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Patterns and Determinants of Livestock Farmers' Choice of Marketing Channels: Micro-level Evidence.

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Abstract

This paper explores the patterns and determinants of smallholder livestock farmer's market participation and market channel choice using a micro-lever survey data from Ethiopia. Binary logit and multinomial logit models have been applied for empirical data analysis. The estimated results reveal that gender and educational status of the household head together with household access to free aid, agricultural extension services, market information, non-farm income, adoption of modern livestock inputs, volume of sales, and time spent to reach the market have statistically significant effect on whether or not a farmer participates in the livestock market and his/her choice of a market channel. The results suggest that relevant policy interventions in the directions of the aforementioned factors are central to stimulating smallholder market participation with relatively better market outlets and escape from subsistence poverty traps in Ethiopia.

Keywords: Livestock, market participation, market channel, binary logit, multinomiallogit, Ethiopia

1. Introduction

There is consensus in the development circle that development of efficient small-scale farmers' livestock marketing is of a paramount importance to eradicate poverty in developing countries. This is because around three fourth of the world's poor live in rural areas and nearly 600 million of these rural poor rely on livestock to produce food, generate cash income, manage risks and build up assets (FAO, 2010). Livestock largely contribute to the sustainable livelihoods and security of the rural poor by providing natural capital (meat, milk, hide, wool, water, rangeland and pasture), source of financial capital (cash, saving, credit, insurance, gifts, and remittance), social capital (traditions, wealth, prestige, identity, respect, festivity, marriage dowry). Small-scale livestock sector development can also be considered as a vehicle for broader economic growth especially in poor countries (Ciamarra and Otte, 2008). According to the World Bank report, livestock accounts more than half of rural households' wealth in Burkina Faso and Ethiopia (WB, 2008). It is with this logic that many developing countries have liberalized their agricultural markets since the 1990s with the intention to facilitate access to market for rural poor farmers. Despite this measure, however, development of efficient livestock marketing in most African countries including Ethiopia has remained a major challenge due to the prevailing high transaction costs, lack of access to credit, poor market infrastructure.

The marketing outlet options (both domestic and international) for livestock and livestock products in most developing countries have been widened thanks to agricultural market liberalization policies of early 1990s. These include state marketing agency, private traders, relatives/neighbors, vending at local markets, associations and cooperatives and private companies. Moreover, empirical evidences show that demand for livestock products in developing countries is on rise due mainly to change of consumption behaviors in many developing and developed countries, rising per capita

income, migration, urbanization and globalization (Hailemariam et al, 2009; Delgado, 1999; Simon et al, 2003). Especially for SSA, demand for livestock products such as meat and milk is expected to grow by threefold from 11.3 million tones in 1997 to 35.4 million tones by 2020 (Simon et al, 2003). Perhaps, this expanding market opportunity can be seen as a potential advantage for most poor countries towards developing appropriate demand-drives strategies in their livestock sector and reap the benefits of high demand for livestock products. This can generate better income for the poor farmers and hence improve their livelihoods and reduce rural poverty.

Hosting one of the largest livestock populations in the world, this opportunity is particularly vital for Ethiopia to be exploited if appropriate strategies are designed to meet the demand of the changing global markets for high quality livestock products with consistent supply. In Ethiopia, livestock are extremely important in promoting economic development and poverty reduction. This is because, Ethiopia has the largest livestock population in Africa; a large proportion of the poor (60-70 percent) rely on livestock for their livelihood; and also livestock constitutes nearly 30 percent of the agricultural GDP (Michael Haldenman, 2004). Previous studies show that although Ethiopia has large livestock population, the contribution of the sector to the national economy is very limited. The livestock market is characterized by high transaction costs which can be explained by high inefficiency of input and out put markets, poor marketing infrastructure, lack of marketing support services and lack of market information (ILRI, 2009). This implies that improving the efficiency of livestock marketing through reducing transaction costs can facilitate producers' access to relatively profitable market outlets that can generate better incomes for the poor households.

Presumably this has driven the Government of Ethiopia to focus on the demand side measures to enhance farmers' access to market as stipulated in the "National Agricultural Input and Output Marketing Strategy" of 2005. In this strategy, livestock marketing with the objective to improve the efficiency of the livestock and livestock products marketing is considered as vital deriver of agricultural development (Azage et al, undated). The private sector is also allowed to participate in the livestock industry to promote foreign earnings from the sector (Hailemariam et al, 2009). With this, large number of export abbatoirs has been flourishing to address the export demands for livestock abroad (Asfaw, 2007). The major challenge for the competitiveness of the export sector is shortage of live animals in the domestic market due to illegal exports and high demand for household consumption (Asfaw, 2007). Evidence shows that small-scale livestock farmers in Ethiopia have limited access to market participation. Livestock production is mostly for household consumption rather than focusing on a strategic production for marketing. According to CSA data, a huge proportion of livestock products have gone for household consumption with milk (85.3percent), butter (60.8percent), beef (46.6percent), and mutton (87percent) (CSA, 2010).

For the Ethiopian livestock marketing (for live animals and livestock products) to be competitive in the global as well as domestic markets, it is imperative to reduce the transaction costs prevailing along the supply-chain by identifying cost-effective marketing channels and coordinated supply chains. This requires a proper understanding of how the marketing chain is organized as well identifying transaction costs along the supply chain/marketing channel starting from production to processing, handling, distribution and trading. The role of traders in livestock markets is very influential in Ethiopia in linking smallholder farmers with rural and urban consumers. However, despite a wealth of literature on livestock production and marketing, very little has been said in the literature on the determinants of farmers' decision on market participation as well as the choice of livestock marketing channels in

Ethiopia. As noted by Azage (undated), studies on the nature and characteristic of livestock market chain and the main actors are not very well covered. Furthermore, the potential alternative marketing channels for smallholder livestock producers that flourished following market liberalization are not adequately documented. This served a motivation for this study to contribute to the literature of livestock marketing channel.

This study was build on the assumption that market participation and market channel choice decisions are made sequentially where farmers initially decide whether to sell or not, and then for whom to sell. The purpose of this study was to understand the factors influencing smallholder livestock farmers decision either to sell or not and for whom to sell. Studies document that farmers' decision whether or not to sale and for whom to sell is influenced mainly by transaction costs (related to information, negotiation, and monitoring costs) and household characteristics (age, sex, education, family size, herd size, assets and land holdings). The first decision variable is captured using binary logit model and the second decision variables on the choice of marketing channels is explained using a multinomial logit model on a sample 888 smallholder livestock farmers drawn from 7 regions in the country. The findings of the study have shown the importance of designing appropriate policy intervention instruments to minimize transaction costs and other socioeconomic factors to enhance small-scale livestock marketing in Ethiopia.

The rest of the paper is organized as follow. Section two briefly explores an overview of livestock production and marketing in Ethiopia. The third section will present the methodology part. Section four discusses the results of the model estimation. The last section presents a brief conclusion with some policy insights based on the findings of the study.

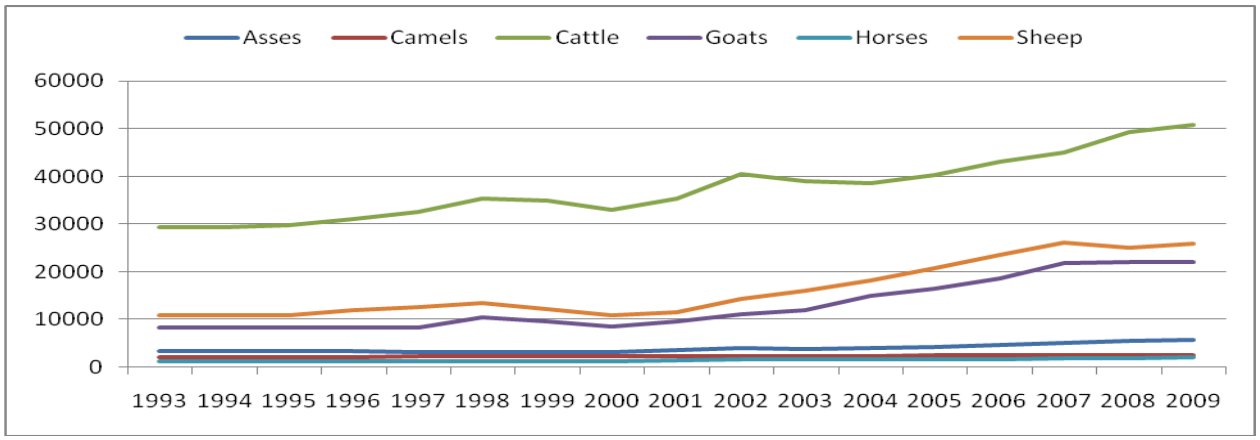
2. An Overview of Livestock Production and Marketing in Ethiopia

2.1 Livestock production systems

Livestock production is an important component of agricultural activities in Ethiopia. The production systems are generally subsistence oriented and productivity is very low (Belachew and Jemberu 2003; ILRI, 2008). Livestock production is dominated by pastoralists, agro-pastoralists and small-scale mixed crop-livestock farmers. In the highland mixed farming systems, livestock and crop production complements each other where crop productions heavily rely on animal draught power. Livestock production also varies across the different agro-ecological zones in the country, where farmers in the highland areas predominantly rear cattle and sheep and farmers in the lowland area mostly produce camel and goats. It is estimated that the highland crop-livestock mixed farming constitutes about 80percent of cattle, 75percent of sheep while the pastoral and agro-pastoral farmers (such as Afar, Somali, Borena and others) contribute about 75percent of goats of the total national livestock holdings (NEPAD-CAADP, 2005).

