CHAPTER 9

Returns to Education in Italy: A Review of the Applied Literature

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1 Introduction

The current education system in Italy is composed of primary, lower secondary, upper secondary and tertiary education. Primary school is compulsory for children aged between 6 and 11 years. Lower secondary education is also compulsory, free of charge and lasts three years. Post-compulsory education is differentiated into the following categories: classical, scientific and pre-school teacher training; artistic education; technical schools and vocational education. Upper secondary education lasts from three to five years, depending on the type of school. Since 1969, the selection of the type of school does not preclude access to tertiary education.

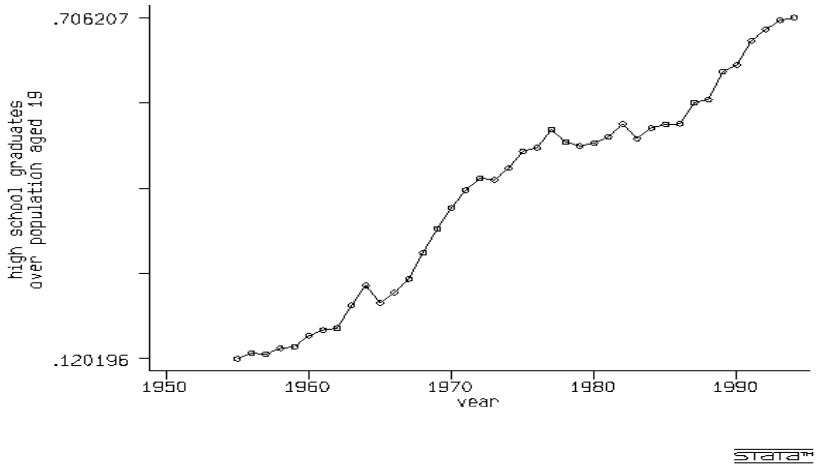
Major post-war reforms of the education system in Italy are the 1962 reform of compulsory schools, the 1969 liberalisation of access to tertiary education and the 1985 reform of the primary school system. Graduation from upper secondary schools requires a leaving certificate examination and access to tertiary education is only conditional on passing this exam.

In the last decades, Italy has experienced a generalised increase in the level of education. In the early 1950s less than 25 per cent of the population in schooling age (over 6 years old) had completed compulsory schooling (junior high school). It took the 1962 reform of junior high schools and an additional eight years to get close to 100 per cent in the percentage of graduates among 11 year old individuals (see Figure 1). The percentage of high school graduates increased sharply, from less than 15 per cent in the early 1950s to close to 70 per cent in the 1990s (see Figure 2). After the reform of the criteria regulating access to college in 1969, the percentage of college graduates increased only mildly. While the percentage of individuals enrolled in college increased, graduation rates remained low because the average duration of completed spells before graduation increased (see Figure 3).

The growth in the percentage of individuals with a secondary (and college) education over the years, however, was not enough to close the educational gap between the North and the South of the country (the North being on average more educated than the South). Conversely, the educational gender gap progressively decreased, with a growing proportion of women enrolling in upper secondary schools and obtaining a diploma.

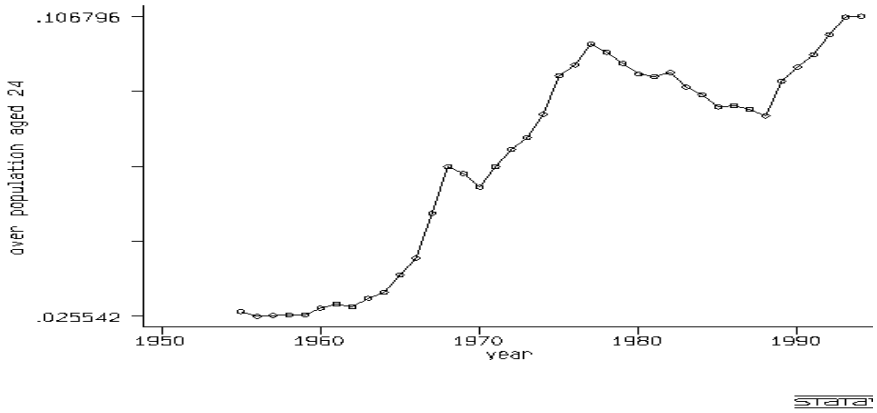
Figure 1. % aged 14 with junior high school diploma

Figure 2. % aged 19 with high school diploma



Economists try to measure school quality by looking both at the inputs and the outputs of the schooling system. Starting with the inputs, commonly used measures include public (and private) educational expenditure, the pupil/teacher ratio, the intensity of schooling,

Figure 3. % aged 24 with college diploma



often proxied by the length of the school term, and average annual teachers' salary. *Ceteris paribus*, a higher expenditure on education, a lower pupil/teacher ratio, a longer term and a higher average teachers' salary are expected to improve the average quality of education. In particular, an increase in expenditure or a decrease in the pupil/teacher ratio improve the quality of instruction and lead to higher returns for each year of completed education. An increase in term length increases the amount of material covered in a school year and thereby increases the economic value of additional years of schooling. Finally, higher teacher salaries lead to improved classroom instruction by motivating teachers to perform well.

