

# Parental background and educational career: evidence from a cohort study (\*)

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## Abstract

In this paper we follow a cohort of young people throughout their school career and study the determinants of school choice at different stages of the Italian education system.. We use a new and unique cohort study that covers 1700 individuals born in 1982 and 1983 and living in the Novara Province<sup>1</sup>; we have information about their school curricula, marks at each compulsory exams, family characteristics and a set of information on how they are satisfied with the more important aspects of their school life and are thus able to analyse the association between family background and school career in Italy. We find that parents education role differs along school career, mother education being more important in later (19 years old) proficiency rather than early one (13 years old).

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<sup>1</sup> Funding by Novara Province is gratefully acknowledged.

## 1. Introduction

In this paper we follow a cohort of young people throughout their school career and study the determinants of school choice and outcomes at key stages of the Italian education system. Parental background's influence on children educational career is likely to be the more significant the earlier decision are taken, and in Italy pupils should decide among different secondary school tracks when they are 13. We use a new and unique cohort study that covers 1700 individuals born in 1982 and 1983 and living in Novara Province; we have information about their school curricula, marks at compulsory exams, family characteristics and a set of information on satisfaction about some relevant aspects of school life.

We begin our analysis presenting a model of educational attainment to overview the determinants of individual school choices. Our analysis then follow individuals along their school career: we start from pupils performance at the exam taken at the age of thirteen and end with university performance. Given that the upper secondary school track is chosen very early by individuals and their families (there are recommendations by the lower secondary teachers about which track to chose but they are not binding), the mark scored at this exam is likely to have a strong effect on the subsequent decisions. As expected, parental education has a great importance on pupils achievement, the father education being the more important determinant.

After compulsory school, pupil should decide whether to stay in education or to enter the labor market. Early leavers are about 6% of the sample. Those who stay-on after compulsory school can choose between a short vocational school or among eight tracks (ranging from general schools to more market oriented vocational schools) of secondary school; Modelling this decision, we find that parental background heavily affects children decision. We then turn to drop-out from secondary school phenomenon, which as expected is related to individual characteristics, school career and outside options.

The university enrolment decision is then addressed. Despite the Italian well known scarcity of tertiary educated people but in line with recent evidence of 1999 reforms<sup>2</sup> effect, the great majority of the cohort under study enrolled to university. It turns out that while family characteristics loose their direct effect, individual ability and

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<sup>2</sup>In 1999 a reform of University system was approved by Italian Parliament, reducing the length of university and introducing also in Italy the so called 3+2 scheme. For an extensive review of past and present reforms see [www.eurydice.com](http://www.eurydice.com)

perceived school and teacher quality play a big role. Among the main determinants of university enrolment, we should acknowledge the type of secondary school attained, which, of course, was strongly correlated with parental characteristics.

Finally, study university performance and find out a greater importance of individual ability (measured as school proficiency at the age of 18) than earlier.

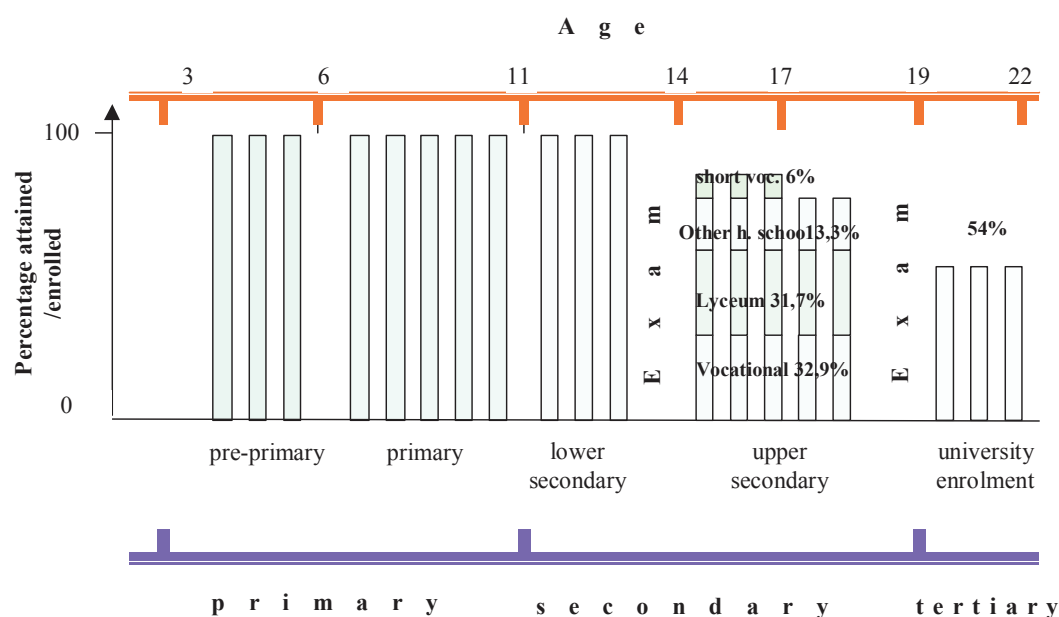
## 2. The Italian education system

In this section we briefly describe the Italian education system, while a more detailed description could be found elsewhere (see, for example, Brunello et alii, 2005). Figure 1 draws a picture of the current educational system. In primary and lower secondary education, establishment and actual operation are regulated by general provision and applied to the whole country. Exams are normally taken at 14 (*esame di scuola media inferiore*) age at which the compulsory part of the school career ends. Further education is a matter of individual choice around the age of 14. A good indicator of the child's potential is the mark scored at the final exam which, although evaluation is made on a local basis, is a sort of relative to peer ability test<sup>3</sup>. Furthermore, lower secondary teacher usually write a global evaluation document and short recommendations about which upper secondary school to choose, but they are not binding. Those continuing education can choose among the four different school tracks: *Classico*, *scientifico* and *linguistico* (general track), *artistico* (arts), *tecnico* and *professionale* (technical and professional track). An alternative to upper secondary education is short vocational training, which falls under the responsibility of Regions and last about three years. There is another leaving exam, usually after five years of upper secondary school (*scuola secondaria superiore*). This exam (known as *esame di maturità*) is mostly taken at the age of 19. Many students, however, drop out of school before reaching the final exam which is necessary to enrol in university. Many students, once finished upper secondary, enrol in university. In order to increase efficiency and reduce drop-outs, the university system has been reformed in 1999 and now it has adopted a scheme consisting of two cycles - undergraduate (*laurea*, usually 3 years) and postgraduate studies (2 years of specialist degree and then a three-years doctorate). Other reforms of the whole system, from primary to upper secondary, are currently under debate in the Italian Parliament.

