

Determined to Succeed? Performance, Choice and Education

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Chapter Six

**Social origin inequalities in educational careers in Italy.
Performance or decision effects?**

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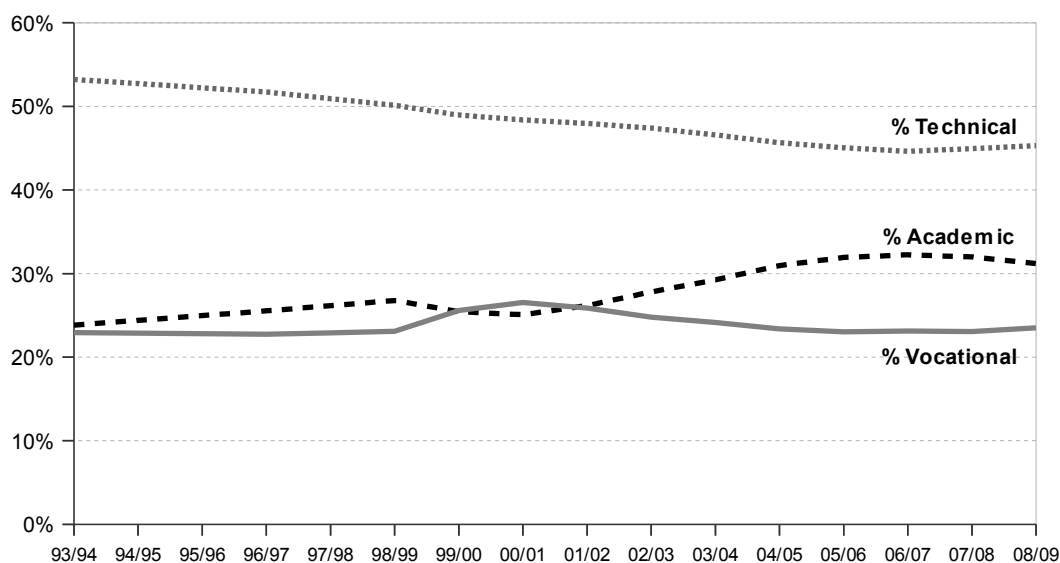
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Web Appendices

APPENDIX A – The Italian school system over time

Upper secondary school enrollment has become practically universal in the last two decades. From the beginning of the 1990's to 2005 there has been a steady decline of the proportion of children in the technical track, although this is still the track chosen by the largest number of children. Conversely, from year 2000 the share of students choosing the academic track has increased significantly (Fig. A.1).

Figure A1. Composition of the enrolled into upper secondary education by track, 1994-2009

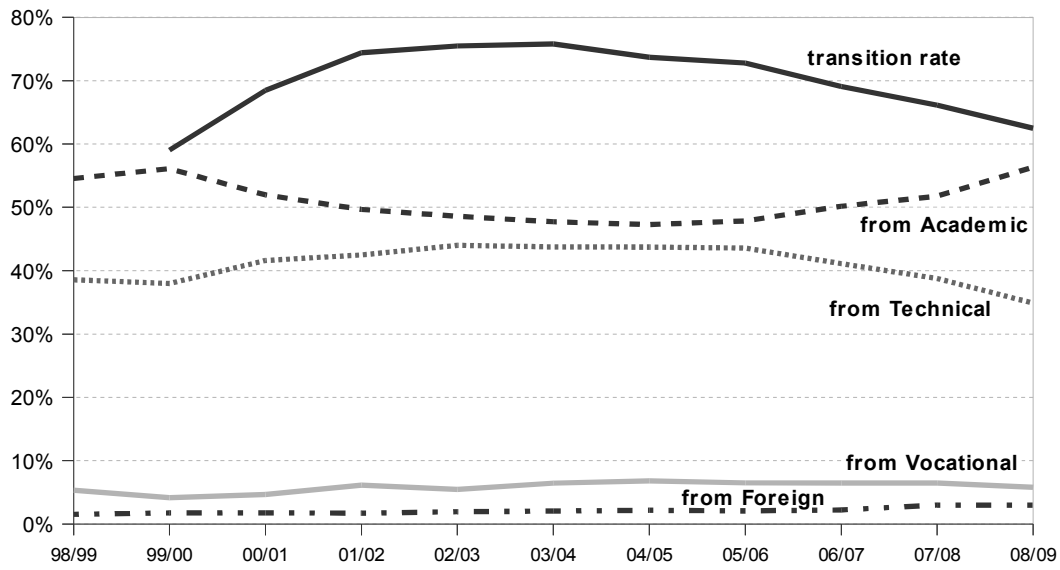


Source: Computed from Ministry of Education data
Socio-pedagogical lyceum and art schools included in the technical track