Public expenditure on education as a proportion of GDP in Italy is close to 5 per cent. While expenditure per student for primary and secondary education relative to per capita GDP is higher than the OECD average, it is lower than the OECD average for tertiary education. Turning to the pupil/teacher ratio, this ratio in Italy is about half as large as the OECD average ratio for primary schools and slightly higher than half for secondary schools. Next, consider some indicators of the intensity of schooling. According to the OECD, Italian primary and secondary schools are second only to Sweden in the relatively low numbers of hours taught per year. At the same time, average teachers' starting and maximum salaries as a percentage of GDP per capita are relatively low by European standards (see OECD, 1995).

Turning to the results of the education process, the level of attainment in Italy is dramatically lower than the OECD average. In 1992, the share of Italians aged 25 to 34 with an upper secondary education was 42 per cent, compared to 65 per cent for the OECD (inclusive of Italy). The difference was even sharper for individuals aged 45 to 54. In this age group, only 21 per cent had an upper secondary degree, compared to 50 per cent in the OECD, on average.

Another useful measure of the performance of the education system is the percentage of graduates in the population at theoretical age of graduation. Strikingly, close to 70 per cent of individuals at theoretical age of graduation had completed an upper secondary education in Italy in the early 1990s, compared to an average of 85 per cent in the OECD. For tertiary education, these percentages were, respectively, 10.5 in Italy and 20.8 for the OECD average.

These differences are partly explained by the very high drop-out rate in the Italian system. According to a study by CENSIS (1992), in a cohort of 100 individuals entering the first year of lower secondary education, only 80 individuals enrol in upper secondary schools. Of these, 49 graduate after five years and 33 enrol in a university course. Among those entering tertiary education, only 10 individuals graduate.

The importance of drop-outs in the Italian system is also highlighted by the net enrolment rate in schools by individuals aged 16 and 17. While in Italy only 6 teenagers out of 10 are still in school at 16, this proportion is close to 9 for the OECD average. The high drop-out rate in the Italian educational system could be interpreted as an indicator of the system being very competitive and selective. This is hardly the case, however. Given the relatively low private cost of education, we speculate that many teenagers enrol only temporarily in school because of the problems they encounter in finding a satisfactory job match in the labour market. When an acceptable job offer turns up, they simply drop out of school.

The evidence discussed so far suggests that the Italian educational system uses substantial resources to produce disappointing results in terms both of intensity of education and graduation rates. According to a recent report by the Italian Association of Employers (Confindustria, 1998), this outcome is partly to be attributed to the lack

of competition both among schools and pupils, to excessive red tape and centralisation and to poor personnel management.

Even a very broad evaluation of the performance of the education system in a country requires that we consider the interaction between schooling and labour market performance. In most developed countries, individuals with a lower level of educational attainment are more likely to be unemployed than those with a higher level of attainment. This is apparently not the case for Italy, however, where individuals aged 14 to 25 experience substantially high unemployment rates, quite independently of the level of education. In this context, (expected) returns to education have not offered great advantages in terms of job opportunities and remuneration (OECD, 1999).

A number of empirical studies, in recent years, have studied the returns to education in Italy. This chapter reviews the main results of available applied research. It is probably worth stressing that while education is an important aspect of human capital, 'off-the-job' and 'on-the-job' training are also key determinants of human capital accumulation. Despite substantial theoretical research on the relationship between training and wages, however, very little has been done to evaluate the returns to training in Italy, mainly because of the lack of data. Henceforth, we shall restrict our attention to the empirical evaluation of economic returns to education.

Research on these issues has made significant progress – in the Italian context – in the past few years, both in terms of data used and in terms of empirical methodology. While the studies carried out in the late 1980s and early 1990s were based on OLS estimates and on unrepresentative data sets, recent studies use nationally representative samples and employ more suitable econometric techniques, such as IV (instrumental variables) methods. The key result of the most recent crop of studies is that the estimated (private) returns to education are significantly higher than previously suggested.

The remainder of this paper is organised as follows. Section 2 presents an overview of the Italian literature. Section 3 describes the data. Section 4 identifies the methodological options and shows the estimation results. Section 5 is devoted to a brief illustration of the changes over time in the returns to education and Section 6 concludes.

2 Overview of the literature

The literature concerning empirical analysis of the economic returns to education, in recent years, has expanded significantly mainly due to improved access to better-quality data as well as to a more appropriate methodology of investigation. We document this evolution by reporting, in Table 1, the main features of the available empirical research. While some contributions focus explicitly on the issue at hand, other contributions have a different focus but also present empirical estimates of earnings functions that include education as an explanatory variable. We look at them in order.

The studies devoted to estimating the (private) returns to education deal in an explicit way with methodological issues and try to disentangle the effects of education from those of other (mainly unobservable) factors affecting economic returns (such as individual ability). This group of studies includes Cannari and D'Alessio (1995), Colussi (1997) and Brunello and Miniaci (1999).

Other studies discuss the returns to education as a by-product of broader issues. Antonelli (1987), for instance, studies the transition from school to work in a large Italian region (i.e. Emilia Romagna located in Central Italy) and runs earnings regressions both for the private and the public sector. The study of wage differentials in the private and public sectors is the focus also of Brunello and Dustmann (1996).

