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Why are African commodity exchanges languishing? A case study of the Zambian Agricultural Commodity Exchange

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ABSTRACT

Food price volatility and high transactions costs remain major problems in African food markets. These persistent problems provide a strong theoretical justification for the development of commodity exchanges. However, the majority of African commodity exchanges remain underdeveloped. Through a case study of the Zambian Agricultural Commodity Exchange (ZAMACE), this article explores why agricultural commodity exchanges in the region have thus far failed to develop into sustainable trading platforms and identifies the most important changes needed to enhance their performance.

Drawing on interviews and group discussions with the primary participants on ZAMACE, five main factors that impede volumes traded on the ZAMACE exchange are identified and analyzed: (1) the limited success in attracting financial institutions' commitment to commodity exchanges; (2) the anonymous nature of trading on a commodity exchange exacerbates the risks associated with contract non-compliance and opportunistic behavior; (3) the potential for conflict of interest among brokers; (4) the potential for market manipulation in a thinly traded market; and (5) the high fixed costs that are imposed on actors trading in a thin market. Exacerbating all these factors is the unpredictability of government intervention in cereal markets.

Background

Market liberalization has ushered in a host of sweeping changes to African food markets. Many of these changes have directly benefitted African farmers and consumers. In east and southern Africa, for example, there is now well documented evidence of expanded private investments in grain trading and processing, increased regional food trade and market integration, reductions in grain marketing margins for some important food crops, and a general increase in the affordability of consumer staples (Smale et al., 2011; Mason et al., 2011). Evidence also indicates that price volatility remains high and that traditional forms of exchange give rise to persistently high transactions costs in African food markets (Kydd, 2009; Sarris and Morrison, 2010). Presumably these conditions would provide important motivation for the development of vibrant agricultural commodity exchanges in the region. In other emerging markets, commodity exchanges have been facilitated by elevated transaction costs incurred by the private sector after the withdrawal of direct state intervention in food markets (UNCTAD, 2009). Given the persistent challenges faced in increasingly liberalized African food markets, commercial farmers, large grain traders, industrial processors, banks, and indirectly smallholder farmers are all theoretically well positioned to derive significant benefits from a vibrant commodity exchange. It would, therefore, seem puzzling that agricultural commodity exchanges in Africa have by and large languished, especially in light of the substantial support provided by international donors for their development.[1]

As their proponents rightly point out, commodity exchanges are explicitly designed to address the very marketing challenges facing African food markets (Gabre-Madhin and Goggin, 2005). By offering a platform for competitively matching a broad range of buyers and sellers, commodity exchanges can stimulate market transparency and price discovery, reduce the potential for collusion among market actors, moderate price volatility and bubbles, and provide more accurate price information to all (UNCTAD, 2009; Rashid et al., 2010; Poulton et al., 2006; Gabre-Madhin and Goggin, 2005). Commodity exchanges can also reduce transaction costs by expanding the range of potential trading partners, providing industry approved inspection and quality certification services, and providing contract enforcement and arbitration services to protect against default.

Commodity exchanges have been actively promoted and developed in South Africa, Zambia, Malawi, Kenya, Uganda, and Ethiopia. Additionally, USAID has supported the development of a regional internet-based exchange, known as the Agricultural Commodity

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[1] For example, the Ethiopia Commodity Exchange has reportedly received at least US$24 million in donor support in recent years (Goggin, 2011).

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Exchange for Africa (ACE). Of these, however, only in South Africa has a vibrant commodity exchange developed for the major staple grains. Taking a broad view of African commodity exchange, some analysts have argued that the underdevelopment of commodity exchanges on the continent can be attributed to a combination of factors: (i) limited size of formalized food markets in most countries in the region; (ii) weak infrastructure and underdeveloped financial services to support the development of an exchange, and; (iii) a general lack of supportive legal and regulatory frameworks (Rashid et al., 2010). Of course there is a high degree of variability in the structure and performance of food markets across the continent, which can significantly affect the viability of an exchange. Thus, while the stylized constraints identified by Rashid et al. (2010) provide a useful framework for understanding some of the impediments to the development of commodity exchanges on the continent, the full array of specific challenges hindering their development (and reasons for variations across countries) are more likely to emerge from country-specific analyses. As is well described in a recent report by UNCTAD (2009), commodity exchanges in emerging markets exhibit a high degree of structural variability resulting from differences in the market context within which they operate. Thus, our understanding of the factors inhibiting commodity exchange development in sub-Saharan Africa can benefit greatly from an in-depth case study analysis of a specific exchange on the continent.

This article is motivated by the need to better understand why agricultural commodity exchanges in the region have thus far failed to develop into sustainable trading platforms and to identify the critical changes needed to enhance their performance. These points are illustrated through a case study of the Zambian Agricultural Commodity Exchange (ZAMACE). By identifying the underlying conditions hindering the development of ZAMACE, this study highlights the types of changes that are likely to be required before commodity exchanges can begin to realize their potential role of contributing to a transformation of African food markets.

