RETURNS TO SCHOOLING IN ETHIOPIA: THE CASE OF THE FORMAL SECTOR

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Abstract

The main objective of this study is to examine and estimate the returns to schooling in one state-owned enterprise i.e. Edget Cotton Factory, and one private enterprise i.e. MOENCO, both belonging to the formal sector in Ethiopia. The earning function was employed to estimate the returns to schooling using primary and secondary sources of information. The main findings of the study are: (a) human capital variables (education and experience), as estimated by the standard rate of return, are most important in influencing wages in the two enterprises; (b) the Mincerian rates of return to primary, junior secondary, senior secondary, diploma-certificate, and above diploma levels in Edget Factory are 3.3%, 5.5%, 2.8%, 18.3% and 11.3%, respectively. The Mincerian regression coefficients, associated with primary education, although positive and significant, do not conform with global patterns observed by Psacharopoulos (1994) who estimated highest returns to primary education; (c) a comparison of the wages of males and females in Edget Factory, showed that, for the same level of educational attainment, males had higher average wages than females. Women, though having more experience within the industry, had less experience outside of the industry and occupied lower-status jobs; (e) rates of return estimated using comparative 1985 and 1996 data for Edget Factory reveal that women were paid less in 1996 compared to 1985, suggesting that their situation in the factory has deteriorated over time. But, for both males and females, a one-year increase in education increased wages from about 9% in 1985 to about 56% in 1996.

1. INTRODUCTION

Education is generally assumed to raise productivity by imparting knowledge and skills that can make a worker more efficient, and hence, more valuable in the labor market. While this is generally accepted, some controversies have arisen in recent years about the value of education. Such controversy surrounds "the screening hypothesis" which argues that, although education raises workers' productivity, employers use it as a screening device for valued attitudes, abilities, social and communication skills which are indirectly fostered by education, rather than as a

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means of acquiring required skills directly imparted by education. Some critics go further than the "screening hypothesis" and argue that, in developing countries, education has become a "diploma disease" (Woodhall, 1987). The standard rate of return approach used in this study, assumes that education performs a human capital function rather than a screening or credentialist function.

The expansion of formal education in Ethiopia has been viewed as an important instrument for transforming society. Since 1974, the participation rate in the formal education sector has risen substantially and in 1995, the country had nearly one million students in grades 7 to 12. By the end of this decade, the educational sector is expected to pour out a total of nearly 400,000 secondary school graduates in the labour market (Tekeste, 1996). This drastic expansion of formal education in Ethiopia has been at the cost of quality and this is reflected in high pupil-teacher ratios, increasing numbers of teachers with no specialized training, overcrowding of schools, shortage of educational materials and poor educational management.

The curriculum of Ethiopian institutions of learning has also often been criticized as irrelevant to the needs of the country. To the extent that the existing curriculum has imparted knowledge to them, most Ethiopian students know more about Western history and civilization than Ethiopian realities. Thus, the indiscriminate adoption of imported curricula has produced a youth that does not understand its past and is largely incapable of comprehending the dynamics of social, economic and political change in Ethiopia (Tekeste, 1990).

In July 1994, the Transitional Government of Ethiopia (TGE) issued the Ethiopian Education and Training Policy (EETP), which decentralized education policy decisions to newly created regions. Each region (Kilil) had earlier been granted the right to use its own local language of instruction. With the EETP, each region, zone or wereda (sub-district) became responsible for the provision of primary education (from grade 1 to 8) to its communities. One of the objectives of the new education and training policy is to develop human resource, trained in various skills that can effectively manage and utilize available resources. From an economic point of view, the pursuance of this policy is expected to directly link education with economic growth (TGE, 1994) and, to raise the private and social benefits of education.

Labor market assessments of returns to investment in education in Africa, have consistently found rates of return of above 10% and of above 20% occasionally. Available evidence also suggests that the impact of education is largest in developing countries because of its relative scarcity. However, according to the World Bank (1988), the quality of education in Africa has recently declined and if this trend is allowed to continue, new investments in improving education quantitatively may not yield returns commensurate to those obtained in the past.

In Ethiopia, it can be said that, in the Haile Selassie era, there was increased investment in both the quality and quantity of education. A 1972 study indicated that

the private rates of returns to primary, secondary and higher education in Ethiopia were 35%, 22.8% and 27.4% respectively, while the social rates of return (unadjusted) were 20.3%, 18.7% and 9.7% respectively. Thus, the social costs of education were much higher than the private costs, especially at higher or university level (Psacharopoulos *et al.*, 1985).

