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Social-Origin Inequalities in Educational Careers in Italy Performance or Decision Effects?

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Performance or Decision Effects?*

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Abstract. Class differentials in educational attainment can be seen as a consequence of primary and secondary effects (Boudon 1974). The former,describe the influence of social origin on measured academic ability early in a child's educational career; the latter operate through the choices that students and their families make within the educational system, given the student's level of measured academic ability. In this work we evaluate the relative contributions of primary and secondary effects in creating educational inequalities in Italy at the transitions to upper secondary and tertiary education.

1. Introduction

A notable feature of Italian society is the low average educational attainment in comparison with other late industrial countries (OECD 2009). Over time, the proportion of students obtaining upper secondary education has increased in line with other countries, but the gap between Italy and other nations is still sizable with respect to participation in tertiary education. Italy is also characterized by a low degree of social mobility compared to other European countries (Breen 2004) and the United States (Checchi, Ichino, and Rustichini 1999). Comparative research also points to a high level of inequality of educational opportunity (IEO) in Italy, and although many countries witnessed decreasing IEO over the second half of the 20th century, little change is observed in Italy (Shavit and Blossfeld 1993; Cobalti and Schizzerotto 1994; Shavit and Westerbeek 1998; Breen et al. 2009; Barone 2009). As suggested by Checchi (2003), low intergenerational mobility could be an important limiting factor in educational attainment.

Class differentials in educational attainment can be considered to be a consequence of the operation of primary and secondary effects (Boudon 1974). The former, also known as performance effects, describe the influence of social origin on measured academic ability early in a child's

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educational career: for example, advantaged parents will be better able to sustain and motivate schoolwork and provide a stimulating environment for their offspring. The latter, also known as decision effects, operate through the choices that students and their families make within the educational system, given the student's level of measured academic ability. A rational action approach that assumes that families wish to avoid intergenerational downward mobility (e.g., Goldthorpe 1996; Breen and Goldthorpe 1997) provides a theoretical explanation for the evidence that, at given levels of ability, schooling decisions vary by social background.[1]

In this work we evaluate the relative contributions of primary and secondary effects in creating educational inequalities in Italy at the transitions to upper secondary and tertiary education. After lower secondary education, students can choose between a variety of programs, broadly classified into *lyceums* (constituting the academic track) and technical and vocational schools that are more oriented toward the labor market. In the empirical analysis of the first transition (to upper secondary education), we analyze the divide between the academic track and other educational programs; despite all children with an upper secondary school diploma having access to university, continuation rates are much higher for those from the academic track. For the later transition we consider whether students enroll in university within three years of attaining the diploma.

Given the absence of longitudinal educational surveys in Italy, the empirical analyses are based on a cross-sectional repeated survey of secondary school graduates carried out by the National Statistical Institute for the purpose of investigating transitions to tertiary education and the labor market after upper secondary education. The survey has been conducted every three years since 1998 on approximately 20,000 respondents per graduation cohort, and it collects information on individual educational careers up to three years after attainment of the diploma. Since children who do not enter upper secondary school or who eventually drop out before attaining the degree are not interviewed, the survey is not perfectly suited for studying transitions from lower to upper secondary school. We can view this issue as a problem of nonrandom sample selection; as we show below, if sample selection is ignored, results are biased. Conventional econometric methods for correcting sample selection bias do not apply to our case, and for this reason, we attempt to solve the problem with a simple ad hoc nonparametric approach by employing additional sources of data. First, we use aggregate administrative information supplied by the Ministry of Education and the population census. Second, we use a cross-sectional survey of a nationally representative sample of young people ages 15–34.[2] However, sample sizes for each birth cohort are small, and for this reason we use these data in an

auxiliary way: (a) to provide information that will allow us to account for sample selection in the graduate survey and (b) to derive a second direct estimate of primary and secondary effects.

In the next section we describe the main features of the Italian educational system. We then review the literature on educational inequality in Italy, before describing the data and variables. Next, we outline the methodological issues faced in the analysis related to specific features of both the available surveys and the Italian educational system. We present results for the transition to upper secondary education and the transition to tertiary education[3]. In our concluding remarks we suggest possible explanations for the high level of IEO in Italy and our findings on the relative importance of secondary effects.

2. The Italian Educational System

Over the last 50 years the Italian schooling system underwent several major reforms that reduced barriers to accessing education and limited its stratification (Cobalti and Schizzerotto 1994). In today's educational system, children enter the school system at age 6 and follow an eight-year compulsory education period, formally divided into two cycles: primary education, lasting five years, and lower secondary education, lasting three. The current system was established in 1962, when the former lower secondary school system, which included an academic track and a dead-end vocational track, was replaced by a unified three-year comprehensive middle school. Since 1923, education had been compulsory up until age 14, but it was only in 1962 that the law was actively enforced. In recent years the school-leaving age was further increased from 14 to 16 (although for the birth cohorts analyzed here, schooling was compulsory only up until age 14).

Lower secondary school ends with a national examination. After this examination, students choose from a variety of upper secondary educational programs, broadly classified into academic, technical, and vocational tracks. There are no performance-related admission restrictions. The academic track includes various types of lyceums: the *liceo classico*, emphasizing humanities; the *liceo scientifico*, favoring mathematics and science; and the *liceo linguistico*, specializing in foreign languages. The sociopedagogical lyceum (formerly called *istituto magistrale*) was originally designed to prepare for primary school teaching. Although university qualifications are now required, until a few years ago this lyceum provided direct access to a teaching career, and for this reason the sociopedagogical lyceum is not always treated as if it is part of the academic track. Given its specific focus, a similar argument also applies to the artistic lyceum. In contrast, technical schools (*istituti*

tecnici) combine general education with vocational training and are considered to be less demanding than lyceums. Lyceums and technical educational programs generally last for five years, while vocational education (provided by *istituti professionali*) lasts for a minimum of three and up to a maximum of five years.[4] After five years of schooling students take a school-type-specific national examination (*esame di maturità*) and eventually attain the upper secondary school diploma.

Upper secondary enrollment has become practically universal. The proportions of students in the different tracks have changed significantly over the last 15 years: the share of children in the academic track has risen from 25 to 31 percent; that in technical, sociopedagogical, and art schools has declined from 53 to 45 percent; and that in vocational education has remained quite stable.

The tertiary-education system in Italy is university based, while higher vocational education is very limited. Access to university, formerly possible only for students with an academic degree, was liberalized in the 1969 reform, which extended eligibility to all those with five-year upper secondary educational qualifications. There are no admission requirements related to previous performance, although transition rates differ markedly between tracks.[5] University degrees have a legal value, in that they certify that the qualification has been attained. The standard required to obtain a degree is officially the same across all higher-education institutions, and as a consequence the prestige of the university awarding the qualification is not particularly important for students' and potential employers' decision processes.

The Bologna process, which aimed to harmonize the structure of university programs across European states, led in 2001 to a major restructuring of the Italian tertiary-education system[6]. This restructuring meant that four- to six-year programs, depending on the discipline, were transformed into three-year undergraduate degree programs and optional two-year master's-level degrees. The shorter time for an undergraduate university qualification was expected to increase enrollment, reduce drop-out rates, decrease inequality of opportunity, and allow faster entrance into the labor market. University attendance indeed witnessed a significant increase immediately after the reform, from 60 to 75 percent, mainly driven by more students coming from the technical track. However, just a few years later enrollment rates fell back to 62 percent, suggesting that the effect of the reform was temporary. Two of the four birth cohorts included in our analysis experienced the postreform system, so despite the very short observation window, we can observe short-term changes in IEO associated with the new arrangement.