Figure 1 below depicts the trend in production of major livestock population in the country. Cattle, sheep and goats are dominant in livestock population. During 2009, cattle population amounted to around 50.9 millions followed by sheep (26 millions) and goats (22 millions), FAOSTAT (2010). Cattle, sheep, goats stocks have shown significant rise over the last 15 year, while the growth in asses, camel and horses appeared to be modest.

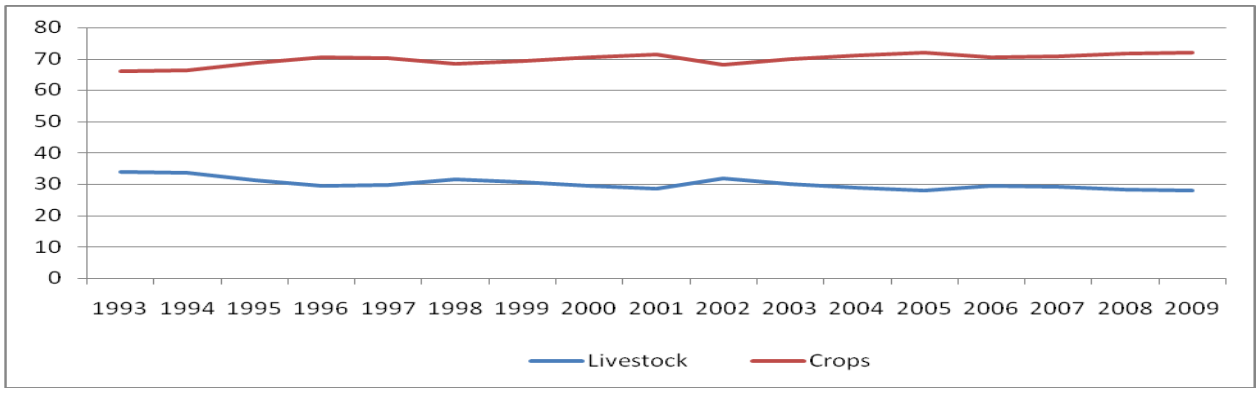
Figure 1: Trends in Stocks (Head), thousands (1993-2009).



Source: FAOSTAT, 2010 (accessed on September 2010)

Although Ethiopia has the largest livestock population together with convenient environment (due to its diverse agro-climatic conditions) for livestock production, the proportion of the sector to the total agricultural gross production is steadily declining over time while the proportion of crops is rising (see figure 2). Presumably this can be explained by lack of appropriate policy concern by the government for the livestock sector while crop productivity and marketing has been given due attention (Michael Halberman, 2004). For instance, all strategic commodities covered in PASDEP were crops and no single components of livestock were given policy priority.

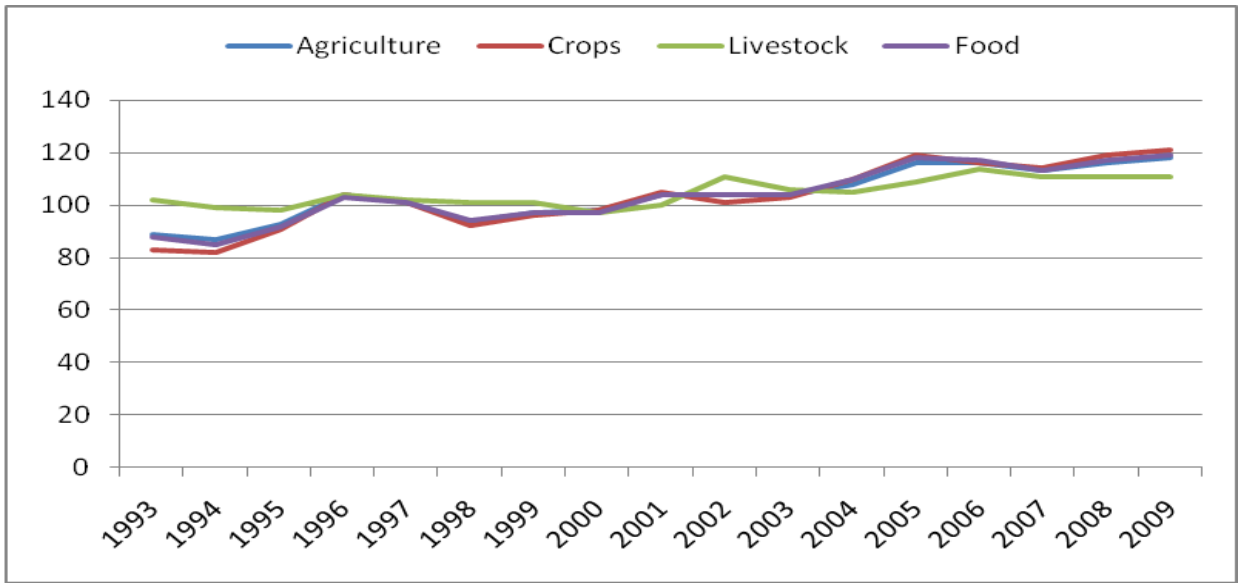
Figure 2**: Proportion of Agricultural production, livestock vs crops (percentage), 1993-2009**



Source: FAOSTAT, 2010 (accessed on September 2010)

While per capita production is increasing for agriculture, crops and food, it is declining for livestock over the period 1993-2009 (figure 3).

Figure 3: Per capita production trends (base 1999-20010 for agriculture (total), crops and livestock and food, 1993-2009.



Source: FAOSTAT, 2010 (accessed on September 2010)

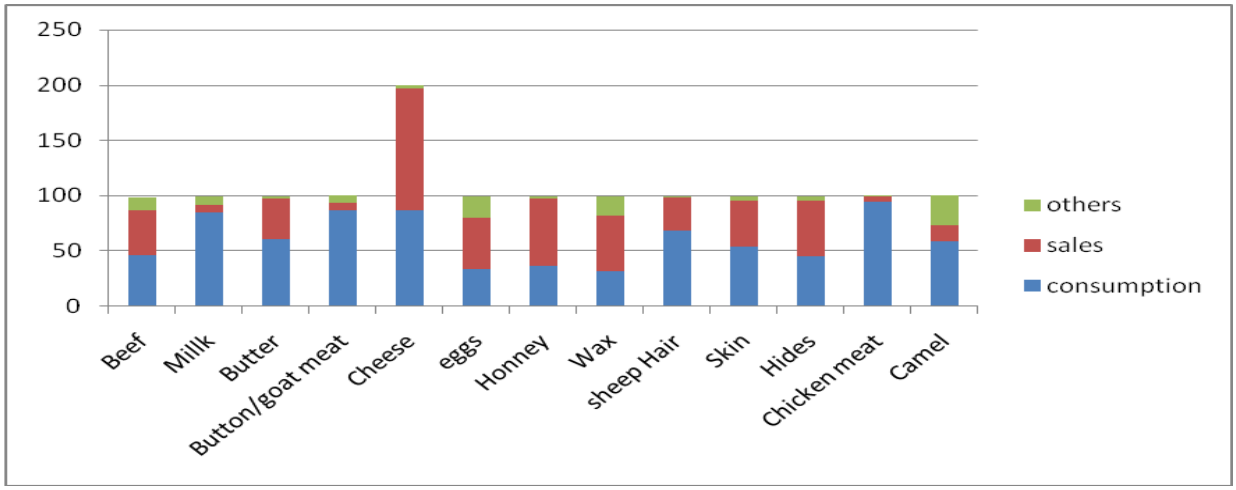
Farmers keep livestock because they provide manifold advantages for farmers as sources of food (meat, egg, milk & milk products), foreign exchange (skins and hides), employment, draught power, organic fertilizer for crop production and means of transport. They are also a measure of wealth and status especially in rural Ethiopia. For instance pastoralists consider larger herd size as symbols of prestige. Household's ownership of livestock varies from region to region depending on factors related to variation in agro-climates, feed availability, diseases conditions and resource status of the farm household (Hailemariam et al, 2008). Cattle, sheep and goats are the most common sources of meat production in the country.

2.2 Livestock marketing

Despite the largest number of livestock population in the country, farmers lack strategic and market-oriented production system hence livestock failed to assist the effort of transforming subsistent farming system in to a commercial production system. Farmers take a very small proportion of their non-homogenous livestock to the market in order to secure some finance to cover unforeseen expenses. It is observed that many smallholder farmers and pastoralists do not participate in the livestock market. Furthermore, for those smallholder farmers and pastoralists who participate in the market, the size of transaction (sale or purchase of cattle or shoats) is found to be very small (ILRI, 2008). Farmers also failed to meet the quality required by the different markets for their live animals. This is associated with the absence of critical support services that can ensure strong link between producers and the various participants along the marketing chain. These missed support services include lack of commercial animal health service, non-existence of appropriate trucking equipment, lack of sufficient air-cargo capacity, underdeveloped feed industry, lack of commercial fattening and holding facilities (Adina and Elizabeth, 2006).

Most of livestock products are for household consumption and very little proportion is taken to the market (figure 4). Except for honey and hides other livestock products are used mostly for household consumption.