The central question to be asked about education in present-day Ethiopia is, therefore, "Should education be expanded, given its costs and benefits? and if yes, what level and type of education should be made to grow faster?". In order to answer these questions, the economic returns to education, at various levels, and in different sectors, should be determined so as to provide baseline information for government policy makers to take appropriate decisions regarding educational investments and priorities to be set at different levels.

The purpose of this study is not as ambitious as to seek to answer the questions raised above which would require comprehensive data and detailed analyses of the returns to education in Ethiopia as a whole. The intent here is rather modest and is to shed some light on what the returns to education may be in the modern formal sector in Ethiopia which has not been the subject of much analysis.

To this end, this study examines the determinants of returns to schooling and looks into other individual characteristics of education in connection with two enterprises (a state-owned and a private one) operating in the formal sector in Addis Ababa. Given that the study relies mainly on data from these two specific enterprises, its findings are, of necessity, restricted in scope and coverage and cannot claim to be representative of the whole of the formal, let alone the informal or rural, sectors in Ethiopia. However, although the results reported in this study should be interpreted with caution, they may serve to highlight some important features of the impact of education in the formal sector.

1.1. Data Collection

This study uses primary and secondary information from various sources to estimate returns to schooling. Secondary information on the returns to schooling in the Ethiopian civil service is first reviewed in relation to recent policy developments. The more specific analysis in the paper largely relies on information collected from the following sources:

a) Edget Cotton and Yarn Factory was selected purposively from among a number of state-owned industries in Addis Ababa. Information on occupation, wages, education, sex, age, experience (within and outside of the industry) was collected for the 843 workers of the factory in 1996. In addition, a 1985 data set of 1074 employees of the factory, used earlier by the author for another study (Wolday, 1988), was used to examine changes in the wage determination process (in relation to education) which have occurred in the factory in the last 11 years.

b) One of the oldest private firms in Ethiopia, MOENCO, was also selected for this study. As in the case of Edget, information was collected on the wages, education, experience, age and occupation of the 180 employees of the company in 1996.
c) Informal discussions were also held with key informants in the above mentioned enterprises specifically, and in the formal sector in general.

1.2. Methods of Analysis

The concept of human capital refers to the fact that, human beings invest in themselves by means of education and training, so as to raise their future income and lifetime earnings (Woodhall, 1987). The earning function or the standard human capital model (described below) is used in this study to estimate the returns to different levels of education and to examine other explanatory variables in the two selected enterprises.

At the outset, it should be noted that analytical methods adopted by researchers are often dictated by the nature of available data sets and that the blind application of the earning function method, which has its own strengths and weaknesses, can lead to misleading results, especially where data are lacking or apply to a small sample. As in other studies, the choice of the functional form for the earning function, in the current study, was a matter of flexibility, computational ease, relevance to purpose, and comparability with previous studies. Bearing this in mind, and following Psacharopoulos (Psacharopoulos, 1987, 1993, 1994) (Psacharopoulos *et al.*,1985), it is postulated in this study that estimates of the profitability of investment in education can be arrived at through the earning function method.

The basic human capital model measures only the average effect of additional schooling and work experience on wages. Additional variables such as sex, occupation, marital status, etc., appear in the earning function. The basic earning function involves the fitting of a semi-log ordinary least squares regression, using the natural logarithm of earnings as a dependent variable, and years of schooling, potential years of labor market experience, and the square of the latter, as independent variables (for empirical results on Ethiopia, see Wolday, 1988).

The classical least square equation (with both dummy and continuous regressors) used has the following functional form:

$$LnY_j = b_o + \Sigma b_j X_j + u \qquad [1]$$

where, Y stands for the level of wages
$X_1, X_2, \ldots X_j$ are observable variables (continuous and dummy) explaining Y
b_js are coefficients;
u is a random unobserved disturbance term with zero mean and constant variance.
b_o is a constant

The earning function or standard human capital model assumes that earning variations among individuals arise from differences in the human capital they possess and in their work experience. The model typically equates human capital with education and assumes that earnings are parabolic in the experience, the function being of the form:

$$\ln W = a+bS+cL+dL_2 + u \quad [2]$$

Where, ln W is the logarithm of individual earnings
S is schooling (either dummy or continuous), i.e. a proxy of cognitive skills or other marketable traits acquired with a certain level of education
L is the number of years of individual experience
u is the error term
a is a constant
b, c, d are coefficients

The coefficient of education (b), in the semi-log model, indicates the percentage increase in wage resulting from a unit change in education. If education is considered as a dummy, the coefficient gives the percentage increase in wage for a specified educational level (primary, junior secondary, etc.), compared to the base level (no education). Mincer (1974) being the first to have used the semi-log earning function in his analysis of the returns to formal schooling, the earnings function is sometimes described as the "Mincerian function". Mincerian returns to education per year are usually adjusted for the opportunity cost of attending school by dividing estimated changes in earnings by the number of years spent in each cycle of schooling (6 years in primary; 2 years in junior secondary; 4 years in senior secondary; 2 years in diploma and certificate; and 2 years above diploma, levels).

