Educational attainment in Switzerland: the role of observable and non-observable family factors

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Abstract

Intergenerational correlation with respect to educational attainment is generally found to be quite high. Yet, these observed correlations could stem either from social factors or natural factors such as genetic endowment. While some family background variables are measurable like parents' education or occupation, some cannot be easily observed in the data. This is typically the case for variables like genetic endowment or the parents' investment in their children's human capital. To control for these unobserved factors, we use a large sample of twins aged between 15 and 19 years old drawn from the 2000 Swiss census data. Our results seem to indicate that unobservable factors play a greater role than observable factors, though lack of information on whether our twins are monozygotic does not enable us to disentangle genetic factors from environmental factors. While "natural" factors seem to be predominant, our results point to important intergenerational effects. This should be a concern for policymakers as the impact of observable variables such as parents' schooling may be considered as inequities produced either by the educational system or by the society as a whole.

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I. Introduction

Intergenerational correlation with respect to educational attainment is generally found to be quite high. Yet, these observed correlations could stem either from social factors or natural factors. Social factors are those that have an impact on a given outcome (for instance educational attainment through the social position or income of the family. These would be observed in case of different opportunities depending on the position in the social spectrum. On the other hand, natural factors are supposed to be independent of any social influence. Among them, we mainly consider genetic endowment and human capital choices, as long as the latter are determined by taste. If social factors were found to be predominant, this would probably mean that the society is highly stratified and this would raise questions about equity. Concerning educational attainment, it would put into question the ability of the education system to cope with social stratification and to ensure equal opportunities for all children. These concerns are especially important in Switzerland as the results from the first wave of the PISA seem to indicate that the Swiss schooling system is rather inegalitarian (see OECD, 2001).

One of the main problems of studies on educational attainment is to disentangle social factors from natural factors. In this study, we endeavour to estimate the impact of the social position of the parents on the probability of pursuing education. Thanks to a large sample of twins drawn from the Swiss census data, our estimates of intergenerational correlations are net of factors such as genetic or family taste for human capital. However, lack of information on whether our twins are monozygotic does not allow us to determine precisely what part of the intergenerational correlation could be attributed to genetic endowment.

In Switzerland, studies on educational attainment are rather scarce. One can mention Riphahn and Bauer (2004) who investigate the differences in educational attainment between natives and immigrants from census data. Other studies focus on the efficiency of the Swiss schooling system using data drawn from the PISA survey. For instance, one can mention Meunier (2004) who found strong intergenerational correlation with respect to skill test scores or Wolter and Vellacott (2002) who studied sibling rivalry. Outside Switzerland, Riphahn (2004) also uses census data in order to analyse the German case. The focus is on educational attainment of second generation immigrant and this study does not control for unobserved factors. To our knowledge, our contribution is the first study in Switzerland that endeavours

to investigate intergenerational links by controlling for unobserved factors like genetic endowment.

Attempts to control for unobservable factors and genetic endowment are common in the economic literature as labour economists have studied the influence of nature and nurture on education and earnings. Most of them have used twins samples (see early work of Taubman, 1976; or Berhman et al. 1977) or adoptee (see Plug and Vijverberg, 2003). Institutional changes like modifications in years of mandatory schooling have also been used as research instruments (see Chevalier, 2004).

The remaining of the paper is organised as follows: Section 2 discusses the econometric strategy while Section 3 describes the data. Results are presented in Section 4 while Section 5 summarizes and concludes.

II Econometric strategy

Our empirical strategy borrows heavily from Miller et al. (2001). The starting point of the analysis is the estimating equation:

$$S_{ij} = \alpha + \beta_1 S_{i'j} + \beta_2 T_{ij} + \beta_3 X_j + \varepsilon_{ij} \qquad (1)$$