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<sup>3</sup> This exam is composed by three separate parts: a written composition, a mathematical test and an interview which covers all the subject.

**Figure 1 – The Structure of the Italian educational system for this cohort**



### 3. The data

The data set used in this paper is a unique cohort study originate from the SEMEQ (i.e. Economics Department of Novara University) in the Novara Province<sup>4</sup>. In 2004 about 1700 youngsters born in 1982 and 1983 were interviewed, the sample is representative of resident population in the Province of the same age. Detailed information about school career, family background, training and labour market experiences has been collected. The cohort nature of this sample allows us to study for the first time important choices taken during the school career of homogenous individuals who were asked to decide in the same years and region, which guarantees the same economic environment conditions.

As it can be seen by table 1, in the sample about 51 percent of the individuals are born in 1982<sup>5</sup>. Females on average perform better than males: they obtain higher marks at the 13 years exam (*esame di licenzia media*), they tend to attain higher levels of education and to repeat less frequently years of schooling. About one third of the entire

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<sup>5</sup> This figure reflects the actual enrolment rate of individuals in the cohort under analysis.

population lives in Novara. As regards repetition, in the currently used data-set it is not possible to calculate the average incidence of this phenomenon in the population, because the only available figures regards young people still in school, while, as it is well known, people more likely to repeat tend to drop from formal education and is no more observed in school statistics. According to our data, this is a quite common experience, because, about one third of our sample repeated at least one year during its school career, alongside our analysis we will be able to address the repetition effect both on proficiency and on staying –on decisions.

TABLE 1 AROUND HERE

Our dataset contains full information about parents education, and thus we are able to explore the intergenerational mobility in education. We can see from table 2 that this Province is characterized by a great degree of upward mobility: we highlight those cells in which children reached the same educational level of their parent. Even if only a part of the youngsters enrolled in education will attain any university degree (*laurea or diploma*), it is clear-cut that this generation is out-performing its parents one, because, given parent education, the large majority of children is concentrated in a higher level (right of grey cells). Notwithstanding the existing upper mobility, parental education is still important in determining offspring educational attainment because only one third of children born from low educated parents enrol in tertiary education against the 70/80 percent of children born from highly educated parents.

TABLE 2 AROUND HERE

#### **4. Empirical analysis**

To overview the school choices of the cohort under study, we begin our analysis studying educational attainment. As it can be seen in table 1, 16% of our cohort exits school just after compulsory school (we will see in section 4.2 that 6% decide not to continue, while 10% drop out from secondary school), about 6% hold a short vocational diploma, 24% hold a secondary school diploma, while the majority of our cohort (54%) enrolled in university.

We estimate an ordered probit model, in which the dependent variable is equal to 1 if the individual has a compulsory degree, 2 for short vocational education, 3 for secondary school diploma, 4 if she is enrolled in university. Given that investment in education decision are to be taken very early in Italy (i.e. the choice of secondary school

trak in taken when child is 14), we use as explanatory variable of educational attainment only variables related to childhood. (children aged 6 to 14) or who could possible not have changed during the years (parents education or region of birth). According to the economic theory, individual or family maximise their utility and the decision to invest in further education depends on whether benefits are higher than costs, both direct as well as indirect (opportunity) (Card, 1999). Individual ability, family characteristics and labor market conditions are the main factors driving individual behaviour. Our dataset contains information which could proxy individual ability (marks at 14 and 18 exams). Family passes to its offspring genetic endowment, effort in nurture as well as economic resources.) and we collected retrospective information about nurture during childhood<sup>6</sup>, the period in which decision about education are taken, (whether the mother worked, who used to help children in doing homework and whether the child attended any kind of children activity) and we can proxy economic resources with parents education which, according to human capital theory, is strictly related to labor earnings. Wage differential due to levels of education acts as incentive to invest in further education, but in our study, we observe a cohort of individual born in a two year span of time in the same Province, and thus they face more or less same labor market condition. So in all the regressions, we put town of residence dimension to control for within Province existing differences in local labour market. Finally, we have past and present information about a risky behaviour, smoking, which can be used as a proxy for individual aversion to risk and help explaining observed differences in investment in education (for the use of smoking behaviour related to investment in education see (Festerer and Winter Ebmer, 2000 and Harmon and Walker, 1995).

#### TABLE 3 AROUND HERE

As expected, females tend to invest more in education than male. This could be related to the higher female return to years of schooling (see Brunello et alii, 2001) which creates higher incentive for female than for male to invest in further education. Parents education increases the probability to enroll in university, the mother being slightly more important, while family composition (number of sibling) or parents origins do not has a statistically significant effect. Obtaining a higher mark at the 13 years compulsory exam (which means, anything else equal, to be more able) and

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<sup>6</sup> 6 to 13 year

having attended children activity during childhood increase the probability to attend higher level of education. Anything else equal, not have been helped by no one in doing homework during childhood increases the probability to enroll in university: it could be that only more able children are left alone in doing homework and thus this is again a proxy for individual ability. Mother working full-time during childhood are those whose children invest more in education: as we will explain in next section, this could be related to an income effect. Finally smokers or past-smokers tend to invest less in education.