Using the above model specification, the returns to different educational levels are estimated in this study for Edget Factory and MOENCO in Ethiopia. A number of variables i.e., education, experience within and outside the industry, occupation, sex, sector, location, change of jobs, union power, etc. are assumed to influence the level of earnings. The explanatory variables which are qualitative in nature are treated as dummies. Given our interest in education, two functional forms, i.e., linear and semi-log, have been used to alternatively compute the education variable in its continuous and dummy forms.

As indicated earlier, the semi-log earnings function is used to estimate the returns to schooling, and the Ordinary Least Squares (OLS) method is used to estimate the earnings function, with monthly wage as dependent variable and the variables specified below as independent variables.

As is apparent from the table below, the sub-categories excluded from the estimation are: for sex, male; for education, illiterate; for occupation, sales workers; and for department services.

Sex	1 if female	0 otherwise
Experience within the industry	Continuous	
Experience outside the industry	Continuous	
Education	Continuous	
Education	Dummy	
Primary (1-6)	1 if primary	0 otherwise
Junior secondary (7-8)	1 if junior secondary	0 otherwise
Senior secondary (9-12)	1 if senior secondary	0 otherwise
Diploma and certificate (13-14)	1 if diploma and certificate	0 otherwise
Above diploma (> 14)	1 if diploma and above	0 otherwise
Occupation	Dummy	
Professional and technical	1 if professional	0 otherwise
Production and related	1 if production	0 otherwise
Administrative and related	1 if administration	0 otherwise
Clerical and related	1 if clerical	0 otherwise
Service workers	1 if service	0 otherwise
Department	Dummy	
Production	1 if production	0 otherwise
Technical	1 if technical	0 otherwise
Administrative	1 if administration	0 otherwise

In addition to the above, descriptive statistics like percentages, means, standard deviations and correlation coefficients, are used to highlight some of the important characteristics of the enterprises studied. A standard statistical package, SPSS, was used to analyze much of the primary and secondary data, and to derive cross-tabulations and multivariate regression results.

2. RETURNS TO SCHOOLING IN A STATE-OWNED INDUSTRY, EDGET COTTON FACTORY

Table 1 presents regression results estimated for Edget Cotton and Yarn Factory in 1996, using the methods described in Section 1.4. As can be seen from the table, the coefficients of human capital, i.e., experience (within and outside the industry) and continuous education, are positive and statistically significant at the 1% level. In contrast, the coefficient of the sex variable is negative and statistically significant at the 5% level.

As shown in Table 1, where education is included as a continuous variable, the return from a one year increase in education in Edget Factory is about 5% and is statistically significant at the 1% level. The returns to different levels of education in the Factory are also presented in Table 2, where education has been treated as a dummy variable. Table 2 reveals that the estimated coefficients of schooling for the binary variables representing primary, junior secondary, senior secondary, diploma-certificate, and above diploma levels of education, are 19.5%, 30.5%, 40.9%, 77.4% and 100%, respectively.

Table 1. Regression Results of the Earning Function (education continuous) for Edget Cotton Factory, 1996

Variables	Semi-log model	
	Coefficient	Standard error
Sex	-0.04460**	0.02130
Experience (within)	0.00934*	0.00130
Experience (outside)	0.01725*	0.00300
Education	0.05281*	0.00250
Professional	0.46550*	0.08500
Production	-0.00920	0.05733
Administrative	0.17690	0.07797
Clerical	-0.11089	0.04833
Service	-0.12470**	0.05763
Department 1 (Production)	0.00219	0.03849
Department 2 (Technical)	0.04687	0.04307
Department 3 (Administrative)	-0.00499	0.04927
Constant	5.33710	0.07180
R^2	0.65000	
F value	131.18000	
N	843.00000	

* Significant at 1% level. ** Significant at 5% level. **Source:** Own computations based on 1996 data for Edget Factory.

