

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUTE STUDIES**

**WILLINGNESS TO PAY FOR SOCIAL SERVICES IN
DEVELOPING COUNTRIES: THE CASE OF
EDUCATION IN ETHIOPIA**

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F.B.E. Library

**Submitted to
the School of Graduate Studies,
Addis Ababa University,
Faculty of Business and Economics,
Department of Economics
in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Economic Policy Analysis**

June, 1999

Addis Ababa



ADDIS ABABA UNIVERSITY
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*Willingness to Pay for Social Services in Developing Countries:
The Case of Education in Ethiopia*

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AKNOWLEDGEMENT

First of all I would like to thank my almighty Allah, the merciful and the compassionate.

I wish to express my profound gratitude to my adviser Dr. Ajay Tandon for all his invaluable comments and suggestions.

My special thank is also due to my dear wife, without whose courageous support it would have been impossible to accomplish this study.

I also wish to extend my gratitude to my Mother, my Father, my Brothers and Sisters who have supported me financially and spiritually.

Finally I wish to express my great full thank to all my friends and all members of the department of Economics for every support they made for the accomplishment of this study.

TABLE OF CONTENTS

AKNOWLEDGEMENT
LIST OF TABELS
ABSTRACT



CHAPTER I: INTRODUCTION	1
1.1 Background Of the Study	1
1.1.1>Returns to Education in Ethiopia	3
1.2 Statement of the Problem	6
1.3 Objectives and Significance of the Study	9
1.4 Data Sources and Methodology	10
CHAPTER II: LITERATURE REVIEWS	14
2.1 Theoretical Literature Review	14
2.1.1. Equity and Efficiency Arguments for Charging User Fees For Education.....	14
2.1.2 Economic Theory.....	20
2.2 Empirical Literature Review.....	23
2.3 Hypothesis to be Tested	26
CHAPTER III: MODEL SPECIFICATION	30
3.1. Theoretical Framework of the Model.....	30
3.2. Empirical Model Specification	32
3.3 Driving the Formula for Price Elasticity.....	38
3.4 Driving the formula for Willingness to pay.....	39
CHAPTER IV: DISCUSSION OF EMPIRICAL RESULTS.....	41
4.1. Summary Statistics.....	41
4.1.1. Consumption and Consumption-Square	42
4.1.2. Distance to School	44
4.1.3. Sex of the Child	46

4.1.4. Education of the House-Hold Head.....	48
4.1.5. Number of Siblings.....	49
4.1.5. Student-Class Ratio.....	49
4.2. Logistic Regression Analysis	50
4.2.1 The Logistic Regression Results.....	51
4.2.1.1. Percapita consumption and percapita consumption-square.....	56
4.2.1.2. Dummy Variable for the Education level of the Household Head.....	57
4.2.1.3. Dummy Variable for female Child.....	58
4.2.1.5. The Number of High school aged siblings.....	58
4.2.1.5. Distance to School.....	59
4.2.1.6. The Ratio of Student to Class room	59
4.3. Computing Price Elasticity.....	59
4.4. Computing Willingness to Pay	62
4.5 Limitations of The Study.....	65
CHAPTER V: SUMMERY AND POLICY RECOMENDATION	67
5.1. SUMMERY	67
5.2. Policy Recommendation.....	72
Bibliography	
Appendix 1	
Appendix 2	
Appendix 3	



LIST OF TABLES

- Table4.1.1. Distributions of Secondary School Enrollment
in by Expenditure Groups in Rural Ethiopia
- Table4.1.2. Mean Hours per Week in Activities of
Potential Secondary school students.
- Table4.1.3. Distribution of High School Enrollments With
distance and Income Groups
- Table4.1.4. Distribution of High School Enrollment by Sex
and Income Groups.
- Table4.1.5. Distribution of High School Enrollment and
high school Enrollment in Rural Ethiopia
- Table4.1.6. Mean Number of Siblings by Enrollment
- Table4.1.7. Results of Estimated Logistic Demand Function
- Table4.1.8. Arc Price Elasticity
- Table4.1.9. Willingness to pay by Income and Distance
groups



Abstract

It has long been argued that developing countries has to deveiop their human capital to lay down the necessary base fore long term economic growth. One of the most important ways through which improvement in human capital can be brought about is by extensively investing on the formal education. Ethiopia, as one of the least developed countries, has been lagging behind in its human capital development. Enrollment has been among the lowest in the word. On the other hand due to the lack of public resources to finance the expansion of education there is an increasing needs for a policy of charging user fees at secondary and higher education. The purpose of this study is to investigate whether households are willing to pay for education particularly in the rural areas, by using the 1994/95 Ethiopian rural household survey. I estimated the logistic demand function for education and computed the price elasticity and willingness to pay for reduction in travel time to school. The major findings of this study are school prices, number of siblings, distance to school and the ratio of student to classroom are found to be the most important determinants of enrollment in rural Ethiopia. In addition, rural households are found not willing to pay for reduction in travel time to school. This implies, therefore, that the policy of charging user fees to cover the cost of providing school services is not feasible in rural Ethiopia.

CHAPTER I

INTRODUCTION

1.1 Background of the Study

There is a growing argument that most of the developing countries are required to invest much on the development of their human capital, since it is the most important component of their capital stock. One way of improving human capital base is through investment in the quality and accessibility of education.

Many economists believe that education plays important role in economic and social development. Education can bring economic development through improving labor productivity and through accumulation of knowledge. It improves the cognitive skills of workers so that they can easily adopt modern technology. Many economists site earning differences arising from levels of education as one of the most important evidences for the role of education in productivity.

The role of education in influencing fertility and health is also another important channel through which it can bring economic and social developments. Women's education is one of the crucial determinants of fertility and health. Many studies show that educated women are more likely to use contraceptive than that of uneducated ones. It is also believed that educated mothers are more likely to use frequently of modern medication and take better care for their children than do

uneducated mothers. In general, parental education, especially of mother's, is important in bringing perceptual and attitudinal change within the family which is also crucial in improving the health status of that family.

Another important role that education is assumed to play is its intergenerational linkage. Education may help children of the poor families to get access to higher income earning jobs in the labor market in the future. This is so because it may enable such children to be equally competent with that of children from privileged families. It can also alleviate poverty by increasing productivity of labor and hence increasing income for the poor in the future. In general, education can bring down income disparities within the future generations.

Unlike the crucial importance of education in promoting development, its expansion has been unsatisfactory in Ethiopia. Enrollment ratio is very small at all levels of education. In 1991, for instance, primary enrollment was only 24 % while secondary enrollment was 12 % (World Bank 1995). Geographical and gender parities in enrollment are also very high. Therefore, there is a crucial need to improve enrollment at all levels in all areas, and hence reduce the observed significant disparities within different groups of the society.

On the other hand, Ethiopia is one of the low-income countries of the world. Its economy has been suffering from natural disasters, structural bottlenecks, and external debt. In addition, it is characterized by small domestic revenue, which is accompanied by rapid population growth.

In spite of the above facts, however, the government is the major supplier of education in the country, and that almost all costs are borne by the government of its revenues.

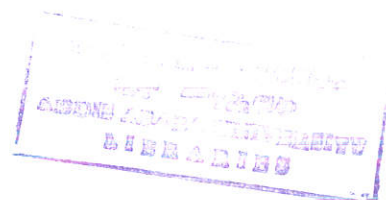
1.1.1>Returns to Education in Ethiopia

Many economists believe that the expansion of education services and improvement in its quality is essential for many developing countries in order to bring rapid economic development in these countries.

Many economists also believe that investment in education has more social and private returns than any other forms of capital investment in developing countries. Therefore, they argue that it is more beneficial for both governments and individuals in these countries to invest more on education (Psacharopolus 1973).

Polachek and Siebert (1993) defined the rate of return in education as the ratio of school benefits to school costs.

The major public benefit from education is its externalities. However, since externalities are not considered by individuals in their decision to invest on education, there is higher probability of under investment by private individuals,



particularly where social returns are much higher than private returns. Therefore, the public sector subsidy is required to fill the gap.

Many studies in Ethiopia indicate that education is the most important determinant of productivity in this country. Recent study by Assefa and Abay (1997) for instance indicates that education improves allocative and technical efficiency in agricultural sector in Ethiopia. However, according to this finding, it is primary education, which has more significant effect.

Admit (1997) also found that the education level and productivity in manufacturing sector are positively and significantly correlated.

Therefore, the findings in these studies indicate that education has external benefits to the economy, since improvement in agricultural productivity has larger effect on the economy. In addition, these externalities are more significant in the case of primary education than that of secondary and post secondary education.

Unlike the social benefits, education has also private benefits in Ethiopia. These private returns are assumed to be incentives to increase private investment on education, particularly at secondary and post secondary levels.

Individuals incur both direct and indirect costs for every additional years of schooling. Similarly, they also expect higher private returns, as measured by

higher future earnings, in exchange for their expenditure. However, individuals will continue their investment on education so long as the present value of their expected return is higher than the cost they incur for education.

Brayant (1990) sets three reasons why the rate of return to education declines with additional years of schooling. The first is that as the education level of individual increases so also is the opportunity cost of the preceding years of education. Secondly, each additional years of schooling reduces the remaining years for work. The third is that, additional years of schooling increase productivity at a diminishing rate(Brayant 1990).

Most of the studies in Ethiopia regarding the private returns of education are concentrated on the earning differentials in the public and private formal sectors, which are mainly found in the urban areas.

A recent empirical study in Ethiopia by Wolday (1997) assesses the determinants of earnings in one state owned cotton factory and one privately owned company. He found that in both of these formal sectors education level is positively and significantly related with earnings. According to his findings, the rates of return from education ranges from 3.3 % for primary level to 18 % and 11 % for diploma and post diploma levels, respectively.

On the other hand a study by Tesfaye and Krishna (1997) also found that private returns of education fell at all levels of schooling in both public and private



sectors over the year 1994 to 1997. In addition their findings indicate that being secondary school complete or being migrant in the previous five years influences either to be unemployed or wage worker. The probability of a migrant or a high school complete being self employed is very low, while this probability is higher for primary grade complete or being resident in the town.

Even if there is no clear indication regarding the returns of schooling in the rural areas in Ethiopia, where non formal agricultural sector dominate the activity, the implications of the above findings are that that of non formal agricultural sectors, because there is no sufficient employment opportunity for secondary school completes in this area. In addition, the finding that there is a negative relation between being high school complete or being a migrant and being self-employed implies that in the rural areas secondary education has lower returns. Moreover, the finding that allocative and technical efficiency in agriculture is highly and positively correlated with primary education than that of secondary education confirms this conclusion.

