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Education and Intergenerational Mobility in Occupations

By Daniele Checchi*

Summary

In this paper I discuss the problem of measurement and the welfare implications of intergenerational transmission of inequality. A decomposition between educational attainment and other factors is proposed and applied to three sets of individual income data from Germany, Italy, and the United States. The main result is that educational attainment is responsible for almost half of the observed immobility. I also speculate on whether increasing the equality of opportunity in entering the educational system can exacerbate income inequality.

1. Measuring Intergenerational Mobility

It has long been recognized that the analysis of inequality must be performed in a dynamic framework. Recent theoretical models (Galor and Zeira 1993; Banerjee and Newman 1993) obtain persistent inequality as equilibrium outcomes, contrary to neoclassical prediction of long-run equalization (Stiglitz 1969; Barro and Sala-i-Martin 1992). But the transitional dynamics are relevant as well. One is not only interested in knowing whether long-run distribution is more or less unequal, but also whether we will get there, and how long it will take. Since income (or wealth) distributions evolve through subsequent generations, it is necessary to look at their intergenerational evolution.

In the empirical literature there are two basic approaches to measuring the evolution of income through generations. On one side, the speed of mean regression is taken as an indicator of the degree of independence from inherited conditions¹. Defining y_{it} as the variable describing the social status achievement (be it income, wealth, or social prestige) of individual i belonging to the generation that is working in period t , a process of social mobility (at the individual level) can be represented as

$$y_{it} = f(y_{it-1}, x_{it}), \quad \text{for } i = 1, 2, \dots, n \quad (1)$$

where x_{it} are characteristics of individual i (like sex, age, education, but also exogenous events, such as policy reforms or wars), which are uncorrelated with y_{it-1} , and n is the number of families. Abstracting from population growth and intermarriages, an equilibrium social status for individual i can be defined as

$$\bar{y}_{it} = f(\bar{y}_i, x_{it}) = g(x_{it}), \quad \text{for } i = 1, 2, \dots, n. \quad (2)$$

Equation (1) can be empirically estimated invoking the assumptions of linearity and the existence of a common dynamic process across families. The parameter β pro-

vides information on the speed of adjustment of each family to its equilibrium position in the society. From dynamic theory we know that:

- for $|\hat{\beta}| < 1$ we can speak of a stable process, and for $\hat{\beta} > 0$ (< 0) we have monotone convergence (divergence)².
- the higher is $\hat{\beta}$, the lower is the speed of adjustment to the individual equilibrium value defined by x_{it} .

Apart from econometric problems in obtaining information on the true from the estimated $\hat{\beta}$ ³, we are left with the problem of interpretation of the results. Taken by itself, β is just a speed measure, the measure of the mean regression of a given process⁴. However, conditional on the assumption that equation (2) is a desirable allocation process of each individual in the society, some ordering of alternative societies may be inferred from $\hat{\beta}$. In general, one can claim that on average a lower $\hat{\beta}$ implies smaller deviations from the desired allocation and, therefore, greater intertemporal welfare for the society. Notice that equation (2) does not predict an egalitarian distribution of resources as the optimal allocation. Rather, it predicts that each family should reach its own steady state, corresponding to its individual characteristics, x_i . Thus, actually measures the speed of convergence to a (possibly) stratified society, where the stratification depends on observable characteristics (like age, sex, education).

The second empirical approach is to measure mobility in terms of the opportunity set open to each family in the passage from one generation to the following⁵. In this case define Y_t as a $(1 \times k)$ row vector representing the (marginal)

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¹ Recent examples of this procedure can be found in Becker and Tomes (1986), Zimmerman (1992), and Solon (1992).

² Here convergence only means that the distance from the equilibrium position declines with time. In the growth literature this corresponds to the concept of β -convergence, not to be confused with σ -convergence (a decline in the cross-country dispersion).

³ Quah has shown in several papers that when working with random fields (i.e., panel data where the number of individuals and the number of observations for each individual are of comparable order) there are problems in obtaining consistent estimates of autoregression coefficients (like β), especially when the random walk hypothesis cannot be rejected. Quah (1994b) proves that the short sample distribution of the same parameter is neither normal, nor standard Dickey-Fuller. Quah (1993b, 1993c, 1994a) proposes an alternative strategy of directly modeling the dynamics of the evolving cross-section distributions.

