

Parents and Children: Education Across Generations in India

Pushkar Maitra and Anurag Sharma

Monash University

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Introduction

- Mobility - one of the hallmarks of the process of development
 - Vertical - Increasing levels of education across generations
- Indian Experience
 - Unequal distribution of the effects of growth
 - Due to lack of mobility?

Why is mobility important

- In a completely rigid society, parental educational attainment completely determines the educational attainment of the child.
- Importance of mobility: mobile societies are better able to internalize the externalities.

In this paper

- Re-examine the issue of differences in human capital accumulation over generations in India
 - examine the issue of vertical (or inter-generational) mobility in educational attainment.
 - focus on the issue of the correlation between education levels of parents and children.

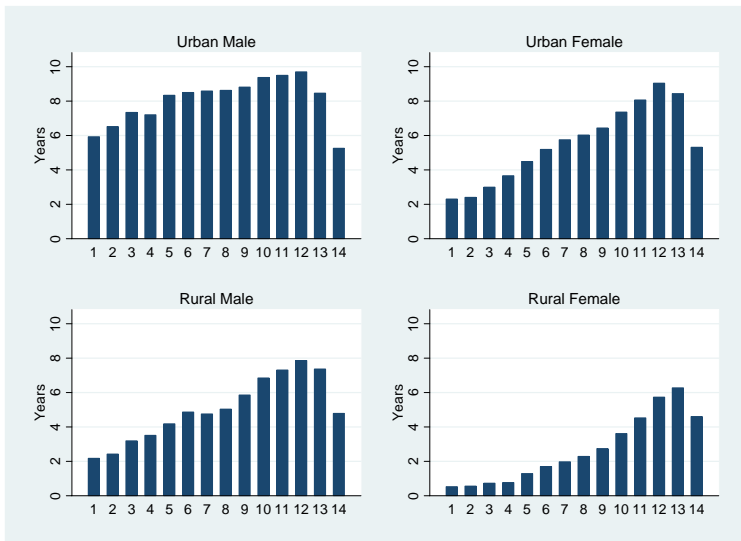
Research Questions

- 1 How has the profile of educational attainment of adults (defined as at least 20 year old at the time of the survey) changed over generations?
- 2 What is the effect of parental education on the educational attainment of individuals?
 - explicitly account for the potential endogeneity of parental educational attainment
- 3 Examine effect of parental educational attainment on the educational outcomes of young adults (aged 15 – 24 at the time of the survey).
 - important demographic

Data

- Indian Human Development Survey 2005 (IHDS).
- Nationally representative, multi-topic survey of 41,554 households in 1,503 villages and 971 urban neighborhoods across India.
- Survey was conducted between November 2004 and October 2005

Average Years of Schooling by Cohort of Birth



Levels and Growth of in Educational Attainment of Adults

	Urban Male (1)	Urban Female (2)	Rural Male (3)	Rural Female (4)
Years of Schooling (OLS)	0.0528*** (0.0021)	0.1219*** (0.0020)	0.1025*** (0.0012)	0.1011*** (0.0012)
Sample Mean	8.8035	6.5496	5.6779	2.9961
Average Schooling by Birth Cohort				
Born 1930 or before	5.9305	2.3067	2.1762	0.5317
Born 1981 – 1985	9.7033	9.0461	7.8636	5.7363
Observations	21959	21592	40196	39954

Key Observations

- The average years of education has increased by 1.2 years each decade for urban females and around 1 year each decade for rural males and females.
- The average years of schooling has increased by about 0.5 years per decade for urban males (from higher base).

Levels and Growth of in Educational Attainment of Adults: by Religion

	Hindu	Muslim	Christian	Other Religion
Urban Males				
Growth per year	0.0571*** (0.0024)	0.0563*** (0.0049)	0.0472*** (0.0100)	0.0545*** (0.0098)
Sample mean	9.17	6.49	9.94	10.06
Urban Females				
Growth per year	0.1254*** (0.0023)	0.1255*** (0.0047)	0.1070*** (0.0102)	0.1437*** (0.0090)
Sample mean	6.78	4.42	9.08	8.21
Rural Males				
Growth per year	0.1058*** (0.0014)	0.0897*** (0.0040)	0.0720*** (0.0074)	0.1081*** (0.0050)
Sample mean	5.72	4.89	7.36	5.57
Rural Females				
Growth per year	0.1033*** (0.0012)	0.0823*** (0.0036)	0.1019*** (0.0075)	0.1203*** (0.0052)
Sample mean	2.92	2.40	6.20	3.53

Key Observations

- Significant variation across religions
- Females: No evidence of catching up
- Muslims: Lowest mean years of schooling and growth rate
- Average years of schooling attained by rural females belonging to other religions is more than double that of Muslims in 1980.

