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Returns to education in Bangladesh

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This paper reports labour market returns to education in Bangladesh using national level household survey data. Returns are estimated separately for rural and urban samples, males, females and private sector employees. Substantial heterogeneity in returns is observed; e.g. estimates are higher for urban (than rural sample) and female samples (compared to their male counterparts). Our ordinary least square estimates of returns to education are robust to control for types of schools attended by individuals and selection into wage work.

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I Introduction

Although the effect of education on individual earnings is one of the most commonly studied relations in the economics literature, reliable estimate of returns to education is not available for Bangladesh. Largely due to lack of data, Bangladesh has remained absent from the rich literature on the relationship between education and earnings. Although there has been some research in the past, none of the earlier studies (e.g. Hossain, 1990; Hussain, 2000) yields reliable estimates of economic returns to education for Bangladesh. Past attempts potentially suffer from various methodological problems such as bias due to sample selection, omitted variables and/or do not exploit nationally representative data. All of these can undermine the usefulness of conventional estimates of returns to education: bias in the OLS estimates often makes a causal interpretation of wage earnings-education nexus difficult[i]. The objective of this paper is to estimate private (labour market) returns to education in Bangladesh. In addition to ordinary least square (OLS) estimates, we report estimates that correct for sample selectivity problem owing to potential non-random participation in wage work by individuals. The balance of this paper is as follows. Section 2 discusses our empirical strategy. Section 3 describes the data. Results are discussed in section 4. Section 5 is conclusion.

II Empirical Strategy

We adopt the standard Mincer-Beckerian human capital earnings function approach for our purpose. Within this framework, the coefficient on schooling variable in the earnings (measured in logs) regression yields an estimate of the private returns to education, after controlling for experience and other characteristics of the individuals[ii]. We use data on net earnings, both for wage earners and labourers. Hourly (instead of monthly) wage data is used for individuals with different levels of education may choose to work different numbers of hours. If so, returns would differ depending on whether work hours are controlled (Schultz, 1988). The earnings regressions are presented for various sub-samples such as by gender, rural urban location, sector of work etc. The motivation for using sub-samples comes from the observed earnings differences across sectors and locations of work in Bangladesh. In the formal labour market, wages differ depending on whether workers are in the public or private sectors, and whether they are in urban or rural areas[iii]. While regional and sectoral wage differences may indicate compensating differentials, differences in returns to education may well exist due to relative availability of educated workforce.

Earnings functions are estimated using OLS. However, two major problems make a causal interpretation of the OLS coefficient on schooling variable problematic. First, the sample of individuals for whom wage data is available is likely to be non-random one. This is particularly a concern in developing country context where majority of the population is engaged in various self-employment type activities. In addition, labour market participation is very low for certain groups such as females. In Bangladesh, about 68 percent of the work force is employed in agriculture, 20 percent works in the services sector, and 12 percent are in manufacturing (World Bank, 1996)[iv]. If individuals select into wage work on the basis of some unobserved attributes that also affect their wages, the correct estimation strategy should account for this process. We do so following the framework suggested by Heckman (1979). In this framework, we first estimate wage work participation probit from which a sample selectivity correction

term, lambda, is computed[v]. Then the earnings function is estimated with the selection correction term included in the list of regressor as an extra variable.

For the purpose of identifying the lambda term, at least one variable needs to be excluded from the wage equation, which is otherwise included in the probit equation. Duraisamy (2002) uses assets, an indirect proxy for non-labour income, as an exclusion restriction. In our model, we use information on both, direct and indirect measures of non-labour income, as excluded identifying variables (which form the exclusion restrictions). Our two direct measures of non-labour income are: (a) sum of monies received from sales of assets and lands and (b) total income received from other sources such as land leasing, rents, insurance policy, windfall gains such as lottery awards, money received through intra-household transfer, remittances etc.[vi] Household landholding size, an indirect measure of unearned income, serves as an additional exclusion restriction[vii]. Land ownership is likely to increase productivity of self-employment type activities and hence reduce the probability of participation into wage work but it is unlikely to affect wages directly. As discussed later, these exclusion restrictions turned out to be jointly significant in most of the first-stage probit regressions. For the female sample, the most important choice lies between work and no-work (instead of work in wage and self-employment). To account for this, the Heckman estimates of wage regression for female sample are obtained using two additional identifying variables–marital status and number of household members–in the participation probit.