To achieve these objectives, we interviewed five commercial farmers, seven large-scale grain traders, two commodity brokers, two large food processors, and a representative of the World Food Programme (WFP) in Zambia. This sample, while small, represents the majority of the relatively few market actors that have or continue to trade on ZAMACE, hence it represents a large share of the trade volume and population of actors that have utilized ZAMACE. Each of the respondents have either conducted a trade over ZAMACE or invested resources into investigating the feasibility of trading on the exchange. The brokers, processors, and traders interviewed represent 10 of the 11 current grain trading ZAMACE shareholders. The WFP is the largest grain purchaser on ZAMACE. We then brought representatives of these five groups together with the Executive Director of ZAMACE in July 2011 to share initial findings and elicit feedback together as a group, which was then incorporated into this article.

While some of the issues identified in this article are specific to Zambia, others speak broadly to challenges faced throughout the region. Identifying the full range of impediments to the development of sustainable commodity exchanges in Sub-Saharan Africa is necessary for recalibrating donor and government expectations about the nature of the institutional development challenges and the time frames required for effectively addressing these challenges.

Factors impeding the use of the zamace commodity exchange

Achieving sufficient market size, both in terms of volume of trade and number of participants, is a fundamental precondition for any commodity exchange to function effectively (UNCTAD, 2009). Sufficient market size is necessary for achieving the competitive conditions that foster price discovery (Gabre-Madhin and Goggin, 2005). High trade volumes also allow the fixed costs of operating the exchange to be spread over a large number of transactions and participants, thereby imposing lower costs on market participants trading across the exchange. Finally, sufficient market size reduces the risk of market manipulation and collusion among market actors (UNCTAD, 2009; Rashid et al., 2010). Because of the fundamental importance of achieving adequate market size, sustainable commodity exchanges are rarely, if ever, thinly traded. Commodity exchanges either grow quickly into heavily traded institutions or they fail.

As with most exchanges in the region, ZAMACE has yet to achieve the necessary market size to function efficiently or sustainably. Indeed, when comparing traded volumes on ZAMACE to a better developed commodity exchange, like the Johannesburg Stock Exchange's agricultural trading division, SAFEX, the differences are glaring. A single day of trade activity on SAFEX is normally valued at over US$100 million, while ZAMACE has reported a total of US$78million since its inception in October 2007 through May 2011. Even the US$78 million is somewhat misleading. ZAMACE brokers are not mandated to trade over the exchange floor, but they are required to report "over the counter" transactions—transactions conducted directly between buyer and seller—to the exchange once they have occurred. As a result, only 32% of the US$78 million reported by ZAMACE are actual "closed deals" conducted across the trading floor and open to competitive bidding on the exchange. The remaining 68% involved a ZAMACE member, but were trades that occurred directly between buyer and seller with the quantity and price terms of the off-line trade later reported to ZAMACE. In Section 2.6 we will examine why ZAMACE members may prefer off-line transactions over trading across the floor of the exchange. Our main point here is that ZAMACE is thinly traded. Over the past three years its closed deal trade volume for maize, wheat, and soybeans has averaged roughly 40,000 tons per year in a market where the annual marketed volume of these three commodities has been well over 1.5 million tons. This represents just a fraction of the potential trade volume, and begs the question: why has ZAMACE thus far been unable to capture a greater share of the potential market for these key commodities?

Low trade volumes across ZAMACE should be understood as a consequence of fundamental problems affecting the performance of grain markets in Zambia more broadly. This section identifies five main factors impeding volumes traded on the ZAMACE exchange: (1) the limited success in attracting financial institutions' commitment to commodity exchanges related to underlying structural problems of grain markets more generally; (2) the anonymous nature of trading on a commodity exchange may actually exacerbate the risks faced by a market participant associated with contract non-compliance and opportunistic behavior by other actors; (3) the potential for conflict of interest among brokers; (4) the potential for market manipulation in a thinly traded market; and (5) the high fixed costs that are imposed on actors trading in a thin market, which generates a vicious cycle of exit followed by the fixed costs being imposed on the smaller number of actors remaining loyal to trading on the exchange.

Limited participation from the financial sector owing to structural problems of grain markets

Commercial banks in much of Africa have only recently begun to invest significant percentages of their lending portfolios in agriculture. In Zambia, increased commercial lending to the agricultural sector has been driven by two important factors. First, with inflation rates now consistently in the single digits, Zambia has been able to significantly lower its cost of government borrowing. As recently as 2003, interest rates on 91-day Treasury bills in

Zambia exceeded 30%. High interest rates on government treasury bills tend to suck liquidity out of the commercial lending market, as banks are able to make large and safe returns on government debt without the risk exposure associated with lending to the private sector. However, by the end of 2010 Treasury bill rates had dropped to 5%, which has encouraged banks to seek out new areas for investment, including the agricultural sector (Bank of Zambia, 2011). At the same time, structural changes in global demand for food has drawn increased investment into African commercial agriculture, which has stimulated growth in commercial lending to the sector. Yet, despite their increased presence in Zambia's agricultural sector, commercial banks have not leveraged this position to encourage greater utilization of commodity exchanges. Aside from providing clearinghouse facilities, commercial banks and other financial institutions are in a unique position in the agricultural sector to encourage greater volumes of trade through commodity exchanges, either through advocacy to their clients, financing of warehouse receipts tied to the exchange, or by financing their own brokerage seat on the exchange. According to the management of SAFEX, the participation of banks in the development of SAFEX was critical (UNCTAD, 2009). Given that most of the banks trading on SAFEX are also active in Zambia's agricultural sector it may seem puzzling that, thus far, they have had limited or no engagement with ZAMACE.

