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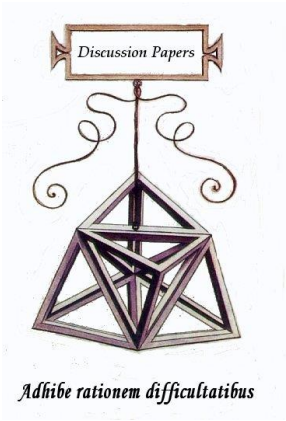

Giovanni Bernardo – Giuseppe Cinquegrana –
Giovanni Fosco

Teenage parenthood, circumstances and educational mobility of children.

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Indirizzo degli Autori:
G. Bernardo
Department of Law, University of Naples "Federico II", Via Marina Nuova 22, Naples - 80133, (Italy)
email: giovanni.bernardo@unina.it
G.Cinquegrana
Direzione DVSE, ISTAT, Via Cesare Balbo 16, Roma – 00184, Italy
email: gicinque@istat.it
Phone 0646732785
G.Fosco
Department of Law, University of Naples "Federico II", Via Marina Nuova 22, Naples - 80133, (Italy)
email: giovanni.fosco@unina.it

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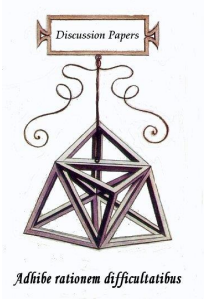

Giovanni Bernardo – Giuseppe Cinquegrana – Giovanni Fosco

Teenage parenthood, circumstances and educational mobility of children.

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JEL codes: C43, I24, J62, O15.

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Giovanni Bernardo*
Giuseppe Cinquegrana†
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*Department of Law - University of Naples Federico II - giovanni.bernardo@unina.it
†Direzione DVSE - ISTAT - gicinque@istat.it
‡Department of Law - University of Naples Federico II - giovanni.fosco@unina.it

1 Introduction

Intergenerational mobility is a key socio-economic indicator that aims to examine the degree of dependency between an individual's well-being and the socio-economic status of his or her parents. The economics literature has initially focused on intergenerational income mobility, as evidenced by the work of Black et al. (2005), Chetty et al. (2014), Corak (2013), Durlauf et al. (2022), and Solon (1999). More recently, there has been a growing interest in examining the correlation between parental and child educational attainment, which is widely acknowledged as one of the most influential conduits of income transfer across generations (Black & Devereux, 2010). One of the most comprehensive studies of intergenerational educational mobility has been proposed by Hertz et al. (2008), who provide an extensive cross-country analysis of transmission in education attainment, showing large differences in educational mobility across countries. This literature emphasises the importance of cognitive and non-cognitive skills, as they exert a critical influence on individual's economic outcomes, thereby affecting their level of social mobility (Carneiro & Heckman, 2002; Cunha & Heckman, 2007; Cunha et al., 2010). In particular, these studies highlight that household environmental and parental investment determine human capital accumulation, suggesting how family circumstances affect offspring's cognitive and non-cognitive outcomes.

The aim of this paper is to examine the phenomenon of teenage childbearing, which is a relevant topic in economics literature because it can have significant economic and social consequences. A relevant issue is to understand which features, backgrounds and experiences determine the childbearing outcome in the teen period. In particular, some of the most commonly cited factors include poverty, low levels of education, limited access to contraception and reproductive health services, and cultural and social norms that encourage early childbearing (Haveman & Wolfe, 1995; Wolfe et al., 2007). Economists have studied also

the consequences of adolescent pregnancy which typically has a detrimental effect on both mothers' and fathers' education since it disrupts their educational aspirations, often leading to early school leaving (Card & Wise, 1978). Young parents with low levels of education are likely to be in lower-paid jobs with low skill requirements compared to those who do not have a child during their teenage years (Cook & Cameron , 1992). Additionally, this phenomenon can lead to social exclusion, increased healthcare costs and strain on families and communities (Hoffman & Maynard, 2008).