#### 4.1 Explaining early educational achievement

The first important test of individual talent in Italy it's the compulsory exam taken at the end of lower secondary education, when pupils are about 13 years old. We begin our empirical analysis from the determinants of early achievement. Economic literature agrees that family influence is stronger in early stages, thus an important family cultural effect is expected. We model the mark scored in the 13 years old exam as a function of both individual and parental characteristics. A local (mainly at class level) commission evaluates pupils according to both individual behaviour and proficiency; it turns out that the mark, even if it is normalized in the same range by the same judgment rules around the whole country, remains a relative (at class level) measure. It ranges from "fair" (*sufficiente*), to "good" (*buono*), to "very good" (*distinto*) and "distinction" (*ottimo*), a naturally ordered rank and so we estimate an ordered probit model. We exclude from this part of the analysis those for which we do not observed the mark scored (about 30% of the sample) and end up with 1198 observations.

Parental characteristics strongly affect pupils performance in early childhood. Haveman and Wolfe (1995) review social science literature on this issue and stress the influence of mother characteristics. In particular, economists put the accent on genetic transmission (indirect influence) together with the quality and quantity of resources (time and wealth) devoted to children development by both parents (direct influence). Sociologists and developmental psychologists contributed to the literature with many different approaches: in all these models, parental and siblings traits, such as motivation, ambition, values and behaviours together with stressful events (divorce, imprisonment, etc.) have strong influence in children cognitive development. Finally some theories point at mother importance in children development: the "working mother perspective" postulates that if maternal works reduce the level of controls, guidance, and monitoring

given to a child, conversely a working mother increases the disposable income offsetting the reduction in child care time and helps to prevent the family from poverty which may have adverse effect on children' development. Given also the positive relationship existing between education and labor market participation of mothers, we expect that the more educated mothers are also more likely to work.

#### TABLE 4 AROUND HERE

Table 4 shows how mark scored at the exam varies according to some family characteristics during childhood. For example, it can be seen that having attended some organized activities (sports, music, languages etc..) during childhood, increases the probability to score a better mark (more that buono =41% of the sample that attained activities against 20%). The income effect of a working mother seems to offset the lack of guidance due to the absence of the mother and finally both mother and father educational attainment influences child performance in the same way, even if the former seems to be slightly stronger.

#### TABLE 5 AROUND HERE

The results of the multivariate analysis are in table 5. We present the marginal effects for the probability to score the highest mark computed at the sample means. As it can be seen, females perform better than males and there are no statistically significant differences between the two years of our cohort. The probability to reach the highest grade decreases with the number of siblings and whether there are older siblings. Having attended any kind of children activities (sport, music, dance) during childhood increases the probability to score the highest mark. Also help in doing homework affects the early proficiency, again, "do it by yourself" being the best performing category. As regards parental education, surprisingly we find that father education exerts an influence greater than mother education, which is also mildly statistically significant. To better understand this evidence, we exclude from the regression father education (column 2) and then mother education (column3). Mother education alone (column 2) does not reach the expect level of importance in determining child achievement, while father education maintains more or less the same marginal effects (column3). Assortative mating between parents is quite strong : about 60% of parents have the same level of education, 23% have a father with a higher level of education, the remaining 17% have a mother with a higher level than father. When



assortative mating is strong, a higher correlation between parents educational levels is expected, but this does not seem to be our case: we clearly observe a stronger influence of father education on achievement, which, we believe, is related to the fact that father education determines the socio-economic position of the family in the society and thus has a stronger and clearer effect on children achievement.

In the last columns, we add to the specification also the main activity of the mother when children were from 6 to 13 years old. We find that having a mother working full-time increases children performance, while a mother working part-time decreases it: as already pointed out, the first results suggest an income effect, the latter

## 4.2 Early leavers

In Novara area we observe about 16 percent of youngsters who just hold a compulsory degree (end schooling at about the age of 14). Among this sub-sample of early leavers, we can distinguish between two different sub-sets: those who decide not to continue and those that continue for some years but do not reach nor the high school diploma nor the short vocational school diploma<sup>7</sup>. The former are about 6% (110 individuals) of the whole sample. According to the economic literature, these are rational individuals who discount future streams of costs and benefits and maximize their utility (mainly wealth based) deciding to abandon school just after mandatory *licenzia media*. We model their decision as a function of some individual and family characteristics. In table 6 we report the probability for some stylised individuals, while Table A1 in appendix shows the results of the probit estimation.

TABLE 6 AROUND HERE

The number of siblings has a clear influence on the probability to not continue: as the number of siblings increases, the probability to drop after compulsory school increases. This result together with the working condition of the mother (having a working mother increases the probability to continue) points at the presence of an income effect, more than a role model effect. Individual ability proxied by the mark scored at the *licenzia media*, and parents education have the expected sign and size, the former slightly bigger. Previous schooling experience (such as repetition and degree of

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<sup>7</sup> About ?? percent of those holding a short vocational degree enrolled first in high school, then drop and enrolled in a short vocational track

satisfaction with many different aspects of school life ) does not play a significant role in this decision and are excluded from the estimations.

### **4.3: The upper secondary track choice**

As already pointed out in section 2, pupils are called to choose the upper secondary school track at the age of 13, relatively early, if compared to 16 in the UK, slightly later if compared with Germany, and thus family characteristics is likely to play an important role (Zimmerman, 2003 and Hanushek and Woessman, 2005). This choice is likely to affect future decisions: for example, about 90% of those holding a general vocation diploma enrol in university, compare to 25% of those holding a professional (one type of vocational school) diploma. According to the prevailing education literature in Italy, the upper secondary school track choice is actually a university versus labor market at the age of 18 choice.

We slightly change the classification of high schools, splitting long vocational (market oriented) track in two: technical high school and professional high school. Those schools, in fact, are quite different, being professional schools more market oriented than technical school (i.e. about one half of those holding a technical diploma enrol in university).

We model this decision using a multinomial logit model and summarize result in stylised individuals, isolating the effect of some covariates. This model is estimated on the sub-sample of those who actually enrolled in upper secondary even if they drop out later on because we wish to model the 13 years old choices. Table 7 shows the results.