Zambia's agricultural markets are plagued by myriad factors that limit commercial banks' willingness to participate in the development local trading platforms. Local traders often conjecture that the longstanding reticence of local banks to invest in firms involved in agricultural production or trading is due to limited bank understanding of the complexity of Zambian agricultural markets and the opportunities that exist for profitable investment. However, bank representative point to the major risks associated with lending to the agricultural sector. Farmers and traders taking loans may default due to many factors out of their immediate control, including weather risks leading to inability to deliver on contracted supplies and price volatility leading to either trading losses or temptations for one marketing actor to shirk on the contract. Of course weather and price related risks are, to varying degrees, inherent in most agricultural markets and in other countries do not necessarily lead to low lending rates to the sector. What exacerbates these risks in the Zambian context are the numerous policy-related challenges associated with government operations in grain markets, including unanticipated changes in marketing board purchases or sales out of buffer stocks, export bans, and sudden changes in import tariff rates on imported grain. These unpredictable government operations have the potential to adversely affect farmers and traders by causing rapid and unexpected changes in prices (Chapoto and Jayne, 2009).

Yet, the fact that banks have thus far not been actively involved in promoting the development of ZAMACE does not mean that they do not rely on it when conducting business in the agricultural sector. Indeed, banks routinely utilize the reference prices generated by ZAMACE to negotiate the terms of collateral management arrangements with processors and traders as well as production loans to commercial farmers. In essence, banks free-ride on ZAMACE's price information services without making any substantive contribution to the operation of the exchange. The benefits banks derive from functional commodity exchanges and accurate reference prices should theoretically serves as an incentive for them to drive sustained growth in trade volumes going across the exchange unless they can achieve these benefits without incurring any costs or risks themselves. Therefore, a major challenge would appear to be how to overcome the free rider problem so that the financial sector can play a positive role in the development of commodity exchanges. Concrete actions that banks could play would include requiring the liquidation of collateral management loans to sales across ZAMACE, opening up their own brokerage services for their clients to use, as they have done in South Africa, thereby addressing some of the current distrust in brokerage services and fear of market manipulation that will be discussed in Section 2.5. Finally, with the recent amendment to Zambia's Agricultural Credit Act, which provides legal standing to warehouse receipts and grants ZAMACE a role as a warehousing agent, the regulatory impediments to banks' participation in financing of warehouse receipts have partially been addressed (Coulter, 2009). Tying the liquidation of these receipts to trade across ZAMACE may help to draw financial service participation to the exchange, thereby increasing the potential for the exchange to become a viable trading platform (Coulter and Onumah, 2002).

Yet ultimately, for banks to play a wider role in the agricultural marketing the policy–related risks of agricultural markets must be addressed. For example, unpredictable interventions in food markets increase the price risks associated with grain storage, thereby undermining the viability of a warehouse receipting system and the development of futures contract. While the development of these financial instruments may not be essential for a functional exchange, they would certainly bring much needed liquidity to the market.

Poorly developed arrangements for addressing contract shirking and opportunistic behavior

As Douglass North (1990) famously suggested, "the inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary under-development in the Third World" (p. 54). One of the defining obstacles to the development of ZAMACE is the high levels of risk and uncertainty associated with contract default, including delivery and payment failure. Almost every interviewed trader in Zambia mentioned that contract non-compliance is common in Zambia. This normally occurs in response to unexpected price movements, which provide incentives for one party to default on a contract agreement. Contract non-compliance is further encouraged by the high costs and time associated with resolving disputes through Zambia's legal system. This significantly elevates the screening costs of identifying reliable trading partners, as unreliable partners are only identified by their non-compliance with the terms of a contact, and increases the importance of developing long-term trading relationships with trusted partners (Fafchamps, 2004). Theoretically, in this context a well-functioning commodity exchange, with effective arbitration and settlement guarantee, can play a transformative role in improving the efficiency of food markets. Although ZAMACE has arbitration protocols and a settlement guarantee facility in place, there is a perception among potential clients that the cost of dispute resolution remains prohibitively high and time consuming relative to the informal risk mitigation strategies used by most market actors.

ZAMACE Arbitration: A number of factors contribute to the perceived high cost of dispute resolution through ZAMACE. First, ZAMACE draws arbitrators from the Zambian Arbitration Association, operated under the Legal Association of Zambia, who may or may not be knowledgeable about the agricultural sector. Lack of knowledge of the sector can contribute to delays in reaching a decision, as arbitrator must learn about the case at hand as well as the sector more generally. Second, ZAMACE relies on the Arbitration Association's fee scale and other procedural rules, which in some cases are not well-suited for the needs of the exchange, its members, or clients. Although efforts are currently underway to rectify this, there is a widely held perception among stakeholders that in its current form ZAMACE arbitration procedures are too long and costly. This perception was reinforced by one particular arbitration case, which took approximately a year

to reach a resolution and, according to people involved in the case, cost approximately US$ 20,000. While much of the cost and delays incurred during this arbitration were the result of the parties themselves seeking adjournments and legal representation, appropriate rules of arbitration could have prevented much of this. These rules would include a scale of fees that are agreed upon by the members and a limit on the number of days a case can be under arbitration.

