



The Ethiopian Commodity Exchange and spatial price dispersion



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ABSTRACT

In this article, we study the impact of an institutional intervention on market efficiency in Ethiopia. More specifically, we analyze to what extent the Ethiopian Commodity Exchange (ECX) in combination with regional warehouses have contributed to a reduction in price spreads between regional markets. Our hypothesis is that warehouses connected to the ECX reduce the dispersion between export prices and local retail prices in different coffee growing areas, as well as the dispersion between export prices and local retail prices in different coffee growing areas. By doing so, the ECX has the potential to improve the market efficiency. To identify the causal effect, we combine retail price data with information on the gradual rollout of warehouses connected to the ECX from 2007 to 2012. Our results suggest that, when two markets both have access to an operating warehouse, the average price spread is 0.86–1.78 ETB lower than it is for markets where at least one part lacks warehouse access. This is a substantial reduction considering that the average price spread over the full period is 3.33 ETB. The main results are robust to various econometric specifications, and our analysis thus suggests that local warehouses connected to the ECX have indeed improved market efficiency.

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1. Introduction

This paper analyzes changes in the spread of coffee prices between regional markets following the recent introduction of a national commodity exchange, and a decentralized warehouse system in Ethiopia. The analysis contributes to answering broader questions of how exogenous institutional interventions can contribute to increased efficiency of output markets for smallholder farmers in developing countries.

In response to the failures of agricultural markets in developing countries (e.g., due to high transaction costs), there has been aggressive liberalization of agricultural systems since the late 1980s. However, in spite of liberalization reforms, the emergence of a common price and commercialization of subsistence farmers has been limited (Sadoulet and de Janvry, 1995; Shiferaw et al., 2011). In addition, price volatility is still high, and investments remain constrained (Reinganum, 1979; Stahl, 1989; Dercon, 1995; Negassa and Jayne, 1997). In other words, historical liberal-

ization efforts, with the explicit aim to eliminate market failures, do not seem to have reached the stated goals.

As a consequence of the failure of previous liberalization strategies, more recent interventions have taken slightly different approaches. One such approach is the introduction of commodity exchanges with a specific focus on correcting fundamental shortcomings, such as lack of physical and informational infrastructure, storage facilities, and access to credit. Pioneers include the Uganda Commodity Exchange (UCE), the Kenya Agricultural Commodities Exchange (KACE), the Zimbabwe Agricultural Commodities Exchange (ZIMACE) and the South Africa Futures Exchange (SAFEX), all established in the 1990s. The ECX, which was launched in 2008, is the most recent spot/cash exchange in Africa.

A well-functioning agricultural exchange platform, that disseminates relevant information to all decision makers and that provides storage facilities as well as a legal framework for negotiating contracts, has the potential to reduce such transaction costs. These types of platforms thereby hold potential to improve resource allocation and to make the price discovery process more efficient (Easwarana and Ramasundaram, 2008; Shalini and Duraipandian, 2014). One such institution, which has been suggested to have potential to enhance market efficiency is commodity exchanges (Mattos and Garcia, 2004).

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The analysis conducted in this paper provides a formal evaluation of the effect of the ECX, a recently introduced institution in Ethiopia, on market efficiency. We evaluate market efficiency by comparing price dispersion between pairs of regional markets where both markets have access to warehouses, with market pairs where at least one region lacks access to a warehouse. Our dataset consists of a sample of regional markets that all installed a warehouse during the study period, but where the timing of this installation varied. We thus use spatial price dispersion as a measure of market efficiency. Our focus on price spreads is based on the following arguments: (1) the price of commodities sold from a regional warehouse (at the ECX) is likely to function as a benchmark for the regional retail price of those commodities, and (2) the closer the warehouse is to a regional market, the lower are transaction costs between the two outlets. More specifically, shorter distances imply lower transport costs and that the price information transmitted from the ECX is more relevant to the regional market (lowering the cost of information search). Furthermore, shorter distances are most likely associated with fewer middlemen, less negotiation of contracts and lower transaction risks. Thus, the closer the warehouse, the closer are retail and export prices likely to be linked. At the same time, the trading platform at the exchange is likely to immediately exhaust arbitrage possibilities of products from different warehouses and thereby reduce the dispersion in export prices of coffee from different regions.

Our hypothesis is thus that warehouses linked to the ECX reduce the dispersion between export prices and local retail prices in different coffee growing areas as well as the dispersion of export prices between regions, implying a reduced price dispersion between regions. If warehouses linked to the ECX do indeed improve efficiency, the price in markets with access to such warehouses should co-vary more closely with export prices than markets without access to an ECX warehouse. As a consequence, the observed price spread between two markets with access to warehouses should be lower than the price spread between markets with no access to warehouses, or where only one side of the market pair is connected to the ECX.