Becker et al. (2018) emphasised the complementarity between parental human capital and education investment in enhancing the productivity of children's human capital. Educated parents can effectively nurture their children's scholastic aptitude by providing support, guidance, and financial resources for educational activities. In our specific contest, parents who experience teenage childbearing tend to have limited financial resources and lower educational attainment, resulting in less investment in their children's human capital development. This is likely to be exacerbated in the case of lone parents, who may be less willing to spend on their children's education as they rely on a single source of income. (Astone & McLanahan, 1991; Ribar, 1994; Sandefur et al., 1992). Only few studies have highlighted the negative impact of teenage parenthood on children, demonstrating that they exhibit poorer performance across various economic, social, and cognitive domains (Hoffman & Maynard, 2008; Kearney and Levine, 2012; Machado et al., 2021). Using Italian census data (ISTAT, 2011), our proposal aims to quantify the impact of inequality of opportunity on intergenerational mobility by analyzing the educational outcomes of different groups of children based on their parents' age at the time of the first child's conception. We provide Pearson correlation-based absolute and relative indicators, as described in Aydemir and Yazici (2019) and Hertz et al. (2008), as well as rank-based approaches proposed by Chetty et al. (2014) and Emran & Shilpi (2017), which are less prone to measurement error and lifecycle

bias. Our findings demonstrate that increasing parents' age at conception is associated with higher levels of upward educational mobility among their children. In particular, we have identified a pattern of low upward mobility for children whose parents are at the 25th percentile and experienced early pregnancies (i.e. between the ages of 12 and 18), as they are unable to surpass their parents' educational attainment. This trend persists in all Italian macro-regions, including the North, Centre and South. However, we observed a reversal of gender inequality, with female children showing greater upward mobility than their male counterparts.

The rest of the paper is divided as follows; section 2 data description and limitations; section 3 methods; section 4 results; section 5 conclusions and policy implications.

2 Data

Our main source of data is the Italian Census (2011) provided by ISTAT. We collect data on individuals belonging to the 14 Italian metropolitan cities since they represent the most urbanized area of the country, consisting of over one-third of the population, with only 1333 municipalities covering about 16% of the Italic peninsula surface. We link parent and child education attainment by gathering the information provided by children residing with their parents at the census time. There are approximately 1.5 million children in the core sample. Following other studies of educational attainment (Hertz et al., 2008; Checchi et al., 2013), our measures of parent and children's education are based on the highest degree completed, which is related to the legal duration of the degree considered (see Appendix A for additional details).

Few studies exploit Census data to compute intergenerational mobility indices, among others Aydemir et al. (2013); Hilger (2015); Card et al. (2022), as they may suffer from some

limitations. In particular, the link between parent and child outcomes is present only in the case they are co-resident. Therefore, there is a possible life cycle bias when children get final education attainment after leaving co-residence with their parents. To address potential selection bias concerning the co-residency constraint, we take as a core sample the co-resident children aged 23-35, including thirteen cohorts (1975-1988). Our sample starts to consider children from age 23 since potentially they can conclude their education attainment with a graduation degree. Moreover, the upper bound of our sample is 35 because children often do not leave their parents' residence before getting a stable position in the labour market [1]. Further, we observe a tiny difference in the average education between children co-resident with parents and no co-resident for each cohort (see fig A1 in Appendix A). In the same way, the difference is negligible for co-residents and no co-residents that are still students. To further verify the potential life cycle and selection bias, we offer an additional robustness test in Appendix A by restricting the core sample to co-resident children aged 25-30.

3 Methods

We estimate intergenerational mobility for three different groups of children (g=0, 1, 2) based on the parent's age at the time of the first child's conception. The first comprises those who got parenthood between 12 and 18 years, which embody parents who got an early pregnancy. For comparison, the second and third became parents between 19 and 25 years and above 25 years, respectively. These additional categories take into account the completion of two different levels of education, i.e. upper secondary education and tertiary education, and the time of entry into the labour market. Therefore, awareness of the decision to have children is likely to be a function of economic stability, which is often correlated with the age of the

[1]The fraction of children between 18-34 co-residents with at least one parent is around 60% in Italian metropolitan areas (ISTAT, 2011).

parents. To define parents' level of education, we consider the dominance criterion (Erikson, 1984), which considers the highest educational attainment between father and mother[2].