1.2 Statement of the Problem

There is a general consensus among economists that education is an engine of economic development. It is also considered to be a medicine for alleviating poverty through improving labor productivity, particularly in developing countries. Even recent studies made in Ethiopia indicate that both primary and post primary education is significantly important in improving labor productivity

and bringing technical and allocative efficiencies in different sectors of the economy (see Admit 1998, Assefa 1998).

However the fact that most of the education services are publicly provided, and the fact that public education is highly subsidized, added with poor performance of the economy, has bottlenecked the promotion of education in the country. In 1997, for instance, education sector accounts for 16.5 % of the total recurrent or 13 % of the total public expenditure in the country. On the other hand, it is only a handful of school aged children that have got access to schooling. In 1997, for instance, the coverage was only 37.7 percent of primary school age, and 8.4 percent of secondary school age population. This figure is the worst in the case of rural Ethiopia. It was only 27.3 percent of primary school age and 0.16 percent of secondary school age population that was enrolled (ESAA1996/97).

Repetition rate is also higher and rises with grades, which indicates deteriorating internal quality of schooling (ESAA1997/98). The implication, therefore, is that there is a need for policy instruments, which can improve the prevailing situations.

Given the scarcity of public financial resources and poor performance of the economy, expanding education and improving its quality through the government bearing the whole costs may have more serious effects than does lower enrollment rate. Such a policy may cause macroeconomic instability due to the possible effects of persistent budgetary deficit that the country cannot proceed with at the

current economic situation. On the other hand, even if the private sector is believed to contribute its own part in promoting education, it may not be equitable to shift the whole responsibility to this sector.

Therefore, another alternative, which is mostly proposed by the World_Bank groups, is to charge user fees at least at secondary school level. The rationale for this proposition is that even if the private and social returns of investment in education are positive at all levels than any other form of capital investment in developing countries, the social return is higher at primary levels than it is at secondary level. Therefore, any subsidy to secondary and higher education at the expense of primary education is inefficient. Higher education should be subsidized only if there is sufficient resources left for primary education.

Another rationale for proposing the policy of charging user fees at secondary school is that fees can be charged at secondary school without adversely affecting, and even improving, enrollment because of the low price elasticity of demand for secondary school, particularly by middle and higher income households. The only thing that may be required, according to this argument, is, therefore, to find a mechanism to compensate the poor in order to minimize the possible risks of such a policy on them (World Bank 1995).

However, the validity of this assumption in the context of rural Ethiopia is questionable. Most of the rural people in Ethiopia may not be aware of the benefits of education, particularly at secondary level. One possible reason could

be due to the fact that the returns of secondary education are mostly perceived in the formal sector employment, which is rarely accessible to the rural poor. In addition many studies show that it is primary education which is more significant in the agricultural sector in Ethiopia (see Assefa and Abay 1997).

Therefore, due to lower perception of returns in the secondary education in rural Ethiopia, the assumption of lower price elasticity of demand for secondary education may not hold true in rural Ethiopia.

The major issues to be raised in this study are, therefore, is secondary education price inelastic in rural Ethiopia? Are rural households willing to share the cost of providing education given that it is available in their village? And are there any differences among households in willingness to cost sharing.

1.3 Objectives and Significance of the Study

The purpose of this study is to investigate the willingness of rural households to pay for education, and whether this willingness is concentrated in particular groups of the society. The main objectives of this study are, therefore, specified as:

1. To examine whether rural households are willing to pay user fees for reduction in travel time to school.

2. To examine the impact of charging user fees on the lower income groups of the society.
3. Based on 1 and 2 above, to give some policy recommendation; and
4. Apart from the above objectives, this study help to pave the way for policy makers to conduct further studies on this issue.

With the current policy of the government to expand its human resource base, and emphasis on this by international organizations, there is higher demand for expanding different levels of schools with improved quality. But the lack of government financial resources necessitated charging user fees, particularly at secondary school.

However, implementing such a policy requires prior knowledge of the response by deferent groups of the society. Therefore, these study helps policy makers to guide them of investigate the feasibility of such policy before its implementation.

1.4 Data Sources and Methodology

The data employed in this study are from 1994 first round Ethiopian household survey, jointly undertaken by the Economics Department at Addis Ababa University and center for the study of African Economies at Oxford University. It is a comprehensive survey, which contains information on the education of each household member, including expenditure on education.

The survey also contains information on the socioeconomic and demographic characteristics of each household in the community.

There is also data at community level, which contains information regarding the distance to the nearest school to the community.

The other important source of data is the national economic parameter analysis for the public investment program in Ethiopia, prepared by ministry of economic development and cooperation in collaboration with project planing center, University of Bradford in UK. This also contains information on the opportunity cost of rural labor.

The third data source is the 1994 to 1997 Education Statistics Annual Abstract prepared by Ministry of Education.

The methodology implemented in this study is as follows. I estimated the direct price of schooling for each students attending school by simply dividing the total expenditure for school fees of each household by the number of children attending secondary school. Because the assumption taken in this case is that households incur no or a few direct costs for the students attending school at primary level in the rural areas. This is due to the presence of school within the community, and probably there is no charge of any type at this level, particularly in the rural areas. However, the indirect cost of schooling (the opportunity cost of child's time in

school) is calculated by using the average national school days and opportunity cost of hourly rural labor.

In calculating the hourly opportunity cost of rural labor I employed the methodology used by the Ministry of Agriculture to calculate effective agricultural working days and that of child's daily working hours. Detail information for the methodology used will be found in the appendix2.

Another important methodology to be mentioned is the one used to assess the issue of willingness to pay. There are many alternative methods to assess the issue of willingness to pay.

Willingness to pay could be examined by using the techniques of valuations. In this method respondents will be directly asked regarding their willingness to pay for the service under consideration and hence this will be considered as the extent to which respondents value the service. One of the advantages of this method is that non-users are also asked how much they are willing to pay for the service even if they don't use it and hence this is considered as the existence value. However, most of the time this technique is implemented in environmentally related assessments, and is not used by many researches to assess willingness to pay for education.

The other alternative method to assess willingness to pay for education is to compute the compensating variation arising from a change in the household's

utility due to reduction in school costs through reducing travel time to school, and hence increase consumption. The assumption here is that, since households are assumed to be indifferent if left at any point along the indifference curve, it is possible to take from them the amount of money that is equivalent to the opportunity cost of the reduced travel time. Most of the empirical studies use this technique in their assessment of willingness to pay for social services. This is probably because of the advantages of this method to minimize the possibility of under or over estimation of the willingness to pay since this is the indirect method of assessment. Therefore, I will also use this technique in my computation of willingness to pay in this study.

CHAPTER II

LITERATURE REVIEWS

2.1 Theoretical Literature Review

2.1.1. Equity and Efficiency Arguments for Charging

User Fees for Education

The main objectives of any policy are to improve the well being of its society and to bring rapid economic growth. In attempting to attain these goals policy makers should also give much attention to equity and efficiency of the policy.

A policy is said to be equitable if it can attain its goal with no or minimum adverse effects on the special classes of the society such as the poor and female, while efficiency requires that priority be given to areas with higher social returns in public investment decisions.

Given the above facts, therefore, there are both equity and efficiency arguments to charge user fees at secondary and tertiary education. According to these arguments highly subsidized social services are hardly accessible to the poor. On the other hand, in most of the developing countries primary education has much more social returns than does higher education. Therefore it is inequitable and inefficient to subsidize higher education at the expense of primary education,

since the former has relatively lower social returns than does the latter, and that the latter is relatively more beneficial to the poor.

In 1995 the World Bank argued that, the government has two fundamental concerns regarding equity in charging user fees. The first is to insure that every one has basic education; and secondly, to insure that any potential student not is denied access to any institutions because of their classes in the society. No potential students should be unable to enroll because of inability to pay (World Bank 1995a).

Knight and Sabot (1990) argued that equality of educational opportunity, which is regarded as the whole mark of a just society, could be justified on grounds of equity and efficiency. According to their arguments, the combinations of subsidies and meritocratic selections are not enough to insure equity. This is because, according to them, such a policy is more likely to benefit disproportionately of children from privileged families, since such children have more access to facilities, which may enable them perform very well, to be able to fulfill meritocratic criterion for selection. Subsidizing education can bring equity only if it is accompanied by rapid expansion to satisfy the resulting growing demand for school places. However, according to them, subsidization will adversely affect children from lower socioeconomic backgrounds in the case of short supply, because such children will have lower access to the services due to rationing.

On the other hand, since private returns are by far greater than private costs in highly subsidized education, the impact of charging user fees on enrollment in general will be insignificant, because price elasticity of demand for education is lower at least up to some level in this case. Therefore, charging user fees, by reducing subsidies, will be efficient as far as the benefits of high subsidies are reaped by the privileged children. However charging user fees should be discriminatory if it is expected to change disproportionately of the composition of enrollments against the poor.

Psachoropoulos and Woodhall (1995) argued that in most of the developing countries even if investment in education at all levels are profitable than any form of capital investment, the return is much more higher in the case of primary education than that of higher education. In addition, the fact that private rates of return in education is higher than social rates of return at higher education, than it is at primary education, necessitate the reduction in subsidizing higher education at the expense of primary education. There is a need, therefore, for charging user fees at higher levels in order to reduce subsidy. Such a policy is also equitable, according to them, because it is primary education which will more benefit the poor since, in general, primary education tends to redistribute income towards the poor.

Bray (1996) argued that secondary and higher education have higher private returns than does primary education. And, since students from rich families form much larger proportion than that of poor children in former cases, it is

unreasonable to subsidize higher education while there is shortage of resources to subsidize primary and basic education in which students from the poor families form the higher proportion.

Thobani (1983) argued that, even if charging higher user fees are likely to make the poor drop out of the services, the impact of charging lower user fees is more significant, because higher subsidies for public services will benefit the rich much more than it does for the poor for two reasons. The first reason is that there will be short supply of the service so that the poor people is likely to be denied access to it, and this in turn worsen the situation.

Secondly, more subsidized public service is likely to be supplied in poorer quality, and improving quality to some optimal level will benefit the poor much more than it does for the rich. He quoted, in his argument, the study made in Brazil which revealed that “public input (quality and availability) are a substitute for parents education”.