Levels and Growth of in Educational Attainment of Adults: by Caste

	Brahmin	OBC	SC	ST	Other Caste
Urban Males					
Growth per year	0.0397*** (0.0052)	0.0710*** (0.0033)	0.0895*** (0.0051)	0.0755*** (0.0121)	0.0378*** (0.0034)
Sample mean	11.59	8.11	7.11	8.24	9.65
Urban Females					
Growth per year	0.1349*** (0.0058)	0.1332*** (0.0030)	0.1344*** (0.0047)	0.1316*** (0.0126)	0.1153*** (0.0035)
Sample mean	9.22	5.75	4.55	6.26	7.66
Rural Males					
Growth per year	0.0983*** (0.0054)	0.1076*** (0.0019)	0.1133*** (0.0025)	0.0974*** (0.0040)	0.1003*** (0.0025)
Sample mean	8.97	5.70	4.61	4.04	6.65
Rural Females					
Growth per year	0.1499*** (0.0051)	0.1029*** (0.0018)	0.0874*** (0.0023)	0.0754*** (0.0033)	0.1176*** (0.0024)
Sample mean	5.01	2.89	2.03	1.89	4.10

Why is Parental Education Important?

- Educational attainment is typically influenced by both public and private investments in education:
 - While state policy typically drives the former, parental education is a crucial part of the latter
- In a rigid society with no mobility, parental education completely determines the educational attainment of the child.
- After controlling for other socio-economic characteristics that potentially affect educational attainment of an individual, the greater the influence of paternal and maternal education, the lower is the extent of inter-generational mobility.

Some Descriptive Statistics

- Fathers are more educated compared to mothers in both rural and urban households
 - the average difference in the years of schooling attained is around 3 years
- Both fathers and mothers in urban households are more educated compared to their rural counter parts
 - the difference is around 3 years at the mean

Endogeneity of Parental Educational Attainment

- Parental educational attainment might be correlated with some of the unobserved determinants of the child's schooling.
- Alternatively the unobserved components of the child's educational attainment might be correlated with the unobserved components of that of the parents (genetic characteristics).
 - Both of this could result in biased estimates

Instruments

- The year of birth of the father and mother
- Interaction of the year of birth with original location of the father and mother i.e., whether the father/mother originally lived in a rural or urban area
 - Similar to instruments used by Schultz (2002) in a different context.

Parental Education and Children's Education. OLS and Instrumental Variable Regression

		Father: Years of Schooling	Mother: Years of Schooling	Hansen J-statistic	Sargan Statistic
Urban Male	OLS	0.3332*** (0.0146)	0.1308*** (0.013)	0.048	0.092
	IV	0.6197 (0.868)	-0.494 (1.2969)		
Urban Female	OLS	0.2708*** (0.0265)	0.2047*** (0.0222)	0.799	0.811
	IV	-0.1949 (0.5581)	0.4051 (0.4928)		
Rural Male	OLS	0.3831*** (0.0106)	0.1524*** (0.0149)	0.538	0.724
	IV	-0.0955 (0.1882)	0.7752* (0.4305)		
Rural Female	OLS	0.3914*** (0.0267)	0.2470*** (0.0317)	0.905	1.178
	IV	0.2562 (0.3147)	0.1374 (0.2503)		

Interpretation

- It is public investments in education that matters and not private investments.
- Educational attainment of the next generation is *not* constrained by the endowments, preferences and opportunities provided by the previous generation
- State policy has been successful in severing this link
- Effect on Mobility?