University attendance increased significantly after the reform of tertiary education originated from the Bologna process and applied in 2001¹. This expansion was mainly driven by larger enrolment rates of students coming from the technical track. However, enrolment started decreasing again just a few years later, suggesting that the effect of the reform was only transitory (Fig. A.2)

¹ Programs previously lasting 4 to 6 years, depending on the field of study, were transformed into 3-year undergraduate degrees and optional 2-year master level degrees. The shorter time required to achieve undergraduate university qualifications was expected to increase enrolment, reduce drop-out rates, decrease inequality of opportunity and allow for faster entrance into the labor market.

Figure A2. Transition rates to tertiary education and composition of the enrolled by upper secondary school track, 1998-2009



Source: Computed from Ministry of Education data

APPENDIX B – Descriptive statistics

Table B1. Social background distributions in the samples and in the Population Census (relative distributions) (%)

Birth cohort	1976	1979	1982	1985
Parental education (ISTAT sample)				
High	12	13	17	16
Medium	36	39	44	48
Low	52	48	39	36
Parental education (IARD sample)¹				
High	15	16	23	21
Medium	33	39	38	42
Low	52	45	38	37
Parental education (Census)²				
High	7	9	12	13
Medium	21	25	33	37
Low	72	66	55	50
Parental class (ISTAT sample)				
Salariat	18	20	23	21
Intermediate	53	51	52	52
Working	29	29	26	27
Par. educ*class (ISTAT sample)				
High/Salariat	10	10	13	12
Medium/Salariat	2	3	3	4
Low/Salariat	0	0	0	0
High/Intermediate	7	7	9	9
Medium/Intermediate	25	26	28	30
Low/Intermediate	5	6	7	8
High/Working	2	2	0	0
Medium/Working	26	22	20	18
Low/Working	24	23	19	19
Sample size (ISTAT)	18843	23262	20408	25880
Sample size (IARD)¹	1444	1214	786	669
Sample size (IARD)¹	529	465	269	166
For prim/sec decomposition (survey year 2000 only)				

¹ IARD cohorts: 1975-77; 1978-80; 1981-83; 1984-86

² 1991 Population Census for birth cohorts 1976 -79. 2001 Population Census for birth cohorts 1982-85

Table B2. Parental class

<i>Parental Class</i>	<i>Job types</i>
Salariat*	University professors, professionals, secondary school teachers, managers and executives
Intermediate*	Infant and primary school teachers, high or medium qualification office workers, company owners*, partners in family owned or mutual companies, small farmers
Working	All dependent and self-employed manual workers without any specific qualification

* Data provided by the National Statistical Institute do not distinguish between large and small company owners. According to the EGP classification, the first should be included in the *salariat* class, the second in the intermediate class. Since owners of small companies are much numerous than those of large companies, we classify all company owners as belonging to the intermediate class.

APPENDIX C – Sample selection correction (performance distribution)

The observable distribution of lower secondary final examination grades $P(A1|SB, G=1)$ and the distribution of interest $P(A1|SB)$ are related by:

$$P(A1 | SB, G = 1) = P(A1 | SB) \frac{P(G = 1 | A1, SB)}{P(G = 1 | SB)}$$

The correction factor cannot be estimated directly with official data: the marginal graduation probability is available, but not by performance, nor by any measure of social background. However, as we show below, we can provide a rough indirect estimate of it. The IARD survey can also be exploited, as it provides information on the attainment of the upper secondary school diploma, so that estimation of the correction factor is straightforward. However, the relevant samples are small: for this reason we derive parametric estimates of $P(G=1|A1,SB)$ and $P(G=1|SB)$ from binary logit models . The estimates are reported in the web Appendix.

