7. MOBILITY COMPARISONS: DOES USING DIFFERENT MEASURES MATTER?

Daniele Checchi and Valentino Dardanoni

ABSTRACT

In this paper we review alternative measure of intergenerational mobility, emphasizing the distinction between absolute, relative and ordinal mobility. We then compare the performance of various mobility indices using real data. From Treiman and Ganzeboom (1990) dataset we compare the degree of occupational and educational intergenerational (father-son) mobility in 16 countries in a single year (comprised between 1968 and 1982). From three Bank of Italy surveys (1993, 1995, 1998) we obtain a comparable measure of social prestige and we show that intergenerational mobility in Italy across regions or age cohort exhibits different trends according to different indicators. We suggest that ordinal relative and absolute measures provide divergent indications whenever we compare mobility data with markedly different marginal distributions.

1. INTRODUCTION

When discussing mobility issues, a basic distinction is usually made between *intergenerational* and *intragenerational* mobility. The first concept concerns the study of how the distribution of some relevant measure of individual status

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changes between different generations in a given society. Alternatively, intragenerational mobility studies how the distribution of individual status changes among a group of individuals over a given period of their lifetime.

In general, the simplest framework to capture either of these aspects is to consider how, in a society of n individuals, a vector $x = (x_1, \ldots, x_n)$ is transformed into another vector $y = (y_1, \ldots, y_n)$, where x_i denotes the value of a relevant observable indicator of the social and economic status of individual i, and y_i denotes its value in the next generation (intergenerational case) or in the next time period (intragenerational case). Typical variables employed in most mobility studies for measuring socio-economic status are income, consumption, education, and occupational prestige. Henceforth, we will focus on intergenerational mobility and follow the usual convention of analyzing father to son movements in status as unit of analysis. Thus, the vector x will describe the marginal distribution of status amongst the fathers and y the marginal distribution of status amongst the sons in the society.

It is widely believed that socioeconomic mobility is somewhat an elusive concept, difficult to define, let alone to measure. This is in stark contrast with the literature on income inequality, where a consensus has emerged on what concepts of inequality mean, the correct theoretical procedures to measure them, and how to go from theory to empirical application. Mobility data (x, y) describe the joint distribution of fathers' and sons' statuses in a population, while the vectors x and y describe their marginal distributions. In general, mobility data contain information about many different aspects of the mobility in a society. For instance, x and y each describe both the average level of status and its dispersion respectively within fathers and sons. Thus, one could say that that the marginal distributions contain information of a static nature. Mobility, on the other hand, concerns how the distribution of fathers' statuses x is transformed into that of the sons y. Sociologists have suggested that, when analyzing mobility data, the interplay between the distributions of x and y can be described by two quite different concepts.

Structural mobility refers to how far apart x is from y. For example, if a country is experimenting a substantial economic growth, there will be a greater number of high status positions available to the sons than there were for the fathers, and thus it determines some kind of social change. However, it is important to notice that there are many ways in which a given vector y can be obtained from another vector x. In particular, two hypothetical societies could display the same amount of structural mobility because they have the same marginal distributions, but they could differ in how families interchange their relative positions. This second aspect is called *exchange mobility* by

sociologists and refers to the positive association between fathers and sons statutes in the society.

Given the multifaceted nature of mobility data, we expect that mobility comparisons are intrinsically much more problematic than inequality comparisons. In particular, when analyzing the distribution of a single relevant variable in a population, as described by a real valued vector, we can typically summarize much of the information by two summary statistics on location ("the size of the pie") and dispersion ("the equality of its distribution"). On the other hand, when analyzing mobility data we need not only measures of location and dispersion both for the x and the y variables, but also summary statistics on the distance between the marginal distributions x and y (structural mobility) and their positive association (exchange mobility). Thus, we expect that comparing mobility data by a single summary mobility index may give results, which are very dependent on the characteristics of the chosen index, and we expect that the conclusions reached by the mobility analysis are more dependent on the choice of the mobility index when comparing societies with very different marginal distributions.

2. MOBILITY INDICES

To make our study manageable and the interpretation of the results consistent, in this paper we compare the performance of various mobility indices that are built up by aggregating the change in status occurring in each family in the society. Let us assume that family ith has observed status indicators (x_i, y_i). As a first methodological issue, we should consider whether (x_i, y_i) describe accurately the concept of mobility that we want to capture. Let $h(x_i; x)$ and $k(y_i; y)$ denote real valued functions of observed status, monotonically increasing in x_i and y_i respectively, such that $h(x_i; x)$ and $k(y_i; y)$ capture what the researcher feels is "true" status of family i. For example, if x and y are the vectors of incomes in the population, the researcher may feel that *income shares* $\frac{x_i}{\bar{x}}$ and $\frac{y_i}{\bar{y}}$ (where $\bar{x}$ and $\bar{y}$ denote the means of x and y) rather than *incomes* x_i and y_i are better indicators of family ith status. If we feel that income shares capture the concept of mobility that we want to compare, then in the transition from x to y, family i has experienced a degree of mobility which is a function of the distance between $\frac{x_i}{\bar{x}}$ and $\frac{y_i}{\bar{y}}$. In general, let $d(h(x_i; x), k(y_i; y))$ denote the numerical value taken by an appropriate distance function between true status $h(x_i; x)$ and $k(y_i; y)$ for family i. The function $d: \Re^2 \Rightarrow \Re$ thus measures the

degree of mobility at the family level. The class of mobility indices $M(x, y)$ that we will consider in this paper then simply aggregates all family distances $d(h(x_i; x), k(y_1; y), \ldots, d(h(x_n; x), k(y_n; y))$ by taking the average value:

$$M(x, y) = \frac{1}{n} \sum_{i=1}^{n} d(h(x_i; x), k(y_i; y))$$

The class of mobility indices $M(x, y)$ is sufficiently rich to capture many widely employed indices. It is conceptually very simple, because it makes explicit that social mobility is simply an aggregation of family mobility, and depends on the explicit choice of the "transformation functions" h and k and the distance function d. Thus, $M(x, y)$ is sufficiently rich to capture many different views about the appropriate way of measuring mobility, since the researcher has simply to specify the functional form of d, h and k to derive a suitable index of mobility. In particular, depending on the choice of h and k, $M(x, y)$ contains three subclasses of mobility indices:[1]

(1) *Absolute indices*: in this case the data x and y are directly employed to define true social status.
(2) *Relative indices*: we can distinguish between *weakly relative indices*, which are invariant to multiplication of x and y by common positive constant, *strongly relative indices*, which are invariant to multiplication of x and y by two possibly different positive constants, and *affine indices* which are invariant to possibly different linear transformations of x and y.
(3) *Ordinal indices*: indices that are invariant to any monotonic transformation of the data. For example, any rank-based index is ordinal.

Two mobility indices that belong to $M(x, y)$ have been proposed in two important papers by Fields and Ok (1996, 1999). In the first of these papers Fields and Ok axiomatize a mobility index that takes h and k to be the identity function (thus observed status equal true status), and uses Euclidean distance for d:

$$M_1(x, y) = \frac{1}{n} \sum_{i=1}^{n} |y_i - x_i|$$

In a recent paper, D'Agostino and Dardanoni (2002) axiomatize a class of mobility indices which lets $d(h(x_i; x), k(y_i; y)) = (h(x_i; x) - k(y_i; y))^2$ and discuss

various choices of the transformation functions h and k. By letting h and k be again the identity function we have the index

$$M_2(x, y) = \frac{1}{n} \sum_{i=1}^{n} (y_i - x_i)^2$$

M_1 and M_2 are the absolute mobility indices considered in this paper.

Moving on to relative indices, Fields and Ok (1999) axiomatize an index that takes h and k to be the natural logarithm function, while still using Euclidean distance:

$$M_3(x, y) = \frac{1}{n} \sum_{i=1}^{n} |\ln(y_i) - \ln(x_i)|$$

On the other hand, taking income shares in D'Agostino and Dardanoni's class we get the index:

$$M_4(x, y) = \frac{1}{n} \sum_{i=1}^{n} \left(\frac{y_i}{\bar{y}} - \frac{x_i}{\bar{x}} \right)^2$$

We notice now that by appropriate choice of the functional form of d, h and k, Pearson's correlation coefficient ρ_{xy} is ordinally equivalent to an index in the class $M(x, y)$. In particular, letting $d(h(x_i; x), k(y_i; y)) = (h(x_i; x) - k(y_i; y))^2$, we have that if $h(x_i; x) = \frac{x_i - \bar{x}}{\sigma_x}$ and $k(y_i; y) = \frac{y_i - \bar{y}}{\sigma_y}$ (the standardized values of x_i and y_i)

$$M_5(x, y) = \frac{1}{2n} \sum_{i=1}^{n} \left(\frac{x_i - \bar{x}}{\sigma_x} - \frac{y_i - \bar{y}}{\sigma_y} \right)^2$$

and it can be shown that $M_5(x, y) = (1 - \rho_{xy})$. Clearly M_3 is weakly relative, M_4 is strongly relative and M_5 is affine.

