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STAPLE FOOD CROPS TURNING INTO COMMERCIAL CROPS: CASE STUDIES OF TEFF, WHEAT AND RICE IN ETHIOPIA¹

Berhanu Gebremedhin² and Dirk Hoekstra

Abstract

Teff, wheat and rice are becoming important market oriented crops in Ethiopia. This study aims at measuring the level of market orientation of households in these crops, identifying the important market places and market outlets used by producers, and analyzing the determinants of market orientation in these crops. Results are based on analysis of data collected from community (peasant association) and household surveys in three districts in three regional states of the country in 2005. Analysis of descriptive information and econometric analysis are used. About 65 - 77% of households produce these market oriented commodities in the study areas, on about 27 - 44% of the total cultivated land. About 47 - 60% of the produce of these market oriented commodities is sold. The important market places for producers of these commodities are the district town markets and markets located at the peasant associations within the district. Wholesalers and retailers are the most important buyers from producers. Average distance to market places for these commodities is about two walking hours. Econometric analyses show that market orientation of households is affected by a host of factors related to household demographics, household endowments of human and physical capital, access to institutional services, and village level factors. Size of cultivable land and traction power, and household labor supply are important factors that induce households to be market oriented. While household size tends to favor food security objectives, number of dependents is associated with market orientation. Population control measures could contribute to market orientation through their effect of reducing household subsistence requirements. Our results also imply that interventions to improvements markets operations in order to benefit producers need to consider the operation of district level markets. Improving the operations of factor markets of land, traction and farm labor could contribute to enhancing market orientation of farm households. Special attention is needed to female headed households in the process of commercial transformation of subsistence agriculture. The development and institutionalization of marketing extension warrants due consideration.

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1. Introduction

Sustainable food security and welfare cannot be achieved through subsistence agriculture (Pingali, 1997). Cognizant of this, the Government of Ethiopia (GoE) has adopted commercial transformation of subsistence agriculture as the basis of the Agricultural Development-led Industrialization (ADLI) development strategy of the country. As a result of the economic reform that took place in Ethiopia in 1991, grain markets have also been liberalized and restriction on grain trade lifted, and official pricing have been eliminated (Gabre-Madhin, 2001).

Commercial transformation of subsistence agriculture is a process and commercializing subsistence farmers may not instantly move on to high value crops. Often times, increased market orientation of staple crop production offers a more pertinent option to small holders, at least in the short and medium terms until infrastructural facilities are developed to accompany the production, processing, transportation and marketing of high value crops.

Commercial transformation of subsistence agriculture can not be expected to be a frictionless process, as it is likely to involve substantial equity issues (Pingali and Rosegrant, 1995). The rural poor can be left out from benefiting from the commercialization process due to inadequate services and infrastructure, and new set of transactions costs that emerge from new market institutions and actors. Moreover, economic development, coupled with rising per capita incomes, technological change, and urbanization is causing significant changes in food markets in developing countries (Reardon and Timmer, 2007). Ethiopia is not an exception. Hence, governments and development agencies are confronted with the challenge of ensuring that small holders and the rural poor benefit from commercialization either by participation in the market or providing exit options for employment in other sectors.

An understanding of the marketing behavior, market places and outlets used and the determinants of market participation of small holders is required to aid in designing appropriate technological, policy, organizational and institutional strategies to ensure small holders and the rural poor benefit from the process of commercialization. In spite of the policy decision of the GoE to commercialize subsistence agriculture, there is a dearth of information on the commercialization process and marketing behavior of small holders in Ethiopia. This paper attempts to contribute to redressing this gap of knowledge using

case study analyses for the cereal crops of teff³, wheat and rice. Specifically, the paper is aimed at (1) measuring the degree of market orientation of households, (2) identifying the important market places and outlets used by producers, and (3) analyzing the determinants of market orientation of households.

Data for the study was collected from districts where these crops are considered important market oriented commodities (Ada'a and Alaba Kulito for teff and wheat, and Fogera for Rice). Analysis of the variation in market participation of households in these crops in areas where the crops are already important market oriented commodities offers a unique opportunity to gain insight into the determinants of the commercialization behavior of households during the process of commercial transformation of subsistence agriculture.

2. Conceptual framework, data and analytical approach

Conceptual framework

In this study, market orientation of households is conceptualized as incorporating both production and marketing decisions, because commercial transformation of subsistence agriculture is basically a shift from "selling surplus of what is produced" to "producing for sale". There is a fundamental difference in the two approaches. In the first approach the prime objective of subsistence producers is to fulfill subsistence requirements and production decisions are made based on agro-ecological feasibility and subsistence needs. In this case, producers attempt to sell what ever surplus they might have upon fulfillment of subsistence needs. In the second approach, the prime objective of producers is profit maximization and production decisions are made based on comparative advantages and market signals. Hence, in this study, proportion of households producing the market oriented commodities and the proportion of area under the commodities are used as indicators of market orientation at the community (Peasant Association (PA⁴)) level, while whether a household produces the commodities and the proportion of produce sold are used as indicators at the household level.

Several factors affect market orientation of households by affecting the conditions of commodity supply and demand, factor and output prices, and marketing costs and risks faced by producers, traders and other market actors (Pender, 2006). Hence, in this study,

³ Teff is a grass-like fine seeded staple food crop grown in Ethiopia.

⁴ APA is the lowest administrative unit in Ethiopia and consists of 4 - 6 villages.

market orientation is modeled as a function of household demographic factors (age and sex of head, household size, children dependents), human capital (education and labor supply); physical capital (land, oxen ownership, ownership of other livestock), institutional services (access to extension, credit, and market information), market access (distance to nearest market, distance to district town market) and village level factors (population density, rainfall and agricultural labor wage).

Data

Results are based on analysis of data collected from community (PA) and household surveys conducted in the three districts of Alaba Kulito (about 310 km south of Addis Ababa, in the Southern region), Ada'a (about 45 km east of Addis Ababa, in the Oromia region), and Fogera (about 610 km north west of Addis Ababa, in the Amhara region). Data on teff and wheat are collected from Alaba Kulito and Ada'a districts, and those on rice are collected from Fogera district. The study districts are areas where these crops are considered important market oriented commodities for smallholders⁵.

For sampling purposes, each district was classified into two farming systems based on agro-ecology, cropping pattern and livestock production. Important market oriented commodities were then identified in each farming system. Community level data were collected from all PAs in the farming systems where the commodities are identified as market oriented commodities. Household level data was collected from a random sample of households in each farming system. Analysis of the determinants of variations in the degree of market orientation of households in these market oriented commodities provides a good opportunity to inform policy making to facilitate commercial transformation of subsistence agriculture. The data pertain to the 2004/05 production season.

Analytical approach

Analysis of descriptive information is used to determine the level of market orientation, average household income from the sale of the commodities, and market places and outlets used by producers. Econometric analyses are used at both the community (PA) and household levels. At community (PA) level, econometric analyses are used to analyze the determinants of the proportion of households who produce the market

⁵ The districts are pilot learning woredas (PLWs) of the Improving Productivity and Market Success (IPMS) of Ethiopian Farmers project, implemented by the International Livestock Research Institute (ILRI) on behalf of the Ethiopian Ministry of Agriculture and Rural Development (IPMS, 2005). For more information on the IPMS project, visit www.imps-ethiopia.org.

oriented commodities and the proportion of area covered by these commodities. Interval regression (with robust standard errors) and OLS are used to estimate the regression models as appropriate. Distance to markets, rainfall, agricultural labor wage, proportion of female headed households in community, population density, average cultivated land per household, average number of bullocks per household, average other livestock holding per household, average altitude, availability of credit and market information services in community are used as explanatory variables in the community level regression models.

At the household level, econometric analyses are also used to analyze the determinants of household decision to produce these market oriented commodities (Probit models) and the proportion of produce sold (interval regression). Since the proportion of households who do not sell the produce was small, regressions for the determinants of household decision whether to sell or not are not estimated. Household demographic characteristics (age and sex of head, household size, number of children dependents), household human capital endowments (literacy of head, household labor supply), household physical capital endowments (land ownership, ownership of livestock), access to institutional services (involvement in extension program and access to credit during the previous year), and village level factors (rainfall, population density, distance to markets) are used as explanatory variables in the household regression models.

A sample selection problem arises in the regression for the proportion sold by the household, since proportion sold is observed only for households who produce the crop. Hence, Heckman's two-step estimation procedure is used. The probability of growing the grain crop was predicted in the first stage, a predicted value of the inverse Mills ratio (IMR) is obtained and the ratio included as an explanatory variable in a second stage regression (Maddala, 1983). However, since the second stage regressions are censored the predicted IMR introduces heteroskedasticity because its errors depend on the values of the explanatory variables. Unlike in the linear model, heteroskedasticity results in inconsistent estimators (Maddala, 1983). Hence, in the second stage, interval regressions with robust to heteroskedasticity standard errors are used. Interval regression is a generalization of the Tobit model, and is estimable with robust standard errors (Stata Corp. 2001). The regression for rice is not significant and not reported.

Identification of the second regression is an important issue. The problem of identification is resolved by finding variables that are correlated with the decision to grow a cereal crop, but not correlated with the decision of how much to sell. Altitude and walking time to nearest milling service are used as instruments in the Probit models. Intuitively, these

variables explain the decision to grow a cereal but not to market it. Altitude determines the suitability of the agro-ecology for the crop, while distance to milling service affects cost of consumption. Descriptive statistics of explanatory variables are given in Annexes 1 & 2.

3. Results and discussion

3.1 Degree of marketing orientation

Indicators of the level of household market orientation in the commodities are given in Table 1. The indicators are calculated at the community and household levels.

Teff

Teff has become an important market oriented crop in Ethiopia. In the study area, about 77% of households produce the crop, on an average of about 31% of the total cultivated land (Table 1). On average, among the households that produce teff, a household produces teff on about 1.2 ha.

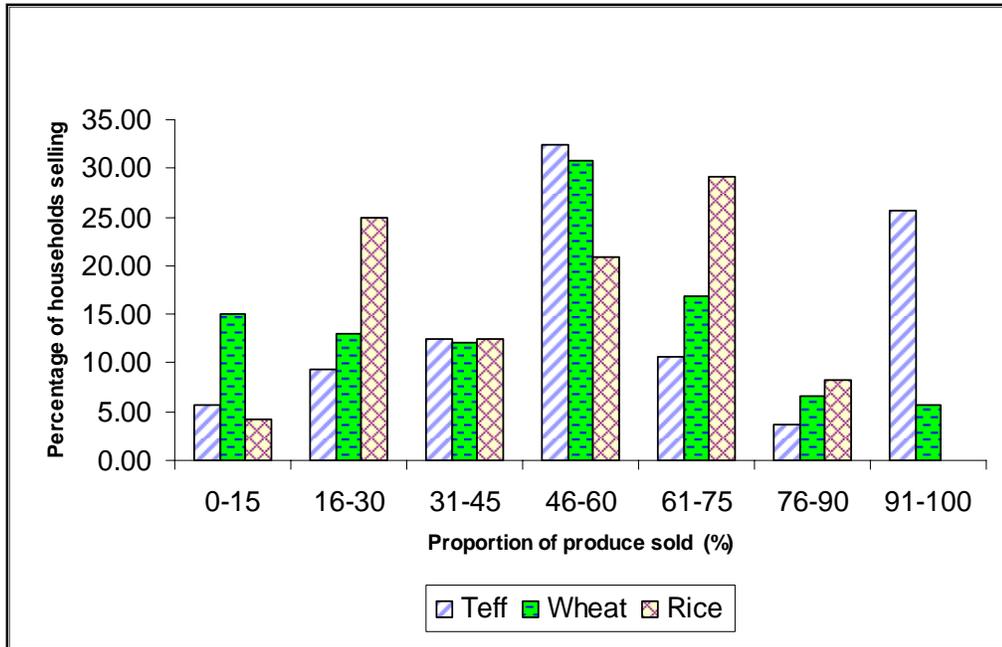
Table 1: Indicators of level of market orientation and average income

Indicator	Teff	Wheat	Rice
Percentage of households producing crop/PA (Std)	77 (22.84)	64 (26.37)	72 (32.17)
Percentage of area covered by crop / PA (Std)	31 (19.12)	27 (11.05)	44 (26.00)
Area allocated (ha/household) (Std)	1.2 (0.96)	1.4 (0.87)	0.62 (0.22)
Percentage of produce sold /household (Se)	60 (2.38)	47 (2.81)	50 (4.35)
Amount sold (kg) (Se)	540 (50)	601 (96)	886 (149)
Average revenue/household (Birr) (Se)	1417 (126.36)	978 (145.92)	1567 (292.65)

About 60% of teff produce is sold, although there were significant variations across the study area. On average about 540 kg of teff per household was sold, with a monetary value of about Birr 1417 (USD 170.00). Analysis of the household market participation level shows that about 32% of households sold 46-60% of their teff produce, and about

25% of them sold more than 90% of their teff produce (Figure 1). It is interesting to note that the mode in the percentage of teff produce sold is 46-60%, followed by 91-100%. In general, the proportion of households selling teff increases with the increase in the proportion of teff sold from 0-15% to 46-60%, then drops when the proportion sold increases to 61-75% and 76-90%, after which it rises again.

Figure 1: Percentage of produce sold by percentage of households selling



Wheat:

Like teff, wheat is also an important market oriented commodity in the study area. On average, wheat is produced by about 64% of the households on about 27% of total cultivated area (Table 1). On average about 1.4 ha of land is allocated for wheat by a household. About 47% of wheat produce is sold. A household sold about 600 kg of wheat for a sales value of about Birr 978. About 31% of households sold 46-60% of their wheat produce, while about 17% sold 61-75% (Figure 1). Like teff, the mode in the proportion of wheat produce sold is 46-60%, followed by 61-75%. The pattern of the variation in the proportion of wheat sold is similar to that of *teff*.

Rice

Rice, which has relatively recently been introduced to Ethiopia, is also fast becoming an important market oriented crop in the swampy part of the Fogera district⁶. About 72% of households produce rice in this farming system, on about 44% of the total cultivated area. Among the households who produce the crop in the district, an average household produces rice on about 0.62 ha of land. About 50% of rice produced was sold. A household sold an average of 880 kg of rice, with a sales value of about Birr 1566. About 28% of households sold 61-75% of their rice produce, while about 26% sold more than 90% of their rice produce, and 22% sold 46-60% (Figure 1).

3.2 Market Places⁷

Teff

The most important market places for teff producers are the nearest markets outside the PA where about 45% of households sold their teff produce, and the district town markets where about 38% of producers sold teff (Table 2). Markets outside woreda and regional markets are not important for teff producers in the study area. The average distance to teff market in the study area is 2 walking hours.

Table 2: Producer market places (proportion of households selling) and average distance (SE)

	Teff	Wheat	Rice
Market in PA	16 (0.03)	20 (0.04)	4 (0.04)
Nearest market outside PA	45 (0.04)	66 (0.05)	19 (0.09)
District town markets	38 (0.04)	13 (0.04)	74 (0.09)
Markets outside district	1 (0.01)	1 (0.01)	0
Regional markets	0	0	0
Average distance to markets of sale (walking hours)	2.1 (0.31)	1.5 (0.14)	1.9 (0.19)

⁶ Upland rice is being introduced in the higher altitude farming system.

⁷ Market places were classified into five: markets that exist in the PA where the household lives (Market in PA), markets in nearby PAs within the same district (Nearest market outside PA), markets located at district capital towns (district town markets), markets located at other districts (markets outside district), and markets located at regional capital towns (Regional markets).

Wheat

As in teff, the most important market places for wheat producers in the study area are the nearest markets outside PA, where about 66% of producers sold their wheat (Table 2). However, district town markets are not as important for wheat as they are for teff. Hence, the second most important markets for producers are markets in PA where about 20% of producers sold wheat, followed by district town markets where about 11% of producers sold wheat. Markets outside district and regional markets are not important for wheat producers, as is the case with teff. The average distance to market for wheat is 1.5 walking hours.

Rice

Unlike in the case of teff and wheat, the most important market place for rice are the district town markets where about 74% of the households sell the commodity, followed by the nearest market outside PA where 19% of households sell their rice (Table 2). A small proportion of households use markets in PA to sell their rice. The average distance to market place for rice is about 2 walking hours.

3.3 Market outlets

Teff

On average across the study area, About 65 of teff producers sell their teff produce to wholesalers, and about 31% sell to retailers, while only about 2% of teff producers sell directly to consumers (Table 3). The role of rural assemblers and processors in the teff market chain is quite insignificant. Hence, the most important market channels for teff producers appear to be producer → wholesaler, and producer → retailer. All teff is sold in cash.

Table 3: Producer market outlets (percentage of households selling (Se))

	Teff	Wheat	Rice
Rural assembler	2 (0.01)	0	13 (0.07)
Wholesaler	65 (0.04)	51 (0.06)	35 (0.10)
Retailer	31 (0.04)	43 (0.06)	22 (0.09)
Processor	0	0	22 (0.09)
Consumer	2 (0.01)	6 (0.03)	8 (0.06)

Wheat

As in teff, wholesalers and retailers are the most important buyers from wheat producers. On average, about 51% of producers sell to wholesalers, 43% sell to retailers, and 6% sell directly to consumers (Table 3). It is interesting to note that no producer sells to rural assemblers or processors. Hence, as in teff, the important market channels for wheat producers are producer → wholesaler, and producer → retailer. As with teff, wheat sale is effected only in cash.

Rice

The market channel for rice seems to be broader than those of teff and wheat. About 35% of households sell to wholesalers, and 22% of households sell to retailers and processors each (Table 3). While about 13 % sell to rural assemblers, the remaining 8% sell directly to consumers. Hence, the important market channels for rice producers appear to be producer → wholesaler, producer → processor, producer → retailer, producer → rural assembler, and producer → consumer. As with teff and wheat, rice sale is effected only in cash.

3.4 Determinants of market participation

Teff

At the community level, proportion of households who produce teff is explained positively by the average size of cultivated land per household, but negatively by proportion of female headed households (Table 4). Availability of cultivated land is associated with higher proportion of households producing the market oriented commodity due to the land scarcity and also the land market imperfection that exist in the study areas. This result indicates that land is an important constraint in households' efforts to be market oriented. The explanation for the negative association between the proportion of female household heads and proportion of households producing teff can not be made in reference to variations in household resource endowment or household labor supply since we are controlling for these factors. Perhaps, women headed households do not have comparative advantage in commercializing in the laborious teff crop production

The proportion of area covered by *teff* is explained positively by daily wage of agricultural labor and availability of credit service, but negatively by the amount of rainfall. Higher opportunity cost of labor as reflected in higher wage rates appears to induce communities to shift to market oriented commodities, consistent with the findings reported in Pingali and Rosegrant (1995) and von Braun and Kennedy (1994). Availability of credit service,

by easing liquidity constraints of households, also contributes to market orientation in *teff*. The negative association between rainfall and proportion of area covered with *teff* may be due to the water logging problem that results from high rainfall and heavy vertisols in the study area. Interestingly, non of the market access factors have significant impact on either the proportion of households who produce *teff* or the proportion of cultivated land covered by *teff*.