In addition to the sample selection problem, another common methodological problem that plagues the OLS estimate of returns is the endogeneity of schooling. Schooling is endogenous owing to the omission of various observed and unobserved (e.g. innate ability, motivation and taste for education etc.) covariates of earnings which may also have independent effects on labour market productivity. Such omissions lead to potential biases in the OLS coefficient on the schooling variable. The direction of bias is unclear, a priori. The difficulty in predicting the direction arises, Card (2001) points out, due to two types of bias in the OLS estimate of returns to education: discount rate bias and ability bias. If there is no discount rate bias so that returns to schooling vary only due to differences in unobserved ability, the resulting bias is positive (assuming that schooling is measured with no error). However, if all individuals in the labour market have similar ability but they differ in (unobserved) discount rates, then OLS estimates would be negatively biased.

In recent years, the literature on the returns to education, particularly that for developed countries, has focused on resolving the issue of endogeneity of schooling variable in an earnings function. The most topical solution involves an application of the instrumental variable (IV) framework. Two types of IV estimates are commonly reported in the literature: experimental and non-experimental. The former exploits various institutional reforms/features of the education system such as changes in minimum school leaving age (e.g. Harmon and Walker, 1995) which cause exogenous variation in school attainment. The non-experimental studies, on the other hand, use parental/spousal/siblings characteristics to construct instruments for education (e.g. Butcher and Case, 1994; Trostel et al., 2002). In the absence of credible instruments for the schooling variable in our dataset, we have eschewed the IV strategy here. Nonetheless, it should be noted that recent studies that have corrected for the endogeneity problem via IV technique suggest that the direction of bias in OLS

estimates is mostly downward (Card, 2001; Harmon et al., 2003). As such, the OLS estimate, if anything, yields a conservative estimate of true returns to education. Throughout the study, therefore, we have relied on the OLS estimates of returns to education as the benchmark in Bangladesh.

III Data

We use data from the national Household Income and Expenditure Survey (HIES) 1999-2000 of Bangladesh Bureau of Statistics (BBS). The HIES sampled a total of 7440 households and collected data on 41140 individuals residing in the sample households. The working-age population comprises of 21271 individuals aged between 19 and 65 years of which 642 were reportedly in full time education[viii]. Of the remaining 20602 individuals[ix], a total of 11740 individuals were observed in wage work or self-employment activities. Table 1 provides a breakdown of the sample observations by individuals' work status. Since we estimate labour market (private) returns to education in this paper, our analysis will be restricted to the sample of 5668 wage workers only.

[Table 1 here]

The dependent variable, wage earning, is constructed in two steps. Wage earners in Bangladesh are employed on a monthly-salary as well as daily/casual-wage basis. For daily labourers, data on average daily wage is available. The HIES collected data on average number of days and hours-per-day worked by an individual in the last 12 months. This is used to compute hourly wage rate for the daily labourers. For salaried workers, on the other hand, wage is defined as the sum of net monthly salary and allowance plus other additional payments and allowances received in cash in wage employment over the year. This is further adjusted by hours worked to compute the hourly wage rate. Table 2 summarises all the variables used in regression analysis in this paper.

[Table 2 here]

IV Main Findings

Table 3 presents the results for the full sample. Both the OLS and selectivity corrected Heckman estimates are reported (along with the first stage participation probits underlying the Heckman estimates). All the regressions include region of residence dummies (i.e. district fixed effects) and therefore control for local labour market effects, both in wages and labour force participation rates[x]. Initial specification also included a dummy for marital status. This variable was dropped for it was insignificant in all the specifications (and also likely to be endogenous).

The average returns to education obtained for the full sample is 7.1%. This OLS estimate is robust to correction for sample selectivity. There is substantial heterogeneity in the observed estimates. Return is also higher for urban workers (8.1%) than their rural counterparts (5.7%). This is consistent with Wodon (1999) who finds that higher education has the largest impact in urban areas. Low returns to education in rural areas is somewhat puzzling in that rural labour market is often featured by a relative scarcity of educated personnel in Bangladesh and hence a higher demand for education. These findings are interesting in that real rural wages in Bangladesh has been falling since the

mid-1980s, while urban wages continue to rise (World Bank 1996). Given consistent returns to education noted by Wodon (1999) in this time period, it would be interesting to see, to what extent such rural-urban wage differential is driven by differences in years of education between rural and urban workers.

It is to be noted that we do not find significant evidence of sample selection bias in our analysis. As discussed earlier, we use land holdings, income from sales of various assets and rents earned from various other sources (e.g. remittances, leasing household assets, land etc.) as exclusion restrictions in the probit model to identify the selectivity term lambda will be identified. Most of these identifying variables in the probit models (that are excluded form the last stage regression) have expected signs and are jointly significant. Higher unearned income and rents in general are found to significantly decrease labour market participation. Similarly, landholdings perhaps raise returns to self-employment type activities, thereby negatively affecting participation into wage work. Despite highly significant exclusion restrictions, the lambda term is not significant in any of the three Heckman regression models.

