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Participation into off-farm activities in rural Ethiopia: who earns more?

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Woinishet Asnake Sisay (Mrs.)
(Ethiopia)

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Members of the examining committee:

Prof. Dr Michael Grimm [Supervisor]
Prof. Dr Arjun Bedi [Reader]

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This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

Inquiries:

Dedication

This research paper is dedicated to my daughters Bethy, Mary, Seti and Mihru who have sacrificed their mother's love for 16 months for the success of my studies.

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List of Acronyms

AAU	Addis Ababa University
ADLI	Agriculture Development Led Industrialization
CLAD	Censored Least Absolute Deviation Model
CSA	Central Statistical Agency of Ethiopia
EEA	Ethiopian Economic Association
EEPRI	Ethiopian Economic Policy Research institute
ERHS	Ethiopian Rural Household survey
ESRC	Economic and Social Research Council
ETB	Ethiopian Birr (Local currency)
FE	Fixed Effect
GDP	Gross Domestic Product
HH	Household
IFPRI	International Food Policy Research Institution
MSE	Micro and Small Enterprises
NGOs	Non-Governmental Organizations
RE	Random Effect
RIGA	Rural Income Generating Activity
SIDA	Swedish International Development Agency
SNNP	Southern Nations, Nationalities and People
USAID	United States Agency for International Development
WB	World Bank

Abstract

This paper analyzes off-farm activities and income among 1343 households in rural Ethiopia using an original panel data set. The key findings are as follows. (a) 'Non-poor' households generate a significant amount of income from farming activities. (b) Non-poor participate more in high-earning off-farm activities while, on average, 'poor' participate in low-earning off-farm activity. (c) Poor household participate due to push factor while non-poor participate as a choice. (d) Household with more resources are getting better off-farm earnings. (e) Share of off-farm income is higher for poor households, that is, off-farm income constitutes nearly 35% and 18% of household income for poor and non-poor households respectively (in 2008). In general, the finding indicates that the poorer segment of the society relies relatively more on off-farm income and there is an entry barrier for poor households to participate on high-earning activities. Off-farm activities have a potential to reduce poverty and income inequality as it is relatively beneficial to poorer households. However, this requires substantial improvement in terms of increasing off-farm earnings that the poor households engaged in. Otherwise, the contribution of off-farm to the national economy will only be limited to absorbing the poor on lower earning activities. However, it is to be noted that off-farm activity are acting as a safety net for rural society in Ethiopia, no matter what the earning level is, by preventing them from a worst livelihood situations.

Relevance to Development Studies

The livelihood of most people in developing countries is highly dependent on agriculture, but the carrying capacity of the sector is decreasing over time due to rate of increase in population growth and the corresponding reduction in farm size. As a result, share of off-farm participation of rural labor force is increasing. It is, therefore, crucial to closely examine the cause and effect of diversification to better understand the situation and explore policy options to rationally address it. This study points out some of the motives behind the decision for diversification and consequences on household income using panel dataset.

Keywords

Livelihood, Diversification, Off-farm, Non-farm, Rural household, Ethiopia

Chapter 1
Introduction

The majority of households in rural Ethiopia are poor, often face income fluctuation and fail to smoothen their consumption patterns due to price changes, weather related shocks, pests, death and illness of family member, as well as livestock. The propensity of high risks and shocks perpetuates poverty, affects economic growth and household consumption, and reduces the capacity of household's human capital formation (Dercon and Woldehanna 2005). Moreover, some shocks have a longer-term effect and further deteriorate household living standards. For instance, the most commonly reported worst shocks among rural households in Ethiopia between 1999 and 2001 were drought, illness and output price changes. Due to these shocks household consumption were reduced from 13% to 28% and their effect was observed in 2004 (Dercon and Woldehanna 2005). Households use *ex ante* and *ex post* mechanisms to minimize the risk of income fluctuation. In rural Ethiopia, *ex post* mechanisms, like formal insurance can be pronounced as virtually missing market. The credit markets are imperfect. In the absence of *ex post* mechanisms insuring majority of risks particularly covariate shocks using informal insurance is found to be unsuccessful especially among poor households. Bardhan and Udry (1999) also rejected the hypothesis of pareto-efficient risk-pooling mechanism within rural communities in poor countries.

The increasing population growth in rural Ethiopia obliged households to cultivate and making their living on extremely small size of land. For instance 29% of grain farmers in 2006/7 have cultivated a land less than 0.5 ha per household (EEA 2008 Report). Besides, due to the smaller farm size and low return from farming activities, majority of rural households exposed to food insecurity and chronic poverty. The national survey conducted in 2003/4 by EEA/EEPRI indicated that 63% of surveyed households were food deficit. One of *ex-ante* copying mechanisms used by households in rural Ethiopia in such difficult situations is to diversify their income sources into off-farm activities. Attracted by available opportunities, a household might choose to diversify in non-farm as well as farming sectors that have tendencies to increase income.

In most developing countries, importance of non-agricultural activities is increasing and it is estimated to account for 30-50% of rural incomes (World Bank 2008). However, little is known on the current overall participation rate in Ethiopia. There is also no consensus on factors that affect participation decision into off-farm activities in Ethiopia. Some found that diversification is positively associated with wealth accumulation (Block and Webb 2001). On the other hand, Berg and Kumbi (2006) found that poorer households are more likely to engage in non-farm sectors.

Household in rural Ethiopia are diversifying both within agricultural and non-agricultural sectors. In addition, they are involved both in low and high return activities. It is found that households do not have equal opportunities for off-farm activities. Household that are skilled and trained are getting better

wages and secured jobs (Smith et al. 2001). Dercon and Krishnan (1996) cited in Dercon (2005) found that the poor in Ethiopia typically enter into activities with low entry costs, such as collecting fire woods, making charcoal and work as casual agricultural wage earners where as entry into high-return activities is restricted to richer households. Efforts need to be directed towards creating equal income generation opportunities for all rural households. Getting a clear picture on the involvement of the poor and non-poor households in various income generating sectors provide insights on the impact of each sector and activity on household income. This, in turn, allows opportunity to institute some corrective measures. However, very limited researches are available on pattern and trends of the share of agricultural and non-agricultural income diversification strategies and income share from each activity among households in rural Ethiopia. Identifying and analysing these trends allow to understand how fast the sectors grow and effects of sectors on each other.

Households are often motivated to either participate in off-farm activities by pull or push factors. Households that are motivated by pull factors are those attracted by relatively higher returns in off-farm activities than in the farming sector (Reardon 1998). Their decision to participate in off-farm activities is principally to increase their earnings and not on the intention of risk reduction as opposed to households whose decision to diversify is due to push factors (risk aversion). This creates opportunities to choose activities that generate high returns. On the other hand, households that are motivated by push factors prioritize their survival rather than looking for better earnings. According to Reardon (1998), households who strive to manage their income and consumption uncertainties engaged in low return activities or activities that have negative correlation with farming sectors. Therefore, separately identifying the motivation behind the decision of the household to participate in off-farm activities is central for sound policy decision making.

It is also advisable to identify factors that affect profitability of off-farm activities because factors that affect off-farm participation are not identical to amount of earnings. The objective of rural development policy is to improve the living standards of the rural communities through better earnings. However, the relative importances of factors that affect the amount of earning from off-farm activities in Ethiopia were not well documented. This paper, attempts to assess the effect of variables on amount of earning, therefore, provides clue to characteristics of households that are getting more from off-farm activities.

With respect to analyzing behaviours of households on livelihood strategy, most authors used cross-sectional data (Hassen 2001, Damite 2003). In the present study, however a longitudinal data from Ethiopian Rural Household Survey (ERHS) used as it allow us to control household and community fixed effects.

Since 1995, Ethiopia is implementing an Agriculture Development Led Industrialization Strategy (ADLI), which advocates technology-based agricultural growth and advancing industrialization through the development of agriculture. The findings of the present study expected to provide relevant information on household's existing capacity on commercialization of agricultural products and could be considered as an important input to ADLI. The study

also indicates how households respond to environmental, economic and social changes. In general, the study outputs are pertinent in terms of influencing local and national policies on food security, human capital formation, rural urban linkage, risk reduction and improvement of market imperfections

Therefore, this study has four objectives. First, to assess the trends of different livelihood strategies adopted by rural households in Ethiopia by stratifying into groups based on their consumption expenditures. Second, to explore factors that influence households to allocate labour into off-farm activity. Third, to identify factors that determine amount of earnings from off-farm activities. And, fourth to find out effects of off-farm participation on household total income.

The rest of the paper is organized as follows. Section 2 and 3 respectively provide background information on off-farm activity in rural Ethiopia and review of literatures related to off-farm activities. Section 4 is devoted to the presentation of data and descriptive statistics. Section 5 provides the empirical model specification and presents the discussion of results obtained from the study. Section 6 summarises the conclusions drawn from this study.

Chapter 2
Off-farm Activities and Income in Ethiopia

The Ethiopian economy is based on agriculture, which is the largest contributor to the economy that accounts for nearly 80% of employment and 45% of the national GDP[1]. However, agriculture in Ethiopia is characterised by low labour productivity, a declining in farm size, soil degradation, subsistence farming, tenure insecurity, lack of financial services, imperfect agricultural markets and poor infrastructure (Beyene 2007)cited (Degefe and Nega 1999). There are mainly two production systems in Ethiopia; i) crop-livestock mixed production in high and mid altitude areas and ii) pastoral and agro-pastoral production system in lowlands. Agriculture in Ethiopia is characterised by traditional method of farming mainly relying on animal traction and is rain fed. The dominant type of farm input is family labour power. Cereals, pulses, oil crops, cash crops, fruit and vegetables grown yet, the extent varies with location. The country faces fluctuation in agricultural productivity due to weather or man-made related shocks.

In Ethiopia, participation into off-farm activities is increasing among rural households. According to Rijkers et al. (2002) non-farm enterprise makes considerable contributions to rural income and approximately 25% of all households in rural Ethiopia own one or more nonfarm enterprises, however, about 2% of households exclusively rely on nonfarm enterprises. Off-farm activity in Ethiopia includes wage work and self-employment. Wage work, in turn, includes farm wage work, professional wage work (e.g. lecturers), skilled labourer (e.g. mechanics), unskilled wage work, and community work. The employers could be small and/or commercial farmers, NGOs, government organizations, urban dwellers, religious institution, and contractors. Self-employment include milling, weaving, handicraft, trade in grain and livestock, collecting and selling firewood and selling local food and drinks. Enterprises dealing with milling, livestock and grain trade are relatively profitable. The non-farm activities in Ethiopia are almost labour intensive. According to Rijkers et al. (2002), enterprises in Ethiopia do not seem to operate in a sub-optimal scale. The production technology of the existing firms exhibit constant returns to scale, hence, at their existing stage there are no unexploited scale economies. The authors state that almost all enterprises in rural Ethiopia are stagnant. The reason for lack of investment could be high-risk and uncertainty associated with variability in agricultural performance due to weather fluctuations. In addition, there are low wage rate and low returns from self-employment activities. Nevertheless, enterprises located in rural towns are relatively profitable than those located in far distant remote areas. Payments to professional works are relatively higher

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[1] World Bank country brief accessed on 10/10/2010 http://go.worldbank.org/WA1RL12OL0

concerning wage employments. However, the number of households engaged in high earning professional activities is lower due to the lower educational status and less number of enterprises that could provide employment opportunities.

In the previous Ethiopian Government, (1974-1991) the agricultural policy advocated for collective and state-owned farming and non-farm systems. Hence, private ownership of resources was very restricted. Government support like training and finance was restricted to cooperatives and state-owned enterprises. According to Woldehanna (2002), during this period, nationalized public institutions were given responsibility to promote non-farm sector but efforts directed towards cooperatives on which individuals trained in crafts were unable to establish themselves because they lacked credit, tools, raw materials and business skills. After 1991, the economy of the country was liberalised, individual property rights were allowed and participation to non-farm activities substantially increased. However, according to Woldehanna (2002), even though the policy of the current government emphasizes both farming and non-farm sector, the focus of the economic reform is exclusively on farming sector.

Chapter 3
Concepts and Literature Review

3.1. Concepts

We study rural livelihoods based on the livelihood framework following Carney (1998) which enables to see a wide range of processes and factors. We started by the concept of *livelihood* because diversification, our main interest, is a strategy for livelihoods. A *livelihood* means the behaviour of household and community, with respect to holdings and *access* of *assets* and the productive *activities* to which the assets are applied (Barrett and Reardon 2001, Ellis 1999). Chambers and Conway (1992) include elements of *capabilities* to explain livelihood in addition to *activities, assets* and *access* that are required for a means of living. Hence analysis of livelihood is a global and local process that takes into account the strategies and ways people use to access resources in order to perform activities through their resources and individual agencies, the negotiations they pursue with institutions, the way of living and working in a particular policies and in a socio-cultural-economic context (Parrott et al. 2006)(Fig.1).

Activity is the main element in the study of diversification. Following Barrett and Reardon (2001), Barrett et al. (2001) Activity can be classified as primary, which include agriculture, mining, and other extractive activities; secondary like manufacturing; and tertiary are those related to service provision. The authors distinguish "agriculture" or "farm" income as production or gathering of unprocessed crops, livestock, forest, fish products from natural resources. And "non-agricultural" or "nonfarm" income as all other sources of income, including from processing, transport or trading of unprocessed agricultural, forest and fish products. According to Haggblade et al. (2007) 'off-farm' income or employment mean "off the owner's own farm" that includes wage employment in agriculture earned on other people's farms along with nonfarm earnings from the owner's nonfarm enterprises or from nonfarm wage earnings. "off-farm income" is thus rural nonfarm income and wage earnings in agriculture.

