Institutional innovation in African markets: can commodity exchanges address sustainability issues?

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Markets play an important role in Africa, but they are beset with problems of commitment failure, asymmetric information, and transaction risks and costs. Because institutions are usually underdeveloped in Africa, informal institutional arrangements and transaction costs shape patterns of trade and partly determine the extent to which allocative efficiency is achieved. The Ethiopian Commodity Exchange (the ECX) was established in Ethiopia to solve many of these problems. This paper uses econometric analysis and a dataset of information on traders (collectors, brokers and wholesalers) from three sesame producing areas and the main market in Addis Ababa. The results provide an insight into which transaction risks and costs traders face and what mechanisms were employed by traders to reduce these risks and costs. The paper then analyses the effect of the ECX on these transaction risks and costs. We find that although the ECX may help reduce transaction costs, it may not be the most appropriate institution to address sustainability issues in the chain. A system for tracking and tracing is one of the measures required to assess sustainable sesame production. However, this system is incompatible with the current the ECX set-up.

KEYWORDS: commodity exchange, Africa, transaction risks, sustainability

1. Introduction

Before the 90's, most African governments intervened in the agricultural markets mainly as a part of development policy framework. Even though, the instruments of interventions varied across country and also across the different agricultural commodities, the target was stabilizing producers' income mainly through marketing boards which provided a single channel for exports and imports, state ownership of processing centers, and which administered domestic prices that were normally pan seasonal, pan-territorial, and detached from international prices (Akiyama et al., 2001). However, several changes in terms of improvement in productivity in agriculture, transportation and communication, began to erode the efficiency of these intervention instruments forcing economists and policymakers to turn to market-based approaches. It is at this stage that the World Bank and other international organizations began a series of structural adjustment loans and credits conditional on certain policy reforms, which most African governments accepted.

The market reforms in Ethiopia as in most other African countries has resulted in improvement in performance of the agricultural markets in terms of significant re-engagement of the private sector in trade, improved market integration, and the reduction of marketing margins ((Dadi, Negassa, and Franzel 1992; Lirenso 1993; Dercon 1995; Negassa and Jayne 1997;

Dessalegn, Jayne, and Shaffer 1998; Gabre-Madhin 2001; Gabre-Madhin 2003). However, very importantly, these studies also pointed out the reforms did *not* have the envisaged impact on agricultural growth and poverty reduction. This is mainly associated with the presence of prohibitively high transaction costs, evidenced by the lack of sufficient market coordination between buyers and sellers, the lack of market information, the lack of trust among market actors, the lack of contract enforcement, and the lack of grades and standards.

The persistence of these market constraints in Ethiopia points to the fact that market reforms alone, defined as the removal of policy distortions, are necessary but not sufficient to enhancing market performance. This suggests that the new development agenda, not only in Ethiopia but throughout post-reform Africa, is to move beyond market reform to market development. In addition to policy incentives, key interventions are required to develop appropriate incentives, market institutions and build needed infrastructure, defined together as the "3 I's of market development" (Gabre-Madhin and Goggin 2005).

It is with the intention of moving from market reform to an integrated market development that the government of Ethiopia started promoting the establishment of Ethiopian Commodity Exchange (the ECX) with the technical and financial support of international organizations like IFPRI, World Bank, UNDP and others. The Ethiopian Commodity Exchange was established in Ethiopia in 2006 and opened for major cereal crops, oil crops, pulses and coffee.

2. Background

Ethiopia is a landlocked country in the horn of Africa. Its economy is based on agriculture, accounting for 45% of GDP, and 85% of total employment. With a GDP per capita of 700 USD per year (PPP), it is one of the poorest countries in the world. Sesame is an important crop for Ethiopia in terms of economic development. Ethiopia is the third world exporter of sesame seed after India and Sudan. Oilseeds are the third important crop in acreage in Ethiopia after cereals and pulses (Wijnands, Biersteker, and van Loo 2009). The major sesame growing areas are located in the Northwest; in Humera area in Tigray near the border with Sudan and Eritrea; in Metema in North Gondar and in Wollo area of Amhara region, Chanka area in Wollega of Oromiya, and in Pawi area in Benshangul Gumuz region.

The Ethiopia Commodity Exchange (the ECX), which was officially opened May 2008, is expected to play an important role as a platform for transparent and cost effective marketing. It opened for sesame trade in late

2009. The ECX does not include futures yet, it is basically a spot market, where on a trading floor transactions are made through open outcry bidding. The produce (e.g. sesame) is brought to various warehouses where it is sampled, weighed, graded and certified. The producers who deposit their produce at the warehouse, receive a warehouse receipt, which they keep until the produce has been sold at the ECX and they are paid.

After the ECX opened for coffee, and it was made mandatory for all export coffee to be sold through the ECX, there was much protest from exporters who were selling various specialty coffees to specific buyers. This led to the establishment of the " Direct Specialty Trade" facility (DST) in February 2010, whereby specialty coffee is offered for sale with a more extensive description (including e.g. origin) instead of the standard grades the ECX used for its other non-specialty coffee.

3. Objectives

This paper documents the overall role of the ECX in addressing the major marketing constrains mainly related to market risks and transaction cost focusing on sesame traders. It builds on the new institutional economics literature that focuses on how institutions develop. This paper presents (i) the overview of sesame traders along with their trading practices and participation in the ECX, (ii) the estimated transaction costs before and after the ECX, (ii) the marketing cost comparisons, (iii) the determinants of trader's willingness to trade through the ECX along with the issues of sustainability of the current trade through the ECX.