Because there have been only two arbitrations on ZAMACE in its short history, this one very long and costly arbitration set a bad precedent and shaped the perception among many potential and current users that the exchange lacks the institutional capacity to effectively guarantee its trades. Under conditions of long and costly arbitration, there is little or no incentive to bring a transaction dispute to arbitration, because in many cases the gain from the transaction will not exceed the cost of arbitration. In essence, the cost and time associated with arbitration is only justified for large trades. In the absence of a well-financed clearinghouse, small trades across the exchange have little or no recourse for compensation from a default.

Clearing Facilities and Settlement Guarantee on ZAMACE: For commodity exchanges to be effective, they must have access to clearinghouse facilities with sufficient capital to serve as a guarantor of all transactions (Rashid et al., 11). The development of clearinghouses to ensure the delivery of product in the face of potential contract default and lengthy arbitration can greatly reduce the risks of transacting on the exchange.

ZAMACE has designed a Settlement Guarantee Structure with Standard Chartered Bank, covered by Africa Trade Insurance, to guarantee transactions. However, to date no brokers have opened a brokerage account that is backed by the settlement guarantee system. Currently, the use of the settlement guarantee facility is not mandatory for brokers. In part, the lack of buy-into the settlement guarantee facility is a reflection of the limited capacity of ZAMACE to bring punitive measures against brokers. Although the monthly cost of the guarantee facility is fairly low, paying for a settlement guarantee facility may not be justified in situations where arbitration procedures are weak. Furthermore, the volumes of current transactions may not justify the cost of maintaining a guarantee facility. In this context, there is little incentive for brokers to voluntarily commit funds to a settlement guarantee facility. At the same time, possibly due to a lack of information on the guarantee facility, there has been virtually no demand for guaranteed brokerage services from clients. As a result of limited buy-into the guarantee facility, default risks associated with trade over ZAMACE are in all likelihood as high as default risks associated with traditional trading risks. This, in turn, limits the value to potential clients of paying to use a centralized exchange relative to traditional trading systems.

Traditional risk mitigation strategies and their effects on ZAMACE participation

While the institutional structures for addressing contract non-compliance are in place at ZAMACE, they are under-utilized and unable to address some of the pressing needs of Zambian agricultural markets. It is important to understand how and why weak formalized contract enforcement institutions tend to entrench large farmers, traders and processors—all of whom have the capacity and incentives to effectively sell commodities across an exchange—in complex networks of informal trade and risk mitigation strategies that are not well-suited to a formal and transparent exchange.

The limited use of ZAMACE by commercial farmers and medium-scale wholesalers must be understood as the outcome of the risk mitigation strategies they deploy to protect against contract default and payment failure in the highly volatile market conditions that prevail in Zambia. In a market environment where there is little or no contract enforcement and prices unexpectedly decline, buyers can and do walk away from contracts or refuse to pay at the agreed upon price. The inverse is also true, when prices move up, farmers may be unwilling to fulfill their contractual obligations at an earlier agreed price. Respondents reported that many buyers have experienced situations where they have been unable to acquire sufficient quantities to meet their demand due to contract non-compliance. Conversely, many grain sellers have experienced difficulties in liquidating their stocks because a buyer refused to pay at previously agreed upon price. Consequently, commodity markets in Zambia have evolved in such a way that interpersonal relationships between buyer and seller, what Fafchamps calls "relational contracting networks," have become of paramount importance in mitigating the risk of contract default. These relationships are critical for ensuring availability of supplies and protecting against severe price collapses in markets characterized by extreme policy and climate induced volatility and limited institutional development of contract enforcement mechanisms.

In Zambia, interpersonal market relationships between buyers and sellers may be cultivated in a number of ways. For example, traders or processors may provide pre-financing to farmers prior to the planting season or to medium-scale wholesalers prior to the marketing season. Buyers may also provide free or low-cost transport services to farmers and wholesalers. Alternatively, buyers may offer forward contracts to farmers where profits from upside price movement are shared, while all the downside price risk is assumed by the buyer. Buyers in Zambia are also willing to offer commercial farmers and medium-scale wholesalers prices that are slightly higher than the market price for a relatively abundant commodity, like maize, in the hopes that this will provide a foundation for them to acquire more scarce commodities, like soy or wheat when the need arises. Indeed, in some cases preferred farmers and wholesalers are regularly offered higher than market prices in an effort to maintain a long term relationship with them, which the buyer hopes to capitalize on during deficit years. Buyers and sellers are less likely to default on a contract if that default would jeopardize a sellers' ability to sell commodities at remunerative prices during surplus years or a buyers' ability to attract sufficient grain in deficit years. As these examples suggest, Zambian grain trading is built upon a deeply social structure of interpersonal relationships between buyers and sellers, which is not well-suited to the anonymity and transparency of a centralized exchange. In the absence of well-developed legal or regulatory systems to effectively punish cheats through impersonal market trading, relational contracting networks tend to flourish. These networks may hamper market efficiency, as the terms of trade are not solely dictated by price and quantity in an impersonal market, but rather by investment in long-term exchange relationships in which trust is developed over the course of numerous transactions (Fafchamps, 2004). Having been developed over the course of many years, these relational trading networks tend to persist, even as new market innovations present themselves. With continued uncertainty over ZAMACE's capacity to guarantee its contracts, the value of long-term trading relationships with a known buyer or seller continues to outweigh the benefits offered by an exchange.

Does anonymity help or hinder the development of African commodity exchanges?