Finally, ordinal indices are typically obtained by using ranks for defining true social status h and k. Our next mobility index is thus

$$M_6(x, y) = 1 - \lambda(x, y) = 1 - \frac{6}{n^2(n-1)} \sum_{i=1}^{n} (r(x_i; x) - r(y_i; y))^2$$

where $r(x_i, x)$ indicates the rank of x_i, $r(y_i; y)$ indicates the rank of y_i and $\lambda(x, y)$ denotes the well-known non-parametric index of association of Spearman

(Kendall & Gibbons, 1990). However, while ranks are uniquely determined in the case where there are no ties in the marginal distributions, there is no single accepted way of defining ranks in the presence of ties. Spearman's λ utilizes *midranks* for ranking tied values. On the other hand, if we use the cumulative distribution functions F and G to define family ranks for x and y respectively, we get an alternative ordinal index:

$$M_7(x, y) = \frac{1}{n} \sum_{i=1}^{n} (F(x_i) - G(y_i))^2$$

while if we use Euclidean distance we get the index:

$$M_8(x, y) = \frac{1}{n} \sum_{i=1}^{n} |F(x_i) - G(y_i)|$$

Notice that M_6 is ordinally equivalent to M_7 whenever there are no ties in the marginal distributions and the populations we are comparing have equal size.[2]

In the following sections we will study how the eight indices considered above behave when used with some real datasets. As reference, we will also calculate two widely used indices of mobility, namely functions of the ordinary least square (OLS) regression coefficient when regressing y on $\alpha + \beta x$ or $\log(y)$ on $\alpha + \beta \log(x)$:

$$M_9(x, y) = 1 - OLS_{y,x} = 1 - \frac{\sum_{i=1}^{n}(y_i - \bar{y})(x_i - \bar{x})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} = 1 - \frac{\sigma_x}{\sigma_y}\rho_{yx}$$

$$M_{10}(x, y) = 1 - OLS_{ly,lx} = 1 - \frac{\sum_{i=1}^{n}(\ln y_i - \ln \bar{y})(\ln x_i - \ln \bar{x})}{\sum_{i=1}^{n}(\ln x_i - \ln \bar{x})^2}$$

It can be easily verified that M_9 is weakly relative while M_{10} is strongly relative.

In Sections 3 and 4 we will apply the ten mobility indices above to two real datasets. We expect that absolute indices will be the most sensitive to differences in marginal distributions, while ordinal indices will be the less sensitive. In fact, if we are comparing two mobility data without ties in the marginal distributions, ordinal indices, by taking ranks, are calculated on transformed variables with identical marginal distributions regardless of the shape of the original distributions. On the other hand, if we are comparing two mobility data which differ for the extent of socioeconomic growth between the fathers and sons generation, absolute indices will always display a greater level of mobility in presence of greater growth even if in both societies there is a perfect positive association between fathers' and sons' statuses (that is, there is

no exchange mobility). Thus, we expect that ordinal indices will give greater weight to the exchange component of mobility, while absolute indices will give greater weight to the structural component. Notice however that ordinal indices will be the more sensitive to differences in marginal distributions the greater the extent of tied values, depending on the choice of the status transformations *h* and *k*.

Finally, notice that relative indices fall somewhat in between absolute and ordinal ones; depending on the choice of the transformations *h* and *k* performed to raw data, relative indices may reduce the influence of differences in the marginal distributions in differing fashions. In general, structural mobility may have resulted from many different sources (generalized proportional growth; alternatively status changes might have been concentrated only in higher or lower levels classes; or there could have been substantial changes in inequality, etc.). Thus, taking shares, logs, differences from average values, standardized differences, etc. will reduce the effect of differences in marginal distributions thus giving less weight to structural mobility, for a given level of exchange mobility. The extent of this reduction will be dependent on the chosen transformations *h* and *k*.

3. A FIRST EMPIRICAL APPLICATION

The first empirical exercise applies to the 10 measures of mobility considered above to an international comparison. Treiman and Ganzeboom (1990) have collected data on occupational mobility from 31 different surveys conducted in 16 countries[3] over a period of 14 years (from 1968 to 1982). This dataset is composed only of men and contains information about the respondent age, marital status, educational achievement (both as type of degree and in terms of year), his current occupation (coded under alternative classifications), working hours, supervisorship role and self-employment condition. Self-reported current earnings and actual family incomes (measured in local currency) are also available, but in some cases they are reported at intervals, thus rendering cross-country comparisons almost impossible. Moreover, the dataset lacks direct information about father incomes. Finally, information on education and occupation of father, mother and spouse are also available. Treiman and Ganzeboom (1990) provide a consistent ordering of occupations for cross-country comparisons, based on social prestige. Two alternative measures of social prestige are available: the ISEI – international status of employment index (ranging between 0 and 90) and the TREI index (ranging between 0 and 86), originally proposed by Treiman (1977). Both measures are strongly

correlated with respondent age, income and years of education (see Table 2). Given the high correlation between the two indices (0.75 over the entire sample), we will report results for the former index only. Table 1 contains information about sample size and averages for education, income and relative rank positions for both respondents and their fathers; the same table also displays Gini indices for each marginal distribution.

There are two variables in this dataset that can be used to analyze intergenerational mobility: (occupational) social prestige and years of education. In Tables 3 and 4 we report the value of the 10 mobility indices considered in this paper both for occupational and educational mobility and also the ranking of the mobility data according to the 10 indices. The last column in both tables gives the overall ranking obtained by averaging the rank under all the indices. Note that there are 31 mobility data for the case of occupational mobility while only 29 for the case of educational mobility, since the data on father's education are missing for Brazil 1973 and Northern Ireland 1968.

We notice that U.S., Taiwan and the Netherlands come out consistently as the most mobile societies, both in terms of occupation and education-based mobility. It is rather surprising to find that Germany under different surveys comes out as the least mobile society in terms of educational achievements mobility.

We next compute the correlation matrix of the 10 indices across different surveys. A glance at Table 5 reveals that a very different picture emerges in the two cases of occupation and education-based mobility comparisons. In particular, the correlations between the 10 mobility indices are generally much higher using occupational prestige rather than years of education as variables.

These different positive correlations in the two cases of occupational and educational mobility can be explained by various hypotheses. In general, while occupational mobility tracks changes in the productive structure, such that we record a generalized improvement in the average "quality" of jobs but with possibly a high variance among different groups, educational mobility is enhanced mainly during the process of mass access to education, given that compulsory education forces the young generation to obtain a given amount of schooling. Thus, in general we expect that the difference in inequality between the marginal distributions of x and y is lower for occupation rather than education. This is confirmed by looking again at Table 1, where we have calculated the Gini coefficient for the marginal distributions in the two cases. We notice that there is a decline in inequality of educational achievement, but not in occupational prestige.

However, the most plausible explanation of the much greater correlation between the various indices when considering occupational rather than

Table 1. Observations Available for Cross-Country Comparisons – Sample Averages.