The paper also addresses sustainability issues by discussing the role of the ECX in supplying sesame for niche markets such those for organic sesame or fair trade.

4. Data and methodology

Sampling and sample size

For this study, market centers in the major sesame production areas i.e. Humera, Gonder/Metema, and Nekemte together with the terminal market Addis Ababa were selected. Except for Nekemte, the list of sesame traders was taken from the ECX branch office and for Nekemte, the list of traders was prepared by the enumerators by consulting Nekemte office of Trade and Industry. The sample sizes for each market center were determined by the willingness of the traders. Accordingly, the number of respondent traders

was as summarized in for each market center with a total sample size of 194 traders.

Table 1 around here

The data was collected using a pre-tested questionnaire using enumerators, who have knowledge about sesame trade in respective market centers and also exposure to the ECX operations. The data were collected from February 2 to March 7, 2010 simultaneously in the four marker centers.

Estimation of determinants of willingness to trade through the ECX

In order to identify the factors affecting the willingness of traders to trade through the ECX, traders were categorized into willing (1), consisting of traders who are interested to trade through the ECX; and non-willing (0), consisting of traders who have no interest to trade sesame through the ECX. A probit model was then used for the analysis of determinants for traders to have interest (willing) to trade through the ECX. The probit model is one of the most widely used models where a discrete dependent variable is involved; the other equally widely used being the logit model (Aldrich and Nelson 1984; Amemiya 1981; Greene 2008). Both models give comparable results particularly when sample sizes are large. In this study, the probit model was chosen because it fitted to the data best. The probit model is specified as:

$$Z = \beta' X + \varepsilon,\ \varepsilon \sim \mathrm{N}(0,1)$$

$$Y = 1 \text{ if } Z > 0 \text{ and } Y = 0 \text{ if } Z \leq 0$$

Where:

β' represents vector of parameters to be estimated
Z is observed probability to have interest to trade through the ECX (willing)
Y is estimated probability to have interest to trade through the ECX
X represents vector of independent variables listed
ε is error term

For validation of the model, tests for multi-collinearity were performed using variance inflation factor (VIF) and Breusch-Pagan/Cook-Weisberg test for heteroskedasticity and adjustments were made accordingly.

Marginal effects, which measures the change in the probability to have interest to trade through the ECX due to a unit change in an explanatory

variable, can be estimated either at the sample means of the data or at every observation and using the sample average of the individual marginal effects. In this study, the marginal effects were estimated using the sample means of the respective explanatory variables as:

$$\partial Y / \partial X_i = \Pr\left(Y = 1 | \bar{X}, \Delta X_i\right)$$

Where:

$\partial Y / \partial X_i$ is the marginal effect of explanatory variable X_i on the probability to have interest to trade through the ECX

$\bar{X}$ represents the sample means of other explanatory variables

ΔX_i is the unit change of X_i

The hypothesized determinants of traders' willingness to trade through the ECX and their descriptions are summarized in Table 2. In general, the determinants are categorized into household socio-demographic factors, asset ownership, livelihood diversification/ specialization in agricultural activities, agricultural commercialization, access to and utilization of support services. Software packages of SPSS, STATA and MS/EXCEL were used to carry out the computations.

Table 2 around here

5. Results

Overview of sesame traders

The distribution of respondents by trader type shows significant differences among the market centers (Table 3). More exporters are found in Addis Ababa and Humera and wholesalers in Nekemte and Gende Wuha/Gonder. Similarly, there are larger number of retailers in Nekemte and Gende Wuha/Gonder which reflects the existence of local market for local consumers in these areas.

Table 3 around here

The distribution of the trader types by period of business establishment is statistically different. Most of the businesses were established in the first 10 years after marker liberalization (since 1991) followed by the 2000s (Table 4).

Table 4 around here

The average years of formal education of respondent traders varies by market center where in Addis Ababa, where there are more sesame exporters, the formal education level is higher (about 12 years) followed by Humera (about 10 years). Traders in Gende Wuha/Gonder seems to have the least level of formal education with about four years of average years of formal education (Table 5).

Table 5 around here

The average number of local and foreign languages spoken by respondent traders varies in the different market centers (Table 6). The highest number of local languages on average is spoken by traders in Humera followed by traders in Nekemte and Addis Ababa with total average of 1.36 languages. Similarly, more traders in Humera speak foreign languages as compared to traders in the other market centers.

Table 6 around here

The resource ownership in terms of warehouse and cleaning facility ownership varies by market center, where more traders in Addis Ababa and Humera own warehouse and cleaning facility (Table 7). The capacity of these resources also varies among market centers, where higher capacity warehouses and cleaning facilities are found in Addis Ababa followed by Humera.

Table 7 around here

As expected, exporters have higher initial and working capital followed by traders with mixed activities and wholesalers. On average, a sesame trader had about 8 million ETB (or around € 467.000) initial capital and about 19 million ETB (or around € 1,110,000) working capital with about 65% from own funds (Table 8). Use of own funds is the least for the exporters compared to other types of traders.