Table 4: Community level regression results for proportion of households producing Teff (interval regression) and proportion of area covered by Teff (OLS)

Variable	Proportion of households producing (interval regression) ^a	Proportion of area covered by teff (OLS) ^a
Nearest market place (km)	-0.00356 (0.00421)	-0.00118 (0.00217)
Nearest market town (km)	0.00342 (0.00249)	-0.00052 (0.00119)
Rainfall (mm)	-0.00059 (0.00043)	-0.00104 (0.00028)***
Average adult male daily local wage during peak season (Birr)	0.00675 (0.00442)	0.00917 (0.00330)***
Proportion of female household head (%)	-1.05803 (0.30424)***	-0.22079 (0.18567)
Population density (persons/ha)	-0.01337 (0.03192)	0.00145 (0.02055)
Cultivated land per household (0.25ha/household)	0.04366 (0.02330)*	0.00475 (0.01690)
Number of bullocks per household (No.)	-0.00922 (0.01556)	0.01382 (0.00869)
Number of other livestock per household (No.)	-0.00102 (0.00474)	-0.00169 (0.00292)
Average altitude (meter)	-0.00017 (0.00015)	0.00004 (0.00013)
Credit service availability in the PA (0/1)	0.10398 (0.02921)	0.11408 (0.03138)***
Market info service available in the PA (0/1)	-0.05831 (0.04952)	0.00250 (0.02395)
Constant	1.74229 (0.39852)***	1.09244 (0.28506)***
Chi ² /F	80.43	26.17
Prob > Chi ² /F	0.0000	0.0000
R ²	-	0.7087
Number of observation	85	84

*, **, *** significant at 10, 5 and 1%, respectively.

^a Proportion of area covered is not a censored variable in the data, while proportion of households producing *teff* is.

Household level regression analysis also shows that household decision to produce *teff* and the proportion of *teff* produce sold given the decision to produce are explained by a host of community level factors, household demographic characteristics, household

endowment of human and physical capital, and access to institutional services (Table 5). The Probit model shows that household decisions to produce teff is explained positively by the number of dependent children, household labor supply, number of bullocks owned, involvement in extension, and amount of rainfall. The decision is explained negatively by population density, household size, and cows owned. All significant variables in the Probit model have the expected signs.

Higher number of children dependents implies higher need for cash to cover household expenditures related with children such as school fees and other expenses, inducing households to grow market oriented commodities. *Teff* is a labor demanding crop and requires multiple rounds of land preparation. Hence, households with higher family labor supply and more traction power are more likely to grow it, given the labor and traction power market imperfection in the study area. Involvement in extension service increases likelihood of growing *teff*, since *teff* is one of the crops for which improved varieties are available from the national research system and has received attention from the extension service. Higher amount of rainfall encourages households to grow *teff* for obvious reasons.

Population density is associated negatively with growing *teff*. Perhaps, more densely populated areas in the highlands of Ethiopia suffer from higher land degradation resulting in low soil fertility and thus reducing the probability of growing *teff* since it requires relatively good and fertile soils. Larger households have higher household consumption needs and perhaps are more likely to produce cheaper but more productive staple food crops relative to *teff*. Higher ownership of cows appears to detract from *teff* production, perhaps by offering an alternative income source to households.

We find U-shaped relationship between age and probability of growing *teff*. The turning point on this relationship is 38 years, well within the age range of household heads in the sample. The U-shaped relationship between age and probability of growing *teff* may indicate variations in consumption preferences of households. However, this is a tentative explanation for unexpected results and requires further testing.

Interval regression results show that the determinants of the proportion of *teff* produce sold are generally consistent with the determinants of household decision to grow the crop (Table 5). The proportion of *teff* produce sold is explained positively by ownership of land and traction power, population density, and amount of rainfall, while it is negatively explained by ownership of shoats, involvement in extension and availability of credit.

Table 5: Household level regression results for decision to produce Teff (Probit) and proportion of produce sold (Interval regression)

	Household decision to produce teff (Probit marginal effects)	Proportion of teff produce sold (interval regression)
Population density (persons/ha)	-0.00016 (0.00044)***	0.06758 (0.02107)***
Nearest market place (km)	-0.00002 (0.00005)	0.00234 (0.00327)
Nearest market town (km)	0.00001 (0.00002)	0.00005 (0.00181)
Age of household head (years)	-0.00005 (0.00013)*	-0.01499 (0.00570)***
Age squared	0.000006 (0.00000)**	0.00012 (0.00006)**
If household head is male (0/1)	0.00330 (0.00694)	-0.01173 (0.04394)
If household head is literate (0/1)	-0.00025 (0.00060)	0.02092 (0.03018)
Household size (No.)	-0.00023 (0.00065)***	0.01139 (0.02663)
Children (<14 years old) (No.)	0.00026 (0.00073)***	-0.01672 (0.02969)
Household labor supply (No.)	0.00021 (0.00060)**	-0.01156 (0.02752)
Land owned (1/4 ha.)	0.00001 (0.00002)	0.00735 (0.00367)**
Bullocks owned (No)	0.00011 (0.00029)**	0.02696 (0.01296)**
Sheep & goats owned (No)	-0.00001 (0.00003)	-0.00727 (0.00425)*
Other cattle owned (No)	-0.00003 (0.00008)**	0.00161 (0.00585)
Equine owned (No)	0.00005 (0.00016)*	0.02374 (0.01741)
Chicken owned (No)	0.00000 (0.00001)	0.00088 (0.00365)
Involvement in extension (2003/04) (0/1)	0.00188 (0.00409)**	-0.07250 (0.03889)*
Access to credit (2003/04) (0/1)	-0.00006 (0.00019)	-0.25135 (0.04766)***
Rainfall (mm)	0.000003 (0.00001)***	0.00096 (0.00034)**
Average altitude (meter)	-0.000001 (0.00000)***	---
Nearest milling service (km)	0.00001 (0.00003)	---
Inverse Mills ratio (IMR)	---	-0.00651 (0.05847)
Constant	4.86453 (8.26494)	0.05736 (0.37421)
F	1.58	16.36
Prob > F	0.0609	0.0000
Number of observation	164	156

*, **, *** significant at 10%, 5%, and 1%, respectively

That population density is negatively associated with household decision to grow teff while it is positively associated with proportion of teff produce sold is interesting. Perhaps, it indicates that given the decision to grow teff, households in high population density areas offer higher amount of their teff produce to market, perhaps to cover for variable expenses such as fertilizer required to make up for the low soil fertility due to higher land degradation. Given the imperfections in the land market and land scarcity that prevails in

the area, households with higher land ownership offer higher proportion of their *teff* produce for sale, as is also the case with traction power. In the presence of factor market imperfections, ownership of the resource increases efficiency. Households who live in areas of higher rainfall sell higher proportion of their *teff* produce, perhaps due to the effect of rainfall on *teff* productivity and thus production. None of the market access factors have significant impact on either the probability of household growing *teff* or the proportion of *teff* produce sold.

Contrary to expectation, we find an inverse relationship between involvement in extension and access to credit, and proportion of *teff* sold, although involvement in extension is associated with higher probability of producing *teff*. Investigation of the nature of the extension and credit services are required to explain these unexpected results, but are also indicative of the need to institutionalize marketing extension. Consistent with the result for the probability of growing *teff*, we also find U-shaped relationship between age and the proportion of *teff* produce sold. The turning point in this relationship is 65 years, within the age distribution of sample households. About 11% of household heads are 65 or more years old. The IMR is insignificant indicating little sample selection problem.

Wheat

At the community level, proportion of households producing wheat is positively explained by agricultural labor wage rate, average size of cultivated land per household, and availability of credit, while it is negatively explained by proportion of female headed households in community, and availability of market information service (Table 6). Similarly, proportion of area covered by wheat is explained positively by agricultural labor wage rate, average number of bullocks per household (ownership of traction power), and availability of credit, and negatively by the proportion of female headed households in community. All variables except availability of market information service have the expected signs. As in *teff*, none of the market access factors has significant effect.

Increased opportunity cost of labor induces households to be profit oriented and commercialize. Given the imperfections in the land and traction power markets in the study area, households with higher cultivated land and more traction power tend to be more market oriented in wheat. Availability of credit services appears to play role in enhancing market orientation by easing credit constraint of liquidity constrained households. Wheat is also laborious crop and female headed households may not have comparative advantage in producing it. A deeper analysis of the market information

service provided at community level is required to explain the unexpected effect of the variable, including possibilities of measurement error.

Table 6: Community level regression results for proportion of households producing Wheat (interval regression) and proportion of area covered under Wheat (OLS)

	proportion of households producing (Interval regression) ^a	proportion of area covered (OLS) ^a
Distance to nearest market place (km)	0.0001 (0.0057)	0.0006 (0.0019)
Distance to nearest market town (km)	0.0027 (0.0024)	-0.0003 (0.0009)
Rainfall (mm)	0.0007 (0.0007)	-0.0003 (0.0003)
Average adult male daily local wage (Birr)	0.0115* (0.0059)	0.0053** (0.0023)
Proportion of female headed households (%)	-0.7242** (0.3188)	-0.1890* (0.1083)
Population density (persons/ha)	-0.0255 (0.0479)	-0.0057 (0.0123)
Cultivated land per household (0.25ha/household)	0.0851** (0.0262)	0.0071 (0.0101)
Number of bullocks per household (No.)	0.0099 (0.0267)	0.0207** (0.0102)
Number of other livestock per household (No.)	-0.0060 (0.0100)	-0.0051 (0.0035)
Average altitude (meter)	-0.0001 (0.0002)	0.0002** (0.0001)
If credit service is availability in the PA (0/1)	0.1427** (0.0644)	0.0883*** (0.0246)
If market information service is available in the PA (0/1)	-0.1040** (0.0474)	0.0002 (0.0181)
Constant	-0.1271 (0.4695)	0.0446 (0.1934)
Chi ² /F	99.56	9.95
Prob > Chi ² /F	0.0000	0.0000
R ²	----	0.61
Number of observation	73	73

*, **, *** significant at 10%, 5%, and 1%, respectively

Proportion of area covered is not a censored variable in the data, while proportion of households producing *teff* is.

Household level regressions of the determinants of probability of household decision to produce wheat show that male headed households and households involved in extension program are more likely to produce wheat (Table 7). On the other hand, literacy of household heads detracts from household decision to produce wheat, perhaps because literate households have higher opportunity cost of their labor in other farm enterprises or non-farm employment.

Table 7: Household level regression results for decision to produce wheat (Probit) and proportion of wheat produce sold (Interval regression)

	Household decision to produce wheat (Probit marginal effects)	Proportion of produce sold (interval regression)
Population density (persons/ha)	0.03931 (0.04825)	-0.01529 (0.02483)
Nearest market place (km)	0.01477 (0.00975)	-0.00874 (0.00534)
Nearest market town (km)	-0.00107 (0.00370)	-0.00249 (0.00246)
Age of household head (years)	-0.00646 (0.01604)	-0.00971 (0.00806)
Age squared	0.00000 (0.00015)	0.00013 (0.00007)
If household head is male (0/1)	0.27912 (0.16376)*	0.00430 (0.10003)
If household head is literate (0/1)	-0.30222 (0.09930)***	0.04658 (0.06805)
Household size (No.)	0.03637 (0.06429)	-0.09402 (0.03767)**
Children (<14 years old) (No.)	0.00094 (0.06758)	0.07675 (0.03726)**
Household labor supply (No.)	-0.01067 (0.06265)	0.07917 (0.03906)**
Land owned (1/4 ha.)	0.00969 (0.00928)	0.01161 (0.00465)**
Bullocks owned (No)	0.03570 (0.02620)	0.02382 (0.01818)
Sheep & goats owned (No.)	-0.01650 (0.01129)	-0.00219 (0.00928)
Other cattle owned (No.)	-0.00497 (0.01215)	-0.00244 (0.00692)
Equine owned (No.)	0.00548 (0.03534)	0.06578 (0.03033)**
Chicken owned (No.)	-0.00078 (0.00814)	0.00768 (0.00440)*
Involvement in extension (2003/04) (0/1)	0.31097 (0.14180)**	0.03165 (0.09419)
Access to credit (2003/04) (0/1)	-0.10719 (0.07912)	-0.45278 (0.08123)***
Rainfall (mm)	0.00098 (0.00123)	0.00102 (0.00044)**
Average altitude (meter)	0.00034 (0.00032)	---
Nearest milling service (km)	-0.01779 (0.00835)**	---
Inverse mills ratio (IMR)	---	0.07824 (0.15766)
Constant	-6.38198 (4.23557)	-0.09254 (0.59325)
F	2.14	9.22
Prob > F	0.0058	0.0000
Number of observation	138	106

*, **, *** significant at 10%, 5%, and 1%, respectively

Household level regression of the determinants of the proportion of wheat produce sold, given decision to produce, shows that the proportion of wheat produce sold is positively explained by number of dependent children, labor supply, land ownership, ownership of equines, and rainfall, while it is negatively explained by household size and access to credit. All variables except credit access have the expected signs (Table 7).

Number of dependents increases the need for cash to cover expenses related to services associated with children. Availability of labor supply and cultivated land increase market orientation in wheat due to their effect on production efficiency as a result of imperfections in these factor markets. Equines are used for transportation of produce to market, thus reducing marketing costs to households who own them. Rainfall also increases proportion sold due to its effect on production. The negative association between household size and proportion of wheat produce sold is perhaps due to the higher domestic consumption needs of larger households. The negative association of credit service with proportion of wheat sold was not expected, especially since credit service is associated with higher proportion of households producing the market oriented crop and the proportion of area covered by the commodity. A closer investigation of the credit service is required to explain this unexpected result. The IMR is insignificant indicating little sample selection problem.

4. Conclusions and Implications

Teff and wheat are important market oriented commodities in the Ad'a and Alaba Kulito districts, while rice is in the Fogera district. In these areas, about 60%, 47% and 50% of teff, wheat and rice produce are sold, respectively. The average distance to markets where producers sell their produce is about 2 walking hours. The important market places for producers are either those located at the district town or in the peasant associations (PAs) within the district. District town markets are especially important for rice. Markets outside the districts (markets at other district towns or regional markets) are not important for producers. Wholesalers and retailers are the most important buyers of these markets oriented commodities from producers. All sales are effected in cash. These results imply that interventions to improve the gains to producers from the operation of the cereal markets must take into consideration the operation of the district level markets.

Community and household level econometric results show that market orientation of smallholders is affected by household demographic factors, household human and

physical capital endowment, access to institutional services, and the village level factors of population density, agricultural labor wage rate and rainfall. Female headed households are less likely to grow the market oriented cereal crops of teff and wheat, perhaps due to their low comparative advantage in such laborious crops. Moreover, female headed households have no positive association with any of the market orientation indicators used in this study. These results imply that special attention is required to female headed households in the process of commercial transformation of subsistence agriculture. The comparative advantage of female headed households may not be in grain production.

Household size is associated negatively with many of the market orientation indicators, with no positive association with any indicator. This suggests that larger households have higher household consumption needs, and so are more likely to grow cheaper but more productive subsistence crops, and sell less proportion of their produce. Hence, population control measures may contribute to commercial transformation of subsistence agriculture through its effect of reducing household subsistence requirements.

Number of child dependents, through its effect on cash need to cover expenses related with children, appears to induce market orientation. We find evidence of a U-shaped relationship between age of household head and market orientation of households in teff, indicating the increasing preference for self sufficiency during the initial years and a shift to market orientation as the household gets older.

Given the scarcity of land and the imperfections in the factor markets of land, labor and traction power, endowment of these resources explained market orientation significantly positively. Hence, improving the operations of factor markets of land, traction and farm labor could contribute to enhancing market orientation of farm households. Alternatively, institutional arrangements to improve household access to land and traction power could contribute to market orientation of households.

Access to markets as measured by distance to market places does not effect market orientation of households in teff and wheat. The study areas for teff and wheat are relatively plain lands and infrastructure is relatively better developed. Hence, market access remains an important factor for market orientation of households, implying the need for interventions to develop market infrastructure.

Among the village level factors, we find population growth to have mixed effects on market orientation. While population density detracts from the probability to produce teff, it is associated positively with proportion of teff produce sold. These results indicate that land degradation due to population pressure reduces the probability of producing teff, but once the hurdle of decision to produce is overcome, proportion of produce sold is higher in order to cover variable costs associated with land preparation and soil fertility management. Wage of farm labor, by increasing the opportunity cost of labor, appears to induce market orientation.

The effect of extension and credit services on household market orientation is mixed. Involvement in extension service is positively associated with household probability of growing teff, but has negative impact on the proportion of teff produce sold. While availability of credit at the community level is positively associated with proportion of households who produce the market oriented commodities and the proportion of area covered by the commodities, household use of the credit service has negative impact on the proportion of teff and wheat produce sold. Deeper investigation of the nature of the credit service is required to offer explanations. The extension and credit services that were designed to achieve food security objectives need to be re-examined to adopt them to the policy of commercial transformation of subsistence agriculture Ethiopia is following. In particular, the development and institutionalization of marketing extension services warrants emphasis.