As indicated earlier in Section 1.4, in order to obtain the Mincerian returns to education at each level, these coefficients need to be adjusted for the opportunity cost of time spent in school. By dividing the coefficients by factors of 6 for primary, 4 for senior secondary, and 2 for other levels, the Mincerian rates of return to primary, junior secondary, senior secondary, diploma-certificate, and above diploma education, in Edget Factory, are estimated to be 3.25%, 5.5%, 2.8%, 18.25% and 11.3% respectively. As is apparent from these coefficients, the highest return is derived from higher i.e. above diploma level education and the lowest returns for junior secondary and primary education.

Table 2 also shows that the return to a year's experience within the industry is about 1%, while the return to experience outside of the industry is much higher and close to 2%. The coefficients of the dummies for professional and administrative occupational categories are also positive and statistically significant at the 1% and 10% levels, respectively. Thus, if a worker belongs to the professional group in Edget Factory, his/her wage would increase by about 37.7%. Similarly, if a worker is in the administrative category, his/her wage would increase by about 13%. Unlike these two occupations, the other occupational and departmental categories considered (e.g. production, clerical) do not seem to affect the level of wages in Edget factory to any significant degree.

Table 2. Regression Results of the Earning Functions (education dummy) of Edget Cotton Factory, 1996

Variables	Semi –log	
	Coefficient	Standard error
Sex	-0.07519*	0.02165
Experience(within)	0.00856*	0.00129
Experience (outside)	0.01740*	0.00305
Elementary	0.19522*	0.03553
Junior Secondary	0.30490*	0.04483
Senior Secondary	0.40902*	0.03528
Diploma and Certificate	0.77427*	0.03753
Above Diploma	1.00311*	0.09512
Professional	0.37696*	0.09040
Production	-0.02459	0.05730
Administrative	0.12994**	0.07824
Clerical	-0.07398	0.04864
Service	-0.16440	0.05781
Department 1 (Production)	-0.00450	0.39060
Department 2 (Technical)	-0.04690	0.04332
Department 3 (Administrative)	0.02832	0.04995
Constant	5.4058*	0.07146
R^2	0.61	
F Value		
N	843	

* Significant at 1% level ** Significant at 10% level **Source:** Own computations based on 1996 data for Edget Cotton Factory

In both Tables 1 and 2, the estimated coefficients of the sex variable are negative and statistically significant at the 5% and 1% levels respectively, suggesting a negative relationship between earnings and being a female. Indeed, women are less paid than men in Edget Factory, their average income being 7.5% lower than men's. The results of the fitted standard human capital model, using education and experience as explanatory variables, are reported below for male and female workers of Edget Factory.

Results for Male Workers

$$\text{Wage} = \underset{(16.320)}{186.14^*} + \underset{(0.75)}{18.83\,\text{Edu}^*} + \underset{(1.77)}{3.23\,\text{Exp}^*} - \underset{(-0.046)}{0.038\,\text{Exp}^2}$$

$R^2 = 0.55$ N=542

Results for Female Workers

$$\text{Wage} = \underset{(36.07)}{263.37^*} + \underset{(0.178)}{25.60\,\text{Edu}^*} - \underset{(4.747)}{11.009\,\text{Exp}^*} + \underset{(0.169)}{0.493\,\text{Exp}^{2*}}$$

$R^2 = 0.44$ N = 295

Values in parentheses are standard errors of estimates. * Significant at the 1% level.

As is apparent from the above human capital model, education and experience are important variables explaining the variation in wages for both males and females in Edget Factory. While the coefficient of education is significant and positive for both males and females, it is of higher magnitude for females (25.6) compared to males

(18.8). Unlike education, experience appears to be negatively related to the wages of female workers, but positively related to the wages of male workers.

Part of the explanation for these differences between male and female workers in Edget Factory can be found in Table 3, which provides information on the average wages, age, education and experience of Edget Factory workers, disaggregated by sex. As can be seen from Table 3, female workers in Edget Factory are about 3 years younger than men, much less educated (slightly above grade 1) and have less experience outside of the factory (less than one year) than their male counterparts. On average, a male worker in Edget Factory is more than four times educated than a female worker (having reached above grade 6) and earns over 1.5 times the salary of female workers, in spite of the fact that female workers have over 2 years more experience in the industry than males. These figures suggest that women in Edget occupy lower level positions and have a tendency to stick to these positions, probably because of their poor educational background and limited exposure/experience outside of the industry.