Table 8 around here

Trading practices

The major purchase market centers vary across the different types of traders. The majority of exporters, assemblers and traders with mixed trading activities use Humera as their major purchase market. A considerable proportion of wholesalers and retailers purchase sesame from other rural markets (Table 9).

Table 9 around here

Even though the average number of sesame purchase markets varies across trader type, most of the traders operate in more than one market center with the highest number for exporters (Table 10).

Table 10 around here

The average number of contacts in the first purchase market center per trader is about six people and it is not statistically different across the trader types. However, the average number of contacts in the first sale market is different across the trader type with the highest for assemblers with about 6 people followed by exporters with about 4 people (Table 11).

Table 11 around here

The sesame trade is seasonal and seems to be a four month activity for most of the traders, starting in November and ending in February following production season (Table 12). Of course, the exporters operate in a bit longer period mainly due to need for cleaning/grading along with the aggregation.

Table 12 around here

the ECX and sesame trade

The ECX was officially opened in May 2008, but sesame trade through the ECX did not start until early 2009. The delayed start was mainly due to the need of setting the standards that are linked with origin and other common quality indicators, and the need to establish the required infrastructure in the main production areas that are far from the central market in Addis Ababa. Even after the start of sesame trade, traders' interest to trade through the ECX was very minimal. Cognizant of the limited interest of traders to trade though the ECX not only for sesame but also for other major export commodities, the government has passed a law that makes trade through the ECX compulsory in early 2010. It expected that the 2010/11 production

season sesame, which will start entering the market in October, 2010 will be traded mainly through the ECX.

Currently, there are about 51 full ECX members, who are registered for sesame trade along with other ECX traded commodities and all of them are exporters. The Akrabi's--traders that collect sesame from the production areas and supply to the central markets (to exporters)—have limited membership status. Five Akrabi's have limited trading membership and 21 Akrabi's have limited intermediary membership. There are also 44 exporters with limited membership status (Table 13). Most ECX members operate in Addis Ababa, Amhara (Gonder and Metema area) and in Tigray (Humera area).

Table 13 around here

The survey results indicate that the traders' interest to trade through the ECX varies by trader type (Table 14). About 27% of the sesame exporters and about 25% of wholesalers are interested to trade through the ECX mainly due to the estimated reduction in transaction cost. All retailers and traders with mixed trading activities are not interested to trade through the ECX. Overall, 20% of the traders are interested to trade through the ECX due to its benefit in reducing transaction costs.

Table 14 around here

the ECX and transaction costs in sesame trade

The literature on transaction costs present two broad categories of transactions costs, proportional and fixed transactions costs (Key, Sadoulet, and Janvry 2000). Proportional transactions costs change according to the volume sold or bought (e.g., per unit transportation costs and price premiums deriving from bargaining capacity). Fixed transactions costs are independent of the quantities sold or bought. They include information, bargaining, and monitoring costs. Information costs occur before the exchange takes place and include aspects such as searching for attributes that could facilitate the transactions, seeking better prices, and looking for potential buyers. Bargaining or negotiation costs are incurred during the exchange and include the time to negotiate a contract, reach an agreement, and make arrangements for payment. The extent to which a person is able to minimize these costs is usually assumed to be a function of individual characteristics (education, skills, gender), product attributes like quality, and the relationship between agents participating in the transactions. Finally,

monitoring costs are incurred to ensure that the conditions of an exchange are met (for example enforcing the payment schedule agreed upon or the specified quality of the product) (Stifel, Minten, and Dorosh 2003; Key, Sadoulet, and Janvry 2000).

We present the trends in transaction costs based on estimates of respondents for "before" and "after" the ECX became operational. The indicators for transaction costs used for comparison are (i) the average number of intermediaries each trader used (buying agents, brokers, and selling agents) along with the role of ethnicity and religion, (ii) average number of people consulted and involved to make a transaction per market day (number of people consulted in the main market and in other markets, number of employees involved to collect market information, (iii) methods/means of verification employed for sesame quality assurance, and (iv) time required per transaction (number of trips made to market centers, costs incurred in paying trips, time required to purchase and sale).

The average number of intermediaries traders used to undertake transaction has declined for all types of traders. All traders who have traded through the ECX have stopped using brokers and selling agents which has reduced the number of buying agents with whom they have been working (Table 15).

Table 15 around here

The details of the use of buying agents for the different trader types shows that along with the reduction in the number of buying agents used to undertake transaction, the proportion of buying agents from similar ethnic groups and religions has declined for traders who are using the ECX. However, the proportion of buying agents with social linkage has remained more or less similar (Table 16).

Table 16 around here

The transaction costs in terms of the average number of people consulted to undertake a transaction along with the average number of employees involved in information collection has considerably declined following the ECX as compared to before the ECX (Table 17).

Table 17 around here

Traders use different mechanisms to verify the quality of purchased sesame, such as sample verification, direct observation, buying from people whom

they trust, weighing each bag. After the ECX became operational, traders also use the ECX certificate of quality. Higher proportion of traders who has experience with the ECX started to depend on the ECX quality certificate even though some still use the other methods (Table 18). For instance, of the 86% of traders who reported that they used to weigh each bag of sesame bought before the ECX, about 14% of traders still verify the accuracy by weighing each bag.

Table 18 around here

On average, the proportion of traders paying trips to market centers and the number of trips made has considerably declined after the ECX has become operational. Similarly, the time required to sell sesame has declined from about 42 days to about 16 days, on average. However, the time required to purchase seems to remain the same (Table 19).

