

# RURAL NONFARM SECTOR AND POVERTY: EVIDENCE FROM SOME VILLAGES OF AMHARA REGION, ETHIOPIA<sup>1</sup>

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## *Abstract*

*This study examines the effect of poverty on participation and intensity of rural nonfarm sector (RNFS) in some villages of Amhara region of Ethiopia. Probit and censored-Tobit regressions were run on a pooled data of 366 random rural households from the last two rounds (2004 and 2009) of the Ethiopian Rural Household Survey. The results of the study reveal that poverty does have a significant effect on households' participation in and income share of RNFS. Both participation and intensity are estimated to be higher for the poor. More specifically, compared to the non-poor, those who persistently fell into poverty throughout the five-year period are more likely to participate. Income share of RNFS is higher for households owning less number of oxen. Besides poverty indicators, controls such as credit, crop and labor prices as well as locational and time dummies are found as other significant determinants of both participation and intensity. The findings imply that rural intensification of the existing micro-credit schemes and improvement of rural institutions and infrastructure that promote the functioning of rural labor markets are crucial to initiate and deepen the engagement of the rural poor in RNFS.*

**Keywords:** rural nonfarm sector; poverty; Amhara region; Ethiopia

**JEL Classification:** D13, J22, J32, Q12

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## 1. Introduction

Land and labor are obviously the most viable factors of production in the Ethiopian rural setting. On the one hand, land is alarmingly becoming too scarce. On the other hand, however, primarily due to high fertility rates, total population and working force in rural areas is increasing. Explaining the prevalence of high youth unemployment/underemployment rates in rural Ethiopia are also lack of adequate urban jobs for rural-urban migrants and their low literacy levels. Although agricultural production and productivity could be augmented through extensive use of other complementary inputs such as fertilizer, there is still a limit given the fixed land. Coupled with the seasonal nature of many farm activities, all those could open a good ground for rural residents to participate in some form of nonfarm activities. The youth may get organized and participate in micro and small scale business and manufacturing activities thereby reducing rural unemployment and thus rural-urban migration in line with one of Todaro (1969)'s conclusions.

Studies make use of various terminologies and definitions to refer to rural nonfarm activities (RNFA). Terms such as 'nonfarm', 'off-farm' and 'non-agricultural', are frequently used to explain perhaps similar types of activities. Though the term 'nonfarm' is used in this paper, no distinction is made between those terms. Following Lanjouw and Lanjouw (2001) and Atamanov and van den Berg (2012), the current study considers rural nonfarm activities as all economic activities in rural areas except primary activities (crop and livestock production, fishing and hunting). Remittances, however, are excluded as they do not represent an income from the supply of household resources (Lemi, 2009). The types of RNFA rural dwellers could get income from and/or complement their agricultural incomes in Ethiopia are quite heterogeneous and may generally of wage employment and self-employments. Woldehanna (2002) identified such wage employment activities as paid community development work or food-for-work, farm work and manual work in construction, masonry and carpentry; and self-employment activities like small trading, transporting goods by pack animals, selling fuel-wood, making charcoal, selling fruits, making pottery and handicrafts and stone mining. In many instances, it is observed RNFA in Ethiopia are highly related with the agricultural sector.

Rural nonfarm sector (RNFS) plays a pivotal role in the rural economies of many developing countries. It accounts for roughly 25% of fulltime rural employment and 35-40% of rural incomes across the developing world (Haggblade *et al.*, 2002) and as

much as 40%, 32% and 42% of average household income in Latin America, Asia and Africa respectively (Reardon *et al.*, 2000). In Ethiopia, the sector was found to have an income share of 17% in 1994 (Lemi, 2009) and this became 14% in 2004 and 25% in 2009. In the Amhara region of the country, a region of over 18 million people and on which this study focuses, RNFS is a sector from which some 25% and 23% of rural dwellers make some form of livelihood in 1994 and 1997 respectively (Lemi, 2009), reaching as high as 37% in 2009. The literature on what factors motivate people to participate in the RNFS generally identifies two micro-level determinants—push factors and pull factors (Barrett *et al.*, 2001; Davis *et al.*, 2009). The former include households' efforts to manage income risk in agriculture via income diversification and to cope with short-term shocks such as drought while the latter are attributed to households' attempts to reduce risk or increase returns from RNFS.

RNFS as related to poverty is found to be worth examining for a number of reasons. Firstly, the empirical literature on the effect of poverty on participation in and intensity of nonfarm activities provides mixed results elsewhere (Lanjouw and Murgai, 2009; Malek and Usami, 2009; Bagamba *et al.*, 2009; Sanusi, 2011; Atamanov and van den Berg, 2012). Secondly, studies linking RNFS to poverty in Ethiopia at national and regional levels are quite lacking. Moreover, the existing studies, in addition to being inconclusive, either (i) are made at a point in time and hence incapable of capturing the overtime changes (Woldehanna, 2002; van den Berg and Kumbi, 2006; Kimhi, 2011) or (ii) do not take into account the effects of the recent economic growth in the country and the dynamics of poverty (Lemi, 2009; Bezu *et al.*, 2012). To date, no in-depth analysis of RNFS in the Amhara region of Ethiopia has been made. This inadequacy in literature may be held responsible for the lack of clear policy and institutional support to the sector at different administrative levels. The present study tries to address those issues by considering a longitudinal data set.

Lastly, poverty reduction is at the forefront of the agenda of the Ethiopian government. According to a recent report, yet 29.6% of the country's total population and 30.4% of the rural population live below the national poverty line in 2010/11 (MoFED, 2012). In Amhara region, these figures are slightly high, reaching 30.5% totally and 30.7% in rural areas. It is, hence, imperative to look into all the possible ways of tackling poverty, one of which could be rural dwellers' engagement in nonfarm activities. It is said that a high growth in the agricultural income alone is insufficient to achieve rapid reduction in rural poverty. This is so because such growth applies mainly to those with access to the key factors of production (land and water) and because growth linkage effects on

incomes in the rural non-agricultural sector are small. It may, therefore, be critical to encourage the nonfarm sector to bring about rapid rural poverty reduction in virtually all sides. In areas where landlessness prevails, rural nonfarm activity offers important economic alternatives for the rural poor (Haggblade *et al.*, 2002). Moreover, income from agriculture is subject to high risk due to climatic factors, price fluctuations, pests and diseases (van den Berg and Kumbi, 2006). Earnings from nonfarm employment may thus help buffer the resulting income fluctuations and improve household security (Lanjouw and Lanjouw, 2001).