⁴ Both Friedman (1992) and Quah (1993a) criticize the convergence interpretation of negative correlation between initial conditions and growth rates (which substantiate most of the empirical results of growth literature) claiming that this is nothing more than mean regression (or Galton's fallacy).

⁵ This is the approach preferred by the sociological analysis, which explores class mobility. Among recent examples are Erikson and Goldthorpe (1992) and Cobalti and Schizzerotto (1994).

distribution of generation t across k predefined categories (that can be thought as classes, income percentiles, or wealth categories). P is a $(k \times k)$ transition matrix whose elements $[p_{ij}]$ give the probability that an individual with initial conditions in category i ends up in category j . In symbols

$$Y_t = Y_{t-1} \cdot P. \quad (3)$$

There are several measures that can be obtained from the analysis of matrix P (Shorrocks 1978). The closest analog to the autoregression coefficient, β , is the second highest eigenvalue, λ_2 ⁶. Using transition matrices we gain some information about the changes in the ordered ranking of individuals in the passage from one generation to the following. However, this approach is weak in defining the partition of the marginal distributions, and most of the results are conditional on this operation.

2. Social Welfare Implications

Under neither approach do we have a convincing interpretation of the parameters in terms of welfare; that is, it is difficult to impose some ordering among alternative situations. A commonly shared point of view claims that the higher is the independence from initial conditions, the greater is the equality of opportunity. In terms of previous measures, the lower is β or λ_2 , the more egalitarian is a society. But we know that equality of opportunity does not necessarily correspond to equality of final outcomes. In this respect two brilliant interpretations have been proposed in the literature.

Assuming a model of intergenerational (genetic) transmission of intelligence, Becker and Tomes (1986) prove that in the absence of liquidity constraints β the coefficient measures the degree of natural linkage across generations. It is natural in the sense that it acts mechanically, independently of rational choices by the agents. When the β estimated on incomes converges to the genetic β , the society as a whole approximates an intergenerationally efficient allocation of resources. Whether to trust the story of genetic transmission of talent is a matter of taste⁷. The true problem is how to measure income transmission in the absence of liquidity constraints. The authors suggest using data from the upper tail of income distribution where liquidity constraints are unlikely to matter. This procedure is unconvincing, however, because it is based on the assumption that parents know perfectly the talents of their children at birth. Moreover, Cooper, Durlauf, and Johnson (1993) have shown that mean regression is not constant across the income distribution, but rather is higher at both tails. As in all natural theories, the underlying idea is that the convergence to an unequal distribution of incomes explained by an unequal distribution of talents is good in itself because it is based on an original distribution of resources. Pareto was probably

the first author to investigate systematically the distribution of income and wealth. After his discovery of the iron law of incomes (the two parameter Pareto distribution) in 1896, he researched the causes of the surprising stability of this empirically derived distribution across countries and historical periods. His main explanation for the persistence of this finding was based on human nature and on differences in innate endowments of natural abilities (Pareto 1964).

Sen (1973) argued strongly against this proposition, stressing that there is no personal merit in being born with a better endowment of natural ability and therefore it does not deserve rewards. He strongly objected to such a theory of distribution on the grounds that natural ability has an inelastic supply and, there is no need to offer incentives in terms of income differentials⁸.

An alternative strategy is to impose some regularity assumption on intertemporal individual utilities and social welfare functions and to study the evolution of the (expected) intertemporal social welfare function under alternative assumptions regarding the dynamic process. This is the route proposed by Atkinson (1981) and Dardanoni (1993) with respect to mobility matrices. Atkinson proposes a partial ordering criterion (analogous to Lorenz dominance) based on the difference in cumulative probability with respect to the main diagonal (diagonalizing transformation). The intuition behind this procedure is that the higher is the dependence from original conditions, the higher is the variance of individual intertemporal utility functions, and consequently the higher is the variance of the (aggregated) social welfare function. Dardanoni, on the other hand, imposes marginal utility of income on the social welfare function and therefore gives greater weight to the mobility chances of the lower tail of income distribution. For both authors the reference point in terms of welfare evaluation is the independence from original conditions, which is justified on the grounds of equality of opportunity and which, in the absence of any other source of intergenerational linkage, speeds up the convergence to an egalitarian distribution of incomes. The actual problem in implementing these measures is their partial ordering nature⁹. A theoretical disadvantage is their reliance on the axiomatic approach to welfare evaluation.