Table 19 around here

the ECX and Marketing costs

Table 21 presents the marketing cost breakdown based on the estimates of respondents before and after the ECX for the last transaction made converted into a quintal of sesame (100 kg). The costs that are incurred lump-sum per transaction were divided with the volume purchase. The estimate shows that the marketing costs have declined by about 57%.

Determinants of willingness to trade through the ECX

The probit estimate of the determinants of traders' willingness to trade through the ECX is presented in Table 20. Along with the overall significance of the model, from the hypothesized 11 explanatory variables, five variables were found to significantly affect the trader's willingness of trade through the ECX. In terms of demographic, traders with higher formal education and higher number of languages spoken tend to be more willing to trade through the ECX. A unit-change in formal education and language spoken increase the probability of willingness of a trader on average by about 2% and 12%, respectively. In terms of resource ownership, traders with higher working capital tend to be more willing.

Table 20 around here

Among the transaction cost related explanatory variables, the number of buying agents the trader works with and perceived change in time required for a transaction with the ECX were found to positively influence traders willingness to trade through the ECX. On average, a unit increase in the number of buying agents the trader deals with, increases the probability of the traders to be willing to trade through the ECX by about 5%. Similarly, the perception of a trader about the reduction in the time required to undertake transaction due the ECX increased the probability of willingness by about 47%.

Sustainability issues

It could be of interest to Ethiopian farmers to consider producing for high value markets. Research has shown that farmers' margins are much higher if sesame is produced for a high end market (Wijnands, et al., 2009). The top end market segment often pays a premium. On the other hand, their demand for a high value product can entail higher production costs. Experience from other countries has shown that the private sector is committed to co-invest in high value export chains to bring about a higher productivity and improved quality. Below we will look into the most important requirements of high value markets.

Food safety and hygiene

The assurance of high food safety standards is a requirement that has grown in importance over the past years in Western markets. After food scares such as the mad cow disease and pesticides that are occasionally found in food products, food safety and hygiene has become a key issue for customers.

To guarantee the customers that food marketed in the EU is safe, the EU has formulated the 'General Food Law'. This law, which came into effect in 2005, has put in place stringent guidelines requiring that all food manufactured and sold in the EU, should be safe and fully traceable "from farm to fork" and back again. In case a product has been identified as unsafe, food business operators or authorities need to quickly withdraw or recall products. Therefore, traceability is the cornerstone of the EU's food safety policy (EC 2007; EU 2008). Food legislation in America and Japan is also moving in the direction of transparency of origin and traceability of the final product.

Fair trade certification

There are several organizations that are promoting fair trade. Therefore, it is not possible to present one checklist of requirements for fair trade.

Organic certification
There are two major sets of regulations for organic production and certification: one for the USA and one for the EU. The first set of EU regulation on organic farming was developed in 1991. In 1999 additional rules for production, labelling and inspection of the main animal species were also developed. According to these regulations, only products that have been produced and processed following the EU regulation on organics can be marketed in the EU as organic (EU 2010). In the United States, Congress passed the Organic Foods Production Act in 1990, requiring the United States Department of Agriculture to develop standards for the production and management of organic products, which were developed under the National Organic Program.

Socially and environmentally responsible production
Producers, traders, exporters, importers and retailers that apply for fair trade or organic certification thus have to follow clear standards and regulations. There are no such generally accepted standards for 'sustainably produced products'. Often retailers, or groups of retailers, decide which minimum social and environmental requirements must be met for the products they sell. They set the rules to which their suppliers and producers must comply.

Despite the fact that the requirements may slightly differ between retailers, what is clear for all cases is that the importers need to know who the producers are and how the product has been produced. If they do not have this information, they cannot guarantee the consumer that the product has been produced in an environmentally and socially responsible way.

Although the Ethiopian Commodity Exchange has opened the ECX Direct Specialty Trade (DST) facility for coffee, it will find it difficult to meet the demands of all oilseed end markets, especially the high value markets such as the second most important market, the Japanese. The ECX will also face difficulties in responding to the requirements of the growing niche markets, and the demand for sustainably and safely produced mainstream products by major Western retailers. The ECX faces four major challenges with respect to catering to high value end markets.

Firstly, there is currently no traceability system in place. This is necessary for the demands of the organic and fair trade market, and of the EU, USA or Japanese food markets. At present a product can be traced back to an ECX warehouse, not to the farmer, although the DST for coffee can trace a product back to a producer (ECX, 2010). It is technically feasible to introduce a full traceability system for oilseeds. However, because many smallholder farmers produce small quantities for sale through the ECX, this

will be a major and costly operation. Also, to gain the confidence of the importers, an additional measure will be necessary. A procedure that guarantees that the product has indeed been grown by the producer whose name is on the bag and that no commingling took place at farmer's level, will be necessary. With sesame produced in areas near borders with neighbouring countries this is a major issue. Farmers in other countries are using pesticides that are forbidden in Ethiopia. If prices are high in Ethiopia, sesame from farmers in neighbouring countries is sold to Ethiopian farmers. This crop produced by foreign farmers can easily be sold through the ECX together with the produce of Ethiopian farmers.