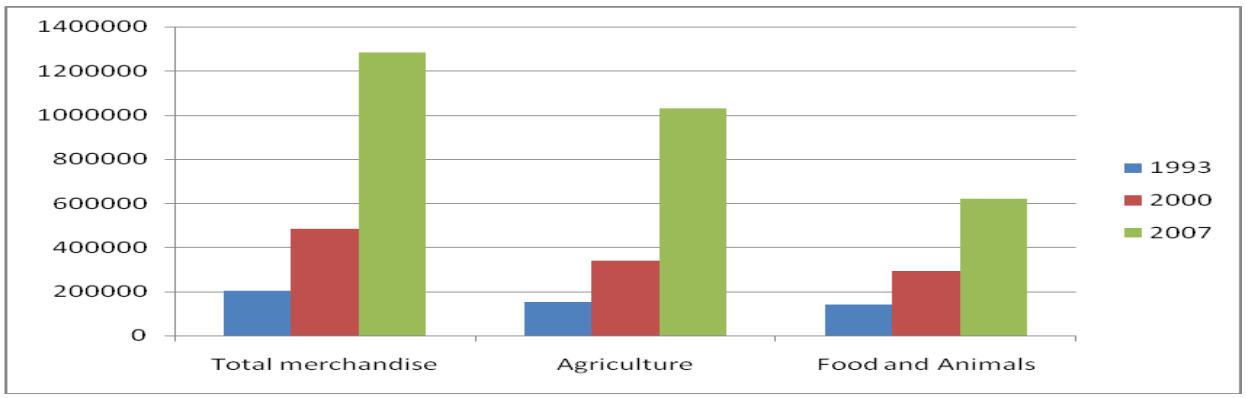
Figure 4: Livestock products, household consumption vs marketed in 2009/2010, country level



Source: CSA, 2010

The volume of exports has dramatically rising over the last two decades between 1993 and 2007 (Figure 5). The share of agricultural exports in total merchandise export is dominant and continuously on rise from 74.7 percent in 1993 to 80 percent in 2007.

Figure 5: Export trends for merchandise total, agriculture, and food and animals (1000 USD).

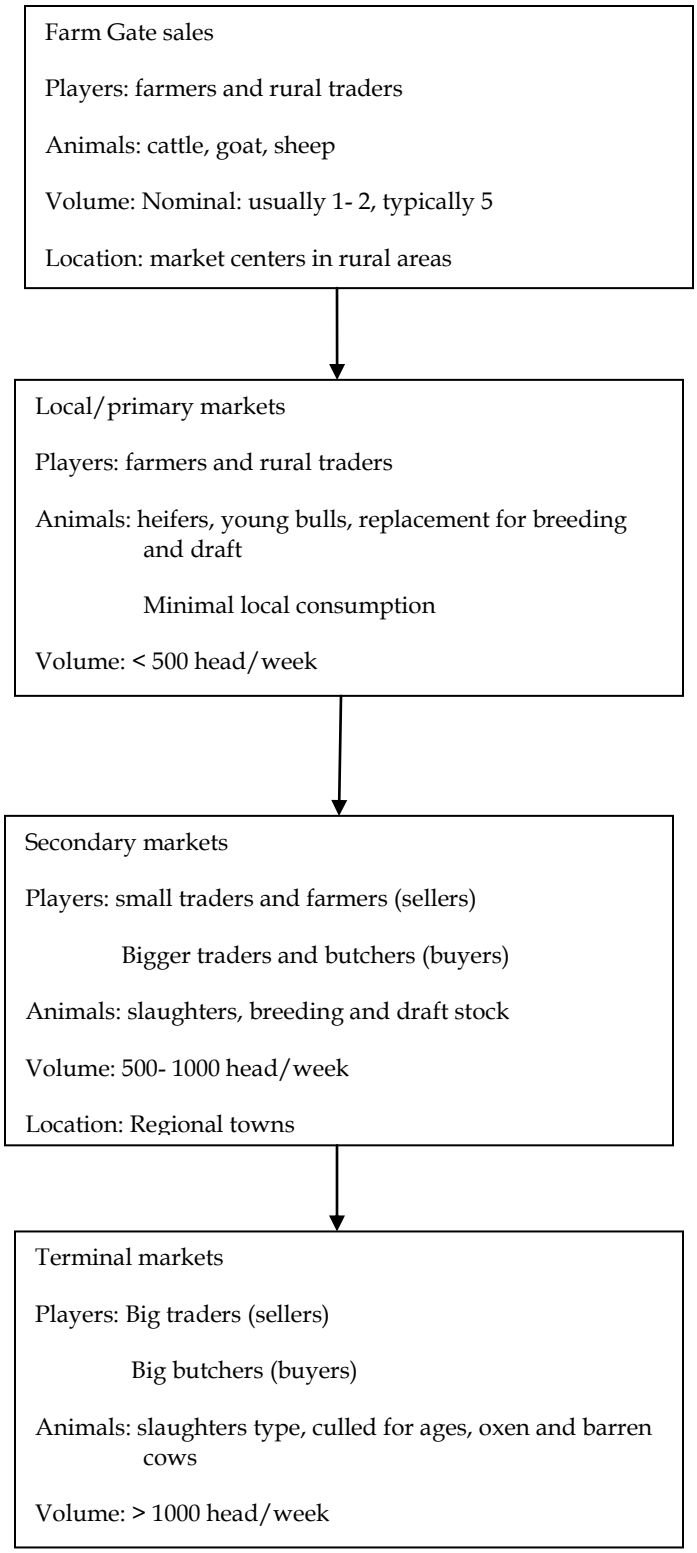


Source: FAOSTAT, 2010 (accessed on Septmeber 2010)

The livestock market is structured in such way that the marketable livestock from the major producing areas reaches to the final consumer or end-user passing through

complex channels along the supply chains. This involving various actors such as: producers, middlemen, livestock trading cooperatives, traders, live animal exporters and meat exporters (Hailemariam et al, 2008). Broadly speaking, the structure of livestock markets involves four different tiers based on the volume of animal supply and the nature of market participants, bush/farm gate, primary, secondary and tertiary markets (Ayele et al, 2003). The number of animal supplied and the types of buyers and sellers at each market can be easily summarized in the figure below.

Figure 6: Typical Ethiopian livestock market



Source: Ayele et al, 2003

Livestock marketing chain is influenced by the activities of different market agents/participants. These include:

Producers: They are the primary producers and supplier of livestock of different types such as cattle, shoats and camel. These include pastoralists, agro-pastoralists and mixed crop-livestock farmers in the highland areas. Most of them are located in the rural areas where access to the market is very difficult and market information is mostly obtained from traders and neighbor. The marketing behavior of producers varies from place to place. Sales of live animals are taken as a last resort and animals are generally sold when the producers face financial shortage and drought (ILRI, 2008).

Collectors: They are given such name because they usually collects/assembles animals from their locality and remote markets and supply to big and small-scale traders and sometimes to livestock trading cooperatives. Using their local knowledge and social relationships, collectors attempt to access remotes areas (such as pastoralist's temporary residents or central watering points and other rural markets) to collect animals. (ILRI, 2008).

Feedlot operators: They involve in fattening cattle of different age groups and breed types for different markets. Older animals (more than four years old) and some times of highland origin are fattened for domestic market (slaughterhouses) while young bulls (three to four years old) and usually of lowland origin are kept for export market. At times of high demand, some exporters buy young bulls that have finished their quarantine requirements from feedlot operators at Adama or Dera. The feedlot operators are collecting cattle either from Dera and Adama markets or from the main source markets (ILRI, 2008).

Medium/small traders: Medium traders have smaller operating capital as a result of which they collect limited number of animals on a weekly or biweekly basis and transport them directly to abattoirs using rented vehicles than waiting for the abattoirs trucks (e.g. from Bale lowlands). In some other places like Borena, these traders used abattoirs' collection point as selling outlets. They also serve as supplier to the big traders in the secondary and terminal markets. Medium/small-scale traders do not

have strong trade relationship with specific abattoirs. As a result, they do not have precise market information like that of big traders. The information disseminated through such agents sometimes misleads the producers.

Big traders: These are those market participants permanently operating in the live animal and meat value chain usually known by purchasing large number of animals from different sources and supply to their customers. They are few in number compared to small traders.

Cooperatives: Livestock trading cooperatives are organized in pastoralist and semi-pastoralist areas based on the good will of their members who are residents in specific market areas. They work using operating capital obtained from members' contribution. As a result, they usually try to deny other traders entry into primary markets where they are operating. Livestock trading cooperatives mostly operate in the shoats market due to its low financial requirement relative to cattle and camel. They buy animals from their area (from both members and non-members) using spring balances and sell them to big traders or purchasers of abattoirs in areas where they have purchasing stations. Livestock trading cooperatives have several problems such as shortage of operating capital, lack of training on entrepreneurship skills, narrowly focused organizational setup, transparent management system, lack of market information, dependence on a single exporter, and involvement of their leaders in their own livestock trading

Brokers: These are those market agents that serve as mediators between buyers and sellers in the livestock market. They usually link buyers with sellers and moderate negotiations and facilitate the terms of exchange. Brokers are not as such active in Bale livestock markets. However, buyers have to pay ETB 10/head of cattle as a broker's fee whether they are mediated by a broker or not. This is taken as an assurance for a buyer that a seller will take a responsibility of finding the animal in case it is lost during trekking. There is a different story in the Borena cattle and camel markets. Brokers in these markets intentionally create a communication gap between buyers and sellers

(producers) and arbitrate them in the way they need. After the two parties come to agreement, they take the money from buyers and pay a deducted amount to the sellers. This is taking the opportunity of being well familiar in the area, and a speaker of a local language.

Exporters: These are exporters of live animal and meat to different countries through the formal channel. Live animals are exported to Egypt (camel), Yemen (cattle, camel and sheep), Saudi Arabia, and Jordan

The proper functions along the marketing chain among these different agents are highly constrained by a number of problems which intern impedes the overall performance of small-scale livestock marketing in Ethiopia. These include poor market infrastructure, absence of market information and market support services, poor coordination among market agents, clan conflicts, disorganized purchasing practices of abattoirs, lack of standardized unit of transaction in shoat markets, lack of access to credit and extension services as well as animal diseases (ILRI, 2008; Mohammed et al, 2006; ILRI, 2009).