Commodity exchanges are meant to be anonymous platforms for linking buyers and sellers. In developed agricultural markets this anonymity helps to facilitate participation. However, in less developed markets like Zambia anonymity can work against the exchange. According to interviewed farmers and traders there is

a real fear that an anonymous exchange may attract risky trading partners who would otherwise have had difficulty negotiating an exchange if their identity were known. These include politically well-connected individuals who have become notorious for using their political power to provide legal shelter when backing out of trade agreements. There is a good deal of concern within the sector that the limited capacity of ZAMACE to enforce contracts combined with its anonymity raises the risk of default and fraud relative to relational trading networks. Under these conditions farmers and wholesalers find it safer to sell to a known buyer with whom they have a personal relationship, rather than risk the uncertainty of an anonymous exchange.

However, commodity exchanges in small markets like Zambia are not always anonymous. In particular it is extremely difficult for large-scale grain processors to act anonymously across the exchange. Grain processors in Zambia have been unwilling to actively participate on the exchange out of fear that the prices they offer and the quantities they buy will become publicly known. Processors thrive on relatively opaque markets, which allow them to blend down the high prices they pay to their preferred producers and traders with lower prices from less well connected and savvy sellers. Under these conditions, where the anonymity of the exchange is questionable for larger buyers and where investments in long-term trading relationships may not be well suited to an open and transparent market, the participation of processors on an exchange will tend to be tempered.[2]

The main conclusion from this section is that, while commodity exchanges are envisaged as institutions to drive down transaction costs in African food markets, the perceived costs associated with adequately developing the formal institutions to ensure contract compliance through an exchange may, in fact, exceed the risk mitigation costs of traditional relational trading networks. Until the potentially high transaction costs associated with an anonymous exchange can be effectively lowered below the costs associated with traditional risk management strategies, commodity exchanges in Africa will face an uphill battle in attracting sufficient volumes of trade—from wholesalers, farmers, and processors—to become sustainable trading platforms.

Potential conflicts of interest: brokers or traders?

When ZAMACE was initially developed there were no true commodity brokers in the country. In the absence of brokerage services, ZAMACE turned to existing market actors to comprise its board and to buy brokerage seats. Given the reluctance of processors to participate on the exchange, the eight founding members of ZAMACE were primarily large grain traders. While the number of members has since grown to eleven, the structure remains the same; ZAMACE brokers are primarily either current or former grain traders.

In the beginning, these actors held certain advantages for the nascent exchange, such as experience with using exchanges in other countries, liquidity, and significant market knowledge. However, while these advantages may have been important in helping to develop the exchange, the predominance of grain traders serving as brokers on the exchange is perceived by many farmers and processors as a liability (UNCTAD, 2009; Robbins, 2010). Grain traders acting as brokers on ZAMACE present a potentially serious conflict of interest, or at least the perception of one, which is equally important. As brokers working on the exchange, they operate on a fixed commission. These commissions tend to be smaller than margins gained through conventional trading. Under these conditions, a trader-broker may have little incentive to encourage the farmers or processors they interact with to route their commodities through the exchange. Instead, it is more profitable for them to negotiate trades directly with farmers and traders through the trading side of their business and then post these "over the counter" trades on the exchange, if their client doesn't object. Brokers counter that their willingness to link buyer and seller through the exchange even at the smaller trading margins afforded to brokers proves that they are participating in good faith, and that it is the other trading partners that refuse to take their transactions formally across the exchange. This would suggest that farmers and processors may be hurting themselves and receiving less advantageous prices than they could if they chose to sell their commodity formally on the exchange.

Furthermore, because most of the brokers on ZAMACE are also grain traders, many commercial farmers and smaller traders believe that ZAMACE is not competitive, that it is open to price collusion between members, and that brokers may not be acting in the best interest of their clients, but rather in the interest of the major trading firms they represent. Our study has not attempted to address whether these views are accurate or not, but the fact that perceptions of collusion and broader distrust in the exchange run high among some market participants underscores the need for stronger safeguards and information to allay such fears.

Overcoming this binding constraint will require a combination of structural changes to ZAMACE and the agricultural market within which it operates. First, ZAMACE must identify and recruit to the exchange more true brokers having no vested interests in grain trading. These could include farmer's associations and financial institutions. Commodity exchanges in other emerging markets have addressed this issue through demutualization—i.e. the separation of the management of the exchange from the trading interests of the owners (UNCTAD, 2009). Second, until trading margins decline to parity level with brokerage commission fees, some trading firms with brokerage seats will remain hesitant to fully promote the exchange to their clients. Achieving lower trading margins again takes us back to addressing the structural challenges of grain marketing systems in the region, including the need for more predictable agricultural policies, more efficient storage, and improved road and rail transport systems to reduce the marketing costs and risks of trade.

Fears of market manipulation in thinly traded markets

The development of a centralized exchange is more likely to succeed if a large spot market, in terms of value and number of participants, already exists (Rashid et al., 6). In 2009/2010 Zambia produced approximately 2.5 million tons of maize, 200,000 tons of wheat, and 90,000 tons of soy (CSO, 2010). By comparison, in the same year South Africa produced roughly 12 million tons of maize, 2 million tons of wheat, and 500,000 tons of soy (FAOStat, 2011).Thus, relative to more mature exchanges in the region, Zambia is structurally hampered by the thinness of its existing spot markets. In the past several years, over half of the country's marketed maize crop was purchased by the Food Reserve Agency at prices far above market prices, which has made the remaining private markets more thinly traded. With the exception of a 20,000 ton contract in 2010, none of the FRA's maize was sold across the ZAMACE exchange. The marketed trade among the other two potential crops in Zambia, soy and wheat, is highly concentrated, both in their production and in the trading and processing stages. For example, Zambeef alone has the processing capacity to utilize roughly 60% of Zambia's soy crop, while National Milling

[2] For example, during our group discussion with farmers, brokers, traders, and government authorities, one broker publicly revealed the identity of the two firms under protracted arbitration. Possibly this was because the broker believed that all people in the room were already well acquainted with the case, but in any event, this example makes it clear that many participants feel that the identity of those conducting business on the exchange is not anonymous.