Additional estimates of returns to education are presented in Table 4 where regressions are estimated splitting the sample by gender. Females enjoy a higher return (13.2%) to education than their male counterparts (6.2%) in the labour market. This finding of higher returns to female education is consistent with the international literature on returns to education. Turning to the Heckman estimates, all the 3 excluded variables in the probit regressions are highly significant and have the expected sign. This is also true for other variables. However, there is once again no evidence of sample selection for both males as well as females. The female-specific regression also includes "marital status" and "household size" as additional exclusion restrictions, both had significant and negative impact on wage work participation.

This finding of no sample selection bias is somewhat puzzling when compared to other studies for South Asian countries (e.g. Kingdon, 1998, Duraisamy, 2002). This could be attributed to the control for "region of residence" of individuals in our analysis. Indeed, when regional dummies are excluded, the lambda term turns out to be highly significant. The second possible explanation for the insignificance of sample selection correction term may lie in the way selection process was modelled. The decision to participate in wage work was modelled as a univariate probit regression where individuals simply chose between wage work and non-wage work status. This approach is restrictive in a developing country context where individuals outside "non-wage work" are either self-employed or not working at all. To circumvent this problem, we additionally implemented selection bias correction based on the multinomial logit (MNL) model following Bourguignon, Fournier and Gurgand (2002). In the MNL model, individuals choose among the options of no-work, wage work and self-employment. No-work status was set as the base category and the other two sets, wage work and self-employment, were estimated relative to this category. To identify the parameters of the wage equation, once again variables such as household landholding and two measures of unearned income were included as regressors in the selection equation but excluded from the wage equations. Bootstrapped standard errors were estimated in order to account for the two-step nature of the procedure (results not reported). The exclusion restrictions -- household landholding and measures of unearned income -- were highly significant. The effect of land size on the probability of participation in wage- and self-employment was negative and positive respectively.

Unearned income however significantly and negatively affected the probability of participation in any type of employment. Despite the significance of the exclusion restrictions, the sample selection correction terms remained insignificant. This finding is therefore consistent with the Heckman estimates presented throughout this paper.

The estimated return of 7% is somewhat at contrast with earlier estimates of returns to education for Bangladesh. For example, using Household Expenditure Survey (HES) 1995-6 data, Hussain (2000) reports a 10% return to education[xi]. However, smaller estimate of return reported in our study does not mean that there has been a decline in returns to education in Bangladesh in the last 5 years. A more probable explanation for the difference in the two estimates lies in the fact that Hussain uses household income for a sample of 7390 household heads (in the absence of individual level wage data in HES 1995-96). Hence the estimates are a mixture of returns to education in self-employment and in labour market activities and therefore unreliable. Because of this limitation of the earlier study, we are unable to conclude on the direction of change (if any) in the labour market returns to education in Bangladesh. Apart from this, comparisons of sex-specific estimates with those from the Bank estimates show some agreements. For example, the reportedly higher returns observed for female sample in Table 4 is consistent with the WB estimates which also find that return is higher for female household-heads (16.5%) than male heads (9.2%). The rate of returns for the household-heads in rural and urban area was 9.5% and 10% respectively.

Among other noteworthy results, a negative coefficient on the gender dummy in the full sample is indicative of *gender gap* in labour market earnings. Females earn significantly less relative to their male counterparts. Given the higher labour market returns to female education, the observed wage gap is perhaps due to smaller educational attainment of women vis-à-vis men. Although one could also argue that labour market discrimination is driving this result, without a detailed study, such claim is difficult to assess. A rigorous approach to examine this issue requires decomposing male-female wage gap into differences due to productive characteristics and differences owing to returns to these characteristics (Kingdon, 1998). However, this is not attempted in this paper.

Additional Sensitivity Tests

In this section, we conduct two robustness tests. We examine whether the result of a positive wage returns to education in Bangladesh holds if we (a) exclude public sector employees from the analysis and (b) additionally control for quality of schooling attained by individuals and their family background.

i) Excluding government employees from the analysis: Table 3 used data on all wage workers including those employed in the public sector. Approximately a third of the salaried individuals in Bangladesh are employed in the public sector. However, estimates obtained using a sample that includes public sector employees may be problematic in that payments are unlikely to be made on the basis of productivity. Observed returns to education in developing countries in the public sector may not reflect productivity (Glewwe, 2002; Psacharopoulos and Patrinos, 2004). Hence, Appendix Table 1 reports results based on a parsimonious sample that excludes public sector employees (the first stage participation probits underlying the Heckman estimates are suppressed).