3. The Data and Research Methodology

3.1 The data source

This study used data obtained from the rural household survey in 2009. The data was collected by the Ethiopian Economic Association and the International Food Policy Research Institute (EEA/IFPRI) under the project on "*Making Rural Services Work for the Poor and Women: Public Investment in Agriculture and Water Services in Ethiopia*" as part of a research program which aims at addressing the development challenges of the country. The main objective of the survey was to understand the public services in

agriculture and water that are provided to farmers, and the factors that can improve the services farmers have been obtaining. The survey covered 1117 sample household heads from seven regions in Ethiopia: Afar (132), Amhara (211), Benishangul-Gumuz (109), Gambella (96), Oromia (134), SNNP (127) and Tigray (96). The sampling design used was multistage stratified random sampling where by in the first stage regions were classified and one zone was selected from each region and two zones from Amhara region. Then woredas were classified and selected in similar way. From the selected woredas, sample kebeles were chosen to identify villages for the final survey. Finally, from the selected villages sample households were selected randomly for the interviews.

The survey covers wider issues related to household demographics, assets, agricultural and consumer assets, cooperatives, access to modern inputs, access to credit, household savings, output marketing, innovation and extension, community participation and information and water services. In understanding output/livestock marketing, farmers were asked to recall livestock transaction and their preferred marketing channels over the last one year period at the time of the survey. Having its interest in understanding the marketing behavior of livestock farmers, this study considered only those sampled household heads who owned some livestock assets and tried to see the level of market participation and decision on the choice of marketing channels. This is because the decision to whether or not to sell is conditional upon producing the product, in this case owning a livestock.

Out of the total 1117 sample, only 996 of them own some types of livestock. However, data on market participation and market channel choice pattern of the households was available only for 888 farm household heads. Thus, only 888 household heads were

included in the final analysis where 59.2 percent of them marketed some livestock while 40.8 percent of them didn't sell any of their livestock during 1999/2000.

The study also utilized relevant secondary sources to describe the marketing behavior of small-scale livestock farmers in Ethiopia. These included review of similar empirical studies by various institutions, journals, statistical abstracts from Central Statistics Agency (CSA) and internet sources.

3.2 Specification of the empirical model

It has become a common practice to apply logit models for data which are individual (household) specific (Green, 2000). The application of logit models depends on the number of marketing channels involved to study decisions related to market participation and channel choice (Lu, 2007). When the choice set consists of only two options, binary or probit models are the most frequently used econometric models for an empirical analysis. However, if the choice sets are more than two, then the multinomial logit discrete choice model is used (Green, 2000).

In this study two empirical choice models were used, a binary logit and multinomial logit models. The logit model was used where market participation is assumed to be dichotomous, that is whether or not small scale farmers are participating in livestock markets. The objective of the binary logit model was to estimate the probability of participating in a livestock market during 1999/2000 harvesting season. The second model was the multinomial logit model with the intention to estimate the determinants of farmers' decision to choice market channels to sell their livestock during the same period. The inverse mill's ratio was calculated from the first model and included in the

second stage as one explanatory variable to control selectivity bias. If the coefficient of the IMR is not significant, this indicates that the selectivity bias is not statistically significant.

The Binary Logit model for market participation decision

The binary logit model belongs to the general class of binary choice model, where the dependent variable is dichotomous (Greene, 2003). It is an extension of the linear probability model and takes the form:

$$\gamma i = Xi\beta + \varepsilon i \qquad (1)$$

Where xi, is the vector of independent variables representing a number of transaction costs and socioeconomic variables related to i^{th} livestock farmers. The dependent variable γi, is equal to 1 if the farmer decides to participate in the market and zero otherwise. The above equation (1) can be interpreted as describing the probability that a farmer is deciding to participate in the market. The value of the parameters, β, measures the marginal impact of a unit change in the explanatory variables on the probability of the choice of market channels.

The above linear model can be transferred into a cumulative probability function as follow, mainly to avoid the potential errors of having the predicted values, γi falling outside the (0, 1) range.

$$Pi = F(Xi\beta) \qquad (2)$$

If the cumulative probability function $F(.)$, is logistic, then we have the logit model of the form:

$$Pi = \frac{1}{1+e^{-xi\beta}} \qquad (3)$$

The marginal effect of a particular variable χ_k on the probability that a particular household decide to sell is given by:

$$\frac{\partial P_i}{\partial \chi_i} = f(X'\beta)\beta_k \qquad (4)$$

Where $f(.)$ is the logistic density function given by:

$$f(X'\beta) = \frac{e^{-x'\beta}}{(1+e^{-x'\beta})^2} \qquad (5)$$

The Multinomial logit model for the choice market channels

A multinomial logit model was applied to explain inter- household variation in the choice of a specific marketing channel. This study assumes that farm's decision is generated based on its utility maximization. This implies that each alternative marketing outlet choice entails different private costs and benefits, and hence different utility, to a household decision maker. The analytical model is constructed as follows. Suppose that the utility to a household of alternative j is Uij, where $j = 0, 1, 2, \ldots, J \ldots$ *(1)*. From the decision maker's perspective, the best alternative is simply the one that maximizes net private benefit at the margin. In other words, household i will choose marketing channel j if and only if $Uij > Uik$, $\forall k \neq j \ldots$ *(2)*. It is important to note that a house hold's utility cannot be observed in practice and what a researcher can observe is the factors influencing the household's utility such as household and personal characteristics and attributes of the choice set experienced by the household (Deginet, 2008). Based on McFadden (1978), a household's utility function from using alternative J can then be expressed as follows:

U (Choice of j for household i) = $Uij = Vij + \varepsilon ij$ (3)

Where, Uij is the overall utility, Vij is an indirect utility function and εij is a random error term. The probability that household i selects alternative j can be specified as:

$$\begin{aligned} Pij &= \Pr(Vij + \varepsilon ij > Vik + \varepsilon ik) \\ &= \Pr(\varepsilon ik < \varepsilon ij + Vij - Vik, \forall k \neq j \end{aligned} \quad (4)$$

Assuming that the error terms are identically and independently distributed with type i extreme value distribution, the probability that a household chooses alternative J can be explained by a multinomial model (Greene, 2000) as follow:

$$Pij = \frac{\exp(\beta i \chi ij)}{\sum_{j-0}^{J} \exp(\beta j \chi ij)} \quad (5)$$

where χij is a vector of household of the i^{th} respondent facing alternative J and βJ is a vector of regression parameter estimates associated with alternative J.

Following equation (5) above, we can adapt the MNLM fitting to this study as follow:

$$P(CHOICEji = j) = \frac{\exp(\beta' j \chi i)}{\sum_{j=1}^{4} \exp(\beta' j \chi i)}$$

Where

i represents i^{th} farm household, and i = 1, 2,...., 888;

j represents different marketing channels, j =1 for sales to traders (Traders), j =2 for direct sales to consumers at the local market (Consumers), and j =3 for sales to other individuals (Otherfarms).

P represents the probability of a livestock marketing channel j to be chosen by farm household i;

$CHOICE_{ij} = j$ means that livestock marketing channel j is chosen by farm household i;

χ_i = (sex_i, age_i, $litreracy_i$, $offincm_i$, $herdsize_i$, $freeaid_i$, $_i$, $spent_i$, $extenvisit_i$, $mcoop_i$, $volume_i$, $hhsize_i$, $loan_i$, $eudc2_i$, $marktinform_i$)

It is a common practice in econometric specification of the MNLM to normalize equation (5) by one of the response categories such that $\beta j = 0$. In this regard, the MNLM can alternatively be specified as follow:

$$Pij = \frac{\exp(\beta j \chi i)}{\sum_{j-1}^{J-1} \exp(\beta j \chi i)} \qquad (6)$$

The coefficients of explanatory variables on the omitted or base category are assumed to be zero. The probability that a base category will be chosen can be calculated as follow:

$$Pij = \frac{1}{1+\sum_{j-1}^{J-1} \exp(\beta j \chi i)} \qquad (7)$$

For better understanding the values attached to the coefficients, it is recommended to compute the marginal effects, Green (2000). The marginal effects of the attributes on probability of choice are determined by differentiated equation (5):

$$\delta j = \partial Pj / \partial \chi i = Pj = Pj\left[\beta j - \sum_{j=0}^{J} (Pj)(\beta j) \right] \text{ for } j\text{-}1,2,\ldots J \qquad (8)$$

where:

Pj is the probability for farmers choose market channel j.

βj is a vector of regression parameter estimates associated with alternative j.

In our case, farmers have three channels to sell livestock, $J = 3$, and the alternatives $j = 1,2,3$, represent sale in the outlets, to market traders, directly to consumers at the local market, and to other farmers, relatives and neighbors at the farm gate respectively.

The model predicts the relative probability that a producer would choose one of the three categories based on the nature of the explanatory variables. For this analysis, the marketing channel market traders (Traders) was used as comparison base because this marketing channel was chosen by the majority of livestock farmers in trading their livestock. The marginal effects were calculated using the STATA command- mfx- for the three categories. Econometric analysis of the data was done with Sata 10 software.

The dependent variables (the marketing channels (CHOICE) chosen) in the analysis is measured by the probability of selling livestock to either of these markets. According to the survey result, three main different marketing channels were identified. These include; sales to market traders (1= Traders); direct sales to consumers at the local market (2=Consumers) and sales to other farmers, relatives and neighbors (3= Otherfarms) usually at the farm gate.

To determine factors affecting these dependent variables in both models, a number of independent variables were considered in the estimation model taking in to account economic theory, previous studies as well as the nature of the study. The variables most commonly used to explain the behavior of livestock marketing in developing countries are related to the different forms of transaction costs, socio-economic conditions as well as assets holdings. These variables include access to market information, transport costs, market distance, sex, age, education, household size, farm land holding, off-farm income, access to modern inputs and herd size.