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Annex 1: Descriptive statistics of explanatory variables used in community level regressions

Variables	Teff					Wheat				
	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
Nearest market place (km)	86	6.52	5.15	0.00	25.00	74	6.42	4.71	0.00	21.00
Nearest market town (km)	86	11.86	7.92	0.50	37.00	74	13.78	9.96	0.50	47.00
Rainfall (mm)	87	980.79	72.13	858.00	1108.00	73	931.86	48.33	858.00	1080.00
Average adult male daily local wage during peak season (Birr)	87	11.88	4.34	5.50	23.00	74	12.64	4.64	5.00	23.00
Proportion of female household heads (%)	86	0.17	0.08	0.04	0.37	74	0.13	0.07	0.03	0.40
Population density (Persons/ha)	87	2.13	1.13	0.19	6.76	73	1.82	1.07	0.19	5.81
Cultivated land per household (1/4 ha)	87	2.67	1.54	0.68	6.81	74	2.97	1.48	0.93	6.81
Number of bullocks per household (No.)	87	1.26	1.57	0.00	12.90	74	1.54	1.62	0.00	12.90
Number of other livestock per household (No.)	87	4.38	4.82	0.00	35.54	74	5.37	5.22	0.00	35.54
Average altitude (meter)	87	1859.87	125.20	1603.00	2264.00	73	1866.06	148.59	1603.00	2264.00
Credit service availability in the PA (0/1)	87	0.66	0.48	0.00	1.00	74	0.64	0.48	0.00	1.00
Market info service available in the PA (0/1)	87	0.60	0.49	0.00	1.00	74	0.61	0.49	0.00	1.00

Annex 2: Descriptive statistics of explanatory variables used in household level regressions

Variables	Teff					Wheat				
	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
Population density (persons/ha)	170	2.08	1.10	0.19	6.76	140	1.82	1.09	0.19	5.81
Nearest market place (km)	167	6.29	5.22	0.00	25.00	141	6.35	5.07	0.00	21.00
Nearest market town (km)	167	11.96	7.96	0.50	37.00	141	14.27	9.69	0.50	45.00
Age of household head (Years)	170	43.35	14.41	16.00	89.00	141	45.16	14.21	16.00	89.00
Age ²	170	2085.45	1403.84	256.00	7921.00	141	2239.61	1445.97	256.00	7921.00
If household head is male (0/1)	170	0.84	0.37	0.00	1.00	141	0.89	0.31	0.00	1.00
Proportion of household heads literate (%)	170	0.43	0.50	0.00	1.00	141	0.38	0.49	0.00	1.00
Household size (No.)	170	6.99	2.94	1.00	22.00	141	6.94	2.99	1.00	22.00
Number of dependents (No.)	170	3.15	1.97	0.00	9.00	141	2.96	1.89	0.00	8.00
Household labor supply (No.)	170	3.56	2.08	0.00	16.00	141	3.65	2.26	0.00	16.00
Land owned (1/4 ha.)	170	7.75	4.20	0.00	25.00	141	8.67	4.67	1.00	25.00
Number of bullocks (No.)	170	2.04	1.82	0.00	10.00	141	2.46	1.90	0.00	10.00
Number of sheep & goats (No.)	170	2.18	3.34	0.00	23.00	141	2.80	4.60	0.00	28.00
Number of other cattle (No.)	170	3.19	3.05	0.00	21.00	141	3.82	4.70	0.00	40.00
Number of equine (No.)	170	1.34	1.23	0.00	6.00	141	1.64	1.38	0.00	6.00
Number of local poultry (No.)	170	4.17	4.67	0.00	24.00	141	4.40	4.95	0.00	24.00
Involvement in extension (2003/04) (0/1)	169	0.61	0.49	0.00	1.00	140	0.71	0.46	0.00	1.00
Access to credit (2003/04) (0/1)	170	0.75	0.43	0.00	1.00	141	0.79	0.41	0.00	1.00
Rainfall (mm)	170	972.82	73.54	858.00	1108.00	140	928.26	42.45	858.00	1080.00
Average altitude (meter)	170	1864.87	124.42	1603.00	2264.00	140	1880.61	142.13	1603.00	2264.00
Nearest milling service (km)	165	3.87	4.72	0.00	21.00	140	4.62	5.28	0.00	21.00

THE NATURE OF SELF-EMPLOYMENT IN URBAN ETHIOPIA¹

Getinet Astatike Haile²

Abstract

Various studies on the Ethiopian economy in general and the urban sector in particular have stated about the staggering level of unemployment in the country. Rapidly growing population and a less than satisfactory performance in economic growth over the years, among others, are to blame for this situation. That the unemployment situation is particularly rampant among the youth which constitutes over a third of the population calls for an urgent intervention aimed at improving the fate of the unemployed. Promoting self-employment forms an integral part of any intervention aimed at reducing unemployment. Given this, studying the determinants of self-employment is essential by way of informing concerned parties as to factors important in encouraging self-employment. As well as surveying the relevant literature, the study undertakes an empirical investigation into the nature of self-employment using data from a unique panel data set, the Ethiopian Urban Socio-Economic Survey. Findings of the study give some evidence that self-employment is largely a route out of unemployment rather than being something driven by entrepreneurship. It also finds a declining trend in the patterns of self-employment over the study period. Very few studies have looked into issues relating to self-employment in the context of developing countries in general, and none in the case of Ethiopia. As such, this study serves an important role shedding some light on issues pertaining to self-employment.

Key words: Self-employment; urban Ethiopia

JEL classification: J23; J33; R23

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1. Introduction

Various recent studies³ have stated about the unprecedented level of unemployment that characterises urban Ethiopia.⁴ The problem is rampant especially among the youth which constitutes over a third of the urban population. That the youth, which is the future of the country, is found in such a state is unfortunate and rather disquieting. One way of tackling this problem of unemployment is through the promotion of self-employment. That the State in countries such as Ethiopia is poor means that the promotion of self-employment is all the more essential in easing the high level of unemployment. Sustained growth performance accompanied by rapid employment creation is ultimately to decide the fate of the unemployed. Nevertheless, the promotion of self-employment can play a crucial role in this process. On a more optimistic note, the promotion of self-employment may even have a far reaching positive outcome. The accepted wisdom is that the development of new firms almost always starts with self-employment, and this may turn out to be particularly essential to capital-constrained developing economies such as Ethiopia. Given these, understanding the nature of self-employment is important for it makes possible an informed intervention. This paper investigates issues surrounding self-employment in the context of urban Ethiopia. In particular, the study focuses on factors that influence the decision to be self-employed.

This study is unique on at least three important grounds. First, there are very few previous studies investigating issues of self-employment in the context of a developing country, and none in the case of Ethiopia. Second, this study uses a unique panel data, the Ethiopian Urban Socio-Economic Survey (EUSES), which has rarely been used previously. Third, the study employs an empirical methodology that accounts for unobserved heterogeneity. Although most researchers agree on the importance of unobserved factors (for example, unobserved entrepreneurial ability) in determining the decision to be self-employed, no previous study models unobserved heterogeneity exclusively. As such, this study also adds a new dimension to the self-employment literature.

The study has the following sections. Section 2 is devoted to some background discussion with focus on the urban labour market and the unemployment situation in urban Ethiopia, particularly among the urban youth. Section 3 is devoted to some

³ Bizuneh *et al.* (2001), Getinet (2003), Serneels (2001) and Krishnan *et al.* (1998) are some of the studies dwelling on the labour market situation of the youth/'young' in Ethiopia. Findings reported in various publications of the UN give a similar account of the unemployment situation in Ethiopia.

⁴ Unemployment rate related discussion in the developing world is largely an urban phenomenon for in the rural areas, where the bulk of the population resides; the unemployment rate may not be as reliable given the seasonality in labour market slack in these areas.

discussion on the underlying theoretical framework and review of the literature on self-employment. Section 4 discusses the data and the empirical methodology employed. Section 5 discusses the empirical findings and the final section concludes the paper.

2. Background

The Ethiopian economy is essentially a subsistence-agriculture economy. Some 80 per cent of the population⁵ resides in rural areas driving its livelihood directly from agriculture and animal husbandry, and contributing 52 per cent of the country's GDP. The urban centre is home to about 20 per cent of the population with some 12 per cent of this driving its livelihood from government and services while the remaining 8 per cent relying on industry and construction. A number of recent studies that have focused on different aspects of the urban labour market in Ethiopia (Bizuneh *et al.*, 2001; Getinet, 2003; Krishnan, 1996, 2001; Krishnan *et al.*, 1998; Serneels, 2001) have emphasised the unprecedented level of unemployment in the urban centres of the country, particularly among the youth/young.

Several factors are to blame for this sad state of affair. To start with, there is the unprecedented rate of growth of the (urban) population. The larger the size of the youth cohort, the more daunting the provision/generation of accommodating employment will generally be. That the growth and job creation performance of the economy has been disappointing for the most part is another important reason explaining the high level of unemployment. Poor growth performance and weak aggregate demand is a recipe for disaster when combined with growing youth/adult labour force in need of employment. The mismatch between the skill requirements of the labour market on the one hand and the education/training skills of the youth/young on the other is also another factor held responsible for the high and persistent levels of unemployment in the urban centres. That private sector development had been openly stifled in the pre-1991 period and has been given minimal support since then is yet another reason contributing to the current high level of unemployment in Ethiopia. The move to a market led system in the post-1991 period, which commenced with the adoption of the WB/IMF sponsored structural adjustment program, marked a major departure from the previous policy regime. Nonetheless, performance in employment creation has particularly been poor despite some improvement in growth performance. Krishnan (2001) attributes this to the fact that the private sector and self-employment has not yet overcome the effect of the repression it had experienced in the pre-1991 period. Alemayehu and Befekadu

⁵ Recent UN sources/estimates put the population of Ethiopia to be in excess of 74 million.

(2002), on the other hand, state that the recent improved growth performance came largely from the rural sector which is weakly linked to the urban sector.⁶

3. Self-employment: theoretical background and some stylized facts/evidence

The issue of self-employment has gained more ground in the economics literature relatively recently. Moreover, the existing literature dwells largely on developed economies, with very little to offer to the labour market situation of a developing country such as Ethiopia. The theoretical argument behind the self-employment decision is one that is based on labour market states as choice variables determined by expected utility from each labour market state. Following Evans and Jovanovic (1989), Evans and Leighton (1989) and Taylor (1996; 1999), suppose that the expected utility from self-employment, $E(U_{se})$, and employment, $E(U_e)$ are given as follows

$$E(U_{se}) = f(\theta, k, r, D, \mathbf{X})$$

$$E(U_e) = f(w, \mathbf{X})$$

where θ represents entrepreneurial ability, k represents available capital, r is the rate of interest, D stands for the level of demand in the economy, w stands for the wage rate and/or wage offer, and \mathbf{X} represents individual tastes and preferences. Suppose also that individuals receive no utility from being unemployed and/or being out of the labour force (OLF), i.e. $E(U_u) = E(U_{olf}) = 0$. Given this framework and assuming that $E(U_u) = E(U_{olf}) = 0$, the self-employment decision lies in comparing $E(U_{se})$ and $E(U_e)$. Thus, an individual will prefer self-employment over wage employment (or wage offer) if: $E(U_{se}) > E(U_e)$.

This framework has some important implications. For example, individuals would voluntarily cease to be in self-employment if a wage offer, w , warrants that $E(U_e) > E(U_{se})$. Likewise, individuals who perceive to have high entrepreneurial ability, who have access to capital and/or favourable rate of interest, among others, may prefer to be/stay in self-employment. As stated in section 2 above, in the context of the urban centre of developing countries in general and Ethiopia in particular there

⁶ It is noteworthy the anecdotal evidence relating to the expansion of party-affiliated businesses (parastatals) in post-1991 Ethiopia. To the extent that this is the case, small businesses and the private sector are likely to be crowd out.

is very high and persistent unemployment. The implication of this is that expected earnings from self-employment are likely to be lower relative to expected employment earnings. Given the assumption $E(U_u) = E(U_{of}) = 0$, the pattern of preference/choice among alternative labour market states identified is to be $E(U_e) > E(U_{se}) > E(U_u) = E(U_{of})$. In other words, in an environment where jobs /wage offers/ are hard to come by for the large army of the unemployed, self-employment is almost certainly a preferred labour market state to being in unemployment and/or inactivity.

The existing literature on self-employment raises various issues of importance worth noting here. First, there is the conceptual and measurement issue that deserves particular attention. As Earle and Sakova (2000) state, a self-employed worker may represent a 'true' entrepreneur running successful business, exploiting new opportunities and inventing new products, processes and distribution methods. At the other extreme, we may have a self-employed worker who chose to be self-employed due only to lack of opportunities elsewhere. Similarly, "a high rate of self-employment may reflect an environment encouraging risk-taking, job creation, and market development, or it may indicate a lack of jobs in a primary sector in which wages are set above the market-clearing level. An increase in the self-employment rate may represent entrepreneurship derived from economic liberalization and tax reduction, or it may be a consequence of imperfect adjustment to contractions or structural shocks" (Earle & Sakova, 2000, p. 576).

The self-employment literature also makes some claims that have not yet been proved conclusively for the most part. One such claim is that self-employment helps promote invention, innovation and the creation of new jobs.⁷ The promotion of self-employment/small business is also claimed to lead to a higher degree of competition in the product market, bringing gains to consumers. Greater levels of self-employment are also linked to increased self-reliance and well-being. Despite lack of conclusive evidence on these claims and the advantages of promoting self-employment, some governments, particularly those in developed market economies, provide various types of support to encourage the unemployed to start own business. The types of support these governments provide include loans to small businesses, exemption of small businesses from certain regulations, exemption of small business from some taxes and an advisory service to beginner small businesses (Blanchflower, 2000; 1999)

⁷ These claims/arguments are in line with the benefits of entrepreneurship that Schumpeter (1942) identifies, and can be justified if one assumes that self-employment represents the simplest kind of entrepreneurship

With regards to characteristics that best describe the self-employed, the existing literature identifies some important factors that include access to capital and liquidity constraint, certain demographic and human capital characteristics, family background related factors, local/regional labour market conditions, and policy/institution related factors, among others. In terms of access to capital, the literature states that lack of capital and liquidity constraint affect the propensity to be self-employed adversely (Blanchflower, 1999, 2000; Blanchflower and Oswald, 1998). These studies also find that the propensity to be self-employed depends positively on whether the individual in question ever received an inheritance or gift. Regarding the role of institutions and/or policy, there is some evidence in the literature that attests to the positive effect of increases in income tax on self-employment. The existing evidence also points to the strong negative relationship between unemployment and self-employment. In terms of demographic characteristics, the evidence suggests that the probability of being self-employed is generally higher among men than women, and it is also found to increase with age. With regards to the educational profile of the self-employed, they are more likely to come from the least educated. There exists some evidence, however, that the most educated too have a higher probability of being self-employed (Blanchflower and Oswald, 1990; Blanchflower, 1999; 2000; Earle and Sakova, 2000; Taylor, 1996).

4. Data and empirical methodology

The data employed in this study comes from a unique panel data set collected by the Ethiopian Urban Socio-Economic Survey (EUSES) over the period 1994 – 2000. The EUSES is a national survey of urban households that has been undertaken by the Department of Economics, Addis Ababa University, in collaboration with the Department of Economics, Goteborg University. The first wave of the EUSES was conducted in 1994 covering seven major urban centres of the country, including the capital city, each with a population in excess of 100,000 and believed to represent the major socio-economic characteristics of urban Ethiopia. The original EUSES sample households had been selected by allocating a total sample size of 1500 households to the seven urban centres based on stratified random sampling technique. The first survey that was conducted in 1994 therefore covered these 1500 households. The second and third waves of the EUSES were conducted in 1995 and 1997 covering the original households⁸, but capturing only changes on socio-economic conditions since the first/previous wave. The most recent wave available is the fourth wave that

⁸ Subsequent waves covered the original households. Households that dropped out in subsequent waves were replaced by other/new households that are believed to be more or less similar to the original households, in terms of socio-economic characteristics.

was conducted in 2000. Unlike the preceding two waves where only changes from the previous wave were monitored, the 2000 wave enlists each and every member in the households (Bigsten *et al*, 2004). In this study, use is made of all four sweeps of the EUSES for the purpose of studying the nature of self-employment in urban Ethiopia.

In terms of the empirical methodology employed to study the nature of self-employment, a panel data binary choice model that accounts for unobserved individual heterogeneity has been used. That we have, for each individual included in the sample, a binary outcome variable of self-employment, y_{it} , for each of $T = 4$ time periods justifies the use of panel data binary choice model.

Suppose that $\{(\mathbf{y}_{it}, \mathbf{x}_{it}) : t = 1, \dots, T = 4\}$ represent a random draw from the cross section for each individual, i , where \mathbf{y}_{it} and \mathbf{x}_{it} can both be vectors; we then assume and model that there is an unobserved heterogeneity, v_i , associated with each cross section unit i . Using unobserved effects probit model, the propensity to be self-employed can be assumed to take the form

$$P(y_{it} = 1 | \mathbf{x}_{it}, \theta_i) = \Phi(\mathbf{x}_{it}\boldsymbol{\beta} + v_i), \quad t = 1, \dots, 4$$

with v_i appearing additively in the index function and \mathbf{x}_{it} containing a full set of time dummies. Because we specifically account for unobserved heterogeneity, it is safe to assume that y_{it} are dependent across t conditionally only on the observables, \mathbf{x}_i . The density of (y_{i1}, \dots, y_{iT}) conditional on (\mathbf{x}_i, v_i) can be given as

$$f(y_1, \dots, y_T | \mathbf{x}_i, v_i; \boldsymbol{\beta}) = \prod_{t=1}^T f(y_t | \mathbf{x}_{it}, v_i; \boldsymbol{\beta})$$

where $f(y_t | \mathbf{x}_t, v; \boldsymbol{\beta}) = \Phi(\mathbf{x}_t\boldsymbol{\beta} + v)^{y_t} [1 - \Phi(\mathbf{x}_t\boldsymbol{\beta} + v)]^{1-y_t}$ (Wooldridge, 2002). The relevant log-likelihood function of interest is then given by

$$L(\boldsymbol{\beta}, v) = \sum_{i=1}^N \sum_{t=1}^T \{ y_{it} \log[\Phi(\mathbf{x}_{it}\boldsymbol{\beta} + v_i)] + (1 - y_{it}) \log[1 - \Phi(\mathbf{x}_{it}\boldsymbol{\beta} + v_i)] \}$$

An empirical issue of importance at this stage has to do with the nature/distribution of the unobserved heterogeneity term, v_i . The traditional random effects probit model

makes the rather strong assumption that $v_i | x_i \sim \text{Normal}(0, \sigma_v^2)$. That this assumption implies that v_i and x_i are independent and that v_i has a Gaussian distribution may prove to be implausible, for v_i , by definition, has an unknown distribution. The omitted variable that v_i stands for might, for example, be represented by a categorical variable, making the normality assumption inappropriate. In the face of such possible drawback, the best alternative is to model the unobserved heterogeneity term non-parametrically. In this study, unobserved heterogeneity is modelled non-parametrically by using a discrete mass point distribution for the heterogeneity term v and its density function $g_v(v)$. Representing the distribution of mass points by a number of finite locations $\theta_1, \dots, \theta_m$ and associated probabilities for each mass point π_1, \dots, π_m , the number and location of the mass points and associated probabilities has been estimated together with other parameters of interest.⁹ The additional parameters characterising the unobserved heterogeneity term should satisfy the condition that $\sum_{m=1}^M \pi_m = 1$, $\pi_m \geq 0$ and $\sum_{m=1}^M \pi_m \theta_m = 0$, however.

To account for the conceptual and measurement issues raised in section 3 of this study, alternative definitions of self-employment have been used. First, we make use of a narrow and a broader definition of self-employment. The narrow definition regards the self-employed as only those that are employers. The broader definition of self-employment, on the other hand, includes those that are own account workers and those involved in household female business activity. Secondly, the comparison group for the self-employed has been made to account for the different labour market states possible. Accordingly, the first version of models estimated has a dependent variable that assumes a value of 1 if an individual is self-employed and 0 if an individual is (wage) employee. The second version of models has a dependent variable that assumes a value of 1 if an individual is self-employed and 0 if an individual is (wage) employee or unemployed. The third version has a dependent variable that assumes a value of 1 if an individual is self-employed and 0 if an individual is (wage) employee, unemployed or out of the labour force.

⁹ The estimation of the discrete random effects probit model is conducted using the GLLAMM software (<http://www.gllamm.org>)

5. Discussion of results

As stated in section 4 above, alternative definitions of self-employment and comparison group have been used in the empirical analysis. Looking at the descriptive statistics given in Table 3 in the appendix reveals that there has been a declining trend in the proportion of the self-employed, defined broadly, over the study period. Accordingly, the self-employed make up 19 per cent of the labour force in 1994 but this percentage has declined consistently reaching 16 percent in 2000. The narrower definition of self-employment which refers to those that are employers, on the other hand, indicate some variability over the period but accounts for roughly 1 per cent of the urban labour force.