In addition, he argued that, increased access to secondary education by the poor has a long-term beneficial effect on income distribution, by enabling the labor from the poor family to earn similar wage with that of the rich. He also stated that, raising user charges according to the excess demand for the given level of education would bring efficiency in Malawi. This is so because, he argued, the only way to provide education at the level of socially optimal quantity is to

observe the excess demand by charging optimal level of user fees and using the fund to expand the service and also improve its quality (Thobany 1983).

An empirical study conducted in Kenya by Mwanbu and Mwangi (1996) concludes that charging user fees for public health in order to improve quality and accessibility are equitable because they benefit the poor proportionally more than the rich. Of course the study suggests that selective introduction of user fees is important.

Show and Griffin (1995) also argued that, since the demand for health care rises disproportionately with income, it is possible to pool more resources from the rich by charging higher fees for the services and subsidize the poor, and hence it is equitable.

Jimenez (1986) sets four reasons why rich people gain more from public services than poor people do. The first is private costs of using the service. Even if there are no user fees for public services, its consumption involves direct and indirect costs, such as transportation costs of complimentary services, and the time opportunity costs. These costs are the real constraints for the poor people to use free public services.

Secondly, differential costs and benefits. The cost of using social services is greater for poor people in absolute terms. On the other hand, the benefits from social

services are lower for the poor than that of the rich. The major reason for this is because of the lower awareness of the poor about the value of the services, and because of the fact that the rich can utilize those services more efficiently than does the poor.

Thirdly, patterns of government expenditure. In many developing countries the public subsidies go to those services of which access is severely limited and for which benefit cost ratio is larger for higher income groups. These are mainly tertiary services.

The fourth reason is rationing. Rationing arises due to excess demand for social services, which are supplied at no or very few user fees. One way of rationing, for instance education, is to use exam score. However many empirical studies indicate that exam scores and income are highly and positively correlated.

Therefore, providing social services at zero or very few user fees will hurt the poor for these four reasons and hence are not equitable.

In addition Jimenez compared the ratio of social to private rates of return for three developing regions, and the result shows that in the entire region the ratio is higher for primary education than for secondary and higher education. This, according to him, implies that re-allocating the resources towards primary education until the social rates of return is equalized across all levels of education will bring efficiency.

He also pointed out another efficiency argument that if social services are allocated in such away that those who value the services the most be given priority than rationing, then it will be more efficient. This is because the return from such services is much higher for such people than that of those people who value the service the least. For instance, giving educational priority for those people who have more potential to improve their productivity may bring efficiency than rationing it, in which case most of the efficient people might be denied access to the service (Jimenez 1986).

Therefore both equity and efficiency arguments, in general, favor charging user fees for social services at secondary and tertiary levels.

2.1.2 Economic Theory

The microeconomic theory of the household utility maximization is the starting point for economists to estimate household's willingness to pay for the social services. The rational behind this theory is that household is characterized by unlimited needs and limited resources.

Therefore, in attempting to attain the maximum satisfaction from its limited resource it has to decide what combinations of goods and services to consume so that the maximum satisfaction is attained, for a given resource.

Brayant explains this by stating that: “The household’s preferences reflect its likes and dislikes views as to what will increase and what will decrease its wellbeing... the household’s demand for goods and services are the results of the interaction between its preferences and, its possibilities, the latter being responsible by the budget constraint”(Brayant 1990).

In deciding to allocate its scarce resources to attain its goal, the household faces a set of goods and services from which it has to choose. Therefore, it will choose the combination of goods and services, which will maximize its utility.

Johannson (1987) decomposed the combinations of goods and services that households consume into the set of private and public goods, and analyzed how they allocates their resources between these two categories of goods. The rational behind these analyses is the assumption that households are indifferent between the consumption of public and private goods because the major thing that matters in the decision of household is the combinations, which will maximizes the wellbeing of its members (Johannson 1985).

The implication of this explanation is that since households are indifferent between the consumption of public and private goods, they have to foregone a portion of their consumption of the one in order to consume a unit of the other.

The other important theoretical assumption is whether the household is concerned with only the current period or that of inter-temporally. According to the permanent and life cycle income hypothesis, household is concerned in maximizing not only the current utility but also the utility over their lifetime. According to this assumption, therefore, the concern of the household is not only utility maximization but also time preferences, and hence the importance of saving arises. Household save out of its scarce resources because it expects higher utility in the future than it is today (Brayant 1990).

Deaton and Muellbauer (1980) states the neoclassical assumption of inter-temporal utility maximizing decisions of households as “...expenditure to day may be at the expense of expenditure tomorrow or at some unspecified time in the future”.

The implication of this statement is that households decide against their scarce resources in order to maximize inter-temporal utility. Thus it has to decide on how much to consume today and how much to save for future consumption. Therefore, the major motive behind the household’s saving is because of the because of expectation of higher consumption in the future(Deaton and Muellbauer 1980).

The types of savings household decides to take place are also another issues for economists. Brayant discussed three types of alternative forms of savings. These are Physical capital, financial capital, and human capital. Household selects in which form to save depending on the expected rates of return from each type of



saving. Saving in the form of human capital takes place if the rate of return from human capital, as measured by improvement in the expected wage rate, is higher than the return from any other forms of capital investment (Braynt 1980).

There are many ways of investment in human capital of which the most common way is through formal education. Individuals or households invest in additional years of schooling because of expectation of higher rates of return from additional years of schooling in the labor market (Braynt 1980).

Therefore, the neo-classical theory of inter-temporal utility maximization, in addition to the assumption regarding the preference functions of the households that households are indifferent between public and private goods, laid down the theoretical bases for the derivation of the demand model for public goods. Finally, the solution to the willingness to pay for education will be solved from the demand model.

2.2 Empirical Literature Review

There are a number of empirical studies made to investigate the willingness of households to pay for social services in developing countries.

Gertler and Glewwe (1989) made an empirical study on the likely effects of raising user fees on school enrollment in rural Peru by using the data from Peruvian living standard measurement study (LSMS). They assumed nested

multinomial logit demand model for schooling and estimated by using full information maximum likelihood method. They found that consumption and consumption square are significant determinants of demand.

Their estimation also indicates that those variables, which are considered as the determinants of the human capital of the child, are found significant for local school option.

They also calculated the price elasticity of demand for schooling for different income groups, and the compensating variation as a proxy for willingness to pay for education for different income groups and different distances to school. The computed arc price elasticity indicates that elasticity declines with income. The willingness to pay, as proxied by the compensating variation, also shows that households are found to be willing to pay for education, although willingness to pay varies with income and distance to school (Gertler and Glewwe 1989).

A study by Gertler and Glewwe (1992) was also conducted to investigate whether there are differences within household's willingness to pay between male and female children. They also used the Peruvian LSMS data to see if there is gender discrimination in household's willingness to pay for education in rural Peru. The estimated nested multinomial logit demand function indicates that all factors affecting consumption and human capital are significant for local school option, except in the case of the variable for the number of siblings. The arc price elasticity, computed in this study, shows that elasticity declines with income. But

this elasticity is higher for female child than for male, which indicate that there is gender bias in household decision. The compensating variation also shows that even if households are willing to pay for education in general, this willingness varies with sex.

Tan, Lee, and Mingat (1984) made an empirical study on the willingness and ability to pay for education in Malawi to investigate the effects of user charges for education on enrollment. They conducted a survey by interviewing students on the demographic characteristic and willingness to pay of their parents for education. They estimated the linear household enrollment ratio function by using OLS estimation method. They found that Malawian households are generally willing and able to pay for schooling. However this willingness to pay rises with income. According to their argument, the economic rational behind this willingness to pay lies in the higher private returns to education, particularly for post primary education.

An empirical study by Gertler and Gaag (1988) shows that those middle and higher income groups are willing to pay for medical care. They estimated nested multinomial logit demand function, and computed the price elasticity and compensating variation from the demand function. They found that demand for higher income households are less elastic than that of low-income households, and the former is found to be more willing to pay for medical services.

Levy and Quigley (1993) estimated the nested logit demand function to investigate the willingness to pay for quality and intensity of medical care. Availability is found to be more significant than prices in this study.

Mwambu and Mwangi (1986) also made an empirical study on health care financing in Kenya. They found that patients value quality health care and are willing to pay for it. Their foundation also suggests that improvements in the quality of small-scale health facilities would increase their utilization substantially.

2.3. Hypothesis to be Tested

The major task of this sub-section is to set the hypothesis to be tested regarding the explanatory variables, and predict their expected signs based on the previous theoretical and empirical literature reviews. Estimating the logistic demand for education will test this hypothesis.

Many empirical studies indicate that consumption and consumption-square are the most important determinants of demand for schooling in developing countries. The higher the consumption the higher will be the demand for schooling. However, the significance in the consumption terms, in this study, reflects the significance in the school prices, because consumption is computed as the difference between the total income and that of school prices. Total income in turn is the sum of the amount of consumption perceived at the time of decision to

send or not to send the child to school and that of total school prices, and hence it is the variation in the price that is reflected in the significance of consumption.

The intuition behind this assumption is that, if the child's schooling doesn't involve any cost, there is no doubt that every household would have send its children to school. However, in reality, child's schooling involves both direct and indirect costs, that the household is to incur from its consumption. Therefore, if the household decides to send the child to school then it means that it has decided to sacrifice the additional consumption that it would have got from the child's labor participation in the absence of schooling.

Thus, the utility maximizing household compares the costs of child's schooling with that of expected returns from additional years of schooling the child before its decision.

Therefore, consumption and demand for schooling, as measured by the rate of enrollment, are expected to be positively and significantly related in this study.

The expected negative sign for consumption-square is due to the expectation of non-constant marginal rate of substitution between consumption and human capital of the child across different income level.

The other important variables which are assumed to affect the demand for schooling are those of the demographic characteristics of the family and school attributes.

Education of the household head is expected to increase the probability of enrollment because, if head is exposed to some schooling, then he/she may have better understanding of the advantage of sending the child to school. In addition, parental education may affect enrollment not only directly but also indirectly through affecting the income status of the household. However, the indirect effect of parental education on enrollment may create a problem of multicollinearity in the process of estimation, and hence we will deal with this problem latter. Therefore, this variable is also expected to affect enrollment positively and significantly.

The other is the gender variable. It is expected, for many reasons, that households are more likely to send male child than female child to school. One of the major reasons is expected to be due to lower expected return from female education. There are also cultural and religious factors. In addition, sending girl to school has more risks than sending than that of boys. Therefore the negative relation between the gender variable, which is a dummy variable for female child, and enrollment is expected.