Another line of research has looked at regional wage differentials. Cannari, Pellegrini and Sestito (1989) estimate standard Mincer earnings functions by region. Manacorda (1996) considers the evolution of earnings differentials in the North and the South of Italy and tries to explain it as the result of the interaction between the supply and demand for education. Lupi and Ordine (1999) study regional wage differentials using quantile regressions, based upon partitions of the empirical distribution of wages.

Yet another angle of research is wage differentials by firm size. Both Lucifora (1993b) and Brunello and Colussi (1998) estimate earnings functions to explore the relationship between earnings and firm size. Gender earnings differentials is the topic studied by Biagioli (1989), Ghidoni (1989), Lucifora and Reilly (1990), Erickson

Table 1. Data set description

Authors (year)	Data set	Years	Estimated equations	Number of obs.
Antonelli (1987)	Federindustria (Emilia Romagna)	1977	Private sector: 1419 obs. Public sector: 375 obs.	1795
Biagioli (1989)	Unità Sanitaria Locale	1983	Males: 280 obs Females: 462 obs	742
Ghidoni (1989)	Personal survey	1983	Males: 271 obs Females: 115 obs	386
Cannari, Pellegrini & Sestito (1989)	B. I.	1986	Sample used for all the specifications: 5650 obs	5650
Lucifora & Reilly (1990)	ENI-IRI	1985	Males: 18549 obs Females: 4223 obs	22772
Sestito (1990)	B. I.	1977/1987	From 2325 in 1977 to 5305 in 1987	-
Lucifora (1993b)	ENI-IRI, Mediobanca	1985	5 different sectors	19318
Erickson & Ichino (1992)	B. I.	1978-1987	(For 1987) Males: 3192 obs Females: 1797 obs	-
Cannari & D'Alessio[1] (1995)	B. I.	1989/1991 /1993	Panel 1989-1991: 334 obs 1993: 2041 obs	-
Brunello & Dustmann (1996)	B.I.	1993	Public sector: 935 obs Private sector: 1382 obs	2317
Manacorda (1996)	B. I.	1977-1993	North: 1817-3746; South: 508-1569	-
Flabbi (1997)	B. I.	1991	Males: 3801 Females: 1933	-
Colussi (1997)	B. I.	1993	North-Centre: 1498 South-Isles: 817	2315
Brunello & Colussi (1998)	B. I.	1993	Large firms: 633[2] Small firms: 777[2]	1410
Brunello & Miniaci (1999)	B. I.	1993-1995	Mixed sample for 1993,1995: 2943 obs Panel(1991-1995): 590 obs	-
Lupi & Ordine (1999)	B.I.	1995	Quantiles by region	1554[3]

Notes: [1] Cannari and D'Alessio (1995) consider three separate sub-samples: male full-time full-year employees in the 1989-1991 panel (334 obs); male full-time, full-year employees aged from 16 to 30 and still living with their parents (520 obs); 1993 household heads younger than 60 (2041 obs).

[2] Firms with less than 100 employees are small firms; firms with at least 100 employees are large firms.

[3] Males and females aged at least 17 and working in the private sector.

and Ichino (1992) and Flabbi (1997). Biagioli (1989) investigates the structure of wage differentials within a large state-owned service firm (i.e. national health) and considers earnings differentials by occupation and gender. Ghidoni (1989) and Lucifora and Reilly (1990) fit separate earnings regressions for men and women and use a standard Oaxaca decomposition to measure discrimination. Lucifora and Reilly (1990) also control, in their estimates, for female occupational intensity and try to capture the effect of gender occupational distribution (segregation) on wage determination. A comparison between Italian and US labour market performance can be found in Erickson and Ichino (1992), who focus on how labour market institutions affected earnings differentials by skill during the period 1978 to 1987. Finally, Flabbi (1997) evaluates the robustness of the frequent result that female returns to schooling in Italy appear to be higher than male returns.

3 The data

As shown in Table 1, the data set used by most of the reviewed studies is the *Bank of Italy Survey on Household Income and Wealth (BI)*. This is the only micro data set available for a reasonable period of time (1977–95) that covers the entire nation and includes information on schooling. The data are cross-sections but a panel component has been added since 1987, based on a sub-sample of individuals re-interviewed in later surveys.

Information on educational attainment in the survey consists of the highest degree attained at school. There is no direct information on the number of years spent at school. Given that irregular students are frequent in Italy and that the expected duration of a college degree is much higher than the statutory duration, the computed number of years spent in school, the standard variable used in earnings functions, carries an important measurement error, especially for higher educational attainment.

The measure of earnings available in the BI data set is annual earnings net of taxes (both payroll and income taxes). Additional information on the average number of hours worked per week and on the number of months worked per year can be used to construct an estimate of the hourly net wage, the measure used by

most empirical studies. The Bank of Italy has run this survey since 1965. Information before 1977, however, is not reliable and difficult to obtain. The survey has been carried out on a yearly basis until 1987 (with the exception of 1985) and every two years afterwards.