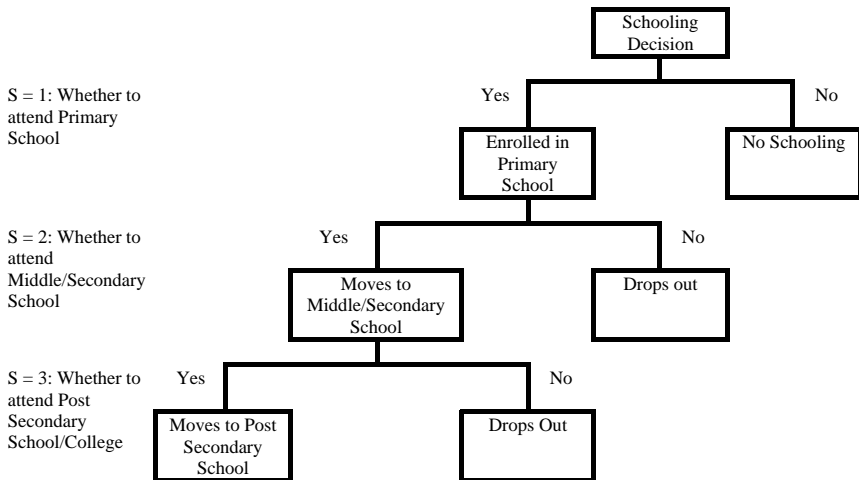
Why study School Progression?

- While there might be “valid” economic reasons for dropping out of school early, the consequences of such action are quite severe.
- Significant long-term impacts:
 - Low educational attainment and low levels of human capital accumulation
 - Future income earning opportunities are limited and lifetime incomes are low.
 - Inter-generational effect:
 - Children born to parents with low levels of education are themselves more likely to end up with low levels of educational attainment

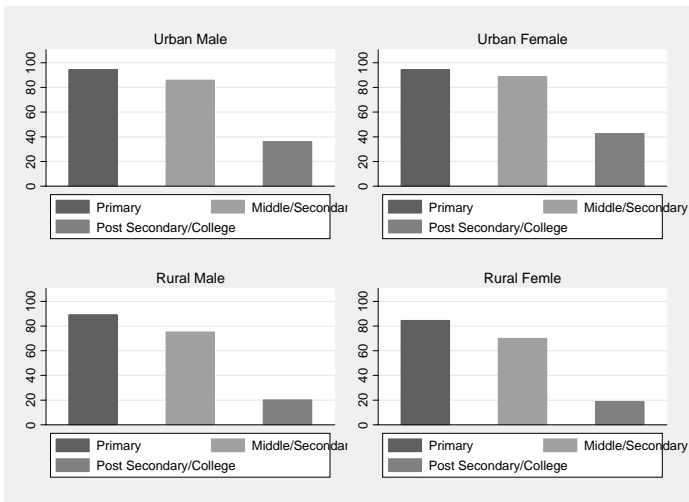
Modelling School Progression: Sequential Probit Model

- 1 Considering all sample children, whether a child gets enrolled in a primary school ($S = 1$);
 - 2 Among those enrolled in primary schools, whether a child moves on to the middle/secondary level ($S = 2$);
 - 3 Among those enrolled in secondary schools, whether a child moves on to the post-secondary level ($S = 3$).
- Determinants of selection to vary across the different levels.
 - Child ability
 - Control for sibling composition, household resource constraint, parental preferences and some community characteristics

Schematic Representation of the Sequential Framework



School Progression Rates



Sequential Probit Model

- Three schooling decisions ranked in ascending order:
 - ① whether to attend primary school (years 1 – 5);
 - ② whether to attend middle/secondary schools or stop after the primary level (years 6 – 10)
 - ③ whether to move on to post-secondary levels or stop after the secondary level (years 10+).
- Define:

$$S = \begin{cases} 0 & \text{if years of schooling} = 0 \\ 1 & \text{if years of schooling} > 0 \\ 2 & \text{if years of schooling} > 5 \\ 3 & \text{if years of schooling} > 10 \end{cases}$$

Sequential Probit Model

- These decisions are not only ordered, but also sequential in nature:
 - Decision (2) is conditional on decision (1);
 - Decision (3) is conditional on decision (2)
 - Self-selection for each higher level of schooling.
 - The probit index functions at each decision point $s = 0, 1, 2, 3$ for a child i :

$$I_{si} = \beta'_s X_{si} + \delta_i + u_{si}; s = 0, 1, 2, 3$$

- $u_{si} \sim N(0, 1)$ and $\delta_i \sim N(0, \sigma_\delta^2)$.
- δ_i is constant across the different schooling decisions