where S_{ij} is a binary variable which takes the value of 1 if the member *i* of the twin pair *j* is pursuing his/her education and 0 otherwise, $S_{i'j}$ is a binary variable indicating whether the respondent's co-twin is pursuing education, T_{ij} is a set of individual characteristics like gender, age or nationality, X_j is a vector of observables family background characteristics like, for instance, the education level of the parents or their profession. β_1 is an estimate of twin resemblance, including genetic resemblance, net of common observables factors that are captured by the other model terms. Lack of lack of information on whether our twins are monozygotic does not allow disentangling genetic factors from environmental factors as per Miller et al. (2001). Including or excluding vector X_j (or variable $S_{i'j}$) in equation (1) will allow determining the relative impact of observable or unobservable factors on the young individuals' education choices or opportunities. The impact of these two different sets of factors can be assessed in many fashions. First, by estimating sequentially equation (1) without and with vector X_j and comparing the estimates associated with the co-twin variables in both cases, we can reach some statistical inferences on the impact of measurable

factors. Indeed, if β_1 does not change considerably following the inclusion of observable indicators of family background, it would mean that the latter inadequately capture the common environmental factors that influence educations choices or opportunities. Thus, unobservable factors could be considered as more important than observable characteristics. To measure the relative importance of both set of factors, one can also focus on the proportion of the variance explained in different model configurations. To avoid the arbitrariness of the order of the sequences, we will decompose the variance with the help of Shapley-value techniques (see Shorrocks, 1999). All estimations are carried out by means of probit models.

III. Data and choice of variables

We use data drawn from last wave of the Swiss population census (SPC) which was carried out in 2000. The main advantage of our census data is that it covers the entire Swiss population. We build two samples, one that contains all the Swiss population aged between 15 and 19 years of age and a second sample that focuses on twins. The purpose of the first sample is to provide preliminary estimates of the level of intergenerational correlation of educational attainment. We keep in our samples only individuals that live with at least one parent and who do not attend compulsory school anymore. We consider as a parent a household head that indicates in the questionnaire to have given birth to a child. To properly identify youth's parents, we drop individuals living in households where two households heads are of the same sex. In the census, each parent provides the year of birth of his/her child(ren). Thus, we drop from our sample each individual whose date of birth could not be matched with the parent's information. The twins were matched on the basis of their date of birth.[2] Finally, some information were implausible (for instance: parents barely older than their children) and had to be dropped altogether. After trimming the sample for missing values and other inconsistencies, our sample of twins consist of 4492 observations which accounts for 2246 twin pairs. The sample consisting of the whole population contains 284'815 observations.

As mentioned in the previous section, we have to build two vectors of explanatory variables i.e. T_{ij} and. In the first one, we include all variables that can not be considered as intergenerational factors and variables that could be individual specific. As such, we introduce

[2] Of course, despite all the care taken, some of the pairs might be made of unrelated people, though the likelihood of this happening is quite small.

the gender, the nationality and the age of the individual and the number of siblings. The latter may capture a quality/quantity trade-off. If this effect were to be observed, the coefficient attached to the number of siblings should be negative. As this sibling effect could be due to birth order rather than family size, we introduce indicators of birth order in the preliminary estimations. We also include various set of dummies for the region of residence, the place of birth (same community, same canton, somewhere in Switzerland or in a foreign country), the type of community (urban, rural, etc...) and an indicator of geographical mobility (place of residence five years earlier). The latter variable allows controlling for newly arrived immigrants. One could argue that some of these variables are indeed intergenerational as they reflect parents' choices. Such is the case of the place of residence or the number of sibling.

Table 1. Descriptive statistics: individual characteristics

Variables	Twins sample	Whole sample
Pursue higher education	0.277	0.258
Foreigners	0.148	0.178
Female	0.515	0.480
Number of siblings	3.16	2.64
Born in a foreign country	0.113	0.143
Moved from abroad	0.023	0.026
Age: 15 years	0.073	0.086
Age: 16 years	0.184	0.201
Age: 17 years	0.256	0.241
Age: 18 years	0.257	0.245
Age: 19 years	0.230	0.227
Region 1 (VD, VS, GE)	0.185	0.173
Region 2 (BE, FR, SO, NE, JU)	0.238	0.235
Region 3 (BS, BL, AG)	0.142	0.137
Region 4 (ZH)	0.159	0.156
Region 5 (GL, SH, AR, AI, SG, GR, TG)	0.146	0.159
Region 6 (LU, UR, SZ, OW, NW, ZG)	0.092	0.099
Region 7 (TI)	0.039	0.042
Large city (over 100'000 inhabitants)	0.096	0.088
Number of observations	4'492	284'815