Table 3. Gender Differences in Average Wages, Age, Education and Experience in Edget Cotton Factory, 1996

Variables	Male	Female	Both
Salary (in birr)	389.00	256.00	303
Education (grade)	6.165	1.436	3.106
Experience (within), years	14.160	6.70	15.800
Experience (out of the industry), years	1.750	0.72	0.760
Age	44	40.70	42.800
Job grade	5.76	3.81	4.500

Source: Own computations based on 1996 data for Edget Factory

The Chow test (Gujarati, 1988) was also used to test the differences between the regression results for male and female workers of Edget Factory. The results of the test showed that the computed F values were significant, meaning that the regression coefficients in the male and female models were significantly different.

The regression results of the earning function are summarized in Table 4 (male workers) and in Table 5 (female workers). As might be expected, for both males and females, the coefficients of the human capital variables (experience and education) are found to be positive and significant. In contrast, occupation and department do not seem to affect the earnings of female workers, but have a significant influence on the earnings of male workers (the coefficients for professional and administrative occupations were significant at the 5% and 1% levels, respectively). Furthermore, the R^2s derived in the male and female models were 73% and 53%, respectively, indicating that the regression for male workers had a higher explanatory power than the one for females.

Table 4. Regression Results of the Earning Function for Male Workers in Edget Cotton Factory, 1996

Variables	Semi-log	
	Coefficient	Standard Error
Experience (within)	0.00680*	0.00870
Experience (outside)	0.02454*	0.00533
Primary	0.14570*	0.03030
Junior Secondary	0.10934*	0.04290
Senior Secondary	0.41290*	0.04350
Diploma and Certificate	0.82460*	0.04210
Above Diploma	1.08970*	0.10640
Professional	0.18490**	0.10820
Production	0.00930	0.03720
Administrative	0.26510*	0.07180
Clerical	-0.04530	0.03020
Service	-0.07850**	0.03960
Department 1 (Production)	0.17330**	0.73640
Department 2 (Technical)	0.20780**	0.09590
Department 3 (Administration)	0.15890**	0.07390
Constant	5.15090	
R^2	0.73	
F	96.629	
N	542	

* Significant at 1% level, ** Significant at 5% level.
Source: Own computations based on 1996 data from Edget Factory.

Table 5. Regression Results of the Earning Function for Female Workers in Edget Cotton Factory, 1996.

Variables	Semi-log Model	
	Coefficient	Standard Error
Experience (within)	0.01231 *	0.0033
Experience (outside)	0.01820 *	0.0050
Primary education	0.24660 *	0.0702
Junior secondary	0.42280 *	0.0844
Senior Secondary	0.42550 *	0.0619
Diploma and Certificate	0.79030 *	0.0689
Above diploma	0.98200 *	0.1697
Professional and technical	0.32460	0.2162
Production and related	-0.08320	0.2043
Administrative and related	-0.23400	0.2009
Clerical and related	-0.36110	0.2035
Service workers	-0.00310	0.1839
Department 1 (Production)	0.02970	0.0647
Department 3 (Administrative)	-0.13690	0.0682
Constant	5.39570 *	
R^2	0.53000	
F	23.14600	
N	295	

* Significant at 1% level.
Source: Own computations based on 1996 data from Edget Factory.

The estimates of the Mincerian returns to schooling, presented in Table 6, provide further insights on gender differences in Edget Factory. While primary and junior secondary schooling have an important influence on female wages, yielding rates of 4.1% and 8.8%, respectively, they have a lesser or even a negative influence on the wages of male workers (rates of 2.4% and -1.8%, respectively). These results reinforce the suggestion made earlier that women, in Edget factory, are employed in lower level jobs, requiring little if any educational qualification, while men usually hold better paying positions requiring some secondary or higher level education. Indeed, the returns to schooling are much higher for males at senior secondary (7.6%), diploma (20.6%) and above diploma (13.3%) levels.

It is also striking that, while returns to education, in the factory as a whole, are highest for diploma-certificate (18.31%) and above diploma (11.3%) education levels, they are consistently lower for female relative to male workers. Thus, the estimated return to diploma and certificate level averaged 20.6% for males and 18.2% for females, while the equivalent rates for males and females at above diploma level stood at 13.3% and 9.6% respectively. Given that these differences occur between male and female workers with the same educational attainment, they imply that educated women in Edget Factory are discriminated against and that this bias increases as women advance from diploma/certificate to above diploma level.