Distance to school is also expected to be one of the most important determinants of enrollment. We also expect the sign of distance variable in the model to be negative. The more distant the school is the less likely enrollment will be. The

major reasons for this is that, more distance means more opportunity cost of sending the child to school. In addition, more distance means more travel time to school, and hence this may affect the efficiency of the child in the school. This will, in turn, increase the probability of repetition and hence reduce enrollment.

Finally the relation between the ratio of student to classroom and the rate of enrollment is expected to be negative. This ratio measures the internal efficiency of school and, can affect enrollment through reducing the quality of school. Lower quality of school means lower utility gain from additional schooling of the child by his/her household. In other words, lower quality of school, as measured by scr, will reduce the expected returns from improvements in the human capital of the child.

CHAPTER III

MODEL SPECIFICATION

3.1. Theoretical Framework of the Model

A central issue in this study is examining the extent to which raising user fees for education may have affect enrollment by investigating household's willingness to pay for reduction in travel time to school and improvement in its quality. This will be possible by estimating the price elasticity of demand for education and computing compensating variation. Thus, the starting point for the analyses is the formulation of the household utility function, which assumes that the household's utility is a function of human capital of its children and that of consumption of all other goods and services.

Therefore, household allocates its budget inter-temporally, and makes decision on how much to consume today and how much to save for the future consumption. In making such a decision, household compares current consumption with that of expected future consumption.

The expected future consumption will be measured by the expected returns of different forms of savings of which saving in the form of its child's human capital is the one with the higher expected return. Therefore, by improving the human capital of its children, household expects higher future consumption due to higher

expected income for the children. Hence household has to sacrifice part of its current consumption for future consumption which is a cost for that household.

Given the above assumption, parents have to decide whether to send the child to school or not to send, depending on the costs and expected benefits of schooling. In addition many empirical studies indicate that household will also decide on the kind of school the child has to attend, depending on the perception of quality by that particular household. However, in this study the latter assumption is overlooked, firstly because of data problem. And secondly, because of the fact that in rural areas of Ethiopia most of the households, which send their child to school, are expected to send him/her to the nearest school, regardless of its quality, and this can even hold true for higher income households. The importance of these assumptions is to adopt the general model developed for health care by Gertler and Gaag (1988) in to our problem.

Gertler and Gaag (1988) developed the conditional utility function for health care, and hence by adopting this model for education we can set the conditional utility function, conditional on sending or not sending the child to school.

The conditional utility function for schooling alternative is given by

$$U_1=U_1(S_1,C_1)+e_1 \quad (1)$$

Where S_1 is the expected improvement in human capital of the child due to additional years of schooling, C_1 is consumption net of the cost of sending the child to school; and e_1 is the stochastic error term.

And the conditional utility for no schooling alternative is given by

$$U_0 = U_0(C_0) + e_0 \quad (2)$$

Where C_0 is the consumption possible with-out incurring any cost for the child's schooling, e_0 is the stochastic error term.

Each household maximizes the conditional utilities against the budget constraint given by:

$$C_1 + P^* = Y = C_0 \quad (3)$$

Where P^* is the direct and indirect prices of child's schooling, and Y is percapita income.

By substituting (3) in to (1) and (2) we will get:

$$U_1 = U_1(S_1, Y - P^*) + e_1 \quad (4)$$

$$U_0 = U_0(Y) + e_0 \quad (5)$$

Therefore, the utility maximizing household compares these conditional utility functions and selects the one with the higher utility.

3.2. Empirical Model Specification

The utility maximizing behavior of the household is the theoretical foundation for the specification of the model in this study. From equation (4) and (5), in the last section, household faces the conditional utility functions, which are the functions of consumption and improvement in the human capital of its child. Given the

conditional utilities in equation (4) and (5), therefore, the unconditional utility maximizing problem of the household can be given by

$$\text{Max } U^*(U_0, U_1) \quad (6)$$

Subject to the budget constraint

$$Y = (C + P + wH) \quad (7)$$

Where U^* is maximum utility, w is the hourly wage rate for the child's labor (or opportunity cost of the child's hourly labor), H is the total number of the child's time lost due to schooling, and U_0 and U_1 are conditional utility functions which are set in equation (4) and (5).

The solution to (6) given (7) will lead to the derivation of the probabilistic demand function.

Another important issue is to determine the specific forms that the utility function should take.

Many empirical literatures suggest that linear specification is the common assumption because of its simplicity. However, Gertler, Locay, and Sanderson(1987) shows that linear specification is inappropriate for such model because it assumes constant marginal rate of substitution between consumption and human capital of the child at every level of income, since income influences the choice only through consumption in the linear specification. In other words, since marginal rate of substitution between consumption and human capital of the child is expected to be different across different income groups, it is unfair to assume linear relation between the utility functions.

Therefore setting semi-quadratic utility function, quadratic in consumption and linear in human capital of the child, will be more appropriate. Thus equation (4) and (5) can be written, respectively, as

$$U_1 = \beta_1 S_1 + (Y - p - wH) + B_3 (Y - P - wH)^2 + e_1 \quad (8)$$

$$U_o = B_2 Y + \beta_3 Y_2 + e_o \quad (9)$$

Since S_1 represents a change in the human capital of the child, it will be determined by school attributes and demographic characteristics of the child's parents. The school attributes such as the number of teachers in the school, as proxied by the student teacher ratio, measures the internal quality of schooling and hence the level of change in the human capital of the child. On the other hand, the demographic characteristics of his/her parents will also determine the possibility of improvement in the child's human capital.

Therefore,

$$B_1 S_1 = \alpha_i Q + \eta \quad (10)$$

Where Q is a vector of demographic characteristics and school attributes; η is the random error term that captures the unobserved portion of school attributes.

Substituting equation (10) in to (8) yields

$$U_1 = \alpha_i Q + B_2 (Y - P - wH) + B_3 (Y - P - wH)^2 + e_1 + \eta \quad (11)$$

By further dis-aggregating (9) and (11) in to systematic and random components, respectively, as

$$U_1 = V_1 + e_1^* \quad (12)$$

For schooling alternative.

$$\text{Where } V_1 = \alpha_i Q + B_2(Y-P-wH) + B_3(Y-P-wH)^2$$

$$\text{and } e_1^* = e_1 + \eta$$

and

$$U_o = V_o + e_o \quad (13)$$

For no schooling alternative.

$$\text{Where } V_o = B_2 Y + \beta_3 Y_2$$

The latent demand function for schooling can be derived from (12) and (13) as

$$\text{SchDD} = V_1 + e_1^* \quad (14)$$

where schDD is demand for schooling.

However, in reality what we observe is dummy variable, which is given by

$$D = \begin{cases} 1 & \text{if SchDD} > 0 \\ 0 & \text{otherwise} \end{cases}$$

Where, D is dummy for school attendance.

Therefore, the probability of attending school is given by

$$\begin{aligned}
 \text{Prob}(D=1) &= \text{prob}(V_1 + e_1^* > 0) \\
 &= \text{prob}(e_1^* < -V_1) \\
 &= 1 - F(-V_1) \\
 &= F(V_1)
 \end{aligned} \tag{15}$$

where F is the cumulative distribution function of the random error term, e_1 .

The functional form of F will be determined by the assumption about the distribution of the random error term, e_1^* , in equation(14). Assuming the logistic distribution for the error term will give the logit model as:

$$\text{Log} \frac{\text{prob}(D = 1)}{1 - \text{prob}(D = 1)} = V_1 \dots \dots \dots (16)$$

and hence

$$F(V_1) = \frac{\exp V_1}{1 + \exp V_1} \dots \dots \dots (17)$$

But we can rewrite equation (16) by using anti-logarithm as:

$$\frac{\text{prob}(D = 1)}{1 - \text{prob}(D = 1)} = \exp V_1 \dots \dots \dots (16a)$$

Assuming that each observation is drawn randomly and independently from the population, the likelihood function for this model can be written as:

$$L = \prod [1 - \text{prob}(D = 1)]^{1-D_i} \text{prob}(D = 1)^{D_i} \dots\dots\dots(18)$$

Therefore, the probabilistic demand model can be estimated by maximizing the loglikelihood function. There are several computer packages, which can be used to analyze this. In this study I will use stata version 6 to estimate and analyze the probit and the logit models.

However, many researchers prefer the logistic assumption for its computational simplicity. Therefore I will also use the logit model for analysis in this study.

The other important assumption is regarding the distribution of the random error term. Many writers state that both logit and probit models lead to similar conclusions. The major difference between the two models is only at the tail, which may be serious when there is large sample is taken.

In the case of linear probability model the relation between the dependant variable, and the independent variables is direct. Therefore the estimated coefficient will be interpreted as marginal effect of the independent variable on the dependant one.

Unlike the linear probability model, in the case of logit model, where the dependant variable is non-continuos, the estimated coefficient will not be

interpreted directly. Rather, they will be interpreted indirectly through the odds. In other words, in the case of logistic model the relation between the explanatory variables and the dichotomous dependant variable is not directly but indirectly through the link function, which is the odds of the probability of occurrence to that of nonoccurrence. Therefore, the coefficients are interpreted as the marginal effects of the explanatory variable on the odds through which the probability of event occurrence will be affected.

3.3 Driving the Formula for Price Elasticity

After estimating the demand equation, the next step is to compute the price elasticity of demand. It helps to see how much households are responsive to changes in prices. In this particular case we will calculate the arc price elasticity since prices enter the demand nonlinearly through consumption and consumption-square terms. Price elasticity will also be compute for each income groups separately, in order to see the response of each income group for a change in the prices.

The formula for arc price elasticity in the case of logit demand function will be given by:

$$\lambda_{P_{j^*}}^{P(i)} = \frac{\sum_{n=1}^N P_n(i) \varepsilon_{P_{j^*}}^{P_n(i)}}{\sum_{n=1}^N P_n(i)} \dots\dots\dots(19)$$

Where $P(i)$ is the probability of choice i within the income groups, p_{j^*} the direct and indirect price of schooling for each child.

The arc price elasticity for each household will be computed as:

$$\varepsilon_{P_{j^*}}^{P_n(i)} = \frac{\partial P_n(i)}{P_n(i)} + \frac{\partial P_n(i)}{P_{j^*}} \dots\dots\dots(20)$$

3.4. Driving the Formula for Willingness to Pay

The final step is the estimation of the willingness to pay for education which will be proxied by compensating variation.

Compensating variation is the maximum difference between the utility attained before and after a reduction in travel time to school, which is the opportunity cost of school. Therefore, we will compute compensating variation by considering different travel time to school.