4. Results and Discussion

4.1 Characteristics of sampled households

The sex composition of the household heads showed a male dominancy in livestock marketing, with 81.3 percent male and 18.7 percent females. Household head's age ranges from 18 and 90 years of age (mean 42.5). The literacy level of respondents was very low with the majority (59.1 percent) of them did not complete any school level, be it religious or secular. Most (59.2 percent) of them neither write nor read in any language and only 40.8 percent of them were able to write and read. Among respondents who reported completion of some level of education, 39percent of them completed first cycle primary (1-4 grades), 37.4percent second cycle primary (5-8 grades), 7.6percent high school (9- 10 grades), 2percent preparatory (grade 12), 0.6percent TEVT (10+1, 10+2), 0.3percent university/college, 7.9percent adult literacy and other literacy program, and 5.3percent some religious education (church/mosque schools). Relatively larger proportion (34.5percent) of the households belongs to orthodox Christians while about 31.5percent of them are non-orthodox Christians, 31percent of Muslim and the remaining 2.6 percent have no religion. It is interesting to note that most of the households who sold some livestock during 1999/2000 were Muslims (42.7 percent), followed by orthodox Christians (28.3 percent), non-orthodox Christians (27.6 percent) and a few of them who have no religion (2.4percent).

Agriculture remains to be a dominant economic activity and source of livelihood for households in the study areas, with 74.4 percent of them rely on own farm cultivation and 13.3 percent of them on livestock rearing. Opportunities to diversify income from off-farm employment was limited for most (65.8 percent) of the households while some (34.2 percent) seem to have some access to non-farm income generating activities. On

average farmers spent nearly 35 percent of their time in non-farm income generating activities.

Household heads owned different types of livestock with majority own cattle (oxen and bulls (38 percent)), cows (15.8 percent), heifer (7.1 percent), calves (5.4 percent); shoats (goats (6.3 percent) and sheep (4.3 percent); poultry (12.4 percent), and others. On average households possessed 5 livestock. Although the Food Security Program (FSP) in the form of free food aid and free cash aid has been in place, the majority (91.5 percent of households were not entitled for such services during 1999/2000 cropping season. Most (76.9 percent) of the respondents have not been a member of any cooperatives in the past or today while very few (23.1 percent) of them indicated as a member. This implies that the role of agricultural cooperatives in facilitating access to markets for smallholder livestock farmers was missing or insignificant.

Households marketing behavior

Out of the total sampled farmers who kept some sorts of livestock, 59.2 percent of them sold their livestock while 40.8 percent of them didn't sell any of their livestock during 1999/2000. In terms of the degree of market participation by region, it was observed that nearly all (93 percent) of the sampled farmers in Afar sold their livestock followed by Oromia (71 percent), Amhara (65.9 percent), Gambella (46.9 percent), Tigray (48 percent), SNNP (40.4 percent) and Benishangul-Gumuz (30.2 percentpercent). Most livestock traded include goats (30.3percent) followed by oxen (22percent), sheep (11.5percent), chicken/poultry (9.8percent), cows (8.1percent), camels (5.3percent) and calves (2.8percent). High variation existed across regions in terms of the type of livestock marketed. Only Amhara (42.9 percent) and Afar (57.1 percent) supplied

camels for market. Afar supplied most (58.9 percent) of goats followed by Amhara (25.9 percent). While Gambela provided most of chicken/poultry (61.5 percent), it traded the least in other types of livestock. Among traded sheep, Tigray, Oromia and SNNP contributed 36.7 percent, 30 percent and 16.7 percent respectively. Oxen market was dominant among households in Amhara (40.2 percent) followed by SNNP (21.4 percent) and Oromia (19.7 percent) regions. Livestock marketing in Benishangul-Gumuz was the least compared to other regions in the sample.

The volume of livestock marketed per household was very small where nearly half (47 percent) of the households sold only one livestock while others sold two (17.5 percent), three (7.1 percent), four (4.1 percent) and five (4.3 percent). On average farmers sold nearly 5 livestock during 1999/2000. It is important to note that the role of female headed households in livestock market was very limited. With the exception of goats and chicken/poultry (where female trade participation was relatives important), livestock market tended to be dominated by male headed households. In fact this reflects a typical characteristic of rural life in most developing countries of SSA. The average prices for livestock sales ranged from 7 Birr to 4700 Birr.

Producer characteristics by market channel

In this study three major livestock market outlets were identified as alternatives to farmers to sell their livestock. These were traders (i.e. farm gate buyers and market traders) which accounts for 63.5 percent of total sells followed by, consumers (24.1 percent), other farmers/neighbors/relatives (12.4 percent). One important finding in this study is that some significant (11percent) volume of livestock transaction was conducted among farmers themselves (as indicated in the market channel- other farmers) presumably for breeding, replacement and draught purpose. This kind of market option is also indicated in previous study (see ILRI, 2008). The overall marketing

behavior found that the role of intermediaries (traders) in livestock market is still dominant. Although the role of agricultural cooperatives in smallholder farmers marketing is recognized as vital, no single household reported cooperatives as alternative market outlet in their livestock marketing. This should be seen as serious policy concern for the government and other relevant stakeholders in this sector.

The study found that Afar farmers dominated livestock sales to market traders, accounting to 31.2 percent of total sales at this market channel. The descriptive result also showed that among those farmers who sold at the farm gate and to other farmers, a relative majority of them were illiterate implying the low level of literacy prevailing among those farmers. Nearly all of the farmers who sold at the farm gate and to other farmers didn't receive any form of free aid be it free food aid or free cash aid from the government's Food Security Program (FSP), as indicated in the table below.

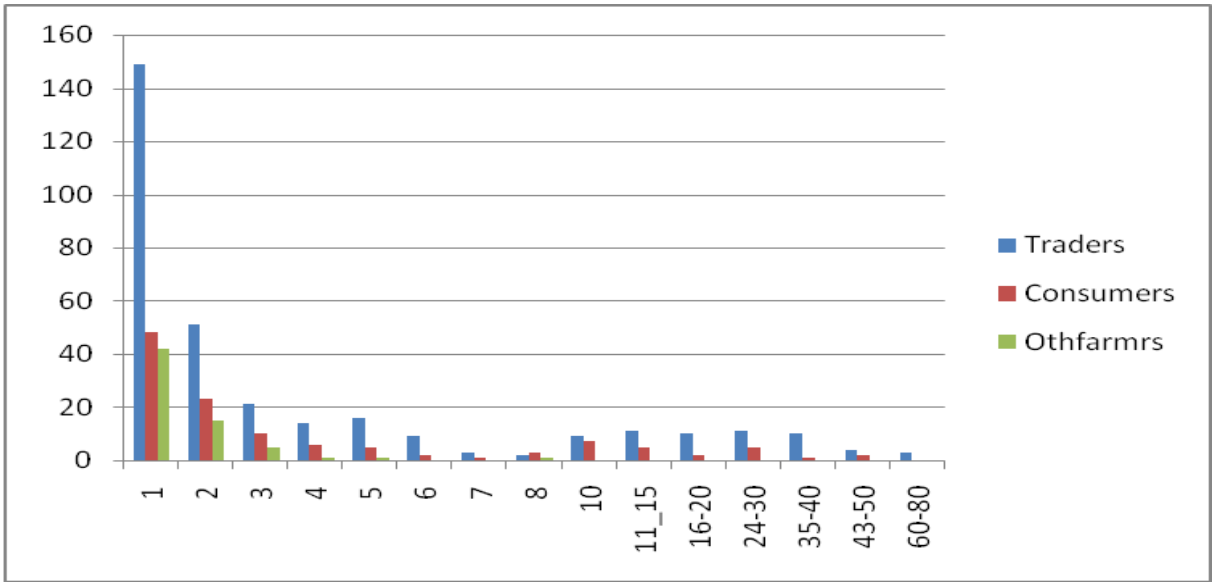
Table 1. Variations across market channels for selected variables

Variables		Market channels			
		Traders	consumers	other farmers	Total
Gender	female	56	32	5	93
	male	281	96	61	438
	Total	337	128	66	531
Regions	Afar	105	16	1	122
	Amhara	78	40	18	136
	Benishangul-Gumuz	17	0	16	33
	Gambella	29	17	0	46
	Oromia	57	19	23	99
	SNNP	34	11	6	51

	Tigray	17	25	2	44
	Total	337	128	66	531
Literacy	no	205	78	34	317
	yes	132	50	32	214
	total	337	128	66	531
Free aid	no	294	120	64	468
	yes	50	7	2	59
	total	334	127	58	527

Source: EEA/IFPRI Household Survey, 2009.

Figure 7. Volume of livestock sales (horizontal) by market channels and number of farmers (vertical) during 1999/2000 E.C.



Source: EEA/IFPRI Household Survey, 2009.

The above figure reveals that as volume of livestock sales increases, farmers are more likely to select the market traders to sell their livestock. The decision to sale to other

farmers at the farm gate was characterized by small volume of livestock sales. Presumably this implies that wealthier farmers are not interested in small quantity sales as compared to resource poor farmers. As stated in figure 6, the volume of livestock transaction can tell as the type of markets (i.e. farm gate, primary, secondary or terminal) where the transaction is made. The market outlets in this study indicated that livestock transaction was conducted at the farm gate (< 5 livestock) and primary market (< 500 livestock) levels while the transaction at the secondary and terminal markets were strictly absent.