Table 1 reports the years of the BI data used in the estimates carried out in each single study. In most cases, the authors use the core labour force, consisting of 18 to 65 year old males working as employees the whole year in the non-agricultural sector. The sample size of the BI data has sensibly increased over the years: it was about 3,000 households in 1983, 4,000 households in 1984 and doubled to over 8,000 from 1986 onwards. The size of the panel component was about 1,200 households in 1987–89, 2,200 in 1989–91 and over 3,500 in 1991–93 and 1993–95.

Some of the authors listed in the table use different data sets that are less representative of the whole economy. Antonelli, for instance, uses regional data (Emilia Romagna, collected in 1977). Biagioli (1989) uses data collected from a large firm operating in the national health sector. Ghidoni (1989) uses an ad hoc data set for men and women employed in the Modena area in 1983. Lucifora and Reilly (1990) and Lucifora (1993b) use a data set based upon the ENI and IRI earnings surveys, which were discontinued in 1986 and covered only the manufacturing sector.

4 Estimated returns to schooling

We distinguish between two generations of studies. The first generation overlooks the fact that differences across individuals in (unobserved) ability and quality can affect in a significant way the estimated returns to education. The second generation, in line with more recent international research, tackles this issue head on.

Table A1 of the Appendix is devoted to the first generation of studies on the returns to education in Italy and lists the explanatory variables used in each earnings regression. As mentioned above, the dependent variable is based on net rather than gross earnings, because only the former measure is available in the raw data. As previously discussed, the range of control variables included in the empirical specifications is quite varied and the results

Table 2. Estimation results from OLS regressions[a]

Authors (year)	Variables[b]									
	Year	S	Exp	Exp^2	T	T^2	A	A^2	Sub-sample used	[c]
Antonelli (1987)	1977	4.9	5.5	-0.08	-	-	-	-	Private sector: 1419 obs	P
		4.7	3.4	-0.05	-	-	-	-	Public sector: 375 obs	
Biagioli (1989)	1983	5.46	-	-	0.91	0.013	-	-	All: 742 obs	
		6.00	-	-	1.30	0.023	-	-	Male: 280 obs	O
		3.52	-	-	1.99	-0.05	-	-	Female: 462 obs	
Ghidoni (1989)	1983	2.21	2.21	-0.02	-	-	-	-	Male: 271 obs	O, I,U F
		1.37	0.94	-0.01	-	-	-	-	Female: 115 obs	
Cannari, Pellegrini & Sestito (1989)	1986	4.62	4.98	-0.08	-	-	-	-	All: 5650 obs	O,I,H,P,G
Sestito (1990) & (1992)	1977/ 1987	4.5/ 2.7	2.6/ 4.3	-0.19/ -0.07	-	-	-	-	2325/5305	P,G[d]
Lucifora & Reilly (1990)	1985	3.55	1.49	-0.02	-	-	-	-	Male: 18549 obs	P,O,I[e]
		3.92	1.48	-0.01	-	-	-	-	Female: 4223 obs	
Lucifora (1993b)	1985	4.5	1.7	-0.02	-	-	-	-	All: 19318 obs	O,S,F
Erickson & Ichino (1992)	1978/	3.5/ 2.9	3.4/ 4.1	-0.03/ -0.05	-	-	-	-	Male: 1767/ 3192 obs	P[d]
	1987	3.7/ 3.0	1.8/ 3.0	-0.02/ -0.05	-	-	-	-	Female: 838/ 1797 obs	
Brunello & Colussi (1998)	1993	4.0/ 5.0	-	-	-	-	2.0	-0.01	Large Firms: 663 obs	I,G,T
		2.0/ 3.0	-	-	-	-	3.0	-0.03	Small Firms: 777 obs	

Notes: [a] All the coefficients reported in the table have been multiplied by 100. All the paramenters are significant at the 1% level.

[b] S=schooling (in years); Exp=Experience; Exp^2=Experience squared; T= Tenure; T^2=Tenure squared; A=Age; the A^2=Age squared.

[c] Additional control variables in the specification reported are: O=occupation dummy; P=EXP is potential experience; I=sector of activity; industry; U=unionisation; F=firm characteristics; H=position in the household; G=geographical dummies; T=town size

[d] Coefficients range within the time period considered.

[e] Regressions also control for 'female occupational intensity' (i.e. proportion of females in narrowly defined occupational categories).

sults concerning the returns to human capital variables are in part affected by the choices made. In order to highlight the range of estimates obtained in these early contributions, in Table 2 we present the results of parameter estimates limited to education, experience and tenure. In this table, education is measured by the number of years required to complete a degree. The studies that use education dummies rather than years of schooling are reported in Table 3.

Starting with the illustration of Table 2, Cannari, Pellegrini and Sestito (1989) investigate and discuss methodological aspects of the earnings function approach and test among different functional forms using a Box-Cox transformation. Their findings confirm the results by Heckman and Polachek (1974) that the best empirical specification has a semi-logarithmic form. In their general specification they use dummies to control for industry, region, town size, occupation, gender and position in the household. They also use the two-step Heckman estimation procedure to address the endogenous selection of industry. This methodology is standard in the empirical literature and applies when some attribute (such as industrial sector) is not assigned but chosen by individuals. According to their estimate, one additional year of schooling increases hourly earnings by 4.6 per cent.