#### TABLE 7 AROUND HERE

As table 7 shows, individual ability is very important in shaping the distribution of pupils among schools, in fact pupils who scored the highest mark have more than double times the probability to go to a general track respect to those who scored the lowest. Parental education has more or less the same importance: having a parents with a tertiary degree more than double the probability to choose a general track. Also town dimension is important and influences this choice in different way: the type of school supply and local labor market characteristics. Living in Novara or in a medium size town ( less than 5000 inhabitants) increases the probability to attend a general track.

#### 4.4. Dropping out from secondary school

Some of the individuals (about 10 percent in the whole sample) enrol in upper secondary school but then drop-out and do not reach the diploma. According to the main economic theory, drop-outs rationally decide to study that precise number of years and not to finish high school is the optimal choice for them (Eckstein and Wolpin, 1999). But this belief is not commonly accepted: policy makers<sup>8</sup>, teachers and parents often consider this choice as a sort of failure which will negatively affect future life chances.

We treat this decision separately from other and estimate the probability to drop during upper secondary in the sub-sample of those who actually enrolled. Again, in table 8 we report the probability for some stylised individuals, while Table A3 in appendix shows the results of the probit estimation.

TABLE 8 AROUND HERE

As it can be seen, the type of school chosen at the age of 14 is extremely important and thus drop-out probability could perhaps be driven by self-selection in type of school: anything else equal (i.e. ability and family characteristics) different type of secondary school have different probability to drop, from 7% in a liceo to 72% in a professional high school. Individual ability, parents education and attending children activity affect the probability to drop, in fact pupils obtaining the highest mark, having at least a parent with a high school diploma or having attended activities reduce the probability to drop by one quarter. But the greater importance in played by repetition: repeating one or more years almost doubles the probability to drop. Repetition should be used to give *immature* students more time to learn and acquire the same amount of notions as the average students, but this result rather suggests that repetition tend to discourage students and increases the probability to drop.

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<sup>8</sup> That's the cause of the introduction of minimum leaving age. See Oreopolos 2003 for a review of the literature

#### 4.5 Explaining achievement at 18

In this section we model the mark scored at the exam taken at the age of 18 by students at the end of upper secondary school. This exam, once called “*esame di maturità*” has been recently reformed and now consists on a evaluation ranging from 60 to 100 of many aspects of students life, not only on school performance, even if proficiency still play a huge role. It is mainly a school level evaluation, because the evaluation commission is compose by teacher of the school with only an external member. Table 9 showS the OLS estimation results.

TABLE 9 AROUND HERE

We first estimate the marks scored at the age of 19 as a function of the mark scored at the age of 13 (*licenzia media*). As it can be seen in column one, the 13 years old mark are able to explain about one third of the variation observed in the 19 years old mark. We then add individual and family characteristics and find that while mother education increases children proficiency, father education decreases it, exactly the reverse that we have observed in 13 years exam. Being in a private secondary school is not statistically significant, while smoking (or having smoked in the past) have a positive and big influence on the mark scored.

#### 4.6 University enrolment decision

About two third of those who complete upper secondary school enrol in university. We model this decision as a function of some individual as well as family characteristics. The results are in table 10. Almost all the variables have the expected signs and size. In particular, we see that father education is more important than mother one and that attending a private upper secondary school and to repeat one or more year decrease the probability to enrol in university. We add also some variable about the degree of satisfaction (dummy variable equal to one if the satisfaction is very high) about some school aspects and find that they are almost not significant, except peer’s one. In general we observed that individual characteristics and past experience became more important then family characteristics if compared at decision at earlier stages.

## 5 Concluding remarks

In this paper we follow a cohort of young people throughout their school career and study the determinants of school choice and outcomes at key stages of the Italian education system.

We can conclude that females tend to invest more in education than male and perform better in both the compulsory exams. Parents education has a positive effect on educational attainment, and on children performance, the mother being slightly more important in attainment and later achievement and, surprisingly, the father education being more important in early achievement.

Family composition (number of sibling) has a strong effect in particular on the decision to not continue after lower secondary school.

Individual ability (proxied by the mark at 14 years exam) decreases the probability to stop after compulsory schooling and the probability to drop and increases the probability to attend university. Anything else equal, not have been helped by no one in doing homework during childhood behave exactly as individual ability.

Mother working full-time during childhood are those whose children invest more in education and perform better both in early and in later exams.

Smokers or past-smokers tend to invest less in education, are more likely to drop from high school, to not enroll in university and perform very poorly in both exams.

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**Table 1: sample means \***

	<i>Males</i>	<i>Females</i>	<i>All</i>
Born 1982	51,5	50,5	51,0
Born 1983	48,5	49,5	49,0
<i>Mark scored at the lower sec. exam</i>			
Sufficiente (1)	24,6	15,2	20,0
Buono (2)	23,9	23,8	23,9
Distinto (3)	10,9	15,4	13,1
Ottimo (4)	9,8	17,3	13,5
Not answer	30,8	28,3	29,5
<i>Educational levels</i>			
Compulsory education	21,5	10,3	16,0
Vocational education	6,5	5,3	5,9
High school (upper secondary)	22,8	24,9	23,8
Enrolled in university	49,2	59,5	54,2
<i>Repetition</i>			
Never	60,4	76,3	68,2
One time	20,9	17,1	19,0
More than one time	15,3	4,7	10,1
Not answer	3,4	2,9	3,7
<i>Regional distribution</i>			
Novara	37,7	38,7	38,2
Rest of the province	62,3	61,3	61,8
N	869	831	1700

Notes: \* percentages

**Table 2 : Intergenerational mobility in Education.**

<b>Mother education</b>	<b>Children education</b>			
	lower secondary (compulsory)	vocational upper secondary	High school	enrolled in university
primary or no education	38,31	7,96	28,86	24,88
lower secondary (compulsory)	23,53	8,24	34,12	34,12
vocational upper secondary	10,49	8,02	24,07	57,41
High school	6,62	2,86	19,68	70,84
Tertiary education	1,93	3,38	8,21	86,47
<b>Father education</b>				
primary or no education	38,37	11,29	33,33	17,2
lower secondary (compulsory)	23,40	6,98	31,7	37,92
vocational upper secondary	10,1	6,06	33,33	50,51
High school	8,81	2,2	19,63	69,36
Tertiary education	2,61	5,97	10,45	80,97

