

Barriers to Private-Sector Arbitrage in Kenyan Maize Markets

Marshall Burke and Lauren Falcao

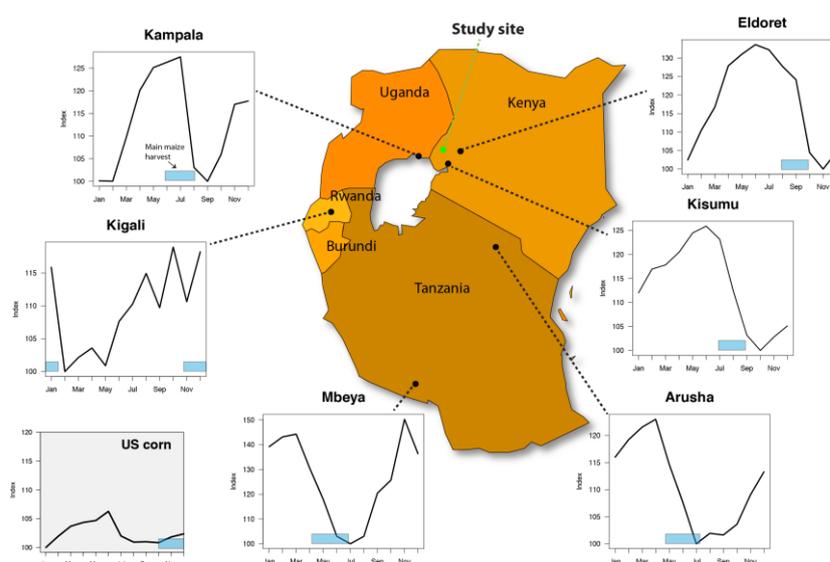
Limited access to capital, risk of unpredictable price fluctuations, and the availability of more profitable alternatives may limit traders' willingness to arbitrage away seasonal price fluctuations in African agricultural markets.

Introduction

Staple grain prices throughout sub-Saharan Africa show large, regular seasonal fluctuations, falling precipitously in the post-harvest period and rising throughout the rest of the year as market supplies dwindle. Data from grain markets in five East African countries indicate that grain prices in major cities typically rise 25 to 50% over the course of the season, with much larger increases (up to 300%) regularly observed in more isolated rural markets (see Figure 1).

These fluctuations are source of hardship for smallholder farmers who, as a result of their collective post-harvest sales, must accept a low price for their grain at harvest, and a source of hardship for consumers, who must purchase very expensive grain during the "hungry season" later in the year. These large and regular price fluctuations are also puzzling from an economic standpoint: why do private-sector agricultural traders not buy maize at the low point in the season, store it until prices rise, and then sell for a profit?

Figure 1: Evidence of Learning Curves



Unexploited Arbitrage Opportunities

The assumption that a competitive private sector would engage in such welfare-enhancing arbitrage underpinned the wave of liberalization seen across African agricultural markets as part of the 1990's structural reforms. Reformers argued that traders, spurred by the opportunity to make a profit, would move crops from surplus to deficit areas and from the harvest to the lean season, buying low and selling high. This would result in a more even distribution of food and smaller price gaps across space and time, benefiting farmers, who would receive a higher price during the harvest season, and consumers, who would be able to purchase food at lower prices during the lean season.

However, the full potential of these reforms is yet to be realized in African agricultural markets. While an emerging private sector has taken hold since liberalization, major opportunities for arbitrage remain unexploited. The lack of engagement in storage is among the most salient of these. Maize storage appears to offer a clear entrepreneurial opportunity: seasonal price movements are typically large, maize



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is abundant post-harvest, and storage appears relatively inexpensive. Indeed, traders interviewed in this study confirm that storage is profitable; on average, they report that they could make a 30% return buying maize at harvest, storing, and selling later in the season after prices have risen. However, few traders exploit this apparent arbitrage opportunity. Among traders surveyed in this study, only 8% stored for longer than 2 months; those who do store for this period typically only store for 3 months, substantially less than the eight-month period from trough to peak prices.