⁶ Given the linear dependence of one row and column, the first eigenvalue is always equal to unity.

⁷ In the 1960s the works of Bowles proved that measured IQ at the age of 14 was a mere reflection of cultural and socio-economic background; see a review in Bowles and Gintis (1976). New interest in the theory of genetic differences appeared with the publication of Herrnstein and Murray (1994) and Goldberger and Manski (1995).

⁸ A lengthier discussion of this issue in connection with the problem of efficiency is in Checchi, Ichino, and Rustichini (1994).

⁹ For example, the three matrices reported in Table 2 cannot be ordered according to Atkinson criteria.

3. Theoretical and Empirical Approach

Given the present state of the art, I propose a simple exercise in the spirit of the second strand of the literature based on transition matrices. The independence from family conditions is taken as the reference point to which alternative observed situations will be compared. However, even without accepting the idea of biological dependence of intelligence (as advocated by some authors), one must recognize the existence of a „cultural environment“ in which children are raised, and that these environments differ across families. As in the case of genetic transmission, it is assumed that the cultural endowment is transmitted at zero cost for the society and, mainly for this reason, it is not easily mutable from a public policy point of view without an accompanying change in social attitudes¹⁰. From a social policy point of view one is interested in decomposing the observed mobility (or immobility) into component factors in order to evaluate the relative effectiveness of socializing agencies, such as schools, job training, institutional rules in labor markets, and so on.

A growing theoretical literature points out that indivisibility of investment in human capital combined with imperfect financial markets produces persistent inequality (Galor and Zeira 1993; Banerjee and Newman 1993). Since human capital cannot be collateralized and the credit market is segmented, poor families will face a higher cost of credit that will prevent them from acquiring more education and consequently more income (Piketty 1992; Glomm and Ravikumar 1992). Once inherited wealth becomes a function of family income, inequality within one generation is transmitted to the next. A companion literature introduces externalities from the environment. While originally intended to analyze the formation of ghettos, it helps us to understand another potential channel of inequality transmission. Since local school funding is proportional to (average) local income (at least in the United States), sons raised in richer environments tend to acquire better quality human capital (Benabou 1993, 1996).

For all these reasons in this section I propose a decomposition of observed mobility into two channels: "education acquisition" (henceforth EA) and "other factors" (henceforth OF). The first channel takes into account the fact that educational attainment is conditional on family income and that there are returns to education. If this were the only existing channel for inequality transmission, by conditioning sons' earned incomes in their educational achievements, and their educational achievements on family incomes, I should be able to replicate observed patterns of mobility¹¹. On the other hand, if there is cultural transmission, family networking, or even genetic transmission, then observed immobility will be higher than that implied by EA. The main difference between EA and OF is the possibility of policy intervention. Inequality arising through the EA channel can be reduced in two ways: by increasing equality of opportunity in educational achievements (that is, making educational attainment less

dependent on family income) and by reducing income differentials based on education (i.e., reducing the return to education through an equalizing income or taxation policy). On the contrary, inequality due to OF can occur rather independently from existing incentive structure and therefore is more difficult to modify.

4. Estimates of Intergenerational Mobility

In order to perform this exercise, I have collected data on incomes of fathers and sons for three countries: Germany, Italy, and the United States¹². I have taken occupational income as a proxy of social status enjoyed by an individual in a society. Economists prefer to speak of permanent income and, in some cases, they take multi-year averages as a proxy of this concept. Sociologists are more inclined to make use of status of social-prestige indices (such as the Duncan index) associated with occupations, claiming that occupations have an intrinsic measure of power that cannot be captured by earnings. I shall take an intermediate position by considering the median income associated with each occupation (within each national sample) as a better proxy of the social status. While exhibiting sufficient correlation with the corresponding prestige index¹³, the occupational income has the advantage of inducing a cardinal ordering among the occupations. Thus, I analyze occupational income mobility more than earned income mobility, and I think that this is more appropriate in the framework of inequality transmission.

