Avocado Producers' Market Participation in 'Damot Gale' and 'Boloso Bombe' Districts of Wolaita Zone, Southern Ethiopia

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Abstract

The focus was analyzing the determinants of market participation, supply volume and demand level for avocado, with especial emphasis to 'Damot-Gale' and 'Boloso-Bombe' districts of Wolaita zone in southern Ethiopia. Primary and secondary data were used and a total of 160 households from 14 potential kebeles from the selected districts were surveyed. In addition to descriptive statistics, Heckman two-stage econometric model and double log model were employed to identify factors affecting the market participation and the supply volume and consumed; using SPSS and STATA software. The study reveals that the major actors of avocado marketing are producers, rural assemblers, wholesalers and retailers; 7 important market chains have been identified and much of the marketed surplus channeled through farmer → retailer → consumer. The survey result also showed that the total purchase of avocado was in the hands of few individuals indicating the existence of oligopoly market structure of different degrees. Results from Heckman two-stage model shows that among 12 explanatory variables hypothesized to affect avocado market participation 3 of them: family size, quantity of avocado produced and price of avocado in the market found to affect significantly producers' decision to sell. 5 variables: education level, active labor, farming experience, quantity of avocado produced and market information found to significantly influence the quantity/volume supplied to the market. From 8 variables hypothesized to affecting consumption level, income, price and availability found significant. The research recommends improving production and productivity, organizing producers into cooperatives and improving market information services as intervention.

Keywords: avocado, market chain, market participation.

1. Introduction

Ethiopia, with a geographical area of 1.13 million km2 and a total human population of over 82 million (CSA, 2009), is agro-ecologically diverse and can support production of temperate, subtropical and tropical fruits. Despite this potential, the existing income generating capacity of fruits as compared to its immense potentials at the macro and micro level is not encouraging.

Studies show that the production potential of fruits is not widely and evenly distributed across the various regions of the country and its cultivation is also seasonal and the supply is scanty and volatile even in areas where irrigation is possible. The wide knowledge gap on fruit production techniques and processing technologies, the confinement of consumers' knowledge about the benefits of fruits and low demand except for few widely known tropical fruits have adversely affected the growth and expansion of the fruit sub-sector in Ethiopia (Yilma, 2009). In addition, shortage of postharvest and marketing infrastructure like packaging, pre-cooling, warehousing, cold storage, prepackaging and distribution, chemical treatment, and washing facilities, both on farm and at port; and hitherto, the government's focus mainly on improvement of grain crop production due to the objectives of attaining food security are some of reasons for the limited development of fruit production in Ethiopia (Gebremariam, 2003).

2. Fruits Production and Marketing

Ethiopia has a variety of fruit crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as home consumption for food. The production of fruit varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets. The country has diverse agro ecology and many areas are suitable for growing temperate, subtropical or tropical fruits. Substantial areas receive sufficient rainfall and many lakes, rivers and streams could also be used to support fruit production. Despite the potential, the total land area under fruits is below expectation and mainly smallholder farmers based (CSA, 2009).

In the context of increasing the high value production of agricultural commodities, fruit trees and perennial crops play an important role. Except table banana, tropical fruit trees like mango and avocado are not well known and considered as diet by most Ethiopians. However, Yilma in his study indicated that the expansion of state farms in the past command economy and the prevailing expansion of private investors in different regions of the country has contributed a lot on the introduction of fruits as business. Otherwise, areas suitable for growing fruit trees are idle even near riverbanks where there is ample water supply for growth. In general, fruit production is still backward, the business is under developed and the private sector is not much attracted (Yilma,

2009).

Compared to most other products, agricultural products are bulkier, more perishable, occupy a lot of space and expensive to transport and store. These product characteristics have their effect on the facilities necessary to market farm products (Kohls and Uhl, 1985). On the other hand, the existence of large number of producers (sellers) and limited number of merchants (buyers) particularly in the perishable product market, the bargaining position of farmers is usually weak. Besides the market structure, farmers and merchants may not have equal information from central transactions (Moti, 2007).