Country	Survey year	Survey label	Number observations	Respondent personal income (local currency)	Respondent occupational prestige (ISEI)	Respondent father occupational prestige (FISEI)	Respondent years of education (educyr)	Respondent father years of education (feducyr)	Gini index respondent occupational prestige	Gini index respondent father occupational prestige	Gini index respondent years of education	Gini index respondent father years of education
Australia	1974	AUT74P	452	6872.48	40.58	35.11	9.96	7.25	0.204	0.193	0.100	0.124
Brazil	1973	BRA73	6743	1592.31	33.81	25.11	4.75	–	0.258	0.268	0.422	–
Brazil	1982	BRA82	8742	72.68	37.79	28.98	4.53	2.62	0.224	0.244	0.472	0.528
England	1972	ENG72	7027	1940.78	43.21	37.44	9.98	8.95	0.175	0.156	0.087	0.081
England	1974	ENG74P	377	–	41.84	43.31	10.28	8.81	0.177	0.194	0.124	0.134
Finland	1975	FIN75P	388	1605.14	38.91	32.27	8.94	7.79	0.176	0.200	0.151	0.128
Germany	1975	GER75P	635	1572.52	44.77	39.09	9.70	8.03	0.178	0.200	0.119	0.083
Germany	1976	GER76Z	503	1487.52	46.13	40.02	11.14	9.78	0.175	0.193	0.111	0.086
Germany	1977	GER77Z	377	1816.01	44.55	39.68	10.64	9.87	0.178	0.191	0.122	0.072
Germany	1978	GER78W	440	1999.37	42.55	39.32	10.38	9.93	0.164	0.190	0.123	0.092
Germany	1979	GER79X	405	2010.42	45.34	39.59	10.73	9.76	0.173	0.182	0.127	0.085
Germany	1979	GER79Z	441	2081.41	46.12	39.64	10.72	9.70	0.175	0.169	0.114	0.084
Germany	1980	GER80Z	421	2264.12	46.55	39.21	10.78	9.66	0.207	0.237	0.169	0.248
Germany	1980	GER80a	706	2176.40	44.63	38.91	10.37	9.70	0.170	0.153	0.652	0.784
Hungary	1982	HUN82	4745	469.65	38.48	31.46	9.74	7.25	0.217	0.202	0.128	0.141
Indonesia	1971	IND71	1980	138.94	41.40	41.83	3.18	1.75	0.173	0.170	0.280	0.312
Ireland	1973	IRE73	1807	1662.36	37.11	32.65	10.36	8.63	0.193	0.209	0.161	0.148
Italy	1975	ITA75P	413	–	41.07	33.93	7.75	4.96	0.189	0.186	0.169	–
Japan	1975	JAP75	2271	2170.54	43.75	37.55	10.71	7.60	0.199	0.197	0.118	0.133
Netherlands	1974	NET74P	350	1505.74	47.37	39.91	10.16	7.64	0.186	0.210	0.162	0.192
Netherlands	1977	NET77	1252	4.00	47.30	41.66	11.17	8.12	0.187	0.203	0.190	0.196
Netherlands	1982	NET82A	309	574.99	46.91	41.75	10.02	8.40	0.185	0.192	0.175	0.194
Netherlands	1982	NET82B	599	26454.49	48.83	44.45	11.06	9.04	0.168	0.191	0.122	0.186
Northern Ireland	1968	NIR	430	–	39.60	33.27	5.12	–	0.208	0.165	0.394	0.596
Northern Ireland	1973	NIR	1876	1866.82	40.04	34.88	10.19	8.14	0.192	0.157	0.375	0.574
Philippines	1968	PHI	6670	2573.69	35.23	31.80	7.41	3.85	0.185	0.192	0.152	0.146
Philippines	1973	PHI	2468	3014.28	34.74	30.39	7.10	3.72	0.208	0.195	0.394	0.657
Switzerland	1976	SWI	392	2938.79	44.55	36.93	9.31	7.79	0.186	0.183	0.067	0.073
Taiwan	1970	TAI	990	36.48	41.08	35.67	5.12	5.36	0.187	0.138	0.096	0.083
United States	1973	USA	26788	1125.91	44.07	37.20	11.82	8.36	0.206	0.219	0.145	0.275
United States	1974	USA	432	13708.62	48.50	39.64	12.70	9.49	0.193	0.204	0.134	0.232
		Total	*81429*	–	*39.31*	*37.18*	*9.08*	*6.92*	*0.190*	*0.193*	*0.199*	*0.230*

Table 2. Correlation Between Occupational Prestige and Respondent Income/Education – Cross-Country Sample (robust standard errors – *t*-statistics in parentheses).

No. obs:	76402	76402	80207	80207
Depvar:	trei	isei	trei	isei
age	0.086	0.075	0.082	0.072
	(24.41)	(18.76)	(26.28)	(23.11)
education/years	1.384	2.095	0.729	1.194
	(93.15)	(126.25)	(55.91)	(86.46)
log prs income	3.441	5.694		
	(50.17)	(72.27)		
log median occupation/income			13.527	21.689
			(126.13)	(176.35)
Study dummmies	Yes	Yes	Yes	Yes
Years dummies	Yes	Yes	Yes	Yes
R^2	0.932	0.924	0.942	0.947

educational mobility is entirely due to the different nature of the *scale of measurement* employed for the two variables. Occupational prestige is typically an *ordinal scale*, while a *ratio scale* measures education. Thus, data on occupational prestige are intrinsically less sensitive to the various transformations (shares, ranks, logs, etc.) required to obtain the 10 indices considered. On the other hand, years of educations take intrinsically fewer values than occupational prestige, so that there are many more tied values in the marginal distributions of education rather than occupation. Thus, for example, the ordinal indices M_6 and M_7 which are theoretically almost perfectly correlated in the case of no ties (in which case the indices are actually measuring pure exchange mobility) have greater correlation in the occupation rather than the education example.

Looking at Table 5, it also emerges that absolute, relative and ordinal mobility indices give quite different views of the degree of mobility present in the different data. For the reasons just explained, we will comment only on the correlation matrix for the education-based calculations, where the effect of the chosen transformations is clearer and more marked. We notice first that the two absolute indices M_1 and M_2 have correlation equal to 0.942. On the other hand, there is much less agreement between the relative indices M_3, M_4, M_5, M_9 and

M_{10}: while the correlation between OLS coefficient calculated on education and its logarithm counterpart have correlation equal to 0.805, M_3 has negative correlation (-0.182) with the OLS coefficient, and low positive correlation (0.254) with the log OLS coefficient. Even more surprising is the strong negative correlation (-0.718) between the two strongly relative indices M_4 and M_5. Given the generally changing level of inequality between the marginal

Table 3. Alternative Measures of Intergenerational Mobility – Occupational Social Prestige – Cross-Country Sample.

Country	year	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
USA	74	16.33	452.11	0.37	0.29	0.73	0.73	0.11	0.27	0.70	0.73
Netherlands	82	1445	356.97	0.32	0.18	0.73	0.69	0.11	0.26	0.74	0.77
USA	73	14.29	380.81	0 35	0.28	0.65	0.65	0.10	0.25	0 63	0.66
Hungary	82	12.99	312.98	0.38	0.32	0.62	0.64	0 10	0.25	0.60	0.66
U.K.	72	12.23	277.63	0.3l	0.20	0.64	0.68	0.11	0.26	0.60	0.67
Germany	77	12.30	295.74	0.29	0.19	0.63	0.68	0.11	0.26	0.64	0.67
Taiwan	70	12.25	340.22	0.30	0.27	0.70	0.68	0.07	0.23	0.68	0.67
Finland	75	10.88	221.97	0.29	0.2l	0.66	0.72	0.11	0.27	0.57	0.65
Netherlands	82	13.11	30l.2l	0.30	0.17	0.62	0.65	0.10	0.25	0.60	0.62
Japan	75	12.48	319.72	0.31	0.23	0.61	0.62	0.09	0.24	0.62	0.63
Germany	80	12.50	281.14	0.27	0.17	0.62	0.65	0.11	0.25	0.58	0.61
Germany	80	11.66	263.92	0.30	0.l8	0.62	0.64	0.10	0.25	0.60	0.65
Germany	75	11.85	275.70	0.29	0.l8	0.62	0.63	0.10	0.25	0.61	0.65
Brazil	82	12.84	332.96	0.39	0.40	0.58	0.58	0.09	0.24	0.54	0.59
N. Ireland	73	11.34	258.14	0.30	0.21	0.59	0.65	0.11	0.26	0.53	0.61
U.K.	74	12.17	218.50	0.31	0.12	0.61	0.62	0.14	0.29	0.50	0.62
Italy	75	11.00	232.61	0.30	0.20	0.63	0.62	0.09	0.25	0.57	0.60
N. Ireland	68	10.79	235.12	0.29	0.21	0.59	0.64	0.10	0.25	0.53	0.62
Netherlands	77	12.71	301.76	0.30	0.l7	0.57	0.58	0.09	0.24	0.56	0.60
Germany	78	10.65	247.86	0.26	0.l6	0.6l	0.63	0.l0	0.23	0.62	0.66
Netherlands	74	12.51	299.45	0.30	0.19	0.52	0 53	0.09	0.23	0.50	0.56
Germany	78	11.83	262.39	0.28	0.17	0.57	0.61	0.10	0.25	0.57	0.60
Brazil	73	11.78	295.76	0.39	0.47	0.50	0.52	0.07	0.23	0.46	0.50
Switzerland	76	11.57	265.07	0.29	0.19	0.53	0.55	0.09	0.23	0.47	0.56
Ireland	73	9.69	215.51	0.27	0.20	0.49	0.55	0.09	0.24	0.42	0.47
Germany	76	11.35	248.84	0.27	0.16	0.47	0.56	0.09	0.23	0.49	0.55
Philippines	73	8.00	I85.89	0.22	0.20	0.60	0.58	0.07	0.22	0.53	0.54
Germany	78	10.42	217.55	0.25	0.14	0.48	0.54	0.09	0.23	0.51	0.56
Australia	74	10.19	221.99	0.26	0.18	0.50	0.50	0.08	0.23	0.43	0.44
Philippines	68	8.41	185.30	0.24	0.18	0.53	0.52	0.07	0.21	0.44	0.44
Indonesia	71	6.88	156.53	0.19	0.09	0.46	0.46	0.09	0.16	0.43	0.41

Table 3. Continued.