In terms of the characteristics of the self-employed, Table 1 and Table 2 in the appendix indicate that the self-employed are unlikely to come from the young, regardless of the type of definition used. Women are significantly less likely to be employers but are more likely to constitute the broader definition of the self-employed which has to do with the inclusion of household female business activity in the broader definition. Those who migrated to the urban centres over a period of 10 years prior to being surveyed are significantly less likely to make up the self-employed irrespective, again, of the type of definition used. In terms of ethnicity and religious background of respondents, the *Guraghes* are significantly more likely to make up the self-employed defined narrowly while the other ethnic groups are significantly less likely to make up the self-employed.¹⁰ Such ethnicity related significance tends to disappear when the reference category is made to account for the unemployed and the inactive, however. With regards to religious characteristics, orthodox Christians are significantly less likely to make up the self-employed, defined narrowly, in general while Muslims are more likely to constitute employers compared with their employee counterparts.

The nature of self-employment in terms of educational background of respondents suggest that the self-employed are generally significantly less likely to come from those that have completed at least secondary level education. On the other hand, those with at most primary level education are significantly more likely to form the self-employed defined broadly. This finding is in line with the evidence that the self-employment literature attests to. The general consensus is that the self-employed are more likely to come from the least educated segment of the labour force that is unlikely to get wage offers that would make employment an option. The wider literature does, however, indicate that some, albeit a smaller proportion, of the highly educated

¹⁰ This seems to be in line with the traditionally held view that the *Guraghes* have the edge, in terms of entrepreneurship, over other ethnic groups.

moving into self-employment. In the sample used in this study, the proportion of those that have a tertiary education (or beyond) is rather small which explains the broad category of 'secondary level or more' used in the empirical exercise undertaken.

A finding that does not conform to what the self-employment and micro-enterprise literature suggests is that associated with 'access to credit'. Access to credit does not have the expected sign and significance in this study.¹¹ The wider literature suggests lack of capital and/or access to credit being an important impediment to would-be entrepreneurs from being self-employed or, for that matter, for giving up self-employment. Household/parental background is found to have a significant positive effect, for the most part, in determining the propensity to be self-employed. In particular, those whose father is/was in self-employment are more likely to pick the art of their father. This is not an unexpected finding given the influence that parental career may have on siblings in general. Not surprisingly, the self-employed are significantly more likely to be heads of the household. What is not in line with expectation is the finding that being in Addis Abeba does not have any positive and significant effect on the probability of being self-employed. One would expect urban based self-employment and/or entrepreneurship, if any, to be noticeable in the capital city of the country.

The declining trend in the number of the self-employed, defined narrowly or otherwise, that we observed in the descriptive statistics given in Table 3 in the appendix is further confirmed by the results from the formal modelling exercise. Broadly speaking, the trend in the patterns of self-employment in urban Ethiopia is one of declining. This is again very much counter-intuitive for an economy that claims to have departed from a command system of economic management over a decade or so ago. One would expect to observe a positive, however small in magnitude, trend in the direction of more entrepreneurship and self-employment. Such expectation is justified, irrespective of the weaknesses of the liberalisation measures undertaken in Ethiopia in the post 1991 period and/or other problems that beset this period/system.¹² Economies that have made a similar transition seem to have created a favourable condition for the development of self-employment and entrepreneurship. For example, in their recent study into the nature of self-employment in former socialist Eastern European countries, Earle and Sakova (2000) find that the level of

¹¹ This may have to do with the 'crude' proxy used in the estimation. The access to credit variable is generated on the basis of the question that monitors whether or not at least one member of a household has a bank account; whether or not at least one member of a household is member of a credit association, or whether or not at least one member of the household is a member of an 'equib'.

¹² It is not uncommon to hear about the charges that international (financial) institutions and the domestic private sector lay against the current government regarding the half-hearted nature of the liberalisation measures undertaken to date and the increasing role that party affiliated companies have in the conduct of business in Ethiopia in the post 1991 period. Both of these are likely to be detrimental to the development of the private sector and the promotion of self-employment in the country.

self-employment has grown extremely rapidly in the post transition period although it was generally very much negligible at the start of transition in 1989.

With respect to the heterogeneity related parameters, we can view the location of the discrete points estimated (the θ 's) and their respective masses (π 's) as representing different, four in our case, latent classes of respondents, each representing different levels/propensity to be self-employed. Thus, if we take the narrow definition of self-employment with employees as the reference category, we can have four distinct groups with probabilities of 14 per cent, 38 per cent, 30 per cent and 18 per cent. The importance of these parameters is in providing us a way to handle unobserved factors that may determine the propensity to be self-employed.

6. Summary and conclusion

This study has attempted to shed some light on the nature of self-employment in urban Ethiopia. To this end, the study reviewed the literature on self-employment focusing on the relevant theoretical background and empirical evidence on the same. Findings from the empirical investigation undertaken give some indication that self-employment is a route out of unemployment rather than being something of an entrepreneurial venture. In particular, findings of the study indicate that the young, the educated, those that migrated to urban areas recently and those without parents in self-employment are less likely to be found in self-employment. Findings regarding the effect of 'access to credit' on the propensity to be self-employed are counterintuitive. This may have to do with the way 'access to credit' has been measured and calls for a further investigation into the role that access to credit plays in determining self-employment.

The finding that there is a declining trend in self-employment is rather puzzling. One would expect a rising trend in self-employment in an economy that departed from a command system of economic management. That the liberalisation process has not gone far off and that government affiliated companies are having increasing role in the economy may, at least in part, explain this pattern. Small businesses and self-employment are likely to be crowded out when faced with large companies that seem to enjoy preferential treatment. As stated earlier, two important factors that are likely to impact the level of self-employment most are: 1) the availability of an environment that encourages risk-taking and market development and 2) the lack of employment opportunity in the major employer sector of the economy. That there is lack of employment opportunity in the urban sector in Ethiopian is quite apparent. What is not obvious is as to why self-employment has not picked up in the urban sector substantially. This brings to the fore the issue of whether there has been a conducive

environment, including credit availability, in the urban sector of the country. This is an important question to ponder about. That the growth of entrepreneurship in general and the private sector in particular is commonly associated with innovation, job creation and rapid economic growth makes this assignment all the more important.

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Appendix: Tables of results and descriptive statistics

Table 1: Random effects probit estimates of the determinants of self-employment (employers)

	Exp(b)	Exp(b)	Exp(b)
	1	2	3
Age	0.78*** (0.04)	0.82*** (0.02)	0.86*** (0.02)
Agesq	1.004*** (0.00)	1.003*** (0.00)	1.002*** (0.00)
Female	0.10*** (0.04)	0.15*** (0.03)	0.10*** (0.02)
Married	0.38*** (0.11)	2.07*** (0.37)	2.57*** (0.45)
Migrant	0.18*** (0.08)	0.56*** (0.12)	0.71 (0.15)
No health problem	1.12 (0.29)	0.97 (0.15)	0.85 (0.12)
TV set in the house	1.11 (0.31)	4.74*** (1.12)	1.51*** (0.23)
Amhara	0.25*** (0.09)	0.15*** (0.04)	0.10*** (0.03)
Oromo	0.09*** (0.04)	0.14*** (0.04)	0.08*** (0.02)
Tigrawi	0.45 (0.21)	0.25*** (0.09)	0.10*** (0.04)
Gurage	10.60*** (4.99)	0.31 (0.09)	0.75 (0.20)
Orthodox Christian	0.18*** (0.09)	0.14*** (0.04)	0.16*** (0.04)
Muslim	24.14*** (16.39)	1.13** (0.35)	0.43*** (0.11)
Primary level education	1.01 (0.31)	0.82 (0.16)	1.43** (0.22)
Secondary or more	0.07*** (0.03)	0.27*** (0.06)	0.99 (0.17)
Access to credit	0.28*** (0.08)	0.85 (0.13)	0.86 (0.12)
Father self-employed	1.90** (0.56)	2.12*** (0.38)	1.33 (0.21)
Household head	4.31*** (22.24)	4.39*** (0.85)	9.24*** (1.78)
Children in the household	0.38*** (0.12)	0.85 (0.16)	0.71 (0.11)
Addis Ababa	0.77 (0.23)	1.05 (0.17)	0.71* (0.11)
year95	0.92 (0.19)	0.88 (0.12)	0.83 (0.10)
year97	0.74 (0.16)	0.82 (0.12)	0.83 (0.10)

Table 1 contd....

year00	0.63*	0.75*	0.72**
	(0.16)	(0.12)	(0.09)
Mass point 1 (θ_1)	1.7892	1.4499	2.3349
Probability 1 (π_1)	0.3428	0.2105	0.1880
Mass point 2 (θ_2)	6.9807	4.5897	5.2136
Probability 2 (π_2)	0.1872	0.1500	0.0958
Mass point 3 (θ_3)	-8.9121	-2.4574	-1.7186
Probability 3 (π_3)	0.3677	0.5862	0.6887
Mass point 4 (θ_4)	13.264	8.3887	8.9072
Probability 4 (π_4)	0.1023	0.0533	0.0275
No. of level 1 units	5258	11184	18799
No. of level 2 units	2677	5320	8736
Log-likelihood	-1285	-1884	-2245

Note: 1. Reported results of covariate estimates are exponentiated form of coefficients

5. Figures in bracket are standard errors

6. *** significant at 1%; ** significant at 5%; * significant at 10%

7. Columns 1, 2 and 3 represent the different reference groups used involving employees; employees and the unemployed; and employees, the unemployed and the inactive, respectively.

Table 2: Random effects probit estimates of the determinants of self-employment (employer & own account worker)

	Exp(b)	Exp(b)	Exp(b)
	1	2	3
Age	0.90*** (0.04)	0.87*** (0.02)	0.88*** (0.01)
Agesq	1.002*** (0.00)	1.003*** (0.00)	1.001*** (0.00)
Female	3.37*** (0.92)	2.33*** (0.31)	0.72** (0.09)
Married	0.53** (0.16)	1.25*** (0.19)	1.11 (0.15)
Migrant	0.42** (0.18)	0.49*** (0.09)	0.75 (0.11)
No health problem	0.83 (0.16)	0.96 (0.12)	0.97 (0.10)
TV set in the house	0.13*** (0.04)	0.49*** (0.07)	0.62*** (0.08)
Amhara	0.09 (0.04)***	0.13*** (0.03)	0.20*** (0.04)
Oromo	0.05*** (0.04)	0.12*** (0.03)	0.20*** (0.04)
Tigrawi	0.23*** (0.12)	0.37*** (0.10)	0.20*** (0.05)
Gurage	1.54 (0.68)	0.84* (0.21)	0.70* (0.14)
Orthodox Christian	0.50* (0.18)	0.13*** (0.03)	0.16*** (0.03)
Muslim	3.63* (2.73)	0.42 (0.11)	0.37*** (0.09)
Primary level education	1.52 (0.46)	1.55*** (0.25)	2.08*** (0.33)
Secondary or more	0.11*** (0.04)	0.18*** (0.03)	0.91 (0.16)
Has access to credit	0.42*** (0.12)	0.81 (0.11)	0.53*** (0.07)
Father self employed	2.35*** (0.55)	1.99*** (0.27)	1.59*** (0.20)
Household head	3.99*** (1.89)	4.43*** (0.73)	16.25*** (2.90)
Children in the household	1.11 (0.26)	1.15*** (0.15)	0.91 (0.10)
Addis Ababa	1.48 (0.49)	0.47*** (0.07)	0.59*** (0.09)
year95	0.87 (0.14)	0.82** (0.09)	0.87* (0.08)
year97	0.70** (0.12)	0.68*** (0.08)	0.85* (0.08)
year00	0.64**	0.66***	0.67***

Table 2 contd....

	(0.13)	(0.09)	(0.07)
Mass point 1 (θ_1)	-1.9251	0.7933	1.9567
Probability 1 (π_1)	0.1438	0.3068	0.1785
Mass point 2 (θ_2)	2.0397	4.0489	4.3187
Probability 2 (π_2)	0.3845	0.1894	0.1273
Mass point 3 (θ_3)	-6.928	-3.7497	-1.9448
Probability 3 (π_3)	0.2962	0.4303	0.6455
Mass point 4 (θ_4)	8.8045	8.2074	7.3254
Probability 4 (π_4)	0.1755	0.0735	0.0487
No. of level 1 units	6088	11184	18799
No. of level 2 units	3061	5320	8736
Log-likelihood	-1835	-2631	-3514

Note: 1. Reported results of covariate estimates are exponentiated form of coefficients
 2. Figures in bracket are standard errors
 3. *** significant at 1%; ** significant at 5%; * significant at 10%.
 4. Columns 1, 2 and 3 represent the different reference groups used involving employees; employees and the unemployed; and employees, the unemployed and the inactive, respectively.

Table 3: Descriptive statistics, dependent variable

Dependent variable*	Mean	Std. dev.	No. of obs.
Year = 1994			
Employer1	0.020	0.140	1500
Employer2	0.011	0.105	3289
Employer3	0.007	0.082	5485
Employer & own account worker1	0.337	0.473	1500
Employer & own account worker2	0.189	0.391	3289
Employer & own account worker3	0.114	0.317	5485
Year = 1995			
Employer1	0.014	0.116	1370
Employer2	0.007	0.085	2865
Employer3	0.004	0.067	4716
Employer & own account worker1	0.335	0.472	1370
Employer & own account worker2	0.180	0.384	2865
Employer & own account worker3	0.109	0.312	4716
Year = 1997			
Employer1	0.012	0.110	1204
Employer2	0.007	0.081	2566
Employer3	0.004	0.064	4169
Employer & own account worker1	0.329	0.470	1204
Employer & own account worker2	0.176	0.381	2566
Employer & own account worker3	0.109	0.311	4169
Year = 2000			
Employer1	0.018	0.133	1184
Employer2	0.010	0.098	2464
Employer3	0.005	0.073	4429
Employer & own account worker1	0.298	0.457	1184
Employer & own account worker2	0.160	0.367	2464
Employer & own account worker3	0.089	0.285	4429

Note: The six dependent variables in each year in Table 3 represent 'employer' and 'employer and own account worker' used in the empirical analysis carried out. In each year, these variables assume same number of 'employer' and 'employer & own account worker' but with different reference categories. Thus, the reference category in 1 is employees, in 2 employees & the unemployed and in 3 employees, the unemployed and the inactive, all within the age range of 16 - 65.

Table 4: Descriptive statistics, covariates

Wave	1994		1995		1997		2000	
	Mean	Std. Dev.						
Age	30.868	13.100	31.126	12.559	32.605	12.354	31.890	13.463
Agesq	1124.389	967.734	1126.531	929.954	1215.650	946.890	1198.194	995.194
Female	0.552	0.497	0.561	0.496	0.571	0.495	0.561	0.496
Married	0.326	0.469	0.328	0.470	0.328	0.469	0.279	0.449
Migrant	0.167	0.373	0.161	0.367	0.150	0.357	0.082	0.274
No health problem	0.143	0.350	0.153	0.360	0.166	0.372	0.099	0.299
TV in the HH	0.395	0.489	0.367	0.482	0.362	0.480	0.410	0.492
Amhara	0.520	0.500	0.522	0.500	0.524	0.499	0.507	0.500
Oromo	0.168	0.374	0.166	0.372	0.168	0.374	0.192	0.394
Tigrawi	0.099	0.298	0.093	0.291	0.094	0.292	0.092	0.289
Gurage	0.128	0.334	0.131	0.337	0.130	0.337	0.133	0.339
Orthodox Christian	0.808	0.394	0.811	0.391	0.812	0.391	0.794	0.404
Muslim	0.128	0.334	0.125	0.330	0.124	0.329	0.130	0.336
Primary education	0.400	0.490	0.405	0.491	0.407	0.491	0.352	0.478
Secondary or more	0.302	0.459	0.292	0.455	0.286	0.452	0.289	0.453
Has access to credit	0.755	0.430	0.742	0.438	0.741	0.438	0.630	0.483
Father self-employed	0.585	0.493	0.576	0.494	0.572	0.495	0.453	0.498
HH head	0.239	0.426	0.222	0.416	0.211	0.408	0.197	0.398
Children in the HH	0.279	0.449	0.281	0.449	0.281	0.449	0.229	0.420
Addis Ababa	0.657	0.475	0.658	0.474	0.669	0.471	0.655	0.475
No of observations	5500		4708		4152		4439	

EDUCATION CHOICES IN ETHIOPIA: WHAT DETERMINES WHETHER POOR HOUSEHOLDS SEND THEIR CHILDREN TO SCHOOL?¹

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Abstract

The paper uses data from a 2002 survey of 1000 rural and urban households with eight-year old children sampled from food insecure communities in Tigray, Amhara, Oromia, SNNP and Addis Ababa Regional States. Using a probit regression model, we investigated external factors associated with child enrolment in school. We found that household wealth, cognitive social capital, adult education and ownership of land had a positive impact on whether eight-year-old children were attending school. Household wealth had the strongest impact followed by cognitive social capital (perceived levels of trust and reciprocity), the maximum level of education attained by female adults in the household, ownership or rental of land, and the maximum level of education attained by male adults in the household. In contrast, child enrolment was found to be negatively associated with the number of household members over the age of 15 years, birth order, ownership of livestock, economic shocks, distance to primary school, and child labour, in declining magnitude. The findings in general suggest that increasing child enrolment in primary school, which is a commitment of the Sustainable Development and Poverty Reduction Program (SDPRP) and Education Sector Development Program (ESDP), will necessitate more targeted educational policies to address regional, gender and wealth disparities, the development of education programmes for adult caregivers, as well as broader inter-sectoral policy initiatives to ensure that policy initiatives in other sectors facilitate rather than hinder children's education (particularly credit and labour markets and infrastructure-related policies).

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¹The research is conducted by the Young Lives Ethiopia project financed by the UK Department for International Development (DFID). The research project is housed under the Ethiopian Development Research Institute (EDRI), Ethiopia, while the dissemination part of the project is administered by Save the Children UK, in Ethiopia and in London. The Young Lives project is an international study of child poverty with a longitudinal panel survey that follows nearly 12,000 children and their families over 15 years in four countries, namely Ethiopia, Peru, Vietnam and India. All errors and opinions expressed are those of the authors.

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1. Introduction

Ethiopia has one of the lowest primary school enrolment rates and one of the highest illiteracy rates in the world. Finding appropriate mechanisms through which to address this has long been an economic, social and political challenge for the government. When the current government took power in 1991, the Ethiopian education system was suffering from a lack of 'relevance, accessibility and equity' (MoE, 1994). These three problems underpin all education policy debates in the country, and are related to the policy-related weaknesses of past governments. During the imperial period (1941-74) the education system emphasised modernisation and focused on expanding secondary education, but expansion, of both primary and secondary education, was limited to urban centres. By contrast, the socialist regime (1974-1990) aimed at expanding primary education to the rural areas by constructing schools in every *kebele* (the lowest administrative unit). However, the education sector was stretched to the limit with no additional available resources, and, as a result, the quality of education was compromised, rendering the education provided of limited relevance (MoE, 1994)).