In this study, we identify the barriers that prevent maize traders in Kenya from engaging in storage. First, to collect a set of candidate explanations, we conducted qualitative interviews with local maize traders to better understand their knowledge of price fluctuations, interest in engaging in arbitrage, and views on storage facilities, credit availability, and other factors affecting storage behavior. We explored the broader macroeconomic and policy factors that shape traders' decisions by conducting interviews with officials from the National Cereals and Produce Board (NCPB), the Kenyan Agricultural Commodities Exchange, and the Ministry of Agriculture. Finally, to gain a quantitative understanding of the barriers traders face, we collected a detailed panel survey of maize traders, following their storage behavior and beliefs for one year.



Credit Constraints and Price Risk

This exploratory work yielded several candidate explanations for why storage rates are so low among traders. The most commonly cited explanation is that traders lack access to the credit they would need to buy maize upfront and store it for six months. However, this explanation is at odds with the fact that these traders do not seem particularly credit constrained. Although only 20% take out formal loans, 83% report that they would be eligible for formal loans if they wanted to receive one. And while interest rates are high in this context – annual rates of 20% are typical – seasonal price increases are typically large enough to make taking out such a loan profitable in all but the most anomalous years.

Of course, it may be exactly this risk of an anomalous year that makes traders hesitant to store. Indeed, 67% of traders say that they do not store because uncertainty surrounding just how much prices will rise makes storage a risky, albeit profitable, investment. For example, although traders report the typical price increase from October to June is 87%, last year saw just a 20% increase, suggesting that in that year, it may not have been profitable to store (given interest rates). In addition to annual fluctuations in harvest levels, traders note that this variation is also driven by changes in government trade policy and NCPB market intervention, which is not rule-based and can so often occurs quickly and unexpectedly.

In order to more rigorously test how much these two constraints – lack of credit and price uncertainty – limit traders' willingness to store, we designed a program to alleviate these barriers. First, to lower the amount of upfront capital required to store, we offered a 40% subsidy on the cost of renting storage space at the NCPB. Secondly, to address concerns about unpredictable price swings, we added an insurance component that eliminated the risk to traders by paying out when local maize prices did not reach their average historical peak price by the end of the season (the insurance payout would make up the



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difference in price for each bag stored). We offered this package to 80 randomly selected traders.

Shockingly, not a single trader took up offer. Given the magnitude of the subsidy and amount of risk that the insurance eliminated, we interpret this as evidence that traders are not on the margin of storing; that is, even massive reductions in the cost and risk of storage are incapable of spurring increases in storage. Of course, these results do not definitely rule out the importance of credit constraints and price uncertainty; perhaps there was something specific to storage at the NCPB that is unappealing to traders. However, it does lead us to question the relevance of these explanations for why traders do not store.

Storage: the Less Profitable Opportunity for Arbitrage

This leaves us with a third and final possible explanation: storage may simply not be the optimal investment when compared to the alternatives available to traders. 60% of traders interviewed in our exploratory work report that – while storage is profitable – it is less profitable than spatial arbitrage: buying maize in surplus markets and selling in deficit markets just a few days later. While traders on average calculate that they can earn a 30% return from storing a bag of maize for six months, they report annualized returns of 200% by investing the same amount of capital in quickly moving bags from deficit to surplus areas and reinvesting that money in continual rotation. It therefore seems that traders have available to them many potential profitable arbitrage opportunities of which they could take advantage, and that storage is typically not the most profitable amongst them. This suggests that policymakers may need to consider the interaction of inefficiencies in spatial and temporal arbitrage, as opportunities to earn rents in one dimension may move intermediaries out of arbitrage in the other

Moving Forward...

This explanation, of course, raises its own puzzle: why can traders make such large mark-ups engaging in spatial arbitrage? Our future work will explore whether limited competition enables traders to earn large rents. In an upcoming study, we will measure the level of competition in agricultural markets, providing quantitative evidence characterizing of strategic interaction between traders who operate in the same market. Further, we will test whether the entry of new traders into the market can increase competition and improve consumer welfare, by subsidizing traders to enter randomly selected new markets. Ultimately, if we find that competition is limited and entry improves consumer welfare, we will identify and test some possible solutions for alleviating the barriers to entry into the agricultural trading industry.