Country	year	rank1	rank2	rank3	rank4	rank5	rank6	rank7	rank8	rank9	rank10	avg.rank
USA	74	31	31	28	28	30	31	29	29	30	30	30
Netherlands	82	30	29	26	12	31	29	30	26	31	31	28
USA	73	29	30	27	27	27	25	19	18	27	24	25
Hungary	82	27	25	29	29	21	21	20	20	22	26	24
U.K.	72	19	18	25	18	26	27	27	28	21	27	24
Germany	77	21	20	13	15	24	26	28	27	28	28	23
Taiwan	70	20	28	19	26	29	28	3	11	29	29	22
Finland	75	9	7	14	24	28	30	26	30	16	21	21
Netherlands	82	28	23	22	7	19	22	23	21	20	17	20
Japan	75	22	26	23	25	18	15	9	13	25	20	20
Germany	80	23	19	9	9	23	23	25	24	19	15	19
Germany	80	14	15	17	13	22	19	21	23	23	22	19
Germany	75	17	17	12	11	20	18	22	22	24	23	19
Brazil	82	26	27	30	30	12	12	7	12	14	11	18
N. Ireland	73	11	13	20	22	13	24	24	25	13	16	18
U.K.	74	18	6	24	2	16	14	31	31	8	19	17
Italy	75	10	9	16	20	25	16	14	17	17	13	16
N. Ireland	68	8	10	15	23	14	20	18	19	12	18	16
Netherlands	77	25	24	18	8	10	10	15	15	15	14	15
Germany	78	7	11	5	5	17	17	17	7	26	25	14
Netherlands	74	24	22	21	16	7	5	12	9	9	10	14
Germany	78	16	14	10	6	11	13	16	16	18	12	13
Brazil	73	15	21	31	31	6	3	2	5	5	5	12
Switzerland	76	13	16	11	17	8	7	6	10	6	8	10
Ireland	73	4	4	7	21	4	8	11	14	1	4	8
Germany	76	12	12	8	4	2	9	10	6	7	7	8
Philippines	73	2	3	2	19	15	11	4	3	11	6	8
Germany	78	6	5	4	3	3	6	8	8	10	9	6
Australia	74v	5	8	6	10	5	2	5	4	2	3	5
Philippines	68	3	2	3	14	9	4	1	2	4	2	4
Indonesia	71	1	1	1	1	1	1	13	1	3	1	2

distributions of education of the fathers and the sons (Table 1), we expect that since M_5 is normalized by the standard deviation it would be less sensitive to changes in marginal distributions, thus behaving closer to ordinal indices rather than absolute ones. This expectation is confirmed by Table 5, where it emerges that M_4 seems to be positively correlated with the absolute indices and negatively correlated with ordinal ones, while M_5 has the opposite behavior. Regarding ordinal indices, it seems that while the choice of ranks in the presence of ties does make an important difference (M_6 and M_7 have correlation

of only 0.47), the choice of the family distance function (absolute value vs. squared difference) does not seem to make much practical difference. Finally notice that all ordinal indices seem to have positive (if in some cases moderate) correlation with all other indices except M_4.

This example shows rather dramatically that the choice of a mobility index has a substantial effect on the results, depending on the data used: when marginal distributions are different, each index gives a different weight to the inequality of the marginal distribution and to the structural and exchange component of overall mobility.

Table 4. Alternative Measures of Intergenerational Mobility – Years of Education – Cross-Country Sample.

Country	year	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
Taiwan	70	4.73	42.19	0.66	1.47	0.60	0.52	0.07	0.21	0.77	0.88
USA	74	3.92	26.00	0.38	0.29	0.54	0.58	0.10	0.25	0.63	0.76
USA	73	4.10	27.13	0.44	0.39	0.52	0.53	0.09	0.23	0.63	0.74
N. Ireland	73	2.39	10.73	0.26	0.16	0.60	0.64	0.11	0.26	0.56	0.68
Hungary	82	3.30	18.11	0.39	0.34	0.57	0.55	0.08	0.22	0.61	0.66
Netherlands	77	3.71	24.89	0.39	0.38	0.57	0.58	0.08	0.23	0.52	0.58
Netherlands	82	2.99	15.27	0.33	0.22	0.63	0.66	0.07	0.20	0.65	0.69
Netherlands	82	3.14	16.34	0.33	020	0.62	0.GS	0.OG	0.20	0.65	0.75
Ireland	73	2.35	10.04	0.24	0 13	0.59	0.61	0.10	0.24	0.58	0.66
U.K.	72	1.29	3.37	0.14	0.04	0.64	0.67	0.10	0.25	0.66	0.76
Philippines	73	4.00	30.01	0.60	2.16	0.46	0.48	0.07	0.21	0.36	0.58
Switzerland	76	1.94	9.32	0.24	0.15	0.57	0.58	0.09	0.24	0.51	0.69
Japan	75	3.43	19.98	0.37	0.35	0.54	0.55	0.07	0.22	0.38	0.50
Germany	76	2.20	13.80	0.20	0.14	0.60	0.61	0.0G	0.19	0.53	0.59
Finland	75	1.42	5.32	0.16	0.09	0.66	0.64	0.08	0.23	0.57	0.64
Netherlands	74	2.94	14.63	0.34	0.25	0.45	0.54	0.08	0.22	0.45	0.57
Philippines	68	4.19	31.32	0.65	2.12	0.38	0.39	0.06	0.19	0.27	0.55
Australia	74	2.96	12.15	0.35	0.23	0.54	0.54	0.05	0.19	0.52	0.61
Italy	75	3.30	21.24	0.55	0.87	0.45	0.39	0.05	0.18	0.32	0.45
Brazil	82	2.68	14.40	0.59	2.10	0.41	0.40	0.06	0.19	0.14	0.45
Germany	80	1.62	9.47	0.15	0.10	0.59	0.59	0.05	0.18	0.46	0.55
U.K.	74	1.72	6.34	0.17	0.08	0.48	0.59	0.10	0.24	0.30	0.47
Germany	75	2.06	8.08	0.23	0.13	0.47	0.47	0.07	0.20	0.46	0.51
Indonesia	71	1.92	11.42	0.51	3.72	0.33	0.35	0.03	0.15	0.15	0.53
Germany	78	1.52	8.68	0.13	0.09	0.54	0.56	0.04	0.16	0.42	0.51
Germany	80	1.33	7.59	0.12	0.08	0.54	0.52	0.04	0.15	0.45	0.44
Germany	78	1.29	7.40	0.11	0.08	0.56	0.54	0.02	0.12	0.49	0.49
Germany	78	1.45	8.14	0.12	0.09	0.54	0.51	0.03	0.15	0.37	0.37
Germany	77	1.33	7.76	0.11	0.08	0.51	0.54	0.02	0.12	0.38	0.42

Table 4. Continued.

Country	year	rank1	rank2	rank3	rank4	rank5	rank6	rank7	rank8	rank9	rank10	avg.rank
Taiwan	70	29	29	29	25	24	8	17	17	29	29	24
USA	74	25	25	20	19	12	18	27	27	25	28	23
USA	73	27	26	23	23	10	10	24	21	24	25	21
N. Ireland	73	15	13	14	14	25	26	29	29	20	22	21
Hungary	82	22	21	22	20	19	16	22	19	23	21	21
Netherlands	77	24	24	21	22	18	20	20	23	18	15	21
Netherlands	82	19	19	15	16	27	28	16	14	26	24	20
Netherlands	82	20	20	16	15	26	27	11	13	27	26	20
Ireland	73	14	12	13	11	22	24	25	24	22	20	19
U.K.	72	2	1	6	1	28	29	28	28	28	27	18
Philippines	73	26	27	27	28	6	6	15	16	6	16	17
Switzerland	76	11	10	12	13	20	19	23	25	16	23	17
Japan	75	23	22	19	21	11	15	18	18	8	8	16
Germany	76	13	16	10	12	23	23	13	12	19	17	16
Finland	75	5	2	8	7	29	25	19	22	21	19	16
Netherlands	74	17	18	17	18	4	11	21	20	11	14	15
Philippines	68	28	28	28	27	2	3	10	9	3	13	15
Australia	74	18	15	18	17	14	12	8	11	17	18	15
Italy	75	21	23	25	24	5	2	9	8	5	4	13
Brazil	82	16	17	26	26	3	4	12	10	1	5	12
Germany	80	8	11	7	9	21	22	7	7	14	12	12
U.K.	74	9	3	9	5	8	21	26	26	4	6	12
Germany	75	12	7	11	10	7	5	14	15	13	10	10
Indonesia	71	10	14	24	29	1	1	3	3	2	11	10
Germany	78	7	9	5	8	13	17	6	6	10	9	9
Germany	80	4	5	3	4	16	9	5	5	12	3	7
Germany	78	1	4	1	2	17	14	1	1	15	7	6
Germany	78	6	8	4	6	15	7	4	4	7	1	6
Germany	77	3	6	2	3	9	13	2	2	9	2	5

4. A SECOND EMPIRICAL APPLICATION

We now move to the analysis of the Italian case. Differently from other countries, Italy does not possess a longitudinal survey that is long enough to provide information on actual incomes of both parents and children.[4] A data set on intergenerational mobility based on occupational status has been built in 1985 by a group of sociologists from different Italian universities.[5] A representative sample of 5016 individuals aged between 18 and 65 was interviewed about their working life and their social attitudes; additional

Table 5. Correlation Between Different Measures of Mobility – Cross-Country Sample.