Correction factor estimation with administrative data

If we combine the ISTAT survey on upper secondary graduates with official data (provided by the National Statistical Institute itself and by the Ministry of Education) on lower secondary final grades and gross graduation rates, we can derive a rough estimate of the lower secondary proficiency distribution for the children who do *not* attain the upper secondary school diploma. We exploit the relation:

$$P(A1)=P(A1|G=1)P(G=1)+P(A1|G=0)P(G=0)$$

The marginal graduation rate $P(G=1)$ can be estimated with administrative data collected on a regular basis. The lower secondary final examination grade distribution $P(A1)$ is not recorded regularly: data are available for birth years 1982 and 1985, but not for the two eldest cohorts. The corresponding distribution for those who attain the upper secondary diploma $P(A1|G=1)$ can be estimated from the ISTAT survey (which, we recall, has a large sample size).

For birth cohorts 1982 and 1985 we find:

	1982	1985
$P(A1=pass G=0)$	0.965	1.080
$P(A1=good G=0)$	0.050	0.030
$P(A1=very\ good G=0)$	0.005	-0.060
$P(A1=excellent G=0)$	-0.020	-0.050

Very small negative values may arise because different data sources are employed. These figures

show that drop-outs are almost entirely drawn from the population of children who obtain the lowest grade in lower secondary school. This result implies that nearly all the children with higher proficiency levels eventually graduate². Assuming that this result also holds for the two oldest cohorts, if $P(G=1|A1,SB)=1$ for $A1=good$ to *excellent*, then:

$$P(A1|SB) = \begin{cases} P(A1|SB, G=1)P(G=1|SB) & \text{if } A1 = \textit{good to excellent} \\ 1 - \sum_{\substack{\textit{excellent} \\ \textit{good}}} P(A1|SB, G=1) & \text{if } A1 = \textit{pass} \end{cases}$$

Consequently, in order to derive the distribution of interest we only need to evaluate $P(G=1|SB)$. This cannot be done directly, because, as we have said, administrative sources do not report graduation rates by social background. Hence, we exploit the following relation:

$$P(G=1|SB) = \frac{P(SB|G=1)P(G=1)}{P(SB)}$$

We estimate each term from different data sources:

- $P(SB|G=1)$ is derived from the ISTAT survey on graduates;
- $P(G=1)$ is the graduation probability at the national level, computed as the ratio of the number of graduates (data directly obtained from the Statistical Office of the Ministry of Education) to the number of births 19 years before (source: ISTAT, *Annuario di Statistiche Demografiche*). We assume a nil net migratory flux in-out the country. $P(SB)$ is the national distribution of the highest parental educational level for each birth cohort, derived from the 1991 and the 2001 Population Census (1991 Census for birth cohorts 1976 and 1979; 2001 Census for cohorts 1982 and 1985)³.

² Incidentally, note that this evidence is not fully supported by IARD data: although almost all of those with *very good* and *excellent* grades attain the upper secondary school diploma, around 20% of those with *good* grades do not.

³ The correction factor to be used in the first transition refers to the children who have obtained the lower secondary education qualification; since the relevant social background distribution cannot be obtained directly because of the lack of data, it is derived by attributing all the children not attaining the qualification (approximately 3.5%) to the lowest social background group. According to the estimates reported in the upper panel in Table 6.1, almost all the students from the upper and middle groups attain the upper secondary diploma: *a fortiori*, this should be true for the lower secondary degree.

APPENDIX D – Transition to upper secondary school

Table D1. Standardized mean of performance scores at age 14 by parental education