Our earlier estimates (reported in Table 3) appear to be somewhat sensitive to the exclusion of public sector employees. The average returns to education obtained for the full sample is 5.7%. For males, the estimate is 5.2% as against 6.3% for the full sample. Estimate for the female sample is however much lower: 9.6% compared to the earlier estimate of 13%. Similarly, there is a fall in the size of the coefficient for the urban sample from 8.1 to 7.2%. For rural worker, the new estimate is 4.1% as against 5.8%. The sample selection term, lambda, however remains insignificant throughout.

ii) Additional control for observed determinants of wages: To minimise omitted variable related bias in OLS estimates, past studies have often employed superior control for observed correlate of wages using data on, for instance, school quality (e.g. Behrman and Birdsall, 1983). The HIES 2000 collected information on types of school attended by an individual. Thus we produce further estimates of earnings functions with additional control for school types which arguably proxy for school quality in Bangladesh. Results are reported in Appendix Table 2. Individuals who studied in public schools earn more in the labour market than those who attended private, aided or religious (Islamic) schools. This finding is consistent with Asadullah (2005) who finds that individuals appearing in secondary school certificate (SSC) examinations from public schools have higher achievements (measured in terms of pass rate in first division). However, our primary intention here is to assess whether the estimate of coefficient on schooling variable is sensitive to the exclusion of control for type of school attended by sample individuals. Comparison of OLS and Heckman estimates of the coefficient on schooling variable with and without school type dummies reveals that the estimate of returns to education is not affected by control for "school quality" in our data.

[Table 3 here]

Lastly, we experimented with additional regression analysis, controlling for family background for a sub-sample of individuals. For a sample of 1626 wage earners, we have information on maternal education whilst for a total of 4206 wage workers, data is available on spousal education. The effect of maternal education (as a regressor) was not significant (results suppressed)[xii]. Nonetheless, the coefficient on spousal education in the wage regression turned out to be highly significant and positive. Furthermore, inclusion of spousal education as a regressor reduced the size of the coefficient on the schooling variable (results suppressed). This finding is in line with Benham (1974) who found that men's earnings were positively related to their wives' schooling, in addition to their own schooling[xiii]. These results are, however, difficult to generalise for they hold only for a selected group of individuals in our sample.

Non-linearity in Returns to Education

Throughout the analysis, we have assumed that returns to education is linear (i.e. each additional year of schooling yields the same return), an assumption which is not necessarily true for Bangladesh. There may be certain transition points in the schooling cycle which are differently valued by employers. Thus we re-estimate average returns using education dummies. Results are reported in Appendix Table 3. Schooling variable is re-defined; instead of a continuous schooling variable, we introduce three dummy variables where individuals with no education comprise the control group. The average rate of return r_i specific to each level (compared to level below) is calculated by using the estimated OLS coefficients in the following way: $r_i = (\beta_t - \beta_{i-1})/(Y_i - Y_{i-1})$ where i is the level of education (i.e. primary, secondary and tertiary), Y_i is the year of schooling

at education level i and β_i is the estimate of the coefficient on corresponding education level dummy in the wage regression. Thus, the rate of return to primary education, $r_{primary}$, is $\beta_{primary}/5$ whereas that to secondary education is $(\beta_{sec} - \beta_{pri})/7$. Table 5 summarises the estimates obtained for Bangladesh along with the estimates available for other South Asian countries.

[Table 5 here]

As can be seen from the Table, the cross-country ranking of estimates by levels of education is robust in South Asia if we discard Nepal from the sample. Returns appear to increase with levels of education, with higher education enjoying highest returns. Individuals with primary education earn 4**.**1**%** more (for each additional year of primary school) than those with no education. This pattern observed in Bangladesh and for other South Asian countries is at contrast with the general pattern noted by Psacharopoulos and Patrinos (2004)[xiv]. One potential supply side explanations of such low returns could be the relative ineffectiveness of primary schools in Bangladesh in imparting cognitive skills. If the labour market rewards individuals for their cognitive skills and primary schools are inefficient producer of such skills, then low returns to primary education is simply revealing low quality of primary schools. Although plausible, this explanation is not very conclusive. Note that returns to primary, secondary and higher education is not constant by gender. For example, for males respective returns are: 3.4%, 3.2% and 12.7%. For females, the respective figures (particularly return to primary education) are much higher: 8.9%, 9.6% and 12.4%. The later is also consistent with our earlier finding that females enjoy higher average returns to schooling. Similar result is obtained for India by Duraisamy (2002).