Although there has been a remarkable improvement in the rate of primary school enrolment during the last decade (from 35% in 1997/8 to 85.8% in 2005/6), there are still wide disparities between regions; the overall ratio of boys to girls is still high in rural areas (approximately 20 percentage points although there are marked regional variations); the urban/rural difference is still significant ; many concerns about the quality of education persist and the primary completion rate is significantly lower than primary enrolment (MoE, 2007).

In order to solve these problems and in recognition of the instrumental role that education plays in social development and poverty reduction (MoE 1994), the first multi-year Education Sector Development Plan (1997) initiated a range of programmes. These included increasing the number of and upgrading existing school buildings⁴, expanding teacher training programs, introduction of automatic promotion for grades 1-3, use of local languages as the teaching medium, development of context-appropriate primary school syllabi and textbooks⁵, and the elimination of school fees. Quality assessment mechanisms have also been introduced: a Minimum Learning Competency Guideline (MLCG) and a National

⁴ In order to cater to the special needs of pastoral communities, there is a plan to build boarding schools and hostels in Afar, Somali, Benishangul Gumuz, SNNPR and Oromia regions. Low cost schools and multi-grade village schools will be established in settlement areas.

⁵ The EDSP stated that the Ministry of Education would aim to print and distribute a total of 37.4 million textbooks in order to attain a student-textbook ratio of one-to-one.

Education Assessment (NEA) are being developed to assess standards at each level in all subjects.

These policy efforts notwithstanding, the first Ethiopian Educational Sector Development Programme (ESDP I) midterm review report shows that while progress has been made in expanding enrolment, educational quality has deteriorated, particularly in terms of the curriculum (which sacrifices breadth for depth). For example, while gross enrolment in grades 1-8 has increased from 34.7 per cent in 1996/97 to 85.8 per cent in 2005/06, on the other side, the drop-out rate for the same grades (1-8) for the year 2005/06 was 11.8 per cent (MoE, 2007). The problem of school dropout was more serious in rural areas than urban areas. Around 13.6 percent of the primary school pupils in rural areas have dropped out during the reference year. This has become a puzzle for the education sector in that while enrolment is growing, poor retention is off-setting the gains and resulting in a continued disparity between gross enrolment rates and primary completion rate (*ibid.*).

Financing concerns further exacerbate efforts to address Ethiopia's educational crisis. The sector is heavily dependent on external assistance, making it vulnerable to changes in donor policy, delays in transferring funds and failure to fulfil commitments⁶. That is, although the government officially allocates 13.4 per cent of its total expenditure to education, it has been able to cover only 64 per cent of the total education budget for the period 2002/03-2004/05. For the rest, it relies on Heavily Indebted Poor Countries (HIPC) debt relief (3.6 per cent), available and expected external loans and assistance (10.3 per cent) and community contributions of 1.6 per cent (MoE, 2002). That is, the education sector budget deficit amounts to 31.4 per cent.

Given these problems, the likelihood of achieving the EDSP's goal of achieving Millennium Development Goal Number 2 of universal primary education by 2015 through the current formal education system seems high. It is therefore essential that other alternatives are explored. While much effort has been put into increasing accessibility to education from the supply side, not much emphasis has been given to the out-of-school factors that influence access to school. The objective of this paper is, therefore, to establish a link between micro-level outcomes and macro-level policy initiatives with respect to primary school enrolment and poverty reduction, and to investigate the relative importance of factors associated with child enrolment. The paper specifically deals with the relatively under-researched external (household and

⁶ While donors transferred only 50 per cent of what they had committed, the government has fulfilled all its budget commitments (MoE, 2001).

community-level) factors affecting child enrolment (such as lack of income, child labour, economic shocks, social capital and parents' education) as opposed to internal (school-related) factor such as improving the quality of teachers and the syllabus of primary grades. By drawing on the Young Lives sample of 1,000 eight-year-olds from 20 sentinel sites (20 locations in 12 rural and 8 urban areas), it will contribute a more comprehensive analysis of the determinants of child school enrolment in Ethiopia. Specifically, it will analyse the relative importance and interactive impact of economic, infrastructural, educational and household composition factors, as well as three key issues that have not been discussed in the literature to date: the relative importance of the average level of education of female compared to male adults in the household; the interactive impact of economic shocks on household livelihoods and child enrolment (which may hinder households' capacity to invest in child schooling); and social capital.

The paper is organised as follows. In section two the literature review begins with a brief overview of child primary school enrolment and the key education policies in Ethiopia. It then provides a thematic review of the key factors influencing child enrolment in the developing world and specifically in Ethiopia. The methodology of the paper is described in section three. Section four presents the descriptive statistics and the results of the univariate and multivariate analyses drawing on the livelihoods framework⁷ on the determinants of child enrolment. Finally, a summary of the results and their policy implications are provided in section five.

2. Literature review

2.1 School enrolment status of Ethiopian children

Although primary school enrolment has been increasing in recent years, Ethiopia still has one of the lowest enrolment rates in the developing world, even by sub-Saharan African standards, as seen in Table 1 below.⁸ Moreover, enrolment rates decline significantly as the school grade level increases (Table 2).

⁷ The Sustainable Livelihoods Framework is based on the assumption that individuals and households aim at sustaining their livelihoods through maintaining or increasing their assets (which can include financial, human, social and natural capital). Poverty can, thus, be seen as a situation in which an individual or a household fails to maintain their assets and becomes vulnerable to shocks. The framework emphasises the centrality of assets, rather than capital, in understanding poverty. (Lockwood, 2001)

⁸ Although enrolment rates are improving (admittedly from a low base), the level of enrolment per se does not guarantee that there will be an improvement in education unless it is matched by sustainable quality of education. Evidence suggests that the quality of education (at all levels) was deteriorating until 2001 and the dramatic increment in enrolment since then (though still low compared to other countries) has resulted in further deterioration in output (for details see Befekadu et al, 2001: 258-96; Befekadu and Birhanu, 2000: 116-18;).

Table 1: Trend in GPER 1970-1996 and NPER 1999

Region	1970	1982	1993	1996	1999	
	GPER	GPER	GPER	GPER	GPER	NPER
Developing countries	79	95	107	108	-	-
East Asia and Pacific	88	111	118	118	106	92
Latin America and Caribbean	99	105	109	114	132	97
Middle East and North Africa	68	91	95	94	94	83
South Africa	67	77	97	101	101	79
Sub-Saharan Africa	50	74	68	74	79	54
Ethiopia	16	36	26	35	59	34

Source: Befekadu et al, 2002; GPER: gross primary enrolment ratio; NPER: net primary enrolment ratio⁹

Available evidence also indicates that there are wide differences between rural and urban areas and between sexes (Mulat, 1997; Befekadu et al 2002; Seyoum, 1997). In 1995/96, 91 per cent of eligible students at primary level were enrolled in urban areas, while the corresponding figure for rural areas was only 18 per cent (Mulat, 1997). The significant difference in participation rate between males and females (Table 2) is attributed to, among others, religious and traditional values and practices that discourage female education. These factors are more widely observed in rural areas (Mulat, 1997; Seyoum, 1997).

Table 2: Participation in education (as percentage of relevant age groups)

Academic year	Primary			Secondary		
	Males	Females	Total	Males	Females	Total
2001/02	71.7	51.2	61.6	20.4	13.7	17.1
2002/03	74.6	53.8	64.4	24	14.3	19.3
2003/04	77.4	59.1	68.4	28.2	15.9	22.1
2004/2005	88	71.5	79.8	34.6	19.8	27.3
2005/2006	98.6	83.9	91.3	41.6	24.5	33.2

Source: Educational statistical abstracts (MoE, various years).

There are also considerable regional differences with regard to the growth in enrolment during the years 1995 - 2005, both in terms of absolute number of primary school enrolments and GPER (see Table 3). Given such wide variation, the national average of GPER is somewhat misleading. More specifically, in terms of percentage changes between 1995 and 2005, the regions with highest achievement were Amhara (382.68 per cent), Oromia (323.58 per cent), Benshangul Gumuz (209.89 per

⁹ Gross primary enrolment ratio is the total number of children in primary school as a proportion of children of official primary school age; net primary enrolment ratio is the total number of children enrolled who are of official school age for that level, as a percentage of the population of official school age for that level. GPER in excess of 100 per cent can be indicative of discrepancies in school and census data, late enrolment in school or children repeating years.

cent) and SNNP (197.22 per cent), where GPER in 2001 was more than triple that of 1995. In contrast, Harari (93.07 Percent) and Addis Ababa (74.91 per cent) are regions with low performance. The comparatively low annual growth in Harari and Addis Ababa is primarily due to high initial enrolment (53.4 and 84.9 per cent respectively).

Table 3: Comparison of relative achievement in GPER across regions (%)

Region	GPER 1995	GPER 2005	Change 1995-2005	Average annual growth rate 1995-2005
Tigray	43.7	100.9	130.89	13.09
Afar	8.4	21.9	160.71	16.07
Amhara	17.9	86.4	382.68	38.27
Oromia	21.2	89.8	323.58	32.36
Somali	11.6	30.3	161.21	16.12
B/Gumuz	35.4	109.7	209.89	20.99
SNNP	28.8	85.6	197.22	19.72
Gambella	53.9	137.1	154.36	15.44
Harari	53.4	103.1	93.07	9.31
Addis Ababa	84.9	148.5	74.91	7.49
Dire Dawa	41.0	79.5	93.90	9.39
Regional total	26.2	85.8	227.48	22.75

Source: Educational statistical abstracts (MoE, various years) and own computation

The net primary enrolment ratios are higher for urban areas than for rural areas in all regions as seen in Table 4. Although nationally, there are still more boys enrolled than girls in rural areas, gender differences across regions were surprisingly mixed. In Tigray and Amhara regions the female enrolment rate was higher than that for males in rural areas. In Amhara, Tigray and Benishangul, female NPER was slightly higher than that of their male counterparts in urban areas, but significantly lower in rural areas in Afar, Oromia, Somali, Benishangul, SNNP, Harari, Addis Ababa and Dire Dawa.

Although clearly more research is needed to understand these regional disparities¹⁰, part of the variation appears to be explained by distance to school. The 1999 Welfare Monitoring Survey (MoFED, 2002b) indicated that while the average distance to elementary schools for the country is 1.7 kilometres, and only one region, Somalia, has more than 3 KM mean distance to primary school. The figures are higher for rural areas than for urban areas. Regional variation, which is presented in Table 2.5, is relatively small, except for Somali where the mean distance from primary schools to household residences is 6.4 km greater than the region with the next highest distance. At the opposite end of the scale are the urban regions, like Addis Ababa,

¹⁰ Forthcoming work by Young Lives based on 2005 fieldwork will attempt to analyze some of the factors involved.

Harari and Dire Dawa, with a mean distance of around one kilometre. However, compared to 1999, there has been a marked improvement in the year 2004. The average distance to a primary school in 1999 for the whole country was 3 km, while for rural areas the figure was 3.8 km and a quarter of the total Ethiopian population was living 3 or more kilometres away from primary schools.

Table 4: Net primary enrolment rate in Ethiopia 2004 (by region, residence and sex)

Region	NPER				
	Urban		Rural		All
	Male	Female	Male	Female	
Tigray	83.99	87.44	38.4	47.35	49.83
Afar	68.03	60.41	24.27	19.15	33.9
Amhara	84.09	86.23	32.74	38.95	40.1
Oromia	81.94	81.1	42.58	33.59	42.45
Somali	65.8	52.4	11.74	5.94	22.76
Benishangul	72.24	74.15	48.12	32.36	44.69
SNNP	73.75	67.91	41.13	30.53	39.01
Gambella	-	-	-	-	-
Harari	89.07	82.99	60.14	34.7	67.49
Addis Ababa	88.32	79.66	53.28	47.86	82.95
Dire Dawa	80.99	72.7	47.12	25.83	62.55
Ethiopia	81.94	79.37	39.18	34.96	42.49

Source: CSA: WMS (2004)

Table 5: Mean distance to reach public schools in 1999 and 2004 by region

Region	1999		2004	
	Primary school	Secondary school	Primary school	Secondary school
Tigray	3.44	20.89	1.27	9.51
Afar	4.6	29.41	1.34	30.76
Amhara	3.23	22.69	2.37	19.63
Oromia	3.16	20.46	1.59	20.15
Somali	3.93	20.95	8.77	44.67
Benishangul	3.13	20.92	2.2	32.66
SNNPR	2.63	15.1	1.05	14.02
Gambella	2.43	12.03		
Harari	0.93	5.05	0.13	1.81
Addis Ababa	0.86	1.93	0.58	1.3
Dire Dawa	1.14	7.64	1	11.62
<i>Ethiopia</i>	3	19.25	1.72	18.18
<i>Rural</i>	3.8	21.9	2.01	20.85
<i>Urban</i>	0.73	3.47	0.72	6.74

Source: MoFED 2002; CSA 2004.

2.3 Determinants of child school enrolment

The literature on access to child schooling in developing countries has placed varying emphases on (a) economic factors, including the level of household income, vulnerability to household economic shocks and the use of child labour, (b) the accessibility of schools in terms of time and cost of travel as well as safety (especially for girl children), (c) the relative importance of parental education, (d) household composition, as well as perceived usefulness of schooling, whereby parents are often willing to make enormous sacrifices for schooling they feel will give their children a better future. Each of these is now discussed.

Economic factors

The decision whether or not to send a child to school depends on the direct and indirect costs involved for the household (see Mulat, 1997; Cockburn, 2001; Pal, 2001; Duraisamy, 2000; Tietjen, 1998). Indirect costs include loss of unpaid farm labour and household chores when children go to school. For example, Tietjen (1998) indicated that in rural Ethiopia, girls not in school work on average 14-16 hours a day, mainly engaged in household tasks such as fetching water, boiling coffee, preparing meals, winnowing and transporting grains, while boys are engaged in activities such as ploughing, herding cattle, cutting grass and feeding cattle. Therefore, much of the housework (for girls) and farm work (for boys) will be lost if they are sent to school (Befekadu et al., 2002).

The direct costs include clothing (the social expectation, according to Tietjen, for children attending school is to have higher quality clothing), book rentals and school fees. In relation to these direct costs, Mulat (1997) and Duraisamy (2000) indicated that parents in rural areas are very sensitive to small charges for schooling which results in a more than proportionate school drop-out rate.

Education can also be seen as a consumer good (i.e., valued for its own sake) and as an investment good (being one component of human capital) that will provide future financial returns. In this vein, Tietjen's (1998) findings show that parents believe child schooling results in the betterment of children's lives – and indirectly their own lives – through the skills and knowledge children accumulate, and better chance of higher earning capacity. Therefore, economic considerations will influence the parents' decision regarding their children's enrolment (for example, Mulat, 1997; Tietjen, 1998; Duraisamy, 2000; Cockburn, 2001). Based on a sample of rural Ethiopian communities, Tietjen (1998) found that parents' primary reason for educating children was "to secure skills that would lead to employment or opportunities for a good job" –

a job that not only improves the livelihood of the child but also assists the parents (or the family) economically. Most of the parents interviewed thought their children's education would serve as security in their old age. In light of this, parents overwhelmingly favour boys' education, for the reason that the return on investment in their sons' education is more tangible because the son remains at home when he marries, while a daughter moves far away, implying that the investment in her education cannot be retained by her parents. In a nutshell, authors of this school of thought argue that parents consider the net benefit they gain from children's enrolment by looking at the trade-offs between earning income in the future and losing income now. For this reason the quality of education is very important.

However, for very poor countries we also need to consider the so-called poverty hypothesis. While wealthy households can afford to send their children to school since they can buy clothes, pay school fees, and feed their children, if people are poor they might simply be unable to afford to send their children to school. Shapiro and Tambashe (2001) found that increased economic wellbeing translates into greater investment in children's education for both females and males in Kinshasa, Congo. However, this poverty hypothesis may only work in poor areas or rural areas where income is the most limiting factor for decisions. In a multi-country comparison, Ersado (2003) found a discrepancy between urban and rural areas in the poverty hypothesis of child schooling, finding that while poverty drives schooling decisions in rural areas it does not appear to significantly influence schooling in urban areas.

In this context, child labour is a key concern. Many studies worldwide indicate that child labour, as a factor that reduces child schooling, emerges from the poorest households (Basu and Van, 1998). However, other studies have shown that children of land-rich/ livestock-rich people are more likely to be working, instead of being in school, than children of land-poor/livestock-poor households, indicating that asset ownership and child schooling could be negatively or positively related, depending on the household's economic circumstances. This phenomenon is called the wealth paradox (Bhalotra and Heady, 2003). The reason for the wealth paradox has been investigated in several studies. Ranjan (1999, 2001), Jafarey and Lahiri (2002), for example, showed theoretically that credit market imperfections could result in child labour and low enrolment of children in school. Labour market imperfections could also promote child labour and its negative impact on child schooling (Bhalotra and Heady, 2003).

Ownership of production assets such as land and livestock can also affect child schooling in various ways. It can have a positive effect on schooling because larger asset holding may allow households to forgo the income that child work brings. However, in the absence of a perfect labour market, land and livestock ownership can

also have the opposite effect on child schooling and child labour. Owners of land and livestock who are able to hire productive labour may have an incentive to employ their children instead of sending them to school. Similarly, if households do not have access to credit or if they cannot use their assets as collateral to access credit to employ labour, they are more likely to use their children's labour instead. In the Ethiopian context, Cockburn (2001) found that while land quality increases the relative probability of children's enrolment, ownership of small livestock reduces the probability of school attendance among younger boys. This is because child labour is traditionally more important for cattle rearing than for crop production activities. It could also be because cattle farmers are credit constrained and hired labour cannot be used as a substitute for family (child) labour. In the same vein, distance to the nearest source of water reduces school attendance among girls (see Cockburn 2001: 18-30 for details), presumably because it is largely girls who traditionally fetch water for the household.

In sum, we have to consider the both the income effect (income contribution of the asset itself) and the productivity effect (if access to the asset raises the returns from child work). The income effect tends to increase child enrolment (and reduce child work) while the productivity effect tends to reduce child enrolment (and increase child labour). This relationship, however, may be disrupted by economic shocks such as crop failures, drought and illness, which can act against parental willingness to enrol and keep children in school (Tietjen, 1998). In such cases, children are often required to work and supplement the household income and shortfalls in production. If food shortages (resulting from the shocks) become acute, children might be forced to migrate with parents in search of work and food (Tietjen, 1998), leading to discontinuity of schooling or unwillingness to enrol children at all.

Accessibility of schools

The demand for education is also likely to be influenced by the distance between the household and the school, as those living farther away from primary school may face higher opportunity (time) and direct (transport) costs. A number of studies have found that the distance to primary school negatively affects the demand for school, with a stronger negative impact for rural children and females (World Bank, 1996; Befekadu et. al., 2002; Mulat, 1997). This problem is aggravated in rural Ethiopia due to the scattered pattern of settlements. Access to secondary schools is also very limited in rural Ethiopia (secondary education is mainly an urban phenomenon) discouraging child enrolment in rural primary schools in the first place (Befekadu et al, 2002). Some studies indicate that girls face an additional problem of security on their way to school, especially in terms of risk of rape and abduction (Tansel, 1997).