To measure intergenerational mobility, we focus on absolute mobility[3], which measures the expected percentile of education attainment of children given the percentile of their parent in the overall distribution of parental education. We define absolute mobility at percentile p in group g with parents who belong to percentile P:

$$r_{pg} = a_g + b_g P \tag{1}$$

a_g and b_g are estimates provided by a rank-rank OLS[4](Chetty et al., 2014; Emran & Shilpi, 2017). Our analysis considers the average absolute mobility of children from families with below-median parent education. Since the relationship is linear, the average absolute mobility below the median parent education equals the average rank of children with parents at the 25th percentile. For comparison, we also report absolute mobility at the 75th percentile of the parental schooling distribution, which shows the expected rank of children born to parents in the upper tail of the distribution. Moreover, we also compute absolute mobility using the intergenerational correlation parameters[5]. In this case, we need to calculate the

[2]We produce additional results for robustness using other two criteria: the average schooling between father and mother; and the father's education.

[3]relative mobility measures have a significant limitation since an improvement may be driven by worse outcomes for children at the upper tail of the distribution rather than an improvement for the children at the lower tail of the distribution.

[4]The rank-rank OLS is $R_{i,g} = a_g + b_g P_{ig} + v_{ig}$ where R is the percentile rank of the child i in the overall distribution of children's schooling, while P is the percentile rank of the corresponding parent in the overall distribution of parents' education. Therefore, the parameter, b_g, provides an estimate of Spearman rank correlation in education across generations.

[5]The intergenerational Pearson correlation is the association between parent's and children's years of schooling adjusted both for their respective standard deviations:

$$\frac{S_{ig}^c}{\sigma_c} = \rho_{0g} + \rho_{1g}\frac{S_i^p}{\sigma_p} + \epsilon_{iq}. \tag{2}$$

The correlation coefficient, ρ_1, measures how children's years of schooling rank increase when the parent's years of schooling increase by one standard deviation

25th percentile of adjusted parents' schooling distribution to get a comparable measure.

4 Results

Table 1 reports descriptive statistics at the group level. In particular, we can see that early pregnancy results in lower educational attainment for both parents. Parents in Group 0 have, on average, a level of education that is about one year less than Group 1, and two years less than Group 2. Delaying pregnancy can help individuals to complete their education, get a better job, and invest in their children's education. Table A1 in Appendix A.1 shows the transition matrices for the overall sample and the three groups. By averaging parental education, which is included in the MDE category, we can see that the probability of children surpassing their parents' education level increases from Group 0 to Group 2. In particular, we can see that only 31% of children are able to exceed their parents' education level in group 0, while the percentage increases to 58% in group 2. This suggests that parental awareness of the importance of education and economic stability in Group 2 may support children's upward educational mobility.

We first examine the relationship between children and parents' education. Figure 1 presents two binned scatter plots of the mean education child rank vs. parent education rank, where intercept and slope are computed with Spearman rank correlation in the first and Pearson correlations in the second one. These two plots summarize the conditional expectation of the child's rank given his parents' rank for group 0. Further, we verify that such a relationship in group 0 is still persistent when we control for other factors [6]. Therefore, since the relationship is robust, we summarize the expected percentile of education attainment of children given the percentile of their parents by using the slope and intercept

[6]Segregation, occupation rate, natural log of population, occupation status, immigrated status, marital status, lone parent.

of the relationship without controls.

Table 2 shows the main results of our analysis, presenting different measures of intergenerational mobility. Columns 1 and 2 present relative mobility measures, Spearman rank correlation and Pearson correlation, while the others account for different absolute mobility indicators extents at the 25^{th} and 75^{th} percentiles. In particular, columns 3 and 5 are based on rank correlation (r), while 4 and 6 show Pearson correlation (s). We provide a different estimate for each group. Our primary interest concerns upward mobility (i.e. Absolute mobility at the 25th percentile) which is lowest for children who grew up in households that experience premature pregnancy. In particular, $r_{25,0} = 20$ corresponds to 8 years of schooling, which means that children do not overcome their parents' education. For the other two groups, the values of this indicator are respectively 27 and 33, corresponding to 10 and 13 years of education. At the same time, the absolute mobility at the 75th percentile for group zero (i.e., $r_{75,0}$) corresponds to the same level of education of group two at the 25^{th} percentile (i.e., $r_{25,2}$) but lower than other groups at the 75^{th} percentile. This suggests that the negative effects of parental teenage childbearing still persist, albeit to a lesser extent, for those in the upper tail of the parental education distribution. Further, splitting the sample based on Italian macro areas, we get the same results path (tab. 2 - Panel B), pointing out that the economic development of each zone does not correlate with the severity of households that obtain an early pregnancy on post-upward educational mobility of their children. Instead, there is evidence of educational inequality when gender is taken into account (Panel C), with female children experiencing greater upward mobility than their male counterparts. In this case, a source of possible bias may be due to the fact that women with a lower level of education tend to marry earlier (Cantalini , 2017), while those who tend to achieve higher educational attainment would delay leaving the family of origin. We also show upward mobility for immigrants in Panel D, which is lower than

no-immigrant ones for each group g, independently from the teenage pregnancy of parents.