Source: Swiss population census 2000

The vector X_j contains intergenerational variables i.e. parents characteristics that may affect the outcome of their children. As such, the chosen variables are the education level (three levels), the occupation status, and the nationality of both the mother and the father. We also include a dummy taking a value of 1 if the mother (the father) is older than 50 years. Unfortunately, no information on income is reported in the SPC. Thus, an important intergenerational variable is left out of the analysis. Of course, education and occupational status are closely correlated with family income.

Table 2. Descriptive statistics: parental characteristics

	Twins sample		Whole sample	
	Mother	Father	Mother	Father
Not in the household	0.037	0.174	0.046	0.189
Education				
Low	0.269	0.140	0.303	0.167
Medium	0.529	0.374	0.512	0.365
High	0.130	0.282	0.100	0.249
Missing	0.035	0.029	0.039	0.030
Occupation				
Manager	0.007	0.032	0.006	0.030
Professionals	0.008	0.027	0.005	0.021
Self-employed	0.038	0.102	0.051	0.121
Supervisor/academic	0.035	0.115	0.026	0.101
Intermediate	0.095	0.149	0.092	0.151
White collar	0.197	0.058	0.195	0.061
Blue collar	0.017	0.072	0.016	0.072
Low skill/unqualified	0.099	0.060	0.107	0.067
Unemployed	0.029	0.012	0.031	0.012
Non active	0.256	0.033	0.231	0.035
Age				
Over 50 years old	0.236	0.366	0.181	0.304
Nationality				
Foreigners	0.155	0.163	0.180	0.187
No. of observations	4'492		284'815	

Source: Swiss population census 2000

The dependent variable is a binary variable taking the value of 1 if the youth member is currently pursuing education that may lead to a tertiary education degree or follows already tertiary education and 0 otherwise. Thus we distinguish between the different sorts of education. This means that the dependent variable for individuals that are pursuing non-college-bound education, like for instance the apprentices, will be equal to 0.[3] The correlation coefficient between twins education variables is equal to 0.6274.

In Table 1 and 2, we report descriptive statistics of the main variables for both the whole sample and the twins sample. One can note that the mean values of the twins do not sizeably differ from those obtained on the whole sample. The twins are found to be more likely to pursue higher education. With respect to parental characteristics (Table 2), parents of twins display higher educational level than average.

[3] The boundary between college-bound and non-college-bound education is getting blurrier in Switzerland as there is increasing opportunities for apprentice degree holders to get into tertiary education (tertiary vocational education). However, the transition between apprenticeship and tertiary education are few compared to transitions between high school and tertiary education.

IV. Results

1. Probability of pursuing higher education: whole sample

We first estimate the model on the sample consisting of all individuals aged between 15 and 19 years. We report marginal effects of the probability of pursuing a type of education that may lead to a tertiary education degree. Thus, the dependent variable is a binary variable taking the value of 1 if the individual is either in a school delivering a degree that allows one to get into tertiary education (*Maturität* in German [4] or *maturité* in French) or already in tertiary education institution, and 0 otherwise. While we can not control for unobserved factors, we add birth order dummies in our model. The expected negative correlation between the number of siblings and the educational attainment may rather be due to a composition effect than to a size effect as observed by Black et al. (2004) on Norwegian data. Indeed, they found that number of sibling has little effect on educational attainment while children born later in the family obtain less education. In Switzerland, Wolter and Vellacott (2002) also found evidence of birth order effect along sibling rivalry. If similar conclusion could be drawn from our data, this would speak in favour of our econometric strategy. Indeed, children living in the same household may not face the same set of unobservable factors if they are born at different times. Thus, only twins can accurately capture the common unobservable factors that influence educations choices or opportunities.