V Conclusion

In this paper, we have looked at the labour market returns to education in Bangladesh using recent nationwide household survey data. We find that an additional year of schooling increases labour market earnings by 7%. Estimates of returns are separately reported for rural and urban work places, males and females, public and private sector individuals. Substantial heterogeneity in returns is observed; e.g. estimates are lower for rural sample (than urban sample) and higher for females (compared to their male counterparts). We also attempted to correct for the bias due to an endogenous selection in wage work. However, no evidence of selection bias was found: the OLS estimates are robust to non-random selection into wage work. Nonetheless, the estimates are found somewhat sensitive to the exclusion of the public sector employees. For the sample of wage workers in the private sector, return to education is 5.7%.

A notable finding of our study is the substantial non-linearity in returns to education in Bangladesh: returns increase across levels of education. The finding that primary education has the lowest return does not imply that investment in primary schooling is necessarily inefficient, however. We have not looked at social returns to education and have ignored the impact of education on various non-economic outcomes such as fertility choice, health practices etc. Besides, returns to education in the labour market may be of limited use in developing country contexts for another reason. As stressed earlier, majority of the work force does not participate in the formal labour market in Bangladesh. Thus, future studies should estimate returns to education in household production context, informal sector and self-employment in farm and non-farm activities.

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Table 1: Distribution of Sample Individuals (aged 19-65 years) by Work Status

	Full	%	Male	%	Female	%
Wage work	5668	27.51	4859	43.35	809	8.61
Self-employment	5976	29.01	5588	49.85	388	4.13
Not working	8958	43.48	763	6.81	8,195	87.26
	20602	100.00	11210	100.00	9392	100.00

Table 2: Means and Standard Deviations

Variable	Definition	N	Mean	Std. Dev.
Wage	log of hourly earnings	5668	2.132	0.725
Exp[xv]	experience (=age-6-schooling)	5668	27.109	11.829
Exp_sq	(experience squared)/100	5668	8.748	7.182
Female	dummy (=1 if Female)	5668	0.143	0.350
Non Muslim	dummy (=1 if non Muslim)	5668	0.100	0.300
Rural area	dummy (=1 if rural workplace)	5668	0.587	0.492
Schooling	years of schooling attained	5668	3.522	4.534
No education	dummy (=1 if no schooling)	5668	0.573	0.494
Primary education	dummy (=1 if schooling>0 & schooling<6)	5668	0.131	0.337
Secondary education	dummy (=1 if schooling>12 & =<14)	5668	0.228	0.420
Higher education	dummy (=1 if schooling>15 & =<16)	5668	0.068	0.253
Private aided school	dummy (=1 if attended private aided school)	2422	0.474	0.499
Public school	dummy (=1 if attended public school)	2422	0.427	0.495
Private school	dummy (=1if attended private unaided school)	2422	0.076	0.266
Religious school	dummy (=1 if attended religious school)	2422	0.020	0.139
NGO school	dummy (=1 if attended NGO school)	2422	0.001	0.035
Mother's schooling	in years	1626	2.153	3.575
Spouse education	in years	4662	2.638	3.925
Wage participation	dummy (=1 if wage worker)	20602	0.275	0.446
Married	dummy (=1 if married)	20602	0. 841	0.365
Household size	total number of individuals in the household	20602	5.790	2.569
Land	landholding (in acres) owned by the household	20602	0.766	2.528
Land less	dummy (=1 if Land<0.05)	20602	0.587	0.492
Land_0549	dummy (=1 if Land>=.05 & Land<0.5)	20602	0.111	0.315
Land_5149	dummy (=1 if Land>=0.5 & Land<1.5)	20602	0.143	0.350
Land_15249	dummy (=1 if Land>=1.5 & Land<2.5)	20602	0.070	0.255
Land_25	dummy (=1 if Land>=2.5)	20602	0.089	0.285
Non-earned income1	(income earned from sales of land and/or other assets)/100	20602	2.144	18.668
Non-earned income2	(income earned from lottery, remittances and renting out Land)/100	20602	15.642	86.028