Corporation buys roughly 60,000 mt of wheat each year, roughly 30%, of Zambia's wheat production. In the absence of significant reforms to the maize market, ZAMACE must effectively attract a large share of the wheat and soy market for it to become a sustainable trading platform.

Thinly traded spot markets with limited numbers of participants significantly undermine the ability of ZAMACE to attract market participants. When a relatively small share of marketed output is trading in spot markets, the price discovery function of any exchange can be undermined by the perception that exchanges can be utilized by powerful market actors to manipulate commodity reference prices to their advantage.

Price manipulation can occur in one of two ways. First, with relatively few market participants trading in a given commodity, there is an incentive for some actor to selectively report transaction prices on the exchange in an effort to move the reference price in their favor. An accurate reference prices requires sufficient volumes of trade and sufficient competition between participants. In its current form, the ZAMACE reference price only reflects the prices that buyers and sellers are willing to make public. As such, processors, for example, may only wish to register trades that are on the low end of their price spectrum, in the hope that this price becomes the new reference price, thereby effectively pushing down prices. As was shown in Section 1, 68% of the total traded value reported to ZAMACE since its inception occurred off the exchange, with trades selectively registered by buyers or sellers. This behavior indicates that millers and traders believe that their own actions can potentially influence the prices quoted on the exchange, which may actually be the case in a thinly traded market.

The second form of price manipulation stems from potential information asymmetries as to the actions of the Food Reserve Agency. Because the FRA is by far the major maize trader in Zambia, sudden changes in its buy and sell prices, volumes purchased or released on the market, and changes in government trade policies can immediately and substantially affect the market. Those with inside information as to impending policy changes can take advantageous positions on the exchange at the expense of less well-informed trading partners. Respondent interviews highlighted the particular case of a large international grain trader that was accumulating large maize stocks for release later in the season and was apparently unaware of the announcement of an export ban on maize, which immediately depressed market prices in Zambia, leading to substantial losses by the trader.

Together, these factors tend to drive farmers, financial institutions, and smaller traders away from the exchange and hamper the potential to develop a trade in forward contracts. This deprives the exchange of much needed volume and contributes to fears that the only actors using the exchange are doing so to influence the reference price. Thus, a vicious cycle emerges where thin spot markets undermine the credibility of the exchange, causing some market actors to opt out, which in turn makes the exchange more open to price manipulation. As a result, while commodity exchanges are theoretically designed to directly address issues of oligopolistic behaviors in commodity markets, under current conditions the result may in fact be the opposite.

Market thinness and participation costs

The services provided by an exchange can be expensive. Fixed costs associated with the operation of an exchange include delivery guarantee services, communication systems, and employment costs of management and employees. Furthermore, variable costs are incurred such as contract enforcement, dispute resolution, and screening new participants for eligibility (Rashid et al., 3). In order for an exchange to be sustainable these costs must be spread over a sufficient volume of trade. In the absence of market scale, the cost of operating an exchange per traded transaction will be prohibitive to some marketing actors and, hence, they opt out of the system, leaving fewer actors to shoulder the remaining fixed costs.

Aside from donor support, which includes over one million dollars from USAID since its inception through March 2011, ZAMACE covers its costs of operations by charging a monthly membership fee to its members, charging for commodity testing and certification services, and collecting transaction fees of 0.15% of each side (bid and offer) of the value of the trade conducted through ZAMACE and 0.2% on the value of a reported (over the counter) trade. This transaction fee is charged to both parties involved. While ZAMACE's operating costs are not publically available, we are able to calculate the average monthly revenue generated by the exchange since its inception in October 2007 through May 2011. Based on a total trade value of $78 million over the 31 month period, the combination of fees from over the counter and standard transactions has generated on average $9259 per month or $111,108 annually for the exchange. This is far from sustainable. Simply to cover the membership fees[3] paid by its owners, ZAMACE will need to increase its trade revenue by 54%. Moreover, at this rate it will take the exchange over nine years to recoup USAID's one million dollar investment in the exchange.

As a result of the low traded volume and difficulties in covering the fixed costs of operating the exchange, ZAMACE recently raised its monthly membership fees by 25%. Although monthly fees would be minimal if members traded even a nominal amount through the exchange, the fee increase has prompted some members interviewed for this study to initiate actions to sell their seats on the exchange.

If current members opt out of the exchange because of the elevated costs, then the burden of covering fixed costs will be passed down to those who remain. However, this is not an issue that can be simply resolved by directing more donor money toward covering existing fixed costs. Opting out of the exchange because of the cost of participation can only be sustainably addressed by improving the benefits that members derive from their participation. This would include cost effective dispute resolution and settlement guarantee, thinner margins between brokerage fees and traditional trading margins, and, consequently, sufficient trade volumes on the exchange. When evaluating the feasibility of developing an exchange, policy-makers and donors must look closely at whether or not the cost of participating on the exchange is justifiable to a sufficient number of potential participants relative to the benefits they derive from participation. If this condition is not met, nascent commodity exchanges will quickly collapse as initial members opt out of the system and return to their traditional trading systems.

