0.038)	(0.022)	(0.033)
Obs	35302	27247	24771	10885
Log-likelihood	-1.87e+04	-7430.187	-1.63e+04	-6446.995
Pseudo-R^2	0.015	0.056	0.042	0.059
P-value	0.000	0.000	0.000	0.000

Source: Our calculatons on pooled ISFOL sample.
Note: Sequential probit. Standar error in parenthesis. Omitted variables are father higher secondary completed, male, area: North.

Table 7: Sequential probit for completing the secondary or the college.

	Wage college graduates			Wage high school graduates		
	Degree of father			Degree of father		
Cohort	college	upper secondary	lower secondary	college	upper secondary	lower secondary
1940-44	14,288	12,189	13,303	12,768	12,351	13,086
1945-49	13,564	12,988	13,051	14,201	13,633	13,786
1950-54	13,394	12,753	13,239	14,237	13,660	13,691
1955-59	13,197	13,271	13,092	13,479	13,945	13,575
1960-64	12,696	12,752	13,030	12,697	13,405	13,252
1965-69	14,491	13,602	13,357	15,241	13,814	13,749
1970 and after	15,685	14,409	14,157	13,275	15,049	14,688
Average	13,902	13,138	13,318	13,700	13,694	13,689

Source: Our calculations on SHIW.
Note: Labor income is conditioned to age, sex, area of residence and sector of employment.

Table 8: Average labor income of college and high school graduates by education of father.

	College graduates (sd of log wage)			High school graduates (sd of log wage)		
	Degree of father			Degree of father		
Cohort	college	upper secondary	lower secondary	college	upper secondary	lower secondary
1940-44	2,180	3,403	3,707	2,733	3,319	3,242
1945-49	3,459	3,008	3,139	2,254	2,887	3,069
1950-54	2,966	2,930	3,179	3,701	2,782	3,252
1955-59	2,904	2,945	3,125	3,619	3,336	3,215
1960-64	3,022	2,726	3,050	3,264	3,301	3,287
1965-69	3,252	3,132	3,271	3,321	3,269	3,438
1970 and after	3,719	3,070	3,805	3,879	3,777	3,601
Average	3,072	3,031	3,325	3,253	3,239	3,301

Source: Our calculations on SHIW.
Note: Labor income is conditioned to age, sex, area of residence and sector of employment.

Table 9: Variability of labor income of college and high school graduates by education of father.

Degree of father	Coefficient of risk aversion
lower secondary	0.138
high school	0.140
college	0.133

Source: our calculation on SHIW.

Table 10: Absolute risk aversion by education of father.

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