Parental education

It has been repeatedly demonstrated that a strong predictor of children's education is parents' educational achievement (Tietjen, 2001; Cockburn, 2001; Duraisamy, 2000; Mulat, 1997; and Pal, 2001). For instance, with a sample size of 540 households, Tietjen found in rural Ethiopia that the simple correlation coefficient between parents' combined educational level and household primary enrolment ratio was found to be positive and significant at 1 per cent, but very low in magnitude (0.11). He admits that the correlation coefficient reported in many other studies is 0.3 or higher but the low correlation in his study could be due to the generally limited level of parental education in rural Ethiopia. Duraisamy (2000) from a study in India, Pal (2001) in Peru and Cockburn (2001) in Ethiopia, arrived at similar conclusions. Ersado (2003) found that, in both urban and rural areas in Ethiopia, adults' educational level is an essential factor in education, making a significant contribution to improvement in the likelihood that children stay at school. Furthermore, Duraisamy (2000) and Mulat (1997) reported that mother's education (as compared to father's education) exerts a much stronger effect of increasing children's enrolment. The relatively low correlation between parents' educational status and school enrolment reported by Tietjen, suggests that other factors may be working in the Ethiopian context and warrants further investigation.

Household composition

Schooling of children can be affected by the size and composition of the family. Rosati and Rossi (2003) found in Pakistan and Nicaragua that an additional child in the household negatively affects the enrolment rate of children in school. In the Ethiopian context, Mulat (1997) argued that having more children within a family *increases* the probability of enrolment, assuming other factors are held constant, implying that the probability of going to school declines for households with fewer children. This counter-intuitive finding is partly explained by some of the complex associations between family structure and schooling outlined below. Shapiro and Tambashe (2001) found that family structure (as measured by the number of children in the household in different age groups) and a child's relationship to the head of the household also had a significant influence on investment in children's education. Cockburn (2001), using Ethiopian data, found that there are schooling biases in favour of the firstborn child, that is, the likelihood of attending school tends to increase with the presence of younger siblings, suggesting a birth order effect. He also suggested that children of the head of the household are more likely to attend school than boys or girls who are more distant relatives or unrelated to the head of the household. Overall, a number of studies indicate that children are more likely to be enrolled in school in female-headed households than in male-headed households

(Mulat, 1997; Duraisamy, 2000; Cockburn, 2001), which may be because they believe educating their children is a means of reducing old-age poverty.

The Importance of School Quality

Schooling is generally associated with earnings, both in the developed in the developing world. Generally this relationship reflects a causal impact of schooling on productivity and therefore on earnings. Most estimates of schooling, however, merely depict it as “quantity” in terms of years of schooling. However, if there are substantial variations in the “quality of schooling”, failure to control for it in earnings functions estimates may cause biases in the estimated returns to schooling.

Behrman and Birdshall (1983) raise several questions about the adequacy of the standard approach in understanding the schooling-earnings relation in order to provide a basis for policy. The standard argument is that there are high returns to expanding primary schooling in developing countries. Quality of schooling has not been ignored, but the tradeoff between further expansion and the possibly more efficient use of resources to improve quality has not been emphasised. Using data for Brazil, Behrman and Birdshall estimate a much lower social return to expanding primary years of schooling once quality is taken into account and indicate that “deepening” schooling by increasing quality has a higher social rate of return than “broadening” schooling by increasing quantity. If these results can be generalised for other countries, the conventional wisdom on schooling investments in developing countries may cause substantial over-investment of resources in schooling with the wrong composition of investments being undertaken.

Along the same lines, many studies of the determinants of economic growth rates across countries use a measure of schooling quantity, such as mean secondary school enrolment rates, to proxy for the rate of human capital accumulation. This approach ignores the contribution of schooling quality. Neri (2001) finds that differences in schooling quality across countries are probably more important than differences in schooling quantity in explaining variations in economic growth rates.

To show the impact of school quality on earnings capacity and educational outcomes, two studies analysing the quality of schools for Black children during apartheid in South Africa show that the lack of resource allocation to improve educational inputs (primarily measured through pupil-teacher ratios) negatively impacted enrolment, educational achievement and test scores for numeracy (Case and Deaton, 1999). Additionally, given that during the system Blacks faced extremely limited residential and school choices, and that Black schools' funding and staffing decisions were made rather arbitrarily, the findings show that the quality of schools in a given district had a

large and significant effect on the rate of return to schooling for Black men from that district (Case and Yogo, 1999).

Card and Krueger (1992) use a composite index -the pupil/teacher ratio, average term length, and relative teacher pay- to estimate the effects of school quality on the rate of return to education for men born between 1920 and 1949 in the United States. Using earnings data from the 1980 census, the authors find that men who were educated in states with higher-quality schools had a higher return to additional years of schooling. Rates of return were also higher for individuals from states with better-educated teachers and with a higher fraction of female teachers. Similarly, Lee and Barro (1997), find that more school resources -especially smaller class sizes, higher teacher salaries and greater school length- enhance educational outcomes.

3. Methods

3.1 The study population

This paper uses data from a 2002 survey of eight-year-old children in the Young Lives study of childhood poverty in Ethiopia. This is part of a larger international study involving Ethiopia and Peru, Vietnam and India. In Ethiopia, the survey of eight-year-olds covers 1,001 children aged 7.5 to 8.5 years (mean age 8 years) of whom 51 per cent are males and 48 per cent females.

The data was collected from 20 sentinel sites in five regions, namely, Addis Ababa, Oromia, SNNP, Amhara and Tigray. These regions were chosen partly for logistic reasons (very remote or inaccessible areas being excluded) but also because they contain the majority of the Ethiopian population (96 per cent). Within regions, sentinel sites targeted poor areas based on the government's food insecurity designation. Three out of four sentinel sites in each region are in high food deficit *woredas* (districts) and one is from a lower food deficit *woreda*. Consequently, the sentinel sites over-sampled the poor but included a degree of variation for comparative purposes. The sentinel sites were distributed over the five regions in such a way that Amhara, Oromia and Tigray had 20 per cent of the sample each while SNNP had 25 per cent and Addis Ababa 15 per cent. Forty per cent of the children were from urban areas and the remaining 60 per cent from rural areas.

3.2 Analysis

Both descriptive and multivariate analyses were used to explore the correlations between children's enrolment in school and household wealth index, parents' education, social capital, economic shocks and ownership of land, among other factors. Data were initially captured using a Microsoft Access database and analysis

conducted using Stata version 8 and SPSS 12.0. The descriptive method of analysis includes cross tabulation between pairs of variables (the probability of a child being enrolled in primary school and its potential determinants) and conducting Pearson's chi-squared test (χ^2) to test the null hypothesis that the pairs of variables are independent of each other. The multivariate analysis used a probit model to examine factors influencing whether a child is enrolled in primary school or not.

4. Results

4.1 Descriptive statistics

Descriptive statistics of the relevant variables for this study are presented in Tables 4.1 and 4.2.¹¹ The highest educational grade completed by the eight-year-old children was four. Although many of the children had not been in school long enough to complete any grades (33 per cent), a significant number had already completed grade one (21 per cent) and two (9.6 per cent), with a few having completed grade three or four (2.3 per cent). This result was consistent with the 28 per cent who reported children starting school before the child was seven years old (the official school entry age). About 3 per cent of the eight-year-old children worked for money or goods, according to their caregivers instead of attending school.

Table 5: Descriptive statistics of dichotomous variables

	Percent	
Male children	51	<input type="checkbox"/>
From Amhara	20	<input type="checkbox"/>
From Oromia	20	<input type="checkbox"/>
From SNNP	25	<input type="checkbox"/>
From Tigray	20	<input type="checkbox"/>
From Addis Ababa	15	<input type="checkbox"/>
From urban areas	40	<input type="checkbox"/>
Children involved in paid work (caregiver's response)	4	<input type="checkbox"/>
Children involved in paid work (child's response)	9	<input type="checkbox"/>
Households in the sample whose welfare has decreased due to considerable economic change(s) in the last three years	78	<input type="checkbox"/>
Households in the sample who own or rent land	41	<input type="checkbox"/>
Male heads of household	76	<input type="checkbox"/>
Households in the sample who own livestock	70	<input type="checkbox"/>
Children involved in household chores (caregiver's response)	67	<input type="checkbox"/>

Number of observations is 1,000.

¹¹ For full details of the household and child characteristics see the Young Lives Preliminary Country Report for Ethiopia (Alemu et al, 2003) or www.younglives.org.

Table 6: Descriptive statistics of continuous variables

	Minimum	Maximum	Mean	SD
Highest grade completed by child	0	4	0.48	0.77
Household size	2	16	6.42	2.16
Years of schooling of mother	0	13	2.05	1.07
Years of schooling of father	0	16	2.83	4.02
Wealth index*	0.01	0.77	0.17	0.16
Social support (number of individuals and groups from which the caregiver receives any kind of support)*	0	12	2.42	2.64
Average number of bad events over the last three years*	0	11	2.33	1.94
Cognitive social capital (caregiver's perceptions of the local community)*	0	4	3.49	0.79
Absolute structural social capital (based on the number of groups caregiver is a member of)*	0	7	1.60	1.21
Citizenship (based on whether or not the caregiver has worked with others in the community to address a common issue)*	0	2	0.80	0.84
Hours the child works on household chores	1	12	1.54	1.99
Mean distance from community to primary school (in km)	2.52	0.50	9.17	2.87

Number of observations is 1,000. * For definitions of wealth index, social capital and economic shocks see the Young Lives Preliminary Country Report (Alemu et al, 2003). See also Tables A8 and A9 in the appendix for the definition wealth index and social capital, respectively).

4.2. Univariate analysis of factors related to children's enrolment in school

This sub-section presents results of cross tabulations of whether the child was currently enrolled in school against those variables that are expected to be correlated with enrolment, based on the literature. The summary of cross tabulation analysis is presented in Tables 4.3 and 4.4. The following variables have a statistically significant association with school enrolment of eight-year-old children (at the 1 per cent level or less): location (urban/rural), poverty status (wealth index), years of mother's schooling, ownership of land, absolute household size, paid and unpaid child labour, number of economic shocks, and absolute structural social capital. Contrary to what is reported in the findings of other studies, female-headed households were slightly less likely to enrol their child in school but this was not significant at the 5 per cent level ($p = 0.066$). Cognitive social capital and citizenship were not statistically correlated with enrolment of the child. The distance to primary schools had a significant negative relationship with enrolment. In our sample, there was a small

difference between enrolment rates for boys and girls but this was not statistically significant (Table 7).

Table 7: Pearson's chi-square test for the determinants of child enrolment in school

Variable	Sign of relationship	Pearson's χ^2 test statistics	Degrees of freedom	Prob> χ^2 (P-Value)
Location (1 if urban and 0 if rural)	(+)	7.61	1	0.000***
Wealth index (three categories)	(+)	147.03	2	0.000***
Years of mother's schooling	(+)	56.8	14	0.000***
Years of father's schooling	(+)	31.9	15	0.007***
Cognitive social capital	(+)	1.76	4	0.780
Citizenship	(+)	0.19	2	0.912
Ownership of land	(-)	76.82	1	0.000***
Ownership of livestock	(-)	29.30	1	0.000***
Household size	(-)	22.00	12	0.000***
Did the child do paid work? (caregiver's response)	(-)	15.52		0.000***
Hours child spends on household chores (caregiver's response)	(-)	51.73	12	0.000***
Number of economic shocks	(-)	62.65	9	0.000***
Absolute structural social capital	(-)	27.41	7	0.000***
Social support received	(-)	21.69	12	0.041**
Sex of head of household (1 if female)	(-)	3.30	1	0.066*
Cognitive social capital	(+)	1.76	4	0.780
Citizenship	(+)	0.19	2	0.912
Sex of child (1 if male)	(-)	1.65	1	0.194
Did the child do paid work? (child's response)	(-)	0.57	1	0.452
Region		60.14	4	0.000***

* Significant at 10%; ** significant at 5%; *** significant at 1%; P-value is the lowest significance level at which the null hypothesis is rejected.

Table 8: Children enrolled in school by sex of child

Sex	Not in school	In school
Female	31.22	68.78
Male	35.10	64.90

Pearson χ^2 (1) = 1.6907 p = 0.194

The validity of the identified relationships is limited, based on simple cross tabulations, since there is no control over the effects of other associated (confounding) factors. Multivariate techniques were used to control for potential confounders and produce a more complete picture.

4.3 Multivariate analysis of factors related to children's enrolment in school

To assess the determinants of a child being sent to school, two versions of a probit model were estimated. Guided by the literature and the results of the univariate analysis, these models were used to test the hypothesis that human capital, including parent's education, financial capital, including economic shocks and child labour¹², physical capital, measured by access to schools (proxied by distance), and social capital, are correlated with a child's likelihood of enrolment¹³. Confounding factors such as the sex of the child and the head of the household, region, and household size (disaggregated by age) were included as explanatory variables. The detailed results of the estimations are presented in Tables A1 to A5, in Appendix A.¹⁴

Results from the probit model of a child being in school (a dichotomous variable with a value 1 when a child is in school and 0 if she/he is not) are extracted and presented in Table 9.

Table 9: Determinants of a child being in school (estimated using a probit model)

Explanatory variables	Marginal effect	Quasi-elasticity [†]
Dummy for male child	-0.035 (1.16)	-0.018
Dummy for Amhara Region	0.146*** (3.58)	0.029
Dummy for SNNP Region	-0.078* (1.79)	-0.019
Dummy for urban residence	0.123* (1.94)	0.049
Wealth index consumer durable	1.075*** (5.07)	0.188
HH Size b/n the age of 5 and 15	-0.026* (1.82)	-0.042
HH Size above the age of 15	-0.030** (2.40)	-0.087
Maximum Grades completed by Male members of a HH	0.012**	0.061

¹² Child labour is potentially an endogenous variable. It could jointly determine with whether or not a child goes to school. This type of endogeneity problem required instrumental variables estimation method. However, given the cross sectional nature of the data, it has been very difficult to find good instruments to correct for the endogeneity of child labour.

¹³ Please note that we recognize that a livelihoods framework does not fully capture the complexities for child enrolment, especially with regard to child labor and accessibility of schools.

¹⁴ We used the following order of estimation in the probit model. First a model with all explanatory variables is estimated. Then we conducted a likelihood ratio test to see if the coefficients of some the variables whose *t*-values are less than one are jointly zero. The null hypothesis that the coefficients are jointly zero cannot be rejected. Hence we run a restricted model with variables whose *t*-values are greater than or equal to 1 in the first model. A test for multicollinearity was conducted. We did not find serious problem of multicollinearity (see Appendix 1). Belsley, Kuh and Welsch (1980) suggest that condition number in excess of a value 20 is indicative of multicollinearity; and according to Gujarati (1995) we should not worry about multicollinearity if the mean variable inflation factor is less than two. To account for heteroscedasticity, we use robust estimation method in which the standard errors are corrected for heteroscedasticity of unknown form. Our interpretation of the result is based on the restricted model.

	(2.48)	
Maximum Grades completed by Female members of a HH	0.017***	0.073
	(3.13)	
Number of events that decreases the HH welfare	-0.020**	-0.048
	(2.49)	
Cognitive Social Capital	0.046**	0.160
	(2.38)	
Absolute structural social capital	-0.029**	-0.046
	(2.19)	
Dummy for HH owns or rent land	0.175***	0.104
	(3.12)	
Dummy for the Ownership of livestock	-0.072*	-0.051
	(1.83)	
Dummy for a child being involved in paid work	-0.113**	-0.010
	(2.11)	
Number of hours a child spent on HH chores	-0.015**	-0.023
	(1.97)	
Mean distance (KM) to public and private primary schools ¹	-0.018***	-0.046
	(2.61)	

*Robust t statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%
See Tables A1 and A2 for details of the estimated results; * Quasi-elasticity measures a change in the probability of a child being enrolled in primary school when a given explanatory variable change by one percent.*

Human capital

Parents' education is potentially an important determinant of child school attendance since it is assumed that educated parents are more able to recognise the long-term benefits of education and thereby try to help their children to have a better education. Equally importantly, educated parents may derive more satisfaction from educated children than illiterate parents.

The gender of the parent may also play an important role. Al-Samarrai and Peasgood, 1998, for example, argue that in the Tanzanian context mothers may have stronger preference than fathers for sending their children to school, and in particular on the enrolment of girls (Glick and Sahn, 2000). As their own education increases, mothers' bargaining power within the household to follow through on these preferences also improves (Al-Samarrai and Peasgood, 1998).

To explore these issues, the highest school grade completed by male and female members of a household and the highest grade completed by the mother and father were used as explanatory variables in a probit regression model (see details in Appendix A, Table A1 and A2). Controlling for other factors, we found that both the maximum level of education of male and female members of a household have a

statistically significant, positive effect on the probability of a child being in school.

When we ran separate regressions for male and female children, we found that mother's education had a positive, but not statistically significant effect on the enrolment of male children only, while the effect of father's education was not significant for either sex. The same result was observed regarding the effect of the maximum level of education of female and male household members, with the aggregate educational level of female members having a positive and insignificant effect on the school enrolment of male children.

In terms of urban/ rural differences, we found that the influence of a mother's education had a positive and statistically significant effect on the probability of a child being in school only in urban areas. However, the effect of the maximum educational level of male and female members on child school enrolment was statistically insignificant in both rural and urban areas.

There were marked regional differences in the impact of maximum schooling of male and female members on the probability of a child being in school. The maximum education level of female members had a significant positive effect in all regions except in Amhara while only in Tigray Region did the maximum education level of male members showed a significant positive effect on child school enrolment.

Household composition, disaggregated by sex, did not show any significant effects on enrolment. However, household composition disaggregated by age had a differential impact on child enrolment. The greater the number of children in the household between the ages of 5 and 15 and the greater the number of household members above 15 years old had a negative and significant effect on child enrolment. This result suggests that parents who have many school-age children cannot afford to send them all to school because more young children means more competition for resources. Our finding about adult members is more puzzling: in theory one would expect that more adult members would result in greater income and remittances to pay for school costs but this was not the case in our sentinel sites. One possible explanation for this puzzling result could be that the adult members are not generating enough income to help children because of lack of employment opportunities and small farm size.

The effect of birth order (which is highly correlated with household size with an order of 0.72 correlation coefficient) was also found to be statistically significant and negatively correlated with the probability of a child being enrolled, indicating the

chance of a child being sent to school is less when there are more children/members above the age of the index child.

Financial capital

We found that the wealth of a household (as measured by the Young Lives wealth index)¹⁵ had a positive and statistically significant association with the probability of a child being enrolled in primary school. The ownership of land, which is not included in our wealth index, also had a positive effect on the probability of a child being sent to school, reinforcing the conclusion that wealth, or at least a lower level of absolute poverty, is an important factor for increasing child school enrolment. However, ownership of livestock was found to be negatively associated with child enrolment, probably because children's labour¹⁶ is normally used for herding cattle. This result lends support to the idea of the wealth paradox observed in Pakistan and Ghana (Bhalotra and Heady, 2003). That is, if households cannot get credit and hire labour, or if hired labour cannot be a substitute for family labour, the ownership of a livestock asset can result in increased demand for child labour. Given that many people do not have access to credit in Ethiopia (Woldehanna, 2000), it is not surprising to see such a paradox demonstrated here.