The term market structure refers to the number of buyers and sellers, their size distribution, the degree of product differentiation, and the ease of entry of new firms into an industry (Abbott and Makeham, 1981). Examples of such dimensions include: degree of buyers and sellers concentration, barriers to potential entrants and degree of product differentiation. Market concentration is the number and size of sellers and buyers in the market. Concentration is believed to play a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms. The relationships between concentration and market behavior and performance must not be interpreted in isolation. Other factors, such as firms' objectives, barrier to entry, economies of scale, and assumptions about rival firms' behavior, will be relevant in determining the degree of concentration and relationship between concentration and behavior and performance (Schere, 1980). Market structure can also be defined as characteristics of the organization of a market, which seem to strategically influence the nature of competition and pricing behavior within the market (Bain, 1968). Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive; monopolistic; or oligopolistic (Scott, 1995; Meijer, 1994). The organizational features of a market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Wolday, 1994).

3.   Marketing Channel and Market Chain Analysis

Market channel is a business structure of interdependent organizations from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstrong, 2003). The analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to their final destination (consumer). This knowledge is acquired by studying the participants in the process, i.e. those who perform physical marketing functions in order to obtain economic benefits (Getachew, 2002).

A marketing chain is used to describe the numerous links that connect all actors and transactions involved in the movement of agricultural products from the farm to the consumer (Lunndyet al., 2004). It is the path one good follow from their source of original production to ultimate destination for final use. According to Hobbs (2000), the term supply chain refers to the entire vertical chain of activities: from production on the farm, through processing, distribution, and retailing to the consumer. In other words, it is the entire spectrum, from gate to plate, regardless of how it is organized or how it functions.

Market chain is the term used to describe the various links that connect all the actors and transactions involved in the movement of agricultural goods from the producer to the consumer (CIAT, 2004). Commodity chain is the chain that connects smallholder farmers to technologies that they need on one side of the chain and to the product markets of the commodity on the other side (Mazula, 2006). Market chain analysis, therefore, identifies and describes all points in the chain (producers, traders, transporters, processors, consumers), prices in and out at each point, functions performed at each point/ who does what?, market demand/ rising, constant, declining, approximate total demand in the channel, market constraints and opportunities for the products.

4.   Market Supply and Demand

Marketed supply refers to the amount actually taken to the markets irrespective of the needs for home consumption and other requirements. Whereas, the marketable surplus is the residual with the producer after meeting the requirement of seed, payment in kind, and consumption by farmer (Wolday, 1994). Marketed surplus may be equal to marketable surplus, but may be less if the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during the transit (Thakur et al., 1997). In the case of crops that are wholly or almost wholly marketed, the output and marketed surplus will be the same (Reddy et al., 1995). The decision to supply market is one big question but usually is taken after the produce is at hand or if decided earlier some other decisions have to be considered. Among many, the choice of crop to grow, land size to allocate, and to which buyer to sell are some. These choices of crop and market outlet choices are household specific and depend on several attributes like household characteristics, farm resource endowments and access to market. Consumer demand, on the other hand, is defined as the various quantities of a particular commodity that an individual consumer is willing and able to buy as the price of that commodity varies, with all other factors that affect demand held constant (Tomek and Robinson, 1990).

5.   Determinants of Supply of and Level of Demand for Agricultural Products

According to different studies on determinants of supply of agricultural products, multiples of demographic and socio-economic factors found to affect demand and supply of agricultural products.

A study by Abay showed that among the different variables that were hypothesized as determining factors for volume of market supply sex of the respondent, active labor power, total size of owned land and quantity produced were significant (Abay, 2007).

Askarie and Cummings (1974) found out that soil fertility, average size of holdings, cultivator's income, literacy, extent of irrigation facilities, and availability of unused cultivated land, risk, and relative importance of the crop in question as determining factors for market responsiveness.

Harris in her study obtained negative relationship between marketed surplus and variables like family size, and distance to market and farm size (Harris 1982).

Another study on determinants of marketable surplus of food grains summarizes that the most important factor, which increases marketed surplus significantly, is the increased production or output followed by consumption and payments in kind which should be reduced to keep up the quantity of marketed surplus of food grains (Thakur et al., 1997).

