

Determinants of School Enrolment, Attainment and Choice in Karnataka¹

By

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Abstract

Educational achievement is a key ingredient in economic and social development. India's literacy level increased from a mere 17% in 1947 to 65% in 2001. This is no doubt a substantial development but far beyond the goal. The relative inadequacy of achievements is reinforced by the fact that the average literacy of 65% reflects considerable inequalities in educational achievements across various socio-economic categories such as gender, caste and rural versus urban location. In assessing the causes underlying the relatively low outcomes, researchers in India and elsewhere have pointed at both demand and supply-side factors. The factors in India may differ systematically across socio-economic categories such as caste, sex or location although specific research on these is quite limited and often, given the nature of the data, it is difficult to disentangle supply versus demand effects.

This study attempts to analyze the socio-economic determinants of schooling achievement and choice of schooling in one state of India, namely, Karnataka, using the results of the 52nd survey of the NSSO. Using enrollment and completion as outcome variables, an econometric exercise has been conducted to understand the relationship with socio-economic characteristics.

Key Word: Attainment, Education, Elementry, Econometric, School, Enrolment, Expenditure, Determinants, Choice, Completion, Consumption, Children, Karnataka, Socio-economic, Primary level, Middle level, Infrastructure, Government, India, Scholarship, Mid day meal, Logit, Probit, Indicus Analytics, Ajay Mahal, Pradeer Srivastava, NCAER, Harvard University, Public Health.

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I. Introduction

Educational achievement is a key ingredient in economic and social development. In the fifty-four years of its sovereign existence, India has undertaken substantial efforts to enhance literacy levels that were a mere 17% in 1947. The latest census of 2001 shows literacy levels have increased to 65%. This is no doubt a substantial improvement, but far short of goals set in Article 45 of Indian Constitution, as also of the needs of an economy seeking to play an important role in tomorrow's global economy as a low-cost provider of information-based products and services. Even aside from such grandiose ambitions, India is still quite far off from a basic target of universal literacy, despite substantial resources committed towards enhancing educational outcomes in the country over the past five decades.

The relative inadequacy of achievements is reinforced by the fact that the average literacy rate of 65% reflects considerable inequalities in educational achievements across various socio-economic categories such as caste and rural versus urban location. In addition, there is also overwhelming evidence, though mostly anecdotal, of a male bias in educational achievements across the country. To redress these inequalities, the government has initiated a number of schemes such as provision of free mid-day meals, scholarships, transport concessions, free books, free uniforms, etc. Yet these inequalities persist despite the existence of such schemes over a considerable period of time.

In assessing the causes underlying the relatively low outcomes, researchers in India and elsewhere have pointed at both demand and supply-side factors. Lack of access to schools (due, for example to distance), poor school quality, unsuitable environment in school, etc. are factors on the supply side that have been associated with low scholastic achievement. On the demand side, these results may stem from a low desire for schooling attainment due to diverse factors that affect the returns to schooling. These factors in India may differ systematically across socio-economic categories such as caste, sex or location although specific research on these is quite limited. Very often, given the nature of the data, it is difficult to disentangle supply versus demand effects.

In this study, we analyze the socio-economic determinants of schooling achievement in one state of India, namely, Karnataka, using the results of the 52nd survey of the NSSO. More specifically, the research presented here is aimed at answering the following set of questions:

- What are the determinants of schooling enrolment?
- What are the determinants of schooling attainment in terms of completion of primary-level schooling?
- What are the determinants of schooling attainment in terms of completion of middle or elementary-level schooling?
- What are the determinants of choice of schooling?

The NSSO survey data we use also solicited information from respondents on the reasons why specific children dropped out of school at different stages. Consequently, we also analyze these responses to determine patterns that may be useful in assessing policies towards the education sector.

Despite the recognized importance of education in India over the past five decades, empirical research in determinants of educational achievement has been relatively little. Duraisamy (1992) uses data similar to that used here to conclude that education of father and mother, consumption expenditure per adult, and distances from schools are important determinants of schooling by gender in India.² He uses a fixed-effects model in his estimation to control for community-specific variables such as quality of schooling. Other studies available use different types of data from those used here but reach conclusions that are broadly consistent. These can be briefly summarized as:- there is a male bias in households' decisions on education, parents' education has an important impact on children's education, and that household income also matters. In addition, other studies also discern a significant impact of supply-side factors in determining educational outcome, such as distance to schools, physical infrastructure, as well as intangibles related to the quality of the schooling experience.³

² Duraisamy, Palanigounder. "Gender, Intrafamily Allocation of Resources and Child Schooling in South India." Center Discussion Paper no. 667, Economic Growth Center, Yale University, 1992.

³ See V. Sipahimalani, "Education in Rural India: An Empirical Analysis of Household Decisions", PhD Dissertation, Yale University, 1999, for an analysis of the role of supply-side factors in explaining educational attainment in India.

The outline of the paper is as follows. In section II we present briefly the well-known theoretical framework to analyze demand for schooling. Econometric issues important to estimating schooling attainment and the econometric methodology are discussed in section III. Section IV contains a brief description of the data used while the empirical results are presented in section V. In section VI, we present an analysis of the reasons cited for children dropping out of school, a group that constitutes a substantial proportion of the population. Finally, section VII contains a summary of important findings and concluding observations.

II. Theoretical Framework

The theoretical framework underlying most empirical studies of schooling achievement is based up on models of human capital development wherein education is viewed not only as a consumption activity but also as an investment good. Forward-looking rational individuals evaluate the costs of schooling with the expected returns over lifetime, and the equality of marginal benefits and costs of investing determine the demand for education.

By embedding this framework in a model of intra-household resource allocation, one can examine the derived demand for investment in schooling. A typical approach is that of altruistic parents maximizing household utility wherein the quantity and quality of children are arguments as are leisure and consumption, and education decisions affect the quality and quantity of children. The resulting reduced form for the demand for education can be specified then in fairly general terms as:

$$S = F(Y, P, C, X, Z).$$

Thus, schooling demand (S) depends on earned and non-earned income (Y), the market and non-market costs of schooling (P), child specific characteristics (C), family background (X), and community and school characteristics (Z).

She also provides a comprehensive literature review for developing countries, as well as India in particular.

Since we do not have data on costs of schooling and school/community characteristics, the reduced form equation that is estimated in different regressions in this study is:

$$S_{ij} = a + bC_{ij} + cX_j + dY_j + \varepsilon_{ij}$$

$$i = 1, 2, \dots, n$$

$$j = 1, 2, \dots, m$$

where i indexes the children and j indexes the households.

S_{ij} : educational attainment for child i , in household j

C_{ij} : child specific characteristics such as age

X_j : household characteristics (including parents' education)

Y_j : per capital monthly expenditure

ε_{ij} : error term

III. Econometric Methodology

In analyzing the determinants of schooling attainment, three measures of such attainment are considered. First, whether or not the child ever enrolled for schooling (E). Second, we look at sub-groups of children by considering whether or not the child finished primary school (P) for those in age group 10-14, and, third, whether or not the child finished primary and elementary school (M) for those in age group 15-19. Separately, we also analyze the decision of choice between different types of school: public, private aided and private unaided.