Secondly, for organic certification all actors, inputs and activities (input supply, production, treatment, transport, storage, sales) in the supply chain need to adhere to organic procedures. This implies – next to full traceability - separate transport to and from the ECX warehouse, separate storage space in ECX warehouses, 'organic' treatment against post harvest losses during storage, separate administration so that the organic products can be followed from the very first inputs to the sales of the final product. To ensure that no prohibited inputs have been used, and no commingling with conventional sesame has taken place at any point in time, all steps and actors in the supply chain have to be inspected and certified. Technically speaking this is feasible. But the fulfilment of all the requirements for organic certification will require important investments by the ECX. Especially if organic production is spread throughout the country.

Thirdly, currently there is no provision in the ECX to ensure that an oilseed product has been produced in a socially responsible and environmentally friendly way. Since the ECX currently does not have a traceability system for oilseeds, it is not possible to identify the origin of the product back to the grower. Hence, it is not possible for the buyer to know for example how the product has been grown and treated, or what the labour conditions have been during the whole process. This is crucial for organic and fair trade markets but also for an increasing number of 'mainstream' markets in the USA, EU, and Japan.

Finally, currently there is no provision in the ECX to ensure that the oilseed product is a fair trade product. Next to traceability, socially responsible production methods and the payment of minimum prices, fair trade markets also ask for longer-term relationships between buyers and sellers, ask for contracts to be agreed upon by both parties before the start of the growing season, and ask buyers to provide pre-financing at the start of the growing season, etc.

6. Final remarks

The comparison between before and after the ECX indicated that transaction costs have declined in terms of (i) the average number of intermediaries each trader used (buying agents, brokers, and selling agents) along with the role of ethnicity and religion, (ii) average number of people consulted and involved to make a transaction per market day (number of people consulted in the main market and in other markets, number of employees involved to collect market information, (iii) methods/means of verification employed for sesame quality assurance, and (iv) time required per transaction (number of trips made to market centers, costs incurred in paying trips, time required to purchase and sale). Similarly, the marketing costs have show reduction after the ECX, which is estimated to decline by about 57% as compared to the situation before the start of the ECX.

The probit estimate of the determinants of traders' willingness to trade through the ECX shows that traders with higher formal education and higher number of languages spoken tend to be more willing to trade through the ECX. A unit-change in formal education and language spoken increase the probability of willingness of a trader on average by about 2% and 12%, respectively. In terms of resource ownership, traders with higher working capital tend to be more willing. Among transaction cost related factors, number of buying agents the trader works with and perceived change on the time required for a transaction with the ECX were found to positively influence traders willingness to trade with the ECX. On average, a unit increase in the number of buying agents the trader deal with, increases the probability of the traders to be willing to trade through the ECX by about 5%. Similarly, the perception of a trader about the reduction in the time required to undertake transaction due the ECX increased the probability of willingness by about 47%.

Ethiopia's sesame sector has the potential to serve higher-end markets, because the quality of sesame produced is generally high in Ethiopia. Ethiopia also has several specialty sesame types. Both the ECX and contract farming are ways to solve various problems that exist in the sesame sector. To serve high end markets large investments need to be made in a system for tracking and tracing. Because such measures are costly, it is recommended that an analysis of the costs and benefits of the investments is made.

However, the question is whether this can be done through the ECX? Other arrangements such as contract farming may serve the goals better than the ECX and a mix of both is probably the best strategy. Contract farming is most suitable when there are very stringent and specific requirements from buyers while the ECX most suitable when there are less stringent

requirements and with bigger volumes traded. Building strong chain relationships (for example through contract farming) is part of the strategy of high value markets. Experiences in other countries have shown that strong relations between value chain actors are an incentive for the private sector to invest in smallholder agriculture. This can be best achieved under contract farming arrangements. However, currently policy in Ethiopia states that only producers can export directly, which limits the use of contract farming models.

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Graphs and Diagrams

Table 1: the number of respondent traders by market centre

Market centre	Respondent traders by market centre	
	Number	% of respondents
Humera	31	16
Gende Wuha / Gonder	58	30
Addis Ababa	78	40
Nekemte	27	14
Total	194	100

Source: Own survey, 2010
Note: Gende Wuha town is the central trade center in Metema area

Table 2: Description of hypothesized determinants of traders' willingness to trade through the ECX

Variable	Definition of the variable	Expected sign	Rationale
Willingness to trade	Traders' willingness to trade through the ECX (1= willing 0=non willing	Dependent variable	
Demographics	Age of household head in years	+	Age is a proxy for experience, which can positively influence willingness
	Formal education in years	+	Education is a source of skill to undertake economic activity
	Number of language spoken (both local and foreign)	-	As the number of language spoken increases, traders ability for getting international experience increases
Resource ownership	Warehouse ownership (1=Yes, 0=No)	+	The higher resources, the better ability to try new things
	Cleaning facility ownership (1=Yes, 0=No)	+	
	Truck ownership (1=Yes, 0=No)	+	
	Working capital (in Million ETB)	+	
Transaction cost related variables	Number of purchase markets	+	If the number of purchase markets is high, traders will be interested to trade through the ECX to reduce the transaction costs due involvement in many markets
	Number of buying agents the trader works with	+	If the number of buying agents is high, traders will be interested to trade through the ECX to reduce the transaction costs due involvement in many markets
	Time required to undertake a transaction (days)	+	If the number of days required to undertake a transaction is high, traders will be interested to trade through the ECX to reduce the transaction costs due involvement in many markets
	Perceived change on the time required for a transaction with the ECX (1=decreased 0=increased or remained the same)	+	If traders perceive that the time required is decreasing by trading through the ECX, then they will be interested
Regional difference	Dummy for regions (Tigray is a base)	±	There will be regional difference in willingness due to the unaccounted variables listed above