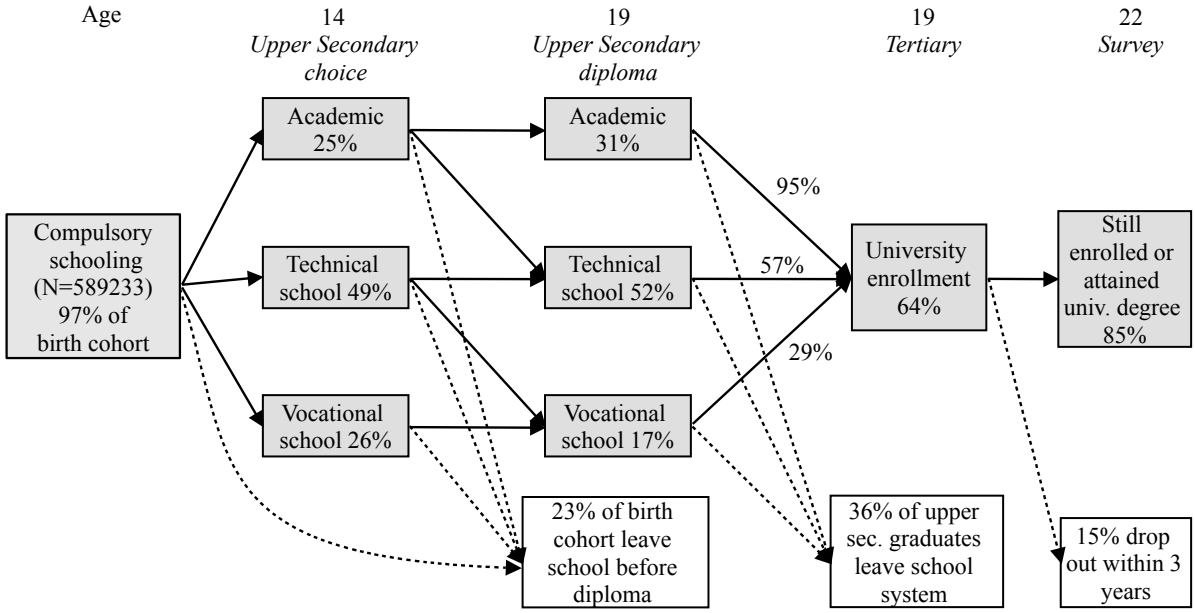
The Italian educational system is in the main a public system, and only a modest share of children attend private schools (in 2002 approximately 7 percent at the primary school level, 3.5

percent at lower secondary level, and 6 percent at upper secondary level). With the exception of a few Catholic schools, Italian private schools at the secondary level provide on average lower-quality education than do public schools, and they often play a remedial role for students from rich families who have been held back by repeating school years (Cappellari 2004; Bertola, Checchi, and Oppedisano 2007; Brunello and Rocco 2008).

It is worth mentioning here that a major problem afflicting the Italian educational system is the large attainment gap between the north and south of the country. Bratti, Checchi and Filippin (2007) report wide differentials in Program for International Student Assessment (PISA) scores and show that the north–south divide is largely attributable to differences in endowments - of individuals, schools, and socioeconomic environment - although there are also differences in school effectiveness between the north and the south.

An overview of transitions occurring throughout the school career for children born in 1985 (the most recent birth cohort of those analyzed here) is shown in Figure 1. According to the population census of 2001, approximately 3.5 percent of the children in this cohort do not complete compulsory schooling, while 23 percent of the birth cohort leave the educational system before attaining the upper secondary school diploma.[7] About 25 percent of students moving to upper secondary education choose the academic track, with vocational schools capturing a similar share, while about half the children opt for technical programs.[8] Among those attaining the upper secondary degree, nearly 31 percent come from the academic track. The difference between enrollment and completion is due to the significantly higher dropout rates observed for the technical and vocational tracks compared to lyceums and to school transfers (usually induced by poor performance, with transfers occurring in the direction of easier educational programs). Overall, 64 percent of those who are eligible enter tertiary education. However, differences between tracks are marked: transition rates vary from over 95 percent for academic track leavers to 29 percent for vocational track leavers. Nearly 15 percent of the children who had enrolled in university report that they have dropped out when interviewed three years after the conclusion of upper secondary education. Although reliable estimates of students leaving the system before they attain a university degree are not available, we believe that this number is considerably larger.[9] Note that Italy lacks a homogeneous body of official statistics on the educational system; for this reason the figures reported in Figure 1 are based on a variety of data sources—administrative and survey data—and therefore full consistency is not assured.

Figure 1. Transitions within the educational system for the 1985 birth cohort



Sources: MIUR. *Dieci anni di scuola statale 1998-2007* (upper secondary choices). Own calculations were based on data of the ISTAT survey *Percorsi di studio e di lavoro dei diplomati* 2007 (upper secondary diploma and tertiary education); data of ISTAT 2001 Population Census (birth cohort size, % leaving before upper secondary diploma).

NOTE: Percentages in boxes refer to the entire cohort at specific ages, with the exception of age 19, where the share of each school track is conditional on enrollment and refers to the 77% who did not leave school before diploma. Percentages in lines between boxes are transition rates of each group.

3. Research on IEO in Italy

The association between social origins and educational attainment seems to be particularly strong in Italy compared to other European countries (Breen et al. 2009) and the United States (Hertz et al. 2008; Checchi, Ichino, and Rustichini 1999). Similarly, in comparative studies, Italy shows a particularly strong association between parents' and child's class position (Breen 2004). Furthermore, Pisati and Schizzerotto show that social fluidity in Italy changed little over the 1980s and 1990s (2004).

Evidence on the evolution of IEO in Italy is inconclusive. Cobalti and Schizzerotto (1993) report no appreciable change in how class inequalities related to the odds of attaining various educational levels for birth cohorts from the 1920s to early 1960s, a conclusion revisited by Shavit and Westerbeek (1998), who find declining effects of father's education on the odds of completing lower levels of the educational hierarchy. These declining effects carried over slightly to the unconditional odds of obtaining an upper secondary school degree, but this did not contribute to an equalization in the chances of attending university. Breen et al. (2009) report a decline in class inequalities in most

European countries, but the change is not statistically significant in Italy. Checchi, Fiorio and Leonardi (2008) show that, despite educational expansion, the differential in the probability of obtaining a university degree related to parental educational levels has not changed substantially over the last 60 years, and Checchi (2003) suggests that this persisting weak intergenerational educational mobility could be the reason for the low level of average educational attainment in Italy.

Several studies focus on upper secondary school transitions. Strong social-origin effects in the type of secondary school attended are reported by Cappellari (2004), Checchi and Flabbi (2007), Mocetti (2008) and Contini and Scagni (2011a). Cappellari employs the first wave of the survey of secondary school graduates that we analyze here and finds that school choices (academic or vocational educational programs, public or private schools) depend heavily on social origin. Checchi and Flabbi (2007) and Contini and Scagni (2011a) exploit PISA data relating to 15-year-olds (Italian children were surveyed one year after tracking had occurred). Checchi and Flabbi (2007) estimate the direct effect of social origin on the probability of entering the academic track, given PISA scores; in comparing Italy and Germany they find higher inequality in the former. Contini and Scagni (2011a) focus instead on total inequality and compare Italy, Germany, and the Netherlands. They observe that Italy falls between Germany (with the highest IEO) and the Netherlands (with the lowest). Using the data of the Italian Labor Force Survey - carried out by the National Statistical Institute – and aggregate administrative data, Mocetti (2008) investigates the determinants of upper secondary school continuation and track choice and finds that school failure is highly correlated with family background and strongly influences later choices. On the whole, the research on transitions to upper secondary school underlines the existence of high social inequalities at this stage of the school career in Italy.