Some literatures revealed some realities on supply determinants specific to Ethiopia. Wolday in his study used size of output (volume produced), access to market center, household size, and cash income from other crops to determine grain market surplus (Wolday, 1994).

A similar study on sesame at Metema also pointed out six variables - yield, oxen number, modern input use, area, and time of selling and unit cost of production - affecting sesame supply (Kindei, 2007). Similarly, Rehima in her study of pepper marketing chain analysis identified access to market, production level, extension contact, and access to market information as variables that affect marketable supply (Rehima, 2007).

In relation to determinants of level of demand, on the other hand, various factors are identified by different researchers. Stigler, for instance, put three characteristics of a rational consumer: consistent tastes, correct cost calculations, and decision making to maximize utility. According to him, purchase of a commodity (demand) depends upon factors like money income and taste and preference in addition to price (Stigler, 2005). Kotler identified factors that influence buying behavior including cultural, social, personal, and psychological factors. The cultural factors include values, perceptions, preferences, social class; social factors include reference group, family, roles and statuses; personal factors include age and lifecycle stage, occupation; psychological factors include motivation, perception, learning, beliefs and attitudes (Kotler, 2003).

Tomek and Robinson also indicated major factors influencing level of demand grouped under four headings as population size and its distribution by age, and geographic area; consumer income and its distribution; prices and availability of other commodities and services and consumer tastes and preferences (Tomek and Robinson, 1990).

Still other scholars listed factors like household income, price and availability of specific commodity, household members' preference, and the decision making power of women relative to men in the household, consumed amount, budget shares, household demographic characteristics, education and area of residence to affect consumption patterns of fruits and vegetables. The factors described above-income, prices, and availability- affect what consumers are able to purchase or consume. Consumer preference on the other hand, shapes the decisions that consumers make regarding what they choose to purchase or consume (Ruelet al., 2005).

6.   Statement of the Problem

The current levels of contributions of the fruits sub sector in Ethiopia, at either the national or regional level is below the potential. The level of foreign exchange earnings from the sub-sector is also much lower than would be expected, given the vast varieties and convenient climatic conditions. The level of contribution of fruits production for the growers and rural families living in high potential areas of fruits production, which largely grow fruits for home consumptions and markets, is below the national average. They are not benefited as expected from the sector despite the fact that it is part of their agricultural production system. As part of rural Ethiopia, the study area is not an exception with respect to fruits production and assuming as much benefits from it.

Despite the potential of Wolaita zone for fruits production, its productivity is low due to use of low level of improved agricultural technologies, risks associated with climatic conditions, diseases and pests. Moreover, the nature of the product on one hand and lack of organized market system on the other hand frequently resulted in low producers' price.

Therefore at this juncture, one may appreciate the paradox - high potential for fruits production against low productivity and benefits. This is currently pressing and critical to the study area in particular and needs to be researched and measures have to be taken to help the producers assume a fair income from the sector and help them improve their living standard. This, therefore, demands an intensive study of the sector in the form of market opportunities, constraints and chain analysis; and the social, cultural, institutional and other factors that

determine the supply of and demand for fruits have to be identified and analyzed to devise solutions for the aforementioned questions.

7.   Objective of the Study

The overall objective of the study is to analyze to analyze determinants of market participation, market-supply of and demand for avocado with special reference to Damot-Gale and Boloso-Bombe districts of Wolaita zone in southern Ethiopia.

8.   Methodology

Type and Sources of Data and Method of Data Collection

For this study both primary and secondary type of data were used. Primary data were collected from selected fruit producing farmers, traders and consumers through administrating semi-structured questionnaire.

Sampling Procedures

To select respondent farmers, multi-stage sampling technique was used. In the first stage out of the 12 districts two (Damot Gale and Boloso Bombe) were selected purposively based on their fruit production performance. In the second stage from the selected two districts, 14 fruit producing peasant associations (8 from Damot Gale and 6 from Boloso Bombe) were selected purposively. Finally 160 farmers (90 from Damot Gale and 70 from Boloso Bombe) were selected randomly based on proportion to size.