**Tab. 3: ordered probit estimation of educational attainment: marginal effects at the sample means**

Independent variables:	Y=prob (enrolled in university)	S.E.
Female	.107	.024
Born 1983	-.040	.024
Lonely child	-.047	.039
One Brother	.005	.033
Buono	.196	.031
Distinto	.405	.026
Ottimo	.492	.021
Forgotten mark	.286	.030
mother lower secondary	.045	.039
mother short vocational	.104	.051
mother high school	.245	.041
mother university	.349	.040
Forgotten mother education	-.004	.086
father lower secondary	.154	.038
father short vocational	.239	.045
father high school	.314	.036
father university	.219	.048
Forgotten father education	.227	.057
attended children activity	.147	.031
homework with parents	-.093	.031
homework with grandparents	-.159	.055
homework with siblings	-.169	.049
homework with others	-.251	.046
Parents not born in the Province	-.022	.030
Only one parent born in the Prov.	-.011	.031
Mother working part-time	.022	.035
Mother working full-time	.058	.029
Smoke now	-.173	.028
Smoked in the past	-.045	.035
Dummies town dimension	Yes	-
Nobs	1695	

**Notes:** Dependent variable: 1 =lower secondary,2=short vocational,3=upper secondary, 4=enrolled in university. Reference categories: more than 1 brother, mark equal to sufficiente, mother and father with no education or elementary education, doing homework alone, with both parents born in the region, mother not working during childhood, who does not smoke



**Table 4: Mark scored at 13 years exam according to family characteristics.**

	mark at 14 years exam				Total
	Sufficiente	Buono	Distinto	Ottimo	
Children activities					
NO	99 <i>45.21</i>	73 <i>33.33</i>	27 <i>12.33</i>	20 <i>9.13</i>	219 <i>100</i>
YES	241 <i>24.62</i>	333 <i>31.01</i>	196 <i>20.02</i>	209 <i>21.35</i>	979 <i>100</i>
Mother employment when child was 6 to 13					
Full time	135 <i>21.50</i>	223 <i>35.51</i>	141 <i>22.45</i>	129 <i>20.54</i>	628 <i>100</i>
Part-time	80 <i>34.63</i>	78 <i>33.77</i>	25 <i>10.82</i>	48 <i>20.78</i>	231 <i>100</i>
Not employed	110 <i>38.73</i>	87 <i>30.63</i>	47 <i>16.55</i>	40 <i>14.80</i>	284 <i>100</i>
Don't Know	15 <i>27.27</i>	18 <i>32.73</i>	10 <i>18.18</i>	12 <i>21.82</i>	55 <i>100</i>
Mother education					
No education or primary	64 <i>41.56</i>	42 <i>27.27</i>	32 <i>20.78</i>	16 <i>10.39</i>	154 <i>100</i>
Lower secondary	157 <i>44.60</i>	108 <i>27.27</i>	53 <i>15.06</i>	34 <i>9.66</i>	352 <i>100</i>
Short vocational	26	49	24	33	132
Upper secondary	19.70	37.12	18.18	25.00	100
Upper secondary	72 <i>17.73</i>	155 <i>38.18</i>	87 <i>21.43</i>	92 <i>22.66</i>	406 <i>100</i>
University	7 <i>5.74</i>	39 <i>31.97</i>	25 <i>20.49</i>	51 <i>41.80</i>	122 <i>100</i>
Forgotten mother education	14 <i>43.75</i>	13 <i>40.63</i>	2 <i>6.25</i>	3 <i>9.38</i>	32 <i>100</i>
Father education					
No education or primary	60 <i>46.51</i>	41 <i>31.78</i>	21 <i>16.28</i>	7 <i>5.43</i>	129 <i>100</i>
Lower secondary	161 <i>42.82</i>	114 <i>30.32</i>	59 <i>15.69</i>	42 <i>11.17</i>	376 <i>100</i>
Short vocational	17	24	11	16	68
Upper secondary	25.00	35.29	16.18	23.53	100
Upper secondary	87 <i>21.59</i>	152 <i>37.72</i>	90 <i>22.33</i>	74 <i>18.36</i>	403 <i>100</i>
University	12 <i>6.45</i>	61 <i>32.8</i>	32 <i>17.2</i>	81 <i>43.55</i>	186 <i>100</i>
Forgotten father education	3 <i>8.33</i>	14 <i>32.89</i>	10 <i>27.78</i>	9 <i>25</i>	36 <i>100</i>