The transition to higher education is investigated by Cappellari (2004), who reports that graduates from the academic track have a higher probability of continuing to tertiary education and perform better in university; on the other hand, attaining a nonacademic type of diploma improves the quality of the school-to-work transition in terms of employment probabilities (but not in terms of remuneration). These results imply a strong indirect effect of social origins on tertiary education operating via upper secondary school choices. He also finds a sizable direct effect of family background. Bratti, Checchi and de Blasio (2008) study the effect of the expansion of higher education on IEO during the 1990s. A much wider range of curricula was established at that time, along with establishment of new institutions in small towns. The authors argue that since the expansion was not based on cost-benefit analyses but consisted instead of the widespread allocation of public funds across regions, it acted as an exogenous policy change. They evaluate whether the increased supply of tertiary

institutions created a higher demand for tertiary education and indeed find that students had an increased probability of enrolling in tertiary education, although they were not more likely to obtain a degree. Middle-class students benefited most from the reform. The impact of the Bologna process is analyzed in Cappellari and Lucifora (2008): since the reform was not anticipated, it represents an ideal social experiment whose effects can be evaluated. The authors find a 10 percentage point rise in the probability of university enrollment among secondary school graduates, with the growth concentrated among students with low parental occupational and educational levels. Although the overall probability of dropping out increased slightly, on the whole the more able students seem to have benefited from the reform.[10]

Research on primary and secondary effects in educational transitions in Italy is limited. Contini and Scagni (2011b) analyze upper secondary transitions; the work presented in this paper employs additional data sources and extends the analysis to tertiary education.

4. Data and Variables

Data

No extensive panel survey providing information on schooling careers is available, and for this reason we use two cross-sectional surveys. The main source is the survey "Percorsi di studio e di lavoro dei diplomati," conducted by the National Statistical Institute (ISTAT) every three years since 1998. Each wave includes data on approximately 20,000 upper secondary school graduates, with the aim of investigating the transition from secondary school to tertiary education and the labor market. Individuals are interviewed three years after the attainment of the diploma and longitudinal information is collected retrospectively. We use data from the 1998, 2001, 2004, and 2007 waves, covering (disregarding repetitions) birth cohorts from 1976 to 1985.[11]

The survey is well suited for studying the transition to university. However, when it comes to investigating the transition to upper secondary education, the sample is self-selected: the entire population of children exiting lower secondary school is of interest, but early school leavers are not interviewed. If dropouts mainly belong to lower social strata, when sample selection is ignored both the social-background differentials in the performance distribution and the effect of social background on school choices will be underestimated. To overcome these problems and account for selection bias, we study the transition to upper secondary school by complementing the ISTAT survey data with (a) aggregate administrative data provided by ISTAT (population census and school-system

administrative data) and the Ministry of Education; and (b) the IARD Socio-Economic and Political Research Institute's survey "Condizione Giovanile in Italia," conducted every four years and including data on young people ages 15–34 (Buzzi, Cavalli and De Lillo 2007). The survey is designed to investigate young people's attitudes and behavior and includes information on school careers. However, final upper secondary grades are not collected, and samples are small.[12] For these reasons we use IARD data in two different ways: (a) to provide information that will be used to account for sample selection in the ISTAT survey and (b) to derive another direct estimate of primary and secondary effects at the first transition, despite sample size problems, for comparison purposes.

Variables: Transition to Upper Secondary School (Age 14)

Dependent Variable

Upper secondary school track (S2). Despite the variety of different educational programs at the upper secondary school level and the broad classification into three tracks (academic, technical, and professional), we follow the common practice of focusing on the divide between the academic track and all other choices, including exit from the system, to allow cross-country comparability. In the academic track we include classical, scientific, and linguistic lyceums.

Explanatory Variables

Performance (A_1). Our measure of academic performance is the result from the lower secondary final examination, a national assessment of all disciplines, administered by a school examination board and an external president nominated by the Ministry of Education. The examination is not standardized, but national guidelines for evaluation are provided to ensure some comparability. Grades follow a coarse four-level scale (pass, good, very good, excellent).[13]

Social background (*SB*). A three-category parental education variable (primary and lower secondary, upper secondary, and tertiary) is defined according to the highest educational level of the parents, whether father or mother.[14] We do not use parental class (as do other authors and our own analyses of tertiary-education transitions), because we cannot obtain the relevant data needed for sample selection correction from official statistics.

Variables: Transition to Tertiary Education (Age 19)

Dependent Variable

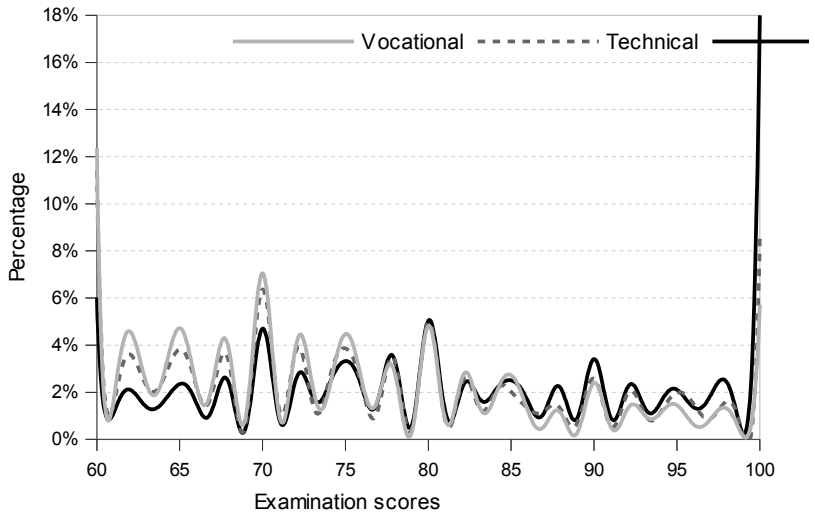
University enrollment (S_3). The dependent variable measures whether the secondary school graduate

entered tertiary education within three years of graduation.

Explanatory Variables

Performance (A_2). As a measure of performance we take upper secondary final-examination scores. Tests are homogeneous throughout the country and are designed and regulated by the Ministry of Education, which also defines broad evaluation criteria. Assessments are designed to correspond to the particular goals of each educational program, so they are school-type specific. Grades range from 60 to 100 for all school types, hence the same score may correspond to quite different levels and kinds of competencies (in Figure 2 we show that final score distributions for 2004 graduates are very similar across tracks). As a consequence, grades are not a good measure of proficiency in and of themselves: grades and the educational programs taken together are a much better signal of student competencies and capacity to successfully complete tertiary education. Upper secondary final-examination scores are affected by another peculiarity compared to the grading systems at work in many other European countries. The grade distributions depicted in Figure 2 are clearly not Gaussian and exhibit strong heaping effects on 10s and in particular on the lowest and highest values: this unusual shape is a strong signal of discretion in grade assignment. This suggests that treating grades as if they had a Gaussian distribution would be inappropriate; thus we do not use the standard methodology described in Erikson et al. (2005) but instead use a nonparametric version.

Figure 2. Upper secondary final-examination score distribution in 2004, by track



Note: Distributions are analytically interpolated to smooth out irregularities.

Upper secondary school degree (S_2).* The attained degree in secondary school is treated as a nominal variable with three levels, corresponding to the academic, technical, and vocational tracks; we distinguish here between technical and vocational programs because they differ greatly in curricular content and in tertiary-education participation rates.[15]

Social background (*SB*). We refer to two alternative indicators: parental education (already described for secondary school transitions) and parental class. Both variables are defined according to the dominance principle: we use either the father's or mother's level, whichever is higher. As regards parental class, we stick as closely as possible to the classification employed by Erikson et al. (2005), which distinguishes the working class, intermediate class, and salariat. We present our results on parental class in the web appendix.

5. Setup of the Analysis

Transition to Upper Secondary Education (Age 14)

We now turn to the setup of the analysis. In this section we provide a brief overview of the methodology employed to decompose overall inequality into primary and secondary effects (fully described in Contini and Scagni, 2011b) and the specific features of the Italian case, and we outline the strategies adopted to overcome sample selection.