<i>Panel (a)</i>	1976	1979	1982	1985
High	0.94 (1.12)	0.85 (1.07)	0.77 (1.04)	0.58 (1.09)
Medium	0.46 (1.14)	0.37 (1.15)	0.35 (1.09)	0.31 (1.07)
Low	-0.23 (0.92)	-0.25 (0.99)	-0.38 (0.97)	-0.39 (0.98)
<i>variance between (% of total variance)</i>	15.0%	14.1%	19.1%	15.5%
<i>Panel (b)</i>	1976	1979	1982	1985
High	0.64 (1.13)	0.78 (1.07)	0.72 (1.04)	0.65 (1.02)
Medium	0.21 (1.13)	0.24 (1.15)	0.20 (1.11)	0.18 (1.03)
Low	-0.13 (1.04)	-0.20 (0.99)	-0.28 (0.96)	-0.30 (0.96)
<i>variance between (% of total variance)</i>	5.1	9.5	12.0	11.3
<i>Panel (c)</i>	1976	1979	1982	1985
High	0.49 (1.03)	0.62 (1.09)	0.51 (1.11)	0.52 (0.99)
Medium	0.15 (1.10)	0.19 (1.02)	0.10 (1.05)	0.10 (1.00)
Low	-0.26 (1.04)	-0.42 (0.95)	-0.45 (0.95)	-0.46 (1.09)
<i>variance between (% of total variance)</i>	8.0%	15.2%	14.1%	13.9%

*marks have been assigned values: 1=pass, 2=good, 3=very good, 4=excellent

**standard deviations in parenthesis

Panel (a): ISTAT survey. Performance distribution corrected with official data; transition probability with IARD data

Panel (b): ISTAT survey. Performance distribution and transition probability corrected with IARD data

Panel (c): IARD survey: Observed frequencies.

Table D2. Observed and synthesized transition probabilities given parental education at age 14 (%)

		Decision		
		High	Medium	Low
1976 Birth cohort		High	50	28
Performance	High	75	38	19
	Medium	68	28	12
	Low	61		
1979 Birth cohort		High	48	29
Performance	High	78	36	19
	Medium	69	25	11
	Low	60		
1982 Birth cohort		High	45	29
Performance	High	71	31	18
	Medium	58	22	12
	Low	48		
1985 Birth cohort		High	42	25
Performance	High	70	30	16
	Medium	59	21	11
	Low	52		

Panel (a): ISTAT survey. Performance distribution corrected with official data; transition probability with IARD data

		Decision		
		High	Medium	Low
1976 Birth cohort		High	47	25
Performance	High	74	37	18
	Medium	69	29	12
	Low	65		
1979 Birth cohort		High	48	29
Performance	High	79	36	19
	Medium	72	26	11
	Low	65		
1982 Birth cohort		High	46	29
Performance	High	72	34	19
	Medium	63	23	11
	Low	54		
1985 Birth cohort		High	42	24
Performance	High	71	31	17
	Medium	63	22	10
	Low	55		

Panel (b): ISTAT survey. Performance distribution and transition probability corrected with IARD data

		Decision		
		High	Medium	Low
1976 Birth cohort		High	48	22
Performance	High	75	40	18
	Medium	67	31	13
	Low	58		
1979 Birth cohort		High	50	24
Performance	High	85	38	17
	Medium	78	26	10
	Low	70		
1982 Birth cohort		High	49	36
Performance	High	75	37	25
	Medium	67	24	15
	Low	54		
1985 Birth cohort		High	52	37
Performance	High	69	41	27
	Medium	59	28	18
	Low	43		

Panel (c): IARD survey: Observed frequencies.

APPENDIX E – Transition to tertiary education

Table E1. Standardized mean of performance scores at age 19 by track and social background