We report the results of the estimation on the whole population in Table 3. Thanks to the large size of the sample, the coefficients are highly significant. Focusing on parental education, we find strong intergenerational correlation. Living with a father that completed tertiary education increases the probability of pursuing higher education by almost 20 percent compared to individuals whose father have only basic education. The marginal effect is even stronger in the case of the mother as it reaches 25 percent. Regarding occupation, we find once again that parental characteristics have a large impact on the probability of pursuing education. With respect to both parents characteristics, we observe the largest positive effect for professionals while the largest negative effect is attached to blue collar workers (the reference person is an intermediate employee). However, one can note that the negative effect is larger for the mother while the positive effect is larger for the father. Among the other estimates, we observe that older parents have a significant and positive impact on the

[4] Actually, *Maturität* stands for the Swiss German term as it corresponds to the *Abitur* in Germany.

probability of pursuing education. Parents age could act as a proxy for household income as labour earnings, especially wages, are positively correlated with age.

Table 3. Probability of pursuing education 15-19 years (whole sample)

	Marginal effects	T-stat
Gender (women=1)	0.0845	50.87
Nationality (foreigners=1)	-0.0651	-11.34
Number of siblings	-0.0042	-3.94
Second child	-0.0468	-26.75
Third child	-0.0629	-22.14
Fourth child	-0.0822	-16.13
Father with secondary educ.*	0.0778	19.25
Father with tertiary education*	0.1979	43.32
No father	0.0759	14.76
Father manager**	0.0852	15.24
Father professional**	0.2368	30.71
Father self-employed**	-0.0296	-8.89
Father supervisor/academic**	0.1115	30.06
Father white collar**	-0.0322	-7.80
Father blue collar**	-0.0705	-17.70
Father low skill job**	-0.0115	-2.08
Father unemployed**	-0.0387	-4.39
Father inactive**	-0.0114	-2.06
Father foreigner	0.0271	6.51
Father over 49 years	0.0469	20.04
Mother with secondary educ.*	0.1141	39.89
Mother with tertiary education*	0.2588	55.33
No mother	-0.0293	-5.23
Mother manager**	-0.0584	-5.54
Mother professional**	0.0519	3.59
Mother self-employed**	-0.0669	-15.74
Mother supervisor/academic**	0.0362	5.88
Mother white collar**	-0.0783	-24.34
Mother blue collar**	-0.1143	-11.43
Mother low skills **	-0.0668	-15.21
Mother unemployed**	-0.0763	-14.15
Mother inactive **	-0.0679	-21.06
Mother foreigner	0.0558	8.78
Mother over 49 years	0.0650	24.56
Pseudo R^2	0.1787	
Log likelihood	-1334310.01	

*: the reference is a mother (father) with only primary education or no education.
**: the reference is a mother (father) holding an intermediate position.
Not reported: age, type of community, regional dummies, remaining birth order dummies, place of birth, and place of residence in 1995. 284806 observations

We also report marginal effects attached to youth characteristics. We find that girls have a greater probability to pursue higher education, a result that could be partially explained by

labour market segregation. Indeed, occupations in which male tend to be overrepresented are often accessible by means of apprenticeship. One should also note that girls tend to have higher test scores in the PISA study (see Meunier, 2004), which could translate into higher college-bound education enrolment. Regarding nationality, we find that being a foreigner reduces substantially the probability of pursuing education. Such result could seem surprising as the coefficients attached to the foreign parents dummies are positive. This result could indicate the high level of heterogeneity among the foreign population.[5]

Finally, we find that birth order has a sizeable impact on the probability of pursuing education. For instance, the second child has approximately 5% less probability of pursuing education than the first child. Moreover, the marginal effect attached to birth order increases monotically in absolute value for each additional child. On the other hand, the marginal effect attached to the number of siblings is close to zero, though it is significant and is of the expected sign. This means that first child of a family has a similar probability of pursuing education whether he/she lives with many siblings or he/she lives with no sibling at all. Thus, it is differences within the family rather than differences between families that could explain the observed negative correlation between the number of siblings and educational attainment.