Lucifora (1993b) estimates an augmented earnings equation by including both the standard human capital variables and the following set of firm characteristics: profits per employee, sales per employee, value added per employee and the capital-labour ratio. His results show that large firms and firms with higher capital-labour ratios pay, on average, more than other firms. He also shows that the key determinants of earnings are schooling, product market structure and the firm's financial structure. His estimated return to schooling is 4.5 per cent per year of school, very close to the value found in the previous study.

Brunello and Colussi (1998) use BI data for 1993 to estimate earnings functions by firm size. They consider the endogenous allocation of workers by firm size by estimating both a probit and a multinomial logit, that includes self-employment as an option, and estimate earnings functions by firm size after including the estimated inverse Mills' ratio to correct for the endogenous selection of firm size by employees. One finding of the study is that the returns to education are higher for workers employed in firms

with more than 100 employees (in the range of 4 to 5 per cent per year) than for workers employed by firms with fewer employees (in the range of 2 to 3 per cent). They also find that individuals with higher educational attainment are more likely to work in larger firms and less likely to be self-employed.

The other studies in the table obtain estimates of the returns to education ranging from the relatively low 2 per cent for males in Ghidoni (1989) to the relatively high 6 per cent for males by Biagioli (1989). These differences are driven, at least in part, by differences in the data being used. One interesting feature of these estimates is that in a number of cases the marginal return to education is higher for females than for males.

Table 3. Estimation results from OLS regressions

Authors (year)	**Variables**[a]								
	Year	S[b]				Exp	Exp^2	Sub-sample used	[c]
		I	II	III	IV				
Manacorda (1996)	1977/ 1993	-4.2/ 31.8	8.1/ 42.5	12.9/ 53.9	59.5/ 25.0	-	-	N1817/ 3746	O,I[d]
		-1.7/ 28.8	6.1/ 33.4	13.0/ 40.4	13.1/ 47.9	-	-	S508/ 1569	
Brunello & Dustmann (1996)	1993	-	9.4	23.6	45.9	2.7	-0.04	Public sector	O[e]
		-	10.7	19.8	37.3	2.3	-0.03	Private sector	

Notes: All the parameters are significant at the 1% level.

[a] S=level of education; Exp=Experience; Exp^2=Experience squared; T=tenure; T^2=tenure squared; A=age; A^2=age squared.

[b] Levels of education: I: Primary, II: Junior High, III: Secondary, IV: Tertiary.

[c] See footnote c in Table 2.

[d] Manacorda uses 4 age ranges rather than age. Noschool is in the constant term. N in the column of sub-samples means North, S means South. The table gives the parameter range within the time period considered.

[e] Primary school in the constant term.

Turning to Table 3, that lists studies using educational dummies, Brunello and Dustmann (1996) estimate (gross) earnings in the private and public sectors in Italy and Germany and explicitly model the selection of employees to each sector. They use the same set of regressors in the two countries and produce a standard Oaxaca decomposition of earnings differentials. There are two interesting findings: first, the returns to education in Italy are larger in the private sector than in the public sector, especially for tertiary education. In particular, they estimate that four years of college add more than 20 percentage points to the expected returns to education in the private sector, which is equivalent to about 5 per cent a year. Expected returns in the private sector are lower for upper secondary education that adds about 14 percentage points in 5 years of school (less than 3 per cent per year). Second, there is some evidence that the estimated earnings profiles are not very stable over time.

Manacorda (1996) investigates the evolution of regional wage differentials from 1977 to 1993 and studies the impact of personal characteristics on these differentials. In the table we report the range of estimates (min/max) for the period under consideration, separating out the returns in the North and the South of Italy. The empirical evidence shows that the returns to education are higher in the Northern regions for lower education levels and lower for higher educational attainment levels and that these differences are statistically significant.

Table 4 and Table A2 of the Appendix are devoted to the second generation of studies that use instrumental variable methods to estimate returns to education. The idea is simple. If individual earnings are affected both by measured ability (education) and unobserved ability, then given that observed and unobserved ability are correlated the standard estimates of returns to education are biased. The bias can be avoided if there are valid instruments that are correlated with education and uncorrelated with earnings. When ability is time invariant, the bias can also be avoided by using longitudinal data, that follow individuals over time, and by taking first differences which difference out the fixed individual effects.

Table A2 of the Appendix lists the explanatory variables used in these studies, including the instruments used, whereas Table 4 shows the key estimated coefficients, separately for studies using IV estimates and for studies using panel data. Cannari and D'Alessio (1995) use family background variables (mother, father, the spouse's

age and education) to instrument education, measured by years of education. Family background is a valid instrument if it affects wages only indirectly, by affecting educational achievement. They show that the IV estimates of returns to education are significantly higher than the OLS estimates, thus confirming the standard result in the literature (see Card, 1994, for a review). Similar results are obtained by Colussi (1997), who uses IV methods and a similar set of instruments (mother's and father's age and education and a dummy indicating whether or not the individual went to school during the years 1942–48, during and just after the last war).