5 Conclusions

This paper measures intergenerational educational mobility in Italy distinguishing groups according to the age at which the first child in a family has been conceived. The case of teenage pregnancy is particularly relevant as parents are at higher risk of lower educational attainment, living with lower income, housing difficulties and family conflicts which determines a negative effect in terms of their children's educational outcomes. In particular, we show that upward educational mobility decreases with the age of the parents at the time of the first child's conception. Furthermore, our results suggest that children of migrant parents face persistent educational disadvantages compared to their native-born counterparts. Despite the fact that teenage childbearing is much more widespread in the South of Italy, which is also the least developed part of the country, upward mobility is stable in the three areas considered. Although this phenomenon is not widespread in developed countries, school-based sex education interventions need to be strengthened to prevent teenage pregnancy. To reduce the likelihood of long-term social exclusion of adolescent parents, it is also necessary to implement policies that aim to improve their participation in education, employment and training. This will reduce the negative social consequences for both parents and their children.

6 Tables and Graphs

Table 1: Descriptive Statistics

	mean	**sd**	**min**	**max**	**N**
		Group 0			
Erickson p.	8.54	3.35	0	22	40935
Father	7.71	3.42	0	22	30928
Mother	7.62	3.31	0	22	40025
Child	10.46	3.45	0	22	41022
		Group 1			
Erickson p.	9.70	3.55	0	22	602894
Father	8.82	3.55	0	22	490856
Mother	8.68	3.52	0	22	589160
Child	12.14	3.44	0	22	602906
		Group 2			
Erickson p.	10.65	4.66	0	22	945415
Father	10.05	4.59	0	22	744766
Mother	9.55	4.65	0	22	860781
child	13.12	3.52	0	22	945421
		Overall			
Erickson p.	10.24	4.27	0	22	1589244
Father	9.52	4.24	0	22	1266550
Mother	9.16	4.23	0	22	1489966
Child	12.68	3.54	0	22	1589349

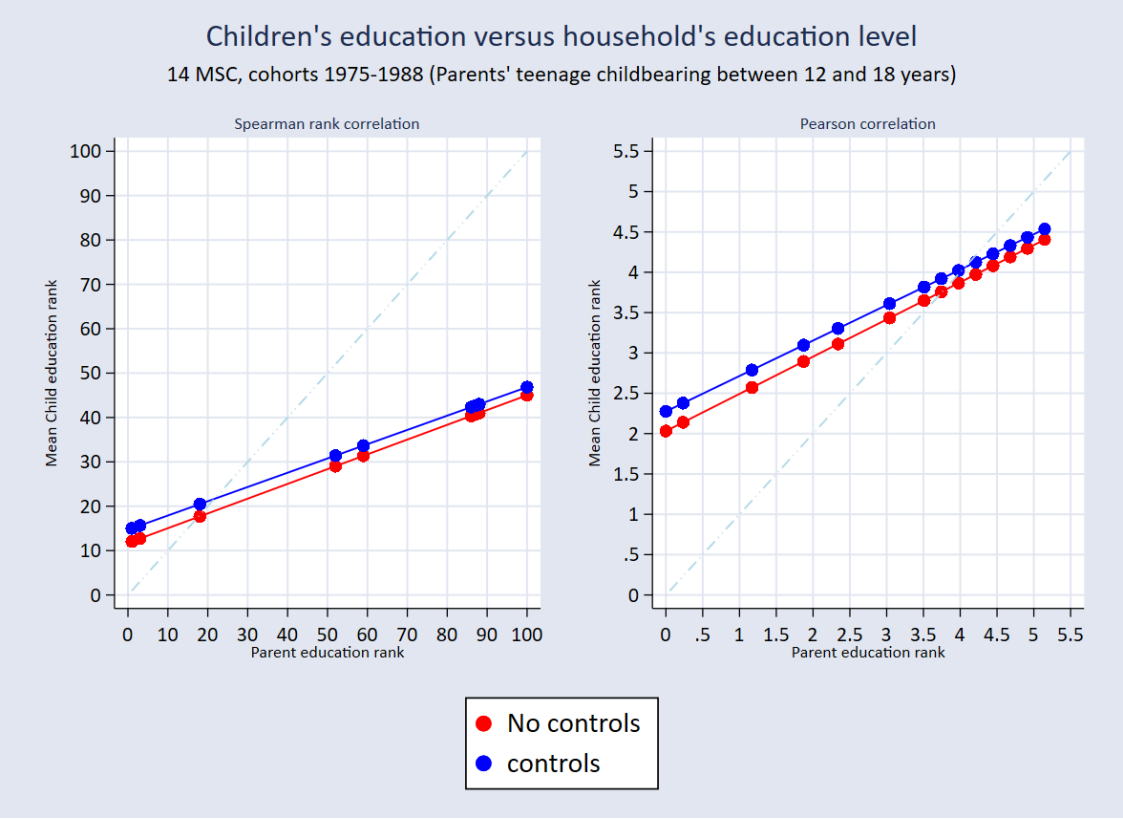
The summary statistics of education attainment are by group g based on parents' age at the time of their first child: g=0 if they are aged 12 and 18; g=1 between 19 and 24; and g=2 above 24. The Erikson principle considers the statistics at the household level, taking the highest level of education between mother and father. Whereas father, mother, and child are at the individual level.