Do governments really want commodity exchanges?

While there is a widespread interest among the donor community and elements of the private sector in promoting agricultural commodity exchanges, can we say the same for governments? Does the development of a commodity exchange require that government agrees to impose certain constraints on its own behavior? Or can vibrant commodity exchanges develop under a wide range of government actions in markets, including the continuation of highly unpredictable operations in domestic markets and trade policies?

In east and southern Africa, maize, wheat, and soybeans are the most likely candidates for trade on a commodity exchange given their relatively high trade volumes compared to other crops grown in the region. However, in Zambia, like other countries in the region, the government regularly intervenes in cereal markets in an effort

[3] We have been asked not to disclose the specific amount paid in membership fees.

to both support producer prices and/or to reduce consumer prices in the event of price spikes. It is widely viewed in the region that governments are responsible for ensuring adequate food supplies at tolerable prices, hence the extremely politicized nature of maize policy in the region (Byerlee et al., 2006). Rashid et al. (2010) argue that by their nature commodity exchanges cannot guarantee that prices will remain within a range that is acceptable to policy makers. As such, there is a strong likelihood that government will continue to intervene in cereal markets even if commodity exchanges were operating efficiently. For reasons indicated earlier, if the government's intervention is large, it can destroy market confidence and undermine the development of an exchange.

Government interventions in the maize market affect the development of the exchange in three primary ways. First, the potential to sell maize to FRA at above market prices limits the incentive for smallholders to sell their maize to marketing actors that might use the exchange. This drastically reduces the potential volume of trade on the exchange and the number of participants who would use it. Second, import and export bans, as well as the release of stocks on the market at concessionary prices, discourage traders and millers with no particular insider knowledge of impending government actions from taking speculative positions in the maize market, which in turn decreases the potential volumes of trade on the exchange. As a corollary, this unpredictability also limits incentives to store grain and invest in new storage facilities, which are both critical for the development of a functional physical exchange like ZAMACE. Finally, the discretionary and unpredictable ways in which the government intervenes in the market clearly impedes the development of forward contracts for maize. This in turn deprives the market of potential liquidity.

For these reasons government action can make or break the development of commodity exchanges. While politicians may truly support the development of an exchange, they may not be aware of how state actions can indirectly undermine them. This is not to say that governments must cease to intervene in food markets in order for commodity exchanges to function. In Brazil, for example, the Bolsa de Mercadorias e Futuros (BM&F) exchange actually provides a platform for government to meet some of its social objectives in food markets by facilitating grain procurement from smallholders (UNCTAD, 2009). As long as it does not introduce major unpredictability into the market or divert a large portion of the marketed surplus from trading across the exchange, government interventions *per se* is not incompatible with commodity exchange development. Rather, it is unpredictable and disruptive forms of state intervention that tend to stifle the development of commodity exchanges.

Conclusions

This study is motivated by the need to understand why commodity exchanges for the staple food grains have remained stunted in sub-Saharan Africa despite strong interest in their development by both the international donor community as well as by elements of the private sector. While the study focused on the Zambian Agricultural Commodity Exchange and draws its findings from interviews of participants in Zambia's maize, soy, and wheat value chains, we feel that constraints identified through this case study are not isolated to Zambia, but speak more broadly to the potential for commodity exchanges to develop throughout Sub-Saharan Africa.

Vibrant commodity exchanges are likely to be a centerpiece of future grain marketing systems in much of Africa, as they are in many other parts of the world. As other donor institutions and governments contemplate investment in commodity exchanges it will be important to keep in mind the kinds of challenges faced by ZAMACE. We highlight three major lessons from the Zambian experience that can guide future efforts in the region to promote the development of commodity exchanges:

1. Historical and contemporary evidence suggests that effective commodity exchanges can develop in a variety of political contexts (Garcia and Leuthold, 2004; UNCTAD, 2009). Yet there is little evidence of commodity exchanges thriving in markets characterized by high levels of discretionary or *ad hoc* state intervention. Given that domestic grain crops are the most likely candidates to be traded on many African exchanges, due to the high number of potential participants and trade volumes, they will often be enmeshed in complex market environments that are shaped by debates over the appropriate role of states to ensure national food security and poverty reduction. Thus, in many ways the development of commodity exchanges in Africa will hinge on whether or not governments are willing to address their food security and poverty reduction objectives through predictable, market-based institutions. When assessing the feasibility of developing commodity exchanges, it is essential to evaluate whether or not government policy tends to support market development or if it contributes to elevated levels of market uncertainty. Unfortunately, in many cases unpredictable government intervention is the dominant *modus operandi* for many African governments.
2. Under such conditions, development assistance may be more productively focused on supporting the foundational "nuts and bolts" investments in grain market development rather than in financing exchanges directly. This would include: investing in physical infrastructure and the transport sector to reduce marketing costs; investing in public market information and the promotion of quality grades and standards; supporting transparent policy dialogue between public and private sector market actors to reduce market uncertainty; promoting the development of a legislative framework for defining the rules governing state intervention in markets; educating and providing technical and managerial support to farmer organizations to facilitate smallholder grain aggregation; and investing in farm productivity to encourage marketed surpluses and scale economies in marketing. These foundational investments in grain market development would help reduce the costs and risks of trading in general, and would provide a more hospitable environment for the introduction of commodity exchanges.
3. It should not be assumed that by their very existence commodity exchanges will lower transaction costs in food market, promote price discovery, and price transparency. The agricultural markets in the region into which commodity exchanges are being introduced are deeply entrenched in webs of interpersonal relations, vastly asymmetrical access to the political decision-making process, and weak regulatory systems. As our case study has shown, in these types of environments, poorly instituted commodity exchanges can produce exactly the opposite outcome from their intended purpose, becoming vehicles for perceived market collusion, elevated trading risks, and price manipulation. Overcoming this potential outcome requires sufficient commitment and participation from a broad range of market actors, including financial institutions and farmers' associations. Of crucial importance is consensus for the use of settlement guarantee systems and clearinghouse facilities with sufficient capital to serve as a guarantor of all transactions.