Occupational Prestige

	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
index1	1.0000									
index2	0.9298	1.0000								
index3	0.7980	0.7820	1.0000							
index4	0.3751	0.5173	0.8031	1.0000						
index5	0.6364	0.6238	0.4289	0.1648	1.0000					
index6	0.6460	0.5707	0.4232	0.1109	0.9185	1.0000				
index7	0.4583	0.2182	0.1961	– 0.3195	0.5117	0.6312	1.0000			
index8	0.6773	0.4408	0.5163	0.0934	0.6519	0.7840	0.7199	1.0000		
index9	0.7088	0.7229	0.4100	0.1193	0.9029	0.8538	0.4491	0.5326	1.0000	
index10	0.7735	0.6909	0.5070	0.1116	0.8780	0.9067	0.6238	0.7337	0.9332	1.0000

Years of Education

	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
index1	1.0000									
index2	0.9419	1.0000								
index3	0.8449	0.8318	1.0000							
index4	0.3498	0.4337	0.7513	1.0000						
index5	– 0.1679	– 0.1891	– 0.5036	– 0.7179	1.0000					
index6	– 0.2301	– 0.3124	– 0.5934	– 0.7484	0.8968	1.0000				
index7	0.3476	0.1797	0.1270	– 0.2347	0.3264	0.4701	1.0000			
index8	0.3699	0.1984	0.1596	– 0.2004	0.3336	0.4605	0.9843	1.0000		
index9	0.2147	0.1745	– 0.1820	– 0.5494	0.8283	0.7363	0.4627	0.4480	1.0000	
index10	0.4719	0.4136	0.2541	– 0.0584	0.5081	0.4796	0.6298	0.6351	0.8050	1.0000

questions were asked about family background. From this file it is possible to extract information concerning the interviewed person referred to 1985 and referring to his/her family when he/she was 14 years old. As a consequence, the generation of sons is observed at the same time, whereas their parents are observed in different years, ranging in principle from 1934 to 1981.[6] This data set has been widely analyzed.[7] International comparison indicates that Italy exhibits a lower degree of intergenerational mobility, both in terms of occupational characteristics (prestige or incomes) and educational achievements.

Another source of information on intergenerational persistence is provided by the Bank of Italy Survey on Household Incomes and Wealth (SHIW),

conducted biannually since 1977.[8] Given the panel component of this survey is rather limited, we have to rely on recall information about the parent status, which is available from the 1993 survey. From sociological literature (and in the absence of direct information about parent incomes) we accept the idea that occupations represent a good indicator of long run status achieved by a person. However, the SHIW data set does not provide a detailed classification of occupation, and therefore we cannot resort to an indicator of prestige,[9] as we have done in the previous application. In addition, we prefer to stick to the economists' viewpoint that incomes are the best summary statistics available on the relative desirability of a social position. However we also know that educational achievement represents a rough measure of the human capital accumulated by an individual. Therefore we have resorted to rank individuals according to their earned income and their educational achievement.[10] This implies that we assume that social ordering is substantially based on spending ability, which in turn derives from earned income and human wealth. In order to eliminate the erratic component based on individual fortunes, we consider the median income associated to any combination of job position and educational achievement, and we rank individuals accordingly.

In the absence of direct information about parent actual incomes, we cannot provide a generation specific ranking and we are forced to use the same ranking for both generations. One could object that each generation should possess its own ranking, which reflect events specific to that age cohort (degree of industrial development, wars, etc.). But data availability prevents this possibility, even if we are aware that part of the observed mobility is actually due to the process of development, the change in the distribution of occupations and the process of mass schooling. Similar methodology has been used by Checchi, Ichino and Rustichini 1999 to obtain measures of occupational status for the Italian case (see also Benabou & Ok, 2001).

We make use of the SHIW surveys conducted in 1993, 1995 and 1998.[11] It comprises 68.838 individuals, gathered into 23.371 families. Among the individuals, there are 41.753 individuals with a non-null income. Total net income is obtained from dependent labor employment, from self-employment, from pensions or from ownership of capital. Since income from self-employment activity are plagued by under-reporting,[12] we have revised it upward by 40%, which corresponds to the discrepancy between post-tax income from self-employment and corresponding values based on national accounts (averaged over the period 1980–1993). For each member of the family we have information about his/her maximum educational achievement (but not about the educational career – we ignore any attendance without graduation), the current work status and the current or past sector of employment. In

addition we have also analogous information about the parents of the household head and his/her spouse. This information is indicatively referred to the same current age of the respondent.[13]

In order to rank people according to their occupations, in addition to educational attainment we know the work status and the sector of employment of the interviewees. Unfortunately, the disaggregation of work status, sectors and educational achievements for parents is less detailed than the corresponding disaggregation for children. Therefore we have aggregated information about children in order to be comparable with the corresponding aggregation of their parents. By restricting to individuals who are employed and earn a positive income, we obtain 23,700 individuals in the children generation. The percentage distribution of relevant variables in the two generations is reported in Table 6.

By combining educational credentials (5 items), work status (8 items) and sector of employment (4 items), we get 160 potential combinations of these features, whereas actual combinations associated with non-negative incomes are only 122. For each cell identified by a combination of education/work status/sector we have computed the median and the mean income in the full sample. The orderings of all combinations is reported in Table 7, where one can notice that ranking according to the mean or to the median are rather similar, since the two measures are highly correlated.[14] In order to define an index of social prestige, in the sequel we make use of the ranking based on median income.[15]

Once we have introduced a cardinal measure of income that renders comparable two generations, we can analyze intergenerational mobility by calculating the 10 mobility indices above. We start by noticing first that inequality is higher in the parents generations than in the children generation, as grasped by Table 8: all inequality measures referred to the parent generation dominate the corresponding measures for the children generation.[16] In addition, it is worth emphasizing that an ordinal measure of social position (reported in column 6 of Table 7 and corresponding almost completely to the rank associated with each combination education/work status/sector in an ordering based on median incomes) implies a degree of inequality which is closer to the inequality in actual incomes rather than median occupational incomes. In any case, by recording a lower inequality in social positions across generations we could anticipate that some "equalizer device" has operated along the century. *Industrial development*, implying significant reallocation of jobs among sectors and the emergence of new occupations and/or *educational push* are the best candidates to this explanation.

We now move to the proper analysis of intergenerational mobility. Following a consolidated procedure, we consider the couple father-son, to avoid distortion due to differences in participation rates across generations and/or regions.[17] We make use of ten previously introduced indices, using either a territorial disaggregation or a birth cohort disaggregation.[18]

We start by considering mobility comparisons in different Italian regions. It is well known that Italy is characterized by a rather unequal distribution of

Table 6. Comparable Distributions Across Generations – Italy 1993, 1995, 1998.

Educational achievement	1	2	3	4
no education	1.34	1.59	23.66	27.48
primary school (*elementare*)	14.78	18.29	51.5	4.34
lower secondary school (*scuola media*)	33.1	33.2	13.52	10.9
upper secondary school (*scuola superiore*)	39.09	35.55	8.08	6.16
bachelor (*laurea*)	11.69	11.36	3.24	1.12
Work status				
blue collar	34.69	32.35	48.51	44.08
office worker	27.05	26.16	13.96	8.24
teacher	7.91	5.17	1.35	7.87
junior manager-official	4.56	6.02	3.15	1.55
senior manager	1.91	3.01	1.22	0.05
professional	3.73	4.44	1.99	1.01
entrepreneur	1.25	1.85	1.99	1.31
self-employed	18.9	20.99	27.83	35.89
Sector of employment				
agriculture	4.68	4.48	24.44	36.62
industry	32.1	33.13	22.94	14.93
public administration	28.94	30.06	16.67	15.98
private services	34.28	32.33	35.95	32.47
Number of cases	*23700*	*12187*	*11901*	*11913*

Legend:
1 = whole sample of employed in the generation of children
2 = household head sample of employed in the generation of children
3 = (employed) father of (employed) household head
4 = (employed) mother of (employed) household head

Table 7. Ordering of occupations – Italy 1993, 1995, 1998.