Table 4. Estimation results from IV regressions

Authors (years)	Variables[a]						
	Year	Levels of education				Exp	Exp^2
		S	Junior High	Secon-dary	Tertiary		
IV Estimates							
Cannari & D'Alessio (1995)	1993	5.03	-	-	-	-	-
		6.08	-	-	-	-	-
Flabbi (1997)	1991	2.2F 1.7M	-	-	-	0.86F 1.04M	-0.016F -0.020M
		5.6F 6.2M	-	-	-	0.84F 1.78M	-0.05F -0.021M
Colussi (1997)	1993	6.2	-	-	-	2.9	-0.03
		7.6	-	-	-	2.0	-0.01
Brunello & Miniaci (1998)	1993-1995	-	9.6	26.7	58.5	-	-
		-	15.1	36.4	73.5	-	-
Brunello & Miniaci (1999)	1993-1995	4.8	-	-	-	-	-
		5.7	-	-	-	-	-
Panel Data							
Cannari & D'Alessio (1995)	1989/ 1991	4.3	-	-	-	-	-
		3.44	-	-	-	2.91	-0.042
Brunello & Miniaci (1998)	1991/ 1995	-	18.17	40.0	68.79	-	-

Table 4. (continued)

Authors (years)	Variables[a]						
	Year	T	A	A^2	Method	Sample size	Notes[b]
IV Estimates							
Cannari & D'Alessio (1995)	1993	-	2.5	-0.017	OLS	Sample C, 2041 obs	[c]
		-	2.3	-0.013	IV	Sample C, 2041 obs	
Flabbi (1997)	1991	0.5F 0.3M	-	-	OLS	974 F 2085 M	[d]
		0.5F 0.2M	-	-	IV	974 F 2085 M	
Colussi (1997)	1993	-	-	-	OLS	2315 obs	I,P,G,O
		-	-	-	IV	2315 obs	
Brunello & Miniaci (1998)	1993-1995	-	1.2	-0.1	OLS	2943 obs	G
		-	1.3	-0.1	IV	2943 obs	
Brunello & Miniaci (1999)	1993-1995	-	1.2	-	OLS		
		-	1.2	-	IV		
Panel Data							
Cannari & D'Alessio (1995)	1989/1991	0.5	5.21	-0.052	OLS	668 obs	G[e]
		0.42	-	-	OLS	668 obs	
Brunello & Miniaci (1998)	1991/1995	-	-0.26			590 individuals; 770 obs	

Notes: [a] S=schooling in years; Exp=experience; Exp^2=experience squared; T=tenure; A=age; A^2=age squared;

[b] Equation augmented by: I=sector of activity, Industry, G=geographical dummies, P= Exp is potential experience, O= occupational rank.

[c] Cannari & D'Alessio (1995) consider three separate sub-samples: male full-time full-year employees in the 1989-1991 panel (334 obs); male full-time full-year employees aged from 16 to 30, still living with their parents (520 obs); 1993 household heads younger than 60 (2041 obs)

[d] F: females, M: males.

[e] Cannari & D'Alessio estimate alternative specifications, using either Exp or Age.

Flabbi (1997) also uses IV methods to check the robustness of the frequent finding that female returns to schooling are higher than male returns. He uses two exogenous events, *province* (i.e. province of birth) and *reform* (i.e. the reform of the Italian schooling system of 1962) as instruments of schooling and finds that, after controlling for the endogeneity of education, men turn out to have higher returns to schooling than women. Brunello and Miniaci (1999) combine both exogenous events (the 1962 reform and the 1969 reform of access to college) and family background variables as instruments and find that the estimated return to schooling is higher with IV estimates. More in detail, they find that the use of instrumental variables increases by close to 20 per cent the estimated marginal return to schooling.

Brunello and Miniaci (1998) use the methodology discussed by Vella and Gregory (1996) and Harmon and Walker (1995) and apply it to cross-sectional BI data for 1993 and 1995 (i.e. the latest available survey). Their technique consists of two stages. In the first stage, they estimate the assignment of individuals to educational attainment levels using an ordered probit model. In the second stage, they augment the standard earnings function with the estimated score and apply OLS. They use educational dummies and find that OLS significantly underestimates the returns to education. This study also uses panel data for the years 1991, 1993 and 1995 and finds that wage differentials by education increase with individual age. This result indicates that education generates permanent and increasing earnings differentials.