The basic purpose of this study is, therefore, to measure the effect of socioeconomic status on participation and intensity of RNFA. It specifically seeks to ascertain how poverty contributes to rural households' participation in and income share from RNFS in the Amhara region of Ethiopia. It uses a five-year-gap longitudinal data of the 2004 and 2009 harvest years. The selected years may be relevant to capture the effects, if any, of economic growth witnessed in a row from 2004 and the associated price increments in the country.

The remainder of the article is structured as follows. Section two briefly reviews the literature. Section three discusses about issues related to data and econometric model while the fourth section is devoted to results and discussion. Section five finally provides concluding remarks.

## **2. Brief review of the literature**

Despite the virtually-conclusive literature on the various roles played by the rural nonfarm sector (highlighted in the introduction), the literature on the determinants of participation in and intensity of RNFS is yet undecided. Though coming up with different signs and magnitude, the majority household and individual level studies identified demographic (age, family size, dependency ratio, gender), seasons, other income and assets, wages, education, access to infrastructures, etc. as the important determinants (Abdulai and Delgado, 1999; Arif *et al.*, 2000; Matshe and Young, 2004; Lanjouw and Murgai, 2009; Bagamba *et al.*, 2009; Lemi, 2009; Sanusi, 2011; Atamanov and van den Berg, 2012).

For instance, Bagamba *et al.* (2009) find that education and road access have positive effects on the amount of time allocated to off-farm activities in Uganda. Matshe and Young (2004) also find, for Zimbabwe, that gender (in favor of men), education

(positive) and assets (positive) have significant effects in participation while these same variables affect the hours worked (intensity) in off-farm in opposite signs and different sizes. Such dissimilar effects of factors in participation and intensity are also evidenced using Kyrgyz data by Atamanov and van den Berg (2012) for livestock ownership (negative in the former and positive in the latter).

A similar inconclusiveness is also observed in the literature on the effect of poverty on engagement in and intensity of RNFA. Several studies analyze one or more indicators of socioeconomic status of households or individuals as determinants and results are far from obvious (Arif *et al.*, 2000; Barrett *et al.*, 2001; Lanjouw and Shariff, 2002; Lanjouw and Murgai, 2009; Malek and Usami, 2009; Bagamba *et al.*, 2009; Sanusi, 2011; Atamanov and van den Berg, 2012).

On the one hand, since the poor usually have lower 'reservation' wages, they end up participating more and getting more share of their consumption expenditure from RNFS (Lanjouw and Shariff, 2002). An alternative argument may be that the rural poor, compared to their non-poor counterparts, have little choice but to diversify out of farming into some form of unskilled off-farm labor (Barrett *et al.*, 2001). They are usually landless rural households so that even a low return from participation in RNFS may contribute to enhance income of households (Arif *et al.*, 2000). Poorer household heads are more likely to participate in nonfarm activities than non-poor household heads and that they earn more income in the *Ibarapa* area, Nigeria (Sanusi, 2011).

On the other hand, the better educated, usually the rich, have more freedom to choose among a wider range of options (Barrett *et al.*, 2001) and thus tend to have more opportunities for non-agricultural employment (Lanjouw and Shariff, 2002). Liquid asset-rich households in terms of livestock receive higher nonfarm incomes in Kyrgyzstan (Atamanov and van den Berg, 2012).

Not all RNFA are feasible for the rural poor. Many studies have thus tried to disaggregate RNFA for better empirical scrutiny (Arif *et al.*, 2000; Malek and Usami, 2009; Lanjouw and Murgai, 2009). In India, the poor get significant shares of income from casual nonfarm wage employment (Lanjouw and Shariff, 2002); casual labor and self-employment in the nonfarm sector reveals greater involvement by disadvantaged groups in 2004 than in the preceding rounds (Lanjouw and Murgai, 2009). According to Arif *et al.* (2000), the poor concentrate in construction, transport and manufacturing sectors in Pakistan. In Bangladesh, land-poor households are most likely to earn

income from low-return non-farm wage employments, for example, nonfarm daily labor (Malek and Usami, 2009).

The few available studies in Ethiopia linking poverty and RNFS are also no different (Woldehanna, 2002; van den Berg and Kumbi, 2006; Kimhi, 2011; Lemi, 2009; Bezu *et al.*, 2012). The first three are region-specific studies made respectively in Tigray, Oromia and Southern Nations, Nationalities and People's regions of the country. The last two are based on a national data and employ previous rounds of the same survey the current study uses. According to Woldehanna (2002), rural people participate in nonfarm activities when agriculture is unable to support the growing population. The study reveals further that district level service trades, small enterprises and microenterprises are negatively correlated with farm output supporting the residual sector hypothesis that nonfarm activities absorb workers who cannot be readily absorbed into agriculture. van den Berg and Kumbi (2006) show that the coefficient for own cultivated land, the most important productive asset, is negative and significant for all three activities, indicating that poorer households earn more income from the nonfarm sector. In a gender-wise analysis, Kimhi (2011) finds that female nonfarm income is the only income source that significantly reduces per-capita income inequality which implies that RNFS is pro-poor.

Capturing socioeconomic differential by crop production and sales in different seasons and livestock value, Lemi (2009) finds that the increased production and sale of part of production during the main harvest season leads households to engage less in off-farm activities. His result supports the view that mainly cash-poor farmers tend to engage more in off-farm activities and that RNFA are practiced as a means of subsistence when crop production fails. His findings also confirm that an increase in the value of livestock lowers both participation and intensity of off-farm activities. However, the recent study of Bezu *et al.* (2012) comes across that relatively wealthy households benefit more from RNFS participation than do poorer ones.

The current study, at least by examining the effects of dynamic and persistent household socioeconomic status to participation in and intensity of RNFS, while still retaining the traditional determinants, will be different from previous studies linking socioeconomic status and RNFS.

### 3. Methodology

#### 3.1 Theoretical model of the study

Following Strauss (1986) and Abdulai and Delgado (1999), the economic model of the study is summarized below. It is assumed that goods produced at home and purchased from the market by a household are perfect substitutes. Hence, people are assumed to be indifferent to whether the goods and services they consume are produced at home or purchased in the market. Households in the model therefore allocate each of their members' time endowment among three main activities: farm production, nonfarm production and leisure.