Cases	Median income (1998 euros)	Rank median	Mean income (1998 euros)	Rank mean	Rank (final)	Education	Work status	Sector of activity
4	1936.713	1	2361.843	1	**1**	primary	office worker	agriculture
45	5941.331	2	7800.203	4	**2**	no educ	self-employed	private services
1	6197.483	3	6197.483	2	**3**	no educ	entrepreneur	private services
70	6589.893	4	6779.366	3	**4**	no educ	blue collar	agriculture
33	6916.473	5	10492.471	2	**5**	no educ	self-employed	agriculture
193	7044.363	6	8386.782	7	**6**	primary	blue collar	agriculture
4	7082.21	7	10304.361	1	**7**	lower secondary	teacher	public administ
207	7381.662	8	8164.44	6	**8**	lower secondary	blue collar	agriculture
34	7867.519	9	8644.603	8	**9**	no educ	blue collar	private services
1	8068.865	10	8068.865	5	**10**	no educ	office worker	industry
123	8781.226	11	11791.26	21	**11**	lower secondary	self-employed	agriculture
18	8921.609	12	14061.07	33	**12**	no educ	self-employed	industry
1	9037.996	13	9037.996	9	**13**	primary	professional	industry
479	9296.225	14	10010.38	10	**14**	upper secondary	blue collar	private services
20	9442.246	15	14547.45	36	**15**	primary	entrepreneur	private services
63	9792.55	16	11329.22	16	**16**	upper secondary	blue collar	agriculture
1139	9802.021	17	10541.86	13	**17**	lower secondary	blue collar	private services
207	10032.12	18	13013.22	30	**18**	primary	self-employed	agriculture
7	10140.12	19	10769.92	15	**19**	bachelor	blue collar	private services
8	10601.62	20	10664.45	14	**20**	bachelor	blue collar	industry
627	11120.28	21	14108.63	34	**21**	primary	self-employed	private services
461	11127.82	22	11776.14	20	**22**	primary	blue collar	private services
2392	11159.6	23	12216.92	24	**23**	lower secondary	blue collar	industry
6	11219.3	24	12104.04	23	**24**	lower secondary	office worker	agriculture

Table 7. Continued.

Cases	Median income (1998 euros)	Rank median	Mean income (1998 euros)	Rank mean	Rank (final)	Education	Work status	Sector of activity
6	11302.35	25	11371.47	17	**25**	bachelor	blue collar	public administ
97	11382.79	26	11452.44	18	**26**	no educ	blue collar	industry
895	11489.42	27	12733.27	28	**27**	upper secondary	blue collar	industry
1163	11578.14	28	14774.68	38	**28**	lower secondary	self-employed	private services
1	12222.47	30	12222.47	25	**29**	primary	teacher	public administ
9	12252.53	31	11644.44	19	**30**	upper secondary	teacher	private services
1	12394.97	32	12394.97	26	**31**	lower secondary	teacher	industry
1105	12554.55	33	13148.84	31	**32**	primary	blue collar	industry
2	12743.68	34	12743.68	29	**33**	primary	self-employed	public administ
3	12894.1	35	12646.49	27	**34**	primary	jnr manager-official	private services
275	13358.67	36	14304.81	35	**35**	primary	blue collar	public administ
382	13530.88	37	14775.02	39	**36**	lower secondary	office worker	private services
2	13696.73	38	13696.73	32	**37**	no educ	entrepreneur	industry
553	13753.49	39	14622.13	37	**38**	lower secondary	blue collar	public administ
858	13784.59	41	18956.16	68	**39**	upper secondary	self-employed	private services
13	13912.12	42	12081.74	22	**40**	no educ	blue collar	public administ
1364	13944.34	44	15911.1	47	**41**	upper secondary	office worker	private services
65	13944.34	44	19831.28	73	42	upper secondary	self-employed	agriculture
220	13949.5	46.5	14935.23	40	**43**	upper secondary	blue collar	public administ
871	13949.5	46.5	15199	42	**44**	upper secondary	teacher	public administ
45	13975.32	48	15005.54	41	**45**	primary	office worker	private services
322	13990.24	49	17233.78	52	**46**	primary	self-employed	industry
446	14066.39	50	18093.11	61	**47**	lower secondary	self-employed	industry
11	14090.41	51	16717.96	50	**48**	bachelor	teacher	private services

Table 7. Continued.

Cases	Median income (1998 euros)	Rank median	Mean income (1998 euros)	Rank mean	Rank (final)	Education	Work status	Sector of activity
44	14128.93	52	18400.5	64	**49**	upper secondary	office worker	agriculture
17	14212.86	53	17509.45	54	**50**	upper secondary	self-employed	public administ
118	14290.47	54	15252.5	43	**51**	primary	office worker	public administ
36	14361.15	55	15869.1	46	**52**	lower secondary	professional	private services
289	14460.79	56	19683.29	72	**53**	upper secondary	self-employed	industry
26	14536.64	57	19343.26	71	**54**	primary	office worker	industry
1768	14937.15	58	16554.51	49	**55**	upper secondary	office worker	public administ
94	15404.68	59	19857.04	74	**56**	bachelor	office worker	industry
281	15406.18	60	17534.88	55	**57**	bachelor	office worker	public administ
1008	15469.01	61	17832.16	58	**58**	upper secondary	office worker	industry
2	15476.17	62	15476.17	44	**59**	no educ	office worker	public administ
975	15493.71	63	17555.64	56	**60**	bachelor	teacher	public administ
2	15686.32	64	15686.32	45	**61**	primary	snr manager	private services
20	**12043.38**	**29**	**18435.09**	**65**	**62**	lower secondary	self-employed	public administ
29	16041.54	65	25192.92	89	**63**	primary	entrepreneur	industry
250	16306.92	66	17835.67	59	**64**	lower secondary	office worker	industry
12	16540.43	67	21193.03	79	**65**	upper secondary	professional	public administ
291	16547.6	68	20999.01	78	**66**	upper secondary	professional	private services
849	16678.25	69	17680.16	57	**67**	lower secondary	office worker	public administ
32	13765.8	40	19154.38	70	**68**	lower secondary	entrepreneur	industry
2	16919.13	70	16919.13	51	**69**	lower secondary	professional	agriculture
156	17030.73	71	18991.5	69	**70**	bachelor	office worker	private services
6	17148.23	72	17412.18	53	**71**	primary	professional	agriculture
20	17692.01	73	20245.8	75	**72**	bachelor	self-employed	public administ

Table 7. Continued.

Cases	Median income (1998 euros)	Rank median	Mean income (1998 euros)	Rank mean	Rank (final)	Education	Work status	Sector of activity
2	17985.93	74	17985.93	60	**73**	lower secondary	snr manager	industry
52	18161.29	75	22066.41	85	**74**	lower secondary	entrepreneur	private services
1	18174.67	76	18174.67	62	**75**	upper secondary	entrepreneur	public administ
1	18305.3	77	18305.3	63	**76**	upper secondary	teacher	agriculture
3	18417.79	78	15982.01	48	**77**	primary	jnr manager-official	public administ
2	18506.64	79	18506.64	66	**78**	primary	snr manager	industry
87	**13944.34**	**44**	**21408.16**	**80**	**79**	**bachelor**	**self-employed**	**private services**
2	18696.55	80	18696.55	67	**80**	upper secondary	teacher	industry
8	19290.46	81	42887.07	110	**81**	primary	professional	private services
65	19358.99	82	21441.47	81	**82**	lower secondary	jnr manager-official	public administ
71	19919.96	83	21762.98	83	**83**	upper secondary	entrepreneur	private services
240	19993.02	84	22118.19	86	**84**	upper secondary	jnr manager-official	public administ
9	20138.97	85	25958.64	90	**85**	lower secondary	entrepreneur	agriculture
33	20563.59	86	21875.45	84	**86**	lower secondary	jnr manager-official	private services
4	20585.48	87	28815.16	98	**87**	bachelor	professional	agriculture
4	21335.5	88	20757.24	77	**88**	upper secondary	professional	agriculture
2	21565.64	89	21565.64	82	**89**	primary	professional	public administ
8	21849.42	90	26182.05	92	**90**	lower secondary	professional	industry
8	21995.49	91	22292.86	87	**91**	bachelor	office worker	agriculture
5	22968.3	92	20658.65	76	**92**	upper secondary	jnr manager-official	agriculture
157	22985.43	93	25978.43	91	**93**	upper secondary	jnr manager-official	industry
73	23091.15	94	32513.75	101	**94**	bachelor	professional	industry
11	23347.98	95	37505.47	106	**95**	primary	entrepreneur	agriculture
14	23457.87	96	32679.72	102	**96**	upper secondary	entrepreneur	agriculture
23	23918.16	97	27732.29	94	**97**	lower secondary	jnr manager-official	industry

Table 7. Continued.