First though, we need to identify and address three important econometric issues related to the estimations undertaken here. These refer to the endogeneity of household expenditure vis-à-vis education decisions, and the problems of left censoring and right censoring of the data.⁴

Endogeneity of Expenditure and Education Decisions

Many studies use income or per capita income of the households as an independent variable to explain the schooling of children. However, income itself is influenced by the portion of household members' time allocated to market work. For example, households in which more children go to school may have the mother participating more (or less) in the labor force. Again, whether a child goes to school, or works will also affect income available to the household instead.

This leads to the problem of simultaneity since schooling determines income and vice-versa. In our data, we have data on aggregate monthly expenditure rather than household income, but that too is likely suffer from the same problems to the extent expenditure is determined (*inter alia*) by income available. Consequently, household expenditure may not be orthogonal to the error term in the schooling equation. If this endogeneity is not dealt with, the estimated coefficients will be biased and inconsistent in a direction that can not be specified *a priori* for a model with more than one regressor.

Typically, an instrumental variable based on household assets could be used to deal with the problem of simultaneity between expenditure and education decision. Unfortunately, however, no data on household assets are available in the present survey, which makes it difficult to correct for this problem. We have estimated the regressions here both with and without the household expenditure and did not find the results changed significantly. The regressions reported are those that include per capital household expenditure.⁵

Left Censoring

The problem of left censoring arises in the present context due to the fact that many students do not even enroll. Specifically, for the Karnataka survey, almost 14% of the children had never enrolled in school. There is thus a probability mass point at zero and the observed

⁴ For more detailed discussion on these, see Sipahimalani (1999).

⁵ We can note though, that the inclusion of household expenditure without instrumenting it makes our results directly comparable with other studies that have also used income or expenditure.

distribution of schooling is a censored distribution of desired schooling. OLS estimates of schooling achievement (by ignoring this group) would therefore be biased. The solution to this problem would be to use a probit regression for estimating enrolment likelihood. For analyzing schooling attainment, on the other hand, a solution could be use of the tobit regression except if there also exists a problem of right censoring of the data.

Right Censoring

When the survey records schooling attainment of those who have finished school, we can observe the level attained by the respondent. However, for students still in school, the observed response only indicates the minimum level of schooling attainment they are likely to achieve. This is a problem of right-censoring of the data since the actual value of schooling attainment is greater than or equal to the recorded value.

The practical significance of the problem of right censoring in our context varies from case to case, depending up on the definition of schooling attainment used in the analysis. For example, the problem would be an important constraint when evaluating determinants of schooling attainment defined in terms of the level of schooling reported by the respondents, i.e., the maximum schooling attained at the time of the survey. In the present sample, almost 69% of the respondents were still in school at the time of the survey. The appropriate regression strategy to estimate the determinants of schooling attainment, defined as the maximum level of schooling attained, would be defined a censored ordered probit as argued Sipahimalani (1999) and Holmes(1996) amongst others.⁶

On the other hand, the problem of right-censoring of data would not affect the analysis in the two cases dealt with in this study. The reason is that schooling attainment is defined not in terms of the maximum attained but, instead, in terms of pre-specified levels (such as primary or elementary) for specific age groups. In particular, we look at determinants of schooling attainment by analyzing two specific measures of schooling attainment, namely, completion of primary level

⁶ Holmes, Jessica. "Measuring the Determinants of School Completion in Pakistan: Overcoming some Empirical Issues," Mimeo, Yale University, 1996. The censored ordered probit is described further below.

and of the elementary level. Thus, our analysis probes what are the determinants of finishing primary school versus dropping out before that (for age group 10-14 years), and what are the determinants of completing primary and elementary school (for age group 15-19). As shown in table 1, only about 10% of the children 10-14 years old are still in primary school, the rest having either moved on to elementary school or dropped out. If schooling attainment (the left-hand side variable) is defined as completion of primary school, the observations for 10% of these children would be right censored, since we do not know if they will actually finish primary. For the remaining children, who are already in middle school, the completion of primary level is observable, i.e., not censored. If we drop children 10 years old, the percentage of 11-14 years still in primary school drops to less than 2.5%. Although we have reported regressions in the paper for 10-14 years, the results are virtually identical to those obtained by using the age group 11-14 years only.

Similarly, in the age group 15-19 years, only 1.2% of them are either in primary or in middle/elementary school. For schooling attainment defined as completion of middle (or anything below), once again right censoring of the variable is not a problem. In both these cases, therefore, an ordered probit is an appropriate estimation methodology. The ordered probit also has the additional benefit that it accounts for the left censoring as well, i.e. the mass point at zero discussed above, since schooling is treated as a discrete variable where successively higher levels of schooling attainment are interpreted as 'better' outcomes.

Table 1: Schooling attainment of those in age groups 10-14 and 15-19 years

Age	Primary	Middle	Secondary	Higher Sec	Dip/cert	Grad	Not attending	Total	
10	176	220	0	0			112	508	Primary Class 1-4
11	28	310	2	0			50	390	
12	25	368	25	0			139	557	
13	3	163	150	0			94	410	
14	0	59	207	2			137	405	
Total	232	1120	384	2			532	2270	
15	1	14	181	6	0	0	171	373	Middle Class 5-8
16	0	4	105	59	0	1	178	347	
17	0	0	21	74	2	5	137	239	
18	0	0	12	57	1	30	369	469	
19	1	0	4	17	11	39	149	221	
Total	2	18	323	213	14	75	1004	1649	

Estimated Specifications

To analyze determinants of school enrolment, we assume an underlying latent variable E_{ij}^* whose value determines whether or not the child enrolls. Thus, our probability of enrolment model is:

$$E_{ij}^* = \gamma'w + e_{ij}$$

and $E_{ij}=1$ if $E_{ij}^* >0$; $E_{ij}=0$ else,

where w is the vector of regressors determining the likelihood of enrolment. This model is estimated using the standard probit regression.

For analyzing determinants of completion of primary school by the age group 10-14 years, an ordered probit is an appropriate estimation model as noted above. We define schooling in this case as an ordered categorical variable taking the value 0 for no enrolment, 1 for enrolment without completion of primary school and 2 for completion of primary school (and any level higher).

Similarly, in case of age group 15-19 years, we analyze the determinants of completion of elementary or middle school again using an ordered probit framework. The observed schooling attainment is then defined as an ordered categorical variable taking the value 0 if the child never enrolled, as 1 if the child enrolled but did not finish primary level, as 2 if the child finished primary and dropped out, as 3 if the child is currently attending elementary or dropped out at the elementary level after finishing primary, and as 4 if the child finished elementary school and either dropped out or is currently attending secondary.

In both cases above, an ordered probit framework is used under the assumption that the error term is normally distributed. Define P_{ij}^* as the latent schooling attainment decision indicator.

$$P_{ij}^* = \beta v + \varepsilon_{ij}$$

However, P_{ij}^* is unobserved. What is observed is the actual schooling attainment category, P_{ij} , which takes values as follows.

$$P_{ij} = 0 \text{ if } P_{ij}^* \leq \tau_0$$

$$P_{ij} = 1 \text{ if } \tau_0 < P_{ij}^*$$

and so on until

$$P_{ij} = J \text{ if } \tau_{j-1} < P_{ij}^*$$

The τ 's (taus) are unknown parameters (threshold levels of desired schooling) that are also estimated.