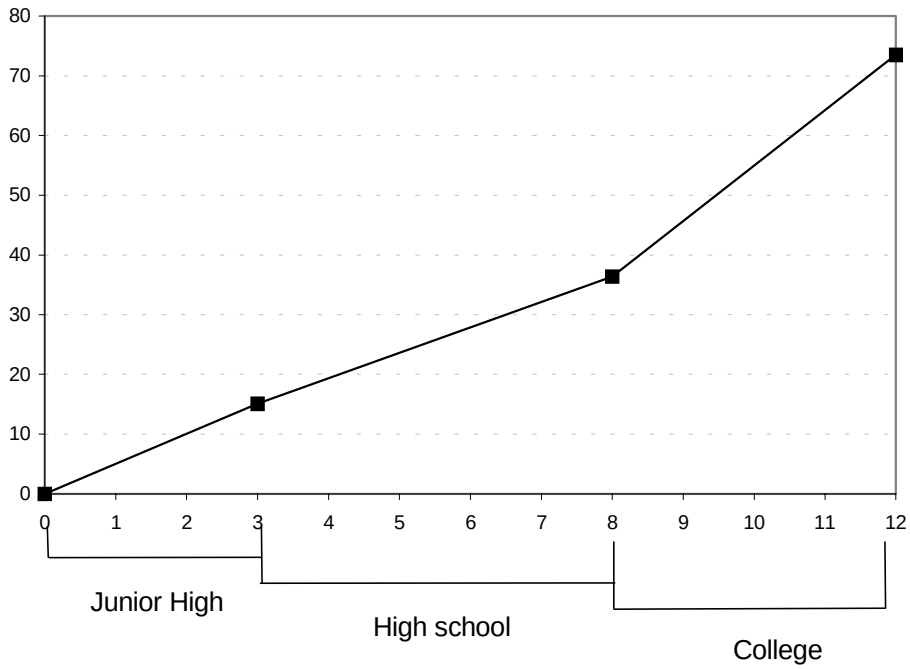
To conclude, the available IV estimates of returns to years of schooling range in this literature from 5.7 per cent in Brunello and Miniaci to 6.2 per cent for males and 5.6 per cent for females in Flabbi, to 6.1 per cent in Cannari and D'Alessio, and to 7.6 per cent in Colussi. Estimated returns are lower when longitudinal data are used. In particular, Cannari and D'Alessio (1995) find that the expected return from an additional year of schooling can be as low as 4 per cent. With the exception of Flabbi, the percentage gap between IV and OLS estimates in these studies ranges between 19 and 23 per cent, slightly lower than for the US, where it ranges from 28 per cent to 33 per cent (see Card, 1994).

Using years of schooling as a measure of accumulated human capital can be overly restrictive when marginal returns are not con-

stant but vary with the level of schooling. As shown in Figure 4, empirical estimates by Brunello and Miniaci (1998) suggest that the average expected return from a year of tertiary education is 7.9 per cent, much higher than the expected return from a year in upper secondary school (4.3 per cent) and in junior high school (5 per cent).

A cursory comparison with the estimated returns to schooling in the United States shows that the returns estimated for Italy are sensibly lower. According to Card (1994), IV estimates of the marginal return to a year of education in the US range from 6.6 per cent to over 15 per cent.

Figure 4. Marginal returns to additional levels of education in Italy in 1993



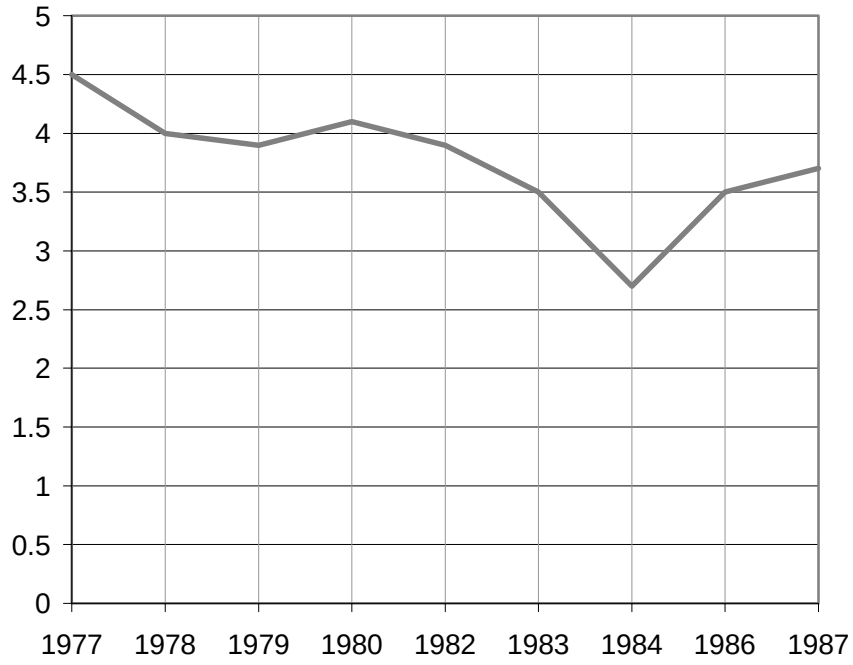
Note: Excluded education category: elementary or less.
Source: Brunello and Miniaci (1998)

5 Changes over time in the estimated returns to education

Is there any evidence that the estimated (private) returns to education have changed over time? In a study carried out in the early 1990s, Sestito (1992) estimates the returns to years of education using the BI dataset for the period 1977 to 1987. As illustrated in Figure 5, he finds evidence that these returns have mildly declined over time, and especially so in 1984. Whether these differences are significant remains, however, an open issue in the absence of statistical confidence intervals about the estimated parameters.

Manacorda (1996) presents estimates over time of the returns to college education in the Northern and Southern regions of Italy. As illustrated in Figure 6, there is some evidence of a decline in these returns in the North. Returns in the South are more or less

Figure 5. Returns to education in Italy, 1977-1987



Source: Sestito (1992)

Figure 6. Percentage of returns to tertiary education: North vs South

Note::::::Excluded education category: noschool.
Source: Manacorda (1996)

Figure 7. Returns to tertiary education in Italy: Men vs. Women

Note: Excluded education category: high school.
Source: Erickson and Ichino (1992)

flat. In contrast, Erickson and Ichino (1992) find that returns estimated for males and females have mildly increased over the years (see Figure 7).