About 61.2 percent of the households indicated that they didn't have the option to choose from different opportunities while the remaining households had the option to choose from before selling their livestock. The latter noted that the reason of selection of one outlet over the other is due mainly to better price (76.9percent) and convenient location (20.2percent). The relatively higher proportions (55.8 percent) of farmers were aware of the market price of livestock offered by other buyers while 44.2percent of them didn't know it. However, access to original market price information seemed to be a big problem. This is because the overwhelming majority (90percent) of farmers noted that they knew about market prices from their neighbors and friends. This is an indication of high dependence of farmers on relatives and neighbors to obtain information so as to fix the selling price for their product, with limited bargaining power over the price. This is a typical problem in most rural areas where provision of market information by relevant institutions such as the radio, Development Agents (DA), cooperatives and commodity exchange is absent.

Lack of access to transportation facilities for livestock market is highly prevalent in the study area and almost all (96.8percent) of the sampled farmers moved to the livestock

markets on foot. As farmers were using their own labour for taking their livestock to the market, transportation costs in monetary terms was not a concern for most of them. However, farmers reported that they were paying other costs related to market fees, broker fees, lunch etc, ranging from 0.5 cents to 200 Birr (average 10.30). Excluding those farmers who sold at their farm land, others noted that on average they spend 201 minutes (3:35 hrs) to reach the nearby local livestock markets. Furthermore, on average farmers had to make 4.2 trips to sell their livestock, with most (60.5percent) of them did it at one round while some of them made it in two rounds (17percent), three rounds (5.2percent), four rounds (2.3percent) and twenty rounds (2.9percent).

Access to modern agricultural inputs and other extension services

A relatively larger (60.6 percent) of household used modern agricultural inputs (crops or livestock) during 1999/2000 harvesting period and 39.4 percent of them didn't get any access to them. The usage of modern inputs was for crops only (19.3percent), livestock only (39.5percent) and both for crops and livestock production (41.2percent). In relation to livestock production, the most important modern input used by farmers was veterinary drugs. Farmers obtained these drugs mainly from input dealers, woreda and kebele government. The role of cooperatives and NGOs in providing veterinary drugs to farmers was very insignificant.

63.4 percent of the total sample households didn't get access to loan from any institutions while 36.6 percent of them got some loan. Among households who sold livestock, only 32percent of them got access to loan and 68percent of them didn't get any loan from any sources. 64percent of the households in the total sample reported that they were not attending any community meetings that were held to discuss

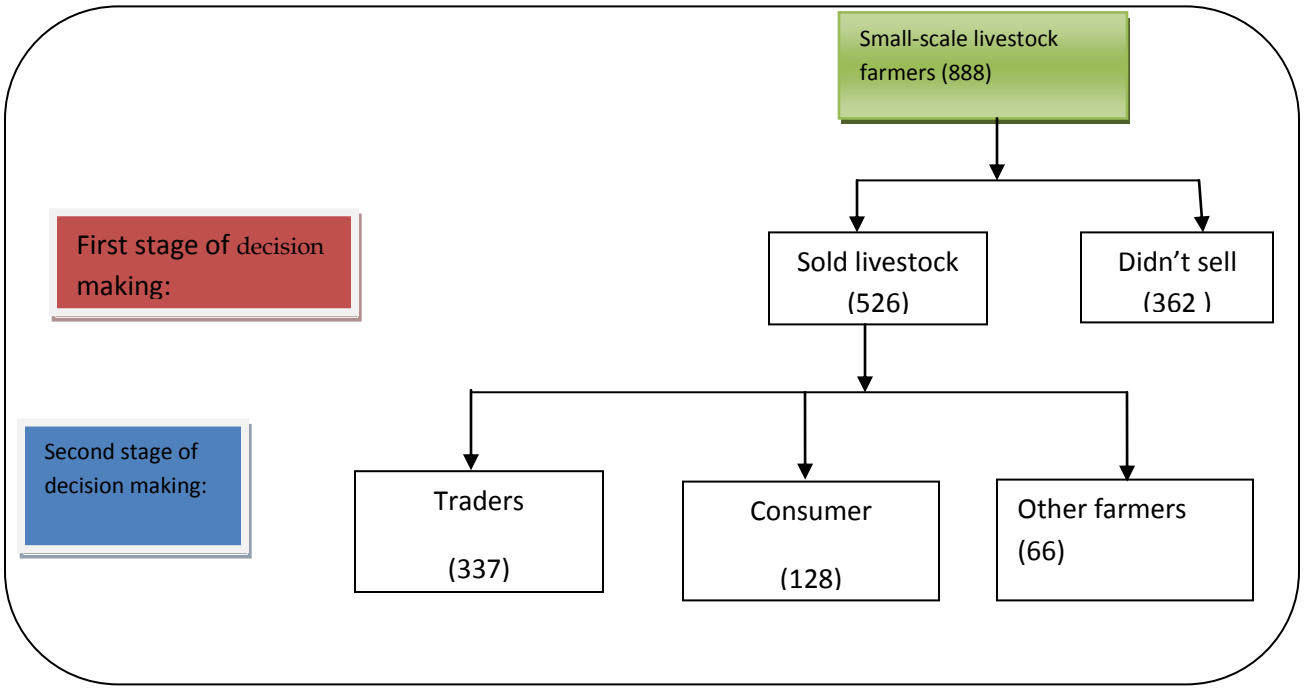
agricultural issues in the past two years. The reasons why most farmers were not attending such meetings included the fact that these kind of meetings were absent in their villages (50percent), they got some other work to do (28.2percent), due to old age (5.5percent), some of them have never been called for such meetings (4.2percent) and such meetings were not so useful to them (4percent). Those (34percent of the total sample) who attended community meeting in relation to agriculture, participated three times on average during the past two years. 71.6percent of farmers didn't get any service from agricultural experts (DA, extension agent or veterinarian). Those (28.4percent) who got some expert visit reported that such visits were made for once (36.6percent), twice (44.1percent), three times (14.7percent) on average over the last two years. Although very few (4percent) of households tried to approach the experts (DA or veterinarian) to come to their home and deliver service, they were not able to get their visit for some reasons.

Famers have encountered a variety of constraints in their livestock production and marketing activities. The five most important problems in order of their impact include livestock diseases (29.3percent), lack of grazing land (19.5), unavailability of veterinary posts (16.5percent), low rainfall (8percent) and the prevalence of drought (7.5percent). It is very apparent to see the effects of such problems on the ability of farmers to provide livestock for market where farmers may loose their livestock due to diseases and other factors. Any effort by any form of intervention towards minimizing such constraints can enhance the participation of livestock farmers in the markets.

4.2 Econometric estimation results

Farmer's sales decision can be viewed as a series of decision-making strategies employed in stages over time. This process can be modeled as a hierarchical structure in which the first step involves the decision to sale the product for various purposes (e.g. to meet unforeseen expenses, to purchase inputs, to pay axes etc), and the second is the subsequent decision for whom to sale among the existing possible marketing channels (Traders, consumers or otherfarms).

Figure 8: illustration of two-stage decisions of market participation and the choice of marketing channels among small-scale livestock farmers (1999/2000 E.C.).



Source: Own compilation.

4.2.1 Market participation decision

A binary logit model was applied to estimate the determinants of smallholder livestock marketing. The model significance and goodness of fit values for the equation is reported in Table 2. The overall significance of the model is measured by the Wald statistics which follows a chi-squared distribution with 12 degrees of freedom. The hypothesis that all the coefficients except the constant are zero (0.000) is rejected as the equation is significant at the 1 percent level of significant. This implies that the independent variables explain a significant proportion of variation in dependent variable. The likelihood-ratio chi-squared had a value of 94.77 with Pseudo-R^2 of 10 percent.

Table 2: Measurements of goodness of fit from the binary logit model

Log likelihood	-532.1965
Number of observations	873
LR chi2 (12)	94.77
Probability > chi2	0.0000
Pseudo R2	0.0983

Source: EEA/IFPRI Household Survey, 2009.

The command *robust* in (Stata version 10) was used to correct for heteroscedasticity. The author also checked for potential multicollinearity problem. The correlation matrix (refer appendix) and VIF (Variable Inflation Factor) (see table 3) methods were used to detect for multicollinearity. It was found from both results (correlation coefficient less than 0.8 and VIF less than 10) that multicollinearity was not a problem.

Table 3: Results of multicollinearity test: Variance Inflation Factor (VIF)

Variable	**VIF**
literacy	2.06
educ	1.67
sex	1.30
age	1.26
mcoop	1.23
minputs	1.19
hhsize	1.17
offincm	1.17
freeaid	1.11
loan	1.06
extenvisit	1.05
herdsize	1.06

Tables 4 and 5 below present the regression results from the binary logit model on the decision of market participation and the marginal effects.

Table 4: Results of binary logit estimation for market participation decision

Variables	Coefficients	P > z
Sex	.2738539	0.211
Age	-0.20437	0.000***
Hhsize	0.1278501	0.000***
Literacy	-.4374324	0.036**
Educ	.0027466	0.856
Offinc	.5728004	0.001***
Herdsize	.0175551	0.109
Freeaid	.8449671	0.005***
Extenvisit	.1724021	0.301
Mcoop	.096121	0.610
Loan	-.4331981	0.005***

Minputs	1.052321	0.000***
Cons	-.3803009	0.290

*= significant at 10percent; **= significant at 5percent; *** = significant at 1percent,

Log likelihood = -532.1965, LR chi2 (12)= 94.77, Probability > chi2= 0.0000,

Pseudo R2 = 0.0983, N= 873

Table 5: Marginal effects after the binary logit model

Independent variables	Coefficients (dy/dx)
age	-.0048854
sex*	.066441
hhsize	.0305623
Literacy*	-.1050394
herdsize	.0041965
offincm*	.1333896
mcoop*	.0234359
minputs*	.2512749
freeaid*	.1808631
extenvisit*	.0408667
loan*	-.1043734
educ	.0006566

(*) dy/dx is for discrete change of dummy variable from 0 to 1.