The effect of wealth on child enrolment in school is positive and significant for both male and female children, but only in rural areas. Wealth as measured by consumer durables (proxied by the Young Lives wealth index) is not the main determinant of child enrolment in urban areas (similar to the result observed by Ersado, 2002). The regional difference in the wealth effect on child enrolment is worth noting. Wealth has a significant and positive effect on child enrolment in Amhara, Oromia, Tigray, and SNNP, but not in Addis Ababa, where access to public schooling is largely not determined by wealth because public schools are not far from many of the residences' home.

The probability of a child being enrolled is negatively related to their being involved in paid farm and non-farm work and in household chores. The effects are statistically significant for both paid work and household chores. The effect of livestock ownership on child enrolment in school is negative in Amhara region indicating that children in Amhara are less likely to go to school because they are involved in livestock herding. Although requiring further research, this is possibly because there are more livestock per household but restricted access to grazing and thus children are required to

¹⁵ See Alemu et al., 2003.

¹⁶ While child labour should strictly be regarded as an element of human or social capital in this context, its use is so intimately related to wealth that it is discussed here.

follow the cattle. In Addis Ababa, the probability of children's enrolment declines when children are more involved in household chores.

The effect of unpaid child labour (household chores) on school enrolment is negative and statistically significant for male children only, while the effect of livestock ownership is negative and statistically significant on female children only. This result seems surprising given the fact that female children are more involved household chores than male children and male children are more involved in livestock herding than female children in Ethiopia. More research is clearly needed to unpack this seeming paradox.

The involvement of children in paid work and household chores has a more significant negative effect in rural areas than in urban areas. Children's labour is in greater demand in rural areas for farm work, off-farm work (i.e. farm-related but not on family-owned land) livestock herding and household chores, and linked to the time-consuming nature of fuel wood collection, fetching water, food preparation and farm work in rural areas, which increases the demand for children to do household chores.

The more shocks a household faces, the lower the probability that the household sends their child to school. This result is statistically highly significant. The effect is more pronounced for rural areas and in the case of male children. This is perhaps because male children are more likely to be required to generate income during economic shocks than female children and shocks are more prevalent in rural areas than in urban areas. Of all the regions, the effect of economic shocks on children's enrolment is most pronounced in Tigray where there is a relatively more frequent drought.

Physical capital

For children not attending school, along with the burden of education-related costs and the need for children's labour to supplement the household economy, distance was found to be one of the most common explanatory factors. In the multivariate analysis the greater the distance from the household, the lower the probability that parents send their children to primary school. This effect is more pronounced and statistically significant for girls and rural areas. Anecdotal evidence indicates that there is greater concern for girls' safety while travelling to and from school since they are vulnerable to physical and sexual violence. In urban areas distance to schools was not found to be a determining factor for children's enrolment.

Social capital

There has been relatively little discussion in the literature about the impact of social capital on education and educational outcomes. We hypothesise that social capital (i.e., the formal and informal relationships among individuals and communities and the relationship of trust and tolerance involved) may help to improve child schooling in two possible ways. First, it may involve the communication of information and the raising of awareness about the importance of child schooling. When a market is constrained by information flow between economic agents, social capital may help in facilitating communication between them. Civil associations and networks of interpersonal social relations facilitate information flows and thereby help to reduce information asymmetries. In doing so, social capital could help to solve the problem of limited communication. Second, social capital might have a complementary effect on government efforts to build schools and encourage enrolment. More specifically, in communities with stronger social capital we could hypothesise that communities might pressure local, regional and national government to invest more resources in schools and schooling.

Cognitive social capital (reflecting caregiver's perception of the local community in terms of trust, self-esteem, 'belongingness', perception of people's co-operation and being used by others) has a positive and significant effect on the probability of a child being enrolled. In contrast, absolute structural social capital (as defined by citizens' participation in community groups) had a negative and significant influence on child enrolment. This result might not be surprising, as the most frequent form of structural social capital in our sample was membership in religious groups, which given their conservative tendencies in the Ethiopian context, could be related to resistance to modern education (see further discussion in Section 5). Citizenship (defined as 'whether or not the caregiver has worked with others in the community to address a common issue' (Alemu et al. (2003)) and social support (defined as 'whether or not the caregiver received support in the year before the survey period (2002)' Alemu et al. (2003)) were found to be positively associated with child enrolment, but none of these variables was statistically significant at the 5 or 10 per cent level.

Interaction effects

According to livelihoods theory, ownership of household assets of various kinds may reduce their overall vulnerability to natural and human-made disasters (DFID, 1999;

Lockwood, 2001). To test this hypothesis, we used the interaction of asset variables (such as cognitive social capital, absolute structural social capital, ownership of livestock and land) with a variable for shocks in our regression analysis. However, none of these interacting variables had a statistically significant correlation with child school enrolment, perhaps because the social capital people own are traditional that they do not contribute much to acquire economic assets (livestock) and to reducing vulnerability to area-wide shocks.

4.4 Relative magnitude of the impacts

The relative importance of variables is assessed using quasi-elasticity estimates as shown in the last column of Table 9. The most important factors for child enrolment were wealth, cognitive social capital, ownership of land, adult household size, females' education, males' education, and ownership of livestock. This result is contrary to a previous study that indicated that adult education has weak correlation with child schooling (Tietjen, 2001). Maximum education of male adult education has less effect than that of the female members in terms of both magnitude and statistical significance. Table A3 also indicated that Mother's education has stronger effect than father's education on child enrolment in primary schooling although none of them are statistically significant. Among the social capital variables, cognitive social capital has the strongest effect on child schooling.

5. Summary of results and policy implications

5.1 Summary of Results

The paper has examined the external factors that impact on school enrolment by poor children.¹⁷ The multivariate analysis robustly indicated that wealth / levels of asset holding, cognitive social capital, the level of adult female education and ownership of land had a positive impact on whether eight-year-old children were enrolled at school. In terms of the relative impact of these variables, the household's wealth level was the most important factor, followed by cognitive social capital (levels of trust and reciprocity) the maximum level of education attained by female adults in the household, ownership or rental of land, and the maximum level of education attained by male adults in the household, in declining magnitude. By contrast, child enrolment was found to be negatively associated with the following variables, in declining magnitude: the number of household members over the age of 15 years, ownership

¹⁷ As with all cross-sectional studies, causality cannot be attributed to the associations found in this paper. In addition, the over sampling of poor respondents for the Young Lives study means that these results can not be generalized to the population of Ethiopia as a whole but are indicative of the situation of poor children.

of livestock, the number of events/shocks that decreased household welfare, the mean distance to primary schools, absolute structural social capital (i.e. the number of community groups in which the caregiver is a member), the number of children aged between 5 and 15 years in the household, the number of hours per day the child spends on household chores and whether or not the child is involved in paid work.

5.2.1 Implications for Education Policy

Our findings suggest that increasing child enrolment in school - a key policy goal of the SDPRP and the ESDP - will necessitate more targeted educational policies, especially in order to address significant disparities between boys and girls and among children in different regions of Ethiopia.

First, because distance is one of the major factors that affect enrolment, especially for rural children and girls, policy initiatives are needed that improve the proximity of schools in remote parts of the country and simultaneously address safety issues for girl children. While the most obvious policy option is to build more schools and develop a standard for equitable distribution of schools in a region or a *wereda* on the basis of acceptable distance (considering the topographic constraints) children could travel to school¹⁸, cost constraints represent a significant obstacle. That is, while the program cost for ESDP II is 15.1 billion Birr, the actual budget fixed for the program was only 11.5 billion Birr, and the budget shortfall was expected to be covered by reducing unit costs (MoE 2002). Another more realistic option is to develop lower-cost alternative education programs in under-provisioned areas, which following the successful pilots by NGOs in several regions of the country are now being rolled out by the Ministry of Education.

Indeed such alternative education programs not only address educational infrastructural shortcomings, but also help to address another issue that arose from our findings, namely that of finding a balance between the demands for children's labor (paid or unpaid) and school enrolment. Yet while the ESDP and SDPRP recognized non-formal education programs as a policy priority, budget commitments remain low (MoE, 2002). The exceptions are the Amhara and Oromia regions where such programs have been introduced with reasonable coverage (personal communication with the head of Amhara Region Bureau of Education)¹⁹. If the

¹⁸ For example, the 2002 Health Sector Development Program mandates that there should be a health clinic in a 10 km radius of every village.

¹⁹ NGOs such as Save the Children UK, the Save the Children Alliance members (Sweden, Norway, Denmark and USA), Action Aid and others have piloted Alternative Basic Education (ABE) in different parts of the country and have tried to influence regional governments to institutionalise it. It is cheaper to expand non-formal education than the formal First Cycle schools and, being more flexible, ABE may be better able to accommodate children's needs in poor communities. Currently concerned NGOs and the Ministry of

government is to achieve the educational Millennium Development Goal of universal primary education by 2015, it should consider expansion of ABEs to all the regions, wereda, and communities, with special emphasis on marginalised areas.

Given the strong positive association between female adult education and child enrolment, girls' education clearly has multi-purpose effects and investing in girls' education today at all costs (apart from education being a right on its own) is an investment in ensuring educated future mothers. In addition, our findings underscore the importance of (re)introducing adult literacy programs, especially for women. While the government has a number of adult and non-formal education programmes—programmes for out-of-school children aged 7-14, literacy programmes for young people and adults over the age of 15, and basic skills training for young people and adults—there are no specific programmes targeting female adult education. The dearth of such programmes needs to be addressed, given the strong positive association found here between adult female education and child enrolment. The case for investing in formal female education is further strengthened by the positive association between maternal education and child health and nutritional wellbeing (Christiaensen and Alderman, 2004).

However, while female adult education has a generally positive impact on child schooling, we found a more significant impact on boys' than girls' schooling. As discussed earlier there are several possible reasons: in the short term, girls are needed to help with household chores and childcare work, and thus mothers are likely to be less supportive of education for girls as they depend on daughters' unpaid labour. In the longer term, investing in boys' education will reap direct benefits when they reach adulthood and are expected to support the family through paid employment. Daughters by contrast marry into another family and the fruits of their labours benefit another family. This suggests then that it is not sufficient to simply rely on the argument that more educated mothers leads to greater school enrolment, but given the differential gender impact, focused government policy initiatives to boost girls' enrolment and attendance are called for. While there is an expressed commitment on the part of the government in the Education and Training Policy, SDPRP, Population Policy and Social Welfare Policy, to enhance girls' education in the country, a collaborative and inter-sectoral approach needs to be developed in order to give the urgent issue of improving girls' education the importance it deserves. Possible measures could include advocacy campaigns to encourage greater sharing of household tasks among all family members; the introduction of technology to save burdensome household tasks; the enforcement of the Family Law (which prohibits

Education are working to ensure that these ABE programs integrate with the formal system so a child could continue in the formal system after attending an ABE.

early marriage i.e. under 18 years of age); and empowerment programs for women (including adult literacy classes), which could potentially have a spill-over impact on the aggregate wealth of the household and children's educational attainment.

5.2.2 Implications for Inter-sectoral Policy

Given that our findings demonstrated that child enrolment is shaped by a number of external household livelihoods and community variables, achieving universal primary education for all is clearly also going to necessitate broader inter-sectoral policy initiatives. This section therefore discusses the economic and social policy implications of our findings.

Not surprisingly, we found that children from wealthier households (using household durable assets as a proxy for income) have a better chance of going to school than children from asset-poor households. We may therefore assume that policies geared towards wealth creation opportunities for poor households should raise the chances of child enrolment. Yet because children in poor households play a major role in augmenting household income, the returns from child work will also need to be substituted from another source such as increased parental income. Therefore policies directed towards increasing the income and assets of poor households should consider the impact that it will have on human development in terms of child schooling.

One of the central pillars of the Ethiopian PRSP, however, is the so-called Agricultural Development-Led Industrialisation Strategy, which being based on labour-intensive agricultural activity, is likely to increase the demand for child labour (MoFED, 2002b). Premised on the argument that in a capital-deficit country, such as Ethiopia, the alternative route to growth is the use of abundantly available labour (MOI, 2002), ADLI overlooks the role of children in the household economy. That is, adding extra activities to the household without a change in technology or the capacity to use hired adult labour increases the likelihood of children's greater involvement in agriculture and/or household reproductive responsibilities (such as childcare or domestic work) to compensate for the involvement of women or older siblings in non-domestic labour at the expense of their right to education and the future of the country²⁰ (ILO Convention 138).

²⁰ The effect on girls would be stronger if mothers are engaged in a day-long income generating activities away from the home because girls have to take over their mothers' domestic role at home: providing care for younger children, fetching water, cleaning the house, cooking meals, etc. In these circumstances girls would lose their chance of going to school or be withdrawn, if they were in school, because they have to replace their mothers to care for younger siblings.

Several specific policy initiatives could help mitigate these problems. First, the introduction of more time-efficient methods of keeping animals would help reduce the time children spend in tending livestock. There are a number of possibilities including:

- preparing sufficiently sizeable package of forage packages so as to reduce children's daily burden of taking animals to grazing areas;
- developing a shift system so children can balance school and work;
- reducing the number of cattle kept by households and encouraging a shift in focus from quantity to quality as is the case in the Harari region.
- providing enclosures for common grazing land where either pooled community labour (as is this case in *Guraghe* in the south of Ethiopia) or hired adult labour could be used to keep animals from different households and thereby release children to go to school. Such a strategy could be integrated within the agricultural extension system.

The ADLI strategy also envisages growth in household income will lead to improved standards of living and in turn rising demand for social services, including education (ibid.). However, without simultaneous investment by parents and the public in children's education (human capital) now, growth will be unsustainable, if not impossible. To ensure long-term benefits for children, a balance has to be created between work and education where working hours are minimised while at the same time maximising opportunities for other activities such as education and leisure. One good example is the recently launched joint donor-government conditional safety net initiative in food insecure areas. This safety net will cover food insecure households, and will involve food or cash transfers on the condition that the children are sent to school.

In addition to such food security measures, given the important negative impact of household economic shocks in our research, we would also underline the importance of developing policies and strategies that build up a household's resilience to events such as crop failure, reduced availability of food or a loss of livestock. Important here will be measures to reduce a household's dependence on rain and a single source of income, creating safety nets to mitigate the effects of shocks and making services (including markets and road infrastructure) accessible.

Lastly, our findings about social capital, suggest that the involvement of the broader community in promoting child education could be potentially important, but still requires further research to fully understand the underlying mechanisms. Our initial hypothesis, however, is that the main local organisations of which most caregivers are members, such as funeral societies, religious groups, and community groups, currently have a negative impact on schooling as they are more likely to reinforce conservative social ties, beliefs and values (see Table A7). In other words, the

assumption that absolute structural social capital facilitates information exchange among members has not been supported by our data. Yet, rather than concluding that group membership will not be able to play a positive future role in facilitating school enrolment, it could be argued that such groups lack the necessary information and awareness about educational services as they are mutually disadvantaged. The policy implication therefore would be to take advantage of the relatively large membership in religious and traditional community organizations to facilitate information sharing. Initiatives should be promoted to make information accessible to local groups and organisations about the importance of education and the availability of formal and non-formal educational services through community radio, civil society organisations, such as NGOs, and through government consultations, especially *wereda* administrations.

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Appendix: Output of probit models estimations

Table A1: Determinants of a child being in school: probit model (dep. var. = if the child is in school)

	(1)	(2)	(3)	(4)
	Probit regression of full model	Marginal effect for Probit regression of full model	Probit regression restricted model	Marginal effect for Probit regression of restricted model
Dummy for male child	-0.109 (1.19)	-0.036 (1.19)	-0.106 (1.16)	-0.035 (1.16)
Dummy for Amhara Region	0.497* (1.89)	0.148* (1.89)	0.487*** (3.58)	0.146*** (3.58)
Dummy for Oromia Region	-0.030 (0.14)	-0.010 (0.14)		
Dummy for SNNP Region	-0.296 (1.37)	-0.102 (1.37)	-0.227* (1.79)	-0.078* (1.79)
Dummy for Tigray Region	-0.128 (0.53)	-0.043 (0.53)		
Dummy for urban residence	0.380* (1.89)	0.123* (1.89)	0.382* (1.94)	0.123* (1.94)
Wealth index consumer durable	3.205*** (4.86)	1.062*** (4.86)	3.244*** (5.07)	1.075*** (5.07)
HH Size below 5 yrs old	0.027 (0.46)	0.009 (0.46)		
HH Size b/n the age of 5 and 15	-0.083* (1.92)	-0.028* (1.92)	-0.077* (1.82)	-0.026* (1.82)
HH Size above the age of 15	-0.099** (2.47)	-0.033** (2.47)	-0.092** (2.40)	-0.030** (2.40)
Maximum Grades completed by Male members of a HH	0.035** (2.32)	0.012** (2.32)	0.037** (2.48)	0.012** (2.48)
Maximum Grades completed by Female members of a HH	0.053*** (3.17)	0.018*** (3.17)	0.052*** (3.13)	0.017*** (3.13)
Dummy for male HH head	0.064 (0.49)	0.022 (0.49)		
Number of events that decreases the HH welfare	-0.056** (2.25)	-0.019** (2.25)	-0.062** (2.49)	-0.020** (2.49)
Cognitive Social Capital	0.141** (2.43)	0.047** (2.43)	0.138** (2.38)	0.046** (2.38)
Absolute structural social capital	-0.058 (1.21)	-0.019 (1.21)	-0.087** (2.19)	-0.029** (2.19)
# of organization from which one get social support	-0.032 (1.21)	-0.011 (1.21)		
Citizenship	0.102 (0.97)	0.034 (0.97)		
Dummy for HH owns or rent land	0.544*** (3.16)	0.184*** (3.16)	0.517*** (3.12)	0.175*** (3.12)
Dummy for the Ownership of livestock	-0.237* (1.91)	-0.076* (1.91)	-0.223* (1.83)	-0.072* (1.83)
Dummy for a child being involved in paid work	-0.303** (1.97)	-0.107** (1.97)	-0.318** (2.11)	-0.113** (2.11)
Number of hours a child spent on HH chores	-0.044** (1.97)	-0.015** (1.97)	-0.045** (1.97)	-0.015** (1.97)
Mean distance(KM)to public and private primary schools ¹	-0.062** (2.38)	-0.021** (2.38)	-0.055*** (2.61)	-0.018*** (2.61)
Constant	-0.244 (0.71)		-0.229 (0.74)	
Observations	1000	1000	1000	1000
Pseudo R ²	0.215		0.213	
Condition number	14.7		11.9	
Test of restriction	$\chi^2(5) = 1.75$ Prob> $\chi^2(5) = 0.88$			

Robust z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table A2: Determinants of a child being in school: probit model (dep. var. = if the child is in school) with mothers' and fathers' schooling as explanatory variables