Another result of this study as indicated in Table 6 is that, in the factory as a whole, the returns to primary education (3.3%) are lower relative to higher educational levels. This result is similar to that of Appleton (Appleton *et al.*, 1994) for Ethiopia, Uganda and Cote d'Ivoire, and of Tesfayi and Krishnan (Tesfayi et al., 1997) for Ethiopia. But, the result conflicts with the widely accepted finding of Psacharopoulos (Psacharopoulos, 1994) who estimated highest returns to schooling for primary education, at global level. This conflicting finding may partially be explained by the small sample size in this study, which has mainly relied on cross-sectional data for two enterprises in Addis Ababa. Nevertheless, the finding may serve to point to the need for adopting a differentiated policy approach in attempting to promote education in the modern, largely urban-based, formal sector in Ethiopia.

Table 6. Mincerian Returns to Schooling in Edget Cotton Factory, 1996

Level of Education	Returns for Males (%)	Returns for Females (%)	Both Sexes (%)
Primary	2.4	4.1	3.30
Junior secondary	-1.8	8.8	5.50
Senior Secondary	7.6	0.0	2.80
Diploma and Certificate	20.6	18.2	18.31
Above Diploma	13.3	9.6	11.30

Source: Own computations based on 1996 data from Edget Factory.

3. THE RETURNS TO SCHOOLING IN EDGET FACTORY: A COMPARATIVE ANALYSIS

This section attempts to compare the returns to education estimated above for Edget Factory in 1996 with those estimated in 1985, on the basis of earlier work done by the author (Wolday, 1988). For consistency, all workers who were reported as working in the Edget factory in 1985 and 1996 were included in the estimation of the earning function from which rates of return to schooling were computed. Tables 7 and 8 report summary regression results for Edget Factory in 1985 and 1996, first treating education and experience as continuous variables (Table 7), and second treating these variables as dummies (Table 8).

In both 1985 and 1996 (Table 7), the experience variable is found to be positive and significant at the 1% level in absolute terms, though in relative terms, the returns to experience appear to have substantially declined between 1985 and 1996. Professional and administrative occupation variables have become significant in 1996. In both 1985 and 1996, the coefficient of the education variable was also positive and statistically significant at the 1% level. A one-year increase in education level is estimated to have increased wages from about 9% in 1985 to 56% in 1996, implying that the returns to education have risen substantially during the past decade. Much of this increase could be due to the wage restructuring process that took place in Edget Factory in 1995. Under the new structure all activities in the factory are categorized by job grades for which corresponding wage rates were determined. An attempt at relating the new job grades to the education level of workers yields the following regression results:

$$\text{Job grade} = 3.347^{*} + 0.372\ \text{Education}$$
$$(0.699) \quad (0.0115)$$
$$R^2 = 0.55 \quad N = 843 \quad \text{(values in bracket are standard errors)}$$

The above regression results indicates that the coefficient of the education variable is positive and significant at the 1% level, and education explains 55% of the variation in job grades in the factory.

The Ordinary Least Squares (OLS) estimates of the determinants of earning are given in Table 8. Judged by the adjusted R^2 (70% in 1985 and 63% in 1996) and F statistics in Table 8, the models used appear to have produced relatively good results. While the returns to education were negative and mostly significant at the 1% level in 1985, they are found to be positive and significant at the 1% level, for all levels of education, in 1996. In 1996, the returns to education increased gradually from lower to higher education levels, reaching an all time high of over 100% at tertiary level. Similarly, the returns to experience were generally positive and significant at the 1% level in 1985, they turn out to be negative (though not very significant) in the 1996 earning function. In contrast to 1985, the variable sex is also negative and significant at the 1% level in 1996, implying a deterioration in the wage

situation of females in the factory, probably resulting from their poor education and literacy status.

Table 7. Regression Results with Education and Experience as Continuous Variables using comparative 1985 and 1996 data for Edget Cotton Factory

Variables	Semi-log model			
	1985		1996	
Education	0.08760*	(0.0033)	0.5641*	(0.0022)
Sex	0.02250	(0.0208)	0.0608*	(0.0192)
Experience	0.02100*	(0.0017)	0.0087*	(0.0013)
Marital status	-0.09190*	(0.0235)		
Professional	-0.00300	(0.1355)	0.4389*	(0.0843)
Production	0.40540*	(0.1346)	0.0033	(0.05469)
Administrative	0.04010	(0.1408)	0.2152*	(0.0777)
Clerical	-0.24610**	(0.1479)	-0.1311*	(0.0489)
Service	0.24560***	(0.1837)	-0.0999***	(0.0576)
Constant	4.54020		5.3514	(0.0623)
R^2	0.65170		0.6385	
F ratio	146.102		186.015	
N	1061		238	

* Significant at the 1% level; **Significant at the 5% level; ***Significant at the 10% level.
Note: Values in parentheses are standard errors.
Source: Own computations based on 1996 data from Edget factory and Wolday (1988).