Given those assumptions, the final decision problem will be to choose the quantity of consumption goods to purchase ( $Q$ ), the hours of farm work ( $F$ ) and nonfarm work ( $F_{nf}$ ), and the quantity of purchased non-labor farm inputs ( $X$ ) so as to maximize household utility ( $U$ ). This can be expressed as:

$$\zeta = U(Q, L; Z, S) + \eta(T - F_f - F_{nf} - L) + \psi[W_{nf}F_{nf} + P_y Y(F_f, H, X; G, M, S) - P_x X - W_f H + R - PQ] \quad (1)$$

where  $L$  is leisure time;  $T$  is total household time endowment;  $Z$  is a vector of (household) demographic and socioeconomic characteristics;  $S$  is fixed effects of sub-location like the state of infrastructure;  $Y$  is output produced from the farm;  $P_y$  is price of farm output;  $H$  is hired labor;  $W_f$  is farm wage rate;  $W_{nf}$  is nonfarm wage rate;  $P$  is price of consumption goods;  $G$  is household characteristics affecting production decisions;  $M$  is fixed factors such as land;  $R$  is non-labor income such as land rent, nonfarm assets, and transfers received;  $P_x$  is price of non-labor farm inputs;  $\eta$  is the Lagrangian multiplier associated with the inequality constraints on the work of each labor type; and  $\psi$  is the Lagrangian multiplier associated with the income inequality constraint.

When households allocate time to the three activities, one may proceed to obtain the structural demand functions for farm labor and leisure as:

$$F_f^* = F_f(W_f, W_{nf}, P_y, P_x; G, M, S) \quad (2)$$

$$L^* = L(W_f, W_{nf}, P_y, P_x; P, R; Z, G, S) . \quad (3)$$

The corresponding nonfarm labor supply function then becomes (since  $F_{nf}^* = T - F_f^* - L^*$ ):

$$F_{nf}^* = F_{nf}(W_f, W_{nf}, P_y, P_x; P, R; Z, G, S) \quad (4)$$

The reservation wage for nonfarm work is the marginal value of the individual's time when all of it is allocated to farm labor and leisure. It is obtained from Equation (4) by setting nonfarm hours worked equal to zero (i.e,  $F_{nf} = 0$ ), and solving for  $W_{nf} = W_{nf}^r$ . It is given by:

$$W_{nf}^r = W_{nf}^r(P_y, P_x, P, W_f, W_{nf}, R; Z, G, S). \quad (5)$$

As the initial assumption of perfect markets leading to separation of household production and consumption does not seem to work in underdeveloped markets, such as in Ethiopia, a sort of adjustment is required. Arcand and d'Hombres (2006) consider different forms of market imperfections and analyze their effects on the optimal results derived earlier. These sources of non-separability include: credit constraints, labor market imperfections, marketing constraints, tenancy (or sharecropping) market and insurance market failure. Various constraints measuring the majority of those sources are, therefore, added to the previous models in the empirical estimation.

### 3.2 Empirical model and estimation issues

The empirical reservation and nonfarm wage equations (Huffman, 1989; Abdulai and Delgado, 1999) can be defined as:

$$W_{it}^r = \phi_1 C_{1it} + u_{1it} \quad (6a)$$

$$W_{it}^m = \phi_2 C_{2it} + u_{2it} \quad (6b)$$

where the  $C_{it}$  are exogenous explanatory variables such as household and sub-locational characteristics; and  $u_{1it}$  and  $u_{2it}$  are random disturbance terms.

A nonfarm work participation indicator variable ( $Z_{it}^*$ ) for household  $i$  can be defined as:

$$Z_{it}^* = \begin{cases} 1 & \text{if } W_{it}^m > W_{it}^r \text{ i.e., a household's member participates in RNFS} \\ 0 & \text{if } W_{it}^m < W_{it}^r \text{ i.e., a household's member does not participate in RNFS} \end{cases} \quad (7)$$

Since  $u_{1it}$  and  $u_{2it}$  are random variables, the probability of participating in RNFS can be:

$$\begin{aligned} Pr(Z_{it}^*) &= Pr(W_{it}^m > W_{it}^r) = Pr(u_{1it} - u_{2it} < \phi_2 C_{2it} - \phi_1 C_{1it}) = F_v(\phi C_{it}) \\ &= \phi C_{it} + v_{it} \end{aligned} \quad (8)$$

where  $v_{it} = u_{1it} - u_{2it}$ ;  $\phi C_{it} = \phi_2 C_{2it} - \phi_1 C_{1it}$  and  $F(\cdot)$  is a cumulative distribution function for the random variable  $v$ . Different poverty indicators will be incorporated in the vector of variables  $C_{it}$  as variables of interest.

The reduced-form nonfarm labor supply ( $F_{nit}$ ) functions can be specified as:

$$F_{nit} = \beta X_{it} + \varepsilon_{it} \quad (9)$$

The vector  $X$  represents the independent variables specified on the right-hand side of Equation (4) and  $\phi$  and  $\beta$  are vectors of parameters to be estimated.

The important models to be estimated ultimately are Equation (8) measuring participation in RNFA and Equation (9) measuring intensity of RNFS. For estimation of the model in Equation (8), the dependent variable is whether or not a member of the household participates in any type of nonfarm activity in the last four months before the respective surveys of 2004 and 2009. In the absence of well-organized RNFS labor supply data in the ERHS, the share of cash income from RNFS in consumption expenditure is considered as a dependent variable in Equation (9). A similar approach is also pursued by Lemi (2009) and Bezu *et al.* (2012). While the participation Equation (8) is estimated using probit, censored-Tobit regression is run on the intensity Equation (9). The pooling of observations is compensated by introducing year dummy as a control variable.

The study's variables of interest are variables measuring whether a household is in poverty (the conventional consumption-poverty) and other asset-poverty indicators such

as number of oxen and size of cultivated land during the main harvesting season. Interactions of consumption-poverty variable with year dummies are also considered to capture the effects of the dynamism and persistency of poverty. Control variables include demographic characteristics such as age and family size, average food crop prices in a nearby market to the village, land size covered by major crops, livestock ownership, various sorts of shocks that might have been faced such as drought, *etc.* (Table A1 of the Appendix contains description of all the variables.)