To select sample traders it is first important to select the sites where fruits of the selected study area are marketed. Accordingly, Areka and Boditi towns were identified as the main destinies where fruits from the two study districts marketed; and selected. Then 40 sample traders - rural assemblers, wholesalers and retailers - (20 from each town) were selected for interview.

To select sample consumers first three fruit receiving towns (Boditi, Areka and Sodo) were identified and selected, then from the selected towns a total of 90 consumers (30 from each) were selected randomly as respondent consumers.

Methods of Data Analysis

To analyze the collected data both descriptive and econometric method of data analysis are used. Descriptive analysis includes mean, ratio, percentage, frequency; whereas the econometric model includes analysis of determinant of fruit supply and demand. All types of data were analyzed by using SPSS-16 and STATA - 10.

In this study Heckman two-stage model is used. Heckman two stages model of estimation is found appropriate with its relevant procedure: estimating first the probability of farmer's participation in a market for obtaining Inverse Mills Ratio which is incorporated in the second stage OLS estimation of market supply level.

In the second stage of estimation, OLS estimation procedure was used to identify determinants of market supply level (quantity of supply) by taking those farmers who participated in the market. The estimation model is given as follows.

$$Q_j = \beta + \beta_{1j}X_{1j} + \beta_{2j}X_{2j} + \beta_{3j}X_{3j} + \beta_{nj}X_{nj} + \rho_{nj}\lambda_{nj}(X_{nj}\beta)_j + \varepsilon_j \quad \dots\dots\dots\dots\dots\dots (1)$$

In this study Double-logarithm model is used for its linearity in the logarithms and results of constant elasticity that are equal to coefficients. In equations of log-log functional form the coefficients are elasticity if the dependent variable is quantity purchased or consumed (Ferris, 2005). The equation of double logarithm model to analyze factors that affect demand level is given as:

$$\ln Y_i = \alpha + \beta_2 \sum \ln Xi + U_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$\dots\dots\dots\dots\dots (2)$$

9.   Results and Discussion

Market Participants

The main actors involved in the avocado marketing system are producers, rural assemblers, wholesalers, retailers, brokers and consumers. Large number of supplying farmers characterized markets at the farm level. The wholesale buyers were estimated to be 32, each of which handled almost equivalent amount of product. Almost all the rural assemblers had equal capacity of volume bought. Calculation of the concentration indices by considering an average load a wholesaler took per day in peak production season basing the four firm criteria indicated strong oligopolistic market power with a concentration index of 54.63%.

Table: 1 Market participation and share of wholesalers

| Number of Traders	cumulative of traders	% of cumulative of traders	Districts Total		
			Quantity purchased (ql)	% share purchase	% cumulative
1	1	11.11	3600	15.46	15.46
1	2	22.22	3360	14.43	29.89
1	3	33.33	3120	13.40	43.29
1	4	44.44	2640	11.34	54.63
1	5	55.55	2400	10.31	64.94
1	6	66.67	2280	9.79	74.93
1	7	77.78	2160	9.28	84.01
1	8	88.89	2040	8.76	92.77
1	9	100.00	1680	7.23	100
			23280	100.00	

Source: Own computation 2013

Market channels - 7 lines of market channel were identified. As can be understood from figure 1 the main receivers from farmers were retailers, rural assemblers, wholesalers and consumers with an estimated percentage share of 36.3, 15.5, 34.3% and 13.9%, in that order. Besides, the volume that passed through each channel was compared and based on the result the channel that stretched from farmer-retailer-consumer hosted the largest followed by channels that went farmer-wholesaler-consumer shouldering a volume of 14,600 and 8007qt, respectively.