The likelihood function is:

$$L(\text{Ordered Probit}) = F(\tau_s - \beta'v) - F(\tau_{s-1} - \beta'v) \text{ for } S = 0, 1, \dots$$

where F is the normal cumulative density function.

An alternative estimation strategy to analyze determinants of completion of primary schooling would be to define a dummy variable P_{ij} that equals 1 if the child finishes primary school and 0 otherwise. Again, we specify an underlying latent variable P_{ij}^* determined by the same regressors, and

$$P_{ij}^* = \beta w + \varepsilon_{ij}$$

and $P_{ij} = 1$ if $P_{ij}^* > 0$; $P_{ij} = 0$ else.

However, P_{ij} is observed only if the child is enrolled, i.e., $E_{ij} = 1$. If this fact is ignored, the results will be biased if $\text{Cov}(\varepsilon_{ij}, e_{ij}) = \rho$ is non-zero. Hence, the model above should be estimated as a probit regression with sample selection. We have estimated both models, an ordered probit and a probit with sample selectivity to analyze determinants of completion of primary schooling.

Finally, if instead of analyzing schooling attainment separately, in terms of completion of primary level and of elementary level, what if one were to analyze determinants of observed schooling attainment for all children together, in the 5-19 age group? The issue of right censoring of data would then be a significant problem for those children still in school. Ideally one should

then distinguish between those who have completed schooling and those who are still in school. This has been done in some studies using a censored ordered probit which accounts for the censoring (see Sipahimalani (1999) and Holmes (1996)).

For the right censored observations (i.e. the children still studying in school), final attainment is unknown. We know that the child will attain *at least* the level P_{ij} or more, i.e. in terms of the ordered probit discussed above, the desired level of schooling, P_{ij}^* , is greater than the observed category of schooling, P_{ij} .

i.e. $\tau_{s-1} < P_{ij}^*$ i.e. $\tau_{s-1} - \beta'v < \varepsilon_{ij}$

The likelihood function for these children is:

$$L(C) = 1 - F(\tau_{s-1} - \beta'v) = F(-(\tau_{s-1} - \beta'v)).$$

The likelihood function that is maximized then is the product of this and the likelihood for the uncensored observations as given in L(ordered probit) above. We have not estimated this specification in the results presented in this study.⁷

Finally, we also analyze determinants of schooling choice, another important issue for policy analysis. The choice of schools is estimated using a multinomial logit model where the choice is between the three types of schools available: public (i.e., government owned), private unaided and private aided, and the fourth option of not sending the child to school at all. The base category (for comparison) is the choice of not being enrolled in school. The equations provide a set of probabilities corresponding to each outcome category. To identify the model, one of the vectors of coefficients is arbitrarily set to zero. This is the base category which, in this case, is 'not going to school'.

⁷ As will be discussed below (section V), our results from estimating ordered probits for schooling attainment in terms of completion of primary and of elementary-level schooling show fairly clear cut and virtually identical results. It is quite likely, therefore, that a censored ordered probit for maximum schooling attained would yield very similar results also.

It is assumed that the choices are unordered in this specification. The multinomial logit does not assume an ordering in the outcomes, which would presume that schools of one type are necessarily better. Although there is some evidence regarding private unaided schools being of higher quality than government schools in India, it is not enough to entail imposing any rank ordering on the data.

IV. Data

Data used in the analysis are from the NSSO's 52nd round survey. The survey was carried out in 1995-96 and covered 72883 households. The survey is representative at the regional level⁸. The data for the state of Karnataka has been extracted from the large survey and covers 1,548 households in rural areas and 1,487 in urban areas of Karnataka. The sample was selected from 279 villages and 248 urban blocks of Karnataka. The detailed sampling procedures adopted by the NSSO are described in its publications⁹.

The 52nd round survey collected information on participation in education through the schedule 25.2. The information collected through this instrument can be classified into three categories. The first set deals with the household characteristics and general information about all the household members of the selected sample. The second set deals with the details about the currently attending individuals within the age group of 5-24 years. The last set is on the education details of the individuals currently not attending school, again within the age group 5-24 years. The various variables and their coverage have been detailed explicitly in the NSSO report and the schedule. The variables of interest to the present analysis are listed below.

General Information

Household Characteristics

Sex of the head of household

Education level of the head of household

⁸ NSSO divides each state into a number of mutually exclusive and collectively exhaustive agro climatic regions. Thus Karnataka, state of our interest, has been divided into four regions.

Education level of the spouse of the head of household
Household size
Number of boys
Number of girls
Per capita monthly expenditure
Social group code
Distance to the nearest primary school

Individual Characteristics

Age
Sex
Educational Attainment

Characteristics of Individuals Currently Attending (5-24 years)

Level
Type of Institute
Free Education
Tuition Fee Exemption
Scholarship
Book allowances
Free stationery
Mid Day Meal
Transport Concession

Characteristics of Individuals Currently Not Attending

Reason for not attending
Ever Enrolled
Reason for not enrolling
Dropped out
Level when dropped out

⁹ See "Attending an Educational Institution in India: Its Level, Nature, and Cost." NSSO, New Delhi, Report No. 439(52/25.2/1), October 1998.

Reason for dropping out
 Age at entry
 Number of years of schooling

V. Results

We first present results for schooling enrolment followed by the analysis of determinants of finishing primary school, P, and elementary or middle school, M. This is followed by the results of multinomial logit to estimate schooling choice.

V.1 Schooling Enrolment

Table 2 presents the results of a probit regression for the binary dependent variable E for the sample of all children in the 5-14 age group. The second column in the table presents the raw coefficients of the probit estimation while the third column displays the marginal effects of the relevant variable. The table shows results of two specification, one with dummies included for the four regions of the state, the other without.

Table 2: Probit Regressions Estimating Likelihood of Enrolment (Full sample, 5-14 years)

	Probit Coef.	Marginal Effects	Probit Coef.	Marginal Effects
Caste	-0.15	-0.03	0.16	-0.03
	-2.38	-2.38	-2.48	-2.48
Urban	0.23	0.03	0.23	0.04
	3.37	3.37	3.51	3.51
Male	0.44	0.07	0.43	0.07
	7.70	7.70	7.55	7.55
Distance	-0.17	-0.03	0.05	-0.01
	-1.88	-1.88	-0.57	-0.57
Education of Head	0.13	0.02	0.11	0.02
	7.16	7.15	6.28	6.28
Education of Spouse	0.07	0.01	0.09	0.01
	2.79	2.79	3.73	3.73

Household Expenditure	0.18	0.27	2.44	0.39
	6.21	6.21	8.80	8.80
R1*	0.73	0.07		
	5.60	5.60		
R2*	0.68	0.07		
	4.49	4.49		
R3*	0.55	0.08		
	7.52	7.52		
_cons	-2.18		2.23	
	-12.89		13.39	

Note: Figures below coefficients are z-values

For the sample as a whole, being male substantially increases the likelihood of school enrolment as does being in an urban area relative to a rural one. In addition, the likelihood of school enrolment is related positively to the education levels of both the head of the household and his/her spouse. On the other hand, being from a disadvantaged social group has a negative impact on the likelihood of enrolment. The only coefficient statistically insignificant at 5% level of significance is distance to the nearest primary school; it is however significant and negative at 6% level. Household per capita monthly expenditure has a statistically significant positive impact on enrolment likelihood: a unit increase enhances the likelihood of enrolment by 27%.¹⁰

All three regional dummies are positive and significant, implying a higher likelihood of school enrolment in these regions relative to the base case. There are four regions in the sample for Karnataka of which the base region has been chosen as "Inland Northern". Region 1 refers to "Coastal and Ghat", region 2 to "Inland Eastern" and region 3 to "Inland Southern".