One concern here is the possible endogeneity of the poverty-indicating ‘explanatory variables’. While they affect decision of participation and intensity of RNFS, it may also happen that they themselves are determined by other factors including income from RNFS so that parameters become biased. Such a possibility could be checked by estimating two regressions, first without the indicators and next with the indicators, thereby comparing the signs and magnitudes of the coefficients of the common covariates. If there is no significant difference, then the concern is not severe (Lemi, 2009). Though this is not an ideal way of testing endogeneity, it at least helps to check its severity. This exercise, applied to our data, shows that there is no severe problem of endogeneity.

### **3.3 The data and descriptive statistics**

#### **The data**

The study employs data from the Ethiopian Rural Household Survey (ERHS), a unique longitudinal survey of seven rounds to date. Though initiated by the International Food Policy Research Institute (IFPRI) in 1989 in only six peasant associations (PAs), the current format started in 1994 encompassing 1477 households in 15 PAs and across four regions of the country. In addition to two 1994 rounds, the survey was conducted in 1995, 1997, 1999, 2004 and 2009. These round surveys were undertaken by the cooperative efforts of the Department of Economics at Addis Ababa University, IFPRI and the Center for the Study of African Economies at Oxford University. While sample households within villages were randomly selected, the villages themselves were chosen to ensure that the major farming systems are represented. However, the 15 villages included in the sample are not statistically representative of all rural Ethiopia. In addition, the sample does not include pastoral households.

For the specific purpose of the study, use is made only of the last two rounds, 2004 and 2009, and part of the data collected in the Amhara region of the country. Households in those rounds were interviewed from three administrative zones of the region – North *Shoa* (NS), North *Wollo* (NW) and East *Gojjam* (EG). The following PAs were then chosen: *Dinki*, *Yetmen*, *Shumshesha*, *Debrebirhan Milki*, *Debrebirhan Kormargefia*, *Debrebirhan Karafino* and *Debrebirhan Bokafia*. In this paper, the last four PAs are aggregated as *Debrebirhan zuria*. The study finally employs a balanced panel data set from 366 households interviewed in the above PAs of Amhara region in each of the two rounds.

### Descriptive statistics

As presented in Table 1, almost all relevant economic variables show a nominal increment on the average in 2009 compared to their 2004 values. Exceptions are for real per capita consumption and land covered by major food crops in the region, each of which register a huge reduction. The mean of cash obtained from participation in nonfarm sector has increased by more than three-fold while its share in consumption has increased from as small as 10% to over 16% between 2004 and 2009. Not surprisingly, average food crop prices and daily wages in the nearby markets to the peasant associations have shown a sharp rise during the five-year period.

**Table 1: Descriptive statistics of some socioeconomic and demographic variables: Amhara region**

Variable	2004				2009			
	N	Mean	Min.	Max.	N	Mean	Min	Max
Age of household head	366	51.61	19	89	366	53.66	18	100
Household size	366	5.19	1	14	366	5.21	1	12
Cash income from nonfarm	366	46.10	0	1770	366	146.62	0	5564
Real per capita consumption expenditure (in 1994 prices)	366	118.65	14.53	1109.39	366	64.70	3.60	256.56
Share of nonfarm income	366	0.10	0	2.84	366	0.16	0	6.85
Farm wage in a PA, average (br/day)	366	5.67	5	6.25	366	16.33	13.25	18
Price of major food crops, average (br/kg)	366	1.89	1.68	2.10	366	5.34	3.8	6.7
Area covered by major crops (ha)	366	2.15	0	14.44	366	1.11	0	10
Total number of oxen	366	1.20	0	8	366	1.38	0	5
Tropical livestock unit	366	4.36	0	19.35	366	7.70	0	38.38

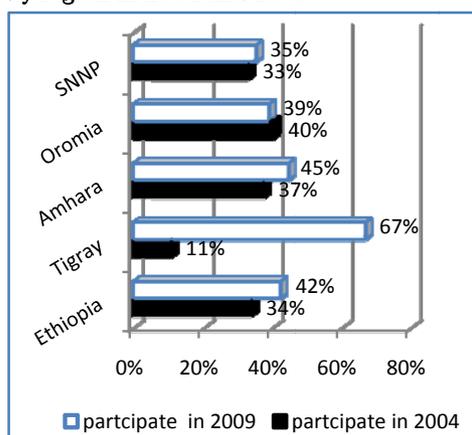
Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

## 4. Results and discussion

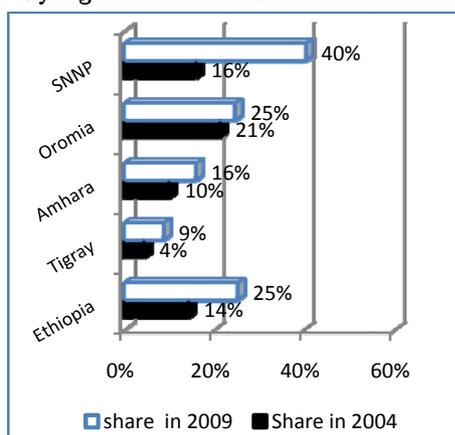
### 4.1 Overview of rural nonfarm activities and poverty in Amhara region

The national and regional participation rates and shares of rural nonfarm sector in 2004 and 2009 are shown in Figures 1A and 1B. Though the agricultural sector still remains to be the dominant employer of people in rural Ethiopia, RNFS is also increasing in importance. 34% of the nationwide sample households in 2004 had at least one member participating in the sector, rising to 42% in 2009. And over a quarter of the consumption expenditure of households in 2009 was covered by cash income from RNFS, an increase by over 10 percentage points in five years time.

**Figure 1A: RNFS participation rates by region in 2004 and 2009**



**Figure 1B: Mean RNFS income shares by region in 2004 and 2009**



Note: SNNP=Southern Nations, Nationalities and Peoples

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

Besides those seasonal differences, there also exist regional differences in both participation and income shares during the survey periods. In terms of participation, a surge has been observed in the Tigray region of the country in 2009 while other regions did not show much deviation from the national averages of the respective years. Rural households in SNNP saw the largest rise in their shares of RNFS income in 2009. The shares have also increased in all other regions. Unlike the participation in 2009 in rural Tigray, the shares figures remain small compared to other regions. RNFS participation

rate in rural Amhara region in 2004 was 37% which rose to 45% in 2009. These compare with 25% in 1994 and 23.3% in 1997 (Lemi, 2009).