Table 3: distribution of respondents by trader type (% of respondents)

Market centre	Exporter	Wholesaler	Retailer	Assembler	Mixed activities	Chi square
Humera	26	6	3	52	13	208.44**
Gende Wuha / Gonder	9	74	12		5	
Addis Ababa	79	6	1	1	12	
Nekemte		78	19	4		
Total	39	37	7	9	8	

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 4: Distribution of traders by period of business establishment (% of respondents)

Period of Establishment	Exporter	Wholesaler	Retailer	Assembler	Mixed activities	Total	Chi square
Before market liberalization (1991)	14	10	-	17	19	12	34.47***
In the first 10 years of market liberalization (1991 - 2000)	60	34	14	61	69	48	
In the 2nd 10 years of market liberalization (2000 - 2010)	26	56	86	22	13	40	

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 5: Average years of formal education of respondents by marker centre

Market centre	Mean	Std
Humera	10	4
Gende Wuha / Gonder	4	5
Addis Ababa	12	3
Nekemte	8	4
Total	8	5
F-value	23.21***	

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 6: Average number of local and foreign languages spoken by market centre

Market centres		Number of local languages spoken	Number of foreign languages spoken	Number of languages spoken
Humera	Mean	1.87	1.23	3.10
	Std	.34	.50	.60
Gende Wuha / Gonder	Mean	1.05	.09	1.14
	Std	.22	.28	.40
Addis Ababa	Mean	1.27	.47	1.74
	Std	.50	.66	1.04
Nekemte	Mean	1.67	.22	1.89
	Std	.55	.42	.85
Total	Mean	1.36	.44	1.80
	Std	.51	.64	1.02
F-value		31.57***	35.11***	40.79***

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 7: Resource ownership (% of respondents)

Market Centre	Resource ownership (% of respondents)		Average capacity of resources		
	Warehouse	Cleaning facility	indicator	Capacity of ware house in quintal	Capacity of cleaning facility (qts/day)
Humera	84	35	Mean	27,617	970
			Std	39,899	659
			N	26	11
Gende Wuha / Gonder	52	9	Mean	14,258	1,238
			Std	26,854	1,201
			N	30	4
Addis Ababa	96	65	Mean	154,054	58,583
			Std	359,287	111,595
			N	74	50
Nekemte	78		Mean	2,240	
			Std	2,518	
			N	21	
Total	84	35	Mean	83,396	45,304
			Std	260,976	100,656
			N	151	65
Chi square	38.38***	64.32***	F-value	1.95*	0.79

Source: Own survey, 2010

Note: * indicates significance at 1% probability level

Table 8: Average Initial and current working capital by trader type (in millions)

Trade type		initial start-up capital	Current working capital	Proportion of working capital from own funds
Exporter	Mean	7.4	37.4	52.6
	Std	12.1	36.6	27.3
	N	63	70	63
Wholesaler	Mean	0.25	4.67	75.35
	Std	1.24	24.92	36.58
	N	69	68	62
Retailer	Mean	0.17	1.27	69.58
	Std	0.53	2.70	39.34
	N	14	14	12
Assembler	Mean	0.24	2.46	61.47
	Std	0.48	1.47	28.981
	N	17	16	17
Mixed activities	Mean	1.98	29.15	73.46
	Std	2.00	31.93	31.32
	N	16	16	13
Total	Mean	2.91	18.79	64.78
	Std	7.96	32.86	33.64
	N	179	184	167
F-value		9.41***	14.36***	4.23***

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 9: Major purchase market centre by trader type (% of respondents)

Market centres	Exporter	Wholesaler	Retailer	Assembler	Mixed activities	Total	Chi square
Humera	57	6	14	93	67	39	135.32***
Gonder	11	30	-	-	20	17	
Tikur Wuha in Metema	4	29	50	-	7	16	
Addis Ababa	20	4	-	-	7	10	
Nazareth	3	-	-	-	-	1	
Nekemte	5	-	-	-	-	2	
Other markets	-	30	36	7	-	14	

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 10: Average number of purchase and sale market centers by trader type

Trader type		Number of markets where purchase is performed	Number of markets where sale is performed
Exporter	Mean	1.95	1.28
	Std.	.79	.45
Wholesaler	Mean	1.34	1.10
	Std.	.63	.30
Retailer	Mean	1.21	1.00
	Std.	.43	.00
Assembler	Mean	1.22	1.11
	Std.	.65	.32
Mixed activities	Mean	1.31	1.06
	Std.	.48	.25
Total	Mean	1.55	1.16
	Std.	.74	.37
F-value		10.59***	3.72***

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 11: Average number of contacts in the first purchase and sale market center by trader type

Trader type		Number of trading contracts in first purchase market	Number of trading contracts in first selling market
Exporter	Mean	7.00	4.13
	Std.	10.48	3.58
Wholesaler	Mean	4.38	2.63
	Std.	10.68	1.88
Retailer	Mean	4.44	3.88
	Std.	5.88	1.46
Assembler	Mean	10.50	5.87
	Std.	7.05	4.60
Mixed activities	Mean	9.00	3.00
	Std.	9.17	1.15
Total	Mean	5.90	3.53
	Std.	9.91	2.94
F-value		1.19	4.28***