In terms of the marginal impact of the variables, being male increases the likelihood of enrolment by 7% while being in urban areas does so by 3.5%. The probability of school enrolment is enhanced by 2% by the educational level of head of household and by 1% by that of the spouse. Lastly, being from a disadvantaged caste lowers likelihood of enrolment by 2.5% while, relative to the base region (Inland Northern), the likelihood of enrolment in all other regions is higher by 7-7.5%.

¹⁰ Household per capita monthly expenditure is defined in thousands of rupees. If it were defined in hundreds of rupees, the likelihood of enrolment would increase by 2.7%, and so on.

Since the dummies for both sex and location (urban versus rural) are significant and since there may be systemic differences in the behavior of enrolment across these categories, it may be worthwhile to analyze determinants of school enrolment separately for males versus females, and for urban versus rural children. This is further confirmed by the fact that, in each case, tests for equality of each coefficient between the two categories were strongly rejected.

Table 3: Probit Estimates (Marginal Effects) of Likelihood of Enrolment by Sex and Location (5-14 years)

	Girls	Boys	Rural	Urban
Caste	-0.08	0.004	-0.03	-0.01
	-3.81	0.38	-1.62	-1.11
Urban	0.06	0.01
	3.59	1.17		
Male	0.14	0.02
			7.90	2.31
Distance	-0.02	-0.03	-0.09	0.01
	-0.94	-1.89	-3.29	0.67
Education of Head	0.02	0.02	0.04	0.01
	4.51	5.75	6.47	3.80
Education - Spouse	0.02	0.01	0.01	0.01
	2.60	1.26	0.78	3.16
HH Expenditure	0.40	0.18	0.61	0.10
	4.93	3.67	6.10	3.52
R1*	0.12	0.04	0.16	0.01
	5.38	2.39	6.34	0.81
R2*	0.09	0.05	0.13	0.02
	3.48	2.81	4.21	1.73
R3*	0.12	0.04	0.13	0.02
	7.01	3.63	7.18	3.03

Note: Figures below coefficients are z-values

The results are presented in table 3 for the four sub-categories, males versus females and urban versus rural. For female children, all explanatory variables have the expected signs and are significant except for distance to school, which, although negative, is insignificant. Being from disadvantaged caste lowers the likelihood of girls' enrolment by 8% while being from an urban area increases it by 6%. The education of both the head of the household and of the spouse also increase the likelihood of enrolment by about 2%. Household expenditure again has a relatively

large impact and is highly significant. At the same time, the effect of household expenditure on likelihood of school enrolment is much larger in case of female children than in case of males. This finding is consistent with other studies that have also found a greater elasticity of female enrolment with respect to household income. The coefficient for household expenditure is also much larger in rural areas than in urban.

For boys, three of the explanatory variable are statistically insignificant: caste, education of the spouse and the location – urban versus rural. This is consistent with the male bias in enrolment likelihood, in that boys are more likely to enroll than girls even if they are from more disadvantaged social caste or from rural areas. On a more positive note, this can be interpreted as indicating that at least among male children, caste and rural location do not have a significant deterrent effect on enrolment. This may reflect higher demand for education (for male children) amongst these groups, better availability of schooling, or both.

In terms of the rural versus urban regressions, the determinants of school enrolment likelihood do not show as much variation across the two categories, yet there are interesting differences. While household expenditure and education of head of household increase enrolment likelihood in both cases, the effect is much larger in rural areas. Thus, the elasticity of likelihood of school enrolment with respect to income is much higher for rural children, by a factor of six. Similarly, the male bias is lot more pronounced in rural areas where being male increases the likelihood of enrolment by 14% compared to 2% in urban areas. Caste status is insignificant in both cases.

Distance from the nearest primary school is a significant determinant of enrolment likelihood for rural children but not for urban ones. This may reflect greater availability of schools in urban areas. Interestingly, education of spouse (of head of household) has no significance in case of rural children but does in case of urban ones. Most studies have found mother's education to be significant in children's education decisions, particularly for girls.¹¹ Our results are similar at the

¹¹ Naturally, it is not necessary that all heads of household in the sample would be males. In addition, even if the head of the household is male, he may not be the father of the child in case of joint cohabitation of extended family members.

level of the full sample, and for girls, but spouse's education does not appear to impact enrolment likelihood of rural children.

Finally, while the regional dummies are statistically significant determinants of schooling enrolment in all the regressions reported above, they are not so for urban children (with the exception of the third region, Inland Southern). This shows considerable homogeneity in unobserved characteristics of the regions across Karnataka for urban schooling relative to other categories. In particular, likelihood of enrolment of girls is 12% higher in the Coastal and Ghat and the Inland Southern regions relative to Inland Northern. The discrepancy between Inland Northern and the rest of the regions is equally pronounced for rural children whose enrolment likelihood is higher by 13-16% in the other three regions.

Given the differences in the regressions across the four categories above, namely urban versus rural and males versus females, we also estimated determinants of schooling enrolment for male versus female children separately for the rural and urban areas. The results are not reported here in details but are consistent with those reported so far (and are briefly presented in the summary table below (table 4)).

Table 4: Summary results of Probit Regressions on Likelihood of Enrolment

	TOTAL	FEMALE	MALE	URBAN	RURAL	URBAN		RURAL	
						MALE	FEMALE	MALE	FEMALE
Male	+	+	+
Caste	-	-	?	?	?	?	?	?	-
Urban	+	+	?
Distance	?	?	?	?	-	?	?	-	-
Hohedu	+	+	+	+	+	+	+	+	+
Spsedu	+	+	?	+	?	+	+	?	?
Hh expnd	+	+	+	+	+	?	+	+	+
R1	+	+	+	?	+	?	?	+	+
R2	+	+	+	?	+	?	?	+	+
R3	+	+	+	+	+	?	+	+	+

Note: + and - indicate statistically significant positive and negative effect respectively. A '?' denotes statistically insignificant coefficient.