In Table 2, average real per capita consumption expenditures by region and year for a balanced panel of both RNFS participating and non-participating households are presented. Sampled households saw a fall in their real consumption in an unprecedented manner over the five-year period, both nationally and across regions. This reduction in consumption was highest in Tigray and lowest in Oromia. The number of households falling in poverty showed an almost similar trend. As presented in Table A2, except in Oromia region, increases in both neighborhood and absolute poverty were seen for the similar households followed in 2004 and 2009. The increase in poverty in Amhara region is despite an average 8.5% per capita output growth recorded in the country during the same period and a recent government report of falling rural poverty in 2010/11 to only about 31% in the region (MoFED, 2012).

**Table 2: Mean rural household real per capita consumption expenditure\* in 2004 & 2009 by region**

	Ethiopia	Tigray	Amhara	Oromia	SNNP
Real per capita consumption expenditure in 2004	90	74	119	92	65
Real per capita consumption expenditure in 2009	58	28	65	84	41
Balanced panel of households in each survey year	1210	132	366	329	383

\*In 1994 prices.

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

The types of nonfarm activities in Amhara region seem to provide a possible explanation to the above finding. The majority of the activities are created by the government. For instance, in the region during 2009, over 38% of the participants end up in food-for-work, paid community development activities to support poor and food insecure families. Others include paid farm works, skilled activities like carpentry, professional activities like teaching, religious works, guarding, and other unskilled activities (see Table A3 in the *Appendix*).

More detailed descriptive statistics may provide extra insights into the links between poverty RNFS. As can be seen from Table 3, out of the 366 rural households followed

in 2004 and 2009 in Amhara region, the engagement of the poor in RNFA has shown a rise in 2009. It reached 49% from only 32% in 2004. Once again, the rise in participation by the poor in the sector goes in line with the increase in rural poverty in the region between 2004 and 2009 (see Table A2). This supports the view that many RNFS participants could be the poor as many of such activities do not require special skills and are usually low-return (Barrett *et al.*, 2001). However, a marginal reduction in the share of RNFS income for the poor over time was observed while it almost doubled for the non-poor.

**Table 3: RNFS participation rate (% of households) and mean RNFS income share (% of consumption expenditure) by poverty status: Amhara region, 2004 and 2009**

	poverty status: 2004			poverty status: 2009		
	non-poor	poor	total	non-poor	poor	total
RNFS participation rate (%)	39	32	37	41	49	45
RNFS income share (%)	7	22	10	13	20	16

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

A further scrutiny could also be made by relating RNFS participation and income shares to poverty status relative to neighboring households. As shown in Table A4 (of the Appendix), the first 20% poorest, who had only 32% participation rate in 2004, increased their participation to about 53% in 2009. It is simple to notice that participation dominance in nonfarm activities was reverted among the poor and the non-poor during the five-year period in favor of the poor. The shares figures, however, did not show any regular trend; though households in the first quintile saw a more-than-doubled share in five years, those in the fourth quintile (the second richer) did the same.

## 4.2 The effect of poverty on RNFS in rural Amhara region

In this sub-section, we present and discuss the econometric results of the study, composed of estimation of participation and intensity models. The probit estimation results of the participation model are presented in Table 4. Only marginal effects of the corresponding variables of interest and controls are shown. The model is estimated on 732 observations (366 households pooled in two years). A total of 14 and 19 variables

were fit as possible covariates in each of the ‘without’ and ‘with’ estimations respectively. As noted earlier, there are no significant differences between the signs and sizes of the common significant coefficients of these two estimations so that our analyses below will be based on the ‘with’ results.

Two of the socioeconomic status indicators used in the estimation, which are created by interacting poverty dummy with year dummies, are found to be statistically significant. One result shows that, compared to the non-poor, those who fell into poverty throughout the five-year period (captured by the variable *Poor in both 2004 and 2009*) were more likely to participate in the RNFS in the rural villages of Amhara region. The implication is that the more household poverty persists the higher would be the probability of participation in RNFS. Though not in its dynamic context, Sanusi (2011) also finds a similar positive poverty coefficient for Nigeria. Evidence from Kyrgyzstan similarly shows that asset-poor households, in terms of livestock and land ownership, tend to incline more to nonfarm activities (Atamanov and van den Berg, 2012). In another supportive finding, the negative coefficient associated with variable ‘Poor only in 2004’ indicates that the probability of engagement in RNFS by the rural poor in 2004 was lower compared to the non-poor and all others in 2009. Complemented with the insignificance of *Non-poor only in 2009* and the significant positive sign of *Year dummy: 2009*, the overall suggestion is that the poor tended to participate more in 2009 than in 2004. This is also consistent with our previous finding at the end of sub-section 4.1.

Nonetheless, our asset-related measures of socioeconomic status – number of oxen owned and cultivated agricultural land – are found not to determine participation at any acceptable level. Abdulai and Delgado (1999) similarly come across an insignificant livestock variable using data of Ghanaian married couples. However, Lemi (2009), using a similar survey as ours but the 1994 and 1997 rounds, finds that households who own more livestock and less land tend to participate less in off-farm activities.

The regression results further show that the diversification into RNFS is primarily due to push factors than pull factors. A push scenario occurs when participation in nonfarm activities is driven by the inability to earn enough from agricultural activities due to a poor asset base or a risky agricultural environment (Atamanov and van den Berg, 2012). As many rural poor in the region are either landless or possess very small per capita land upon which farming entirely depends, such a findings is no surprise. The

poor may not be left with any option than using activities like food-for-work and farm labor as means of survival.