Let *SB* be family social background (typically measured by parental education or class), S_2 the upper secondary school track ($S_2 = 1$ for the academic track, 0 otherwise), and A_1 the lower secondary school final-examination grade. Since final grades follow a coarse four-level scale, the commonly applied normal approximation for A_1 proposed by Erikson et al. (2005) is not appropriate. In this context, we decompose the probability P to enter the academic track given social background as follows:

$$P(S_2 = 1 \mid SB = j) = \sum_{A_1} P(A_1 \mid SB = j)\, P(S_2 = 1 \mid A_1, SB = j), \tag{1}$$

whose observed counterpart is the percentage of those belonging to social stratum j enrolling in the academic track. On the other hand,

$$p_{jk} = \sum_{A_1} P(A_1 \mid SB = j)\, P(S_2 = 1 \mid A_1, SB = k) \tag{2}$$

and

$$p_{kj} = \sum_{A_1} P(A_1 \mid SB = k)\, P(S_2 = 1 \mid A_1, SB = j) \qquad (3)$$

are counterfactual, or synthesized, probabilities, the transition probabilities that an individual would experience if he or she had the performance distribution of social class j and the transition probability of social class k (or viceversa). Comparing estimates of p_{jj} and p_{kj} provides information on primary effects, while comparing estimates of p_{jj} and p_{jk} provides information on secondary effects. Differentials between observed and synthesized probabilities are measured by odds ratios and then turned into log odds ratios to allow the definition of an additive decomposition of the total effect of *SB* on S_2 (see Contini and Scagni, 2011b).

We are interested in the entire cohort of lower secondary school leavers; however, since ISTAT data refer to secondary school graduates (excluding dropouts), the derived observed distribution of performance and the distribution of the transition probabilities generally differ from the distributions of interest. This is a problem of nonrandom sample selection: as we show below, ignoring it leads to biased results. Note that conventional methods for the correction of sample selection bias (such as Heckman's procedure) do not apply in our case.[16] In what follows we outline our strategies to overcome these problems.

Performance Distribution

Let G be a binary variable equal to 1 if the child has attained an upper secondary school degree (in any of the available tracks) and 0 otherwise. The observable distribution $P(A_1|SB, G = 1)$ and the distribution of interest $P(A_1|SB)$ are related by

$$P(A_1 \mid SB, G = 1) = P(A_1 \mid SB)\, \frac{P(G = 1 \mid A_1, SB)}{P(G = 1 \mid SB)}. \qquad (4)$$

The two distributions overlap if the probability of graduation is not affected by performance once social background is controlled for, but this would be an unusual situation in practice. Thus, the performance distribution given social background directly derived from the ISTAT survey is likely to be biased: we expect it to overestimate performance, in particular for the lower social strata.

We obtain the distribution of interest by exploiting equation (4). The correction factor cannot be estimated directly with official data: the marginal graduation probability at the national level is

available but not by performance nor by any measure of social background. However, we can derive a rough indirect estimate of $P(A_1|SB)$ by employing aggregate data on lower secondary final grades and parental education (see the web appendix for details).[17] The correction factor can also be estimated with the IARD survey data; moreover, despite small sample size, this survey can be exploited to derive a direct estimate of the distribution of ability.

Transition Probability

We wish to estimate $P(S_2 = 1|A_1, SB)$, but the ISTAT survey provides an estimate of only $P(S_2 = 1|A_1, SB, G = 1)$. The following relation holds:

$$P(S_2 = 1 \mid A_1, SB, G = 1) = P(S_2 = 1 \mid A_1, SB) \frac{P(G = 1 \mid S_2 = 1, A_1, SB)}{P(G = 1 \mid A_1, SB)}. \quad (5)$$

Note that S_2 represents the first choice undertaken after lower secondary schooling (regardless of possible subsequent failures or changes of track). The observed distribution and the distribution of interest coincide if the probability of attaining an upper secondary degree (any degree, regardless of the track) does not depend on which track is first chosen, given performance and social background. Correction factors in (5) are estimated with IARD data: the evidence is that track choice does affect the likelihood of attaining the diploma, even after controlling for social background and previous school performance. These estimates are applied to correct the distribution derived from the ISTAT survey. IARD data are also used to obtain direct estimates of the transition probabilities, although the sample size further reduces (see note 12), because lower secondary final grades are collected only in the year 2000 survey.

Summing Up

Since only upper secondary school graduates are interviewed, the ISTAT survey is affected by sample selection and provides biased estimates of overall inequality and of primary and secondary effects in secondary school transitions. Correction factors derived from (4) and (5) can be estimated with IARD survey data, which, however, suffer from small sample size. Correction factors for the performance distribution are also estimated from official aggregate data and the population census. These factors are combined with the corresponding estimates derived from the ISTAT survey: two final performance distributions and one transition function given performance are produced, giving rise to two alternative estimates of overall inequality and of the relative contribution of primary and secondary effects. A third

estimate is provided by directly employing IARD data. Summarizing, we conducted the analyses using the following combinations of data sources:

a. *Main data source*: ISTAT survey
   Correction factor for the ability distribution: Official data source
   Correction factor for the transition function: IARD survey
b. *Main data source*: ISTAT survey
   Correction factor for the ability distribution: IARD survey
   Correction factor for the transition function: IARD survey
c. *Data source*: IARD survey (no correction needed)

Combining estimates from different sources is obviously not optimal: it involves different nonsampling errors and makes sampling standard errors difficult to evaluate. Nevertheless, we think that the approach is still valuable. First, other options are simply not available. Second, and more importantly, we produce alternative estimates, derived from independent data sources, that can be compared. As we show, the substantive conclusions are quite robust, giving rise to a clear picture of IEO in secondary school transitions in Italy.

Transition to Tertiary Education

All secondary school leavers are eligible for tertiary education in Italy, provided that they have attained a five-year program degree. However, as we have shown above, markedly different transition rates are observed between educational programs: the great majority of academic track school leavers move to university while only a small fraction of students from vocational schools do. As a consequence, when analyzing transitions to tertiary education we should also take the school track into account. As we discussed above, there is an additional reason for doing so; final secondary school scores are not a good measure of proficiency in and of themselves, and to be meaningful they should be considered together with the educational program.

There are two strategies of analysis: we may adopt a conditional perspective, in which previous choices are taken as given, or an unconditional perspective, in which the focus is on overall IEO. We outline these strategies below.

Conditional Analysis

Let S_3 be a binary variable that equals 1 if the student enrolls in university within three years of attaining the diploma and 0 otherwise. The object of interest is $P(S_3 = 1|SB, S_2^*, G = 1)$, with S_2^*

representing the graduation track.[18] We consider past choices (and their outcomes) as given, ignoring IEO in the probability of attaining a secondary school degree in the different tracks and focusing on additional IEO. We accomplish this by separately analyzing school leavers from each track. As we highlighted above, grades in the upper secondary final examination are more comparable within tracks, so they can be used to decompose total inequality into primary and secondary effects in this context.

In general, we expect social background to exert a much weaker influence at this stage. The reason is that the decision to enter tertiary education has largely been anticipated by the choice of secondary school; despite the absence of formal restrictions in university enrollment, families are well aware that the academic track is designed to provide general education and prepare for university, while the other tracks prepare for the labor market. Moreover, by the end of secondary school, children have already been exposed to a selection process, which is stronger for the lower social strata; in fact higher levels of performance and motivation are needed for children of disadvantaged background to successfully complete the more demanding educational programs. Hence social origin should play a more limited role at this point of the educational career.

Unconditional Analysis

There is also an interest in assessing total inequality in tertiary-education enrollment. In this perspective, the aim is to evaluate social-origin differentials:

$$P(S_3 = 1 | SB) = P(S_3 = 1 | SB, G = 1) P(G = 1 | SB) . \quad (6)$$

This analysis also requires us to take sample selection into account. We estimate the probability of entering tertiary education given eligibility from the ISTAT graduate survey data, and we use estimates of the graduation probabilities to account for sample selection (see Table 1).