A common theme of all three points is the importance of recognizing that commodity exchanges should not be viewed as

panaceas for rectifying the many challenges facing African agricultural markets. While commodity exchanges can certainly improve the efficiency of markets on the continent, they cannot be expected to impose order on dysfunctional markets. Only once the major grain markets of the region achieve minimum threshold levels of policy stability will investment in commodity exchanges begin to contribute meaningfully to market performance and national food and agricultural policy objectives.

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References

Bank of Zambia, 2011. Treasury Bill rates. <http://www.boz.zm/(S(3u4112jvjtcci455gijumm55))/reports/TreasuryBillsIntrates.aspx>.

Byerlee, D., Jayne, T.S., Myers, R., 2006. Managing food price risks and instability in a liberalizing market environment: overview and policy options. Food Policy 31 (4), 275–287.

Central Statistics Office (CSO), 2010. Crop Forecast Survey 2010. Central Statistical Office, Lusaka, Zambia.

Chapoto, A., Jayne, T.S., 2009. The Impacts of Trade Barriers and Market Interventions on Maize Price Predictability: Evidence from Eastern and Southern Africa. International Development Working Paper 102, Michigan State University, East Lansing.

Coulter, J., 2009. Review of Warehouse Receipt System and Inventory Credit Initiatives in Eastern and Southern Africa. Commissioned by UNCTAD, under the All ACP Agricultural Commodity Programme (AACP).

Coulter, J., Onumah, G., 2002. The role of warehouse receipt systems in enhanced commodity marketing and rural livelihoods in Africa. Food Policy 27, 319–337.

FAOStat, 2011. Country Crop Production Data. <http://faostat.fao.org/site/567/default.aspx#ancor>.

Fafchamps, M., 2004. Market Institutions in Sub-Saharan Africa. MIT Press, Cambridge (Mass.).

Gabre-Madhin, E., Goggin, I., 2005. Does Ethiopia Need a Commodity Exchange? An Integrated Approach to Market Development. Concept Note. <http://www.scribd.com/doc/22605/Does-Ethiopia-Need-a-Commodity-Exchange>.

Garcia, Leuthold, 2004. A review of commodity futures & options. European Review of Agricultural Economics 31, 235–272.

Goggin, I. (former executive director of Malawi and Zimbabwe Agricultural Commodity Exchanges), 2011. Comment during plenary discussion at the Ministry of Agriculture Meeting on the Agricultural Credit Act and Zambia Commodity Exchange, Siavonga, Zambia, July, 2011.

Kydd, J., 2009. A new institutional economic analysis of the state and agriculture in Sub-Saharan Africa. In: Kirsten, J.F., Dorward, A.R., Poulton, C., Vink, N. (Eds.), Institutional Economics Perspectives on African Agricultural Development. International Food Policy Research Institute, Washington, DC.

Mason, N., Jayne, T.S., Chapoto, A., Donovan, C., 2011. Putting the 2007/2008 global food crisis in longer-term perspective: trends in staple food affordability in urban Zambia and Kenya. Food Policy 36 (3), 350–367.

North, D., 1990. Institutions, Institutional Change, and Economic Performance. Cambridge University Press, Cambridge, UK.

Poulton, C., Kydd, J., Dorward, A., 2006. Overcoming market constraints on pro-poor agricultural growth in Sub-Saharan Africa. Development Policy Review 24 (3), 243–277.

Rashid, S., Winter-Nelson, A., Garcia, P., 2010. Purpose and Potential for Commodity Exchanges in African Economies. IFPRI Discussion Paper No. 01035. International Food Policy Research Institute, Washington, DC.

Robbins, P., 2010. Review of the Role of Commodity Exchanges in Supporting Smallholder Farmer Market Linkages and Income Benefits.

Sarris, A., Morrison, J. (Eds.), 2010. Food Security in Africa: Markets and Trade Policy for Staple Foods in Eastern and Southern Africa. Edward Elgar Publishers, Cheltenham.

Smale, M., Byerlee, D., Jayne, T.S., 2011. Maize Revolutions in Sub-Saharan Africa. Policy Research Working Paper 5659, Development Research Group, World Bank, Washington, DC.

UNCTAD, 2009. Development Impacts of Commodity Exchanges in Emerging Markets. UNCTAD/DITC/Com/2009/9, Geneva and New York, UNCTAD.