The intuition behind this is that if school is built within the community then the travel time to school will be reduced to zero or some walking distance. This reduction will then reduce the total time lost due to schooling of the child by the

amount of double trip travel time. Therefore, we will take the different between the level of utility that the household attain due to reduction in cost or price of schooling and the utility that the household would have attained if there were no reduction in school price as a maximum willingness to pay for education by the household.

The formula for computing compensating variation is derived from the general formula developed by Small and Rosen(1981) as:

$$CV = \frac{1}{\lambda} - [Ln(\exp V_0 + \exp V_1 - \exp V_0' - V_1')] \dots \dots \dots (21)$$

Where λ is the marginal utility of income, and hence computed as:

$$\lambda = \frac{\partial V_1}{\partial Y} = \beta_2 + 2\beta_3(Y - P - wH)$$

And V_0 and V_1 are the systematic utility functions computed before the reduction in opportunity cost of schooling, and V_0' and V_1' are the systematic utility functions computed after the reduction in the indirect cost of schooling through reducing travel time to school.

CHAPTER IV

DISCUSSION OF EMPIRICAL RESULTS

Household's willingness to pay for reduction in travel time to school depends on both the socioeconomic and demographic characteristics of the household. Advocates of charging user fees for social services at secondary level believe that the demand for these services are price inelastic at secondary level, and hence charging user fees at these level may not affect enrollment. These people believe that even the poor households are willing to pay for the services, even though there may be variation in willingness to pay across different income groups. Therefore, according to them, charging user fees may bring both efficiency as well as equity.

Critiques, on the other hand, doubt that the lower income groups are willing to pay for social services. They believe that, therefore, charging user fees for social services at secondary level may affect the utilization of the services by the poor, and that there may be gender bias in willingness to pay.

The purpose of this section is, therefore, to investigate empirically the effects of charging user fees at secondary school level on different classes of the community by using descriptive statistics and estimating econometric models.

4.1. Summary Statistics

4.1.1. Consumption and Consumption-Square

Most of the empirical studies indicate that consumption and consumption-square are the most important determinants of the demand for schooling. As consumption increases enrollment is also expected to increase. In other words, higher income households are more likely to send their child to school than that of lower income. In addition, lower school prices will encourage enrollment due to higher consumption. Consumption is computed as a difference between percapita household income and the total percapita price of schooling. Details of the methodology used to compute per capita consumption and other explanatory variables is found in the appendix2.

The data in table 4.1.1. indicate that, except for the upper middle income groups, enrollment rate rises with expenditure. The poorest 25 percent account for only 7.9 percent, and 25 percent of the lower middle income groups accounts for 13.2 percent of the total enrollment, while that of upper middle and the richest 25 percent accounts for 7.9 percent and 71 percent of enrollment, respectively. Thus, the share of the lower income 75 percent of the sample is only 28 percent, while the richest 25 percent of the sample accounts for 71 percent of the total enrollment.

Table 4.1.1. Distribution of Secondary School Enrollment, by Expenditure

Groups in Rural Ethiopia.

Expenditure Groups	Enrollment Rate
Poorest 25 %	7.9 %
Lower Middle income 25 %	13.2 %
Upper Middle income 25 %	7.9 %
Richest 25 %	71 %

Source: Ethiopian rural household and community survey (1994/95).

The data in table 4.1.1. suggests that consumption appears to be highly correlated with the likelihood of enrollment.

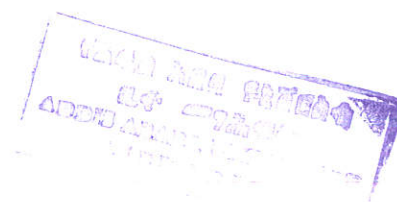
The distribution of weekly hours spent in working for potential high school aged children for both students and non-students is shown in table 4.1.2. It shows that those children attending school spends only 5.2 hours per week in working for their households, while that of non-students spent about 17.9 hours per week in working for their household.

Table 4.1.2. Mean hours per week in Activities of Potential Secondary

Students

Hours in school	Types of activities	Hours working
24.14	Students	5.2
0	Non students	17.9

Source: Ethiopian rural household survey(1994/5)



Therefore, the opportunity cost of school attendance by children in rural Ethiopia is higher, since consumption cost due to schooling is higher. In other words since those children which are attending school spend much lower hours per week in the labor participation of the household than do those children who are not attending, the opportunity cost of schooling a child in rural Ethiopia is higher. In addition, higher loss of consumption due to higher opportunity cost of schooling the child explains the effects of school prices on enrollment through reducing potential consumption.

4.1.2. Distance to School

This variable is constructed under the assumption that all households in the rural areas of Ethiopia, if decide to send the child to school, will send him/her to the nearest school to the community. The necessity for this strong assumption arises due to shortage of data regarding the type of school the child is attending in. However, this assumption will be valid as long as we believe that most of the rural households do not take in to account the quality of the school in their choice of school to which they should send their children, once they decide to send him/her to school.

This assumption seems sound in the context of Ethiopia, because in this country almost all school are publicly owned and hence rural households may not have strong grounds to differentiate between different schools for their quality. On the other hand, most of the rural people have no or a few access to private schools, since such schools are concentrated in larger cities like Addis Ababa. However,

such assumption may undermine the opportunity cost of schooling for those children who attend in schools other than the nearest school to the community, and hence it may lead to biased conclusion in case such children are considerable in number.

There are strong empirical and theoretical arguments that distance to school influences the household's decision to send the child to school. One of these arguments is that distance to school affects the price of schooling through rising the opportunity cost of schooling.

Table 4.1.3. distribution of High-School Enrollment by Distance and Income Groups

Distance to school in km	Poorest 25 %	Lower iggle 25 %	Upper middle 25%	Richest 25 %	Total average
Less than or equal to 10 km	7.89 %	13.2 %	2.62 %	42.1 %	65.78 %
Greater than 10 km	0	0	5.26 %	28.95 %	34.2 %

The data in table 4.1.3. indicates that distance to school is one of the crucial determinants of enrollment. Those households that are found within 10 kilometers away from school accounts for 65.78 % of the total enrollment, while those which are found beyond 10 kilometer away from school accounts for 34.2 % of the total enrollments.

However the impact of distance on enrollment varies across different expenditure groups. The higher expenditure groups are less affected by distance than that of

the lower expenditure groups. As distance extends beyond 10 kilo meter, the enrollment rate falls to zero for both the poorest and the lower middle expenditure groups, while it falls by about 31% in the case of the richest households. In general, however, enrollment by distant households is by about a half lower than that of relatively nearer households.

4.1.3. Sex of the Child

Many empirical studies indicate that there is great gender bias against female within the household's decision(see for instance Gertler and Glewwe 1992). In most cases, households bias against female for both economic and socio-cultural reasons.

Table 4.1.4: distribution of High-School Enrollment by Sex and Income Groups

Sex of the child	Poorest 25 %	Lower middle 25%	Upper Middle 25%	Richest 25 %	Total average
Male	0	5.26 %	7.89 %	50 %	63.2 %
Female	5.26 %	7.89 %	0	21 %	36.8 %

Source: Ethiopian rural house hold and community survey (1994/95)

Table 4.1.4. indicates that out of the total enrollments in the sample female children accounts for only 36.8 percent, while that of male is 63.2 percent.

Gertler and glewwe (1992) explained two reasons why parents, particularly in low-income countries, may bias against girls in their decision. It is either because of the differences in the direct values they put on the educated female children or, it is because parents expect lower returns from girl's education than that of boys

in these countries. This could be due to the cultural influences, which set more responsibility on boys to help parents in their old age.

Table 4.1.4. also shows that lower expenditure groups are more likely to send their female children to school than male, while the higher expenditure groups are more likely to send male children than female. In other words, the discrimination against female child is higher among the richer households than it is among the poor. This could be due to the fact that the poor is more dependent on the labor of its male children for its earnings, and hence male children in the poorer families, particularly high school aged ones, intensively participate in the daily activities of the household. Therefore, among lower expenditure groups the probability of sending female child to school is expected to be higher than that of the richer ones.

Mulat (1998) stated that “...more boys than girls discontinue their education due to the higher opportunity cost of schooling while more girls left school because they failed exam”.

Therefore even if generally enrollment by boys is greater than that of girls in rural Ethiopia, it seems that the gender gap is very high within richer households than it is within the poor.

4.1.4. Education of the House-Hold Head

Table 4.1.5. indicates the relation between mean education of the household head and enrollment rate of children. In this study education of the household head is a dummy variable, and it ranges from zero to five, since there are six different groups of education depending on the education level of the household head. Therefore, from table4.1.5, on average, educated households are more likely to send their child to school than do uneducated ones.

Two of the many possible reasons for the importance of head's education are firstly, the relation between income and education of the head. More educated households are likely to earn higher income due to improved productivity in the rural areas; and secondly, educated household head may have better understanding of the benefits of educating its children. The study by Asafa and Abay (1998) indicates that farmer's education is significant determinant of allocative and technical efficiency in agriculture.

Table 4.1.5: Distribution of High-School Enrollment and Parental education

In Rural Ethiopia

High School Enrollment	Mean Years of education of the house-hold head
Not attending	0.657
Attending	1.132

Source: Ethiopian rural household survey (1994/95)

4.1.5. Number of Siblings

The presence of many high school aged children in the household may affect the decision of the household due to lower marginal utility from additional years of schooling the child. Table 4.1.5. shows that enrollments among children with larger number of siblings is lower than that of children with the lower number of siblings. Those households who send their children to school have, on average, 4.5 high school aged children, while those who do not send their children to school have on average 5.6 high school aged children.

4.1.6. Mean number of siblings by enrollment

Enrollment	Mean number of siblings
Not attending	5.6
Attending	4.5

Source: Ethiopian rural household survey (1994/95).

4.1.5. Student-Class Ratio

The ratio of student to classroom and the number of students, which are successful in passing the ESLCE exams are taken, in this study, as the proxy for the quality of school. This variable is expected to affect the household's decision through influencing parents of their expectation on the return from schooling. If the ratio of student to classroom is lower, it is expected that the possibility of improvement in the child's ability to pass exam will also be higher.

Therefore it is assumed that household perceives the quality of school, as measured by student class-ratio, through the degree of exam success by their children.

There are two grounds for this assumption. The first is that if the child succeed in exam the cost of schooling will be lower than if he/she fails, since the latter is considered to be additional cost for parents without any change the human capital of the child. Secondly, the rate of return from improvement in the human capital of the child increases with higher classes and, not with the number of years in school.