Primary and Secondary Effects Decomposition

The decomposition for the conditional analysis is based on

$$P(S_3 = 1 | SB, S_2^*, G = 1) = \sum_{A_2} P(S_3 = 1 | A_2, SB, S_2^*, G = 1) f(A_2 | SB, S_2^*, G = 1) \quad \forall S_2^* , \quad (7)$$

while that for the unconditional analysis is based on

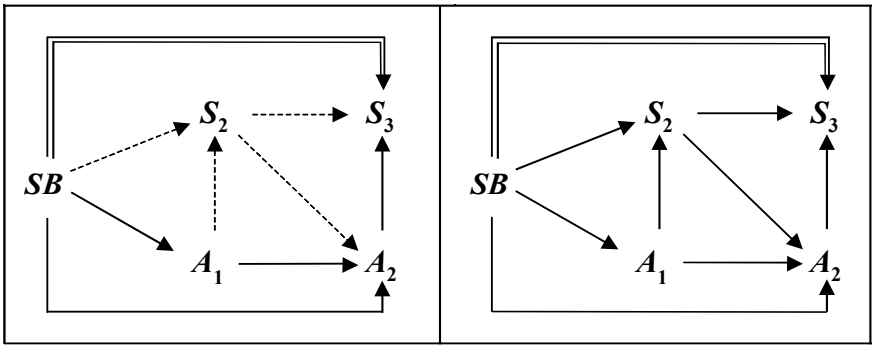
$$P(S_3 = 1 | SB) = \sum_{A_2} \sum_{S_2^*} P(S_3 = 1 | A_2, S_2^*, SB, G = 1) f(A_2, S_2^* | SB, G = 1) P(G = 1 | SB) , \quad (8)$$

where the sum over G is omitted because the transition probability given $G = 0$ is 0.

Changing social background in the tertiary-education transition function given performance provides information on secondary effects; changing it in all other terms provides information on primary effects. From this perspective, *secondary effects* are defined in both the conditional and the unconditional analyses as the net effect of social origin, given past schooling history (educational program and performance) up to the onset of university studies. *Primary effects* are defined by difference.

Consider the charts in Figure 3, depicting all the relevant effects involved in educational choices, at the upper secondary and tertiary levels (to keep the charts simple, let first-choice track S_2 and graduation track S_2* coincide). Social background affects performance and choices at all levels of schooling; performance is affected by social origins and, at the transition to university, by previous performance; and school choices are influenced, besides by social origins, by performance at the time the choice is undertaken.

Figure 3. Primary and secondary effects in tertiary educational transitions



Conditional analysis **Unconditional analysis**

Note: Double solid arrows represent secondary effects, single solid arrows represent primary effects, and dotted arrows represent ignored effects.

When we consider tertiary-educational choices conditional on S_2 (Figure 3, left panel) we implicitly ignore the mechanisms that lead to the choice of S_2 (all the paths going to S_2), how that track affects university enrollment, and how it affects performance at the end of upper secondary school A_2 (all the paths going from S_2). If as we have stated above, secondary effects are defined as the net effect of social background given track and performance, primary effects capture the remaining relations: in this case, the influence of social background on university enrollment S_3 occurring via performance but not via the school track.

On the other hand, all the paths connecting *SB* to S_3 are considered in the unconditional analysis (Figure 3, right panel), which refers ideally to an entire birth cohort of children. If primary effects are defined by difference with respect to secondary effects, primary effects here capture the fact that children from advantaged backgrounds perform better during compulsory schooling, have a higher propensity to choose lyceums because they perform better in compulsory school - but also at given levels of performance - and perform better during secondary school and are more likely to obtain an upper secondary school degree. For all these reasons, they are more prone to enter tertiary education. In this sense, naming these effects primary effects might be somewhat improper, because they incorporate decision effects at earlier stages of the educational career.

6. Probability of Attaining the Secondary School Degree Given Social Background

To correct for sample selection in the ISTAT survey—in the upper secondary education transition and for the unconditional analysis of the tertiary-education transition—we evaluate the correction factors in equations (4), (5), and (6). These are ratios of different versions of the probability of attaining a secondary school degree given social background, measured by the highest parental educational level. No official figures are provided by national institutions, so we have derived our own estimates.[19] The estimation procedure is described in the web appendix and results are reported in Table 1 (upper panel).

Table 1. Estimated probability of attaining upper secondary diploma by parental education (%)

		Parental education			
	Birth cohort	**High**	**Medium**	**Low**	**All**
ISTAT[1]	1976	104	91	49	62
	1979	105	97	56	70
	1982	102	100	53	74
	1985	94	101	56	77
IARD[2]	1975-77	99	85	62	75
	1978-80	96	84	58	73
	1980-82	97	79	57	73

[1] Our own analysis of data from the ISTAT 1998, 2001, 2004 and 2007 surveys and other official data (see web appendix).
[2] Our own analysis of data from the IARD 1992, 1996, 2000 and 2004 surveys (Buzzi, Cavalli and De Lillo 2007). We aggregate contiguous cohorts to raise sample size. Last cohort is omitted because there are no observations

The evidence is striking: the chances of attaining the upper secondary degree (in any of the tracks) are much smaller for those originating from the lowest parental education group, and this result is rather stable over time. Some figures exceed unity: these inconsistencies result from the use of various data sources, each possibly affected by different nonsampling errors[20] (in the analyses that

follow, these values are forced to 1). Estimates derived from IARD data (Table 1, lower panel) are smaller for those originating from the medium parental education group and somewhat larger for those from the lowest group. Although these differences are not negligible, as we see later the corresponding estimates of the transition probabilities, odds ratios and relative importance of primary and secondary effects do not change substantially.

7. Results: Transition to Upper Secondary School (Age 14)

Estimates of the probabilities of entering the academic track by social background are shown in Table 2 (left panel). Given the sample selection problem affecting the graduate survey, direct nonparametric estimates are biased. Hence, we refer to the decomposition used to estimate primary and secondary effects,

$$P(S_2 = 1 \mid SB) = \sum_{A_1} P(A_1 \mid SB)\, P(S_2 = 1 \mid A_1, SB),$$

and apply the sample corrections according to equations (4) and (5) to the raw estimates of the performance and transition distributions based on the ISTAT survey, as described above.[21] These estimates are reported in panels a and b of Table 2; estimates directly derived from IARD data are shown in panel c, where contiguous cohorts are aggregated to increase sample size.

Table 2. Transition rates (%) to the academic track and overall inequality, age 14 (odds ratios vs. low parental education)

Parental education	**Transition rates per Birth cohort**				**Odds ratio per Birth cohort**			
***Panel* (*a*)**	**1976**	**1979**	**1982**	**1985**	**1976**	**1979**	**1982**	**1985**
High	74	79	72	69	29.6	33.5	23.5	21.0
Medium	36	37	36	34	5.9	5.2	5.0	4.8
Low	9	10	10	10	-	-	-	-
***Panel* (*b*)**	**1976**	**1979**	**1982**	**1985**	**1976**	**1979**	**1982**	**1985**
High	74	79	72	71	20.3	30.5	20.3	21.1
Medium	37	36	34	31	4.4	4.5	3.9	4.0
Low	12	11	11	10				
***Panel* (*c*)**	**'75-'77**	**'78-'80**	**'81-'83**	**'84-'86**	**'75-'77**	**'78-'80**	**'81-'83**	**'84-'86**
High	71	77	70	70	20.9	24.6	11.4	13.2
Medium	35	38	33	41	4.1	4.5	2.4	3.9
Low	11	12	17	15				

Panel (a): ISTAT surveys. Performance distribution corrected with official data; transition probability with IARD data
Panel (b): ISTAT surveys. Performance distribution and transition probability corrected with IARD data
Panel (c): IARD surveys: Observed frequencies.