Table 3: OLS and Heckman Estimates of Earnings Functions

	Full			Urban			Rural		
	OLS	Heckman	Probit	OLS	Heckman	Probit	OLS	Heckman	Probit
Exp	0.042	0.042	0.020	0.048	0.048	0.032	0.032	0.032	0.015
	(0.003)**	(0.003)**	(0.004)**	(0.004)**	(0.004)**	(0.006)**	(0.004)**	(0.003)**	(0.005)**
Exp_sq	-0.057	-0.057	-0.045	-0.063	-0.063	-0.070	-0.045	-0.046	-0.035
	(0.005)**	(0.004)**	(0.006)**	(0.008)**	(0.007)**	(0.010)**	(0.006)**	(0.005)**	(0.007)**
Female	-0.653	-0.648	-1.319	-0.769	-0.779	-1.309	-0.531	-0.536	-1.323
	(0.028)**	(0.032)**	(0.024)**	(0.042)**	(0.060)**	(0.039)**	(0.036)**	(0.038)**	(0.031)**
Non Muslim	-0.050	-0.050	0.008	-0.020	-0.020	-0.069	-0.051	-0.051	0.059
	(0.027)+	(0.025)*	(0.036)	(0.042)	(0.045)	(0.066)	(0.035)	(0.030)+	(0.046)
Rural area	-0.178	-0.178	-0.096						
	(0.019)**	(0.018)**	(0.029)**						
Schooling	0.071	0.071	-0.007	0.081	0.081	-0.011	0.057	0.057	-0.011
	(0.002)**	(0.002)**	(0.003)*	(0.003)**	(0.003)**	(0.005)*	(0.004)**	(0.003)**	(0.004)**
Non-earned income1			-0.003			-0.004			-0.003
			(0.001)**			(0.002)*			(0.001)*
Non-earned income2			-0.000			-0.000			-0.003
			(0.000)**			(0.000)+			(0.001)**
Land_0549			-0.384			-0.137			-0.423
			(0.036)**			(0.087)			(0.040)**
Land_5149			-0.607			-0.066			-0.692
			(0.034)**			(0.084)			(0.039)**
Land_15249			-0.898			-0.262			-1.024
			(0.051)**			(0.118)*			(0.059)**
Land_25			-0.882			-0.265			-0.983
			(0.046)**			(0.106)*			(0.054)**
Lambda		-0.01			0.01			0.01	
		(0.03)			(0.05)			(0.03)	
Adj/Pseudo R^2	0.46	–	0.20	0.48	–	0.20	0.35	–	0.22
N	5668	5668	20602	2343	2343	6529	3325	3325	14073

Notes: (1) Robust standard errors reported. (2) + significant at 10%; * significant at 5%; ** significant at 1%. (3) All regressions include district dummies and a constant.

Table 4: OLS and Heckman Estimates of Earnings Function by Sex

	Male			Female		
	OLS	Heckman	Probit	OLS	Heckman	Probit
Exp	0.044	0.044	0.019	0.057	0.056	0.057
	(0.003)**	(0.003)**	(0.004)**	(0.009)**	(0.009)**	(0.008)**
Exp_sq	-0.060	-0.059	-0.045	-0.085	-0.084	-0.113
	(0.004)**	(0.004)**	(0.007)**	(0.015)**	(0.015)**	(0.012)**
Non Muslim	-0.071	-0.071	-0.119	0.046	0.042	0.300
	(0.026)**	(0.026)**	(0.044)**	(0.080)	(0.077)	(0.065)**
Rural area	-0.250	-0.249	-0.010	0.221	0.223	-0.278
	(0.018)**	(0.018)**	(0.035)	(0.063)**	(0.061)**	(0.054)**
Schooling	0.062	0.063	-0.008	0.132	0.132	0.018
	(0.002)**	(0.002)**	(0.003)*	(0.008)**	(0.007)**	(0.007)*
Non-earned income1			-0.005			-0.000
			(0.001)**			(0.002)
Non-earned income2			-0.000			-0.001
			(0.000)*			(0.001)*
Land_0549			-0.394			-0.374
			(0.041)**			(0.084)**
Land_5149			-0.619			-0.550
			(0.039)**			(0.084)**
Land_15249			-0.971			-0.587
			(0.056)**			(0.124)**
Land_25			-0.986			-0.339
			(0.052)**			(0.099)**
Household size						-0.084
						(0.010)**
Married						-0.887
						(0.053)**
Lambda		-0.01			-0.02	
		(0.03)			(0.06)	
Adj/Pseudo R^2	0.40	–	0.08	0.39	–	0.09
N	4859	4859	11210	809	809	9392

Notes: (1) Robust standard errors reported. (2) + significant at 10%; * significant at 5%; ** significant at 1%. (3) Regressions also include district dummies and a constant.