4.2. Logistic Regression Analysis

The purpose of the previous section is to examine the effects of each of the explanatory variables by simply looking at the observed statistical relation ship between them. However, such explanation is not sufficient to investigate the validity of the previous hypothesis regarding their relation ships without considering the group effects of all explanatory variables on the dependant variable, which is beyond the discussion of the discussion of descriptive statistics. The purpose of this section is to investigate the validity of the previous hypothesis by examining the group effects of the explanatory variables on the dependant variable by estimating econometric model.

4.2.1 The Logistic Regression Results

In estimating the logistic demand function for education all explanatory variables discussed in the previous section are included. In addition the step wise regression method is applied in the regression process.

Before analyzing the regression results it is necessary to test for the presence of serious correlation between the explanatory variables, because multicollinearity affects the regression result by distorting the values and signs of the correlated variables. This in turn may lead biased conclusion(Green 1997).

The advantage of using step-wise method in the estimation process is to examine the effects of adding each of the explanatory variables on the value and signs of the other estimates. Particularly, if there is serious multicolliniarity between some of the variables, then the simultaneous inclusion of the correlated variables will result in extremely different values for these variables when compared with the regression results of their separate estimate.

Table 1a, in the aooendix1, shows that the simultaneous inclusion of the two school quality variables, SCR and ESLCE, affects their estimation results by increasing their respective standard errors.

Before inclusion of the ESLCE variable in the estimation, table1a, the SCR coefficient is statistically significant at 10 % level of significance. However, after the inclusion of the ESLCE variable, table1b, the SCR coefficient become statistically significant at about 25 % level of significance, which in statistical terms, is insignificant. The standard error for SCR increases from 0.018 in table1a to 0.037 in table1b. therefore, this implies the presence of multicolliniarity between these variables.

However, we need further tests to identify whether the above suspect is realistic and how serious it may be. One of the possible mechanisms to test for multicolliniarity, which I assume is relevant for this study, is the Auxilarytest (Gujirati 1995). Critiques suggest that this test should be applied only if there is no suspect of complex correlation between the variables in the model. Therefore, as the correlation matrix and the partial correlation coefficient, in appendix3, shows no serious correlation will be suspected between the other variables, except the previous two. Hence I will use the Auxiliary test.

The formula for computing the auxiliary regression is given as:

$$R_i = \frac{R_{X_1.X_2X_3...X_k}^2 / (k - 2)}{1 - R_{X_1.X_2X_3...X_k}^2 / F_i(k - 2, n - k + 1)}$$

Where k is the number of explanatory variables, n is the number of observations in the model, X_i ($i=1...k$) are explanatory variables in the model and, $R_{X_1.X_2X_3...X_k}^2$ is coefficient of determination in the regression of X_i on the other explanatory variables (Gujirati 1995).

The computed R_i is equivalent to F distribution with $k-2$ and $n-k+1$ degrees of freedom. These computed F_i value will be compared against the F statistics at $(k-2)$ and $(n-k+1)$ degrees of freedom. And if the former is found to be greater than the latter at a chosen level of significance it means that there is multi-collinearity between that variable and the other explanatory variables in the model.

The results of this test for this specific study indicates that the computed F_i values for SCR and ESLCE variables are greater than the F statistics at 10 % level of significance, and hence there is correlation between these variables and the other data sets. In addition, the partial correlation coefficient also indicate that there is 83 % correlation between SCR and ESLCE variables(see appendix3).

Once the presence and direction of multicollinearity are identified, the next step is to take the remedial measures, which is assumed to be appropriate for this study in order to overcome the possible consequences of multicolliniarty.

The straightforward and most widely used alternative is to drop one of the correlated variables from the regression. However, this method may cause more serious problem, which is the problem of specification error, than the problem of multicollinearity. Therefore, before taking this measure it is necessary to test for specification error, if there is any, which may arise due to dropping important variable from the model.

Ben-Akiva and Lerman (1985) compared the adjusted chi-square ratio index after including additional variables in the regression, and if adding a new variable increases this ratio then it implies that the variable is found to be important in the model (Ben-Akiva and Lerman 1985).

The formula for computing the adjusted chi-square ratio index (ACRI) is given by:

$$ACRI = 1 - \frac{L(\beta) - k}{L(0)}$$

Where $L(\beta)$ is the value of the log likelihood for unrestricted model, $L(0)$ is the value of log likelihood for the restricted model, ARCI is adjusted chi square ratio index and, k is the number of explanatory variables included in the unrestricted model. The advantage with this method is that ACRI will not increase unless the added variable is relevant to the model. Therefore, by comparing the ARCI for both estimations we can see the presence of specification error resulting from dropping one of the correlated variables. In addition the significance test for the dropped variable may also help as additional information as to the presence of specification error in the model (Ben-Akiva and Lerman 1985).

The value of log likely hood function for the restricted model (the model with constant only) is -84.008397 . Using this value and the value of likely hood function in table 1a and 1b in the appendix.

The ARCI will be given, respectively, as:

$$ACRI = 1 - \frac{(-74.079961 - 7)}{(-84.008397)} = 0.0349$$

by excluding the ESLCE variable, and

$$ACRI = 1 - \frac{(-74.0798894 - 8)}{(-84.008397)} = 0.0234$$

by including the ESLCE variable.

Therefore, ACRI in the case of ESLCE variable is greater than that of ACRI in the case of including ECLCE variable.

In addition, the value of the parameter estimate for ESLCE variable in table 1a indicates that the variable is insignificant even at 20 % level of significance. Hence dropping the ESLCE variable from the regression analysis will cause no specification error.

The logistic regression result, excluding the ESLCE variable from the regression, is found in table 4.1.7. Therefore, I will proceed analyzing the results of the regression based on this result.

Table 4.1.7. : Results of Estimated Logit Demand for School: excluding ESLCE Variable

Variables	Coefficients	Std.Err	Asymptoti t-atio	P> Z
Prcapcn	0.001029	0.0004133	2.490	0.013
Prcapcn2	-8.17e-09	3.30e-09	- 2.474	0.013
Dumedhed	0.064639	0.1281328	0.504	0.614
Dumfem	-0.2817993	0.4521077	- 0.623	0.533
Numsib	-0.1454515	0.083706	- 1.738	0.082
Dis	-0.0887539	0.0483663	- 1.835	0.067
SCR	-0.0333036	0.0183362	- 1.816	0.069
_cons	-2.094172	1.153303	1.816	0.069

4.2.1.1. Percapita consumption and percapita consumption-square

From column 5 of table 4.1.7 we can observe that percapita consumption and percapita consumption-square are both significant at about 1 % level of significance. In addition their sign is as it was expected. Percapita consumption has positive sign while percapita consumption-square has the negative sign.

The positive sign for percapita consumption indicates that as consumption rises the probability of enrollment also rises. The significance in this variable also shows the strong relation between the two. However, as previously discussed, the significance in the consumption terms arises not due to the significance in consumption per se. Rather it reflects the strong indirect relation between school prices and enrollment. If school prices were kept to zero, consumption may not affect enrollment because regardless of the level of consumption each household would have sent its child to school, since the child's schooling has no cost for the household. In reality, however, child's schooling involves at least indirect costs, which are foregone consumption, and hence parents compare these costs with that of the expected return from education in deciding whether to send or not to send the child to school. Therefore, both direct and indirect prices of schooling are the most important determinants of enrollment.

The negative sign and significance of consumption-square indicate that the effect of school prices on enrollment declines with income. Higher school prices affect enrollment by the poor more than it does that of the rich. In general the significance

and proper signs of these variables validate the hypothesis that consumption affects enrollment positively and significantly.

The same results are found by other similar studies for developing countries. For instance, Gertler and Glewwe (1989) found that consumption and consumption-square are among the major determinants of enrollment.

4.2.1.2. Dummy Variable for the Education level of the Household head

This variable has the positive sign as expected, but is not significant in this model. The possible reason for the insignificance of this variable may be due to the fact that in the rural areas the returns of schooling are dominantly perceived in non-formal agricultural sector where secondary education has little impact. Many empirical studies indicate that it is the primary education that have more significant effect on the productivity of agricultural sector, while the effect of secondary education is dominated in the earnings and productivity of formal sectors which are mainly found in the urban areas (see for instance Admit 1997 and Assefa 1997). Therefore, even if the educated parents are more likely to send their child to secondary school than that of uneducated ones, there may not be significant difference between the two parents in their decision.

4.2.1.3. Dummy Variable for female Child

This variable is included in the model to investigate if there is significant discrimination between children because of their sex within the household. This variable has a negative sign as expected but is also found insignificant.

Such a result is not unexpected in the rural areas, because in these areas most of the poor households are expected to be more dependant on the labor of their boys, particularly high school aged, than they do on the labor of girls. Due to this facts, the opportunity cost is higher for boys than for girls. The study by Mulat (1997) also confirms this conclusion²⁸. However the gender discrimination is expected to be higher among the richer households than it is among the poor.

Unlike this study, however, some studies find that there is significant discrimination against girls in developing countries. The study by Gertler and Glewwe(1989), for instance, found that this variable is significant for the case of Peru.

4.2.1.5. The Number of High school aged siblings

The negative sign for this variable is as expected and is also found to be significant at 10 % level of significance. The implication of this that as the number of high school aged children increases, then the probability of enrollment declines, because households gain lower marginal utility from additional years of schooling the child

if there are many school aged children in the household. Gertler and Glewwe (1989 and 1992) find the same results.



4.2.1.5. Distance to School

This variable has the negative sign as expected and is found to be significant at 10 % level of significant. The major reason for distance variable to be significant may be that the more the distance the more the travel time to school and the less will be the cognitive power of the child. In addition more travel time means more additional opportunity cost of schooling.

4.2.1.6. The Ratio of Student to Class room

This ratio has also the negative sign as expected, and is found to be significant. The higher this ratio is the lower will be the probability of enrollment because of the higher probability of child's failure in school exam, which in turn is additional cost for the household.

4.3. Computing Price Elasticity

In the preceding section attempt was made to investigate the major factors, which are assumed to determine the household's decision to send its child to school by estimating the probabilistic demand function. In addition the hypothesis which were set in the previous chapter were also tested. The result shows that most of the hypotheses are found to be valid.

The purpose of this section is to investigate the responsiveness of households to a change in price of schooling by estimating price elasticity of demand for schooling. Since prices enter the demand function non-linearly through consumption and consumption square terms, it is arc price elasticity that will be computed. This arc price elasticity helps to see the responsiveness of household's to different levels of price changes, and also help to see the difference in responsiveness among different income groups.