**Table 4: Covariates of participation in RNFS in rural Amhara region: marginal effects after probit estimation**

**(Dependent variable: Dummy for participation in RNFS by any household member)**

Covariate	Without poverty indicators		With poverty indicators	
Age of the household head	-0.006	(0.002)***	-0.006	(0.002)***
Household size	0.019	(0.009)**	0.022	(0.010)**
Member of eqqub	-0.020	(0.053)	-0.025	(0.052)
Taken credit	0.081	(0.040)**	0.077	(0.041)*
Shock: drought	0.031	(0.052)	0.035	(0.053)
Shock: pests	0.023	(0.055)	0.029	(0.056)
Price of major food crops, average	-0.447	(0.090)***	-0.536	(0.108)***
Farm wage in the PA, average	0.116	(0.032)***	0.149	(0.037)***
Some primary schooling	0.050	(0.042)	0.054	(0.043)
Some secondary schooling	-0.140	(0.191)	-0.143	(0.196)
PA dummy: Yetmen <sup>b</sup>	-0.408	(0.040)***	-0.430	(0.038)***
PA dummy: Shumsheha	0.276	(0.070)***	0.299	(0.075)***
PA dummy: Debrebirhan zuria	-0.360	(0.081)***	-0.422	(0.090)***
Year dummy: 2009 <sup>c</sup>	0.391	(0.135)***	0.302	(0.150)**
Number of oxen			-0.016	(0.022)
Area covered by major crops (Meher)			0.014	(0.020)
Poor only in 2004			-0.283	(0.061)***
Non-poor only in 2009			0.009	(0.061)
Poor in both 2004 and 2009			0.170	(0.086)*
No. of observations		732		732
Log-likelihood		-432.267		-423.94
Chi-square		106.32***		109.05***
Pseudo-R <sup>2</sup>		0.1275		0.1443

\*, \*\*, \*\*\* show significance at 10%, 5%, 1% levels respectively. Standard errors adjusted for clusters in parentheses.

<sup>a</sup> No education is the base; <sup>b</sup> Dinki is the base; <sup>c</sup> 2004 is the base.

A number of other control variables are also found to affect participation in RNFS. Ceteris paribus, households headed by relatively aged ones are less likely to participate. Expectedly also, family size positively influences participation as it increases the opportunity to spend some time out of agricultural activities, if any. Further,

households who manage to get credit are found to have a higher chance of engagement in the sector. Lemi (2009) records that increased crop production and sale of part of production during the main harvest season led households to engage less in off-farm activities. This crowding-out effect of the agricultural sector is also confirmed by our finding that producer prices of major food crops negatively and significantly affect participation in RNFS. Surplus food crop producers would have a good chance of obtaining higher incomes from sales, thereby unfavorably affecting their involvement in RNFS. The positive effect of mean agricultural wage is justifiable since paid farm work is considered as one of the important nonfarm activities in the region (see Table A3).

Strong seasonal, as in Lemi (2009), and locational differences in participation are also identified. It is found that average participation in 2009 increased compared to 2004. Rises in prices of food items, applicable to net food purchasers, and other non-agricultural consumables in 2009 compared to 2004 might have forced people to try to engage in some activities off their farm. Locationally, higher likelihood of participation is observed by households in *Shumshaha* peasant association of North *Wollo* zone compared to all other PAs. Since this PA is one of the drought-prone rural areas in Amhara region, the result is expected and is in line with the 'push' scenario. Similarly, households in *Yetmen* of East *Gojjam* zone and *Debrebirhan zuria* of North *Shoa* are found to have lower RNFS engagement probabilities relative to those in *Shumshaha* and *Dinki* of North *Shoa* zone.

Table 5 gives the censored-Tobit estimation results of the intensity (share of RNFS income) model. We find generally that the factors affecting the intensity of RNFS are not necessarily similar to those affecting participation and this is the same as that in Matshe and Young (2004) and Malek and Usami (2009).

**Table 5. Covariates of rural nonfarm income share in Amhara region: results from censored-Tobit estimation (Dependent variable: share of nonfarm income)**

Covariate	Without poverty indicators		With poverty indicators	
Age of the household head	-0.007	(0.006)	-0.005	(0.006)
Household size	0.018	(0.034)	0.061	(0.038)
Member of eqqub	-0.014	(0.239)	0.056	(0.240)
Taken credit	0.584	(0.157)***	0.449	(0.148)***
Shock: drought	-0.318	(0.197)	-0.304	(0.193)
Shock: pests	0.177	(0.222)	0.212	(0.220)
Price of major food crops, average	-1.694	(0.391)***	-1.848	(0.409)***
Farm wage in the PA, average	0.344	(0.138)**	0.392	(0.144)**
Some primary schooling	-0.014	(0.188)	0.066	(0.188)
Some secondary schooling	1.912	(1.418)	2.016	(1.370)
PA dummy: Yetmen <sup>b</sup>	-0.755	(0.400)*	-0.680	(0.406)*
PA dummy: Shumsheha	1.444	(0.315)***	1.558	(0.318)***
PA dummy: Debrebirhan zuria	-1.007	(0.388)**	-0.872	(0.388)**
Year dummy: 2009 <sup>c</sup>	2.170	(0.712)***	2.307	(0.719)***
Number of oxen			-0.304	(0.108)**
Area covered by major crops (Meher)			0.053	(0.079)
Poor only in 2004			-0.195	(0.372)
Non-poor only in 2009			-0.109	(0.252)
Poor in both 2004 and 2009			0.428	(0.348)
Constant	-0.014	(0.541)	-0.147	(0.524)
No. of observations		732		732
Observations left-censored at 0		589		589
Log-likelihood		-433.414		-426.462
F-value		4.17***		3.46***
Pseudo-R <sup>2</sup>		0.0773		0.0921

\*, \*\*, \*\*\* show significance at 10%, 5%, 1% levels respectively. Standard errors adjusted for clusters in parentheses.

<sup>a</sup> No education is the base; <sup>b</sup> Dinki is the base; <sup>c</sup> 2004 is the base.

The study finds that RNFS participating households who own more oxen have lesser share of RNFS income in total household consumption expenditure. The negative coefficient for number of oxen is expected, confirms the competition between farm and nonfarm incomes and is a further evidence for the pro-poor feature of RNFS in Amhara region. It also means that the rural asset-poor, once they participate in RNFS,

finance their consumption expenditures more from rural nonfarm activities than what the non-poor do. In many parts of the region, ox is an important factor of crop production and is sometimes considered as ‘capital’ together with its plough complements. In our sample rural villages, the mean number of oxen per household was 1.20 in 2004 and 1.38 in 2009 (Table 1), lower than the required number of 2 for ploughing normally. Farmers having more oxen are likely to spend much time on the farm so that their incomes are fetched more from farm than nonfarm activities. Our findings supporting the view that RNFS is pro-poor in terms of intensity are consistent with Lemi (2009). He, using censored-Tobit regression, estimates that all the variables measuring asset (e.g. livestock) and income (e.g. seasonal sales income from crops) are negative and significant, implying that asset-poor households get more income from RNFS than their well-to-do counterparts.