Assets or *resources* are stocks of productive factors that produce a stream of cash or in kind returns or endowments (Barrett and Reardon 2001). They grouped assets into two categories as productive and non-productive assets. Productive assets can be used as inputs into production process like human capital (time, skills, health), real property (land, livestock, water, forest) financial capital, and fixed capital (farm or manufacturing equipment). Non-productive assets are those that yield income through generating either transfers or capital gains/losses which include household valuables (jewellery and precious metals), and social claims (e.g., on family or friends, government, churches or other groups). Both assets types offer a store of wealth and a source of income but productive assets must be allocated to one or more activities in order to generate income (Barrett and Reardon 2001). Therefore assets are the core causes for the differences in livelihood strategy and hence in allocating labour and resources into activities.

A third step in the analysis of livelihood is *access*, which shows how people have access to resources. It can be explained as the way one can use resources, put it into productive use, consume it or exchange it (Parrott et al. 2006). This concept cannot explain the availability of resources, skill or capacity but it is a way to use it and the right to benefit from it. Therefore, the way a society access resources leads to a difference in livelihood strategy. Those who can access financial resources with a lower cost might strategize their livelihood in a different way than households access financial resources with a higher cost.

Capabilities in livelihood study entails knowledge, skills and experiences whereas *agency* implies what people do is derived from what they are capable of doing (Parrott et al. 2006). Activities and access to activities are depends on the capability of an individual and the extent to which the individual exercises its agency that determines the type of livelihood.

Institutions and *organizations* are another important factor in livelihood study. In the process of accessing resources, rural households required to interact with institutions and organization. Institutions could be rules, laws, regulations that shape how and whether resources can be accessed or used (Parrott et al. 2006). The way in which rules and regulations set affect the use and access of resources. It differs even among local communities based on institutional set up. Hence, the livelihood that a household perusing differs due to the institutional set up. For example, the livelihood strategies among communities that have land ownership right and that do not have land ownership right is very different.

In the study of livelihood strategy, the unit of analysis could be individuals, social groups, networks and households (Parrott et at. 2006). In this paper, a *household* is used as a unit of analysis considering the norm of utilizing and sharing resources commonly among households in rural Ethiopia. A *household* here in referred as a unit in which production and consumption takes place and it is a collection of people, who eat together, share resources, and live under the same roof (Parrott et al. 2006). However, the extent of interaction might vary according to culture, custom, religion and economic situation. Decision on livelihood strategy among household members could be made either individually or jointly. It depends on the power distributed among the members of the household, which might be bestowed based on social and or economic factors. We consider a household made a livelihood choice collectively, on Ethiopian context, even though the strategy varies based on how the household constructed and worked. The farm household economic model also treats the household as a single decision-making unit maximising its welfare subject to a range of income-earning opportunities, and a set of resource constraints (Ellis 1993).

Hence, livelihood *strategies* are the full portfolio of livelihood activities, which involves different combination of income generating activities, uses of assets and choices about investing money in assets. Diversification, the main interest of this study, is one of the livelihood strategies.

3.2. Theoretical literature

According to Hussein & Nelson (1998) diversification is an attempt by individuals to find new ways to raise incomes and to reduce risk, by involving into activities in addition to main agricultural activity. Minot *et al.* (2006) following Reardon (1997) and Escobal (2001) conceptualize diversification in various ways; an increase in number of income sources, a switch from subsistence food production to commercial agriculture and expansion in the importance of non-crop or nonfarm income on which nonfarm includes both off-farm wage labour and nonfarm self-employment. Start (2001) specify diversification as an increase in number of income sources or multiplicity of activities and a shift from traditional rural sector, such as agriculture, to non-traditional - non agricultural activity. In this study, diversification is conceptualized following the definition of (Minot et al. 2006) and (Start 2001) as a shift from farming activities to off-farm activities (wage work and nonfarm self-employment).

Different reasons were given for the motivation of diversification. For instance, to have a sustainable livelihood, to maintain or enhance their capabilities and assets, a means of survival, to improve standard of living, risk reduction, realization of economies of scope, diminishing returns to factor use, liquidity constraints, and to stabilize income flows and consumption risk (Ellis 1999, Barrett et al. 2001, Hussein and Nelson 1998). Further to maintaining a sustainable livelihood, diversification benefits households and the rural economy by absorbing surplus labour power and providing alternative source of income during slack seasons. Diversification also benefits women to have capabilities in order to generate independent income that might be translated to improvement in care and nutritional status of a child (Ellis 1999).

Elements in livelihood diversification that might be used to capture and measure diversification portfolio could be asset, activity, and income. It is difficult to aggregate activities into a single measure that spans asset categories and it necessarily miss the income that accrues from non-productive capital (Barrett and Reardon 2001). In most African countries, market for goods developed better than market for asset and it is difficult to establish value for human and social capital, collective good, land and other business assets. Income is thus an obvious candidate variable to examine diversification because it is closely related to the concept of absolute poverty. In addition, it is used to define poverty line and measure household wealth. Besides, most analysts understand the motivation behind diversification as income maximization and stabilization (Barrett and Reardon 2001). Therefore, in this study income earned from each activity used to study diversification. It is the cash or in-kind cash-equivalent yield from a household's assets. The household earned incomes are classified by sector as farm and nonfarm, by function as wage and self-employment and by space as local and migratory (Reardon et al. 2001).

Share of income from rural non-farm activities are increasing substantially and it accounts to 40-45% of average rural household income in sub-Saharan Africa (Start 2001, Lanjouw and Shariff 2002, Reardon 2001). According to Start (2001), based on classic theories of structural transformation, some of the reasons for the development of rural non-farm economy are growth in the structure of national economy, difficulty in trading goods and services from

urban to rural area, and a gain from productivity in agricultural sector. These lead to transformation of goods produced by urban areas into rural areas and an increase in demand for non-agricultural goods. According to (Haggblade et al. 2009) expansion of agriculture contributed for the growth of non-farm economy. The Authors stated that in regions where agriculture has grown robustly, the rural non-farm economy has also typically enjoyed rapid growth; for instance each dollar of additional value added in agriculture generates $0.30 to $0.50 additional rural non-farm income in Africa and Latin America. Recently globalization, urbanization and improved infrastructure have also facilitated the development of non-farm sector.

Off-farm activities are highly heterogeneous and have different magnitude on returns that ranges from highly lucrative to a very lower earning activity like poorly paid unskilled labour works. This is due to heterogeneity in personal, regional and national factors that affect household choices to participate in different activities. Therefore, impact of off-farm activity on standard of living could depend on the activity they engaged in due to factors lead them to make participation decision, pull or push factors, on which distress-push diversification dominate in rural areas (Start 2001, Davis 2003). A pull factors are a better opportunity that motivate households to allocate labour into off-farm, which could be better stock of resources, access to resources and a better capability and agency to use the available resources. Factors that increase the propensity of income fluctuation, loss of capability and agency, reduction in stock of asset could be an example of push factors, which forced households to allocate labour into off-farm activities for survival or as a coping strategy.

Off-farm activities have also an impact in level of poverty and income inequality. In the condition that a poor have equal access to participate in high earning off-farm activity its impact to poverty reduction and income inequality will be remarkable. However, if the poor have prohibited from high-earning off-farm activities due to lower level of resources, access and capability then economic growth may imply an increase in inequality. Davis *et al.* (2010) explained this as the impact of rural nonfarm activities on poverty and inequality depend on the access of the poor to rural nonfarm activities, the potential returns from rural non-farm activities and the share of rural nonfarm activities to total income. Hence, diversification might lead to economic prosperity or increases inequality depending on the type of diversification that the household pursued. Based on Lanjouw and Lanjouw (1995) nonfarm activities are contributor to growth, even if the return to labour is low, they are more productive when inputs are measured in terms of their real, social, costs. The Authors argue that non-farm activities also contribute for the distribution of income. Primarily, the rural industry produces lower quality goods that are highly consumed by the poor. This leads the sector to have indirect distributional benefits via lowering prices to the poor. Secondly, the non-farm sector acts as a way of smoothing income for those who have limited access to financial sources and it is a residual source of employment to the poor society.

The rural off-farm labour market is formed by aggregate household and firm labour supply and demand decisions. We consider a general supply function to find out factors that determine household's labour allocation decision into off-farm activities following Reardon *et al* (2006). Labour supply as well as

capital investment function of a household i to activity j is a function of incentives and capacity variables. In this study the labour supply and capital investment decision is participation into off-farm activities. Following Reardon et al (2006) there are three sets of variables that determine choices into activities. *First* the set of incentive "levels" facing the household, including relative prices of outputs from and inputs to activity j versus activity k. *Second* instability of incentives: the set of incentive "variation" facing the household, including relative risks (climatic, market, and other risks) of activity j versus activities k. Third, the set of capacity variables (capital assets including human, social, financial, organizational, physical) that enable undertaking of activities.

Therefore, this study basically examine the effect of different socioeconomic factors on household decision to labour allocation and amount of earning which allows to differentiate if the household makes participation decision either by push or pull factors.

According to Reardon *et al* (2006) income from non-farm is based on activities that have its own production function, with the function being capital assets like stocks of human, financial and physical capital. Agricultural assets, technology, and activity composition could also affect income from nonfarm indirectly. Each activity have a vector of capital requirements, K^*, that constitute the minima required by the production technology and transaction requirements to enter and sustain the activity. These K^* are functions of technology as well as target market with its specific demands of volume, quality, and other transactional requirements. Hence, following Reardon *et al*; nonfarm income is a function of return from activities, which depends on human, financial and physical capital, agricultural asset, agricultural return and technology, market situations, and activity composition.

3.3. Empirical literature

On a cross-country analysis using RIGA database, it has been found that crop and livestock production remain key activities in developing countries with 54-98% of participation rate for crop and 10-91% of participation rate for livestock (Winters et al. 2009)[2]. However, there were circumstances where share of total income from off-farm activity is greater than that of agricultural activity.

Studies came across different factors for the rise in participation[3] and amount of earning[4]. However, the results might be changed if different specifications were applied. For example, Man & Sadiya (2009) used Logit model on a study made among 500 paddy farmers in Malysia. Lanjouw *et al.* (2001) also used Probit model to find determinants of participation in Tanzania. When the

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[2] The data used in this analysis come from household surveys covering 15 different countries, which form part of the RIGA database created as part of a joint FAO-World Bank project. The countries are selected from Africa, Asia, Eastern Europe as well as Latin American and the Caribbean

[3] if not explained specifically 'participation' means participation into off-farm activity

[4] if not specified 'amount of earning' means earning from off-farm activity

dependent variable is a binary outcome variable Logit and Probit models surpass OLS model, however, controlling the fixed effects provide a better estimates. The error term ε_i composed of various features of household and community that could not be captured by the model and there might be a possibility of association of these features with one or more explanatory variables, which might lead to endogenity problem. For instance psychology of a household might affect both participation and one or more explanatory variables like educational level. If head of a household is risk averse or pessimist, she might want to diversify her income earning sources and might decide to reduce school enrolment to increase participation and to reduce cost of schooling. This unobserved characteristic have a positive effect on participation and a negative effect on amount of long run earning and hence underestimate the effect of education on participation. Thus using fixed effect models enable to control at least time invariant unobserved characteristics and results a better estimate.

Lanjouw & Shariff (2002) estimated factors affecting amount of earning in rural India. To do so, earning variable will be missing for non-participants. This enforces to drop the missing household from the estimation. As a result they might left with a non-random sample set. To control the potential selection problem they used CLAD. Even though they controlled the potential selection problem, they did not use a fixed effect models. Hence, the result might suffer from endogenity problem.

Babatunde and Qaim (2009) used Probit and Tobit model when studying the livelihood strategy of 220 households in Nigeria to estimate determinates of participation and amount of earning respectively. However, it is not advisable to use Tobit model when values are clustered at zero due to selection bias rather than censoring. In addition, they did not take into account for the omitted variable bias problem using alternative models that can at least control for time invariant unobservable heterogeneities.

Block & Webb (2001) studied livelihood diversification in post-famine in Ethiopia by defining diversification as activities other than cropping. They grouped all activities like livestock rearing and nonfarm activities, at once, as diversification. These activities have different nature and require different resources and capabilities. Even though their classification is in line with the definition of diversification, it will be better if they analyze each category separately.

Taking the above mentioned problems into consideration, it has been found that some household participate pushed by factors that have a likelihood of reducing future earning like bad weather conditions, death of bread earner family member, deterioration of human capital, reduction on agricultural output prices, and other related shocks. For example Mathenge & Tschirley(2010) in Kenya found positive significant coefficient on long term lower rainfall in determining participation and amount of earning. They also found association between short-term rainfall shocks with an increase in remittance and agricultural wage. Surprisingly, some of the studies made in Ethiopia did not control the effect of weather related shocks directly even though farming in Ethiopia is dependent on rain (Berg and Kumbi 2006, Beyene 2007, Woldehanna and Oskam 2001).

Studies show that poorer households could not tolerate negative shocks to their income; hence, they have more chance of participation into off-farm activities in favour of less risky income sources and activities (Reardon 1998, Barrett et al. 2001). On the other hand, Block and Webb (2001) found that an increase in wealth level of a household increases participation into off-farm activity in rural Ethiopia.