Cases	Median income (1998 euros)	Rank median	Mean income (1998 euros)	Rank mean	Rank (final)	Education	Work status	Sector of activity
71	24505.05	98	24313.06	88	**98**	upper secondary	professional	industry
252	24978.95	99	39702.71	108	**99**	bachelor	professional	private services
210	25194.76	100	27532.91	93	**100**	upper secondary	jnr manager-official	private services
170	25721.15	101	28778.76	97	**101**	bachelor	jnr manager-official	public administ
79	26006.46	102	29904.88	100	**102**	bachelor	jnr manager-official	industry
23	26289.81	103	75293.87	119	**103**	bachelor	self-employed	industry
33	27075.66	104	61512.33	117	**104**	upper secondary	entrepreneur	industry
86	27384.52	105	36503.56	105	**105**	bachelor	jnr manager-official	private services
46	27910.26	106	28076.23	95	**106**	upper secondary	snr manager	public administ
2	28508.01	107	28508.01	96	**107**	lower secondary	snr manager	public administ
108	28795.71	108	33401.12	103	**108**	bachelor	professional	public administ
4	31171.61	109	29685.89	99	**109**	bachelor	jnr manager-official	agriculture
1	34318.56	110	34318.56	104	**110**	no educ	professional	agriculture
209	34460.43	111	39126.57	107	**111**	bachelor	snr manager	public administ
60	42435.52	112	43358.65	111	**112**	upper secondary	snr manager	private services
2	42783.27	113	42783.27	109	**113**	upper secondary	snr manager	agriculture
40	43438.16	114	52591.92	115	**114**	upper secondary	snr manager	industry
2	44032.52	115	44032.52	112	**115**	primary	jnr manager-official	industry
8	47199.6	116	64738.52	118	**116**	bachelor	entrepreneur	private services
42	47366.23	117	49192.59	114	**117**	bachelor	snr manager	industry
2	48852.52	118	48852.52	113	**118**	bachelor	snr manager	agriculture
44	49686.13	119	53298.87	116	**119**	bachelor	snr manager	private services
3	64942.07	120	119733.4	120	**120**	bachelor	entrepreneur	agriculture
3	71434.56	121	123497.5	121	**121**	bachelor	entrepreneur	industry
1	189513.8	122	189513.8	122	**122**	bachelor	self-employed	agriculture

Table 8. Inequality measures – Italy 1993, 1995, 1998.

	Household head			Spouse household head			Household head father		Household head mother	
	actual income	median income	social prestige	actual income	median income	social prestige	median income	social prestige	median income	social prestige
Relative mean deviation	0.230	0.126	0.225	0.207	0.083	0.187	0.133	0.300	0.129	0.316
Coefficient of variation	0.860	0.423	0.559	0.647	0.275	0.483	0.454	0.812	0.329	0.835
Standard deviation of logs	0.613	0.320	0.611	0.688	0.248	0.593	0.359	0.971	0.321	0.970
Gini coefficient	0.330	0.182	0.306	0.307	0.128	0.265	0.198	0.423	0.177	0.439
Mehran measure	0.436	0.239	0.428	0.433	0.183	0.388	0.276	0.579	0.254	0.601
Piesch measure	0.278	0.154	0.245	0.244	0.101	0.204	0.159	0.345	0.138	0.357
Kakwani measure	0.103	0.035	0.084	0.091	0.019	0.068	0.040	0.160	0.030	0.173
Theil entropy measure	0.218	0.069	0.150	0.175	0.034	0.119	0.077	0.303	0.052	0.324
Theil mean log deviation measure	0.186	0.059	0.166	0.179	0.032	0.143	0.070	0.382	0.052	0.400
Entropy measure GE-1	0.337	0.055	0.241	0.422	0.032	0.233	0.071	0.744	0.054	0.698
Number of observations	*11476*	*11476*	*11476*	*6676*	*6676*	*6676*	*10593*	*10593*	*3266*	*3266*

Note: "median income" corresponds to the median occupational income, reported in Table 7, Column 2; "social position" corresponds to the occupation ranking proposed in Table 7, Column 6.

resources between its macro regions, with the southern regions having in general a lower level of socio-economic development. We consider then 5 main macro regions, the Northeast, Northwest, Center, Southeast and Southwest with the islands (Sicily and Sardinia). In general, being the Northern regions far richer than the Southern ones, and having generally experienced even higher levels of economic growth in the post-war years, we expect that most socio-economic indices of mobility will show a much greater level of structural mobility in the North rather than in the South. If it is also true that northern regions are more open to class exchanges than southern ones, then we expect than most mobility indices will display greater values for the Northern regions as compared to the Southern ones. However, given the generalized and nationwide post-war process of mass scholarization, we expect also that using education as status variable may give a different picture: this is so because mass scholarization implies a greater distance between fathers' and sons' marginal distributions in the South rather than the North (since sons in the South have comparable levels of educations than in the North even in the presence of an educational gap between northern and southern fathers). Thus, we expect that the different sensitivity of the various indices to differing marginal distribution will show up more when looking at educational rather than occupational mobility.

Table 9 reports both the value and the relative ordering of the 10 indices for the five macro regions. The upper part of the table uses fathers and sons median occupational income while the bottom part uses fathers and sons years of education as status variables. A glance at the table shows that the table confirms our expectations on regional mobility patterns: when occupational income is used as status variable, the northern regions seem to display unambiguously more mobility than the southern ones, while using education there seems to be an opposite pattern, but with less agreement between the indices, with the absolute indices giving a picture which is more similar to the picture emerging when using occupational income as status indicator than the picture emerging from ordinal indices.

We now move to our last analysis, that is, the study of the temporal evolution of occupational and educational mobility in Italy. To get an appreciation of what has happened to intergenerational mobility in Italy over time, we have divided the families into groups according to sons' birth five-year cohort. Figure 1 shows the evolution of occupational income and educational mobility for the ten indices for the eight age cohorts of the sons. A glance at Figure 1 gives a quite striking picture: while mobility seems to be decreasing over time when using the first four indices, exactly the opposite view emerges using the last six indices. This impression is confirmed by looking at the correlation

Table 9. Mobility measures – Italy 1993, 1995, 1998 – Regional Disaggregation.

					Median Occupational Incomes						
	obs	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
Italy	10593	4789	58700000	0.347	0.421	0.681	0.662	0.108	0.261	0.619	0.683
north-west	2355	5300	75500000	0.343	0.469	0.742	0.674	0.112	0.269	0.685	0.694
north east	2085	4956	77400000	0.350	0.569	0.743	0.753	0.121	0.280	0.661	0.736
center	2346	4798	51600000	0.353	0.371	0.665	0.685	0.112	0.264	0.649	0.714
south-east	1266	4521	45400000	0.358	0.374	0.614	0.604	0.097	0.247	0.513	0.644
south-west & island	2541	4301	40800000	0.336	0.308	0.584	0.609	0.100	0.251	0.524	0.652
	avg. rank	rank1	rank2	rank3	rank4	rank5	rank6	rank7	rank8	rank9	rank10
north-west	4	5	4	2	4	4	3	4	4	5	3
north east	5	4	5	3	5	5	5	5	5	4	5
center	3	3	3	4	4	3	4	3	3	3	4
south-east	2	2	2	5	3	2	1	1	1	1	1
south-west & island	1	1	1	1	1	1	2	2	2	2	2

Table 9. Continued.

	Years of Education										
	obs	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
Italy	11207	5.16	40.49	0.517	1.532	0.472	0.480	0.078	0.216	0.466	0.564
north-west	2527	4.92	37.51	0.505	1.070	0.450	0.454	0.074	0.211	0.458	0.562
north east	2170	5.12	39.97	0.524	1.471	0.533	0.540	0.089	0.232	0.516	0.587
center	2472	5.34	42.23	0.539	1.631	0.515	0.526	0.086	0.228	0.532	0.622
south-east	1334	5.40	43.57	0.530	2.105	0.458	0.462	0.073	0.209	0.433	0.557
south-west & island	2704	5.14	40.59	0.496	1.843	0.439	0.453	0.071	0.207	0.409	0.496
	avg. rank	rank1	rank2	rank3	rank4	rank5	rank6	rank7	rank8	rank9	rank10
north-west	2	1	1	2	1	2	2	3	3	3	3
north east	4	2	2	3	2	5	5	5	5	2	4
center	5	4	4	5	3	4	4	4	4	1	5
south-east	4	5	5	4	5	3	3	2	2	4	2
south-west & island	2	3	3	1	4	1	1	1	1	5	1

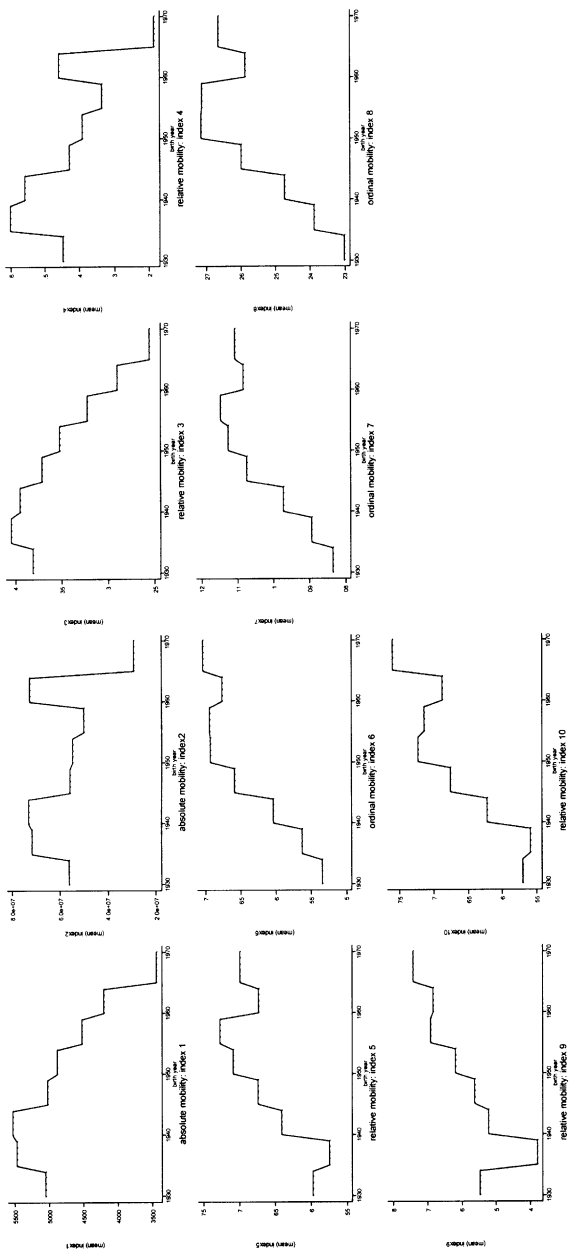

Fig. 1. Mobility Across Cohorts – Italy 1993, 1995, 1998 – Occupational Incomes.