Sequential Probit Model

- Individual i will move from level S to level $S + 1$ if $l_{si} > 0$ and drop out otherwise.

$$P(s = S) = \begin{cases} P[l_{1i} \leq 0] & \text{if } S = 0 \\ P[l_{1i} > 0, l_{2i} \leq 0] & \text{if } S = 1 \\ P[l_{1i} > 0, l_{2i} > 0, l_{3i} \leq 0] & \text{if } S = 2 \\ P[l_{1i} > 0, l_{2i} > 0, l_{3i} > 0] & \text{if } S = 3 \end{cases}$$

Specifications

- 1 Restricted Model (Specification 1): child schooling depends only on parental education.
 - Parental educational attainment: exogenous
- 2 Restricted Model (Specification 2): child schooling depends only on parental education.
 - Parental educational attainment: endogenous
- 3 Full specification (Specification 3)
 - Parental educational attainment: endogenous

Parental Education and Children's Education. Estimates from a Sequential Probit Regression of Educational Attainment: School Enrolment

	Male Urban			Female Urban		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1630 *** (0.0067)	0.1163 *** (0.0261)	-0.0477 (0.0898)	0.1657 *** (0.0066)	0.1201 *** (0.0254)	-0.0181 (0.1079)
Mother	0.1589 *** (0.0129)	0.3342 *** (0.0296)	0.3639*** (0.0975)	0.1560 *** (0.0128)	0.3274 *** (0.0287)	0.3428*** (0.1183)
	Male Rural			Female Rural		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1663 *** (0.0069)	0.1236 *** (0.0260)	-0.0131 (0.0967)	0.1680 *** (0.0070)	0.1244 *** (0.0260)	-0.0132 (0.0948)
Mother	0.1587 *** (0.0133)	0.3239 *** (0.0293)	0.3170*** (0.1050)	0.1569 *** (0.0133)	0.3211 *** (0.0293)	0.3170*** (0.1028)

Key Observations

- Father's education: no significant effect on enrolment
- Mother's education: Positive significant effect
- Endogeneity matters: Failing to control for it results in an over estimation of the effect of the father's educational attainment on school enrolment and underestimation of the effect of mother's educational attainment.
- Significant omitted variable bias: Similar trend

Parental Education and Children's Education. Estimates from a Sequential Probit Regression of Educational Attainment: Continuing to Middle/Secondary School

	Male Urban			Female Urban		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1506 *** (0.0049)	0.1990 *** (0.0200)	0.2356*** (0.0771)	0.1456 *** (0.0048)	0.1808 *** (0.0195)	-0.0008 (0.0845)
Mother	0.1418 *** (0.0073)	0.2293 *** (0.0216)	0.0582 (0.0830)	0.1418 *** (0.0073)	0.2299 *** (0.0209)	0.2698*** (0.0915)
	Male Rural			Female Rural		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1582 *** (0.0049)	0.2066 *** (0.0197)	0.0886 (0.0816)	0.1575 *** (0.0050)	0.1951 *** (0.0200)	-0.0098 (0.0807)
Mother	0.1540 *** (0.0076)	0.2503 *** (0.0214)	0.2521*** (0.0884)	0.1536 *** (0.0075)	0.2545 *** (0.0216)	0.3408*** (0.0879)

Key Observations

- Father's education: no significant effect on enrolment
- Mother's education: Positive significant effect

Parental Education and Children's Education. Estimates from a Sequential Probit Regression of Educational Attainment: Continuing to Post-Secondary School/College

	Male Urban			Female Urban		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1135 *** (0.0039)	0.2546 *** (0.0155)	0.2499*** (0.0697)	0.1109 *** (0.0039)	0.2460 *** (0.0154)	0.1735** (0.0689)
Mother	0.0924 *** (0.0042)	0.0561 *** (0.0149)	0.0216 (0.0732)	0.0919 *** (0.0042)	0.0554 *** (0.0148)	0.0831 (0.0722)
	Male Rural			Female Rural		
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Father	0.1171 *** (0.0040)	0.2624 *** (0.0158)	0.2193*** (0.0718)	0.1168 *** (0.0040)	0.2585 *** (0.0158)	0.1688** (0.0720)
Mother	0.0966 *** (0.0043)	0.0609 *** (0.0152)	0.0670 (0.0755)	0.0960 *** (0.0043)	0.0619 *** (0.0152)	0.1186 (0.0757)