Thus, caste has a negative impact on enrolment likelihood only in case of rural females but not for any others. Distance from the nearest primary school, on the other hand, is statistically significant determinant of enrolment likelihood for both males and females in rural areas, but not in urban areas. Household expenditure, although quantitatively small, has a significant impact all groups except urban males, and its magnitude increases as we move from urban males to females, to rural males to, finally, rural females. The education of head of household is important for all children. In contrast, education of the spouse is significant for all urban children but in rural areas, only marginally significant (at 7.5%) for rural females.

Finally, at a regional level, region 3 (Inland Southern) shows higher enrolment likelihood for all children categories except for urban males (relative to the base region, Inland Northern)). For urban children, the likelihood of enrolment is statistically indistinguishable in the other two regions. For rural children, however, all three regions show a much higher likelihood of enrolment relative to the base region. Interestingly, though, while the likelihood of enrolment is higher by about 9% in all three regions for males, for females, the enrolment likelihood is higher by about 24% in region 1, 20% in region 3 and 17% in region 2.¹² The base region, Northern Inland, thus shows significantly lower enrolment likelihood for girls than all others, and there is more heterogeneity in girls' enrolment likelihood across the state's regions than for boys.

V.2 Determinants of attaining Primary Education

Most children in the sample enroll at the ages 5 or 6 and, as shown in Table 5 below, there is very little attrition until the age of 11. From age 12 onwards, however, there is a steady attrition as increasingly higher percentage of children ever enrolled stop attending their school. It is, therefore, interesting to ask what determines whether a child will achieve a specific level of schooling or drop out instead. We analyze this question for two schooling stages: completion of primary and of elementary education.

¹² The percentage figures are from probit regressions not reported but summarized in Table 4.

Table 5: Percent of Children Ever Enrolled and Still Studying, by Age

Age	5	6	7	8	9	10	11	12	13	14	15	16	17	18
% Ever enrolled Of Which,	20.3	74.9	91.1	85.0	91.5	82.9	91.0	85.5	90.2	85.4	82.8	82.4	88.7	77.2
% Still in school	98.3	97.6	97.6	97.8	95.5	94.1	95.8	87.8	85.4	77.5	65.4	59.1	48.1	27.6

As noted earlier, there are two alternative ways we can estimate the determinants of likelihood of completion of primary school, namely, ordered probit and probit with sample selection. We estimated both but found, in case of probit with sample selection, that ρ ($= \text{Cov}(\varepsilon_{ij}, e_{ij})$ or the covariance between the sample selection equation and the attainment equation) was zero. In all cases, the null hypothesis of $\rho = 0$ had extremely low chi-square statistics that could not be rejected even at 60% levels of significance. This would imply that one could go ahead and just estimate the attainment model as a basic probit. Consequently, we have not bothered to report the results of estimating the probit with sample selection but, instead, report only the ordered probit regressions.¹³

Results of the ordered probit regression to analyze determinants of completion of primary schooling are presented in Table 6 below. The probit regressions were estimated for the whole sample as well as separately for male and female children.

¹³ Given a value of $\rho = 0$, it is not surprising that the maximum likelihood function in case of probit with sample selection appeared not concave in many cases. The results of the joint estimation were also generally inferior to those obtained with the ordered probit. We have not compared the results from the ordered probit with those from estimating the attainment model alone using basic probit, but they are likely to be quite similar.

Table 6: Determinants of Completion of Primary Schooling: Ordered Probit (10-14 yrs)

	All	Boys	Girls
Caste	-0.22	-0.16	-0.32
	-3.21	-1.64	-3.17
HH Expenditure	1.15	0.79	1.60
	4.77	2.57	4.17
Urban	0.20	0.02	0.38
	2.95	0.16	4.02
Male	0.39
	6.68		
Education of Head	0.10	0.10	0.11
	5.31	3.96	4.05
Education of Spouse	0.07	0.05	0.08
	3.21	1.56	2.48
Distance	-0.01	-0.10	0.07
	-0.09	-0.72	0.46
Dreg1	0.51	0.24	0.83
	4.11	1.43	4.48
Dreg2	0.56	0.52	0.56
	4.50	2.87	3.19
Dreg3	0.45	0.34	0.60
	6.21	3.36	5.73
_cut1	0.56	-0.10	0.83
_cut2	1.24	0.70	1.43

Note: Figures below coefficients are z-values

For the sample as a whole, the results show all variables as statistically significant except for distance from the nearest primary school. Thus being a female child, being from a disadvantaged caste or being in a rural area have a negative impact on the likelihood of finishing primary school. On the other hand, education of both head of household and spouse of head of household have a significant positive impact on likelihood of finishing primary school, as does household per capital expenditure. In addition, the coefficient for education of the spouse is not too

much smaller than that for education of head of household. Finally, once again, all three regions show a higher likelihood of completing primary school than the base region.

Results of the ordered probit regression for female children are qualitatively identical to those for the full sample, with all explanatory variables significant in determining likelihood of completion of primary schooling except distance. Quantitatively, however, all coefficients are larger in value compared to the full sample implying, for example, a relatively higher negative impact of caste status or rural location on girls' likelihood of completion of primary school. As before, the coefficient for household expenditure is again larger for female children, showing a greater sensitivity of their schooling attainment to resources available to the household. The coefficients for regional dummies are also much higher, indicating a substantially lower likelihood of completion of primary schooling for girls in the base region.

Determinants of likelihood of completion of primary school for male children are quite different compared to the females. In particular, while household expenditure and education of head of household are still significant, caste status and rural versus urban location do not have any effect. These results are consistent to those obtained for school enrolment where too, for male children at least, being in rural areas or from a disadvantaged caste had no effect on schooling attainment. Two of the regional dummies are also significant implying a greater likelihood of primary completion for male children, but the coefficients are much smaller than those in the regression for girls. Note also that the threshold (cut-off) values for male children are much lower than those for females, implying that boys have a higher likelihood of finishing primary school than girls even if all other factors are similar.

V.3 Determinants of attaining Primary and Elementary Education

Our results of the ordered probit estimating likelihood of finishing primary and elementary school are qualitatively similar to those above focusing on completion of only the primary schooling. Once again, being a male has a significant positive impact on the likelihood of completion of elementary education as shown by the coefficient of the sex dummy in the regression for the full sample in the table below. In addition, once again the cut-off thresholds are

much lower for boys than girls, implying a higher likelihood of boys being in any of the ranked stages of educational attainment relative to girls.¹⁴

Table 7: Determinants of Completion of Primary and Elementary Schooling: Ordered Probit (15-19 yrs)

	All	Boys	Girls
Dsgc	-0.21	-0.16	-0.31
	-2.55	-1.44	-2.48
pcme	1.39	1.80	0.81
	5.48	4.94	2.26
Durb	0.41	0.20	0.66
	5.59	1.90	6.42
Dmale	0.51		
	7.75		
Educ of head	0.11	0.13	0.10
	5.68	4.48	3.56
Spouse educ	0.09	0.06	0.12
	3.73	1.83	3.45
distance	0.05	-0.01	0.15
	0.44	-0.09	0.91
R1	0.24	0.04	0.48
	1.96	0.23	2.81
R2	0.26	0.14	0.42
	2.21	0.80	2.53
R3	0.27	0.09	0.53
	3.40	0.75	4.59
_cut1	0.64	0.06	0.73
_cut2	0.89	0.34	0.96
_cut3	1.03	0.48	1.10
_cut4	1.33	0.79	1.41

Note: Figures below coefficients are z values

Once again, as in completion of primary, the likelihood of elementary education for boys is statistically significantly influenced only by household expenditure and by the education of the head

¹⁴ Recall the dependent variable is ranked as =1 if enrolled but not finished primary; =2 if finished primary; =3 if finished primary and currently attending middle, if finished primary and dropped out at middle stage; and, =4 if finished middle and currently attending secondary or higher, finished middle but dropped out later.

of the household. There is, however, some evidence that there is an urban bias for boys unlike at the level of primary school. Being in rural area lowers the likelihood of boys' attaining completion of elementary school with the coefficient significant at 6% level of significance. There is no regional pattern in boys' elementary education once other factors have been taken into account.