Table 8. Regression Results with Education and Experience as Dummy Variables using Comparative 1985 and 1996 Data for Edget Cotton Factory

Variables	Semi-log model			
	1985		1996	
Read and write	-1.4589*	(0.1974)	0.21320*	(0.03590)
Primary	-1.5933*	(0.2018)	0.31870*	(0.04677)
Junior secondary	-1.2478	(0.2107)	0.44320*	(0.03570)
Secondary certificate diploma	-0.7615*	(0.1961)	0.80480*	(0.03490)
Degree and above	-0.1608	(0.1994)	1.07060*	(0.08530)
Sex	0.3095	(0.2764)	-0.34000*	
Exp 1-3 years	-0.0148	(0.0197)	-0.09429	(0.02007)
Exp 4-8 years	0.0761*	(0.0283)	-0.00009	(0.00061)
Exp 9-14 years	0.1026*	(0.0273)	-0.13440*	(0.04723)
Exp 15-22 years	0.3309*	(0.0431)	-0.06636**	(0.03470)
Exp 15-22 years	0.3648*	(0.0431)	-0.05285	(0.33796)
Exp 26-28 years	0.4443*	(0.0492)	0.02128	(0.45300)
Marital status	-0.0750*	(0.0218)	-0.34000*	
Prof. and technical	0.0256	(0.1266)	0.28670*	(0.08930)
Production	-0.3597	(0.1256)	-0.05399	(0.05510)
Adm. and Management	0.0347	(0.1317)	0.11600	(0.07850)
Clerical	-0.2188***	(0.1383)	-0.11920*	(0.04955)
Service	0.2526***	(0.1756)	-0.1659	(0.05810)
Constant	6.0989		5.6449	(0.06460)
R^2	0.6980		0.63234	
F ratio	123.638		91.616	
N	1062		842	

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.
Note: Values in parentheses are standard errors.
Source: Own computations based on 1996 data from Edget factory and Wolday (1988).

4. RETURNS TO SCHOOLING IN A PRIVATE FORMAL SECTOR ENTERPRISE (MOENCO)

The 1974 nationalization of private firms in Ethiopia seriously damaged development prospects for an emerging private sector. Today, Ethiopia is almost starting from scratch to create an entrepreneurial class, equipped with energy, national commitment, a competitive spirit, ethics, skills and the necessary capital to run private business. One of the few private firms that managed to survive in the formal sector under the former Derg regime, and is still operative today, is MOENCO, for which the earnings function and returns to education are estimated in this section. Apart from being one of the oldest private companies in Ethiopia, MOENCO was selected for this study because of its modern organizational structure and relatively large workforce.

As in the case of Edget Factory in previous sections, models using both continuous and dummy regressors are estimated by Ordinary Least Square (OLS) method for the entire staff of MOENCO. Table 9 summarizes the regression results of the earning function where education is treated as a continuous variable. As shown in Table 9, the variables included in the semi-log model explain about 63% of the wage variation in MOENCO. Among the variables, education and experience are the only ones that are positive and significant (at the 1% level). Since it is possible to interpret these variables as percentage wage effects (given that the dependent variable in the semi-log model is in natural logarithmic (ln) form), it appears that each year of experience in MOENCO increases wages by 4.9% on average. Similarly, each year of additional schooling results in an 8% increase in wages. The other variables in the model, including sex and occupation, are found to be insignificant.

Table 9. Regression Results of the Earning function (education continuous) in MOENCO, 1996

Variable	Semi-log model	
	Coefficient	Standard error
Sex	0.06525	0.08358
Experience	0.04862*	0.00330
Education	0.07958*	0.00800
Professional	0.05493	0.27820
Production	-0.04042	0.10899
Administrative	-0.86729	0.27710
Clerical	-0.08644	0.12917
Service	-0.14599	0.11462
Constant	4.958	0.15490
R^2	0.63	
F Value	36.77	
N	170	

* Significant at 1% level.