Results are quite consistent in showing that upper secondary school choices are plagued by strong inequality: transition rates to the academic track vary from between 9 percent and 17 percent for those from low parental education households to over 70 percent for those from high parental education households.[22] The corresponding odds ratios are extremely high (Table 2, right panel). For example, take the 1985 birth cohort: the odds of entering the academic track for children from the highest parental education group are 13–21 times more than those of children from the lowest parental education group; when comparing children from medium and low parental education groups the ratio is 4–5. Odds ratios tend to decrease over the decade under study, in particular between the second and third cohort. These observed differences are statistically significant: the log-linear model that posits constant association between parental education and academic track enrollment over time was tested and rejected. The 1985 birth cohort is the first to experience the after-reform system elicited by the Bologna process, so these results provide evidence that the reform has succeeded (although possibly only temporarily) in reducing social-origin inequalities.

To evaluate the relative importance of primary and secondary effects we derive the synthesized transition probabilities according to equations (2) and (3). To illustrate the calculations, let us take the 1985 birth cohort and estimates of Table 2's panel b as an example. The observed transition probability for a child from the highest parental education group is 71 percent, while that for a child from the lowest group is 10 percent. On the other hand, the probability for an ideal individual exposed to the performance distribution of the highest parental education group and the conditional transition probability of the lowest parental education group is 24 percent, while the corresponding probability for a child with the performance distribution of the lowest parental education group and the transition probability of the highest parental education group is 55 percent (see the web appendix). Comparing these figures we see that primary effects are less important than secondary effects, because changes are more substantial when we replace the transition probability than when we replace the performance distribution.

The observed odds ratio is

$$\frac{0.71/0.29}{0.10/0.90} = 21.1.$$

Two alternative decompositions can be obtained:

$$\ln\frac{0.71/0.29}{0.10/0.90} = 3.09 = \ln\frac{0.71/0.29}{0.55/0.45} + \ln\frac{0.55/0.45}{0.10/0.90} = 0.69 + 2.40,$$

$$\ln\frac{0.71/0.29}{0.10/0.90} = 3.09 = \ln\frac{0.71/0.29}{0.24/0.76} + \ln\frac{0.24/0.76}{0.10/0.90} = 2.05 + 1.04.$$

According to the first, the share due to secondary effects is 2.40 / 3.09 = 0.78, and according to the second, it is 2.05 / 3.09 = 0.66; the average share is 0.72.

The full set of results on the relative importance of primary and secondary effects is reported in Table 3. Secondary effects account for over 60–70 percent of the total differential between high and low parental education groups and for 50–70 percent between medium and low education groups, depending on the birth cohort and data sources.[23] We thus conclude that decision-related effects are more important than performance-related effects in shaping social-origin inequalities in upper secondary school choices.

Table 3. Performance and decision effects (%) in upper secondary education transitions, age 14 (odds ratios vs. low parental education)

	Birth cohort	**1976**		**1979**		**1982**		**1985**	
	Parental education	High	Medium	High	Medium	High	Medium	High	Medium
Panel (*a*)	Log OR	3.39	1.77	3.51	1.65	3.15	1.61	3.04	1.56
	Performance	29.6	42.2	31.2	43.5	36.6	50.7	28.7	46.6
	Decision	70.4	57.8	68.8	56.5	63.4	49.3	71.3	53.4
Panel (*b*)	Log OR	2.99	1.41	3.42	1.50	3.01	1.36	3.09	1.39
	Performance	21.1	27.4	27.6	35.5	32.5	40.8	28.0	38.7
	Decision	78.9	72.6	72.4	64.5	67.5	59.2	72.0	61.3
Panel (*c*)	Log OR	3.03	1.52	3.91	1.67	2.88	1.22	2.34	1.16
	Performance	23.8	26.1	24.8	33.6	37.2	52.3	44.1	47.5
	Decision	76.2	73.9	75.2	66.4	62.9	47.7	55.9	52.5

Panel (a): ISTAT surveys. Performance distribution corrected with official data; transition probability with IARD data
Panel (b): ISTAT surveys. Performance distribution and transition probability corrected with IARD data
Panel (c): IARD surveys. Observed frequencies

Primary effects are due to the influence of family background on performance and to that of performance on school choices. Assigning values 1–4 to the grades (pass, good, very good, excellent), we computed standardized mean scores for the children of each parental education group. Between-group variance accounts for 5–12 percent of total variability, and mean scores increase by nearly 1 standard deviation when moving from the lowest to the highest parental education group—a rather

substantial difference—and this gap appears to be fairly stable over time.[24] Therefore, the relative weakness of primary effects observed at this stage does not seem to be due to the capacity of the system to limit performance differentials across social groups.

8. Results: Transitions to University (Age 19)

Conditional Analysis

Tertiary-education participation has increased considerably—in particular for children of low and medium social origin—from the 1982 birth cohort, the first to be affected by the reform enforced in 2001. Transition probabilities to university given eligibility highly depend on social background (Table 4, upper panel). We report here only the results pertaining to parental education, leaving those pertaining to parental class to the web appendix. Note that between-group differences are somewhat more marked if we refer to parental education rather than parental class.

Table 4. Transition rates (%) to tertiary education and overall inequality, given eligibility and conditional on track, age 19 (odds ratios vs. low parental education)

		Transition rates per Birth cohort				Odds ratio per Birth cohort			
Track	**Parental education**	**1976**	**1979**	**1982**	**1985**	**1976**	**1979**	**1982**	**1985**
All	High	89	89	91	90	13.2	14.4	12.9	10.1
	Medium	63	60	68	69	2.8	2.7	2.7	2.5
	Low	38	36	44	47	-	-	-	-
Academic	High	96	98	98	98	2.7	6.7	4.8	6.1
	Medium	94	92	95	96	1.7	1.6	1.9	3.0
	Low	90	88	91	89	-	-	-	-
Technical	High	76	62	75	78	6.4	3.6	4.3	4.2
	Medium	50	47	59	63	2.0	2.0	2.1	2.0
	Low	33	31	41	46	-	-	-	-
Vocational	High	38	40	50	54	2.8	3.8	4	3.5
	Medium	26	26	30	33	1.6	2.0	1.7	1.5
	Low	18	15	20	25	-	-	-	-

The transition probabilities conditional on social origin and upper secondary school track are summarized in Table 4 (lower panels). Given the goals of the various educational programs, between-track differences are large, although substantial differences are observed even within tracks across social backgrounds.[25] Consistently, the odds ratios are still fairly large (although quite unstable), highlighting that although secondary school decisions are made by taking into account current plans

about tertiary education, social background continues to influence educational choices even at later stages of the educational career.

To assess whether the inequalities described above are mainly due to primary or secondary effects, we first analyze the variance of school performance between social groups at the end of secondary school. As we discussed above, final-examination grades reflect performance within tracks but not across tracks, because grades vary in the same range for all educational programs and are awarded in accordance with their specific program goals. Social-background differentials in mean performance within upper secondary school tracks are very small and the percentage of variance between social groups over the total variance is negligible for all cohorts (always <2 percent).[26]

Table 5 shows the primary and secondary effects decomposition based on equation (7), conditional on the school track. At this point of the educational career, inequality is driven almost entirely by secondary effects. Primary effects explain a very modest proportion of total inequality, and in light of the limited performance differentials across social strata, this is hardly a surprising result. This is true in particular for academic track leavers, who are generally focused on entering university, no matter how they previously performed. Note that an estimate lower than 0 for primary effects indicates that the (synthesized) transition rates that a child of a higher class would experience if he or she were exposed to the performance distribution of a lower class are *higher* than the actual rates. Hence, overall inequality is represented in this case by the difference between secondary and primary effects, and the differential in favor of the children from the more advantaged backgrounds can be entirely attributed to secondary effects.[27]

Table 5. Performance and decision effects (%) in tertiary education transitions conditional on track, age 19 (odds ratios vs low parental education)