Table 10. Ordering of occupations – Italy 1993, 1995, 1998.

	Median Occupational Incomes									
	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
index1	1.0000									
index2	0.7135	1.0000								
index3	0.9843	0.6134	1.0000							
index4	0.8766	0.9368	0.8249	1.0000						
index5	− 0.6056	− 0.6669	− 0.7249	1.0000						
index6	− 0.6916	− 0.7557	− 0.7003	0.9472	1.0000					
index7	− 0.5923	− 0.6675	− 0.6285	0.9582	0.9884	1.0000				
index8	− 0.5674	− 0.6321	− 0.6497	0.9590	0.9790	0.9904	1.0000			
index9	− 0.8772	− 0.9076	− 0.8613	0.8427	0.8076	0.7558	0.7277	1.0000		
index10	− 0.7760	− 0.8130	− 0.8267	0.9459	0.9730	0.9386	0.9402	0.8802	1.0000	

	Years of Education									
	index1	index2	index3	index4	index5	index6	index7	index8	index9	index10
index1	1.0000									
index2	0.9496	1.0000								
index3	0.9027	0.8089	1.0000							
index4	0.2718	0.5389	− 0.0225	1.0000						
index5	0.6941	0.4627	0.8107	− 0.4075	1.0000					
index6	0.5192	0.2412	0.6515	− 0.6132	0.9437	1.0000				
index7	0.8308	0.6791	0.8659	− 0.1026	0.9194	0.8049	1.0000			
index8	0.7249	0.5195	0.8442	− 0.3577	0.9549	0.9271	0.9436	1.0000		
index9	0.1582	− 0.1535	0.3610	− 0.8777	− 0.7619	0.8872	0.4951	0.6770	1.0000	
index10	0.0255	− 0.2433	0.3469	− 0.9053	0.6614	0.7488	0.3568	0.5596	0.9263	1.0000

matrix between the indices in the upper part of Table 10, with the first four indices being all negatively correlated with the last six, and with high positive correlations within the two groups.

This strikingly different behavior of the various classes of mobility indices has again an explanation in the different weight given to the structural and exchange component of mobility by the different indices. In fact, given the decline of the rather fast industrialization process in Italy and the inverted U-shaped rate of growth of most post-war economic indicators (with exceptional growth rates until the mid 1970s and stagnation during the 1980s), structural mobility has been declining in the period of analysis, while changes in the openness of the society have caused an increase in exchange mobility.

Thus, we have two conflicting forces at work: fathers and sons marginal distributions have become "closer" over time (structural mobility has declined) while becoming also less positively associated (exchange mobility has increased). The net effect depends on the chosen class of indices. Looking at the temporal evolution of educational mobility gives a similar but less clear-cut picture, due to the different time it has required to close the educational gap between fathers and sons. It is worth noticing that both groups of indicators point to an increase of mobility for the generation born during the 1950s. This is probably entirely attributable to the massive educational reform introduced in 1960, which extended compulsory education from five to eight years and unified the lower secondary school. This educational push was at the same time an increase in absolute mobility (for educational reform was legally enforced, thanks to the construction of several new schools) and in relative mobility, because it allowed sons from lower family backgrounds to gain access to secondary education (poorer children were originally de facto discouraged by the existence of professional schools driving children from peasant families directly to work after five years of primary school).

5. CONCLUSIONS

Mobility data contain information of a very different nature: marginal distributions contain static information on the location and dispersion of status both in the fathers and sons generations; the distance between the fathers and sons marginal distributions gives information on the extent of structural mobility in the data; and the positive association between the two marginal distributions gives information on the openness of the society and the extent of its exchange mobility. Thus, comparing mobility data by a single summary

mobility index is bound to give results that are very dependent on the characteristics of the chosen index.

This prediction is confirmed by our results. Indices that give relatively more weight to the structural component of mobility, may give a substantially different view than indices that give greater weight to the exchange component. For example, use of the first types of indices (absolute indices like M_1 or M_2) will result in arguing that intergenerational "mobility" is declining over time in post-war Italy while using ordinal indices (like M_5 or M_6) will give exactly the opposite impression.

A general teaching of this exercise is that intergenerational mobility is historically determined by the stage of development reached by a country. But this consideration suggests that cross-country comparisons in terms of intergenerational mobility (as we have done in our first exercise) have to be taken with caution, unless one can be sure that the countries considered have experienced similar patterns of socioeconomic growth. Being unable to control for the amount of structural mobility and using a single summary mobility index may render the conclusion reached tentative and very dependent on the chosen index.

It seems clear from our study that there is much scope for a clear formal definition of structural and exchange mobility and hence a decomposition of mobility indices into the separate contributions of the exchange and structural parts to overall mobility.

NOTES

1. See Fields 2001, Chapter 6 for an excellent discussion of various axioms that can be imposed on mobility indices.
2. With no ties, the difference lies in the fact that while M_6 divides the sum of the family difference in absolute ranks by n^3, M_7 divides by $n^2(n-1)$. Thus, in most cases the difference between the two indices is entirely due to the different treatment of tied ranks.
3. The countries are (in brackets the number of surveys): Australia (1), Brazil (2), Finland (1), Germany (8), Hungary (1), Indonesia (1), Ireland (1), Italy (1), Japan (1), Netherlands (4), Northern Ireland (2), Philippines (2), Switzerland (1), Taiwan (1), United Kingdom (2) and United States (2).
4. The panel component of the Bank of Italy survey of household wealth and income introduced was initially introduced in 1989 and subsequently expanded to one third of the sample in the following waves (1991, 1993, 1995, 1998).
5. See Barbagli et al. 1986.
6. A 65-year-old interviewee was 14 in 1934, while an 18-year-old interviewee was 14 in 1981.

7. The original group of scholars used the occupational structure to construct a class structure, and analysed intergenerational mobility in terms of class mobility (Cobalti 1988; DeLillo, 1988; Schizzerotto, 1988; Barbagli, 1988; Cobalti-Schizzerotto, 1994; Schizzerotto-Bison, 1996). Mobility measure based on individual information (from the same data-set) can be found in Checchi-Ichino-Rustichini 1999.

8. For more detailed information see Brandolini 1999.

9. With reference to the 1985 survey on intergenerational mobility, DeLillo-Schizzerotto 1985 have built an occupational prestige index of the reputational sort, i.e. interviewing a separate sample of individuals and asking them to rank a given number of occupations. Unfortunately there is no possibility to link this index with information available in the SHIW survey.

10. Duncan 1961 was the first one to propose an index of occupational prestige obtained as linear combination of these two variables. In general we must recall that reputational indices and incomes are not independently distributed (see Treiman, 1977). The Duncan index is constructed by giving half-weight to earnings; when constructing the Italian DeLillo-Schizzerotto index, the interviewees were asked to motivate the expressed ordering: the expected income in each occupation was indicated as the first reason for the proposed ordering.

11. Income data are converted in 1998 liras using the CPI inflation index, and then converted into euros to facilitate cross-country comparisons.

12. See Cannari-D'Alessio 1993 and Brandolini 1999.

13. The questionnaire asks "What were the educational qualifications, employment status and sector of activity of your parents when they were your current age?". This attenuates the "life-cycle bias" in measuring intergenerational mobility by keeping constant the age distance between parents and children. See Grawe 2001 for discussion of alternative research strategy on this issue.

14. The Pearson correlation coefficient is 0.93, and the Spearman rank correlation coefficient is 0.94.

15. However when the difference in ranking with the mean income exceeded a value of 30 positions (three cases in bold in Table 7), we have modified the relative ranking in accordance with the mean ranking.

16. The totals of table is lower than the totals of table because we impose the restriction of parents and children being contemporaneously employed.

17. Checchi, D'Agostino and Dardanoni (2001) consider the issue of marriage strategies and its effect on analyzing mobility using also information on mothers and daughters.

18. The territorial disaggregation could be distorted by different patterns of migration, occurred in Italy during the 1950s and the 1960s. However, taking the difference between the region of birth and the region of residence as a potential proxy for migration (and ignoring whether an individual experienced a period of migration out of the birth region), mobility measures are rather similar when either including or excluding permanent migrants.

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