Elsewhere, akin to the participation case, credit, average crop and labor prices, as well as locational and time dummies are found to significantly influence income shares of nonfarm activities.

## **5. Concluding remarks**

The study has tried to measure the effect of poverty, proxied by both consumption expenditure and asset indicators, on rural nonfarm sector (RNFS) participation and intensity (measured as share of RNFS income in consumption) in Amhara region of Ethiopia. Probit and censored-Tobit regressions were run on a pooled data of 366 random rural households for 2004 and 2009 harvest years. A number of control variables (demographic, socioeconomic and locational and seasonal dummies) specific to the household, the head and the rural village were also included.

The results reveal that poverty does have a significant effect on households’ participation in and income shares of RNFS. The participation and share of nonfarm income are higher, on the average, for the poor than for the non-poor. The rural poor, who usually are either landless or of large family size, use rural nonfarm activities (RNFA) as a means of survival. It is found generally that the sector is pro-poor and that it is a last resort for those segments ‘pushed’ by unfavorable socioeconomic environments. Besides poverty, controls such as credit, crop and labor prices, as well as locational and time dummies are important other determinants of participation and intensity.

Policymakers need to give the sector due attention on the ground. A note must be taken that the types of RNFA pursued are low-return and related to governmental projects. But, there must still be an environment for active participation of the private sector such as ‘model farmers’. A separate office for promotion of these and for sustenance of the RNFS would be quite relevant. Since agricultural offices focus on the agricultural sector and trade and industry offices work almost only in urban areas of the region, such a coordinating office may do better by also identifying high-return activities.

The study’s results also suggest that if policymakers seek to maximize the benefits of the RNFS going to the poor, certain other things related to removal of barriers are crucial. The first focuses on credit. The current rural micro-credit schemes (such as of the Amhara Credit and Saving Institution) may need to be modified and intensified in favor of the rural poor. This not only enhances their participation in RNFS but also helps them shift to medium- or high-return RNFA, thereby augmenting RNFS income. According to our results, wages have the effect of increasing both participation in and incomes from RNFS. In line with this finding, the second issue would be improvement of rural institutions and infrastructure promoting the functioning of rural labor markets.

## References

- Abdulai, A. and C. Delgado. (1999). Determinants of Nonfarm Earnings of Farm-based Husbands and Wives in Northern Ghana. *American Journal of Agricultural Economics*, 81(1): 117-130.
- Arcand, J. and B. d'Hombres. (2006). Testing for Separation in Agricultural Household Models and Unobservable Household-Specific Effects. MPRA Paper No. 1863.
- Arif, G., H. Nazli and R. Haq. (2000). Rural Non-agriculture Employment and Poverty in Pakistan. *The Pakistan Development Review*, 39(4): 1089-1110.
- Atamanov, A. and M. van den Berg. (2012). Participation and Returns in Rural Nonfarm Activities: Evidence from the Kyrgyz Republic. *Agricultural Economics*, 43: 459-471.
- Bagamba, F., K. Burger and A. Kuyvenhoven. (2009). Determinant of Smallholder Farmer Labor Allocation Decisions in Uganda. IFPRI-EPTD Discussion Paper No. 00887.
- Barrett, C., T. Reardon and P. Webb. (2001). Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications. *Food Policy*, 26(4): 315-331.
- Bezu, S., C. Barrett and S. Holden. (2012). Does Nonfarm Economy Offer Pathways for Upward Mobility? Evidence from a Panel Data Study in Ethiopia. *World Development*, 40(8): 1634-1646.
- Davis, B., P. Winters, T. Reardon and K. Stamoulis. (2009). Rural Nonfarm Employment and Farming: Household-level Linkages. *Agricultural Economics*, 40: 119-123.
- Haggblade, S., P. Hazell and T. Reardon. (2002). Strategies for Stimulating Poverty-Alleviating Growth of the Rural Nonfarm Economy in Developing Countries. IFPRI-EPTD Discussion Paper No. 92.
- Huffman, W. (1991). "Agricultural Household Models: Survey and Critique". In: Findeis, J., M. Hallberg, and D. Lass (eds.), *Multiple Job Holding Among Farm Families*. Iowa State Uni. Press: Ames IA.
- Kimhi, A. (2011). Can Female Non-Farm Labor Income Reduce Income Inequality? Evidence from Rural Southern Ethiopia. Paper presented at the EAAE 2011 Congress Change and Uncertainty: Challenges for Agriculture, Food and Natural Resources, August 30-September 2, Zurich.
- Lanjouw, P. and R. Murgai. (2009). Poverty Decline, Agricultural Wages, and Nonfarm Employment in Rural India: 1983-2004. *Agricultural Economics*, 40: 243-263.
- Lanjouw, P. and A. Shariff. (2002). Rural Non-Farm Employment in India: Access, Income and Poverty Impact. NCAER Working Paper Series No. 81.
- Lanjouw, O. and P. Lanjouw. (2001). The Rural Non-farm Sector: Issues and Evidence from Developing Countries. *Agricultural Economics*, 26: 1-23.
- Lemi, A. (2009). Determinants of Income Diversification in Rural Ethiopia: Evidence from Panel Data. *Ethiopian Journal of Economics*, 18(1): 35-70.