Although theoretically important in explaining market participation decisions and maintain the expected positive signs, the sex of household head, herd size, access to extension services and cooperative membership were found to be insignificant in determining small-scale farmer's decision on market participation. The most important

variables that explained market participation decisions among sampled household heads were age of the household head, the ability to write and read in any language (literacy), access to free aid (in the form of free food support and/or free cash aid), adoption of modern agricultural inputs and access to credit. One important contradictory result from previous studies is that access to loan tends to negatively influence farmers decision of market participation.

The household age is an important determinant of market participation decision by small-scale livestock market. It negatively and significantly influenced market participation decision in the livestock market. The marginal effects revealed that the probability of market participation by household head decreases by 4.9 percent as farmers are getting older. Household size positively and significantly influenced the decision towards market participation. As the number of family member increases, more labour can be utilized for livestock production and hence increases the possibility of having some surplus for market in addition to satisfying household needs for consumption. The marginal effect revealed that as family size increases, the probability of market participation increases by 3.1 percent. The literacy level negatively and significantly determined the decision to sale or not. This is perhaps the reflection of the existing low level of literacy among sampled households where most of the farmers could not write or read in any language and hence have less knowhow of business opportunities. The marginal effects showed that the probability of selling livestock decreases by 10.5 percent. The possible explanation for this is that as the level of literacy increases, farmers will be more interested in approaching the better market opportunities for high value products than the existing limited market conditions.

The possibility of generating additional income from non-farm employment positively and significantly influences farmer's decision towards selling livestock. The provision of free aids in the form of free food aid or free cash aid by the Food security Program of the government or others positively and significantly influences the decision of market participation by livestock farmers. The marginal effects revealed that obtaining free aid increases the probability of market participation by 18.1 percent. Free cash aid has the possibility of widening farmer's financial resources and the ability to use modern livestock productive inputs to increase livestock productivity. Access to modern agricultural inputs/services positively and significantly determines farmer's decision towards market participation. It increases the probability of market participation by 25.1 percent as indicated in the marginal effects. The uses of better livestock breeds, feeder as well as access to veterinary services raises the volume of livestock production of small-scale farmers and hence enhance the shift towards commercialization.

4.2.2 Determinants of the choice of market channels

Table 6 presents the model significance and goodness of fit values for the equations. The model explained 13.1 percent of the variation in market choice among smallholder livestock farmers in rural areas. The hypothesis that all the coefficients except the constant are zero is rejected at the 1 percent level based on the Wald test.

Table 6: Measurements of goodness of fit, multinomial logit model

Log likelihood	-382.46743
Number of observations	492
LR chi2 (30)	85.90
Probability > chi2	0.0000
Pseudo R2	0.1307

The author also corrected the model for possible heteroscedasticity and multicolleaniarity problems. The command *robust* in (Stata version 10) was used to correct for heteroscedasticity. The multicolleaniarity problems was corrected using the correlation matrix (refer appendix A) and VIF (Variable Inflation Factor) (see table 7). The variable measuring farmer's access to modern agricultural inputs (minputs) was excluded from the second stage estimation due to the observed multicollinearity problem.

Table 7: Results of multicollinearity test: Variance Inflation Factor (VIF)

Variable	VIF
invmills1	2.35
literacy	1.95
hhsize	1.71
age	1.65
sex	1.5
offincm	1.47
freeaid	1.41
mcoop	1.38
loan	1.27
volume	1.25
educ2	1.25
spent	1.21
extenvisit	1.13
markinform	1.12
herdsize	1.07

Table 8 below presents the coefficients from multinomial logit regression on the existing alternative marketing channels in the sample. The result showed that some of the variables were significant at both market outlets while some others were significant in one marketing channel but not in the other channel. Compared to the base category (traders), household head sex, educ2, freeaid, spent, extenvisit and loan determined the selection of consumers as market options while the variables mcoop, volume, spent, markinfoms, extenvisit and loan affected the choice of market outlet by other

individuals (i.e. farmers, relatives and neighbor). It can be noticed that the variables spent, extenvisit and loan influenced the decision farmers to choose both market channels in relation to the reference (traders).

Table 8: Results from multinomial logit model for the choice of marketing channel[$]

Independent variables	Consumer (Choice=2)		Othfarmrs (Choice=3)	
	Coef	P>Z	Coef	P>Z
age	0.0031946	0.775	0.005163	0.726
sex	-0.5603327	0.078*	0.28525	0.65
literacy	-0.3646197	0.278	-0.18391	0.648
educ2	0.0014992	0.055*	-0.00092	0.486
hhsize	-0.0597799	0.363	0.103506	0.186
offincm	0.2430869	0.379	0.154143	0.663
herdsize	0.0033266	0.792	-0.01322	0.783
mcoop	-0.1490534	0.638	0.698222	0.064*
freeaid	-0.9834033	0.036**	-0.23263	0.79
volume	-0.0020004	0.85	-0.26917	0.005***
spent	-0.0010931	0.049**	-0.00234	0.048**
markinform	0.0448942	0.848	0.726521	0.028**
invmills1	-0.1227005	0.783	-0.06755	0.916
extenvisit	0.8523869	0.001***	0.631342	0.054**
loan	0.4723689	0.068*	0.618132	0.091*
_cons	-0.4472975	0.551	-3.34837	0.003

*= significant at 10percent; **= significant at 5percent; *** = significant at 1percent

[$] (Choice==Traders is the base outcome)

Table 9: Elasticity of the multinomial logit model for choice of the different livestock marketing channels

VARIABLES	TRADERS CHOICE=1	CONSUMERS CHOICE=2	OTHERFARMS CHOICE=3
age	-.0007096 (.00208)	.0005308 .00202	.0001788 (.00059)
sex*	.0983448 (.06895)	-.1144655 (.0674)	.0161207 (.02059)
literacy*	.0673131 (.05956)	-.0634758 (.05783)	-.0038374 (.01578)
educ2	-.0002302 (.00015)	.0002836 (.00014)	-.0000534 (.00005)
hhsize	.0071343 (.01225)	-.0119972 (.01182)	.0048629 (.0035)
offincm*	-.0471418 (.05252)	.0433482 (.0509)	.0037936 (.01447)
herdsize	-.0001681 (.00281)	.0007446 (.0023)	-.0005765 (.00201)
mcoop*	-.0014206 (.05818)	-.0349219 (.05352)	.0363426 (.02426)
freeaid*	.145617 (.06363)	-.1438472 (.05301)	-.0017698 (.03396)
volume	.0086086 (.00253)	.0024122 (.00198)	-.0110208 (.00217)
spent	.0002605 (.00011)	-.0001757 (.0001)	-.0000849 (.00005)
markin~m	-.0300487 (.04424)	.0007095 (.04248)	.0293392 (.01787)

The sex of the farmer was an important determinant of market channel choice to choose between the consumers and traders (be market traders or farm gate buyers). The result shows that male household heads tend to prefer market traders over consumers compared to female household heads. The marginal effects (see Table 9) imply that being male household head increases the probability of selecting market traders by 11.4

percent. As education level increases, livestock farmers choose the final consumers as their market destination in the nearby local markets compared to traders. Educations increase the ability of farmers to gather and analysis relevant market information for their products and choose the market for better price. Access to free aid (free food aid or free cash aid) from the government's Food Security Program negatively influenced farmer's decision to sale to consumers at the local market and increases the probability of selecting farm gate buyers. For those farmers who were entitled for freeaids, the probability of travelling to the local market to sell to consumers decreases by 14.4 percent. One possible explanation is that the FSP targets the resource poor farmers with no or limited asset holdings. Even when they may possess some livestock, they would be happy to wait for farm gate buyers to come to their doorsteps and tolerate low prices for their products. Given the prevailing poor road networks and poor transport facilities, it would be much costly for these resource poor farmers to see beyond their farm gates as potential market outlets for their small quantity of products. The longer the time spent to reach to the consumer market to accomplish a one time sell negatively and significantly affected farmer's decision to go to the nearby local markets. They rather prefer middle men to meet them somewhere in between the local main market and their farm. This is because the longer the time required to travel to final consumer market increases the transaction costs of market exchange. The same is true for other farmers market (otherfarmers), where longer time spent to search for farmers or other individuals decreases the probability of selling to this outlet while it increases the probability of approaching middle men.

Results indicated that the market channel provided by market traders (Traders; base category) was more appropriate for larger volume of livestock sales. As discussed in the descriptive analysis, higher volume of animal sales increases the probability of selecting market traders while it decreases the probability of farmer's decision to select the other

market implying that otherfarmers outlet is not as such important for large number of animal sales. Farmer's agricultural cooperative membership and the availability of market information reduce the probability of traders as market destination and increase the probability to sell to other farmers and consumers. The implication is that household's dependence on traders (middle men) as sources of market information decreases as they are able to get this service from cooperatives. Put differently, cooperatives enhance farmer's direct access to final/end users. Agricultural extension services in the form of visit of farmers by DAs or extension officers tended to increase the probability of selling directly to consumers by 15.9 percent compared to the reference market outlet. It also positively and significantly determined the choice of other farmers market outlet compared to traders. Farmer's frequent contact with extension experts is expected to increase the ability of farmers to acquire important market information as well as other related agricultural information which in tern increases farmer's ability to choose the best market channel for its product. Furthermore, the availability of credit or loan services positively and significantly influences the choice of consumer and other farmer markets. Access to credit for sampled rural farmers increases the probability of choosing consumer and other farmer outlets by 8.2 percent and 2.3 percent respectively as compared to the base category.

5. Conclusion and Policy Implications

This paper examined the patterns and determinants of smallholder livestock farmer's decision to participate in the market or not and if participate for whom to sell. Although the Government of Ethiopia has identified the livestock sector, as stipulated in National Agricultural Input and Output Marketing Strategy of 2005, as vital agricultural enterprise towards improving the livelihood of smallholder livestock farmers, the contribution of the sector has been very minimal.