Table 2: Intergenerational Education Mobility - Relative and absolute measures

	(1) b_g	(2) ρ_g	(3) $r_{25,g}$	(4) $s_{25,g}$	(5) $r_{75,q}$	(6) $s_{75,q}$	(7) N	(8) $n_{\%}$
Panel A: Overall								
0	.333	.461	20.04	2.895	36.685	3.434	41022	.026
1	.39	.468	27.756	3.242	47.234	3.79	602906	0.38
2	.404	.411	33.111	3.451	53.305	3.931	945421	0.59
Panel B: Macro areas								
North								
0	.299	.409	19.921	12.333	34.866	32.77	8682	.019
1	.388	.464	27.633	13.941	47.047	37.125	149000	.334
2	.404	.4	34.66	12.747	54.864	32.756	289000	.646
Center								
0	.294	.409	21.357	12.413	36.033	32.861	6688	.019
1	.351	.411	28.22	12.778	45.775	33.305	128000	.357
2	.371	.364	34.017	11.927	52.57	30.122	223000	.623
South								
0	.357	.496	19.924	14.354	37.781	39.133	25652	.033
1	.406	.491	27.733	14.609	48.031	39.183	326000	.415
2	.412	.43	31.887	13.362	52.487	34.879	434000	.552
Panel C: Gender								
Male								
0	.307	.444	17.14	13.043	32.51	35.233	24384	.027
1	.376	.476	23.986	14.112	42.802	37.91	343000	.384
2	.405	.428	29.297	13.228	49.553	34.649	526000	.588
Female								
0	.357	.472	24.266	13.986	42.139	37.592	16638	.024
1	.394	.444	32.838	13.691	52.559	35.872	260000	.373
2	.393	.38	38.06	12.4	57.694	31.375	420000	.602
Panel D: Immigrated status								
No Immigrated								
0	.352	.478	20.297	13.963	37.898	37.858	4316	.091
1	.396	.471	28.119	14.152	47.921	37.701	27115	.57
2	.404	.409	33.322	12.918	53.52	33.366	16132	.339
Immigrated								
0	.251	.387	18.954	11.735	31.486	31.081	36411	.024
1	.329	.431	20.184	12.849	36.615	34.406	575000	.373
2	.355	.393	22.995	12.123	40.761	31.796	928000	.603

Parental education is considered according to the Erikson principle. The first two columns are relative mobility measures, Spearman rank (b), and Pearson (rho) correlations. Columns (3) and (5) are absolute mobility indicators rank-based at the 25th and 75th percentiles. Whereas columns (4) and (6) are based on the Pearson correlation. Each indicator is provided by each group g based on the parent's age at the birth time of its first child. N is the number of individuals in each group, and n% is its share. The sample is divided more time in such a way as to get a subgroup measure of intergenerational mobility based on Macro Area, Gender, and Immigrated Status. the estimated coefficients are statistically significant at 1%.