Availability of key-assets (such as savings, land, labor, education and/or access to market or employment, access to common property natural resources and other public goods) make individuals more or less capable to diversify(Warren 2002). Lanjouw & Shariff (2002) in India identified that education improves prospects of finding non-farm employment. Furthermore, they pointed out a negative relation between larger landholdings and participation. Education also observed to increase the amount of off-farm earnings in different countries by (Lanjouw and Shariff 2002, Mathenge and Tschirley 2010, Ellis 1999, Davis 2003, Lanjouw et al. 2001, GebreEgziabher 2000). On the contrary, Beyene (2007) arrive at no significant relation between educational status of household head and off-farm participation. Ambiguous result found on effect of loss of asset on participation decision into off-farm activities. A decrease in availability of arable land, an increase in producer/consumer ratio, credit delinquency, environmental deterioration can be important derives towards diversification(Warren 2002). Similar result is registered in Ethiopia by Beyene (2007) that farmers are participating in off-farm activities for push reasons due to small farm size. On the contrary, studies made in Chile and Nicaragua indicates that the poor society could not allocate labour and resources into off-farm activities because of lower level of asset (Berdegué et al. 2001, Corral and Reardon 2001).

Non-earned income like remittances is significant factor in determining labour allocation decision in Kenya. Households might use remittances to invest in nonfarm activities while some are using remittance as a coping mechanism (Mathenge and Tschirley 2010, Lay et al. 2007). Access to credit another proxy to availability of finance recognized to increase income and participation by (Berdegué et al. 2001) in Chile. Yet, little is known on the relation between remittance and participation in Ethiopia.

Some site-specific opportunities such as local market contingencies, development projects, infrastructure development (e.g. a new road), personal contacts (eg information) play an important role in pulling rural household towards livelihood diversification (Warren 2002). According to Ellis (1999) infrastructure (roads, power, and communications) has a powerful effect on mobility and choice to participate. A significant number of researchers found that nonfarm earning are lower when non-farm business activities are located far (Lanjouw et al. 2001, Abdulai and CroleRees 2001). Some Authors identified that infrastructure and socioeconomic factor differences makes region to have different impact on participation decision and amount of earnings (Lanjouw et al. 2001, Babatunde and Qaim 2009, Berdegué et al. 2001, Corral and Reardon 2001, Abdulai and CroleRees 2001). Natural resource endowments of a region observed to be a necessary condition for the development of the non-farm sector and the rural economy (Davis 2003). Conversely, a positive significant relation between an increase in distance to main road and to market places with

off-farm participation found in Ethiopia by (Berg and Kumbi 2006, Beyene 2007).

Studies have indicated that the presence and/or failure of markets affect participation and amount of earning. In the presence of food market, a household might not be forced to produce food if the utility from allocating labour into off-farm activity is greater than the utility from food production. However, in the absence of food market a household might be forced to allocate labour into food cropping by sticking into a lower utility level. There will be a similar effect in the presence of failure in land or labour markets. According to de Janvry *et. al.* (1991) for example, if there is an imposition on monetary head tax, the existence of labour market allows the household to increase wage earnings in order to pay tax. However, with no labour market, the only way in which the monetary tax can be paid might be by increasing the production of cash crops if there is a possible resource to do so. According to Barrett & Reardon (2001) in the presence of missing land market, a skilled blacksmith who inherits land spends scarce time in farming although his comparative advantage lies in allocating his labour hour in smith works, however if the land market are operative he might rent out his land. Quite large number of existing studies control effect of market failure indirectly through distance to the market, availability of assets and family size. However these variables does not exactly show if a household is failed to produce due to lack of hired labour power, land or other factors of production.

Gender relationships are emerged as a factor that influence participation patterns and amount of earning (Lanjouw and Shariff 2002, Davis 2003, Man and Sadiya 2009, Lanjouw et al. 2001, Babatunde and Qaim 2009, Berdegué et al. 2001, Lay et al. 2007, Warren 2002). As per Lanjouw *et. al.* (2001) nonfarm incomes are significantly higher for men than for women in Tanzania. However, in Honduras wealthier women found to participate highly on self-employment activities (Ruben and Berg 2001). In Ethiopia Berg and Kumbi (2006) found no significant relation between sex and participation. Whereas Lemi (2006)found a positive and significant relation between a household headed by male and participation in 1994 but no significant relation found in 1997. An increase in number of adults in a household increased amount of earning in Mali and Kenya(Abdulai and Crolerees 2001,Mathenge and Tschirley 2010). According to Lanjouw et al (2001) high dependency ratio reduces participation rate and amount of earnings.

Researchers also observed performance of agricultural sector as a determinant of off-farm participation and amount of off-farm earning. According to Davis (2003) labour flows between agricultural and non-agricultural sectors are less predictable and dependent on whether the agricultural transformation releases or absorbs labour. Labour flows also depend on the level of earning from agricultural and non-agricultural activities (Man and Sadiya 2009). Empirical finding on a study based on a cross-country analysis of data from 16 countries, indicates that non-farm income is associated with wealth and conversely agricultural based sources of income are most important for the poorest households (Davis et al. 2010). However, other researchers found that higher agricultural return leads to lower allocation of labour into off-farm. For instance, in Ethiopia, farmers with more farm resources were less attracted by

off-farm activities (Block and Webb 2001, GebreEgziabher 2000, Lemi 2006). Same also found in Kenya that households in more productive local agricultural area were less likely to participate in off-farm labour market (Mathenge and Tschirley 2010)

Chapter 4
Data and Descriptive Statistics

One of the main problems encountered in analyzing the determinants of diversification strategy was to find rich dataset that consist of relevant information on factors that affect participation and amount of earning. We therefore used Ethiopian Rural Household survey (ERHS) that addressed topics such as household characteristics, food consumption, agriculture, livestock, livelihood strategy, as well as community level data. Besides, ERHS survey was conducted on a longitudinal basis and allows controlling household and community fixed effects. In addition to ERHS dataset, information on average rainfall for the study areas obtained from Ethiopian National Metrological Agency and yearly retail price of goods and services obtained from CSA incorporated.

4.1. The Ethiopian Rural Household Survey

The Ethiopian Rural Household Survey (ERHS) is a unique longitudinal household dataset conducted in seven rounds from 1989 to 2008 covering households in a number of villages in rural Ethiopia. The survey was conducted in collaboration with the Department of Economics of AAU, IFPRI and Oxford University; and with a financial assistance of ESRC, SIDA, USAID, and the WB[5]. Farming systems were considered as an important stratification basis in selecting villages. The sampling frame to select villages was based on their main agro-ecological zones and sub-zones and one to three villages per strata were selected. A household then proportionately and randomly selected after stratifying based on sex of household heads. The survey was made based on qualitative and quantitative fieldwork, secondary sources, and interviews with key informants in each survey area and community level questionnaires (Sepahvand 2009). The data, therefore, covered villages in almost all direction of the rural part of Ethiopia. However, pastoral areas were not included in the survey (due to their constant mobility and difficulty of accessing them), hence cannot be considered as fully representative of the entire rural Ethiopia.

4.2. Variable Description

In this section, we present explanations on variables of interest and a hypothesis on effect of a variable on participation and amount of earning. Table 1 presents summary of these variables.

   Participation: this is a binary outcome variable having a value of one if a household participated into either wage work or self-employment. It is a de-

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[5] http://www.csae.ox.ac.uk/datasets/Ethiopia-ERHS/ERHS-main.html accessed on 22/09/2010

pendent variable on the first specification and a proxy for labour allocation decision.

Off-farm revenue: it shows the amount of total earning in local currency 'Eth Birr' (ETB) from wage work and self-employment activities. Off-farm revenue is a dependent variable on the specification that determines factors that affect amount of earnings from off farm activities.

Total income: it is amount of total earning from cropping, livestock, remittance, off-farm, etc in ETB. Total income used on our third specification, as a dependent variable, to examine effect of participation on total income. A household participated into off-farm activities expected to have a higher total income as compared to non-participant.

Age of household head: it is controlled to see the effect of experience of a household on participation decision and amount of earning. It is expected that initially an increase in experience increase both probability of participation and amount of earning and the effect of experience expected to reduce after some maximum point.

Household size and adult equivalent unit: these variables included to capture effect of labour force on participation decision. It is expected that more labour power have a positive effect on probability of participation and hence on amount of earning. These variables might also reflect availability of dependents instead of labour hour. Using a similar data set with different survey years, Block and Webb (2001) stated that availability of higher dependency ratio as more labour power because a household with more children have more hands available for off-farm income earning. Berg and Kumbi (2006) also argued that family size and dependency ratio could be translated as labour endowment.

Education: is a dummy variable indicating if a household head participated at least in primary education or not. This is because majority of households were not attending any schooling and number of household heads attending schooling above primarily education is almost nil. For instance, in 2008, nearly 50% of household heads never attended any schooling and 46% of them were participated only in primary schooling. Hence we categorized education variable as at least attended primarily education or not. It is likely that an increase in human capital of a household increases probability of participation and hence increases amount of earning.

Sex and Marital status of head: sex is a dummy variable assigned one if a head is male and zero otherwise. It is expected that participation decision and amount of earning will depend on sex of individual especially amount of earning expected to be high for male headed households due to a difference in wage rate among male and female workers in most developing countries. We used household head as our unit of analysis, however, using individual as a unit of analysis allows to capture effect of sex substantially. The probability of participation for single headed households is expected to be low. This is due to the fact that married households have relatively more labour power and might be motivated to allocate labour into off-farm activity.

Wealth index: this variable indicates the intensity of wealth of household head which is calculated through principal component index. Variables like value of livestock and household equipment are included. Household wealth expected to have different effects on participation decision and amount of

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earning. Empirical findings indicate that an increase in wealth could possibly allow households to have better opportunities to participate in better earning activities. On the other hand, more wealth might be translated to lower participation due to a higher level of income from other activities such as farming. We expect that wealthy households in Ethiopia might have better return from agriculture and they prefer to allocate less labour into off-farm activities. But the probability of participation into high-earning activity expected to increase among wealthy households.

Land: indicates household farm size (in ha). It is preferred to see the effect of land on participation separately; hence, land is not included in wealth index. As a resource, large farm size is expected to increase the capacity of a household to participate in high earning activities and hence increases amount of earning.

Agriculture intensification index: This index includes variables showing a potential of farming for generating improved output. Use of fertilizer, water harvesting system, soil conservation method and participation in agricultural extension program expected to increase the marginal productivity of agriculture. It is expected that a greater agriculture potential or an increase in agricultural earning increase labour supply by providing funds to cover initial investment costs for starting off-farm activities. It also creates opportunity to sellers and buyers by enlarging the market. On the other hand, we expect that it reduces labour supply through income effect, household might prefer leisure time than allocating labour. Yet, this actually depends on the return from off-farm versus farming activity. A reduction in agricultural income also has a tendency to increase labour supply by push factors or necessity for survival. This also reduces participation due to less capacity to cover initial costs to start-up off-farm. Following Methenge and Tschirley (2010) agricultural potential acting as a determinant for off-farm labour market but not directly impacting earnings achieved hence this variable used as an exclusion restriction on Heckman selection model. We found also insignificant relation between amount of earning and agricultural potential.

Vector of Finance variable: The variables indicate access to formal and informal financial sources. Access to formal financial institution controlled by a dummy variable showing if a household have a bank account or not. The presence of informal financial sources controlled by variables indicating if a household is a member of '*Idir*'[6] and whether a household received loan or not. In addition, variable showing if a household received remittance or not included as another source of informal financing. Access to financial sources expected to increase participation by enabling a household to cover initial costs to start up off-farm activities. We calculated finance index based on these variables.

A cash crop index included as an explanatory variable to examine to what extent the availability of cash crops acts as an incentive and affects probability of participation and amount of earning. It is composed of variables showing euca-

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[6] *Idir* is a local community organization in Ethiopia that provides financial and other supports especially during death of close family members.

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lyptus tree, coffee plant and '*chat*'[7] plant that a household have. We expect a higher amount of this index increases probability of participation and amount of earning.

Idiosyncratic and covariate shock index: Table 4 presents list of idiosyncratic and covariate shocks reported in 2004 and 2008 surveys. We separately included these shocks into econometrics analysis as their effect is expected to have different outcomes. Shocks peculiar to the household such as crops suffered from livestock eating, damage due to weed infestation, and ill-health of family member expected to increase participation rate by pushing a household to participate for survival. On the other hand, covariate shock is expected to reduce probability of participation by minimizing the economic capacity of a household. Covariate shock index is calculated using the occurrence of aggregate risks in a community like occurrence of flooding, wind, storm, and frost (low temperature).

Average rainfall and drought: even though these variables are grouped under shock variables, it is preferred to see their effect separately due to the main role rainfall play on farming activity in Ethiopia. Average rainfall is a continuous variable showing yearly average rainfall per region. An increase in rainfall is expected to increase the capacity of a household by increasing agricultural output. Occurrence of drought is a dummy variable showing if drought happened in the last 10 years.

Market failure index: the index is composed of variables showing a reduction in agricultural output due to unavailability of hired labour, oxen and fertilizer. When market fails farmers are unable to make their commodity tradable and the cost of market participation become high and farmers become unable to get factor input at affordable prices (de Janvry and Fafchamps 1991). We expect markets to fail to specific households because the cost of market participation depends on economic situation of each household taking into consideration the possibility of its occurrence on aggregate basis. Thus, market failure is expected to reduce participation decision by prohibiting household from opportunity to participate.