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 12: Seasonality of sesame purchase by trader type (% of respondents)

Month	Exporter	Wholesaler	Retailer	Assembler	Mixed activities	Total
January	28	79	64	17	19	47
February	19	30	-	17	25	22
March	5	3	-	22	13	6
April	1	-	7	17	13	4
May	-	1	-	-	-	1
June	1	-	-	-	-	1
July	4	-	-	-	-	2
August	5	-	-	-	-	3
September	12	-	-	-	-	5
October	8	-	7	-	6	4
November	16	65	36	22	25	37
December	27	82	86	50	31	54

Source: Own survey, 2010

Table 13: Status of the ECX registered Sesame Members by membership and region as of January 27, 2010

the ECX Membership status	Trader type	Total number	Regional distribution					
			Addis Ababa	Amhara	Tigray	Oromia	SNNP	Dire Dawa
Full members	Exporter	51	43	0	1	6	1	0
Limited Members	Akrabi Limited Trading Member (LTM)	5	1	1	3	0	0	0
	Akrabi Limited Intermediary Member (LIM)	21	1	13	6	1	0	0
	Exporters	44	40	1	1	0	0	2
Total Sesame Members (Full & Limited)		121	85	15	11	7	1	2

Source: the ECX, Feb, 2010

Table 14: Trader's interest to trade through the ECX (% of respondents)

Trader type	Interested due to the estimated benefit	Interested based on the information from others	Not interested
Exporter	27	21	52
Wholesaler	25	7	68
Retailer	-	-	100
Assembler	-	50	50

Mixed activities	-	-	100
Total	20	15	65
Chi square	44.28***		

Source: Own survey, 2010
Note: *** indicates significance at 1% probability level

Table 15: Use of intermediaries before and after the ECX in same trade by trader type

Trade type	Indicator	Buying Agent		Brokers		Selling Agent	
		Before the ECX	After the ECX	Before the ECX	After the ECX	Before the ECX	After the ECX
Exporter	Mean	1.60	1.20	1.60	0	1.33	0
	Std	0.89	0.45	1.34	-	0.58	-
	N	5	5	5	5	3	5
Wholesaler	Mean	1.25	1.25	1.00	0	0.50	0
	Std	0.50	0.50	0.82	-	0.71	-
	N	4	4	4	4	2	4
Assembler	Mean	2.00	1.67	1.33	0	1.00	0
	Std	1.00	0.58	1.53	-	-	-
	N	3	3	3	3	2	3
Total	Mean	1.58	1.33	1.33	0	1.00	0
	Std	0.79	0.49	1.15	-	0.58	-
	N	12	12	12	12	7	12
F-value		0.51	0.44	0.78		0.34	

Source: Own survey, 2010

Table 16: Use of buying agents before and after the ECX in same trade by trader type

Trade type	Indicator	Number of buying agents		Proportion of buying agents from the same Ethnic group		Proportion of buying agents from the same religion		Proportion of buying agents with Social linkage	
		Before ECX	After ECX	Before ECX	After ECX	Before ECX	After ECX	Before ECX	After ECX
Exporter	Mean	1.60	1.20	0.90	0.60	0.90	0.60	1.00	1.00
	Std	0.89	0.45	0.22	0.55	0.22	0.55	-	-
	N	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
Wholesaler	Mean	1.25	1.25	0.75	0.67	0.83	0.75	1.00	1.00
	Std	0.50	0.50	0.50	0.58	0.29	0.35	-	.
	N	4.00	4.00	4.00	3.00	3.00	2.00	3.00	1.00
Assembler	Mean	2.00	1.67	0.83	0.83	1.00	1.00	1.00	0.50
	Std	1.00	0.58	0.29	0.29	-	-	.	.

	N	3.00	3.00	3.00	3.00	3.00	3.00	1.00	1.00
Total	Mean	1.58	1.33	0.83	0.68	0.91	0.75	1.00	0.90
	Std	0.79	0.49	0.33	0.46	0.20	0.42	-	0.22
	N	12	12	12	11	11	10	7	5
F-value		0.51	0.44	0.82	0.82	0.65	0.49		

Source: Own survey, 2010

Table 17: Transaction cost in terms of number of employees involved and number of people consulted for market information

Market Centre		number of people consulted at main market per market day		number of people consulted at other markets per market day		Number of employees participating in information collection	
		Before ECX	After ECX	Before ECX	After ECX	Before ECX	After ECX
Humera	Mean	3.33	2.00	4.50	-	2.50	2.00
	Std.	1.53	.	3.54	-	2.12	.
	N	3	1	2	-	2	1
Gende Wuha / Gonder	Mean	3.30	3.00	2.42	-	1.53	-
	Std.	2.67	-	2.63	-	1.99	-
	N	57	1	57	1	58	1
Addis Ababa	Mean	2.81	3.25	1.93	2.25	3.42	1.17
	Std.	2.11	1.26	1.82	0.50	6.36	0.41
	N	37	4	27	4	48	6
Nekemte	Mean	8.39	4.00	3.85	4.00	2.56	-
	Std.	20.03	.	3.66	.	1.19	-
	N	23	1	20	1	25	-
Total	Mean	4.13	3.14	2.60	2.17	2.42	1.13
	Std.	9.13	1.07	2.75	1.33	4.14	0.64
	N	120	7	106	6	133	8
F-value		2.16*	0.44	2.41*	16.17**	1.86	6.13**