Still a significant number of poor livestock farmers are excluded from the market. Nearly 40.8 percent of smallholder farmers that owned livestock did not sell any livestock. We found that nearly half of those that sold their livestock sold only one livestock. The most important factors that influenced the decision of livestock farmers to participate in the market were age of the household head, the ability to write and speak in any language (literacy), household size, off-farm income, free aid and adoption of modern livestock inputs. The decision to sale livestock was dominated by male household heads implying that females have less entitlement of resource ownership in rural Ethiopia. The provision of free aid in terms of free food aid or free cash aid through Government's Food Security Program (FSP) significantly improves farmers' market participation. Moreover, access to modern livestock inputs increases the probability of market access by smallholder livestock farmers. This is because adoption of modern inputs increases the volume of livestock production and provides some surplus products which can be traded. It seems from the result that market exchange was conducted in the primary and local markets because nearly half of them sold only one livestock and the maximum is 80 livestock. Access to better market opportunities in the secondary and tertiary market is absent. Household heads that are able to write and read are more likely to prefer better market opportunities at the regional or tertiary

markets to existing limited market conditions at the primary level. Market information in the livestock industry remains one of the big challenges. The finding clearly explains the current states of affairs in rural Ethiopia where farmers don't participate in livestock markets due to the prevailing market information problem.

The findings of this study also confirm that the role of intermediaries has been still dominant in livestock markets across the country. Large proportion of livestock sales was made by traders (63.5 percent) and only small volumes were sold directly to final consumers (24.1 percent), to other individuals (12.4 percent). The existing market opportunities in the study areas are very thin where most of the transactions were conducted in the local/rural markets and some at farm gate. The possibility of accessing a relatively better market opportunities at the secondary and tertiary market channels has remained one of the big challenges. Even within the existing thin marketing situations, many of smallholder livestock farmers didn't directly sell to final consumers at the local markets due mainly to high transaction costs and lack of additional income generating schemes. The more time spent to reach the final consumer markets and the occurrence of non-transport marketing costs highly discouraged farmers to select this outlet and go for market traders. The absence of free aid and adoption of modern livestock inputs also negatively influenced the choice of consumer market. On the other hand the possibilities of having options to choose from market opportunities as well as obtaining more extension services strongly motivated farmers to go for consumer markets compared to market traders (reference market channel).

It was found that farmers would go for the market channel option offered by market traders in stead of other farmers option when there was high transaction costs reflected in longer time spent to reach other farmers, high transportation costs, lack of

information on market price, volume of sale is high, and absence of free aid. It is interesting to see that farmers who have completed some education level tend to go for the consumer outlet as compared to traders. Furthermore, the availability of extension services and credit increases the probability of moving to the consumer and other individual markets decreases dependence on middle men.

Some specific policy implications can be drawn from the findings that can help design appropriate intervention mechanisms to minimize the prevailing factors that influences market participation as well as which market outlet to choose so as to improve producers' benefit from their trade transactions. These include:

- *Provision of market information*: provision of relevant market information about livestock production and markets should be considered as an integral part of an agricultural market development programme in the country. Dissemination of market information to the smallholder livestock farmers is very essential to increase the probability that farmers can participate in the livestock market as well as receive higher price for their product. Not only does it require setting up an information gathering and analysis system, but also a strong emphasis will have to be put on ways to disseminate such information to ensure optimal access. The main thrust for this would ideally be to train farmers on how to use information (e.g. price determination and market requirements and/or product specifications) and also to supply information to the smallholder livestock farmers.

- *Establishing/strengthening farmer's cooperatives and producer's organization.* Efforts should be made to strengthen existing Farmers' Cooperative and encouraging the establishment of Producer Organizations (POs) towards a collective action to lower transaction costs. Farmers need to be encouraged to work cooperatively in

the procurement of production inputs, managing utilization of their land and infrastructure, obtaining marketing-related information and collectively marketing their livestock. Collective action by producer organizations increases economies of scale and tackle marketing problems by procuring their own inputs, handling distribution and marketing of out puts. Farmers' organization may also facilitate collective collateral for credit.

- *Improving infrastructures. Attempt should be made to improve the road infrastr*ucture linking the farm to market. Improving the quality and quantity of the road in the study area would reduce the time spent to reach the market and hence lower transportation costs. It could also facilitate efforts made by farmers to organize transport to move their product to market and obtain modern agricultural inputs so as to enhance livestock productivity.

- Provision of adequate and relevant agricultural extension services (such as veterinary services) to farmers.

- Provision of credit services to farmers to widen the financial bases of poor farmers. Farmers can use the loan to buy modern livestock breeds and access to veterinary services.

- Facilita*t*ing access to modern breeds will increase livestock productivity which in turn can positively affects farmer's capacity of market participation.

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Annex A Pearson Correlation Coefficients of the Exogenous Variables for the Multinomial Logit Model.

	age	sex	Literacy	Offincm	Herdsize	Mcoop	Freeaid	volume	Mkinform	Spent	Extenvisit	Loan	invmills1	educ2
age	1	.010	-.315(**)	-.197(**)	-.004	.114(**)	.011	-.028	.073	-.037	-.044	-.046	.250(**)	.007
		.776	.000	.000	.895	.001	.742	.529	.095	.400	.190	.170	.000	.838
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
sex	.010	1	.298(**)	-.257(**)	-.089(**)	.166(**)	-.178(**)	-.246(**)	-.029	-.058	.011	.106(**)	-.094(**)	.128(**)
	.776		.000	.000	.008	.000	.000	.000	.500	.184	.735	.001	.006	.000
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
Literacy	-.315(**)	.298(**)	1	.140(**)	-.004	.214(**)	-.188(**)	-.223(**)	.089(*)	-.233(**)	.036	.093(**)	.027	.360(**)
	.000	.000		.000	.897	.000	.000	.000	.040	.000	.289	.006	.429	.000
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
Offincm	-.197(**)	-.257(**)	.140(**)	1	.090(**)	-.021	.053	.124(**)	-.076	-.057	-.014	-.006	-.270(**)	.050
	.000	.000	.000		.007	.526	.113	.005	.079	.196	.668	.853	.000	.140
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
Herdsize	-.004	-.089(**)	-.004	.090(**)	1	-.047	-.025	.157(**)	.039	-.039	-.058	.089(**)	.008	-.035
	.895	.008	.897	.007		.162	.451	.000	.376	.375	.085	.008	.803	.303
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
Mcoop	.114(**)	.166(**)	.214(**)	-.021	-.047	1	-.159(**)	-.182(**)	.137(**)	-.187(**)	.023	.037	-.199(**)	.096(**)
	.001	.000	.000	.526	.162		.000	.000	.002	.000	.502	.274	.000	.004
	883	883	883	883	883	883	877	507	527	520	879	883	873	883
Freeaid	.011	-.178(**)	-.188(**)	.053	-.025	-.159(**)	1	.269(**)	.012	.283(**)	-.069(*)	-.165(**)	-.288(**)	-.045
	.742	.000	.000	.113	.451	.000		.000	.786	.000	.040	.000	.000	.181
	882	882	882	882	882	877	882	505	526	519	878	882	873	882
Volume	-.028	-.246(**)	-.223(**)	.124(**)	.157(**)	-.182(**)	.269(**)	1	.057	.049	-.160(**)	-.074	-.160(**)	-.101(*)
	.529	.000	.000	.005	.000	.000	.000		.199	.275	.000	.095	.000	.022
	509	509	509	509	509	507	505	509	508	501	507	509	501	509
Mk.	.073	-.029	.089(*)	-.076	.039	.137(**)	.012	.057	1	-.141(**)	-.050	.093(*)	.081	-.027

	.095	.500	.040	.079	.376	.002	.786	.199		.001	.251	.031	.065	.534
	530	530	530	530	530	527	526	508	530	522	528	530	521	530
Spent	-.037	-.058	-.233(**)	-.057	-.039	-.187(**)	.283(**)	.049	-.141(**)	1	-.121(**)	-.143(**)	-.163(**)	-.082
	.400	.184	.000	.196	.375	.000	.000	.275	.001		.006	.001	.000	.061
	523	523	523	523	523	520	519	501	522	523	521	523	514	523
Extenv isit	-.044	.011	.036	-.014	-.058	.023	-.069(*)	-.160(**)	-.050	-.121(**)	1	.090(**)	-.062	.135(**)
	.190	.735	.289	.668	.085	.502	.040	.000	.251	.006		.007	.067	.000
	884	884	884	884	884	879	878	507	528	521	884	884	873	884
Loan	-.046	.106(**)	.093(**)	-.006	.089(**)	.037	-.165(**)	-.074	.093(*)	-.143(**)	.090(**)	1	.316(**)	.051
	.170	.001	.006	.853	.008	.274	.000	.095	.031	.001	.007		.000	.130
	888	888	888	888	888	883	882	509	530	523	884	888	873	888
invmill s1	.250(**)	-.094(**)	.027	-.270(**)	.008	-.199(**)	-.288(**)	-.160(**)	.081	-.163(**)	-.062	.316(**)	1	-.058
	.000	.006	.429	.000	.803	.000	.000	.000	.065	.000	.067	.000		.089
	873	873	873	873	873	873	873	501	521	514	873	873	873	873
educ2	.007	.128(**)	.360(**)	.050	-.035	.096(**)	-.045	-.101(*)	-.027	-.082	.135(**)	.051	-.058	1
	.838	.000	.000	.140	.303	.004	.181	.022	.534	.061	.000	.130	.089	
	888	888	888	888	888	883	882	509	530	523	884	888	873	888