Key Observations

- Father's education: Positive significant effect
- no significant effect on enrolment

Changes in the Probability of schooling

	Father's education (ΔP (%))	Mother's education (ΔP (%))
Enrolment		
Male Urban	-0.35	3.2
Female Urban	-0.09	2.2
Male Rural	-0.15	4.2
Female rural	-0.15	4.3
Continuation: Middle/Secondary School		
Male Urban	5.8	1.45
Female Urban	-0.01	6.7
Male Rural	2.18	6.1
Female rural	-0.24	8.3
Continuation: Post-secondary School/College		
Male Urban	5.9	0.50
Female Urban	4.2	2.03
Male Rural	3.7	1.96
Female rural	2.7	1.80

Other Results: Sibling Competition vs Sibling Synergy

- An increase in the number of brothers or sisters aged 0 – 10 *always* reduces the probability of enrolling in school, continuing on to middle/secondary school and continuing beyond secondary school.
- The effects are consistent with the argument that elder siblings in resource constrained households have to leave school in order to take care of their siblings.

Other Results: Sibling Competition vs Sibling Synergy

- Having an additional brother aged 11 – 24 *reduces* the probability of enrolling in school, continuing on to middle/secondary school and continuing beyond secondary school.
 - This is true for both boys and girls.
- However having an additional sister aged 11 – 24 *increases* the corresponding probabilities at every level.
- Having a sister around the same age is actually beneficial for both boys and girls.
- Effects consistent with the hypothesis that older children may subsidize the education of younger siblings by contributing to family time or budget.

Sibling Synergy

- 1 School enrolment is affected by both categories of older sisters: the 11 – 15 year olds who are more likely to contribute to family time and the 15 – 24 year olds who are more likely to contribute to family budget;
- 2 Progression across schooling levels is significantly affected by only one category of older sisters; ones who are more likely to contribute financially to family budget.
- 3 Females are more likely to continue beyond middle/secondary school if they have an elder sister in the age group of 15 – 24

Sibling Synergy

- Positive spill over effect from having children attend school, due to economies of scale in child costs and/or from the development of a culture of schooling within the household.
- Positive externality in children's educational attainment, which the parents try to internalize through their schooling decisions for subsequent (other) children.

Benefits of our Method

- Allow us to account for selection at the different levels and also shows
 - ① How different characteristics affect school progression differently at the different stages; and
 - ② How the same set of factors might affect different levels of schooling in a different manner.

Main Results

- In India there has been a significant increase in educational attainment of individuals over the last 70 years or so with women gaining the most in terms of increases in educational attainment.
- Restricting ourselves to adults (those more than 20 years old at the time of the survey), we find that when we account for the potential endogeneity of parental educational attainment, it is public investments in education that matters and not private investments.
 - Educational attainment of the next generation is *not* constrained by the endowments, preferences and opportunities provided by the previous generation;
 - State policy has been successful in severing this link.

Main Results

- Effect of parental education on school progression varies over the different stages.
 - Mother's education is important at the initial levels
 - At these levels father's educational attainment has almost no role to play.
 - Father's educational attainment becomes crucial in the decision to continue on to post-secondary levels.

Main Results

- When we control for
 - ① Potential endogeneity of parental education; and
 - ② Other individual and household characteristics that affect child schooling
- The effect of parental educational attainment on child education becomes weaker but does not go away.
- Father's educational attainment has a positive and statistically significant effect on the probability of continuing to post-secondary school/college.

Implications for the Indian Growth Process

- A large part of the Indian growth process over the last 2 decades has been driven by the highly skilled Information Technology sector
- Continuation to post-secondary school/college (in order to accumulate the necessary technical skills) is crucial to benefit from the opportunities offered by the Indian growth process.
- Private investment (driven primarily by father's income) continues to be crucial.
- Over the long run state policy has been successful; but the job is not yet complete.