The likelihood of completion of elementary schooling by girls, in contrast, shows a significant caste and location effect with those from socially disadvantaged groups or rural areas much less likely to attain the stages up to elementary schooling. Unlike the case of boys, the education level of spouse of head of household significantly and positively affects the attainment of elementary education by girls. Surprisingly, the coefficient of household expenditure for girls is smaller than that for boys, although this may also be reflecting that far fewer of them go on to the elementary level than boys. Finally, educational attainment up to the elementary stage by girls clearly shows a regional pattern with those in regions 1 and 3 (Coastal & Ghat and Inland Southern respectively) far more likely to display greater schooling attainment.

V.4 Determinants of choice of schools

Table 8A below presents the percentage of children enrolled in the three different categories of schools -- government, private aided (PA) and private unaided (PUA) -- by sex and by region. The variation across sex categories is not very large (these figures are percentages for those enrolled, and do not take into account enrolment rates). For all regions taken together, 68% of both boys and girls attend government schools with the rest attending private schools. Within regions too, there is not much variation between percentage of boys and girls enrolled across different school categories.

However, across regions, there are substantial variations with government schools attended by about three-quarters of the children in regions R0 (Inland Northern) and R2 (Inland Eastern) while private aided schools account for a much higher percentage of students in regions R1(Coastal & Ghat) and R3 (Inland Southern). Quite remarkably, in the Inland Southern region, only 53% of boys and 56% of girls are enrolled in government schools with the remaining in private schools.

Table 8A: Enrolment in school categories by sex and by region (%)

	BOYS			GIRLS		
	Govt	PUA	PA	Govt	PUA	PA
R0	76	6	17	76	6	19
R1	62	8	30	65	4	31
R2	80	7	14	77	9	13
R3	53	17	30	56	15	29
Total	68	10	22	68	9	23

Figures rounded off. R0= Inland Northern region (base region in regressions); R1= Coastal and Ghat region; R2= Inland Eastern region and R3= Inland Southern region

Table 8B: Enrolment in school categories by sex and by schooling level (%)

	BOYS			GIRLS			
	Govt	PUA	PA	Govt	PUA	PA	
Primary	97	1	2	96	1	2	RURAL
Elementary	93	1	4	94	1	5	
Secondary	55	10	34	47	4	47	
Hr Sec	40	4	51	67	14	18	
Primary	52	23	19	59	18	18	URBAN
Elementary	45	20	34	55	15	24	
Secondary	36	15	45	34	19	43	
Hr Sec	27	6	63	40	4	56	

Figures rounded off.

Schooling choice also shows significant differences across the various levels of schooling. This is evident in Table 8B, which presents data on schooling choice for boys and girls separately at different levels of schooling. Clearly, there exists a bias towards private schools at higher levels of schooling. In the upper panel of the table, for rural children, more than 90% of boys are in government schools for primary and elementary schooling while the proportion drops to 55% and 40% respectively for secondary and higher secondary levels. The drop in enrolment in government schools is reflected in a corresponding rise in enrolment in private schools. A similar picture applies to schooling choice for girls too, although far more girls than boys are enrolled in government schools at the higher secondary level.

In urban areas, private schools are far more dominant even at the primary and elementary levels, with enrolment in government schools ranging from 45-59% only. Interestingly, however, within private schools, it is private unaided schools that are more frequently chosen at primary and

elementary level, with the choice shifting to private-aided schools at the higher stages of schooling. These enrolment patterns, across both rural and urban areas, are consistent with substantial cost-adjusted difference in quality at senior levels between government and private schools. Given the distinct shift in preference of private over government schools at higher levels of schooling, we estimate determinants of schooling choice for the sample as a whole as well as separately for lower levels of schooling (primary and elementary) and higher ones.

To estimate the determinants of schooling choice, we have estimated a multinomial logit model for school choice separately for male and female children with results given in Table 9A below. The figures reported are in terms of "relative risk ratios" which measure the impact of a one unit change in the regressor on the probability of the relevant category occurring relative to the base category, which in the present case is that of not being enrolled at all. Thus, let RGB be the ratio of the probability of a boy enrolling in a government school to the probability of the boy not being enrolled at all. Then the relative risk ratio of household expenditure is the impact of a one-unit increase in the expenditure on the ratio RGB.

Table 9A: Multinomial Logit Regressions of School Choice (5-14 years)

	Govt School		PUA		PA	
	Boys	Girls	Boys	Girls	Boys	Girls
Caste	1.07	0.54	0.73	0.66	0.58	0.53
	0.38	-3.79	-0.91	-1.11	-1.79	-2.14
HH Expend	1.32	1.45	2.04	2.02	1.93	1.80
	3.08	4.61	6.87	7.17	6.50	6.33
Urban Dummy	1.02	1.50	8.14	20.78	3.64	5.02
	0.10	2.40	6.15	6.08	4.93	6.39
Education of Head	1.36	1.23	1.57	1.30	1.71	1.46
	5.24	4.42	5.84	3.54	7.50	6.01
Education of Spouse	1.05	1.16	1.11	1.47	1.10	1.34
	0.66	2.18	1.22	4.44	1.15	3.82
distance	0.58	0.80	0.55	0.56	1.01	1.28
	-2.20	-0.91	-1.30	-1.02	0.03	0.82
R1	2.24	6.53	1.30	4.67	2.75	10.20
	2.22	5.31	0.48	2.54	2.25	5.35
R2	5.15	4.47	3.77	5.69	4.12	2.06
	2.86	3.99	1.88	3.20	2.18	1.43
R3	1.99	3.52	4.31	7.59	4.72	5.58
	3.20	6.33	4.89	6.42	5.69	6.44

Note: Figures below coefficient estimates are the z-values. Household per capital monthly expenditure denominated in hundreds of rupees.

Results from the multinomial logit on the pooled sample, which we have not reported here, show again that schooling choice also reflects a male bias. Being male increases the likelihood of joining a government school (relative to non-enrolment) for boys by 143% while the change in likelihood of choosing a private school is even higher: 188% for private aided school and 215% for private unaided one.