Table 1 reports intergenerational mobility matrices based on occupational income quartiles. The numbers on the main diagonal represent the percentage of families that are almost immobile in terms of occupational income. It is clear that the three countries look rather similar. If we take a synthetic measure, such as the second eigenvalue or the distance from a perfect mobility matrix (i.e., a matrix exhibiting 25 percent in each cell, implying total independence from origins), we observe that Germany is the most mobile country, the United States comes in second, and Italy third.

Using instead the speed of mean regression as the mobility measure, we do not obtain a clear ranking of coun-

¹⁰ With respect to the Italian case, an example is offered by the passage from half-day to full-day primary school, which was intended as a cultural compensatory device, but was made possible by — and made in turn possible — full-time jobs for women.

¹¹ One should not forget that educational achievement is endogenous in the process and has to be instrumented in order to be used as a regressor. See Card (1994).

¹² See the data appendix for a clearer description of data sources and educational classifications.

¹³ The correlation coefficient between Duncan index and median occupational index in the PSID sample is 0.86, whereas the correlation coefficient between the prestige index developed by DeLillo and Schizzerotto (1985) and the median occupational index in the Italian sample is 0.66.

Table 1

Intergenerational Income Transition Matrices¹⁾

Father's Income Quartile	Son's Income Quartile			
	I	II	III	IV
	Germany			
I	37.98	24.93	22.85	14.24
II	30.77	29.29	23.67	16.27
III	19.53	28.99	25.44	26.04
IV	11.54	16.86	28.11	43.49
Eigenvalues	1.000	0.307	0.055	-0.0017
Distance from Perfect Mobility		0.1493		
	Italy			
I	40.20	25.81	19.35	14.64
II	26.73	37.87	17.33	18.07
III	22.52	26.98	28.71	21.78
IV	10.40	9.65	34.41	45.54
Eigenvalues	1.000	0.333	0.094 +	0.094 -
Distance from Perfect Mobility		0.1816	0.015 <i>i</i>	0.015 <i>i</i>
	United States			
I	37.60	26.36	23.64	12.40
II	35.14	27.03	21.62	16.22
III	15.71	30.65	25.29	28.35
IV	11.20	16.22	29.34	43.24
Eigenvalues	1.000	0.329	0.001 +	0.001 -
Distance from Perfect Mobility		0.1704	0.047 <i>i</i>	0.047 <i>i</i>

¹⁾ Income is measured as median occupational income.

Source: Author's calculations using GSOEP, DeLillo et al. data for Italy, and PSID.

tries. Table 2 shows the simple correlation and rank correlation of fathers' and sons' incomes and the regression coefficient from equation (1) for each country. The simple and rank correlations are very similar, with Germany appearing the most mobile. The regression results, however, show the opposite¹⁴.

Looking at summary of results in Table 3, it can be seen that the ordering of different societies in terms of relative occupational mobility depends on the index we choose. In most, but not all, cases Italy ranks as the most immobile and Germany as the most mobile. But these comparisons are of little significance if we are not able to interpret these differences.

We start by noticing that the income mobility is quite similar to the ranking in terms of educational mobility. It is legitimate to suspect that the mobility ranking, and especially the German dominance, is related to the functioning of the educational system. In order to obtain a deeper insight on this issue, I introduce the following decomposition. Define w_s as the income rank achieved by the son and w_f the income rank of his father. Also define e_s

as the educational achievement of the son and e_f as the educational achievement of his father. So the intergenerational mobility matrices reported in Table 1 present the probability distribution of income ranking for sons conditional on fathers' income rankings. This corresponds to $prob(w_s | w_f)$ in (4) below. If e is a binary variable (assumed for simplicity) it is possible to show¹⁵ that

$$\begin{aligned}
 prob(w_s | w_f) &= prob(w_s, e_s | w_f) + prob(w_s, \bar{e}_s | w_f) \quad (4) \\
 &= prob(w_s | e_s, w_f) \cdot prob(e_s | w_f) + prob(w_s | \bar{e}_s, w_f) \cdot prob(\bar{e}_s | w_f).
 \end{aligned}$$

The first addend corresponds to the product of the two matrices reported in Table 4 and is intended to capture the education acquisition channel mentioned above. The second addend takes into account all the other factors affecting the income achievement of the son conditioning

¹⁴ Couch and Dunn (1997) also find small differences in father-son earnings correlations in Germany and the United States.