The rest of the paper is outlined as follows. In Section 2, we give a brief description of the Ethiopian coffee market, the ECX, and warehouse system. This is followed in Section 3 by a description of the conceptual framework used in the paper. In Section 4, the data and empirical methodology are presented. Section 5 presents the results of the empirical analysis, and Section 6 concludes.

2. The role of commodity exchange and warehouses in market efficiency: a literature review

A well-functioning agricultural exchange platform has the potential to reduce market imperfections such as information asymmetries and inadequate enforcement of contracts. However, in the absence of institutions that reduce transaction costs and improve access to secure storage in local markets, the effect of a commodity exchange on local market efficiency is likely limited.

Previous research on markets in the developed world has generally shown that commodity markets play an effective role in price discovery, and thereby that such institutions improve market efficiency (e.g., Garbade and Silber, 1983; Yang et al., 2001). However, the literature on price discovery in agricultural commodity markets in developing countries provides mixed evidence concerning whether commodity exchange systems have contributed to improved efficiency (e.g., Mattos and Garcia, 2004; Shakeel and Purankar, 2014)

Research on price discovery in the context of commodity exchange markets in Africa, where markets are notoriously thin, is very scant (Gabre-Madhin and Goggin, 2005). Exceptions include

Abdurezack (2010), Francesconi and Heerink (2011) and Katengeza (2012). However, the results do not draw a completely clear picture of the effect of commodity exchanges. While Katengeza (2012) finds a significantly positive effect of the Malawi Agricultural Commodity Exchange (MACE) on spatial integration (i.e., that the exchange promotes a tendency of prices to move together in spatially separated markets), Francesconi and Heerink (2011) do not find significant effects of the Ethiopian Commodity Exchange (ECX) on commercialization levels of smallholder farmers in Ethiopia, and Abdurezack (2010) finds that traders can earn excess profits using the predictability in price series even after the introduction of the Ethiopian Commodity Exchange (ECX). Further analysis of the conditions under which commodity exchange institutions lead to market efficiency is therefore needed.

Our work is related to a number of previous studies of the link between information infrastructure and market efficiency. As in Abdurezack (2010), we base our analysis on coffee prices. We use coffee prices as our main unit of analysis because (unprocessed) coffee was one of the first commodities traded at the ECX, and because coffee is by far the most important export commodity in Ethiopia. However, our empirical analysis differs from that of Abdurezack (2010) in several important aspects. First and perhaps foremost, we have data on a longer time period since the introduction of the ECX, and we can therefore better estimate effects. Second, instead of analyzing closing prices on the ECX, we analyze how the spread in prices between different regions in Ethiopia has been affected by the presence of warehouses linked to the ECX.

Our analysis is also closely related to the work of Jensen (2007), Aker (2008, 2010) and Svensson and Yanagizawa (2009). Jensen (2007) utilizes a quasi-experimental setting (i.e., the gradual rollout of mobile phones in the Kerala region of India) and shows that the introduction of new technology increased local fishermen's profits, and reduced catch waste and price dispersion. Aker (2008, 2010) use a similar method to evaluate the effect of mobile phones on market efficiency for the grain market in Niger on a market and trader panel dataset. The results of Aker's empirical analysis are in accordance with Jensen (2007), but the panel structure of Aker's dataset also allows her to identify effects on price dispersion both across markets and within years. Perhaps the most important result is that the magnitude of the effects of improved information increases with transportation costs (either due to poor road quality or long distance from markets). Finally, Svensson and Yanagizawa (2009) analyze how the introduction of a Market Information Service (MIS) project in Uganda affected farm gate prices. Similarly to Aker (2008, 2010), and Jensen (2007), Svensson and Yanagizawa (2009) take advantage of the natural experiment characteristic of access to the MIS in Uganda, in this case in terms of exogenous differences in access to radio broadcasts. The results of the study suggest that improved access to information about prices is associated with a significant and substantial increase (15 percent) in farm gate prices.

Similarly to the above-described studies, we utilize what may be seen as a quasi-experimental setting, in terms of the gradual rollout of warehouses connected to the ECX in Ethiopia. Like Aker (2010) and Jensen (2007), we further use price spreads between markets as a measure of market efficiency. However, in contrast to Jensen (2007), Aker (2008, 2010), and Svensson and Yanagizawa (2009), our focus is not solely on information but rather on the compound effect of warehouses and the presence of a centralized commodity exchange. To the best of our knowledge, this type of analysis has not been done before.

One significant departure of our analysis from previous research in the field is the focus on how physical infrastructure, in terms of local warehouses connected to a commodity exchange, affects market efficiency in terms of price dispersion between regions. Our hypothesis is that regional warehouses brings the commodity

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