6 Concluding remarks

Applied research on the economic effects of education has made significant progress in recent years both in terms of data used and methodology employed. In this study we have reviewed the literature on the returns to education for the Italian labour market. Early studies were mainly based on unrepresentative data sets and had clear methodological limitations. More recent research, conversely, has used nationally representative data and more suitable econometric techniques, thus providing more reliable results.

The general picture that emerges from the Italian empirical literature shows a substantial stability in the returns to education over time and, *ceteris paribus*, moderate earnings differentials across different educational levels. The results also point to the existence of substantial dispersion of returns across various groups of individuals. Returns to education in Italy appear to differ by gender, by sector (public, private) and by region (North, South). In particular, there is some evidence that the returns are higher for females as compared to males. This difference, however, significantly declines when the endogeneity of educational choice is explicitly taken into account. Also, it emerges that the private sector grants higher educational wage premia as compared to the public sector, especially for tertiary education. Regional differences underline higher returns in Northern regions particularly for lower educational levels.

Finally, as suggested by those studies having used IV estimation techniques and panel data, it appears that unbiased estimates of returns are higher than suggested by the first generation studies, though still lower than those generally reported for the US. The above evidence has frequently been explained by referring to institutional aspects that characterise the educational system and wage formation in Italy. In particular, it has been argued that the prevalence of both widespread public education and national collective agreements significantly contributed to shape the structure of the returns and to reduce wage dispersion.

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Appendix

Table A1. Specification and variables used in OLS estimations

Variables	Authors (year)					
	Antonelli (1987)	Biagioli (1989)	Ghidoni (1989)	Cannari Pellegrini Sestito (1989)	Sestito (1990) (1992)	Lucifora Reilly (1990)
Dependent variable used	Log of annual earnings	Log of annual earnings	Log of monthly earnings	Log of net annual earnings	Log of net annual earnings	Log of gross actual yearly earnings
Gender				x		
Age					x	
Age Squared					x	
Year Of Education	x	x	x	x	x	x
Levels Of Education	x	x				
Potential Experience[1]	x			x	x	x
Potential Experience Squared	x			x	x	x
Experience	x	x	x			
Experience Squared	x	x	x			
Tenure		x				
Tenure Squared		x				
Job Qualification	x	x	x	x	x	x
Sector Public/Private			x			
Firm size						x
Region				x	x	
Sector of activity/ Industry			x	x		x
Other		x	x	x		x

Note:::[1]::Potential experience = [Age – years of schooling – 6]

Table A1. (continued)

Variables	Authors (year)						
	Lucifora (1993b)	Erickson Ichino (1992)	Brunello Dust-mann (1996)	Mana-corda (1996)	Brunello Colussi (1998)	Lupi Ordine (1999)	Brunello Miniaci (1999)
Dependent variable used	Log of gross annual earnings	Log of net annual earnings	Log of net hourly wage	Log of net annual earnings	Log of net hourly wage	Log of net hourly wage	Log of net hourly wage
Gender	x					x	
Age				x	x		x
Age Squared					x		x
Year Of Education	x				x	x	x
Levels Of Education		x	x	x			
Potential Experience[1]	x	x	x				
Potential Experience Squared	x	x	x				
Experience						x	
Experience Squared							
Tenure						x	
Tenure Squared							
Job Qualification	x		x	x		x	
Sector Public/Private				x		x	
Firm size	x					x	
Region				x	x		x
Sector of activity/ Industry	x			x	x		x
Other	x		x	x	x	x	x

Note:::[1]::Potential experience = [Age – years of schooling – 6]

Table A2. Variables included in the IV estimations

	Cannari & D'Alessio (1995)	Flabbi (1997)	Colussi (1997)	Brunello & Miniaci (1998)	Brunello & Miniaci (1999)
Variables:					
Dependent variable	log hourly net wage	log annual net earnings	log hourly net wage	log hourly net wage	log hourly net wage
Age	x		x	x	x
Age Squared	x		x	x	x
Marital Status			x		
Years Of Education	x	x	x		x
Level Of Education				x	
Potential Experience[1]	x		x		
Potential Experience Squared	x		x		
Experience		x			
Experience Squared		x			
Tenure	x	x			
Job Qualification		x	x		
Hours Worked In A Week		x	x		
Firm Size			x		
Region	x	x	x	x	x
Town Size		x	x	x	x
Sector Of Activity/ Industry		x	x		
Position In The Household		x			
Other	x	x			x
Instrumental variables:					
Age			x	x	x
Age Squared			x		
Father's School Degree (Years)	x		x		
Mother's School Degree(Years)	x		x		
Father's Schooling				x	x
Mother's Schooling				x	x
Mother's Age	x				
Father's Age	x				
Partner's Age	x				
Partner's Years Of School	x				
Father's Occupation				x	x
Mother's Occupation				x	x
Reform		x		x	x
Provinces		x			

Note:::[1]:Potential experience = [Age – years of schooling – 6]