	(1)	(2)	(3)	(4)
	Probit regression of full model	Marginal effect for Probit regression of full model	Probit regression of restricted model	Marginal effect Probit regression of restricted model
Dummy for male child	-0.100 (1.10)	-0.033 (1.10)	-0.090 (0.99)	-0.030 (0.99)
Dummy for Amhara Region	0.533** (2.04)	0.159** (2.04)	0.552*** (3.86)	0.164*** (3.86)
Dummy for Oromia Region	-0.021 (0.10)	-0.007 (0.10)		
Dummy for SNNP Region	-0.261 (1.20)	-0.090 (1.20)	-0.222* (1.72)	-0.077* (1.72)
Dummy for Tigray Region	-0.117 (0.49)	-0.040 (0.49)		
Dummy for urban residence	0.448** (2.24)	0.145** (2.24)	0.441** (2.24)	0.143** (2.24)
Wealth index consumer durable	3.614*** (5.41)	1.208*** (5.41)	3.570*** (5.61)	1.195*** (5.61)
HH Size below 5 yrs old	0.021 (0.38)	0.007 (0.38)		
HH Size b/n the age of 5 and 15	-0.036 (0.86)	-0.012 (0.86)		
HH Size above the age of 15	-0.032 (0.82)	-0.011 (0.82)		
Grades completed by the father of a child	0.006 (0.32)	0.002 (0.32)		
Grades completed by the mother of a child	0.025 (1.21)	0.008 (1.21)	0.025 (1.27)	0.008 (1.27)
Dummy for male HH head	0.076 (0.55)	0.026 (0.55)		
Number of events that decreases the HH welfare	-0.056** (2.27)	-0.019** (2.27)	-0.055** (2.24)	-0.019** (2.24)
Cognitive Social Capital	0.133** (2.32)	0.045** (2.32)	0.130** (2.25)	0.043** (2.25)
Absolute structural social capital	-0.050 (1.06)	-0.017 (1.06)	-0.048 (1.03)	-0.016 (1.03)
# of organization from which one get social support	-0.030 (1.14)	-0.010 (1.14)	-0.026 (1.05)	-0.009 (1.05)
Citizenship	0.101 (0.97)	0.034 (0.97)		
Dummy for HH owns or rent land	0.528*** (3.10)	0.180*** (3.10)	0.511*** (3.11)	0.174*** (3.11)
Dummy for the Ownership of livestock	-0.247** (2.02)	-0.080** (2.02)	-0.217* (1.79)	-0.071* (1.79)
Dummy for a child being involved in paid work	-0.285* (1.88)	-0.101* (1.88)	-0.273* (1.82)	-0.097* (1.82)
Number of hours a child spent on HH chores	-0.050** (2.25)	-0.017** (2.25)	-0.052** (2.34)	-0.017** (2.34)
Mean distance(KM)to public and private primary schools1	-0.065** (2.52)	-0.022** (2.52)	-0.069*** (3.04)	-0.023*** (3.04)
Birth order			-0.054** (2.05)	-0.018** (2.05)
Constant	-0.274 (0.80)		-0.151 (0.49)	
Observations	1000	1000	1000	1000
Pseudo R ²	0.213		0.203	
Condition number	14.7		11.9	
Test of restriction	$\chi^2(8) = 3.52$ Prob> $\chi^2(8) = 0.897$			

Robust z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; Full model means a model run with all potential variables included; and restricted model means a model run without variables whose t-values are less than one in the full model.

Table A3: Determinants of a child being enrolled in school by rural/urban residence (probit)

	(1)	(2)	(3)	(4)
	Urban	Rural	Urban	Rural
Dummy for male child	0.036 (0.18)	-0.149 (1.35)	-0.015 (0.08)	-0.128 (1.17)
Dummy for Amhara Region	0.746 (1.46)		0.715 (1.41)	
Dummy for SNNP Region	-0.952*** (3.84)	-0.573** (2.52)	-0.857*** (3.64)	-0.534** (2.35)
Wealth index consumer durable	1.252 (1.39)	5.465*** (5.66)	2.040** (2.28)	5.833*** (5.98)
HH Size below 5 yrs old	0.120 (0.83)	-0.017 (0.25)	0.104 (0.74)	-0.020 (0.30)
HH Size b/n the age of 5 and 15	-0.061 (0.72)	-0.071 (1.35)	0.015 (0.19)	-0.039 (0.77)
HH Size above the age of 15	-0.050 (0.66)	-0.123** (2.27)	0.063 (0.84)	-0.080 (1.54)
Maximum Grades completed by Male members of a HH	0.050 (1.59)	0.028 (1.50)		
Maximum Grades completed by Female members of a HH	0.100*** (3.10)	0.032 (1.46)		
Dummy for male HH head	0.234 (0.99)	0.070 (0.38)	0.243 (0.88)	0.107 (0.58)
Number of events that decreases the HH welfare	0.118* (1.73)	-0.063** (2.11)	0.105 (1.55)	-0.062** (2.08)
Cognitive Social Capital	0.030 (0.24)	0.154** (2.02)	-0.001 (0.01)	0.152** (2.00)
Absolute structural social capital	-0.013 (0.11)	-0.063 (1.09)	-0.007 (0.06)	-0.054 (0.93)
# of organization from which one get social support	-0.054 (0.70)	-0.042 (1.39)	-0.032 (0.42)	-0.044 (1.45)
Citizenship	-0.043 (0.18)	0.141 (1.11)	-0.030 (0.13)	0.137 (1.08)
Dummy for HH owns or rent land	0.138 (0.32)	0.477** (2.22)	0.069 (0.17)	0.483** (2.25)
Dummy for the Ownership of livestock	-0.514** (2.32)	-0.121 (0.70)	-0.534** (2.49)	-0.115 (0.67)
Dummy for a child being involved in paid work	0.019 (0.03)	-0.302* (1.72)	0.196 (0.33)	-0.288 (1.64)
Number of hours a child spent on HH chores	-0.020 (0.28)	-0.054** (2.12)	-0.060 (0.86)	-0.056** (2.20)
Mean distance(KM)to public and private primary schools1	0.048 (0.40)	-0.057** (2.12)	0.060 (0.53)	-0.060** (2.22)
Dummy for Oromia Region		-0.662*** (3.41)		-0.680*** (3.58)
Dummy for Tigray Region		-0.916*** (4.38)		-0.959*** (4.51)
Grades completed by the father of a child			0.002 (0.05)	-0.018 (0.74)
Grades completed by the mother of a child			0.042 (1.34)	0.032 (0.98)
Constant	0.232 (0.39)	0.275 (0.67)	0.378 (0.66)	0.236 (0.57)
Observations	350	600	350	600
Pseudo R ²	0.226	0.113	0.181	0.107

Absolute value of z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. For the urban model, +50 observation from Oromia dropped because it perfectly predicts the model (all children are enrolled in urban Oromia). Dummy for Tigray dropped because of perfect multicollinearity. For the rural model, dummy for Amhara Region dropped because of perfect multicollinearity.

Table A4: Determinants of a child being enrolled in school by sex of child (probit model)

	(1)	(2)	(3)	(4)
	Male children	Female children	Male children	Female children
Dummy for Amhara Region	0.440 (1.23)	0.806** (2.12)	0.449 (1.24)	0.648* (1.68)
Dummy for Oromia Region	0.141 (0.45)	-0.151 (0.45)	0.146 (0.46)	-0.237 (0.69)
Dummy for SNNP Region	0.172 (0.59)	-0.674** (2.19)	0.138 (0.47)	-0.756** (2.37)
Dummy for Tigray Region	0.012 (0.04)	-0.217 (0.59)	0.079 (0.23)	-0.325 (0.86)
Dummy for urban residence	0.637** (2.14)	0.313 (0.99)	0.587** (1.96)	0.226 (0.71)
Wealth index consumer durable	4.436*** (4.90)	3.051*** (3.33)	3.775*** (4.25)	2.749*** (2.95)
HH Size below 5 yrs old	-0.046 (0.56)	0.064 (0.76)	-0.063 (0.76)	0.083 (0.97)
HH Size b/n the age of 5 and 15	-0.087 (1.49)	-0.013 (0.21)	-0.115* (1.90)	-0.094 (1.47)
HH Size above the age of 15	-0.102* (1.81)	0.031 (0.53)	-0.134** (2.28)	-0.091 (1.48)
Grades completed by the father of a child	-0.024 (0.98)	0.048 (1.60)		
Grades completed by the mother of a child	0.007 (0.23)	0.048 (1.35)		
Dummy for male HH head	0.407* (1.95)	-0.202 (1.00)	0.301 (1.51)	-0.080 (0.41)
Number of events that decreases the HH welfare	-0.062* (1.69)	-0.054 (1.41)	-0.061* (1.68)	-0.056 (1.43)
Cognitive Social Capital	0.113 (1.33)	0.161* (1.78)	0.111 (1.31)	0.167* (1.78)
Absolute structural social capital	-0.166** (2.37)	0.053 (0.74)	-0.190*** (2.69)	0.064 (0.88)
# of organization from which one get social support	0.018 (0.48)	-0.078* (1.92)	0.017 (0.46)	-0.079* (1.92)
Citizenship	-0.039 (0.27)	0.323** (1.98)	-0.018 (0.13)	0.292* (1.78)
Dummy for HH owns or rent land	0.515** (2.03)	0.607** (2.27)	0.501** (1.97)	0.675** (2.52)
Dummy for the Ownership of livestock	-0.150 (0.87)	-0.380** (1.99)	-0.122 (0.71)	-0.404** (2.08)
Dummy for a child being involved in paid work	-0.201 (0.93)	-0.312 (1.19)	-0.207 (0.96)	-0.362 (1.37)
Number of hours a child spent on HH chores	-0.060* (1.79)	-0.032 (0.93)	-0.053 (1.59)	-0.027 (0.78)
Mean distance(KM)to public and private primary schools1	-0.027 (0.78)	-0.111*** (2.89)	-0.028 (0.80)	-0.107*** (2.78)
Maximum Grades completed by Male members of a HH			0.030 (1.40)	0.044* (1.88)
Maximum Grades completed by Female members of a HH			0.034 (1.44)	0.091*** (3.26)
Constant	-0.453 (0.87)	-0.324 (0.61)	-0.408 (0.78)	-0.196 (0.36)
Observations	510	490	510	490
Pseudo R ²	0.215	0.231	0.221	0.247

Table A5: Determinants of a child being enrolled in school by region (probit)

	(1)	(2)	(3)	(4)	(5)
	Amhara	Oromia	SNNP	Tigray	Addis Ababa
Dummy for male child	-0.546** (2.17)	-0.166 (0.73)	0.141 (0.79)	-0.367 (1.55)	-0.271 (0.66)
Dummy for urban residence	1.227** (2.15)		-6.418*** (10.00)	-0.109 (0.21)	
Wealth index consumer durable	5.330*** (2.73)	4.720*** (3.02)	3.507*** (2.85)	7.544*** (3.71)	1.376 (0.77)
HH Size below 5 yrs old	0.109 (0.67)	-0.244* (1.82)	0.282** (2.44)	-0.113 (0.76)	-0.039 (0.14)
HH Size b/n the age of 5 and 15	0.059 (0.55)	-0.224* (1.86)	0.088 (1.17)	-0.371*** (2.81)	-0.468** (2.39)
HH Size above the age of 15	0.008 (0.06)	-0.138 (1.40)	-0.014 (0.17)	-0.212* (1.73)	-0.245* (1.74)
Maximum Grades completed by Male members of a HH	0.063 (1.30)	-0.002 (0.07)	-0.018 (0.60)	0.147*** (3.27)	0.082 (1.15)
Maximum Grades completed by Female members of a HH	-0.029 (0.62)	0.139*** (2.90)	0.064** (1.99)	0.103** (2.15)	0.165** (1.98)
Dummy for male HH head	-0.114 (0.33)	0.748* (1.85)	0.253 (0.84)	-0.005 (0.01)	-0.103 (0.19)
Number of events that decreases the HH welfare	-0.026 (0.36)	-0.081 (1.51)	-0.049 (0.83)	-0.136** (2.05)	0.315 (1.52)
Cognitive Social Capital	0.058 (0.36)	0.246 (1.58)	-0.023 (0.18)	-0.177 (0.98)	0.024 (0.09)
Absolute structural social capital	0.455*** (2.69)	0.009 (0.07)	-0.403*** (3.62)	0.037 (0.36)	0.001 (0.01)
# of organization from which one get social support	-0.043 (0.50)	-0.056 (0.74)	0.004 (0.07)	-0.072 (1.01)	-0.327* (1.88)
Citizenship	0.107 (0.39)	0.065 (0.26)	0.200 (0.96)	0.186 (0.55)	0.713 (1.40)
Dummy for HH owns or rent land	0.990** (2.19)	0.421 (1.35)	-6.098*** (9.26)	-0.437 (0.87)	
Dummy for the Ownership of livestock	-1.033*** (2.90)	0.361 (1.21)	-0.084 (0.30)	0.068 (0.19)	-0.792 (1.55)
Dummy for a child being involved in paid work	-0.258 (0.78)	-0.438 (1.37)	-0.209 (0.66)		
Number of hours a child spent on HH chores	-0.112 (1.58)	-0.024 (0.45)	-0.031 (0.49)	-0.025 (0.57)	0.734* (1.84)
Mean distance(KM)to public and private primary schools1	0.085 (1.56)	-0.263*** (2.99)	+	-0.193** (2.51)	
Constant	-0.845 (0.95)	-0.581 (0.80)	6.114 (.)	2.192** (2.01)	1.068 (0.75)
Observations	200	200	249	200	148
Pseudo R ²	0.256	0.336	0.190	0.376	0.318

+ Mean distance (KM) to public and private primary schools1 for SNNP dropped because of perfect multicollinearity. The same is for urban residence dummy for Oromia, dummy for child work for Tigray, residence dummy and mean distance to primary school for Addis Ababa.

Table A6: Determinants of a child being enrolled in school by region (probit)

	(1)	(2)	(3)	(4)	(5)
	Amhara	Oromia	SNNP	Tigray	AA
Dummy for male child	-0.516** (2.08)	-0.159 (0.71)	0.114 (0.63)	-0.196 (0.88)	-0.217 (0.59)
Dummy for urban residence	1.317** (2.32)		-6.595*** (10.33)	0.135 (0.27)	
Wealth index consumer durable	5.237** (2.56)	5.321*** (3.43)	3.656*** (3.01)	7.717*** (4.02)	2.502 (1.40)
HH Size below 5 yrs old	0.019 (0.12)	-0.194 (1.49)	0.299*** (2.58)	-0.239* (1.72)	-0.075 (0.29)
HH Size b/n the age of 5 and 15	0.084 (0.83)	-0.136 (1.21)	0.108 (1.46)	-0.174 (1.50)	-0.353** (2.06)
HH Size above the age of 15	0.073 (0.66)	-0.067 (0.72)	0.026 (0.29)	-0.020 (0.19)	-0.071 (0.61)
Grades completed by the father of a child	0.073 (1.08)	-0.005 (0.12)	-0.057 (1.64)	0.023 (0.27)	0.003 (0.05)
Grades completed by the mother of a child	0.077 (1.03)	0.074 (1.24)	0.071* (1.73)	0.093 (0.85)	0.009 (0.16)
Dummy for male HH head	-0.171 (0.49)	0.640 (1.62)	0.410 (1.24)	0.157 (0.49)	0.033 (0.06)
Number of events that decreases the HH welfare	-0.028 (0.39)	-0.087* (1.66)	-0.051 (0.87)	-0.114* (1.83)	0.241 (1.29)
Cognitive Social Capital	0.042 (0.25)	0.258* (1.69)	-0.040 (0.31)	-0.086 (0.53)	-0.068 (0.30)
Absolute structural social capital	0.455*** (2.62)	0.013 (0.10)	-0.415*** (3.63)	0.013 (0.13)	0.056 (0.27)
# of organization from which one get social support	-0.061 (0.70)	-0.045 (0.61)	-0.003 (0.06)	-0.065 (0.95)	-0.211 (1.33)
Citizenship	0.044 (0.16)	0.071 (0.29)	0.185 (0.89)	0.169 (0.52)	0.543 (1.26)
Dummy for HH owns or rent land	1.076** (2.36)	0.268 (0.90)	-6.281*** (9.54)	-0.390 (0.82)	
Dummy for the Ownership of livestock	-1.032*** (2.89)	0.374 (1.29)	-0.065 (0.23)	0.024 (0.07)	-0.665 (1.49)
Dummy for a child being involved in paid work	-0.306 (0.91)	-0.483 (1.49)	-0.153 (0.48)		
Number of hours a child spent on HH chores	-0.102 (1.43)	-0.035 (0.68)	-0.044 (0.71)	-0.042 (1.01)	0.406 (1.19)
Mean distance(KM)to public and private primary schools1	0.094* (1.71)	-0.246*** (2.87)		-0.192*** (2.68)	
Constant	-0.973 (1.08)	-0.654 (0.92)	6.316 (.)	1.596 (1.59)	1.529 (1.25)
Observations	200	200	249	200	148

Absolute value of z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table A7: Components of absolute structural social capital

Group type	Percentage of caregivers who are members of the group
Trade union	4.1
Community association	16.5
Women's group	26.4
Political group	2.3
Religious group	37.8
Credit group	9.9
Funeral group	62.3
Sports group	0.5

Table A8: Construction of wealth index

Components of index and score	Contributing variables
H = Housing quality (/4)	Rooms/person, wall, roof, floor durability.
CD = Consumer Durables (/11)	Radio, fridge, bicycle, TV, motorbike/scooter, motor vehicle, mobile phone, landline phone, modern bed, table or chair and sofa.
S = Services (/4)	Electricity, water, sanitation, cooking fuel.
Wealth Index = (H+CD+S)/3	Range = 0.0 – 1.0

Table A9: Definition of social capital YL uses

Four types of social capital were measured, namely, absolute structural social capital, social support, cognitive social capital and citizenship each of which are described below. *Absolute structural social capital (ASSC)* is defined based on the number of groups to which the caregiver belongs. Absolute structural social capital is categorized as high if the number of groups to which the caregiver belongs is three or more; as medium if the number of groups is one to two and zero if the caregiver is not a member of any group. *Social support (SS)* type of social capital is based on whether or not the caregiver has received support (emotional, economic or other) from either groups or individuals, in the year before the survey. It is considered high if a caregiver gets help from five or more groups and medium if the caregiver gets help from one to four groups. *Cognitive social capital (CSC)* is based on the caregiver's perceptions of the local community. The index of cognitive social capital is a combination of the responses to the questions on whether the caregiver feels she/he is part of the community, whether she/he feels people in general can be trusted, whether she/he feels people would try and take advantage of her/him if they could, and whether she/he feels people generally get along with each other. If the caregiver's response is positive for at least three of these they have high cognitive social capital, medium if they give only one or two positive answers and if all questions are answered negatively, we categorized them as having no cognitive social capital. *Citizenship (CIT)* is based on whether or not the caregiver has worked with others in the community to address a common issue. The citizenship index looks at the questions about joining together to address common issues and/or talks with the local authority on problems of the community. This index is a dichotomous (0 or 1) variable. The index is given a value '1' if the caregiver either joins together with others to address common issues or talks with the local authority about problems in the community. Otherwise '0' was given.