The results in table 9A show that an increase of one unit in household expenditure increases the likelihood of enrolment across all categories of schools. However, the effect is highest on the likelihood of enrolment in private unaided school (104% and 102% for boys and girls respectively), followed by private aided school (93% and 80%) and government school. This pattern holds for both boys and girls. Interestingly, relative to non-enrolment, the impact of

household expenditure on likelihood of enrolment in private schools is marginally higher for boys relative to girls across the two categories of private schools. In case of government schools, however, the likelihood of enrolment for girls increases by 45% compared to only 32% for boys with marginal increase in household expenditure. Once again, this shows the sensitivity of girls' schooling to economic factors.

Being from a lower caste lowers the likelihood of enrolment across all categories of schools for girls but not for boys (although the figure is statistically insignificant in case of private unaided schools). This implies that, relative not being enrolled, the likelihood of being enrolled in government or private aided schools declined if a girl is from a disadvantaged caste, while in case of boys, caste has no effect. On the other hand, being from an urban area has a remarkably large impact on the likelihood of choosing a private unaided school for both boys and girls. The location effect is strong for private aided schools too, but smaller. For boys the likelihood of enrolment in government school (relative to non-enrolment) is unaffected by being in an urban versus rural location while it increases marginally for girls in urban areas.

The education of the head of the household has a significant impact on the likelihood in enrolment across all categories of schools. The effect is lowest for government schools and highest for private aided ones. On the other hand, the education of spouse (of head of household) does not affect the likelihood of enrolment in different schools for boys. For girls, in contrast, spouse's education increases the likelihood of enrolment across all categories, the impact being higher for both types of private schools than government ones. Distance from the primary school, as would be expected from the earlier results, has an insignificant impact except in case of boys' enrolment in government school.

Finally, at the regional level, being in the Inland Southern region increases the likelihood of enrolment across all types of schools for both boys and girls. Relative to not being enrolled, the likelihood of girls' enrolment increases far more in this region for private unaided and aided schools than government schools. The impact on likelihood of boys' enrolment also increases across all school categories, again being higher for private ones. The results are qualitatively similar in case of the coastal and ghat region where again, relative to non-enrolment, the impact on likelihood of

enrolment in private schools is much higher than government schools. In the Inland Eastern region however, the likelihood of girls' enrolment (relative to non-enrolment) increases for government schools but not for any of the two types of private schools.

As mentioned earlier, the pattern of school enrolment shows a distinct shift towards private schools at higher levels of schooling. Consequently, we estimated a multinomial logit model of schooling choice separately for age group 5-12 years and for 12-19 years. The first group corresponds to the age group when students are overwhelmingly in either primary or elementary school while the other groups reflects ages when they are in secondary or higher secondary. The results in both cases were qualitatively similar and, in turn, similar to the results for the sample taken as a whole. In table 9B we report the results of estimating the multinomial logit model for age group 12-19 years only.

A comparison with table 9A shows the results are qualitatively identical with the only change being that education of spouse is now significant in determining schooling choice for boys also in case of private schools (both aided and unaided); it was significant only for girls in table 9A. Otherwise, the pattern of statistically significant variables is generally the same across tables 9A and 9B, as are the relative orders of magnitude of the coefficients. This implies that, notwithstanding the shift in enrolment towards private schools at higher stages of schooling, the determinants of schooling choice are qualitatively similar (at least from the explanatory variables used here) at both lower and higher levels of schooling.

Table 9B: Multinomial Logit Regressions of School Choice (12-19 years)

	Government		Private Unaided		Private Aided	
	Boys	Girls	Boys	Girls	Boys	Girls
Caste	0.81	0.58	0.49	0.46	0.77	0.72
	-0.93	-2.31	-1.68	-1.44	-0.88	-1.06
Urban	1.03	2.31	2.47	12.29	1.87	4.94
	0.11	3.74	2.49	5.28	2.14	5.87
HH Expd	1.37	1.48	1.65	1.80	1.64	1.72
	3.32	4.17	4.85	5.32	4.96	5.36
Education HOH	1.39	1.30	1.51	1.24	1.70	1.43
	4.43	4.35	4.40	2.18	6.59	5.02
Education Spouse	1.24	1.25	1.31	1.51	1.35	1.38
	1.93	2.55	2.16	3.78	2.63	3.48
Distance	0.45	1.19	0.79	1.97	0.66	1.43
	-2.09	0.50	-0.47	1.48	-0.97	0.92
Reg 1	3.86	6.52	2.30	5.82	3.56	9.44
	2.33	3.96	1.13	2.35	2.06	4.36
Reg 2	3.60	2.46	1.18	6.03	1.04	1.20
	2.46	2.53	0.20	3.19	0.07	0.39
Reg 3	1.86	2.66	4.18	4.67	2.19	3.42
	2.23	3.89	3.89	3.73	2.49	4.18

Note: Figures below coefficient estimates are the z-values. Household per capital monthly expenditure denominated in hundreds of rupees.

VI. Analysis of Reasons for Dropping Out

The NSSO survey collected responses for children that had dropped out from school in terms of the reasons for dropping out. Fourteen types of responses were coded in addition to a miscellaneous category "others". Unfortunately, the responses coded are not always very clear cut as to what they mean exactly. For example, the response "child not interested in schooling" could reflect that the school quality was not good, school facilities were inadequate, or the desired level of schooling was completed. Similarly, the response "to look after younger siblings" could reflect a lack of interest on part of household in education or re-allocation of the child towards domestic work so adults could enter labor force. Yet, despite these caveats, it is worth considering the responses towards reasons for dropping out to assess if there are any systemic patterns.

Consequently, we have re-classified the coded responses into four broad categories, namely, economic factors, social factors, quality of the schooling experience and others. Table 10 summarizes the details of the survey responses and their mapping into the four categories.

Table 10: Re-classification of Stated Reasons for Dropping Out

Stated Reason for not Attending	Classification
to work for wage/salary	Economic
for participation in other economic activities	Economic
financial constraints	Economic
no tradition in community	Social Factors
to look after younger siblings	Social Factors
to attend domestic duties	Social Factors
parents not interested in studies	Social Factors
child not interested in studies	Quality of Schooling Experience
unable to cope or failure in studies	Quality of Schooling Experience
unfriendly atmosphere at school	Quality of Schooling Experience
studies not considered useful	Quality of Schooling Experience
schooling/higher education facilities not available conveniently	Quality of Schooling Experience
completed the desired level	Others
awaiting admission for the next level	Others
others	Others

Based on this classification, table 11 presents the distribution of stated reasons for dropping out, separately for boys and girls in rural and urban areas. As might be expected, social factors are cited much more frequently in case of female children than for males, both in rural and urban areas. On the other hand, a much higher percentage of boys drop out due to economic factors, ranging from 22% in rural areas to 26% in urban ones. Economic factors are also cited more often in urban areas, across both sexes, compared to rural, while for girls, social factors are more frequent in rural areas. Finally, the quality of education is the most frequently cited category for dropping out, which may also reflect the fact that this category is the largest one in the reclassification presented in Table 10 above.