2. Probability of pursuing higher education: twins sample

Two set of estimates are reported in Table 4, one that includes the co-twin educational status and one that does not. The marginal effects in the first equation can be considered as marginal effects net of genetic endowment and common environmental factors. One can first note that marginal effects are substantially higher when the co-twin educational status variable is excluded from the estimation. This is expected as the latter variable is supposed to capture parents preferences and genetic endowment that are probably correlated with intergenerational characteristics. Thus, the marginal effects attached to the parents' educational levels decrease sharply in the process. For instance, the marginal effect of a father having achieved a tertiary education degree falls to 0.1268 when the co-twin variable is included in the estimation from 0.2219 when there is no control for the co-twin educational status. The drops in the marginal effects are equally substantial when one focuses on mother's educational attainment or parents socio-economic status. One may also note that coefficients attached to individuals characteristics variable (the *T* vector) are also affected by the inclusion of the co-twin variable. However, marginal effects related to gender or nationality do not vary

[5] Educational attainment of migrants is thoroughly investigated by Bauer and Riphahn (2004).

significantly between the two estimations. It is also worth mentioning that the marginal effects related to intergenerational variables do not change substantially when the *T* vector is included.

Table 4. Probability of pursuing education 15-19 years

	Net of common factors estimates		No control for common factors	
	Marginal effects	T-stat	Marginal effects	T-stat
S_{ij}	0.5121	20.67	-	-
Gender (women=1)	0.0637	4.55	0.0806	5.18
Nationality (foreigners=1)	-0.0356	-0.80	-0.0445	-0.66
Father with secondary educ.*	0.0358	1.43	0.0662	1.69
Father with tertiary education*	0.1268	4.69	0.2219	5.12
No father	0.0876	2.80	0.1533	3.00
Father manager**	0.0809	2.40	0.1554	2.80
Father professional**	0.1547	4.15	0.2821	4.31
Father self-employed**	0.0132	0.61	0.0251	0.69
Father supervisor/academic**	0.0854	4.06	0.1552	4.31
Father white collar**	0.0215	0.77	0.0437	0.95
Father blue collar**	0.0166	-0.62	-0.0206	-0.49
Father low skill job**	-0.0275	-0.79	-0.0271	-0.49
Father unemployed**	-0.0509	0.97	-0.0755	-0.99
Father inactive**	0.0267	0.83	0.0334	0.60
Father foreigner**	0.0357	1.31	0.0410	0.96
Father over 49 years**	0.0244	1.88	0.0389	1.82
Mother with secondary educ.*	0.0777	4.21	0.1135	3.95
Mother with tertiary education*	0.1474	5.50	0.2351	5.37
No mother	-0.0465	-1.26	-0.0789	-1.42
Mother manager**	-0.0193	-0.32	-0.0219	-0.21
Mother professional**	0.1502	1.61	0.0213	1.49
Mother self-employed**	-0.0519	-2.01	-0.0765	-1.79
Mother supervisor/academic**	0.0499	1.64	0.1001	1.85
Mother white collar**	-0.0675	-3.65	-0.1131	-3.71
Mother blue collar**	-0.1017	-2.51	-0.1687	-3.25
Mother low skill job**	-0.0441	-1.60	-0.0795	-1.84
Mother unemployed**	-0.0799	2.56	-0.1281	-2.72
Mother inactive**	-0.0529	-2.88	-0.0838	-2.73
Mother foreigner	0.0122	0.28	0.0228	0.33
Mother over 49 years	0.0335	2.48	0.0519	2.29
Pseudo R^2	0.3788		0.2082	
Log likelihood	-1645.82		-1787.82	

*: the reference is a mother (father) with only primary education or no education;
**: the reference is a mother(father) being a intermediate employee
Notes: not reported: individual age, type of community, regional dummies, place of birth, missing dummies and place of residence in 1995. 4492 observations