**Table 5: ordered probit estimation of early achievement: marginal effect at sample means**

Variables	y = Pr(votomedi==4)							
	Y=0,135		Y=0,143		Y=0,140		Y=0,132	
	dy/dx	S:E	dy/dx	S:E	dy/dx	S:E	dy/dx	S:E
female	0,078	0,015	0,073	0,015	0,072	0,015	0,076	0,015
Born 83	-0,018	0,014	-0,022	0,015	-0,009	0,014	-0,016	0,014
# siblings	-0,032	0,009	-0,030	0,010	-0,031	0,009	-0,030	0,009
older sibling	-0,022	0,016	-0,022	0,017	-0,026	0,017	-0,021	0,016
mother lower secondary	-0,090	0,023	-0,067	0,022			-0,098	0,022
mother short vocational	-0,034	0,029	0,054	0,037			-0,045	0,027
mother high school	-0,003	0,029	0,085	0,029			-0,021	0,028
mother university	0,060	0,045	0,250	0,051			0,033	0,042
Forgotten mother education	-0,115	0,017	-0,067	0,034			-0,110	0,018
father lower secondary	0,098	0,035			0,043	0,029	0,110	0,036
father short vocational	0,284	0,071			0,238	0,063	0,299	0,072
father high school	0,180	0,039			0,180	0,034	0,190	0,039
father university	0,331	0,059			0,383	0,050	0,369	0,060
Forgotten father education	0,422	0,088			0,361	0,085	0,421	0,088
attended children activity	0,103	0,014	0,114	0,014	0,096	0,014	0,101	0,013
homework with others	-0,116	0,014	-0,121	0,014	-0,120	0,014	-0,117	0,013
homework with parents	-0,084	0,018	-0,076	0,018	-0,080	0,019	-0,077	0,018
homework with siblings	-0,095	0,018	-0,089	0,020	-0,102	0,017	-0,094	0,017
homework with grandparents	-0,087	0,018	-0,072	0,022	-0,081	0,020	-0,087	0,018
novara*	-0,045	0,018	-0,051	0,018	-0,039	0,018	-0,052	0,018
borgoman*	-0,081	0,038	-0,088	0,040	-0,073	0,045	-0,083	0,037
medium*	-0,019	0,021	-0,026	0,021	-0,022	0,022	-0,021	0,021
medsmall*	-0,066	0,019	-0,071	0,019	-0,066	0,019	-0,070	0,018
Parents not born in the Province	-0,041	0,017	-0,046	0,017	-0,056	0,017	-0,041	0,017
Only one parent born in the Prov.	0,032	0,019	0,031	0,019	0,026	0,019	0,027	0,018
Smoke now	-0,134	0,015	-0,135	0,016	-0,136	0,016	-0,134	0,015
Smoked in the past	-0,107	0,014	-0,102	0,015	-0,117	0,014	-0,105	0,013
Mother working full-time			-	-			0,042	0,017
Mother working part-time			-	-			-0,030	0,020

(\*) dy/dx is for discrete change of| dummy variable from 0 to 1  
(reference category: mother and father no education or primary, homework alone, small village, mother not employed.

**Table 6: probability to not continue after compulsory school according to some individual and family characteristics.**

Individual characteristics	Probability to not continue	% change
<b>Type 1 – reference individual</b> Male, born 1983, lonely child who scored the lower mark at the <i>licenzia media</i> , both parents with less than high school, no children activity attended, who lives in a small village and smokes, whit a mother not working.	.56	-
Same as type 1, but with one sibling	.63	+12%
Same as type 1 but with two siblings	.70	+25%
Same as type 1 but whit the highest (*) mark at the <i>licenzia media</i>	.07	-87%
Same as type 1, but whit one parents whit more than high school	.16	-71%
Same as type 1, but with a mother working full-time	.46	-18%
Same as type 1, but with a mother working part-time	.31	-44%
Same as type 1, but who does not smoke	.32	-42%
Same as type 1 but living in Novara town	.41	-27%

(\*) *distinto* or *ottimo*

**Table 7: the upper secondary school choice probability according to some individual and family characteristics.**

Individual characteristics	Probability to enrol in			
	technical	professional	other (*)	general
Type 1 Male, born 1983, lonely child who scored sufficiente at the <i>licenzia media</i> , parents with less than high school, both parent born in the region, who lives in Novara and doesn't smoke	.65	.06	.04	.25
Same as type 1 but who scored buono at the <i>licenzia media</i>	.67	.12	.06	.15
Same as type 1 but who scored ottimo or distinto at the <i>licenzia media</i>	.35	.01	.02	.62
Same as type 1 but with at least one parent with high school diploma	.50	.04	.03	.43
Same as type 1 but with at least one parent with a university degree	.32	.05	.03	.60
Same as type 1 but living in Borgomanero	.76	.04	.03	.17
Same as type 1 but living in a medium size town	.58	.15	.05	.22
Same as type 1 but living in a medium-small size town	.87	.02	.01	.10
Same as type 1 but living in a small size town	.74	.13	.02	.11

(\*) arts and humanities. Full results in table A2 in the appendix.

**Table 8: probability to drop during upper secondary school according to some individual and family characteristics and to school career.**

Individual characteristics	Probability to drop	% change
<b>Type 1 – reference individual</b> Male, born 1983, lonely child who scored the lower mark at the <i>licenzia media</i> , both parents with less than high school, no children activity attended, who lives in a small village and smokes, who enrolled in a technical high school, has never repeated a year and is not satisfied by her teachers.	.43	
Same as type 1, but who enrolled in a professional high school	.72	+67%
Same as type 1, but who enrolled in a general high school ( <i>liceo</i> )	.07	-83%
Same as type 1 but whit the highest (*) mark at the <i>licenzia media</i>	.32	-25%
Same as type 1, but whit one parents whit more than high school	.29	-32%
Same as type 1, who attended children activity during childhood	.28	-35%
Same as type 1, but repeated at least one years	.83	+93%
Same as type 1, but who does not smoke	.21	-51%
Same as type 1 but satisfied enough by her teacher	.29	-32%
Same as type 1 but satisfied very much by her teacher	.19	-58%

(\*) *distinto* or *ottimo*

**Table 9: OLS estimation of the mark scored at the exam.**

Dependent variable: mark at 19 years exam (range from 60 to 100)				
	COeff	SE	Coeff	SE
Buono	4.14	.93	2.27	1.02
Distinto	11.00	1.11	8.73	1.16
Ottimo	21.6	.94	17.71	1.15
Forgotten mark	7.39	.96	5.29	1.05
Repeated 1 year			-5.02	.79
Repeated 2 years			-4.22	1.44
Professional HS			-1.79	1.23
Art and Humanities			2.11	.95
General school			-.36	.78
Private school			.18	.98
smoke			-3.41	.68
Smoked in the past			-2.43	.82
Born 83			-.39	.59
female			1.01	.39
# sib			.56	.39
Mother lower sec.			.27	1.31
Mother short voc.			4.84	1.47
Mother high school			1.95	1.37
Mother University			6.05	1.64
Forgotten Mother edu.			5.07	2.73
Father lower sec.			.01	1.41
Father short voc			-.11	1.97
Father high school			-3.05	1.46
Father University			-3.96	1.65
Forgotten father edu			-.88	2.26
Activity			1.26	.90
Parents born in the Province			2.61	.77
Only one parent born in the Prov.			.88	.84
Mother working full-time			.22	.73
Mother working part-time			1.92	.90
Town dimension dummies			Yes	
Constant	69.67	.73	69.56	1.82
R2	0.30		.039	1217