¹⁵ See theorems 25 and 31, pg. 35-37 in Mood, Graybill, and Boes (1974).

Table 2

Correlations Between Incomes of Fathers and Sons¹⁾

	Germany	Italy	United States
Sample Correlation	0.33	0.35	0.37
Rank Correlation	0.32	0.37	0.35
OLS Regression Coefficient ²⁾	0.447	0.364	0.388
t-statistic	(13.34)	(15.03)	(13.25)
¹⁾ Income is measured as median occupational income. — ²⁾ The OLS regression also includes father's and son's age and age squared. <i>Source:</i> Author's calculations using GSOEP, DeLillo et al. data for Italy, and PSID.			

on the son's not obtaining education (\bar{e}_s) and on the father's income (w_f); it corresponds to the *other factors* channel. In the work below, e_s is allowed to assume four values.

Table 4 reveals well-known facts. According to the rank correlation indices of father's income and son's education, the United States is the country where educational attainment is most independent of family background (0.27 versus 0.32 for Germany and 0.33 for Italy). When we move from constraints (family income) to incentives (returns to education) we find that, using the correlation between a son's education and his income quartile, education pays more in the United States (0.54) than in Germany (0.50), and it pays more in Germany than in Italy (0.47). Thus, Italy seems to represent the worst of possible worlds: the highest dependence on initial conditions, combined with the lowest incentives to acquire education. Germany represents an intermediate situation, and the United States represents the prototype of a so-called open society with low conditioning on origin and high incentives for mobility.

However, this is only part of the story. The overall mobility that characterizes each country depends on additional fac-

tors: entry barriers to labor markets, imperfections in financial markets, costs of geographical mobility, to name a few.

If we are interested in measuring the relative contribution of the educational system to inequality we must consider the product of the two matrices reported for each country in Table 4. Each product for each country (not reported in the table) yields the relative immobility that could be observed if the only linkage across generations passed through educational attainments (EA). The (Euclidian) distance from a situation of perfect mobility can be used as another ranking measure¹⁶. In this case, in accordance with conventional wisdom, if mobility were just a matter of educational attainment the United States would be the most mobile society in terms of occupation, Italy would rank second, and Germany third. But this is just part of the story because the three countries show different overall mobilities. When we take the ratio of immobility attributable to educational attainment to overall mobility, we find that not only is Germany the country with the lowest overall

¹⁶ These figures are reported in endnote (b) in Table 4.

Table 3

Immobility Ranking According to Different Measures¹⁾

	Germany	Italy	United States
Sample correlation	3	2	1
Rank correlation	3	1	2
Regression coefficient	1	3	2
Second Eigenvalue associated with the intergenerational transition matrix	3	1	2
Distance from perfect mobility	3	1	2
Rank correlation for educational attainments	3	1	2
¹⁾ Income is measured as median occupational income. The OLS regression also includes father's and son's age and age squared. <i>Source:</i> Author's calculations using GSOEP, DeLillo et al. data for Italy, and PSID.			