Participation of female and children in self-work: it is a dummy variable showing one if children and female participated in food selling activity and zero otherwise. This variable is included to see the effect female and child participation on household level of earning as compared to other group of households.

Work in their village and distance to the nearest market: Work in one owns village is a dummy variable having one if a household work in her village and zero otherwise. It is included to capture the effect of working in the village on amount of earning as compared to travelling far distant locations. A long distance to market is expected to reduce the probability of participation by increasing marginal cost of participation.

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[7] *Chat* is a plant grown in Ethiopia which has got a mild stimulant. It is a cash crop and legal for sale and production in Ethiopia.
http://news.bbc.co.uk/2/hi/africa/2203489.stm accessed 09/11/2010

Region: Four regional states (herein after referred to as regions), namely Ti-gray, Amhara, Oromia and SNNP have participated in the survey. Dummy variable for each region is created. It is expected that the probability of participation and amount of earning is affected by region due to the difference in resource endowment between them.

4.3. Descriptive Statistics

This study basically based on 2004 and 2008 surveys respectively involving 1597 and 1574 households. Of these, 254 households that were in the survey in 2004 dropped out in 2008 and 231 households were new entrants during 2008 survey (Table 2). Hence, total sample sizes of 1343 households have been used to create a balanced data for econometric analysis.

As explained earlier in empirical review a factor found to have dissimilar effects and significance level in different situations. One of the reasons could be variation in resources, access and capability among individuals, households and communities. It is expected that a portion of these differences might be grasped by economic situation of a household. Hence, we tried to see effect of each variable by disaggregating a household based on its expenditure quintiles. We also believe that there is a need to separately treat poorer and richer households because a difference in economic level influences a household to respond differently on environmental, social, economic, and demographic changes. For instance, if the return from off-farm activity is smaller than the return from agricultural activity, an increase in agricultural yield due to good weather condition might motivate poorer households to allocate extra labour hour into off-farm activity because of the opportunity created to cover initial start-up cost. On the other hand, a richer household might reduce amount of labour hour allocated into off-farm activity by preferring leisure time. This could be due to availability of more assets such as land, the richer household, can collect the targeted income from agricultural activity only and prefer leisure time than off-farm participation. But, the poorer household could not collect sufficient income from only farming activity due to a lower land size. Hence, for a similar event household in different economic condition expected to respond differently. The analysis, therefore, made by grouping households based on their economic status as poor and non-poor using quintile of expenditure per a household[8]. This section directly focuses on describing off-farm participants referring variables that are expected to affect off-farm participation decision.

Households exhibited different livelihood strategies across survey years and across quintiles (Table 6). More than 90% of them participated in pure farming (cropping). However, participation rate gets increased when one goes

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[8] Household categorized as poor and non-poor based on expenditure quintile per household level. Household fall under 4th and 5th expenditure or land size quintile are grouped as non-poor and household fall under 1st and 2nd grouped as poor. Hence, this category does not in line with the standard measure of poverty.

up across quintiles. This indicates a relatively higher number of participation in farming activity occurs among non-poor households. Almost 100% of sample household participate in mixed crop-livestock farming. This primary livelihood strategy is considered as farming. The second livelihood strategy that sample household pursuing is off-farm activity. In 2008, nearly 64% of households in the first quintile were participated in this activity and participation rate was 74% for those categorized under upper quintile (Table 6). Even though higher participation rate observed in upper quintile a substantial number of household in lower quintile also participated in off-farm activities. Participation rate were also higher across years. It increased by 7% in 2008 for the upper non-poor households. Overall off-farm participation rate was 55% in 2004 and increased to reach 75% in 2008. This testifies that, there exists an increase in rate of participation both across years and across expenditure quintile.

Table 3 presents variables that describe characteristics of households and their economic conditions per household expenditure quintile. The average age of household head is lower for households that fall under upper quintile and relatively higher for households in lower quintile. This might indicate the presence of association between birth cohort and economic condition and it might be translated to off-farm labour allocation decision and earning. Table 4 summarizes the mean differences of the variables between participants and non-participants. The results revealed the presence of a significant statistical difference in average age between participant and non-participants. On average, a participant household is younger than non-participant. Hence, based on this statistics, a household in upper quintiles most probably be a participant.

On average, family size is lower for those in lower quintile and greater for those in upper quintile. This finding indicates a positive association between large family size and being non-poor. Adult equivalent unit, which is expected to capture level of labour power within a household, has a similar trend with family size. There is a strong correlation coefficient (0.7) between family size and adult equivalent unit, which allow us to consider large family size as a presence of more labour power. Consequently, the difference in level of labour power expected to create differences in labour allocation decision and earning across quintiles. In addition to this, the mean difference shows a statistical difference in the mean of the two groups on their respective family size and adult equivalent unit. The latter indicates the presence of more labour power among participants and hence the presence of positive relation between off-farm participation, more labour power and higher level of wealth.

As expected, average size of land increases when one goes up per expenditure quintile in both survey years. The difference in level of factor input per expenditure quintile, expected to create differences in level of labour allocation decision and amount of earning. However, there is no statistically significant difference on mean of land holding between the two groups.

The data reveals that access to education is different across quintiles with a lesser participation rate among the poor. There is also a statistically significant mean difference between the two groups on educational level on which participants have attended more education than non-participants. However, the mean difference is very small. We do not find a statistical difference in means on sex and marital status between the two groups.

There is a huge gap between households in upper and lower quintile on level of access to formal financial institution. For instance, in 2008 nearly 16% and 1% of sampled households in fifth and first quintile, respectively, had bank accounts. Despite this fact, households in rural Ethiopia had informal financial sources, which could be observed from the survey. For instance, in 2004 nearly 84% of households in upper quintile and 16% in lower quintile had access to *Idir* that shows the existence of informal insurance mechanism among rural households. The loan variable also supports our analysis that in 2004 nearly 58% and 13% of households in upper and lower quintile took loan even though same number of households did not have access to formal financial institution. This again confirms a presence of informal insurance among communities in rural Ethiopia. A positive correlation between access to finance and participation into off-farm activities is registered. However, the rate of access among poor households is lower. There is also a highly statistical significant mean difference on access to finance variable between participant and non-participant households on which a participant have relatively higher access to financial sources. The expenditure analysis shows that a household in upper expenditure quintile have better access to financial resources. Hence, we might say that there is positive relation between off-farm participation, better access to financial sources and being non-poor.

Recently, there is a huge investment on the development and expansion of infrastructure in Ethiopia. This includes infrastructure like building and maintenance of roads, dams and communication facilities (EEA 2006/07). However, the distance variable to the nearest daily market shows that there is still a need to do more. The average distance to the nearest market requires a household to walk, on average, more than 2 hours to access the daily market (actually, this is in the absence of transportation facility). It is interesting to note that, in both 2004 and 2008 years, households that are categorized under lower expenditure quintiles are located far away from the nearest daily market and this is expected to create difference on labour allocation decision as well as earning. Reardon (2001), in Latin America, found that a household that is poor in land and education often located far away from roads and electricity. The statistical analysis indicates that, on average, distance to the nearest market is lower for a participant than for non-participant. This is in line with the assertion that the motivations for off-farm participation allow households to get more opportunity to access market with a lower cost. Hence, when we relate the statistics in Table 3 and 4 on distance variable; poor households are located far and a participant household located near. This indicates the presence of positive association between lesser distance to market places, being non-poor and participation.

Conversely, the difference in means of occurrences of shocks shows that participants experienced more shocks than non-participants did. It could be one of the push factors for off-farm participation. Similar result observed in wealth index. There is a high statistical mean difference between the two groups wherein participants have, on average, a lower level of wealth. This could be categorized again as one of the push factors for participation decision.

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Chapter 5
Empirical Model and Discussion

In this section, empirical model specification and two sets of discussions and results will be presented. In the first set, trends of livelihood strategies of sampled households based on the definition of diversification will be discussed. In the second set, discussions based on econometric models will be reported.

5.1. Empirical Model Specification

This section discuss how we implement empirical models to determine first factors that affect households' participation decision, then factors that determine amount of earning from off-farm activities and finally specification to examine the effect of participation on household total income. Panel data set of 2004 and 2008 of the ERHS used to estimate all models.

Following Reardon *et al.* (2006) a labour supply is a function of incentives, instability of incentives and capacity. In this paper, labour supply is our dependent variable, which shows participation into off-farm activity. Incentive could be a vector of variables related to return that motivates household to make participation decision. It could be proxied using wage rate and returns from each activity. Since information on wage rate is not available in both surveys, it is not possible to control it in any of the estimations. It is critical, however, to note that other factors rather than wage rate might be relevant for households' labour supply decisions in the context of rural Ethiopia where there exist imperfect labour markets. Even so, to circumvent any possible omitted variable bias, we use 'distance to the nearest market' as a proxy for access to opportunities in labour markets. This is because the wage rate in most cases tends to decline with an increase in distance. Another incentive that affects labour supply decision could be agricultural intensification and cash crop indices. These variables captured to control output or return from agricultural activity that could be one of the incentives for participation. We also controlled incentives using vector of finance variables that indicates availability of formal and informal financial sources expecting that availability of finance is an incentive for participation.

The second set of determinants following Reardon *et al.* (2006) represents instability of incentives due to relative risks on farming and non-farm activities. We controlled instability of incentives using idiosyncratic shocks, covariate shocks, drought and average rainfall.

The last set of determinant variables are capacity. It is controlled by using wealth index, land and household demographics that demonstrate capacity of a household. We also controlled market related variables, which could possibly represent capacity of a household. Vector of finance variables could also be used as an indicator for financial capital. Therefore, the underlying model for participation will be:-

$$L_{it} = \beta_o + \beta_1 I_{it} + \beta_2 II_{it} + \beta_3 C_{it} + \beta_5 X_{it} + a_i + \varepsilon_{it} \quad \text{........ (1)}$$

Where L_{it} is a binary labour supply variable taking the value one if a household i offers labour in period t. I_{it} is a vector of incentive variables correspond to household i at period t such as agricultural intensification index, cash crop index, vector of finance variable, distance to the nearest market. II_{it} is a vector of instability of incentives to household i at period t such as shock index, average rainfall and draught which is expected to affect the incentives to participate. C_{it} stands for a vector of capacity variables that could possibly affect capacity of participation of household i at period t such as age, gender, education, labour power in a household, wealth, finance, land and market failure. X_{it} represents community characteristics such as region. a_i captures all unobserved time invariant factors that could possibly relate with dependent or independent variables and the error term ε_{it} captures idiosyncratic errors that are varying across time.

One of the basic assumptions of OLS estimator is that the error term should be unrelated to one or more of the regressors. Hence, estimating eq (1) using OLS might lead to a biased result if some of the unobservable factors are correlated with some of explanatory variables like education, and agriculture potential, as explained earlier. Using panel data enables us to control time invariant unobservable factors that are expected to be captured by error term. Hence, by assuming that the unobservable time-invariant features of the household and community characteristics are related to one or more explanatory variables, we estimate eq (1) using fixed effect linear probability model. It is to be noted that employing linear fixed effect had a disadvantage when the dependent variable is a binary outcome variable because it considers the relation between the dependent and independent variables as linear (Gujarati 2004). Non-linear fixed effect probability models (logit and probit) might solve the problem of linear fixed effect when the dependent variable is a binary outcome. However, fixed effect of these models drop observations in longitudinal data set that does not show up variations through time. This might lead to a selection bias. Therefore, in addition to linear fixed effect, we introduce logit random effect model. It is to be noted, however, that random effects make an assumption that time-invariant household and community fixed effects are uncorrelated with one or more of the regressors which might not the case in reality. To do the robustness check we re-estimated eq (1) using linear random effect model. The result for logit random effect is presented in terms of marginal effects. The results of these binary choice models can be interpreted as the percentage change in independent variable on the probability of participation in off-farm activities.

As stated, the dependent variable in eq (1) is participation into either wage work or self-employment. Actually, the nature of self-employment and wage work are different and a distinction should be made when making estimation. However, in Ethiopian context, both activities are highly labour intensive and the determinants are expected to be similar. Hence, we estimated the specification by aggregating both activities at once as participation.

In the second step, following Reardon *et al.* (2006), we estimated factors that affect amount of earning to draw out the influence of explanatory vari-

ables on amount of earning. As shown in theoretical model factors affecting participation is different from non-farm earnings. Because a variable might leads a household to make participation decision but the level of earning vary among households due to a difference in characteristics. However, the goal for rural development is not mainly directed towards participation but to improve the living standard of the rural society, which can be targeted through better earnings. Hence, there appears a need to study the effect of factors on amount of earning. The specification could be:-

$$Y_{it} = \beta_o + \beta_1 X_{it} + \beta_2 Wealth_{it} + \beta_3 land_{it} + \beta_4 Finance_{it} + \beta_5 cashcrop_{it} + \beta_6 Market_{it} + a_i + \varepsilon_{it} \quad .... (2)$$

In equation (2) Y_{it} denotes amount of off-farm earnings of household i at period t. X refers to vector of factors that are related to household and community characteristics which are expected to influence amount of earning and a_i is household and community fixed effect.