Using equation (19) in chapter three, the computed arc price elasticity is found in table 4.1.8.

Table 4.1.8: Arc Price Elasticity

Change in prices Inbirr	Poorest 25%	Lower iddle 25 %	Upper middle 25 %	Richest 25%
0 - 10	-0.0403833	-0.0351065	-0.0340488	-0.0283937
10 - 20	-0.0807666	-0.070213	-0.0680976	-0.05678730
20 - 30	-0.121148	-0.1053196	-0.1021464	-0.085181
30 - 40	-0.1615331	-0.1404261	-0.1361952	-0.1135747

Values across each rows of table 4.1.8 indicate that price elasticity decreases with income. Demand for schooling at secondary level is more price elastic among the poorest income groups than it is among the richest.

However, even if households with different income level have different response to changes in school prices this difference is not very high. This implies that even if the policy of increasing user fees at secondary school in the rural areas affect enrollment by the poor and middle income households than it does on the richest families, this effect is not very much different across all income groups.

Looking across columns of table 4.1.8 indicates changes in household's responsiveness for a change in school prices for different ranges of prices. These values indicate that as a change in prices gets higher and higher the household's responsiveness also gets larger and larger. For instance, the responsiveness of the poorest 25 % of the households for a change in price up to 10 birr is approximately -0.04 , while these responsiveness increases to -0.162 as a change in price rises to the range of 30 to 40. The same is also true for households of the other income groups. This indicates that the responsiveness of households for a change in user fees at secondary school will increase as this changes get higher and higher, and hence implies that there is a limit as to how much user fees at secondary school may be raised with out significantly affecting the level of enrollment in rural community.

Therefore, the arc price elasticity in table 4.1.8 indicate that there is a possibility of implementing the policy of cost sharing through charging user fees in the rural areas with out very much affecting enrollment by the rural community in general. However, this doesn't indicate whether it is possible to extract sufficient resources to cover the cost of providing education in the rural areas. This will be investigated by computing willingness to pay for education in the following section.

4.4. Computing Willingness to Pay

In the preceding section we have seen that how much households in the rural areas are responsive for a change in school prices, and how much this responsiveness changes as prices are increased further. From this we can see that, at some lower price levels household's demand for schooling is price inelastic up some lower level of price change, even if this responsiveness rises with rising prices. However, even if we can see how much sensitive households are to changes in school prices by computing price elasticity, it doesn't show us the maximum prices that households can be charged for the utilization of the education service by their children.

The purpose of this section is to investigate whether it is possible to pool sufficient financial resources necessary to cover the recurrent costs of schooling in the rural areas by computing willingness to pay.

Willingness to pay will be computed by using equation (22) in chapter three. This is the equation for computing compensating variation. Compensating variation is interpreted as a utility gain resulting from reduction in the prices of schooling due to the provision of school within the community, and hence reduction in the opportunity cost of schooling. Compensating variation is considered as the maximum willingness to pay by households as we have discussed in the previous chapter.

The extent to which it is possible to pool sufficient resources from households will be investigated by comparing the maximum willingness to pay for reduction in travel time to school with the average percapita cost of providing education. If the household's willingness to pay is greater than that of the average school cost, then it indicates that it is possible to charge sufficient user fees to cover the operating costs of schooling without adversely affecting the utility of the household.

The methodology used to calculate the percapita cost of providing education in the rural areas is simply dividing the total recurrent budget to the number of students attending school in a given year. Using this method, therefore, the average cost is 450 birr. We will compare this cost with that of the total household's willingness to pay for school. Table 4.1.10. Shows the maximum willingness to pay by each household per child.

Table 4.1.10: Willingness to Pay by Income and Distance Groups

Distance groups	Poorst 25%	Lower Middle 25%	Upper middle 25 %	Richest 25 %	Total average
Dis less or equal to 10km	18	91	103	64.5	69.125
Dis greater than 10 km	29	97	111	75.5	78.125

Looking across each columns of table 4.1.9. indicate that households of different income have different willingness to pay for education. Higher income parents are more willing to pay for education than that of poorer parents.

Looking across each row we can also see that households of different distance to school have different willingness to pay for reduction in travel time to school. Distant households are more willing to pay than less distant ones. This is for the obvious reason that distant households incur more opportunity cost than do less distant ones.

However, unlike the differences in willingness to pay between different income groups and different distance groups, rural households, in general, are, not willing to pay for reduction in travel time to school since the maximum willingness to pay is by far lower than the average percapita cost of school provision. Even the richest and the farthest households are not willing to pay for reduction in travel time to school.

One possible reason is may be because of lower agricultural wage rate. Even if children participate extensively in the daily activities of their households, the monetary value of their labor time is lower due to lower agricultural wage rate. Therefore, if the real value of the child's contribution is greater than the amount of money required to pay for education.

Therefore, this implies that the policy of expanding education through imposing user fees to cover the recurrent cost of providing education will be difficult in the rural part of Ethiopia. Such a policy could be dangerous painful if it is implemented without the government subsidy to cover the perceived financial gap. Particularly the impact of such a policy might be on the poorer part of the community.

The results of this study don't, however, coincide with findings of most of the empirical studies. Gertler and Glewwe (1989) implemented similar methodology and found that rural households in Peru are willing to pay for reduction in travel time to school. Tan, Lee, and Mingat (1984) also found that Malawian households are generally willing and able to pay for education.

4.5 Limitations of The Study

Even if great effort is made to reach at the above finding, there are some limitations that are worth mentioning.

The first limitation of this study is in the calculation of household's consumption. Because of the lack of sufficient information regarding the conversion factors for some of the units of measurements for some cites, I simply used the sum of the value of purchased food and non food items as a proxy for household's consumption. Therefore, I dropped consumption from own harvest and that of gift. However, consumption from own harvest is likely to be the essential components of household's consumption in the rural areas.

The second limitation of this study is in the calculation of the opportunity cost of child's labor in the rural areas. Again because of the lack of information regarding wage rates separately for adults, children and females, since the same wage rate will not be expected for each groups, I used the opportunity cost of yearly

agricultural labor for people aged 10 and above as a proxy for all ages and sex groups. In addition, due to the difficulty of finding the yearly effective agricultural working days and working hours, I adopted the method, which is mostly practiced in Ministry of Agriculture for project planning. This is by simply counting the number of religious holly days, which are supposed to be strictly celebrated in specific areas, and reduced this from total days in a year to arrive at the total effective agricultural working days.

The other limitation of the study is the absence of sufficient data regarding the type of school that each household selects to send its child to. This necessitates to assume that each household in the rural area sends its child to the nearest school to the community, once it decide to send its child to school. Therefore, this may also under estimate willingness to pay in case there are many people, which may send their child to school other than the nearest school to the community.

Given these shortcomings of the study, even if it is difficult to propose strong policy recommendations, it is possible to indicate directions to policy makers.

Therefore, these are the major caveats that one must keep in mind while reading this study.

CHAPTER V

SUMMERY AND POLICY RECOMENDATION

5.1. SUMMERY

One of the major problems facing most of the developing countries, particularly in Sub-Saharan African countries, is the lack of skilled manpower. The long-term economic development will be ambition in these countries without extensive improvement in their human capital base.

One of the mechanisms through which improvement in human capital base can be brought about is through investment in formal education. Investment in human capital is one of the most important types of investment, which may guarantee sustainable long-run economic and social development through improving productivity and accumulation of knowledge.

Education is one of the most important instruments, which may enable developing countries like Ethiopia to adopt modern technology imported from advanced countries.

Unlike the crucial importance of education in economic and social development, particularly in countries like Ethiopia, it has been supplied at a very low scale. Even if it is about a century ever since the introduction of modern education in

Ethiopia, the country is categorized among those countries which are characterized by lower rate of enrollment. It is only 34.7 % of primary and 8.4 % of secondary school age population that was enrolled in the country in 1997 while the situation get worse in the case of the rural community. In the same year it is only 27.3 % of primary school age and .16 % of secondary school age children that was enrolled in the rural area. There may be several reasons, which might cause this situation.

One of the most important reasons is, however, the problem of accessibility. The lower rate of expansion in school services, particularly during the last military regime, resulting from ill economic policy and hence lower rate of economic growth has made the majority of the rural poor inaccessible to the service. During this regime the rural areas were given little attention particularly in the expansion of social services. For instance out of 361 high-school found in the country only 24 are located at the rural areas, while the rest are found in the urban areas.

The intense poverty through which the country has been driven through has also to do with the lower rate of enrollment, particularly in the rural areas, since it made the higher opportunity cost of schooling not tolerable by the rural poor.

On the other hand, due to the ill ideology that the military government had been following, the public sector has been the major, if not the sole, provider of social services. The private sector had been treated as enemy to the development of the country and hence didn't participate enough in the expansion of education services.

Unlike the intense position of the government in the provision of public services, like education, however it couldn't satisfy the ever growing demand for education and other social services in the country, particularly in the rural areas. The government lacks essential resources to finance the expansion of education in the country. In general, the public sector has been unable to play the role it had intended to play in the provision of public services due to lack of resources and appropriate policy. Due to these facts, therefore, the rural poor, in particular, have been denied of access to education services.

Given the scarce resources of the government, and given the depth of the problem, it may be difficult to tackle the whole problems simultaneously, since there are more crucial problems in other sectors, and hence it is necessary to prioritize crucial importance in resource allocation. It seems for this reason that priority is being given to the expansion of primary education than secondary and tertiary education in public investment decisions. For instance, between 1993 and 1997 the number of primary schools has increased by 2084 while secondary school has increased by 90, in absolute terms. As a result primary school enrollment has increased at the rate of 21.2 % while enrollment in secondary school has increased at the rate of 4.1 % over these years¹. However, due to the necessity of improving secondary school enrollment, if improvement in the human capital base of the country is to be brought, it is necessary to expand the provision of secondary education in the country, particularly in the rural areas.

One of the mechanisms to expand secondary education is to give incentive to the private sector to participate in this area. This may be one possible reason why the government of the Federal democratic republic of Ethiopia is encouraging the private sector towards this area. However, because the domestic private sector is at its infancy and, because of low level of participation by foreign investors in Ethiopia, it will be insufficient to leave the whole responsibility to the private sector.

Another alternative, besides encouraging the private sector, is to find different cost sharing mechanisms through which the society can participate in financing these services. One of these mechanisms is charging user fees to finance the cost of providing school services. However, implementing this policy requires prior knowledge as to how much it may affect enrollment, particularly of especial classes of the society such as the poor.