Table: 2 Avocado market chains

Chanel	Participants	Amount in qt.
Channel-1	Farmer ---Consumer	3586qt
Channel-2	Farmer – Retailer –Consumers	14600qt
Channel-3	Farmer – Wholesaler – Retailer – Consumer	5791qt
Channel-4	Farmer – Wholesaler – Consumers	8007qt
Channel-5	Farmer –Rural assembler- Wholesaler – Consumers	1315qt
Channel-6	Farmer – Rural assembler—Retailer—Consumer	2389qt
Channel-7	Farmer—Rural assembler—consumer	2512qt

Figure 1 Avocado market channel
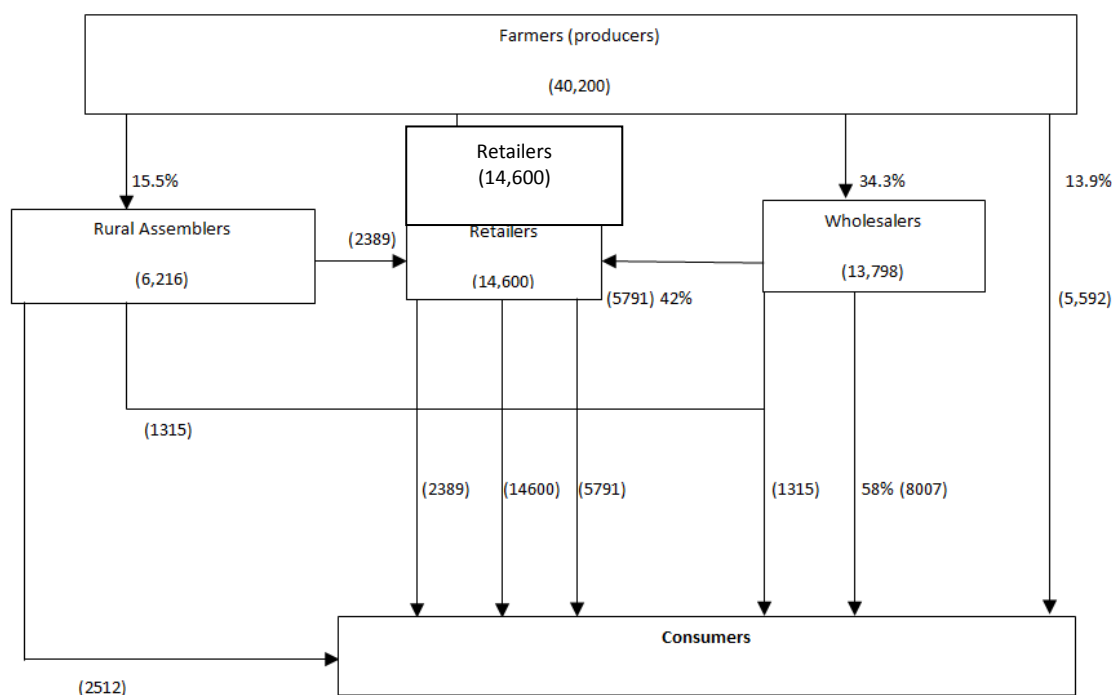
Note: Figures in parenthesis are volume (quantity in quintals) of avocado sold to other market actors

Determinants of Market Supply Volume

Table 3 Market participation

Variables	Coefficients	t-value
Constant	-16.68	-1.64
Age	2.64	1.61
Sex	2.19	1.10
Education	-1.51	-1.51
Family size	-1.22	-1.81***
Distance from market	0.64	1.35
Land size	1.28	1.17
Quantity of avocado	1.41	2.15**
Labor	-0.17	-0.53
Extension frequency	2.14	0.91
Price of avocado	0.91	1.70**
Market information	-0.71	-0.31
Experience in fruit farming	0.12	0.23
N	160	
X2	176.66	
Prob> X2	0.0000	
Log likelihood	-18.17	

, * Significant at 5 and 10 percent

Source: own computation, 2013

As can be seen from the econometric result, 3 variables (family size, quantity and price of avocado) were found significant for avocado market participation.

Family size – As hypothesized it is found to influence market participation decision negatively. It implies that there is a direct relation between number of persons in the household and level of consumption implying less remain for the market.

Quantity of avocado produced: The influence of quantity of production is positive as predicted. In other words, the higher the production the more the family will be tended to decide participating in the marketing of surplus.