The figures displayed in the first column of Table1 are the marginal effects related to each variable net of common environmental factors such as parents' investment in their children human capital and genetic endowment. In such context, our results show that the educational attainment of the parents is still a quite important factor shaping the probability of pursuing education. Indeed, the marginal effect attached to a father with a tertiary education degree is equal to 0.13 (the base category is no education or only primary education). It is also worth mentioning that once again the marginal effect attached to the mother having achieved tertiary education is somewhat bigger (0.15). Thus, it seems that our results are in line with the conventional wisdom that women's schooling has a greater beneficial impact on children than men's schooling[6], though the difference in marginal effect is not statistically significant. Regarding the socio-economic set of dummies, the marginal effects are in line with those observed in the preliminary estimation. Once again, controlling for common environmental factors has a sharp effect on the observed marginal effects. One can also note that the negative effect of unemployment is much larger when it concerns the mother rather than the father. Moreover, the marginal effect associated with mother's unemployment remains substantial after introducing the co-twin variable.

Table 5. Evolution of the marginal effect of common factors

Specifications	15-19 y.	15-18 y.	15-17 y.	15-16 y.
S	0.6274	0.6441	0.6428	0.6451
S, X	0.5507	0.5615	0.5598	0.5632
S, T	0.5951	0.6121	0.6123	0.6200
S, X, T	0.5121	0.5192	0.5223	0.5291

Notes: vectors X, T and X defined as per equation (1). All coefficients are statistically significant at the 0% level.

3. Observable and unobservable characteristics

In the Table 5, we report the sensibility of β_1 depending on the specification chosen for various age brackets. If β_1 would remain unchanged throughout the specification, it would mean that the newly included variables (i.e. vector *T* and *X*) would inadequately capture common environmental factors. In a first step, we estimate the probit model by introducing only the co-twin educational variable. Focusing as in the previous section on individuals aged

[6] see for instance Haveman and Wolfe (1995). However, recent evidence from Behrman and Rosenzweig (2002) find the opposite, i.e. that father's schooling has a greater impact than mother's schooling in the U.S.

between 15 and 19 years, the marginal effect attached to this variable is equal to 0.63. Adding the *X* vector (intergenerational variables) brings down the estimated marginal effect of the co-twin variable to 0.55. While it shows that intergenerational factors like parent's education may play a role, these factors are far from being predominant. Estimating the model by introducing the co-twin variable and the *T* vector (thus leaving out intergenerational factors), the marginal effects attached to the co-twin variable is now equal to 0.59, which is a relatively small change from the value obtained with the model in which the co-twin variable is the only regressor. Finally, when all regressors are included in the estimation of the model, the marginal effect is equal to 0.51. To summarize, unobserved factors (either genetic endowment or common environmental factors) seem to be preponderant, though personal characteristics and intergenerational characteristics do have some impact on the dependent variable. This pattern is remarkably consistent through the sample specifications. Yet, one can observe that the marginal effect attached to the co-twin variable diminishes as the sample expands. This shows that the influence of common environmental factors declines with age. However this does not mean that the other factors included in our equation become more important as we include more age categories.

Table 6. Shapley value decomposition of variance by age brackets

	15-19 y.	15-18 y.	15-17 y.	15-16 y.
Pseudo R^2				
S, T, X	0.379	0.399	0.397	0.398
S, T	0.339	0.354	0.352	0.349
S, X	0.358	0.378	0.376	0.376
S	0.320	0.336	0.332	0.330
X	0.153	0.170	0.174	0.177
T, X	0.210	0.233	0.233	0.238
T	0.072	0.076	0.077	0.072
Shapley contribution				
S	0.2416	0.2483	0.2449	0.2423
T	0.0438	0.0459	0.0460	0.0448
X	0.0935	0.1048	0.1060	0.1105
Shapley contribution (%)				
S	63.77 %	62.22 %	61.70 %	64.28 %
T	11.55 %	11.51 %	11.60 %	14.39 %
X	24.68 %	26.27 %	26.71 %	21.34 %

Notes: vectors X, T and X defined as per equation (1)