Figure 1: Association between children's and Parents' Education



A Other Figures and tables

Table A1: Transition Matrix between groups

Overall					
Parents	*NE*	*PE*	*MDE*	*UPE*	*HE*
NE	8.75	15.23	56.78	15.61	3.62
PE	0.57	8.88	56.21	28.22	6.12
MDE	0.32	2.53	46.28	39.48	11.40
UPE	0.26	0.68	18.63	51.79	28.63
HE	0.35	1.03	14.52	33.55	50.56
Group 0					
Parents	*NE*	*PE*	*MDE*	*UPE*	*HE*
NE	18.16	21.75	47.09	10.09	2.91
PE	1.78	18.49	64.41	12.89	2.43
MDE	0.66	5.30	62.89	26.13	5.02
UPE	0.43	2.71	35.54	47.35	13.98
HE	0.94	3.44	27.81	40.00	27.81
Group 1					
Parents	*NE*	*PE*	*MDE*	*UPE*	*HE*
NE	14.12	15.45	55.78	11.95	2.70
PE	0.65	10.83	61.80	22.81	3.91
MDE	0.29	2.52	49.43	38.25	9.51
UPE	0.32	0.76	21.41	53.43	24.08
HE	0.58	1.06	18.18	37.46	42.72
Group 2					
Parents	*NE*	*PE*	*MDE*	*UPE*	*HE*
NE	5.65	14.64	57.96	17.66	4.09
PE	0.46	7.26	52.78	32.00	7.50
MDE	0.30	2.14	40.08	42.87	14.61
UPE	0.20	0.48	15.12	50.65	33.54
HE	0.13	0.44	6.70	31.32	61.42

NE stands for 'no education', PE for 'primary education' (i.e 5 yr of edu), MDE for 'medium education' (8 and 10 yr of edu), UPE for 'upper secondary education' (i.e 13 yr of edu) , HE for 'High education' (above 13 yr of edu).

Table A2: Variables description

Variable	**Description**
Parental education *Child education*	The education attainment is related to years of the highest degree completed. Since the census provides detailed information about the kind of the degree completed, the years of schooling ranges from 0 (illiterate) to 22 (Ph.D.)
Segregation	The educational segregation index for ordered multigrops (Reardon, 2011), which defines as the overall segregation for each municipality, tanking into account all the educational attainment groups.
Occupation rate	The Employed people over the population in working age at the municipal level.
ln(population)	the natural logarithm of population for each municipality.
Lone parent	Equal 1 for the single parent, 0 otherwise.
Immigrated	Equal 1 if parents are immigrated, 0 otherwise.
Professional status	It is a categorical variable from which we base 7 dummies: 1. Employed 2. First-time job seekers 3. Unemployed 4. Recipients of one or more pensions from previous employment or capital income. 5. Students 6. Housewives 7. Other status
Marital status	It is a categorical variable from which we base 6 dummies: 1. Single 2. Conjugated 3. De facto separated 4. Legally separated 5. Divorced 6. Widowed

Figure A1: Mean children education by age for co-resident and non co-resident

Table A3: Robustness - Rank-Rank and Correlation IGEM for different parents education principle and restricted sample

	(1) b_g	(2) ρ_g	(3) $r_{25,g}$	(4) $s_{25,g}$	(5) $r_{75,q}$	(6) $s_{75,q}$	(7) N	(8) $n_{\%}$
Panel A: Parent's average education								
0	.351	.501	17.709	2.799	38.807	3.617	41022	.026
1	.411	.5	24.811	3.142	51.576	3.958	602906	0.38
2	.409	.411	30.678	3.369	59.807	4.04	945421	0.59
Panel B: Father education								
0	.309	.416	20.533	3.002	35.993	3.491	41022	.026
1	.357	.424	29.112	3.373	46.965	3.873	602906	0.38
2	.38	.384	34.247	3.552	53.228	4.004	945421	0.59
Panel C: Restricted sample								
0	.361	.478	20.732	13.968	38.807	37.874	19321	.026
1	.449	.51	29.142	15.069	51.576	40.588	289000	.394
2	.492	.467	35.229	14.297	59.807	37.646	425000	.579

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