Off-farm earnings can only be observed for a participant household. This results to a sample selection problem (Wooldridge 2003) which indicates a need to account for the resulting non-random nature of the sample for estimating eq.(2). If the household that would earn very low wages might choose not to participate; thus estimating eq.(2) will over estimate the return from off-farm activities. This is because the estimation drops households that prefer not to participate because of lower earning as their data on amount of earning are missed. The opposite holds true. On the other hand, even though, replacing the missing values with zero enables to use all the existing information, it will underestimate the return from nonfarm activities. The Heckman correction, a two-step method, allows for correcting the potential selection problems. It uses information from non-participant in order to estimate factors that determine amount of earning. Hence, equation 2 is estimated using Heckman selection model. The basic outcome equation will be:-

$$Y_{it} = \begin{cases} \beta X_{it} + \varepsilon_{it} \text{ if } L_{it} > 0 \\ - \qquad\qquad if \ L_{it} \leq 0 \end{cases}$$

Where X_{it} represents all explanatory variables and β represents all parameters in equation (1) and (2) above. The result could be interpreted as indicating the effect of a unit change in independent variable on the percentage change in amount of earning. We also estimated equation (2) using fixed and random effect models for robustness check, however, these results applied only to off-farm participants.

In the third step, we estimated eq (3) in order to see the effect of participation on overall income of a household. The specification is:-

$$Y_{it} = \beta_o + \beta_1 L_{it} + \beta_2 I_{it} + \beta_3 II_{it} + \beta_4 C_{it} + \beta_5 X_{it} + a_i + \varepsilon_{it} \ .... (3)$$

Where Y_{it} is log of total income of a household i at period t, L_{it} is a binary variable showing participation of household i at period t into off-farm activity. It is expected that effect of participation on over all household in-

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come might differ among households in different expenditure quintile and farm size. This is because even if a household participate into off-farm activities, the effect of participation on total income could possibly be different based on the difference in resources, capability and access. Hence, it is preferred to find out effect of participation on each households located under different expenditure quintile and land size by controlling household time invariant fixed effects (a_i).

However, it should be noted that the above empirical strategy may not capture a situation when there is reversal casualty problem that may happen. For instance, if better income affects the decision to off-farm participation through financing the investment need to engage in self-employment. Hence, the estimation result should be seen as an attempt to show whether there is relation between the two variables of interests – off-farm participation and household total income.

5.2. Income diversification patterns and trends

5.2.1. Diversification by participation in wage and self work

Table 7 presents the percentage of participation in wage work and self-employment per expenditure quintile. We categorized activities as high-earning if it requires special skill (Haggblade et al. 2007)and/or initial capital. Wage work further categorized as farm wage work, low-earn nonfarm wage work and high-earn nonfarm wage work. Participation of a household into farm wage activities exhibits an increasing trend across expenditure quintile. This demonstrates substantial number of non-poor households participated in farm wage. As explained earlier in descriptive statistics, household size is on average larger among non-poor households. One possible reason for an increase in farm wage work among non-poor household could be due to a relatively greater crop production among non-poor households, they might use own labour power on farm works.

Similarly, participation into high-earn wage work exhibits an increasing trend across expenditure quintile. This also reflects greater involvements in high-earn activities among non-poor households. On the contrary poor households are participated less in these activities. It is interesting to note that overall participation into high-earn wage work categories is very small as compared to other off-farm activities. This could be due to a lower educational achievement among rural households in Ethiopia.

Even though the pattern is not clear in 2004, participation into low-earn wage work shows a declining trend when one goes up across expenditure quintile in 2008. This demonstrates a lower rate of participation among non-poor households and greater participation rate among poor household into a low-earn wage works. As expected, participation into high-earn self-employment activity shows an increasing trend across quintile on which a poor participated less than a non-poor household. High-earn self-employment activities require relatively higher investment when compared to other non-farm activities. Hence, non-poor household and household that do not face liquidity constraint have relatively better capacity to invest and participate in such activities.

This is in line with a hypothesis that poor household participated less in high-earn self-employment activities due to an entry barrier to join a higher return activities. Entry barrier could be inability to overcome start-up costs. Some of the activities grouped as high-earning self-employment activity in 2004 and 2008 ERHS is trade in livestock and milling services. The possible start-up cost required to participate in trade in livestock is, cost of livestock such as ox in addition to other operating costs including labour hour. Based on CSA, on average, cost of one ox is ETB2,000 in 2004. This does not include other operating costs and cost of building up inventories. In addition, to give a milling service; the cost of installing flour-making machine is on average ETB15,000. Panel data set indicates that yearly average income for a household in the first quintile in 2004 is around ETB970. We can easily learn that, how a credit-constrained household, with a yearly household income of such amount faces difficulty to participate in such high earning activities. In addition to this, chance of participation into higher earning wage works might increase through education (though the required level of education might differ based on the type of off-farm activities). In rural Ethiopia, there is no tuition fee to attend primarily education in public schools. However, this situation does not allow us to agree education is free and easily accessed by poor families. Because there are related private costs in Ethiopia viewed as barrier to access primary education such as cost of uniform and stationary, there is no provision of school meals, loss of earning by replacing school attendance for work and work burden by families due to sacrificing labour hour for education (Oumer 2009). These situations then allow us to say a poor cannot overcome entry barrier into higher return activities. On a study made in Sub-Saharan-Africa Grimm et al. (2010) have found a notable entry barrier when initial investment taken into account to start MSEs in transport sector. Dercon and Krishnan (1996) cited in Dercon (2005) in Ethiopia and (Corral and Reardon 2001) in Nicaragua have found presence of entry barrier to high-earning activities.

In general, the trend analysis indicates that, in high earning self-employment and wage works, in all years, participation of non-poor relatively greater than poor households. In addition, on average, participation of poor is greater in low earning wage works and self-employment activities. However, participation rate in farm wage work is higher in all years among non-poor households than poor households.

5.2.2. Diversification by level of income share

Table 8 indicates how different income sources contribute to overall household income. This allows us to examine the effect of income from off-farm activity on overall household income per economic status of a household.

Income from mixed farming (crops and livestock) accounts for the largest sources of income at each level. It constitutes about 51% and 76% in 2004 and 37% and 77% in 2008 for a household, categorized under lower and upper quintile respectively. Similar result was indicated on a cross-country comparison that agriculture based sources of income remain critically important for rural livelihoods in all countries under survey, both in terms of overall share of agricultural income and participation rate (Davis et al. 2010). However, in our

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analysis, we observed that share of income from mixed farming, on average, showing a declining trend across years (Fig 4).

The first four rows in Table 8 presents share of income from self and wage works in 2004 and 2008. We have observed previously that share of income from mixed farming declined in 2008 as compared to the one in 2004. Here, we can easily observe that, share of off-farm income increased in 2008 as compared to 2004. This shows the importance of income generated from off-farm activities in rural Ethiopia is increasing through time. We have observed also an analogous trend on share of off-farm income across expenditure quintile. Income share from both wage works and self-employment show an increasing trend when we go from first to second quintile and it goes declining among households in upper quintiles. This can easily be observed from Fig. 2 and 3. Although share of income from wage work and self-employment were small for households in upper quintile the descriptive statistics and trend analysis shows that participation of non-poor especially on high earning self and wage employment is high. However, when we compare their livelihood strategy; they are getting more from farming activity so their share of off-farm income is lower because of less reliance and less intensity of participation in off-farm activities. The poor have relatively lower income from agriculture and they might allocate more of their time into off-farm activities and hence their off-farm income share became greater as compared to non-poor, even though they are participating less in high-earning activities. Lanjouw and Shariff (2002) have found a similar trend. Authors stated that, in aggregate terms, total non-farm incomes are not particularly more important for the richer quintiles than the poorer quintiles, the poor earn significant shares of total income from casual non-farm wage. In addition to this, Adams (2001) found that the poor in Egypt receive almost 60 percent of their income from nonfarm sources. This indicates how off-farm income is important for the poor society even though they are participated in low-earning activity. According to Berdegue *et al.* (2002) without the nonfarm jobs of the lowest quartile of households, the life of average rural household in the poorer zone would have been worsened below their current economic status.

We also identified that share of remittance were having a similar trend with income from wage and self-employment activities. That is, share of income from remittance is higher among poor households than non-poor households. It might show that the poor highly dependent on income from remittance as compared to non-poor. It also indicates that remittance is commonly used as a form of informal insurance mechanisms among the poor households and those relatively poor are getting transfer of income in the form of currency, goods or services when shocks occurred. We have indicated on the descriptive statistics that occurrence of high shocks were registered among poor households. In addition, almost all households in the survey replied as they are getting help during occurrence of shocks within in the household.

Table 9 shows composition of annual income per land size holdings to explore association of share of income sources with land holding. We found a similar trend from that of expenditure quintiles in that off-farm share increases when we go up across quintiles but it gets reduced among households in upper

quintiles. However, the share of farming keeps on increasing across all quintiles when the size of land holding increased.

5.3 Empirical Findings and Discussion

5.3.1 Determinants of participation into off-farm activities

In this section, we estimate and present our finding on factors that determine participation using linear fixed effect and Logit random effect models considering their caveats. We also estimated the specification using linear fixed effect model separately for female and male household heads in order to see the effect of a variable per sex of household head. This is due to the fact that sex is fixed over time and it gets removed when we employ fixed effect models.

The finding indicates that household size affects participation decision positively (Table 10). The probability of having greater number of adults in a household increases the decision of an individual to allocate labour into off-farm activities. In Ethiopia, there is relatively more labour power as compared to other factors of production. When there is more family labour power, members motivated to participate in off farm activity. This is because the limited supply of land and other factors of production reduce participation into other activities such as, farming. Our finding is robust. The result also indicates that an increase in household size increases participation of female household head. This could be interpreted as, an increase in family labour hour reduces burden of female household head on domestic work and motivates her to allocate labour into off-farm activity. As per our analysis in descriptive statistics, we have shown the association between family size and labour power, in this data set.

Age of household head is not statistically significant in all models with the exception for female household head. It shows that an increase in age of female increases off-farm participation. This might be, in Ethiopian context, female in rural area married and gave birth at their early age and when she is getting older, she will be relieved from domestic works especially from childcare. In addition, the family might start using children labour hour. This situation allows her to have relatively more labour hour that motivates her to increase off-farm participation.

Coefficient of education is significant only in fixed effect model but not in random effect models. A Housman test preferred fixed effect over random effect model. It indicates that attending at least primarily education increases probability off-farm participation. As expected, an increase in human capital increases opportunity to various livelihood strategies. However, Beyene (2007) found education variable as insignificant for participation in Ethiopia. It was interpreted as majority of off-farm activities are labour intensive and do not require education for making participation decision. It is true that most of off-farm activities in Ethiopia are labour intensive and might not require attainment of higher education but it is to be noted that a household that attended at least primarily education have a better opportunity in finding off-farm job especially in wage works. The mean difference indicates also that there is a statis-

tical difference between participant and non-participant on educational level. Hence, we can conclude that education increases probability of off-farm participation. The result also indicates that, given a household attended education, male household head have a greater chance of off-farm participation. This is because women in rural Ethiopia are responsible for domestic works and engaged more on reproductive works, which reduces her chance of participation irrespective of schooling. However, this is not the case among male heads. In Ethiopian context, in majority of the cases, male have almost no responsibility on domestic works as compared to female. The panel data set indicates that greater number of male household heads attended schooling as compared to female household heads. That is, percentage of schooling is 78% for male heads.

Wealth is found to influence the decision to participate in off-farm activities on random effect models. It has a negative effect and statistically significant at 1% level. It indicates that when wealth of a household increases probability of participation reduces. This might be due to income effect. It also demonstrates off-farm participation among poor households is due to push factors. Which allows saying that participation is practised for necessity than for choice like to cover their consumption expenditure. In 1999 survey, 90% of individuals replied as they used income from non-farm activity for consumption purposes. However, the statistics indicates that the rate of off-farm participation from lower to upper quintile is 17%, 18%, 20%, 23% and 20%. Which indicates the rate of participation based on household economic status shows an inverted 'U' trend. It can be interpreted as, initially when level of wealth increases participation increases but it is reduced in the upper most quintile. Which leads us to say that household in the most bottoms and top up economic rank are participated less. The former participated less due to entry barrier and the latter participated less due to an income effect. We have learnt similar flow in our trend analysis that share of off-farm income keeps on increasing from first quintile onwards and gets reduced in the last quintile or among the richest households. This enables us to say that in order to make participation decision wealth is a determinant factor but a further increase in wealth reduces participation rate. In India it is found that relatively large landholders work shorter spells even though their landholdings do provide them *access* to the higher wage occupations (Lanjouw and Murgai 2008).

Finance is one of the variables that affect probability of participation positively. In our analysis, a vector of dummy variables that explain access to finance controlled separately like, having a bank account, received remittance, member of Idir and loan taken. The result testifies that finance is a determinant factor for off-farm participation decision. It indicates that a household that have access to financial sources has a greater chance of participation in off-farm activities. Which also indicates a household faced by liquidity constraint participated less. It is interesting to note that access to formal financial sources is not significant while informal financial sources are significant to participation. This is because only a small number of households have access to banking service in rural Ethiopia. The panel data shows that only 5% of households had bank account in 2004 and 2008 survey years. The result attracts the atten-

tion of policy makers that focused on rural development. The result also indicates that, given a household has access to informal financial sources, being a male increases probability of participation. The panel data set shows that 40% and 60% of households are headed by female and male respectively. Even though number of male headed households is greater; a substantial number of households are headed by female. However, participation rate is found to be higher among meal headed households, which also again attracts the attention of policy makers.