- Malek, M. and K. Usami. (2009). Determinants of Non-farm Income Diversification in Developed Villages of Bangladesh. *American Journal of Economics and Business Administration*, 1(2): 141-149.
- Matshe, I. and T. Young. (2004). Off-farm Labour Allocation Decisions in Small-scale Rural Households in Zimbabwe. *Agricultural Economics*, 30: 175-186.
- MoFED (Ministry of Finance and Economic Development). 2012. Ethiopia's Progress towards Eradicating Poverty: An Interim Report on Poverty Analysis Study (2010/11). MoFED: Addis Ababa.
- Reardon, T., J. Taylor, K. Stamoulis, P. Lanjouw and A. Balisacan. (2000). Effects of Non Farm Employment on Rural Income Inequality in Developing Countries: An Investment Perspective. *Journal of Agricultural Economics*, 51(2): 266-288.
- Reardon, T. (1997). Using Evidence of Household Income Diversification to Inform Study of the Rural Nonfarm Labor Market in Africa. *World Development*, 25(5): 735-747.
- Sanusi, W. (2011). Effect of Poverty on Participation in Non-Farm Activity in Ibarapa Local Government Area of Oyo State, Nigeria. *International Journal. of Applied Agricultural and Apicultural Research*, 7(1&2): 86-95.
- Strauss, J. (1986). "The Theory and Comparative Statics of Agricultural Household Models: A General Approach". In: I. Singh, L. Squire and J. Strauss (eds.), *Agricultural Household Models: Extensions, Applications, and Policy*. Johns Hopkins University Press: Baltimore.
- Todaro, M. (1969). A Model of Labor Migration and Urban Unemployment in Less Developed Countries. *The American Economic Review*, 59(1): 138-148.
- van den Berg, M. and G. Kumbi. (2006). Poverty and the Rural Nonfarm Economy in Oromia, Ethiopia. *Agricultural Economics*, 35(supplement): 469-475.
- Woldehanna, T. (2002). "Rural Farm/Non-farm Income Linkages in Northern Ethiopia". In: Davis, B., T. Reardon, K. Stamoulis and P. Winters (eds.), *Promoting Farm/Non-farm Linkages for Rural Development-Case Studies from Africa and Latin America*. FAO: Rome.

## Appendix

**Table A1. Description of variables**

Variable name	Description
1. Participation in RNFS	=1 if any member of a household was engaged in nonfarm activities during the past 4 months before the survey
2. Share of RNFS income	Share of total cash income from rural nonfarm sector in the total household consumption expenditure
3. Real per capita consumption expenditure	Real per capita consumption expenditure (birr per day in 1994 prices)
4. Poor	=1 if average real per capita consumption expenditure is less than 50 br per day (in 1994 prices)
5. Age of household head	Age of the household head
6. Marital	=1 if the household head is married
7. Male head	=1 if the household head is male
8. Household size	Household size
9. Number of oxen	Number of oxen possessed by the household
10. Area covered by major crops (Meher)	Land covered by major crops (maize, wheat, teff, bean, barley, chickpea, sesame, linseed, sinar) (during the Meher season)
11. Member of eqqub	Any household member is a member of eqqub? =1 if yes
12. Taken credit	Any household member has taken a credit of at least 20 br in the past 12 months? = 1 if yes
13. Shock: drought	Faced drought in the last 5 years? = 1 if yes
14. Shock: pests	Faced pests in the last 5 years? = 1 if yes
15. Price of major food crops, average	Average price of major food crops in the nearby market to the PA (maiz, wheat, teff, bean, barley, chick pea, sesame, linseed, sinar) (br/kg)
16. Farm wage in the PA, average	Average farm wage in the PA to an adult man for land preparation, planting, weeding and maintenance, harvesting and livestock herding/watering (br/day)
17. Year dummy: 2009	=1 if year=2009
18. Some primary school	=1 if the head of the household has attended any primary education
19. Some secondary school	=1 if the head of the household has attended any secondary education
20. PA dummy: Yetmen	= 1 if peasant association is Yetmen
21. PA dummy: Shumsheha	= 1 if peasant association is Shumsheha
22. PA dummy: Debrebirhan zuria	= 1 if peasant association is around Debrebirhan

**Table A2: Percentage of households falling in the quintiles of consumption expenditure and in absolute poverty by region: 2004 and 2009**

	Quintile	2004					2009				
		Eth.	Tig.	Amh.	Oro.	SNNP	Eth.	Tig.	Amh.	Oro.	SNNP
		<b>Relative poverty</b>	Poorest 20%	16	22	4	13	27	26	61	10
	2nd poorer 20%	18	14	13	20	21	24	30	24	17	26
	Middle 20%	19	25	17	19	20	20	7	30	20	16
	2nd richer 20%	20	20	25	21	15	19	2	23	29	11
	Richest 20%	27	19	41	26	17	12	1	13	25	4
	<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
	<b>Absolute poor (%)</b>	37	42	19	38	53	54	93	42	29	73

Note: Eth.=Ethiopia; Tig.=Tigray; Amh.=Amhara; Oro.=Oromia; SNNP= Southern Nations, Nationalities & Peoples

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

This table is generated from a balanced panel data of 1210 households in Ethiopia in each of 2004 and 2009 (132 in Tigray, 366 in Amhara, 329 in Oromia and 383 in SNNP). It also refers to both RNFS participating and non-participating households.

**Table A3: Types of rural nonfarm activities: Amhara region, 2004 and 2009**

Type of rural nonfarm activity	2004		2009	
	Count*	Percent	Count*	Percent
Food-for-work	81	54.73	67	38.29
Farm work (paid)	43	29.05	43	24.57
Unskilled nonfarm work	13	8.78	39	22.29
Skilled nonfarm work	7	4.73	12	6.86
Professional (teacher, health worker, etc.)	3	2.03	4	2.29
Religious work	-	-	4	2.29
Guard	1	0.68	3	1.71
Trading	-	-	2	1.14
Domestic servant	-	-	1	0.57
<b>Total</b>	<b>148</b>	<b>100.00</b>	<b>175</b>	<b>100.00</b>

\* Not necessarily number of households as more than one member in a household may participate.

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

**Table A4: RNFS participation rate (% of households) and mean RNFS income share (%) by quintiles of real per capita consumption expenditure: Amhara region, 2004 and 2009**

Quintile	RNFS participation rate		Share of RNFS income	
	2004	2009	2004	2009
Poorest 20%	31.8	53.2	12.3	29.7
2nd poorer 20%	30.8	47.4	23.4	13.6
Middle 20%	36.5	42.9	13.8	14.7
2nd richer 20%	41.7	40.9	8.1	17.8
Richest 20%	37.6	42.0	6.3	5.4
<b>Overall</b>	<b>37.4</b>	<b>44.5</b>	<b>10.0</b>	<b>15.9</b>

Source: Author's computation based on Ethiopian Rural Household Survey (ERHS) 2004 and 2009 rounds.