**Notes:** in the constant: technical school , parents with no education or primary, both parent not born in the province

**Table 10: Probit estimate of the enrolment in university decision. Marginal effect**

Dependent variable: enrolled into university		
	dy/dx	SE
Buono	.001	.039
Distinto	.118	.032
Ottimo	.167	.034
Forgotten mark	.079	.037
Mark at 19years exam	.0069	.0019
Repeated 1 year	-.237	.046
Repeated 2 years	-.079	.065
Professional HS	-.071	.053
Art and Humanities	.063	.029
General school	.217	.028
Private school	-.10	.05
smoke		
Smoked in the past		
Born 83	-.02	.02
female	.006	.026
# sib	.033	.16
Mother lower sec.	-.066	.062
Mother short voc.	-.052	.078
Mother high school	-.006	.059
Mother University	.117	.059
Forgotten Mother edu.	.155	.027
Father lower sec.	.089	.051
Father short voc	.108	.043
Father high school	.215	.049
Father University	.155	.042
Forgotten father edu	.146	.032
Activity	.052	.038
Very satisfied by school	-.012	.044
Very satisfied by teacher	.002	.031
.Very satisfied by peer	.075	.027
Mother working full-time	.09	.032
Mother working part-time	.070	.032
Town dimension dummies	Yes	
Nobs	1217	
PseudoR2	0.37	

APPENDIX

**Table 1: probit estimates of the probability to not continue after compulsory school (without enrolling in a upper secondary school): marginal effects**

Iteration 0: log likelihood = -395.47297  
 Iteration 1: log likelihood = -293.83465  
 Iteration 2: log likelihood = -276.96603  
 Iteration 3: log likelihood = -273.29104  
 Iteration 4: log likelihood = -272.86484  
 Iteration 5: log likelihood = -272.84888  
 Iteration 6: log likelihood = -272.84883

Probit estimates Number of obs = 1680  
LR chi2(15) = 245.25  
Prob > chi2 = 0.0000  
 Log likelihood = -272.84883 Pseudo R2 = 0.3101

	dF/dx	Std. Err.	z	P> z	x-bar	[	95% C.I.	]
siferma								
female*	-.0021931	.0034775	-0.64	0.519	.48869	-.009009	.004623	
nato83*	.0040772	.003631	1.20	0.232	.48869	-.003039	.011194	
nsib	.0051361	.0021669	3.25	0.001	1.07321	.000889	.009383	
buono *	-.0029323	.0038145	-0.74	0.458	.23631	-.010409	.004544	
dist-ott*	-.0288089	.0067682	-4.00	0.000	.266667	-.042074	-.015544	
dont kno*	-.011808	.0045745	-3.29	0.001	.295238	-.020774	-.002842	
par. with								
high sch*	-.0441118	.0112654	-6.82	0.000	.54881	-.066192	-.022032	
activity*	-.0268812	.0100542	-4.80	0.000	.813095	-.046587	-.007175	
novara*	-.0154637	.0056901	-3.91	0.000	.386905	-.026616	-.004311	
borgoman*	-.0009512	.0062013	-0.15	0.882	.066071	-.013106	.011203	
medium*	-.0096092	.0039267	-2.69	0.007	.157738	-.017305	-.001913	
medsmall*	-.0051472	.004003	-1.15	0.250	.12381	-.012993	.002698	
smoke*	.0111092	.0051398	2.97	0.003	.408333	.001035	.021183	
mothfull*	-.006817	.004319	-1.81	0.070	.514286	-.015282	.001648	
mothpart*	-.0119314	.0043783	-3.38	0.001	.195833	-.020513	-.00335	
obs. P	.0630952							
pred. P	.0103282	(at x-bar)						

(\*) dF/dx is for discrete change of dummy variable from 0 to 1  
 z and P>|z| are the test of the underlying coefficient being 0

**table2: multinomial logit regression for secondary school track choice.**

Multinomial logistic regression Number of obs = 1273  
LR chi2(51) = 613.73  
Prob > chi2 = 0.0000  
 Log likelihood = -1259.6528 Pseudo R2 = 0.1959

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
high school					
technical school					
buono	.589858	.3112603	1.90	0.058	-.0202009 1.199917
dist-ottimo	2.722611	.5267296	5.17	0.000	1.69024 3.754982
mark unknown	.1175796	.3229698	0.36	0.716	-.5154296 .7505887
female	-1.105575	.2313282	-4.78	0.000	-1.55897 -.6521804
born83	.4350471	.2300166	1.89	0.059	-.0157772 .8858714
one par secon	.2462655	.2478993	0.99	0.321	-.2396081 .7321391
one par tertil	-.4239531	.373919	-1.13	0.257	-1.156821 .3089146