According to Bardhan and Udry (1999) fluctuation in income present an acute threat to people's livelihood even if, on average income is high enough to maintain a minimal standard of living. Fluctuation in income occurred mainly due to shocks. A household, therefore, found to devote resources into non-farm activities in order to have a stable stream of income as a response to shocks. We found that an increase in occurrence of idiosyncratic shock, a shock peculiar to a household, increases probability of participation in both fixed and random effect models. This is because the shock reduces earning from main activity, in our case farming, and pushes the household to allocate labour into off-farm. It indicates that a reduction in agricultural output is one of the factors that motivates household to make participation decision. On the contrary, an increase in covariant shock found to reduce participation only in random effect models. This is due to the fact that, such collective shock reduces economic capacity of a community and further reduces overall demand and supply. It then reduces rate of participation. However, even if drought is one of the covariate shocks occurrence of drought found to affect participation decision positively. This is because the effect of drought lasts for a long period of time that forces a household to seek option for getting income other than farming. Similar result found by (Mathenge and Tschirley 2010) in Kenya. We also found that an increase in average rainfall reduces probability of participation even though the effect is not strong. As explained, farming in Ethiopia is based on rain, availability of rain provides opportunity to participate in farming sector, and then it reduces participation into off-farm activities. Finally, based on OLS estimation, region is a determinant variable for participation. We observed that households living in SNNP have a higher probability of participation and households living in Oromia region have a lower probability of participation as compared to households living in Amhara Region.

In general, we found that variables that show level of labour power, education, wealth, access to formal and informal financial institution, occurrence of covariate and idiosyncratic shock, gender, and region determine choice of a household on participation decision.

5.3.2 Determinants of amount of off-farm earning

In this section we present discussion based on the finding of eq(2) using Heckman selection and fixed effect model. The dependent variable is log of earning from wage work and self-employment. Interpretation of the result mainly based on Heckman and fixed effect models. Heckman is selected because it corrects the potential selection problem and it allows us to generalize

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our finding to the population. A Housman test preferred fixed effect over random effect model.

The result indicates that an increase in number of household size is a determining factor for earning more from off-farm activities. As expected, the presence of more labour power motivates household to work a longer period and to get better earning. This allows us to agree on the presence of positive relation between allocated labour hour and amount of earning, keeping other things constant. It is to be remembered from the descriptive analysis that large family size is concentrated relatively among non-poor households. It could be reported as the non-poor have more labour power and getting more off-farm earning.

An increase in age of household head, which can be interpreted as an increase in experience, increases amount of earning. Hence, a household with more experience is getting better earning. We found earning and experience to have a positive linear relation. This might be due to a significant number of households are found under middle age group. For instance, in 2004 only 9% of household heads are above 75 years old and 91% of household heads belong to working group. Then, we can say that when experience increases earning also increases because majority of heads are under working age.

Education variable is found to be a factor that does not affect off-farm earnings. Despite the difference in school attendance, a household earn similar amount, holding other factors constant. Education found as a determinant for off-farm participation. This could be an individual with little education have better opportunity to participate but since due to a lower educational achievement amount of earning might not have a significant difference between those attended primarily education and the other group. This could also show unavailability of enterprises that could make better payments. In ERHS 2004 survey only two household heads in the sample educated at a university level hence, education might not have an effect on amount of earning, in rural Ethiopian context.

Wealth found to be a determinant factor on amount of earning. It indicates wealthy households are getting better off-farm earnings. Our result on wealth variable seems contradictory but they are complementary. So far we found that the 'wealthiest' households participated less, wealthy households are earning more and share of off-farm income for non-poor is less than poor. The result testifies that when wealth increases participation increases but the further increase in wealth, participation reduced. That is the rate of participation among the 'wealthiest' households is lower, could be, due to income effect. The second finding is off-farm earning increases when wealth increases. This is because wealthy households are participating in higher income generating activity that has a potential to increase amount of off-farm earning. On the other hand, the poor participate intensively but they do it in a lower earning activity hence the poorest household are collecting lower off-farm income. However, when we examine the livelihood strategy of non-poor; they are getting more from farming activity so their share of off-farm income is lower (as compared to the poor) because of less reliance and less intensity of participation in off-farm.

A household that has more cash crops like 'chat', coffee and eucalyptus tree able to earn better from off-farm. This is because cash crops allow a household to participate in high earning self-employment activities. Hence, a household with more cash crops earns more.

The coefficient of market failure index is negative and statistically highly significant. Specifically, the result indicates that a presence of market failure reduces amount of off-farm earning. Market failure could be, for instance, inability in getting hired labour due to a higher cost. Hence, a household facing market failure earns lower amount from non-farm activity. Mishram and Holthausen (2002) found that an increase in hired labour expense affects off-farm work in North Carolina.

Nearly 42% of households that were participated in off-farm wage work were working in their village while the others were working by nearby villages or far. This variable affects amount of earning positively. It could be interpreted as those working in their own villages are getting a higher return than a household working far. It shows that in addition to lower capacity of a village to create market, failure to access markets contributes to lower earning. We have got a similar result for distance variable. When the distance to the nearest market increases, the return from off-farm activities reduced. This is in line with our expectation that a household that access a market with a lesser cost are getting more return because of their comparative advantage.

A variable showing participation of female and children into self-employment activities is statistically significant at 1% level. It indicates that households that have more number of female and children participants are getting more revenue than the other group.

The statistics shows that no significant difference in mean of land variable between participant and non-participant household. The result indicates that the coefficient of land variable as statistically significant in OLS, Heckman and fixed effect estimates but the magnitude is very small. Finally, we found that the coefficient of region to be statistically significant. It indicates that households living in Tigrai and Oromia region have better earning than Amhara region.

5.3.3 Effects of off-farm participation on household total income

In this section, we present explanation of findings summarized in Table 12. We prefer to present only coefficient and standard error of off-farm participation on household total income across expenditure and land size quintiles. This is because we are interested on the effect of participation on amount of earning within different group. The dependent variable is log of total income. The result indicates the percentage change on total income due to participation. As explained previously, the model might not capture a situation of reversal casualty problem that may happen if better income affects the decision to participate. Thus, the estimation result will be seen as an attempt to show whether there is a relation between off-farm participation and household income.

For all household in the sample, off-farm participation increases overall income of a household positively and it is statistically highly significant. The

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coefficient of participation is also highly statistically significant in all groups stratified per land and expenditure quintile and it is robust in all models (OLS, fixed effect and random effect).

The coefficient of participation has similar trend across expenditure quintiles with our trend analysis. It indicate that an increase in participation keeps on affecting total income on an increasing trend when one goes up from first expenditure quintile and its effect on total income reduces among households in upper expenditure quintile. It shows that off-farm participation particularly more important for the poor society. Interestingly, the effect of participation on total income across farm size indicates a similar trend. The effect of participation on overall income is very high among a household with smaller land size, which can be considered as relatively poor. On the contrary the effect of participation on total income gets reduced when one goes up after the middle quintile. Jayne *et al.* (2003)found similar result that share of non-farm is highest among poor households in Ethiopia.

In general, the result demonstrates that, all else equal, off-farm activities have a potential to improve the living standard of the poor and hence have a greater tendency in reducing income inequality, as it is important source of income for the poor society. The result motivates us to say policies related to off-farm activity could be pro-poor. According to Lanjouw and Lanjouw (2001) the distributional impact of non-farm earnings found to be pro-poor. However, this might be achieved if capacity of earning on activities that the poor engaged in is improved.

Chapter 6
Conclusion

The importance of off-farm income and employment is increasing among the livelihood strategy of households in rural Ethiopia. Overall participation rate, which was 55% in 2004, reached 75% in 2008. This paper analyzes off-farm activities and income among 1343 households in rural Ethiopia using ERHS panel data set by stratifying households based on expenditure and land size quintile.

Previous researches on this area focused on specific region within Ethiopia. Majority of them were using cross-sectional data without controlling household and community fixed effects. In addition, we did not come across a study showing patterns of livelihood strategy in rural Ethiopia. We also noted that most researchers in rural Ethiopia studied diversification without grouping households based on their economic conditions. This paper is structured to overcome the shortcomings of previous studies mentioned above.

The specific objectives of this study are; to assess trends of different livelihood strategies that a household in rural Ethiopia pursuing, to explore factors that influence off-farm participation decision, to identify factors that determine amount of off-farm earning and finally to find out the effect of off-farm participation on overall household income.

In the trend analysis, the finding clearly depicts the involvement of poor and non-poor households in off-farm activities. Participation rate in farm wage work is higher among non-poor households. In high-earning wage and self-employment activities, participation of non-poor is relatively greater than poor households while, on average, participation of poor households is greater in low earning wage and self-employment activities. This indicates the presence of entry barrier into higher income generating activities for poor households. That means the poor households are unable to overcome start-up costs to join higher-earning activities hence, forced to stick into lower earning activities.

There is a comprehensible trend on share of income from different sources per expenditure and land size quintiles. Income from mixed farming accounts for the largest sources of income for each group and it has an increasing trend across expenditure quintile which shows non-poor households are collecting a significant portion of their income from farming activities. On the other hand, share of off-farm income is higher for poor households as compared to non-poor households, which indicates the poor households have relatively higher intensity of participation into off-farm activity, and they rely more on incomes generated from wage and self-employment activities. We also noted that share of income from farming activities are declining and that of non-farming are rising across years.

Income share from remittance is higher for poor households. It indicates how remittance is acting as a livelihood strategy for the poor community and how the poor are suffered from financial shortage in rural Ethiopia. It again

indicates the existence of informal insurance mechanisms. The entire situation attracts the attention of policy makers on the issue.

We employed linear fixed effect and logit random effect in order to estimate determinants of off-farm participation. Pull factors such as presence of more labour power in the household, human capital and access to financial sources motivates a household to make participation decision. Conversely, the occurrence of idiosyncratic shock increases the probability of participation as a push factor. However, covariant or aggregate shock reduces participation by reducing the economic capacity of a community. The regional variation was also another determining factor in making participation decision. The finding also revealed that wealth required for making participation decision especially in high-earning activities but rate of participation reduced among the wealthiest households. Female household head that have less burden on reproductive works have a greater chance of off-farm participation. In general, household in rural Ethiopia participated in off-farm activities when they have surplus labour power, personal capability, financial resource, regional opportunity and when farming output reduced because of shock, lower agricultural productivity or wealth.

Upon analysing factors affecting profitability of rural off-farm activity, we used Heckman selection and linear fixed effect models. Household that have more experience, wealth, labour power, cash crops, that were not experienced market failure and households able to work in their own village are getting better off-farm income. In addition, participation of female and children allows a household to earn better. Hence, in general, households with better resources are earning more from off-farm activity.

Lastly, we estimated the effect of participation on overall total income of a household per expenditure and land size quintiles using OLS, linear fixed and random effect models. Participation into off-farm activities increases overall income of a household positively. Effect of off-farm participation in increasing household total income is substantial for poorer households. It testifies that off-farm participation benefits more the poorer segments of rural society. The effect of participation on total income across farm size has also indicated a similar trend.

Currently, poorer households rely more on income generated from off-farm activities and they are benefited a lot from it than non-poor households. However, our aim is that off-farm activities to contribute more than merely absorbing the poor into lower earning activity. We have seen that push factor outweigh as a cause of off-farm participation. Off-farm activities created by push factors targets mainly on smoothing fluctuation of income and consumption than targeting better earnings. This situation allows us to say that most of off-farm activities in rural Ethiopia are the result of push factors. They are more of labour intensive and home based activities. One of the advantages of this type of activities is that, it has a lower input cost and can be called as an efficient ways of production. It relieved the household from shortage of cash and food, provides goods with a lower price that can be affordable by the rural society and might keep the household in rural area or reduce rural-urban migration. However, its return from labour and capital is very small. Upgrading

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majority of off-farm activities in rural Ethiopia into medium and small-scale enterprises might increase the return from labour and capital. Our finding indicates that relative to no education, attending at least primarily education increases chance of participation. In addition, the presence of informal source of financing like remittance and informal loan facility has a remarkable impact on off-farm activities. Hence, investment on human capital and access to financial sources facilitate expansion of rural enterprises, allow a household to overcome the start-up cost for higher-earning activities and improve the returns to labour and capital from off-farm activities. Promotion of off-farm activities has also an advantage for agricultural sector via financing agricultural input and adding value on agricultural output by using agricultural output as an input to off-farm activities – (that is promoting farming and non-farming activity through farm and non-farm linkage).

In most developing countries off-farm activities are highly seasonal, fluctuates with availability of agricultural raw materials and in rhythm with household labour and financial flows (Haggblade et al. 2007). It is suggested that future studies focus on the extent of seasonality of off-farm activities and its linkages with agricultural output under the specific Ethiopian situation. The results from such studies may have serious implications on policies that govern development and management of farming and non-farm sectors.