	Birth cohort	**1976**		**1979**		**1982**		**1985**	
Track	*Parental education*	High	Medium	High	Medium	High	Medium	High	Medium
Academic	Log OR	1.03	0.54	2.07	0.46	1.77	0.65	1.76	0.98
	Performance	-0.3	0.1	0.9	-15.7	16.2	10.5	9.6	7.3
	Decision	100.3	99.9	99.1	115.7	83.8	89.5	90.4	92.7
Technical	Log OR	1.91	0.75	1.44	0.67	1.56	0.65	1.43	0.66
	Performance	11.4	12.5	7.8	4.8	14.7	15.5	15.1	15.6
	Decision	88.6	87.5	92.2	95.2	85.3	84.5	84.9	84.4
Vocational	Log OR	0.93	0.57	1.4	0.7	1.38	0.57	1.25	0.38
	Performance	-5.5	4.8	3.2	4.2	8.2	9.9	11.2	12.9
	Decision	105.5	95.2	96.8	95.8	91.8	90.1	88.8	87.1

Unconditional Analysis

The focus of the unconditional analysis is overall inequality in the transition to the tertiary level. Estimates of the probability of entering tertiary education by parental education with respect to the whole birth cohort are summarized in Table 6 (left panel). Despite the non-negligible discrepancies between the different estimates, the odds ratios describing overall inequality (Table 6, right panel) suggest that social-origin differentials in tertiary-education participation are very large.

Table 6. Transition rates (%) to tertiary education and overall inequality, age 19 (odds ratios vs. low parental education)

	Transition rates per Birth cohort				Odds ratio per Birth cohort			
Parental education	**1976**	**1979**	**1982**	**1985**	**1976**	**1979**	**1982**	**1985**
***Panel* (*a*)**								
High	89	89	91	85	36.7	32.4	33.8	16.1
Medium	58	58	68	69	6.0	5.5	7.1	6.3
Low	18	20	23	26	-	-	-	-
***Panel* (*b*)**				*				*
High	88	85	88	-	24.8	22.4	21.2	-
Medium	54	50	54	-	3.8	3.9	3.5	-
Low	24	21	25	-	-	-	-	-
***Panel* (*c*)**				*				*
High	90	89	86	-	17.5	18.0	17.2	-
Medium	61	59	62	-	4.6	3.2	3.1	-
Low	33	32	26	-	-	-	-	-

* no IARD data available for 1985 cohort.

NOTE: Panel a: ISTAT surveys. Performance distribution corrected with official data, transition probability with IARD data. Panel b: ISTAT surveys. Performance distribution and transition probability corrected with IARD data. Panel c: IARD surveys. Observed frequencies.

Decomposition (8) into primary and secondary effects is carried out with respect to Table 6's panels a and b only: the IARD survey alone cannot be employed for this purpose because upper secondary grades are not recorded. We find that 70–80 percent of the social origin differential in tertiary-education enrollment is related to primary effects, that is, those performance differences that develop throughout the educational career, earlier decision effects, and differential dropout rates. However, a substantial share—between 20 percent and 25 percent—is accounted for by the secondary (or decision) effects occurring after the attainment of the upper secondary school diploma, given track and grades (Table 7).

Table 7. Performance and decision effects (%) in tertiary education transitions, age 19 (odds ratios vs low parental education)

	Birth cohort	1976		1979		1982		1985	
	Parental Education	High	Medium	High	Medium	High	Medium	High	Medium
Panel a	Log odds ratios	3.66	1.83	3.58	1.71	3.33	1.84	2.67	1.76
	Performance	74.2	78.7	73.0	76.2	75.0	77.8	74.1	79.1
	Decision	25.8	21.3	27.0	23.8	25.0	22.2	25.9	20.9
Panel b	Log odds ratios	3.24	1.35	3.20	1.36	3.05	1.26	2.95	1.21
	Performance	70.6	71.3	72.7	72.1	74.3	71.3	75.2	74.8
	Decision	29.4	28.7	27.3	27.9	25.7	28.7	24.8	25.2

NOTE: Panel a: ISTAT surveys. Performance distribution corrected with official data; transition probability with IARD data. Panel b: ISTAT surveys. Performance distribution and transition probability corrected with IARD data.

8. Conclusion

The empirical analyses carried out in this work paint a clear picture of IEO in the Italian educational system. We observe very large inequalities related to social background, at both the level of upper secondary and tertiary education. Only a minority of children from the lowest backgrounds enroll in the academic track; although all upper secondary school degrees provide access to university, completion of the academic track is a strong predictor of tertiary-education enrollment, hence inequality at early stages of the school career carries over to university participation. Furthermore, the probability of not attaining any upper secondary school diploma is much higher for the lowest social-origin group, and despite selection effects in operation up to the end of secondary education, additional inequalities that manifest at this point are still sizable: children from advantaged backgrounds are more likely to continue to higher education even within the group of students who have attained the same type of diploma.

Social-origin inequalities can largely be attributed to secondary effects. The estimated share of secondary effects in determining inequality at the first transition is over 60–70 percent when comparing children from high and low parental education groups and 50–70 percent when comparing those from intermediate and low parental education groups (these represent large percentage shares compared to the estimates for the other countries included in this volume). We conclude that although academic performance at this stage strongly depends on social origin, performance is not the major driving force in generating IEO in upper secondary school choices. As regards tertiary-education transitions, almost the entire social-background differential within tracks can be attributed to secondary effects. This is due to performance differentials between social groups being very small at this stage, because only the

most able children from the least advantaged groups attain a diploma (in particular in the academic track), in contrast to children from the highest groups, in which the majority attain a diploma. When we consider the entire birth cohort (in the unconditional analysis), we estimate that previous choices and performance differentials account for 70–80 percent of the overall inequality; the remaining 20–30 percent, quite a significant share, is attributable instead to social-background differentials in tertiary-education participation, given upper secondary school track and school performance.

Although performance effects are not negligible, large secondary effects call for policies aimed toward reducing social-origin differentials in educational decisions, in particular at the upper secondary school level. Institutional features are potentially relevant, particularly the strong differentiation of the curricula at age 14. An extensive literature provides evidence that early tracking, favoring the role of families in school choices, enhances social-origin inequalities (Ammermueller 2005; Schuetz, Ursprung, and Woessmann 2005; Hanushek and Woessman 2006; Brunello and Checchi 2007). In light of this literature, many scholars advocate the establishment of a comprehensive educational system up to age 16; this would provide general education for all students for a longer time and postpone the moment of choice, leaving more room for the evaluation of children's attitudes and educational aspirations.

The weakly meritocratic character of the Italian educational system is also potentially related to the creation of inequalities, and secondary effects in particular. First, no performance restrictions are applied: all children have access to the academic track at the upper secondary school level, regardless of previous school performance, and all children with a five-year diploma are eligible for tertiary education.[28] Second, the absence of standardized assessments makes evaluations to some extent school dependent, with the consequence that grades and degrees have limited informative power, reducing the chances of all actors involved (children, families, prospective employers) making objective judgments of a child's ability and, hence, fully informed choices. If children and employers are aware that grades and degrees provide imperfect signals of students' competencies, other features will be given more weight in decision processes, reducing the role of performance and possibly enhancing the direct effect of social origin on educational choices and in the labor market (Cipollone and Visco 2007).

In this context there are no strong incentives to perform well in school, and this could be one of the reasons for the unsatisfactory placement of Italy in PISA results (OECD 2006) and Trends in International Mathematics and Science Study (TIMSS; Mullis, Martin, and Foy 2008). As regards incentives to enter the academic track and tertiary education, returns to education in terms of wages are comparatively low in Italy (Cipollone and Visco 2007), and there is evidence that job-status attainment

largely depends on social status (Barbieri, Paugam, and Russell 2000). Hence, despite direct costs of schooling having remained low at all educational levels, opportunity costs are relatively large for those originating in the lowest social groups. On the other hand, children from the most advantaged backgrounds are still encouraged to attain a university qualification, in order not to fall down the social ladder (Breen and Goldthorpe 1997). All these factors contribute to enhancing the role of decision effects rather than performance effects in educational choices and to the creation of large social-origin differentials.