nsib		.1455109	.1367043	1.06	0.287	-.1224245	.4134464
mother full		-.3750597	.2882119	-1.30	0.193	-.9399446	.1898253
mother part		-.6978905	.3185425	-2.19	0.028	-1.322222	-.0735587
both par hor		.1505896	.2973216	0.51	0.613	-.43215	.7333292
one par hor		-.1964834	.3019315	-0.65	0.515	-.7882583	.3952915
novara		.5633701	.2953979	1.91	0.057	-.0155992	1.142339
borgoman		1.259746	.5519552	2.28	0.022	.1779335	2.341558
medium		-.4115201	.3459084	-1.19	0.234	-1.089488	.266448
medsmall		1.964191	.4781807	4.11	0.000	1.026974	2.901408
smoke		.8363971	.2516768	3.32	0.001	.3431196	1.329675
_cons		.5754159	.4560299	1.26	0.207	-.3183863	1.469218
-----							
<b>arts and humanities</b>							
buono		.0753513	.3490684	0.22	0.829	-.6088102	.7595128
dist-ottimo		2.306623	.5516681	4.18	0.000	1.225373	3.387873
mark unknown		-.0903987	.3687276	-0.25	0.806	-.8130915	.6322942
female		.7256611	.2740701	2.65	0.008	.1884936	1.262829
born83		.2111	.2562648	0.82	0.410	-.2911698	.7133698
one par secon		.3342802	.2758781	1.21	0.226	-.206431	.8749914
one par terti		.131881	.3945256	0.33	0.738	-.641375	.9051369
nsib		.1301744	.1559579	0.83	0.404	-.1754974	.4358463
mother full		.7859113	.3429582	2.29	0.022	.1137256	1.458097
mother part		.4421626	.3773349	1.17	0.241	-.2974002	1.181725
both par hor		-.0215801	.3255663	-0.07	0.947	-.6596784	.6165182
one par hor		-.6740602	.3414637	-1.97	0.048	-1.343317	-.0048035
novara		1.284077	.3386225	3.79	0.000	.6203891	1.947765
borgoman		1.552094	.6362821	2.44	0.015	.3050037	2.799184
medium		.6958443	.3895504	1.79	0.074	-.0676606	1.459349
medsmall		1.323164	.5541306	2.39	0.017	.2370879	2.40924
smoke		.7087573	.2764297	2.56	0.010	.166965	1.25055
_cons		-2.147252	.545536	-3.94	0.000	-3.216483	-1.078022
-----							
<b>general track</b>							
buono		1.121068	.3812736	2.94	0.003	.3737852	1.86835
dist-ottimo		4.767846	.5616719	8.49	0.000	3.66699	5.868703
mark unknown		1.658705	.3800174	4.36	0.000	.9138848	2.403526
female		-.4397145	.2415389	-1.82	0.069	-.913122	.033693
born 83		.3881693	.2381336	1.63	0.103	-.078564	.8549025
one par secon		1.02962	.2624146	3.92	0.000	.5152964	1.543943
one par terti		1.14683	.3515533	3.26	0.001	.4577985	1.835862
nsib		-.0268198	.1436456	-0.19	0.852	-.30836	.2547205
mother full		-.4287857	.2978051	-1.44	0.150	-1.012473	.1549015
mother part		-.9248628	.3390805	-2.73	0.006	-1.589448	-.2602772
both par hor		.5807947	.3069636	1.89	0.058	-.0208428	1.182432
one par hor		-.0745398	.3181352	-0.23	0.815	-.6980734	.5489938
novara		1.547362	.3090778	5.01	0.000	.9415811	2.153144
borgoman		1.72461	.5583878	3.09	0.002	.6301902	2.81903
medium		.5578816	.3604084	1.55	0.122	-.1485059	1.264269
medsmall		1.666822	.5033354	3.31	0.001	.6803023	2.653341
smoke		.8236341	.2611012	3.15	0.002	.3118852	1.335383
_cons		-2.265864	.5223068	-4.34	0.000	-3.289566	-1.242161

(Outcome **professional track** is the comparison group)

**Table A3: probit estimates of the probability to drop during upper secondary school (after enrolling in a upper secondary school): marginal effects**

```
. dprobit dropout female nato83 nsib votolme2-votolme3 nonsavotolme isttec istpro liceo ungendip
> attivita novara borgoma/*
> */ medium medsmall fuma bocciato m_soddins ab_soddins mammafull mammapart if siferma!=1
```

```
Iteration 0: log likelihood = -510.80115
Iteration 1: log likelihood = -300.63265
Iteration 2: log likelihood = -273.54382
Iteration 3: log likelihood = -267.87897
Iteration 4: log likelihood = -267.20903
Iteration 5: log likelihood = -267.18826
Iteration 6: log likelihood = -267.18822
```

Probit estimates

Number of obs = 1574  
LR chi2(21) = 487.23  
Prob > chi2 = 0.0000



Log likelihood = -267.18822

Pseudo R2 = 0.4769

dropout	dF/dx	Std. Err.	z	P> z	x-bar	[	95% C.I.	]
female*	-.0113732	.0056473	-2.43	0.015	.495553	-.022442	-.000305	
born83*	-.0067366	.0045946	-1.57	0.117	.48094	-.015742	.002269	
nsib	-.0000233	.0027672	-0.01	0.993	1.05083	-.005447	.0054	
buono *	-.0122087	.0049965	-2.79	0.005	.232529	-.022002	-.002416	
dist-ott*	-.0089216	.0068144	-1.25	0.210	.28399	-.022278	.004434	
not know*	-.0162771	.0060496	-3.25	0.001	.298602	-.028134	-.00442	
technical*	.034328	.0139848	3.98	0.000	.330368	.006918	.061738	
professional*	.1718491	.0508293	7.32	0.000	.117535	.072226	.271473	
general*	-.0166563	.0075045	-1.69	0.092	.338628	-.031365	-.001948	
par. high school*	-.0143604	.0064786	-2.71	0.007	.581321	-.027058	-.001663	
activity*	-.0183743	.0094475	-2.69	0.007	.831004	-.036891	.000143	
novara*	-.0088139	.0057123	-1.58	0.114	.398348	-.02001	.002382	
borgoman*	.0083789	.0152797	0.66	0.512	.064803	-.021569	.038327	
medium*	.0049596	.0077185	0.71	0.476	.158831	-.010168	.020088	
medsmall*	.0067174	.0093992	0.83	0.406	.123253	-.011705	.025139	
smoke *	.0260721	.0087151	4.70	0.000	.395807	.008991	.043153	
repeated*	.0715211	.0183786	7.76	0.000	.280813	.0355	.107542	
very sat.teache*	-.0171809	.0058526	-3.89	0.000	.235705	-.028652	-.00571	
not very s teach*	-.0139988	.0067434	-2.78	0.005	.530496	-.027216	-.000782	
mothfull*	-.0050198	.0056999	-0.91	0.365	.524778	-.016192	.006152	
mothpart*	-.0015329	.0055688	-0.27	0.790	.202033	-.012447	.009382	
obs. P	.0997459							
pred. P	.0133181	(at x-bar)						

(\*) dF/dx is for discrete change of dummy variable from 0 to 1  
z and P>|z| are the test of the underlying coefficient being 0