Notes

Appendices

Table 1
Summary of variables

Variable	Obs	Mean	Std. Dev.
Non-farm participation	2686	0.5163812	0.4998246
Revenue non-farm	2686	1176.811	5053.651
log revenue non-farm	1387	6.795449	1.335756
Total Revenue	2686	3083.952	5685.774
Log total revenue	2609	7.383061	1.213875
total expenditure	2686	2160.973	4602.645
Age of Head	2684	56.09016	15.35312
Adult equivalent unit	2659	3.002633	1.488984
Household size	2669	5.118396	2.477378
education	2686	0.4035741	0.4907053
Male headed	2686	0.5964259	0.4907053
head marital status	2660	0.643985	0.4789098
Wealth index	2686	-9.96E-10	1.180131
cash crop index	2686	-0.0133085	0.98463
agriculture index	2664	0.1231132	1.1665
finance index	2686	6.28E-09	1.071569
Covariate shock index	2686	6.08E-09	1.087665
Idiosyncratic shock index	2672	1.24E-08	1.33205
market failure	2665	-1.45E-08	1.279663
Average rainfall	2686	105.6279	37.08502
Drought	2686	0.5093075	0.5000064
Participation of Female and children in self work	2684	0.0834575	0.2766241
Work in this village	2686	0.4210722	0.493823
Land	2661	2.591276	14.633
Distance to the nearest market	2686	12.74572	14.1758

Own calculation based on ERHS 2004 and 2008 data

Table 2
Number of household and attrition

Year	No. HH in the sample	2004		2008	
		Exit	Present	Exit	Present
2004	1597	-	1597	254	1343
2008	1574	231	1343	-	1597
The balanced panel data set					1343

Own calculation based on ERHS 2004 and 2008 data

Table 3
Summary of HH characteristic by expenditure quintile

Variable	2004					2008				
	Q. (1)	Q. (2)	Q. (3)	Q. (4)	Q. (5)	Q. (1)	Q. (2)	Q. (3)	Q. (4)	Q.(5)
Age of HH head	58.5775	54.0282	53.1787	53.1994	54.676	62.0191	57.3535	56.8667	57.2222	54.8243
	(18.378)	(14.9858)	(15.1515)	(15.5788)	(14.512)	(16.021)	(14.942)	(14.633)	(15.264)	(14.236)
Household size	3.8115	4.7508	5.5483	6.1433	6.648	3.2077	4.4185	4.7611	5.0619	5.5609
	(2.3787)	(2.2954)	(2.3235)	(2.4105)	(2.5107)	(1.9044)	(2.129)	(2.2189)	(2.2169)	(2.3916)
Plot area in hectare	1.976	1.4825	2.1018	1.8954	3.0157	1.0918	3.3438	2.4482	4.0912	4.2057
	(5.7629)	(5.1083)	(11.3308)	(1.9613)	(7.8897)	(2.4799)	(33.844)	(11.598)	(15.9222)	(7.2927)
Education	.0351	.2897	.3209	.3427	.3863	.2571	.4667	.5492	.6222	.6465
	(.1844)	(.4543)	(.4675)	(.4753)	(.4877)	(.4378)	(.4997)	(.4984)	(.4856)	(.4788)
Member of at least one Idir	.1693	.7165	.7695	.7788	.8411	.6127	.8063	.8984	.9397	.9713
	(.3756)	(.4514)	(.4218)	(.4157)	(.3661)	(.4879)	(.3958)	(.3026)	(.2385)	(.1671)
member (food for work)	.0639	.2991	.3676	.352	.3053	.2444	.1683	.146	.1175	.0764
	(.245)	(.4586)	(.4829)	(.4783)	(.4613)	(.4304)	(.3747)	(.3537)	(.3225)	(.2661)
Distance to nearest market	11.3882	13.3723	14.2492	12.053	11.2227	15.1159	13.781	11.5317	12.2429	12.3583
	(13.699)	(17.4432)	(17.0278)	(11.7052)	(7.8353)	(15.931)	(16.591)	(11.336)	(11.445)	(8.2616)
at least 20 birr loan taken in 12 months	.131	.4829	.5483	.5421	.5857	.5206	.6571	.6317	.6762	.6529
	(.3379)	(.5005)	(.4984)	(.499)	(.4934)	(.5004)	(.4754)	(.4831)	(.4687)	(.4768)
HH hv bank account	.0032	.0093	.0312	.0685	.0717	.0159	.0159	.0413	.073	.1624
	(.0565)	(.0964)	(.174)	(.2531)	(.2583)	(.1252)	(.1252)	(.1992)	(.2606)	(.3694)
Observation	313	321	321	321	321	315	315	315	315	314

Standard deviation in parenthesis (own calculation based on ERHS 2004 and 2008 data)

Table 4
Summary of variables by off-farm participation (2004/08 panel)

Variables	Non-participant			Participant			Mean difference (non-participant-participant)
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	
Age of Head	1297	57.50	15.92	1387	54.76	14.68	2.74***
Adult equivalent	1283	2.88	1.458	1376	3.111	1.508	-0.23***
HH size	1290	4.98	2.547	1379	5.240	2.404	-0.25***
Education	1299	0.35	0.480	1387	0.444	0.497	-0.08***
Male headed	1299	0.58	0.492	1387	0.607	0.488	-0.022
Marital status	1279	0.63	0.482	1381	0.655	0.475	-0.023
Wealth index	1299	0.23	1.421	1387	-0.050	1.080	0.286***
Finance index	1299	-.173	1.12	1387	.1624	.9932	-.335***
Average rainfall	1299	105.90	37.27	1387	105.36	36.91	0.535*
Drought	1299	0.436	0.496	1387	0.577	0.494	-0.14***
Land	1275	2.381	8.241	1386	2.784	18.67	-0.41
Distance to market	1299	13.90	14.38	1387	11.66	13.89	2.24***
Shock	1299	-0.022	1.336	1387	0.126	1.416	-0.14***

Own calculation based on ERHS 2004 and 2008 data

Table 5
Occurrence of shock reported in 2004 and 2008

Variable	2004		2008	
	Mean	SD	Mean	SD
crops suffered from Low temperatures	.1265	(.3325)	.1436	(.3508)
crops suffered from Wind/storm	.149	(.3562)	.1855	(.3888)
crops suffered from Flooding/water logging	.1252	(.3311)	.1722	(.3777)
enough rain (not too much or too little) at the beginning of rainy season	.583	(.4932)	.6118	(.4875)
enough rain (not too much or too little) during the growing season	.5222	(.4997)	.6055	(.4889)
large increase in input price in the last 10 years	.8384	(.3682)	.9943	(.0754)
large decrease in output price in the last 10 years	.8384	(.3682)	.9987	(.0356)
occurrence of draught in the last 10 years	.02	(.1402)	.9962	(.0616)
crops suffered from Plant diseases	.1816	(.3856)	.1792	(.3836)
crops suffered from Insects	.149	(.3562)	.1588	(.3656)
crops suffered from Livestock (eating/trampling crops)	.0889	(.2847)	.0527	(.2236)
crops suffered from Birds/other animals	.2035	(.4027)	.1455	(.3527)
crops suffered from Weed damage	.1033	(.3045)	.0496	(.2171)
Family ill	.2323	(.4224)	.1489	(.3562)
Observations	1597		1574	

Standard deviation in parenthesis - Own calculation based on ERHS 2004 and 2008 survey

Table 6
Livelihood strategy in 2004 and 2008 per expenditure quintile

Variable	2004					2008				
	Q 1	**Q. 2**	**Q. 3**	**Q.4**	**Q.5**	**Q 1**	**Q. 2**	**Q. 3**	**Q.4**	**Q.5**
Pure farm	.2492	.947	.9688	.9844	.9844	.9143	.9619	.9714	.9937	.9936
	(.4332)	(.2243)	(.174)	(.124)	(.124)	(.2804)	(.1917)	(.1669)	(.0796)	(.0797)
Mixed farm	.9872	.9907	.9969	1	1	.9746	1	.9968	1	1
	(.1125)	(.0964)	(.0558)	(0)	(0)	(.1576)	(0)	(.0563)	(0)	(0)
Non-farming	.1438	.6386	.6355	.6449	.6916	.6413	.7365	.7556	.6889	.7452
	(.3514)	(.4811)	(.482)	(.4793)	(.4626)	(.4804)	(.4412)	(.4304)	(.4637)	(.4364)
Observations	313	321	321	321	321	315	315	315	315	314

Standard deviation in parenthesis – Own calculation based on ERHS data of 2004 & 2008

Table 7
Percentage of participation in wage work and self-employment

Variable	2004					2008				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
farm wage work	.0288	.1651	.2118	.1963	.271	.1333	.254	.2635	.3587	.3631
	(.16)	(.37)	(.40)	(.39)	(.44)	(.34)	(.43)	(.441)	(.48)	(.48)
high earn wage work	0	.0125	.0093	.0187	.0374	.0127	.0286	.0508	.0349	.0669
	(0)	(.11)	(.09)	(.13)	(.19)	(.11)	(.16)	(.21)	(.18)	(.25)
low earn wage work	.0575	.2368	.2118	.2617	.2243	.2921	.2286	.219	.1302	.1146
	(.23)	(.4258)	(.40)	(.44)	(.41)	(.45)	(.42)	(.41)	(.33)	(.31)
low earning self work	.0543	.2274	.1651	.1526	.1184	.1429	.2413	.1841	.1714	.242
	(.22)	(.41)	(.37)	(.36)	(.32)	(.35)	(.42)	(.38)	(.37)	(.42)
high earning self work	.0383	.1495	.1308	.1402	.1682	.1397	.1746	.2063	.1651	.1943
	(.19)	(.35)	(.33)	(.34)	(.37)	(.34)	(.38)	(.40)	(.37)	(.39)
Observations	313	321	321	321	321	315	315	315	315	314

Standard deviation in parenthesis - own calculation based on ERHS 2004 and 2008 data

Table 8
Livelihood strategy by share of income and expenditure quintile

	2004					2008				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
share_wage	.1062	.1033	.102	.0847	.0854	.2251	.1876	.1724	.1034	.0746
	(.2355)	(.2353)	(.2345)	(.189)	(.2001)	(.3391)	(.2991)	(.295)	(.2137)	(.1706)
share_self	.1094	.1699	.1174	.0999	.0933	.1255	.175	.158	.0862	.1127
	(.1907)	(.2897)	(.2387)	(.2138)	(.1962)	(.2499)	(.267)	(.2654)	(.1817)	(.2095)
share_transfer	.2722	.1254	.1054	.0831	.056	.2745	.1218	.083	.0635	.0423
	(.3482)	(.2281)	(.2006)	(.1856)	(.1487)	(.3282)	(.1985)	(.1589)	(.1594)	(.1243)
share_mixed	.5121	.6014	.6752	.7323	.7654	.3748	.5156	.5866	.7469	.7704
	(.3828)	(.3757)	(.3524)	(.3087)	(.3007)	(.3402)	(.3441)	(.3552)	(.3027)	(.2772)
Observations	313	321	321	321	321	315	315	315	315	314

Standard error in parenthesis (own calculation based on ERHS 2004 and 2008)

Table 9
Livelihood strategy by share of income and farm size quintile

	2004					2008				
Variable	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
share_wage	.1025	.0961	.1057	.0967	.0739	.2535	.1822	.1359	.1025	.0858
	(.2305)	(.2195)	(.2194)	(.225)	(.1868)	(.3469)	(.3011)	(.2542)	(.2181)	(.1967)
share_self	.207	.1297	.1129	.0837	.0557	.1808	.1581	.1317	.114	.0711
	(.3135)	(.2435)	(.2365)	(.1751)	(.1374)	(.281)	(.2701)	(.2505)	(.1929)	(.1578)
share_transfer	.1708	.1154	.0831	.0692	.0595	.2398	.14	.0841	.0699	.0489
	(.2739)	(.22)	(.1884)	(.1657)	(.1384)	(.3007)	(.2206)	(.193)	(.1679)	(.1348)
share_mixed	.5197	.6589	.6983	.7504	.8108	.3259	.5197	.6483	.7136	.7942
	(.3784)	(.3484)	(.3323)	(.3116)	(.2684)	(.3106)	(.3513)	(.3391)	(.3099)	(.2664)
Observations	299	323	212	284	264	318	312	344	289	311

Standard error in parenthesis (own calculation based on ERHS 2004 and 2008)

Table 10
Determinants of off-farm participation

Dependent variable – participation into off-farm activities						
VARIABLES	OLS	FE	RE	Logit RE	FE male	FE female
Household size	0.0130***	0.0215*	0.0113**	0.0155**	0.0125	0.0350*
	(0.00468)	(0.0114)	(0.00483)	(0.00669)	(0.0142)	(0.0188)
Age of Head	0.00162	0.0335	0.00148	0.00205	0.00901	0.0701*
	(0.00414)	(0.0302)	(0.00449)	(0.00622)	(0.0426)	(0.0358)
age2	-3.74e-05	0.000161	-3.60e-05	-4.90e-05	0.000228	9.28e-05
	(3.48e-05)	(0.000140)	(3.76e-05)	(5.22e-05)	(0.00011)	(0.000213)
Education	0.0250	0.0713**	0.0300	0.0411	0.0902**	0.0369
	(0.0219)	(0.0328)	(0.0215)	(0.0292)	(0.0443)	(0.0503)
Married	0.0109	-0.0216	-0.00694	-0.00770	-0.0217	-0.00800
	(0.0241)	(0.0445)	(0.0231)	(0.0310)	(0.0539)	(0.0765)
Wealth index	-0.0315***	-0.00345	-0.0371***	-0.0519***	0.0103	-0.0120
	(0.00811)	(0.0162)	(0.00790)	(0.0127)	(0.0246)	(0.0204)
Agri index	0.0149*	-0.00598	0.00299	0.00405	0.0131	-0.0289
	(0.00895)	(0.0122)	(0.00846)	(0.0117)	(0.0154)	(0.0208)
Cash crop index	-0.00439	0.0265	0.00734	0.00969	0.0114	0.0479***
	(0.0123)	(0.0172)	(0.0102)	(0.0140)	(0.0227)	(0.0128)
member_Iddir	0.0947***	0.138***	0.149***	0.201***	0.173***	0.0932
	(0.0325)	(0.0462)	(0.0277)	(0.0377)	(0.0546)	(0.0818)
loan_taken	0.0480**	-0.0246	0.0445**	0.0604**	-0.0568	0.0189
	(0.0204)	(0.0298)	(0.0201)	(0.0268)	(0.0375)	(0.0500)
hv_bank_acount	0.0582	0.0408	0.0436	0.0630	0.0674	0.00163
	(0.0430)	(0.0541)	(0.0423)	(0.0580)	(0.0720)	(0.0835)
transfer_receved	0.0817***	0.0677**	0.0885***	0.121***	0.0904**	0.0564
	(0.0204)	(0.0267)	(0.0197)	(0.0265)	(0.0357)	(0.0416)
Drought	-0.0482	0.0661	0.146***	0.195***	0.0524	0.0325
	(0.0802)	(0.0989)	(0.0203)	(0.0277)	(0.148)	(0.0831)
Average Rainfall	-0.000562	-0.00695***	-0.000758**	-0.00108**	-0.00300	-0.00992***
	(0.000566)	(0.00145)	(0.000347)	(0.000486)	(0.00207)	(0.00210)
Mkt failure	0.00666	-0.00876	0.00157	0.00180	-0.0116	-0.00354
	(0.00837)	(0.0109)	(0.00812)	(0.0108)	(0.0147)	(0.0168)
Shock covariate	-0.0242***	0.00697	-0.0185**	-0.0247**	0.00391	0.0100