Table 11: Distribution of Reasons for Dropping Out, by Sex and Location (%)

Reason	Rural		Urban	
	Male	Female	Male	Female
Economic Factor	21.9	14.2	26.2	17.2
Social Factors	12.7	40.4	11.0	31.0
Quality of Schooling Experience	62.4	41.9	57.4	43.0
Others	3.0	3.5	5.5	8.7

Table 12A: Distribution of Reasons for dropping out and last level attended by sex (5-24 years, Rural, %)

	Rural			Female		
	Economic	Social	Quality	Economic	Social	Quality
< Primary	0	1	4	0	1	2
Primary	18	23	33	30	20	33
Middle	41	28	23	42	42	14
Secondary	29	44	36	28	34	47
Higher Secondary	9	0	3	0	2	4
> HS	2	4	1	0	1	1

Table 12B: Distribution of Reasons for dropping out and last level attended by sex (5-24 years, Urban, %)

	Urban			Female		
	Economic	Social	Quality	Economic	Social	Quality
< Primary	7	1	2	0	1	3
Primary	13	4	21	25	13	19
Middle	34	34	17	23	34	21
Secondary	35	35	45	43	37	45
Higher Secondary	10	27	13	5	7	4
> HS	3	0	2	4	8	9

In tables 12A and 12B, we present the distribution of stated reasons for dropping out classified by the last level attended by the child, by sex and by location. In general, the percentage of children going on to levels beyond secondary schooling before dropping out is higher in urban areas and for boys, both of which are consistent with the econometric results earlier, where being in urban areas and being male positively affected schooling attainment. Both tables also show that the social factors are cited more often for girls than for boys, in both rural and urban areas.¹⁵

However, economic factors appear the most dominant in their effect on schooling relative to the other two factors. Except for urban females, a much larger proportion of those citing economic factors drops out by middle/elementary school or earlier, as compared to children dropping out for social or quality factors. Another way to see this is by considering the impact vector (RB, RG, UB, UG) where the values equal the percentage of children attaining schooling levels equal to secondary or higher amongst (rural boys, rural girls, urban boys, urban girls). The impact vector for economic factors is (40,28,48,54), which is clearly dominated by the impact vector for social factors at (48,37,62,52) and quality factors at (40,52,60,58) respectively. Aside from rural boys, the impact vector for quality factors dominates that for social factors too, implying those citing quality factors in dropping out generally attain higher levels of schooling than those citing social factors, as well as economic factors.

¹⁵ We also estimated a multinomial regression model analyzing the likelihood of economic, social or quality of schooling experience as being cited for dropping out, relative to the base case of continuing enrolment. The results showed only education of head of household and household income (in terms of quartile rank) to have a significant impact on reason for dropping out. Both these variables significantly lowered the likelihood across all three-reason categories (for dropping out) of a student citing any one of them relative to the likelihood of continuing enrolment. The multinomial regressions were estimated separately for boy and girls in both urban and rural areas.

VII. Concluding Observations

The research presented here has analyzed determinants of schooling enrolment and schooling achievement in Karnataka using data from the 52nd round survey by NSSO. We analyze determinants of schooling achievement by assessing factors that affect the likelihood of a child completing primary-level schooling and elementary-level schooling. In addition, we have also analyzed the role of various socio-economic factors that affect the choice of the type of school chosen by households. Finally, we also analyze the stated reasons in the survey as to why children either never enrolled or dropped out before completion of higher-level schooling.

Our results show a consistent pattern of male bias in household education decisions. Being a male increases the likelihood of enrolment as well as the likelihood of completion of higher stages of schooling, up to the elementary level. For school enrolment, we find that being from a rural area or from a socially disadvantaged caste has a significant negative effect on enrolment likelihood. However, this effect operates only for female children: indeed, caste affects enrolment likelihood of only rural girls, not of the urban ones. Neither caste nor rural location affects the likelihood of enrolment of boys. In view of the bias towards male children in households' allocation of resources towards education, this finding potentially reflects a closing of gap in educational achievements across households in terms of caste and rural location.

As in other studies, household expenditure – a proxy for income – is also a significant and important determinant of enrolment likelihood as is the education of head of household. On the other hand, education of spouse of head of household affects enrolment likelihood of only urban children, both boys and girls, and not of the rural ones.¹⁶ Finally, distance to the nearest primary school has a negative effect on enrolment of only rural children, both boys and girls, but has no effect in urban areas.

Our analysis of schooling attainment shows that for girls, being from rural areas and being from a disadvantaged caste, both have a substantial negative effect on likelihood of completion of primary schooling as also of elementary schooling. The education level of both the head of the

¹⁶ Spouse's education is significant for rural girls at 7.5% level of significance.

household and the spouse are also significant and quantitatively similar in their effect on completion of primary level. The education of the spouse has a relatively greater impact on girls' likelihood of completion of elementary school than that of the head of household.

For boys, on the other hand, caste status has no impact on likelihood of completion of primary or elementary education. Neither does being in rural areas although, for completion of elementary education, rural location has a negative affect that is only marginally insignificant at the 5% significance level. For boys' schooling attainment, in terms of both primary and elementary levels, only the education of the head of household is significant, not that of the spouse. Household expenditure is significant in all cases, for both boys and girls, while distance to school is insignificant in all cases.

The male bias in household decisions is reflected in a much lower likelihood of girls' completing the primary or elementary level compared to boys. It is also manifest in the much lower cut-offs or threshold values for girls in the ordered probit regressions, reflecting a lower likelihood of girls completing any of the different stages in between compared to boys.

Our results also show fairly clear cut patterns across the four regions of the state. Relative to the Inland Northern region, being in any of the other three regions implies a higher likelihood of enrolment for all children, with the effect much higher for girls than for boys. The likelihood of completion of primary school is also higher in the three regions, but more so in Inland Southern and Coastal & Ghat regions for girls. The same applies for the likelihood of completion of elementary schools for girls. However, there is no discernible region effect in the likelihood of elementary schooling for boys.

We used a multinomial logit model to analyze choice amongst three types of schools: government, private unaided and private aided. The results show that relative to the base case, i.e., no enrolment, being in an urban area has the largest impact on the likelihood of enrolment in private schools (both aided and unaided), for both boys and girls. The education of the head of the household increases the likelihood of enrolment across all three categories of schools, although the effect is higher for private schools than government ones. This holds true for both boys and

girls. On the other hand, education of the spouse affects only the likelihood of enrolment of girls, which increases across all three types of school but, again, the effect is more on likelihood of enrolment in the private schools. Being from a disadvantaged caste lowers the likelihood of enrolment for girls in government and private unaided schools, but has no effect in case of boys. Distance from nearest primary school only affects (lowers) the likelihood of enrolment for boys in government schools, but otherwise has no affect.

Household expenditure, a proxy for income in this study, has very sharp effects on schooling choice. An increase in household expenditure increases the likelihood of enrolment for both boys and girls across all categories of schools, but the impact is substantially higher in case of private unaided schools, followed by private aided schools. This implies that how well-off the household is has a substantial impact on whether or not the child will be enrolled at all, and even more so on the choice of private schooling.

Finally, the importance of economic constraints in schooling also came out clearly in the in the penultimate section, where we analyzed reasons for dropping out. Those citing economic factors clearly did worse off in terms of schooling attainment than those citing social or quality factors.