Track	Parental education	Birth cohort			
		1976	1979	1982	1985
Academic	High	0.11	0.18	0.17	0.10
	Medium	-0.03	-0.10	-0.07	-0.04
	Low	-0.07	-0.05	-0.14	-0.10
	<i>variance between (% of total variance)</i>	<i>0,5%</i>	<i>1.5%</i>	<i>1.6%</i>	<i>0.6%</i>
Technical	High	0.25	0.12	0.10	0.14
	Medium	0.07	0.03	0.01	0.04
	Low	-0.06	-0.03	-0.04	-0.09
	<i>variance between (% of total variance)</i>	<i>0,7%</i>	<i>0.2%</i>	<i>0.2%</i>	<i>0.6%</i>
Vocational	High	-0.09	0.11	0.15	0.07
	Medium	0.04	0.05	0.03	0.02
	Low	-0.01	-0.02	-0.03	-0.02
	<i>variance between (% of total variance)</i>	<i>0,1%</i>	<i>0.1%</i>	<i>0.2%</i>	<i>1.0%</i>
Track	Parental class	Birth cohort			
		1976	1979	1982	1985
Academic	High	0.06	0.07	0,10	0.08
	Medium	-0.05	-0.05	-0,08	-0.05
	Low	0.01	-0.04	-0,05	-0.06
	<i>variance between (% of total variance)</i>	<i>0,3%</i>	<i>0.3%</i>	<i>0,7%</i>	<i>0.4%</i>
Technical	High	0.18	0.08	0,05	0.10
	Medium	-0.06	-0.02	-0,02	0.01
	Low	0.03	0.00	-0,04	-0.04
	<i>variance between (% of total variance)</i>	<i>0,6%</i>	<i>0.1%</i>	<i>0,1%</i>	<i>0.2%</i>
Vocational	High	0.02	0.06	0,02	0.05
	Medium	0.02	0.02	0,03	0.04
	Low	-0.02	-0.03	-0,04	-0.03
	<i>variance between (% of total variance)</i>	<i>0,0%</i>	<i>0.6%</i>	<i>0,1%</i>	<i>0.1%</i>

Table E2. Probability of entering university given eligibility by social background, age 19 (%)

Parental education	Birth cohort			
	1976	1979	1982	1985
High	89	89	91	90
Medium	63	60	68	69
Low	38	36	44	47

Parental class	Birth cohort			
	1976	1979	1982	1985
Salariat	80	77	85	86
Intermediate	54	52	62	65
Working	35	34	43	47

Parental educ*class	Birth cohort			
	1976	1979	1982	1985
High/Salariat	91	92	92	93
High/Intermediate	84	80	85	85
High/Working	50*	33*	76*	79*
Medium/Salariat	73	70	77	79
Medium/Intermediate	64	60	68	70
Medium/Working	44	45	53	57
Low/Salariat	45	37*	54*	57*
Low/Intermediate	42	40	49	52
Low/Working	33	32	39	43

*fewer than 100 cases (0.5% of the sample)

Table E3. Transition to tertiary education and overall inequality conditional on track, age 19 (Odds ratios vs. low parental class)

Track	Parental class	Transition rates per Birth cohort				Odds ratio per Birth cohort			
		1976	1979	1982	1985	1976	1979	1982	1985
Academic	Salariat	95	97	98	98	2.3	4.1	4.5	5.7
	Intermediate	93	92	94	95	1.5	1.7	1.3	2.4
	Working	90	87	92	89	-	-	-	-
Technical	Salariat	63	52	69	73	3.8	2.6	3.3	3.0
	Intermediate	43	41	54	59	1.7	1.7	1.7	1.6
	Working	31	30	41	47	-	-	-	-
Vocational	Salariat	31	32	42	47	2.6	2.7	3.2	2.7
	Intermediate	25	21	27	31	2.0	1.5	1.6	1.4
	Working	14	15	19	25	-	-	-	-

Table E4. Performance and decision effects (%) in tertiary education transitions conditional on track, age 19 (odds ratios vs working parental class)

<i>Birth cohort</i>		1976		1979		1982		1985	
<i>Parental class</i>		Interme-		Interme-		Interme-		Interme-	
Track	<i>Parental class</i>	Salariat	diate	Salariat	diate	Salariat	diate	Salariat	diate
Academic	Log OR	0,89	0,47	1,27	0,42	1,52	0,29	1,73	0,86
	Performance	-1,8	-4,8	-0,9	-5,6	9,0	-6,3	6,5	1,8
	Decision	101,8	104,8	100,9	105,6	91,0	106,3	93,5	98,2
Technical	Log OR	1,37	0,54	0,98	0,54	1,20	0,54	1,10	0,48
	Performance	9,3	4,4	4,5	-1,9	6,1	-2,4	11,7	7,4
	Decision	90,7	95,6	95,5	101,9	93,9	102,4	88,3	92,6
Vocational	Log OR	0,81	0,66	1,06	0,51	1,12	0,45	0,97	0,29
	Performance	1,0	0,7	1,9	1,6	2,3	6,7	8,7	24,0
	Decision	99,0	99,3	98,1	98,4	97,7	93,3	91,3	76,0