	(0.00909)	(0.0114)	(0.00888)	(0.0123)	(0.0141)	(0.0190)
Shock idiosyn-cratic	0.00595	0.0166*	0.0172**	0.0232**	0.0164	0.0167
	(0.00797)	(0.00994)	(0.00738)	(0.0104)	(0.0122)	(0.0173)
Male Headed	-0.0560**					
	(0.0237)					
Distance	-0.000447					
	(0.000847)					
year08	0.200**					
	(0.0831)					
region1	-0.0895					
	(0.0662)					
region3	-0.0498*					
	(0.0289)					
region4	0.0854**					
	(0.0397)					
Constant	0.348**	-1.443	0.314**		-0.665	-3.129**
	(0.141)	(1.435)	(0.131)		(2.015)	(1.537)
Observations	2,610	2,610	2,610	2,610	1,575	1,035
Number of hhhid		1,330	1,330	1,330	801	529

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11
Determinants of amount of off-farm earning

VARIABLES	OLS	Heckman	Fixed Effects	Random Effects
Adult equivalent	0.0502***	0.0434**	0.134*	0.0921***
	(0.0154)	(0.0180)	(0.0814)	(0.0257)
Age of Head	-0.00397	-0.00237	0.309***	0.00108
	(0.00243)	(0.00296)	(0.0230)	(0.00279)
Education	0.0435	0.0198	-0.238	0.253***
	(0.0736)	(0.0747)	(0.148)	(0.0768)
Married	0.0151	0.0109	0.147	-0.0584
	(0.0824)	(0.0821)	(0.193)	(0.0862)
Male Headed	-0.0243	0.00825		
	(0.0791)	(0.0883)		
Wealth index	0.0898**	0.108***	-0.136	0.216***
	(0.0419)	(0.0405)	(0.0857)	(0.0372)
Cash crop	0.0357	0.0398	0.0789*	-0.0100
	(0.0271)	(0.0294)	(0.0426)	(0.0274)
Mkt failure	-0.113***	-0.114***	-0.0516	-0.180***
	(0.0274)	(0.0263)	(0.0514)	(0.0302)
Land	-0.00306*	-0.00327*	-0.00643***	(0.00162)
	(0.00170)	(0.00174)	(0.000449)	(0.000449)
Finance index	0.0947**	0.0708	0.0477	-0.0505
	(0.0391)	(0.0466)	(0.0679)	(0.0353)
FC in Food Sell	0.321***	0.311***	-0.0632	0.296***
	(0.0914)	(0.0975)	(0.193)	(0.102)
work_this_village	0.181***	0.172***	0.235*	0.176**
	(0.0683)	(0.0663)	(0.125)	(0.0721)
Distance	-0.00860***	-0.00811***		
	(0.00294)	(0.00293)		
year08	1.119***	1.008***		
	(0.0773)	(0.143)		
region1	0.426***	0.443***		
	(0.138)	(0.150)		
region3	0.203**	0.213**		
	(0.101)	(0.0997)		
region4	-0.0508	-0.147		
	(0.108)	(0.144)		
Constant	5.982***	6.305***	-10.60***	6.266***
	(0.184)	(0.392)	(1.256)	(0.188)
Observations	1,360	2,580	1,358	1,358
R-squared	0.246		0.386	0.386

Standard errors in parentheses   *** p<0.01, ** p<0.05, * p<0.1

Table 12
Effect of off-farm participation on total income

Sub group	OLS		Fixed effect		Random Effect	
	Coefficient of Participation	Standard error	Coefficient of Participation	Standard error	Coefficient of participation	Standard error
All sample	.4514***	0.0369	.5363***	0.0554	.5343***	0.0421
Quintile 1	.5606***	0.0764	0.3669	0.3521	.5917***	0.0835
Quintile 2	.5574***	0.0853	1.60**	0.6501	.6246***	0.0931
Quintile 3	.5177***	0.0905	.9398***	0.3042	0.5703***	0.0902
Quintile 4	.4068***	0.0741	0.5711	0.424	.4100***	0.078
Quintile 5	.3081***	0.0734				
Land 1	.5976***	0.091	.8781***	0.1707	.7769***	0.0973
Land 2	.6622***	0.0857	.6547***	0.179	.6786***	0.0912
Land 3	.5310***	0.0837	.5347***	0.171	.5190***	0.0956
Land 4	.4032***	0.0744	.5721***	0.1152	.5256***	0.0825
Land 5	.2742***	0.738	.4725***	0.1209	.3869***	0.0919

Standard errors in parentheses   *** p<0.01, ** p<0.05, * p<0.1
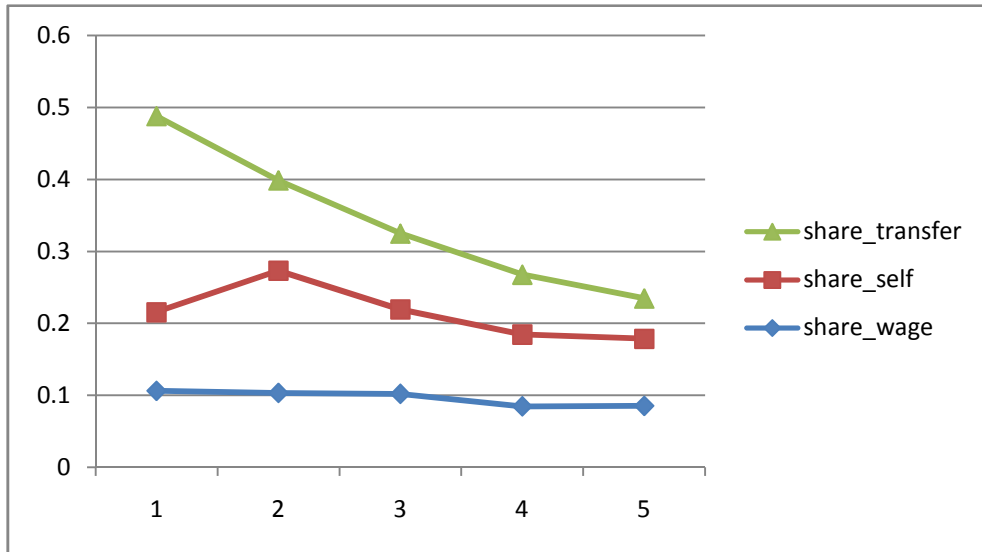
Figure 1
Livelihood Framework
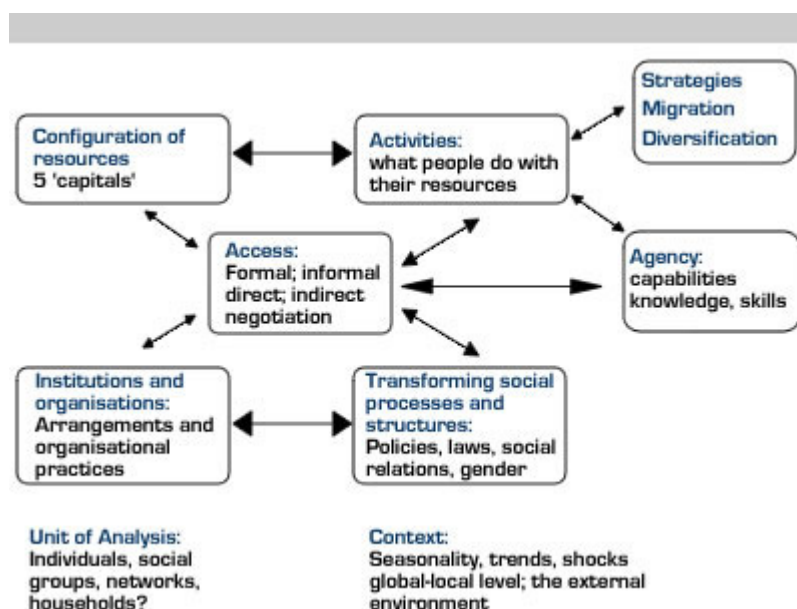
Source DFID accessed from http://www.livelihood.wur.nl/index.php?s=D1-Alivelihoodframework on15/10/2010
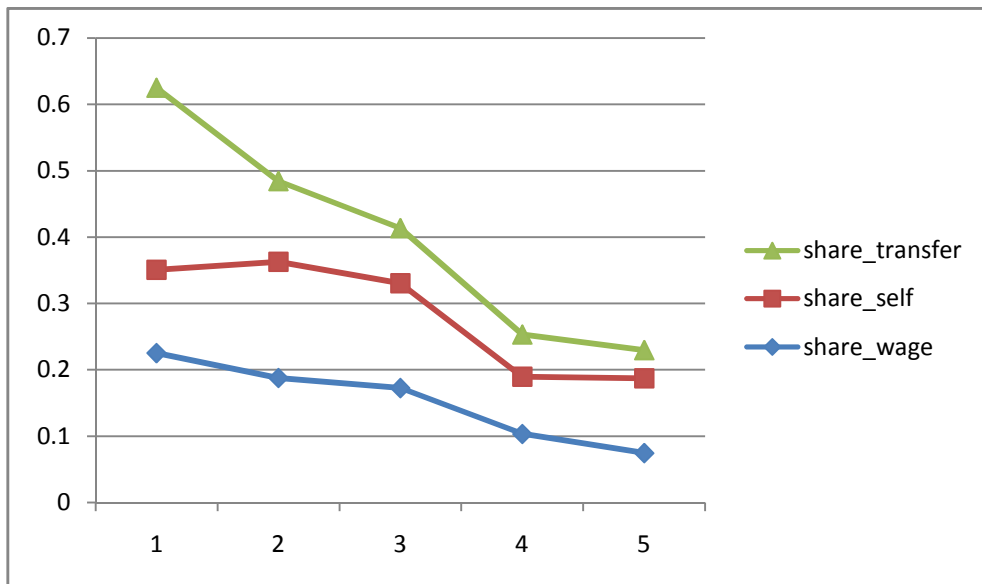
Figure 2
Trends of income shares in 2004

(From self-employment, wage work and remittance)

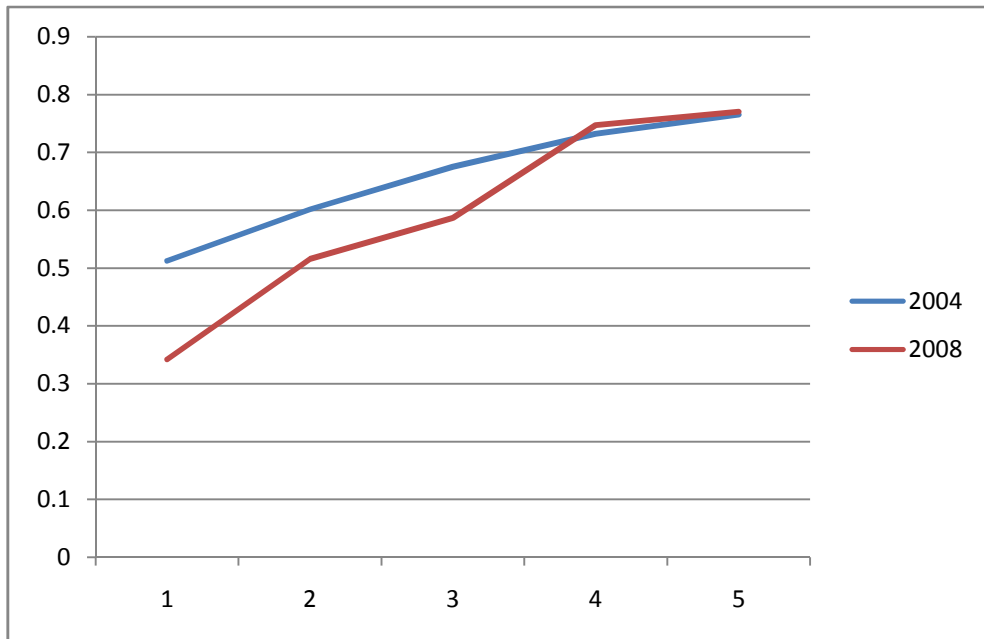ERHS 2004 and 2008 survey

Figure 3
Trends of income shares in 2008

(from self-employment, wage work and remittance)

ERHS 2004 and 2008 survey

Figure 4
Trends of income shares from mixed farming in 2004 and 2008

ERHS 2004 and 2008 survey

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