The weakly meritocratic character of the Italian educational system is considered by many scholars to limit both quality and equity, and from this perspective, a reform of the system promoting merit (of students, teachers, and schools) has often been invoked. A key point in this respect is to provide standardized measures of performance, to allow for between-child comparisons. The demand for a move toward accountability is becoming increasingly widespread in the public debate on the Italian educational system. From one perspective it is held that appropriate forms of virtuous competition between schools would foster higher-quality education; from another, the availability of comparable data on child performance would allow the research community to bring the problems of the school system to light and help design adequate policies to overcome them. To this end, an independent evaluation institution was established by the Ministry of Education in 2004.[29] Significant steps toward an accountable educational system have been taken since then. For the first time, in 2010 a set of nationally standardized tests was administered to comprehensive school pupils in different grades, and in the same year a standardized unit was formally included in the lower secondary final examination. Moreover, the full data archive containing test results and contextual information on children, families, and schools is now available. This is a significant improvement, which we hope will have positive consequences for applied educational research in Italy.

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[1] Ability is here understood to be an observed measure of performance (typically grade point average) as opposed to an unobserved measure of cognitive ability, since it is held that it is the former that affects the decision process through the perceived probability of schooling success.

[2] The survey '*Condizione giovanile in Italia*' (Buzzi, Cavalli, and de Lillo 2007) is carried out by the IARD Institute, a private research center that has been conducting research on Italian youth for 40 years.

[3] Additional results are available in the web appendix (http://www.primaryandsecondaryeffects.com).

[4] Most students attaining a three-year-program qualification continue their studies for another two years.

[5] However, in some universities only a predefined number of students are admitted to some study programs (*numero chiuso*). Admission is regulated by ad hoc tests, while upper secondary examination scores are rarely taken into consideration.

[6] The "Bologna Process" formally began in 1999 with the Bologna Declaration, in which 30 countries expressed their willingness to participate in developing an integrated European Higher Education Area, with the aim of ensuring more comparable, compatible and coherent systems of higher education in Europe (www.ehea.info).

[7] Those leaving before attaining the upper secondary school diploma include children who follow vocational programs set up at the regional level, which provide no general education, as well as those attaining a three-year vocational qualification from state-level schools.

[8] We include teaching and art schools in this category.

[9] Official drop-out rates overestimate drop-out rates in the university system because they do not account for transfers across educational programs provided by different schools.

[10] Ballarino and Checchi (2006) address the general issue of inequality in the Italian educational system and offer an overall discussion of results from some of the papers they cite.

[11] The sampling procedure is based on a two-stage random selection, with schools as first-stage and children as second-stage units. In the first stage the sample is stratified with respect to administrative regions, school track, and school size.

[12] The sample is randomly selected, with proportional stratification with respect to region or city of residence, gender, and age. Approximately 3,000 individuals per wave are interviewed, but since the age range is 15–34, any birth year has only a few cases. By pooling data from different waves (1992, 1996, 2000 and 2004 surveys) and aggregating three contiguous birth cohorts to increase the sample size, we obtain 500–1,500 cases per group. However, data on final grades in lower secondary school—necessary to decompose overall inequality into primary and secondary effects—are available only for the survey carried out in 2000. This means that the relevant samples are

further reduced, amounting to approximately 500 cases for the 1975–77 and the 1978–80 birth cohorts and fewer than 250 for the 1981–83 and 1984–86 cohorts.

[13] Since 2008 final grades have followed a pseudo-numerical five-level scale (adding a level to the four-level scale). In the same year a nationally standardized unit was included in final examinations, although its weight in determining the final grade was decided at the school level; since 2010 evaluation criteria are defined at the national level.

[14] In keeping with the definition employed for children, the upper secondary category refers to degrees in any of the tracks.

[15] Again, we include the sociopedagogical lyceum and art school in the technical track.

[16] Heckman's model assumes that sample selection is determined by the outcome of a probit model not dependent on the y of interest and where the unobservable component is correlated with the unobservable component of the model for y. In addition, the probability of entering the sample can be estimated from the available data. Our case differs substantially from this situation in that the selection variable (attainment of the upper secondary diploma) comes logically after the y of interest (upper secondary track), so that the former directly depends on the latter. This implies that (a) the underlying model does not fit and (b) the selection probability model cannot be estimated (if we had the data to model it, there would be no sample selection issue).

[17] The problem is that the graduates' survey provides no information on lower secondary final grades for upper secondary school dropouts. However, a rough estimate of $P(A_1|G = 0)$ can be obtained by exploiting aggregate data on lower secondary final grades and gross graduation rates, combined with an estimate of the lower secondary final grade distribution for graduates. We find that nearly all the children who did not attain the upper secondary school diploma exited lower secondary school with the lowest grade, and that nearly all the children obtaining higher grades eventually graduated. We show that this result implies that $P(A_1|SB)$ can be obtained from $P(A_1|SB, G = 1)$ and $P(G = 1|SB)$. As we have already noted, graduation rates by social background are not available. But graduation probabilities by parental education can be estimated by exploiting the graduates' survey, gross graduation rates, and the marginal distribution of parental education for selected birth cohorts (derived from Population Census data).

[18] S_2* and S_2 differ in that S_2* stands for the graduation track and S_2 is the first enrollment track. Students who change track, while a minority, are quite numerous in Italy.

[19] To be more precise, for the first transition we estimate the graduation probabilities given social background among those who have successfully completed compulsory schooling. Given the low share of dropouts at this stage, estimates change only slightly and are not reported.

[20] All data sources with the exception of the graduate survey cover the whole population of interest; given the survey's large sample size, sampling variability is not a major issue here; standard errors

of the estimates are very small and cannot by themselves explain the inconsistencies (standard errors of the estimated proportions due to sampling variability in the graduate survey do not exceed 0.0001).

[21] In related work (Contini and Scagni 2011b) we consider the role of gender and geographic area, and although both the performance distribution and the transition probability vary with respect to these variables, the overall picture in terms of IEO does not change much. Given the scope of this work, we report here only national-level estimates, for males and females taken together.

[22] These results are consistent with the marginal probability of academic track enrollment having increased over time: although the probabilities conditional on parental education do not change much over the period of interest, the distribution of parental education varies in that the proportion of students originating from higher education households increases (see web appendix).

[23] We do not calculate standard errors for the relative importance of primary and secondary effects because the procedure outlined recent, unpublished literature does not fit our case. First, the method applies to simple random samples; standard errors are underestimated in complex sampling designs in which first-stage sampling units are schools. Second, performance scores have to be approximated by a normal distribution, but as shown above, this is not feasible in our case. Third, since we use combinations of different sources of data to correct for sample selection, a proper extension of the method is by no means straightforward. In support of the substantive validity of our results, note that results do not vary greatly across birth cohorts (for which independent samples were drawn) and data sources.

[24] These results are detailed in the web appendix.

[25] Note that the share of vocational track leavers coming from the uppermost stratum is very small.

[26] See the web appendix for evidence on performance differentials at this stage.

[27] Consider the comparison between medium and low parental education groups for the 1979 birth cohort. The figure of 115.7 percent indicates that the odds ratio pertaining to secondary effects is larger than the odds ratio measuring total inequality.

[28] Contini and Scagni (2011a) analyze whether access restrictions reduce IEO. By comparing German states with and without restrictions, they show that there is evidence in favor of the thesis, although no general conclusions can be drawn from a theoretical point of view.

[29] INVALSI (Istituto Nazionale Valutazione del Sistema Educativo di Istruzione e di Formazione).