Selling price - As expected it is found to influence market participation decision positively. As farmer sees better price probability of entering a market and volume of supply would increase.

In the second stage of the Heckman Model estimation, determinants of avocado market supply was hypothesized to be age and sex of the respondent, family size, education level, labor, distance from market, total land owned, quantity produced, extension frequency, price offered, farming experience and market information. Accordingly, education level, active labor, farming experience, quantity of avocado produced and market information were found significant. The following table discloses all the econometric analysis result of Heckman second stages for market supply; the implication is discussed as next:-

Table 4 OLS estimation of market supply determinants

Variables	Coefficient	t-value
Constant	-2.45	-0.31
Age	0.77	0.42
Sex	0.58	0.17
Education	-1.58	-1.69***
Family size	-0.25	-1.36
Labor	1.55	3.67*
Farming experience	0.24	2.30**
Distance to the nearest market	0.10	0.31
Land size	0.67	0.63
Quantity avocado	0.93	8.38*
Extension frequency	2.40	1.20
Price avocado	0.01	0.05
Market info	3.21	1.94***
Lambda	2.33	0.68
N	160	
R2	91.01	
Adj. R2	95.11	
Log likelihood function	-232.43	

Educational level of household head: - Contrary to the expectation, level of education was found to exert a negative impact on the level of supply of avocado to the market by the household. The implication is that, the more the family is headed by an educated person the more the family will be aware of the nutritional value of avocado and the tendency to supply to the market likely to decrease.

Labor –The positive relation implies that the more the farming household is likely to get access to labor force from any source, the higher is the probability that the family's interest to farm more size of land and produce surplus thereby quantity of supply to the market would increase.

Experience –The implication of the analysis result is that as farmers get more experience in farming on a particular commodity resulting in boost in output (production). In such a case, the family will have surplus and hence supply to the market obviously would be higher.

Quantity produced - the higher the production the higher the market supply will be. The more they produced the more they would supply to market.

Market information –The positive relation implies that the better information farmers have about the products marketing the higher would be their participation level and supply level.

Econometric Model Result for Demand Analysis

Level of income –The positive relation implies that the higher the annual average income of the household the higher would be the level of consumption of avocado in the family.

Availability of fruits in the market: - the result of the study reveals that availability of avocado in the market at required time and quality impacts the consumption level of the family positively. The implication is hence, if fruit is available in the market on time consumer can buy easily and consume more.

Table 5 Demand estimation model result

Variables	Coefficients	t-value
Constant	-0.67	(-1.07)
Ln FAMLY	0.16	(1.46)
Ln INCOM	0.21	(2.82)***
Ln PRICE	-0.34	(-2.26)**
Ln DIST	-0.02	(-0.55)
Ln AVLAB	0.24	(3.05)***
Ln SUBST	0.13	(2.01)
Ln SEX	0.31	(1.21)
Ln EDU	0.11	(2.51)
N	160	
R2	56.96	
Adj R2	62.27	

Source: own computation, 2013

Price of avocado in the market: - The result of the analysis shows inverse relation between price and consumption of avocado and relates to the law.

10.   Recommendations

Improving production and productivity: policies that would improve avocado production capacity by identifying new technologies and transferring them towards the farmer should be strengthened. Agricultural extension services are the major institutions operating for helping farmers improve their production and productivity in the rural areas. To obtain this advantage there is a need to improve extension system, and technical supervision and follow up must be strengthened. Strengthening of market extension (linking farmers with markets, building marketing capacity of farmers, etc.) is necessary.

Organizing producers into cooperatives: Fruit producers and fruit marketing cooperatives shall be established in the study Woredas with the objective to share labor force; and of increasing farmers bargaining power and to benefit them from economies of scale. Thus to increase the level of farmers' participation and supply of avocado to the market the concerned governmental bodies /NGOs shall initiate producers to be organized in to (local) cooperatives and have to create and develop market linkages between the producers and cooperatives.

Improving market information services: Competitive market and market information services have to be established or strengthened to provide farmers and traders accurate and timely information on current supply, demand and prices of the commodity at national and regional levels.

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