In this study an attempt has been made to investigate how much it is possible to pool resources sufficient enough to finance the recurrent costs of secondary education. Some of the previous empirical studies laid the bases for the methodology used in this study.

In the preceding chapter the estimation of the non linear probabilistic demand models indicate that, per capita consumption, per capita consumption-square, distance to school, student class ratio, which is taken as a proxy for school quality, are found to be among the most important determinants of enrollment in rural Ethiopia.

Per capita consumption is found to be positively and significantly related with enrollment, while the other two are negatively and significantly related with enrollment. This implies, therefore, that enrolment can simply be improved in the rural areas by improving the financial position of the rural community and by improving accessibility and quality of school.

The price elasticity of demand for secondary education, which is computed in chapter4, also indicates that the demand for secondary education is generally found to be price inelastic up to some levels of increment in school prices. However this elasticity rises with rising prices of schooling.

In addition household's response for a change in school prices vary across different income groups, even if this difference is not immense. This implies, therefore, that there is a limit as to how much prices can be raised to improve accessibility without much effect on enrollment in the rural areas.

Finally the willingness to pay equation, computed in the previous chapter, indicates that rural households are found to be unwilling to pay sufficient amount if secondary school is provided in their community. However, there are differences in this willingness to pay among different income groups and different distances to school. Higher income groups are found to be more willing to pay than does lower income groups. The same way, those house-holds which are found in distant areas away from school are found to be more willing to pay for reduction in travel time to school than do those house-holds which are found in the near by areas.

5.2. Conclusion

The above empirical results lead to the following conclusions

- The rural households are unwilling to pay for reduction in travel time to school to the extent that it can cover the recurrent costs of providing education services.
- Even if rural households are less responsive to changes in school prices up to some lower levels, their responsiveness increases with increasing prices indicating that there is an upper limit up to which prices can be increased without much impact on enrollment.
- Therefore, even if there is some possibility of pooling resources through charging user fees for education, it may be difficult to charge sufficient user fees for education in order to avoid subsidies at secondary level.

5.3. Policy Recommendation

Given the above conclusions, the following policies are recommended.

- A policy of pooling resources through charging user fees at secondary level in order to avoid the need for subsidies may not be feasible, unless there is the possibility of subsidizing the gap. Charging.
- If the combinations of charging user fees and subsidies are to be implemented, there should be some mechanisms through which the poor may benefit more from these subsidies.

- Finally policies which may improve the income status of the rural community, such as improving agricultural productivity and increasing employment opportunity in the rural areas may be used to this end.

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APPENDIX1

Table 1a: Logistic Regression Without ESLCE Variable

Logit estimates

Number of obs = 146
 LR chi2(7) = 22.30
 Prob > chi2 = 0.0023
 Pseudo R2 = 0.1332

Log likelihood = -72.558356

attend	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
prcapcn	.0024187	.0008981	2.693	0.007	.0006585	.0041788
prcapcn2	-7.19e-07	3.97e-07	-1.810	0.070	-1.50e-06	5.96e-08
dumfem	.0552123	.451926	0.122	0.903	-.8305464	.9409711
numsib	-.1467868	.0860417	-1.706	0.088	-.3154255	.0218518
dis	-.0959044	.0494008	-1.941	0.052	-.1927282	.0009193
scr	-.0464658	.0206724	-2.248	0.025	-.086983	-.0059486
dumedhed	.0195022	.1306888	0.149	0.881	-.2366431	.2756475
_cons	2.758025	1.268372	2.174	0.030	.2720609	5.243988

Note: 1 failure and 0 successes completely determined.

Table 1b: Logistic Regression With ESLCE Variable

Number of obs = 146
 LR chi2(8) = 22.41 Prob > chi2 = 0.0042 Log likelihood = -72.500844
 Pseudo R2 = 0.1339

attend	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
prcapcn	.0023932	.0009013	2.655	0.008	.0006267	.0041596
prcapcn2	-7.22e-07	3.98e-07	-1.816	0.069	-1.50e-06	5.73e-08
dumfem	.0670009	.4535672	0.148	0.883	-.8219744	.9559763
numsib	-.1492567	.0866506	-1.723	0.085	-.3190887	.0205754
dis	-.0825405	.063519	-1.299	0.194	-.2070354	.0419545
scr	-.0570794	.0388424	-1.470	0.142	-.1332091	.0190503
dumedhed	.023174	.1311762	0.177	0.860	-.2339267	.2802747
eslce	36.53057	111.4507	0.328	0.743	-181.9088	254.9699
_cons	-1.036322	11.62392	-0.089	0.929	-23.81878	21.74614

Note: 1 failure and 0 successes completely determined.

Table 1c: Probit Regression Result

Number of obs = 146 LR chi2(7)= 18.73 Prob > chi2 = 0.0091
 Log likelihood = -74.343139 Pseudo R2 = 0.1119

attend	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
prcapcn	.0005796	.0002401	2.414	0.016	.000109	.0010502
prcapcn2	-4.56e-09	1.86e-09	-2.445	0.015	-8.21e-09	-9.04e-10
dumfem	-.0518861	.2613715	-0.199	0.843	-.5641649	.4603926
numsib	-.08487	.0485834	-1.747	0.081	-.1800917	.0103518
dis	-.0526277	.027491	-1.914	0.056	-.1065091	.0012538
scr	-.0174944	.010857	-1.611	0.107	-.0387738	.0037849
dumedhed	.0377674	.078499	0.481	0.630	-.1160878	.1916225
_cons	1.073967	.6756312	1.590	0.112	-.2502459	2.39818

APPENDIX2

1. Methodology Used to computepercapita consumption

Percapita consumption is computed as the difference between percapita income and total price of schooling for a child. Percapita income is, in turn, computed by dividing the total income of the household to the number of household size. Again total income is the sum of the observed consumption and the opportunity cost of time for children which are attending secondary school.

$$Y_t = C + (W \times H + P) \times N$$

Where Y_t is total income of the household head, C is the amount of consumption observed at the beginning of the year, W is hourly opportunity cost of agricultural labor, H is total hours in a year that each child spends for school related work, P is thew direct price of schooling for each child, and N is the number of high school students n the household.

The major assumption behind this is that at the beginning of every year household is required to decide whether to send its child to school or not, and in doing so it compares the costs of schooling the child and its expected benefits. If it decides to retain the child, then the child will

participate in the labor activities of his/her household. So that consumption of the household will increase by the amount of his/her contribution. On the other hand, if the child is allowed to attend school, then the household will remain with the consumption less of the amount of consumption that the child would have contributed through labor participation. For instance, in some cases the household may employ labor to cover the position of the child in the labor participation, and hence the household will lose part of its income that could have been used for consumption. Therefore it is logical to sum both the observed consumption and the opportunity cost of labor for the high school aged children in the household to obtain total income of the household over the year.

Once total income is calculated we will compute percapita consumption as

$$\text{Prcapcon} = Y - W \times H - P$$

Where Prcapcon is percapita consumption, and Y is percapita income. In this case percapcon will be equal to percapita income if the child is not attending school, because H and W are set to zero for non attendants. In other words, the contribution of the child to consumption, in the absence of schooling, will be included in the consumption. This method is common in many empirical studies. The hourly opportunity cost of agricultural labor is calculated by dividing the yearly agricultural shadow wage rate to the total number of hours that each child is assumed to spend in school related work, where yearly school days and daily school hours are taken from the national average.

1. Distance to school is taken from the community survey and is the distance from each survey cite to the nearest school.
2. Number of siblings is the number of high school aged children within the household.

3. Other variables such as student class ratio, dummy for the household head's education, and dummy for female child are directly taken from the survey and the annual statistics of Ministry of education.

APPENDIX3

Table 3d: Coefficient of Correlation Matrix

(obs=146)

	prcapcn	prcapcn2	dumedhed	dumfem	numsib	dis	scr
prcapcn	1.0000						
prcapcn2	0.9987	1.0000					
dumedhed	-0.0360	-0.0441	1.0000				
dumfem	-0.0551	-0.0571	-0.0070	1.0000			
numsib	-0.1099	-0.1036	-0.1120	-0.0706	1.0000		
dis	0.1445	0.1296	-0.1020	0.0388	0.0542	1.0000	
scr	0.1241	0.1034	-0.0751	-0.1850	-0.0321	0.4865	1.0000
eslc	0.0605	0.0432	-0.0661	-0.2158	0.0048	0.0488	0.7726
dumedhed	-0.0360	-0.0441	1.0000	-0.0070	-0.1120	-0.1020	-0.0751

	eslc	dumedhed
eslc	1.0000	
dumedhed	-0.0661	1.0000

Partial correlation of scr with

Variable	Corr.	Sig.
eslc	0.8315	0.000
dis	0.6873	0.000
numsib	-0.1303	0.125
dumfem	-0.1053	0.216
dumedhed	0.0215	0.801
prcapcn	0.0343	0.687
prcapcn2	-0.0339	0.691

Partial correlation of eslc with

Variable	Corr.	Sig.
scr	0.8315	0.000
dis	-0.6052	0.000
numsib	0.1281	0.131
dumfem	-0.0454	0.594
dumedhed	-0.0973	0.253
prcapcn	0.1827	0.031
prcapcn2	-0.1824	0.031

Partial correlation of dis with

Variable	Corr.	Sig.
scr	0.6873	0.000
eslc	-0.6052	0.000
numsib	0.1650	0.051
dumfem	0.0877	0.303
dumedhed	-0.1258	0.139
prcapcn	0.2183	0.010
prcapcn2	-0.2143	0.011

Partial correlation of prcapcn with

Variable	Corr.	Sig.
dis	0.2183	0.010
scr	0.0343	0.687
eslc	0.1827	0.031
numsib	-0.1333	0.116
dumfem	0.1089	0.200
dumedhed	0.2216	0.009
prcapcn2	(dropped)	

Partial correlation of dumedhed with

Variable	Corr.	Sig.
prcapcn	-0.0334	0.694
dis	-0.0818	0.335
scr	0.0298	0.725
eslc	-0.0590	0.487
numsib	-0.1070	0.207
dumfem	-0.0238	0.779

Partial correlation of dumfem with

Variable	Corr.	Sig.
dumedhed	-0.0238	0.779
prcapcn	-0.0598	0.481
dis	0.1150	0.174
scr	-0.1022	0.228
eslc	-0.0256	0.763
numsib	-0.0961	0.257

DECLARATION

The thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Declared by:

Esmael Yassin

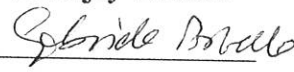


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