Source: Own survey, 2010

Table 18: Means of verification about sesame quality (% of respondents)

Quality indicators	Means of verification	Before the ECX	After the ECX
Place of origin	Sample verification	23	-
	Direct observation	62	15
	Personal trust	15	-
	Use of the ECX issued certificates	-	85
Adulteration	Sample verification	22	8
	Direct observation	77	15
	Personal trust	1	77

Seed Color	Sample verification	21	14
	Direct observation	79	7
	Use of the ECX issued certificates	-	79
Seed Size	Sample verification	19	-
	Direct observation	81	21
	Use of the ECX issued certificates		79
Quantity	Direct observation	7	7
	Personal trust	7	-
	Weighting each bag	86	14
	Use of the ECX issued certificates	-	79

Source: Own survey, 2010

Table 19: Some indicators of transaction costs in sesame trade before and after the ECX

Indicators		Before the ECX	After the ECX
Proportion of traders paying trip to market centres	% of traders	19	6
number of trips made to market centres	Mean	5.64	2.42
	Std	5.46	2.57
	N	36	12
Total costs incurred in paying trips (in ETB)	Mean	8,214.36	5,908.63
	Std	16,067.90	6,115.36
	N	39	8
Purchase time (in days)	Mean	14.02	14.43
	Std	19.90	22.41
	N	134	13
Sale time (in days)	Mean	42.36	16.46
	Std	59.19	23.31
	N	141	12

Source: Own survey, 2010

Table 21 Estimated marketing costs before and after the ECX (per quintal of sesame)

Marketing cost components	Before the ECX			After the ECX			Effect on marketing cost
	Mean	Std	N	Mean	Std	N	
Cost of empty sacks	6.29	5.23	174	19.00	20.16	15	-
Bagging & sewing	2.51	1.40	176	3.46	1.48	13	-

Loading at purchase market	3.76	6.94	183	1.42	0.57	13	+
Payment to intermediary agent at purchase	19.08	102.00	106	105.73	296.37	11	-
Tips during purchase	0.14	0.15	87	0.06	0.04	4	+
Market levies	7.76	22.33	103	17.50	24.75	2	-
Transport cost from purchase to Intermediary market	45.64	25.78	140	49.78	28.80	9	-
Transport cost from intermediary to final market	50.60	29.59	89	10.00	14.14	2	+
Total payments at road stops (kellas)	0.00	0.01	46	-	.	1	+
Total bribes	0.00	0.01	34	-	.	1	+
Payment to transport broker	0.11	0.14	81	-	.	1	+
Off-loading at intermediate market	3.65	3.29	79	0.67	0.58	3	+
Loading at intermediate market	3.75	4.04	70	-	.	1	+
Off-loading at final scale at final sale market	8.38	59.29	159	1.30	0.75	10	+
storage costs per quintal per month	7.93	41.56	92	3.46	1.33	13	+
Telephone/radio costs	0.39	0.60	157	0.09	0.13	2	+
Payment to intermediary agent at sale	334.09	1,529.54	77	4.80	8.67	5	+
Tips during sale	0.09	0.19	49	-	-	2	+
Personal travel costs	0.32	0.66	96	0.54	0.43	6	-
municipality market levies	12.00	98.47	103	-	.	1	+
Total	506.51			217.82			57%

Source: Own survey, 2010

Table 21: Determinants of willingness to trade through the ECX (*Probit* Estimates)

Variable	Definition of the variable	Coefficient	Robust Std Error	Marginal effects
Demographics	Age of household head in years	- 0.0145	0.0161	- 0.0043
	Formal education in years	0.0791**	0.0398	0.0234
	Number of language spoken (both local and foreign)	0.3903***	0.1571	0.1157
Resource ownership	Warehouse ownership (1=Yes, 0=No)	- 0.5070	0.3964	- 0.1645
	Cleaning facility ownership (1=Yes, 0=No)	0.2749	0.3339	0.0848
	Truck ownership (1=Yes, 0=No)	- 0.3851	0.3297	- 0.1123
	Working capital (in Million ETB)	0.0091**	0.0039	0.0027
Transaction cost	Number of purchase markets	0.2454	0.2124	0.0728

Variable	Definition of the variable	Coefficient	Robust Std Error	Marginal effects
related variables	Number of buying agents the trader works with	0.1803***	0.0718	0.0535
	Time required to undertake a transaction (days)	0.0065	0.0077	0.0019
	Perceived change on the time required for a transaction with the ECX (1=decreased 0=increased or remained the same)	1.2862**	0.5401	0.4707
Regional difference	Amhara	- 0.4916	0.6027	- 0.1348
	Oromiya	1.7785***	0.5154	0.6213
	Addis Ababa	0.4340	0.4252	0.1334
Constant term		-2.1186**	1.0074	

Number of observation =170
LR chi2(14) =82.36***
Pseudo R2 =0.39
Log likelihood =-65.38

Note: *** and ** indicate significance at 1% and 5% probability levels

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