Table 5: Estimates of Returns to Education for South Asian Countries

	Full Sample	Male	Female	Primary	Secondary	Higher
India	10.6 (1995)	5.3 (1978)	3.6 (1978)	2.6	17.6	18.2
Pakistan	15.4 (1991)	-	-	8.4	13.7	31.2
Sri Lanka	7.0 (1981)	6.9 (1981)	7.9 (1981)	-	12.6	16.1
Nepal	9.7 (1999)	-	-	16.6	8.5	12
Bangladesh	7.1	-	-	4.1	4.0	12.8
Bangladesh, Male	-	6.2	-	3.4	3.2	12.7
Bangladesh, Female	-	-	13.2	8.9	9.6	12.4

Source: Estimates for countries other than Bangladesh are from Psacharopoulos and Patrinos (2002)[xvi].

Appendix Table 1: Estimates of Earnings Function Excluding Public Sector Employees

	Full		Male		Female		Urban		Rural	
	OLS	Heckman	OLS	Heckman	OLS	Heckman	OLS	Heckman	OLS	Heckman
Exp	0.036	0.036	0.039	0.039	0.038	0.037	0.045	0.046	0.027	0.026
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.010)**	(0.010)**	(0.005)**	(0.004)**	(0.004)**	(0.003)**
Exp_sq	-0.051	-0.050	-0.054	-0.053	-0.062	-0.059	-0.062	-0.063	-0.039	-0.038
	(0.005)**	(0.004)**	(0.004)**	(0.004)**	(0.016)**	(0.016)**	(0.008)**	(0.008)**	(0.006)**	(0.005)**
Female	-0.722	-0.698					-0.841	-0.858	-0.606	-0.580
	(0.028)**	(0.034)**					(0.044)**	(0.065)**	(0.036)**	(0.038)**
Non Muslim	-0.046	-0.047	-0.075	-0.074	0.067	0.055	-0.033	-0.033	-0.046	-0.047
	(0.027)+	(0.026)+	(0.027)**	(0.027)**	(0.082)	(0.079)	(0.045)	(0.049)	(0.034)	(0.030)
Rural area	-0.171	-0.169	-0.235	-0.233	0.227	0.235				
	(0.020)**	(0.018)**	(0.018)**	(0.018)**	(0.067)**	(0.064)**				
schooling	0.057	0.058	0.052	0.053	0.096	0.098	0.072	0.072	0.041	0.042
	(0.003)**	(0.002)**	(0.002)**	(0.002)**	(0.009)**	(0.009)**	(0.003)**	(0.003)**	(0.004)**	(0.003)**
Lambda		-0.02		-0.03		-0.06		0.02		-0.03
		(0.03)		(0.03)		(0.06)		(0.06)		(0.03)
Adj./Pseudo R^2	0.42	–	0.35	–	0.29	–	0.46	–	0.35	–
N	5186	20032	4451	10720	735	9312	1996	6163	3190	13869
Censored N	--	14846	--	6269	--	8577	--	4167	--	10679

Notes: (1) Robust standard errors in parentheses. (2) + significant at 10%; * significant at 5%; ** significant at 1%. (3) District dummies used in estimation are suppressed.

Appendix Table 2: Estimates of the Earnings Function with Control for School Types, Full sample

	OLS		Heckman	
	(1)	(2)	(3)	(4)
Exp	0.050	0.051	0.052	0.053
	(0.004)**	(0.004)**	(0.004)**	(0.004)**
Exp_sq	-0.072	-0.074	-0.077	-0.078
	(0.008)**	(0.008)**	(0.009)**	(0.009)**
Female	-0.349	-0.340	-0.435	-0.411
	(0.045)**	(0.046)**	(0.068)**	(0.068)**
Non Muslim	-0.138	-0.137	-0.141	-0.140
	(0.038)**	(0.039)**	(0.039)**	(0.039)**
Rural area	-0.243	-0.251	-0.249	-0.255
	(0.027)**	(0.028)**	(0.027)**	(0.027)**
Schooling	0.109	0.100	0.117	0.107
	(0.004)**	(0.004)**	(0.007)**	(0.007)**
Public school	0.137		0.139	
	(0.026)**		(0.027)**	
Private school	-0.022		-0.019	
	(0.051)		(0.048)	
Religious school	-0.155		-0.158	
	(0.138)		(0.084)+	
NGO school	-0.433		-0.442	
	(0.368)		(0.333)	
Lambda			0.09	0.08
			(0.06)	(0.06)
Adj. R^2	0.38	0.37	–	–
N	2422	2422	17356	17356
Censored N	–	–	14934	14934

Notes: (1) Robust standard errors in parentheses. (2) + significant at 10%; * significant at 5%; ** significant at 1%. (3) District dummies used in estimation are suppressed. (4) The coefficients on the identifying variables included in the probit regression are not reported.