Table 4

Father's Income, Son's Education, and Son's Earnings¹⁾

Father's Income Quartile	Son's Education				Son's Education	Son's Income Quartile			
	Uncompleted Compulsory	Completed Compulsory	More than Compulsory	University Degree		I	II	III	IV
I	0.13	0.72	0.11	0.04	Germany ²⁾				
					uncompleted compulsory	0.48	0.35	0.15	0.02
	0.06	0.77	0.12	0.05	completed compulsory	0.30	0.30	0.27	0.13
	0.09	0.64	0.18	0.09	more than compulsory	0.12	0.16	0.29	0.43
	0.02	0.44	0.18	0.26	university degree	0.00	0.05	0.13	0.83
Spearman rank correlation	0.32			Spearman rank correlation	0.50				
II	0.17	0.49	0.29	0.04	Italy				
					uncompleted compulsory	0.49	0.31	0.10	0.09
	0.14	0.50	0.32	0.03	completed compulsory	0.35	0.34	0.17	0.14
	0.06	0.37	0.51	0.06	more than compulsory	0.14	0.19	0.36	0.31
	0.05	0.22	0.52	0.20	university degree	0.00	0.01	0.27	0.72
Spearman rank correlation	0.33			Spearman rank correlation	0.47				
III	0.22	0.26	0.35	0.17	United States				
					uncompleted compulsory	0.48	0.36	0.12	0.05
	0.17	0.31	0.36	0.17	completed compulsory	0.42	0.28	0.20	0.10
	0.10	0.20	0.38	0.31	more than compulsory	0.21	0.32	0.31	0.60
	0.07	0.14	0.36	0.44	university degree	0.04	0.08	0.28	0.60
Spearman rank correlation	0.27			Spearman rank correlation	0.54				

¹⁾ Income is measured as median occupational income. Educations are coded according to algorithms in appendix. — ²⁾ The distance from perfect mobility of the product of the two matrices is 0.0843 for Germany, 0.0791 for Italy and 0.0758 for the United States. The ratio of immobility due to educational attainment to overall immobility is 0.564 for Germany, 0.435 for Italy and 0.445 for the United States.

Source: Author's calculations using GSOEP, DeLillo et al. data for Italy, and PSID.

immobility, but it is also the country where educational achievement equalizes individual opportunities the most. It may be that the German apprenticeship system that operates at the end of the compulsory education has a strong equalizing effect in opening high income possibilities for sons who did not get higher education (Soskice 1994). The United States exhibits a greater overall immobility than Germany and a lower contribution of the educational system: evidence that other factors of immobility (the OF channel) are stronger in the United

States than in Germany. Finally, Italy scores third, notwithstanding the presence of a widely public educational system. The two matrices clearly show that in this country getting a degree is heavily dependent on father's income, and that access to the top income quartile is almost impossible if a son does not cross the threshold of compulsory education.

As a general conclusion one can infer from the previous calculations that the EA contribution to immobility is on the order of 40 to 50 percent, i.e., granting equality of oppor-

Table A1

Sample Compositions¹⁾

	Germany		Italy		United States	
	Father	Son	Father	Son	Father	Son
Number of cases ²⁾	1 351	1 351	1 615	1 615	1 037	1 037
Reference year for incomes	son's age = 15	1986	son's age = 14	1987	1974	1990
Average yearly income ^{3), 4)}	40 009 DM	45 200 DM	17 794 960 Lit	20 356 200 Lit	\$ 24,498	\$ 26,185
Average age	n/a	42.5	46.7	43.6	46.0	32.3
<p>¹⁾ The data used in this study for Germany are from the public use version of the German Socio-Economic Panel. The data for Italy come from the data set developed by A. DeLillo and others, whose results are published in DeLillo (1988); Cobalti (1988); and Cobalti and Schizzerotto (1994). The data for the United States come from the Panel Study of Income Dynamics. — ²⁾ In each sample observations refers to matched fathers and first son aged more than 25, both working full-time, both native in the reference country. — ³⁾ Since only information about occupation and occupational prestige are available for the Italian sample, incomes are estimated in the following way: (1) Information on the son's occupation is collected in 1985; while father's occupation refers to the year when the son was 14. (2) An earning function is estimated on a different sample of men for 1987, after computing gross incomes from self-declared net incomes (using Bank of Italy family incomes survey); regressors include age, age-squared, school degree, birth region, sector, and qualification, and interactions among variables. (3) Using the 1987 estimated earning function, earnings are predicted for original sample members. — ⁴⁾ The concept of permanent income is approximated by pretax labor incomes for each occupation. There are 78 occupation categories in Germany, 93 in Italy, and 96 in the United States.</p> <p>Source: Author's calculations using data sources in note 1.</p>						

Table A2

Educational Classification and Attainment¹⁾
in percent

	Germany		Italy		United States	
	Father	Son	Father	Son	Father	Son
Uncompleted Compulsory	17.54	7.55	47.72	10.84	42.04	13.98
Completed Compulsory	64.17	64.03	41.36	39.63	18.61	36.55
More than Compulsory	14.36	17.32	12.88	41.24	23.24	36.16
University Degree	3.92	11.10	3.03	8.30	16.10	27.29
Kolmogoroff dissimilarity index for educational attainments	0.10		0.34		0.28	
Rank correlation between father and son educational attainments	0.38		0.53		0.43	