One can also focus on the explanatory power of the various set of factors by decomposing the value of the pseudo R^2. The latter is defined by the ratio of the value of the log-likelihood function of the estimated model minus the value of the log likelihood function at starting

values divided by the latter. To avoid the arbitrariness of the order of the sequences, we compute each contribution by means of the Shapley value technique. The contributions are reported in Table 6. The sensitivity of our results is checked by repeating the exercise for various age-brackets. One can first observe that the co-twin variable contribute to more than 60% of pseudo R^2 which accounts for an explanatory power of approximately 25%. This is by far the variable with the greatest explanatory power. Intergenerational factors do account for approximately 20% of the explained variance (about 10% of total explanatory power). Finally, the explanatory power of individual characteristics is relatively marginal (around 5%). One can also observe that our results do not depend on the chosen age bracket. The explanatory powers of the various vectors of explanatory variables remain roughly unchanged through the various sample specifications.

V. Conclusion

Our results underline the impact of unobservable factors captured by the co-twin variable. Thus, genetic and parent's investment in human capital seem to be the variables that best explain educational attainment in Switzerland. Moreover, failing to control for unobserved family factors overstates the impact of intergenerational factors. Indeed, our results suggests that marginal effects net of common family factors are approximately 40% smaller than those computed from estimations with no control for common family factors. While measurable intergenerational factors play a lesser role, they should not be discounted. Indeed, we still find sizeable intergenerational correlations after controlling for common factors. For instance, a mother holding a tertiary education degree increases by 15% the probability her child remains on the higher education track. This should be a concern for policy makers as the impact of observable variables such as parents schooling may be considered as inequities produced either by the educational system or by the society as a whole. Finally, while common factors might have been correctly captured by our twin variable, our specification of intergenerational factors may have left out many elements. The first that comes to mind is family income that is unfortunately lacking in the data we used in the current study.

Bibliography

Bauer, P and R.T. Riphahn (2004). Heterogeneity in the Intergenerational Transmission of Educational Attainment: Evidence from Switzerland on Natives and Second Generation Immigrants, *IZA Discussion Paper* No. 1354.

Behrman J. R., Taubamn P. and T . Wales (1977). Controlling for and Measuring the Effects of Genetics and Family Environments in Equations for Schooling and Labor Market Success, in Paul Taubman (ed) *Determinants of Socioeconomic Success within and Between Families*, Amsterdam: North-Holland.

Behrman J.R. and M.R. Rosenzweig (2002). Does Increasing Women's Schooling Raise the Schooling of the Next Generation?, *American Economic Review*, 92: 323-334.

Black S., Devereux P. and K.G. Salvanes (2004). The More the Merrier? The Effect of Family Composition on Children's Education, *IZA Discussion Paper* No. 1269.

Chevalier, A. (2004). Parental Education and Child's Education: A Natural Experiment, *IZA Discussion Paper* No. 1153.

Haveman R. and B. Wolfe (1995). The Determinants of Children's Attainments: A Review of Methods and Findings, *Journal of Economic Literature*, 3: 1829-1878.

Meunier, M. (2004). Estimation de la fonction de production éducationnelle: le cas de la Suisse, mimeo, University of Geneva.

Miller P., Mulvey C. and N. Martin (2001). Genetic and Environmental Contributions to Educational Attainment in Australia, *Economics of Education Review*, 20: 211-224.

OECD (2001). Knowledge and Skills for Life - First results from PISA 2000, *OECD,* Paris.

Plug, E. and W. Vijverberg, (2003). Schooling, Family Background and Adoption: Is It Nature or Nurture? Journal of Political Economy, 111: 611-641.

Riphahn, R.T. (2003). Cohort Effects in the Educational Attainment of Second Generation Immingrants in Germany: An Analysis of Census Data, *Journal of Population Economic*s, 16: 711-737.

Shorrocks A. F. (1999). Decomposition Procedure for Distributional Analysis: A Unified Framework Based on the Shapley Value, mimeo, University of Essex.

Taubman, P. (1976). The Determinants of Earnings: Genetics, Family and other Environments; A Study of White Male Twins, *American Economic Review*, 66: 858-870.

Wolter, S. and M. J. Vellacott (2002). Sibling Rivalry: A Look at Switzerland with PISA Data, *IZA Discussion Paper* No. 594.