Appendix Table 3: Estimates of Returns to Education by Levels of Education

	Full		Male		Female	
	OLS	Heckman	OLS	Heckman	OLS	Heckman
Exp	0.040	0.040	0.043	0.043	0.055	0.054
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.010)**	(0.009)**
Exp_sq	-0.056	-0.057	-0.059	-0.059	-0.084	-0.083
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.015)**	(0.015)**
Female	-0.669	-0.677				
	(0.028)**	(0.032)**				
Non Muslim	-0.044	-0.044	-0.066	-0.066	0.052	0.049
	(0.026)+	(0.025)+	(0.026)*	(0.025)**	(0.081)	(0.078)
Rural area	-0.195	-0.196	-0.267	-0.267	0.213	0.215
	(0.019)**	(0.018)**	(0.017)**	(0.017)**	(0.065)**	(0.062)**
Primary education	0.205	0.204	0.174	0.174	0.449	0.453
	(0.022)**	(0.023)**	(0.022)**	(0.022)**	(0.112)**	(0.109)**
Secondary education	0.485	0.483	0.401	0.401	1.126	1.129
	(0.023)**	(0.021)**	(0.020)**	(0.021)**	(0.086)**	(0.083)**
Higher education	1.128	1.128	1.038	1.038	1.750	1.743
	(0.038)**	(0.031)**	(0.030)**	(0.030)**	(0.131)**	(0.128)**
Lambda		0.01		-0.00		-0.01
		(0.03)		(0.03)		(0.06)
Adj. R^2	0.46	–	0.42	–	0.37	–
N	5668	20602	4859	11210	809	9392
Censored N	–	14934	–	6351	–	8583

Note: Robust standard errors reported. (2) + significant at 10%; * significant at 5%; ** significant at 1%

Endnotes

[i] Most of the commonly cited estimates for various South Asian countries reported in Bennell (1998) and Psacharopoulos and Patrinos (2004) suffer from similar problems. For example, see Shabbir (1994). Duraisamy (2002) uses nationally representative data from India and report estimate of returns to education correcting for sample selectivity. The only South Asian study that additionally accounts for endogeneity of schooling is Alderman et al. (1996). However, (Pakistani) data used in their study is not nationally representative.

[ii] Unless experience (not age) is held constant, OLS estimate of returns to education is biased downward (Chiswick, 1997).

[iii] Azam (1994) reports that an unskilled public sector worker earns nearly three times more than a similarly unskilled agricultural worker in Rangpur district. Differences exist within urban areas. A construction worker, typically operating informally as a day labourer, earns 22% less than a public enterprise worker with similar skills.

[iv] In addition, according to the Household Expenditure Survey (1995-96), for only 30% of the households, source of earning is reported as wage and salary income whereas for an overwhelming 49.13%, the main occupation is non-agricultural self-employment type work (BBS, 1998).

[v] The dependent variable takes zero if the person is not in wage-work i.e. we do not distinguish between choices of self-employment and unemployment.

[vi] We exclude stipend received by own children (from the government) who are enrolled in secondary schools.

[vii] Ideally, we wanted to use inherited landholdings instead of current holding due to potential endogeneity of the former. However, we do not have data on the latter.

[viii] It may be noted that for 43 students, wage data was also reported in the HIES. However, inclusion of these individuals in the regression sample didn't change our estimates of returns to education.

[ix] For another 15 individuals, (wage) data is missing.

[x] Such control is of significant importance in a Bangladeshi context. Differences in poverty between geographical areas depend more on differences in area characteristics than on differences in the characteristics of the households living in those areas (Wodon, 1999). An agricultural worker in Chittagong earns 156% more than one in Rangpur (World Bank, 1996).

[xi] The Bank estimate aside, the only other estimate comes from Hossain (1990). But Hossain's estimates correspond to returns to schooling in non-labour market activities in rural areas of Bangladesh. Besides, returns are assessed at the household level, by looking at the impact of household-head's education on crop production.

[xii] Alternatively, we used maternal education as an instrument in an IV model of wage returns to schooling. However, the effect of mother's schooling remained insignificant in the first stage regression.

[xiii] It also questions studies that use spousal education as an instrument for own schooling (e.g. Trostel et al., 2002).

[xiv] However, recent estimates for India using nationally representative survey data finds that the returns to education increases up to the secondary level and declines thereafter.

[xv] This measure of potential experience (i.e. age-schooling-6) as employed in our study overweighs experience in case of individuals who never attended school. For such individuals, even work experience in childhood (before the age 18) is captured as labour market experience which need not be same as formal labour market experience accumulated by an adult worker.

[xvi] Estimates from Duraisamy (2002) for India is not presented in the Table for the author reports results only for various levels of education.