1) In general I have taken primary (ISCED 1) and lower secondary (ISCED 2) education as corresponding to the concept of compulsory education, and upper secondary (ISCED 3) or tertiary (ISCED 5) as corresponding to the concept of more than compulsory education. The class university degree includes graduate (ISCED 6) and postgraduate (ISCED 7) education (OECD 1993; Caroli 1994). However, since the educational system of each country has undergone significant changes in last decades, the definition of "compulsory education" has been adapted to each generation as follows: (a) In order to take into account the 1964 reform (that unified primary education and created the existing tripartite system), for German fathers compulsory education is equivalent to general school leaving certificate (*Hauptschulen* — corresponding to seven years of schooling). For German sons uncompleted compulsory education is equivalent to either nothing or *Hauptschulen* without further apprenticeship education corresponding to seven years of schooling; compulsory education is equivalent to general school leaving certificate (*Realschulen* or *Gymnasium* stage 1, corresponding to ten years of schooling); (b) In order to take into account the 1962 reform (that unified the lower secondary school and raised compulsory education from five to eight years of schooling), for both Italian fathers and sons compulsory education is defined as completed primary school *scuola elementare* providing *licenza elementare* degree (five years of schooling) if born before 1952 and as completed lower secondary school *scuola media inferiore* providing *licenza media* degree (eight years of schooling) if born later; and (c) Without a specific school reform at the federal level for the United States, I relied on Bowles and Ginti's 1976 claim that 1930 was the turning point for secondary school in becoming a mass institution and set compulsory education equal to completed lower secondary school (junior high school or corresponding to eight years of schooling) if born before 1918, and completed upper secondary school (senior high school or 12 years of schooling) if born afterwards.

tunity in educational attainments would reduce observed immobility by nearly half. In addition, I hope to have made clear that aggregate indicators of immobility (and the relative ordering that can be derived from them) can obscure the mechanisms underlying the phenomenon.

5. Counterfactual Experiment

I now move to a crucial question from a policy point of view. Let us assume that the indicative rule previously obtained (reduce EA channel to zero and obtain a halving of intergenerational inequality transmission) has some reliability¹⁷. Would it be worth it, then, from a progressive point of view to implement this rule? The Social Justice report (Commission for Social Justice 1994) gives the impression that social democratic alliances maintain two joint propositions:

- a) increasing total access to education will increase total domestic income and
- b) increasing access to education will induce income equality.

While discussing proposition (a) is not a goal of this paper, our previous discussion seems to provide support for proposition (b). However, our previous analysis has a narrower implication: increasing equality of opportunity reduces inequality transmission, which does not necessarily prevent the strengthening of other inequality generating mechanisms. In other words, there is a conflict between the socialization role and the selection function of

education (Shavit and Blossfeld 1993). As a thought experiment, think of extending compulsory education up to 24 years. Human capital accumulation would definitely increase, but educational attainment would no longer signal anything in the labor market. To be effective, the compulsory school would necessarily become more selective through stricter marking practices, alternative teaching programs, and other devices. Individuals would go to the market with different labels, and if the school system had been efficient, the labels would be a better proxy of their "natural" ability than previous educational attainment. Inequality of rewards could be easily predicted, and would then be even more easily justified. The paradoxical conclusion emerges that increasing equality of opportunity in educational access yields increased inequality in income distribution.

Obviously, I agree with the viewpoint that extending the access to education is a good thing in itself, for it gives more content to citizenship rights and it creates the fabric of a society (Okun 1975). However, when considering the possibility of increasing access to education, one should take into account not only the constraint side, but the incentive structure as well. We could almost certainly obtain an increase in efficiency and equity, but at the expense of equality. And the last value is more familiar to the leftist heritage than the other two (Cohen 1994).

¹⁷ Obviously it does not, as any counterfactual experiment. Lucas' critique here would imply that families could react against excessive equalization of outcomes and would invent other mechanisms to transmit inequality.

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