Source: Own computations based on data got from MOENCO

Table 10 shows that the variables in the model explain about 64% of the variation in wages in MOENCO. Wages in the company increase with experience, an additional year of experience resulting in a wage increase of 5.1%. Among education

categories, post-diploma education has a positive and significant influence, yielding a return of about 20%. Among educational categories, primary and junior secondary levels are significant at the 1% and 5% levels, other variables in the model being negative and insignificant.

Table 10. Regression Results of the Earning Functions (education dummy), MOENCO 1996

Variables	Semi-log model	
	Coefficient	Standard error
Sex	0.042380	0.08305
Experience	0.051475*	0.00330
Primary Education	-0.656400*	0.17828
Junior Secondary Education	-0.416300**	0.18790
Senior Secondary Education	-0.234660	0.17000
Diploma and Certificate	0.165590	0.17090
Above Diploma	0.177200*	0.30420
Professional	-0.008700	0.27550
Production	0.028890	0.10996
Administrative	-0.725100	0.27666
Clerical	-0.008216	0.13074
Service	-0.065010	0.11535
Constant	5.859390	0.19839
R^2	0.64	
F value	26.102	
N	170	

Note: * Significant at 1% level. ** Significant at 5% level.
Source: Own computations based on data from MOENCO.

An attempt to estimate the relationship between job grading and education in MOENCO yielded the following results:

$$\text{Job grade} = 2.2163^{*} + 0.2029^{*}\ \text{Education}$$
$$(0.379)\quad (0.0340)$$
$$R^2 = 0.1735$$

(Values in bracket are standard errors.)

Table 10 reveals that education is positive and significant at the 1% level, and explains about 17% of the variation in job grading in MOENCO. This is rather low, especially when compared to the 55% variation in job grading explained by education in Edget Cotton Factory. This is probably due to the fact that the workers in the private firm (MOENCO) are much more privileged than workers with the same qualifications and experience, in Edget Cotton Factory. This is reflected in the fact that the average 1996 wage in Edget Cotton Factory was ETB 303 while it was ETB 697 in MOENCO. However, as illustrated in Table 11, the educational background of employees of MOENCO is relatively better than that of Edget Cotton Factory where almost 71% of employees have no education. Thus, while the return to a unit increase in schooling in MOENCO was about 8%, it was only 5% in Edget Cotton Factory.

Table 11. Level of Education of Employees in MOENCO and Edget Factory, 1996 (%)

Level of Education	Edget Cotton Factory %	MOENCO %
No education	70.8	0.5
Primary	6.0	21.1
Junior secondary	3.6	11.7
Secondary	9.2	24.6
Certificate and diploma	9.1	40.9
Above diploma	1.3	1.2

Source: Own computations based on data got from MOENCO.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The main focus of this study has been on assessing the economic returns to education in the formal sector in Ethiopia by using the Mincerian earning function. An attempt was made to estimate the private returns to education in two enterprises in Addis Ababa, one state-owned (Edget Cotton Factory) and the other private (MOENCO). In both enterprises, the human capital variables, i.e. education and experience, estimated using the earning function, were found to be very important in explaining wages. The Mincerian rates of returns to primary, junior secondary, senior secondary, diploma and certificate, and above diploma levels of education in the state-owned Edget Factory, were estimated to be 3.3%, 5.5%, 2.8%, 18.3% and 11.3%, respectively.

The estimated Mincerian regression coefficients associated with primary education, although positive and significant, did not conform with estimates obtained at global level by Psacharopoulos (Psacharopoulos, 1994) who found that returns to education were highest at primary level. In both Edget factory and MOENCO, the estimated returns to post secondary schooling were relatively higher than for primary and secondary education. These results would seem to imply that returns to different levels of schooling estimated may vary significantly between the largely urban-based, modern sector and other larger, dominant sectors like the rural sector. In as far as one can draw policy implications from this, this suggests a differentiated approach to improving education in the urban and rural sectors.

A comparison of the wages of male and female workers of Edget factory in 1996 also showed that, for the same level of educational attainments, men have higher average wages than women. Although having more experience than men within the industry, women were found to be less educated and to have less experience outside of the industry than men. The OLS estimates of the earning function in the factory indicate that the returns to primary and junior secondary education were higher for women than men. In terms of higher education, the return to schooling was higher for male than female workers. A further comparison of the returns to schooling in Edget Factory reveals that women were paid less in 1996 compared to 1985. Overall, it appears that women in Edget factory occupy lower status and lower paying jobs, and

that their situation with regard to wages has deteriorated in the past decade. Even where they had attained higher educational levels, women were paid less than men.

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